



Crescent/Lee BeGole Drive Extension & Stream Mitigation Sites Location Map

Map Author: Runkel
Date: 6-10-25
Version #: 1.0

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- Proposed Road Project Limits
- Stream Mitigation Area - 12 Mile Rd Site
- Stream Mitigation Area - Lee BeGole Site
- Additional Mitigation Area, if needed



City of Novi

Engineering Division
Department of Public Works
26300 Lee BeGole Drive
Novi, MI 48375
cityofnovi.org



0 75 150 300 450
Feet
1 inch = 360 feet



May 27, 2025

Mr. Jeffrey Herczeg
Director of Public Works
City of Novi - Department of Public Works
26300 Lee BeGole Drive
Novi, MI 48375

**RE: Scope of Preliminary Design Engineering Services
Crescent / Lee BeGole Extension**

Dear Mr. Herczeg:

Per your request, the following outlines our proposed scope of services and fee to perform preliminary design engineering, for the above referenced project. This summary includes our project understanding, proposed scope of work, assumptions, schedule, and fee.

PROJECT UNDERSTANDING

The City of Novi has long planned to extend Crescent Boulevard to Lee BeGole Drive to create an additional “ring road” loop and improve traffic access for the DPW facility. As part of the overall master plan, the City acquired property to facilitate the roadway connection and to expand public facilities in the area. The acquired property along Lee BeGole Drive has been identified as the location for the City to construct a new Public Safety Headquarters. As such, the new roadway alignment will be shifted to the east and a roundabout constructed at the intersection with 11 Mile Road. This roadway connection would provide a link between Novi Road and 11 Mile Road and provide a critical second access route for the Public Safety and DPW facilities. The City also sought to realign the roadway approach to 11 Mile Road in order to provide optimal alignment for a future southern extension to Grand River Avenue.

Additionally, this site has been identified as the location for proposed stream mitigation that is required as part of the 12 Mile Road Reconstruction project that is being undertaken in partnership with the Road Commission for Oakland County (RCOC). The Crescent/Lee BeGole connection will also have stream impacts that will require mitigation and permitting through the Michigan Department of Environment, Great Lake, and Energy (EGLE). Adding in mitigation requirements from 12 Mile Road project there are multiple areas to be addressed. The existing enclosure of Bishop Creek west of Lee BeGole Drive on acquired City property will be opened to provide stream mitigation. The Bishop Creek enclosure within Lee BeGole right-of-way under the new roadway will be replaced with a structure having greater hydraulic capacity. East of Lee BeGole Drive additional stream area may be mitigated to balance the projects. The wide array of permits for these two projects will require significant time and effort ahead of the formal project design thus necessitating this scope of preliminary design engineering services. The permit applications for stream impacts and stream mitigation associated with both projects will need to be submitted by September in order to keep both projects on schedule. If the bond proposal passes in August, a separate design scope will be approved for the detailed roadway and utility design for the Crescent/Lee BeGole connection.



SCOPE OF SERVICES

The following outlines our work plan to accomplish the scope of services for this project as noted above:

TASK 1: TOPOGRAPHIC SURVEY AND DATA COLLECTION

- Organize and attend a kickoff meeting with City staff to review project objectives, prepare design criteria, and establish a specific delivery schedule.
- Review existing utility information and record drawings for the project area.
- Perform a site review to identify elements that are sensitive to project which includes driveway locations, access issues, geometric deficiencies, drainage features, wetlands, and utility facilities within the project area.
- Perform topographic survey of the project area and prepare existing conditions plans.
- Schedule and attend a pre-application meeting with EGLE and City to discuss impacts.
- Perform a wetland delineation of the project area and provide appropriate documentation of the same.
 - OHM will conduct a desktop review of aerial imagery, National Wetland Inventory (NWI) and USDA NRCS hydric soil maps, region WETS data, and National Cooperative Soil Survey data to estimate extents of existing wetlands throughout the project area, followed by a field investigation and formal wetland delineation. Conduct of the wetland delineation will conform to protocols and guidance provided in the 1987 US Army Corps of Engineers (USASCE) Wetlands Delineation Manual and the Northcentral Northeast Regional Supplement to the same. Wetland boundary flagging will be used to mark wetland boundaries in the field and georeferenced to sub-foot accuracy using GPS/GNSS survey equipment. Wetland boundary location data will be presented in a format suitable for import into CAD or specified software. OHM will provide a technical memorandum summarizing the conduct and findings of the wetland delineation, including wetland delineation field datasheets and wetland site map with wetland boundaries and sample points, to support JPA package preparation and submittal.
- Perform initial regulatory agency coordination and conduct a reconnaissance survey for native mussels within the project area to supplement a mussel reconnaissance survey along Bishop Creek performed in 2024 as part of the 12 Mile Rd Reconstruction stream mitigation investigation.
 - OHM will coordinate with MDNR Fisheries Biologists to determine the most efficient, cost-effective survey approach for this site, in accordance with the Michigan Freshwater Mussel Survey Protocols (May 2021, v. 3). This includes phone and virtual meetings with regulatory staff and email communication as needed. If the initial reconnaissance survey indicates mussel presence, additional coordination will be required to obtain approval for collection and relocation. OHM will then implement approved methods—such as viewing buckets, snorkeling, and hand grubbing—to investigate the project area. If mussels are found, a more detailed semi-quantitative survey will be required under State regulations. Bishop Creek is unlisted in the Michigan Mussel Mapper and mussel presence is not anticipated; a semi-quantitative survey has been excluded from this proposal.
 - Per the Michigan Mussel Protocols, all mussel surveys must be conducted when water temperature is greater than 50 F and the air temperature is between 50-90 F. Given the potential for mussels to burrow during the colder months, all surveys must be conducted between **June 1 and October 15**. Relocation efforts should be conducted between **June 1 and September 15** to allow for at least one post relocation monitoring survey required to assess survival of mussels moved to the relocation site.
- Conduct a desktop review of 1) Michigan Natural Features Inventory (MNFI) and 2) United States Fish and Wildlife Service (USFWS) Information for Planning and Consultation (IPaC) portal for historical and spatial occurrence data and habitat requirements to identify potential impacts to state listed or federally listed threatened or endangered species within the project area.
- Conduct a survey for bat roost habitat or hibernacula within the project area.



TASK 2: PERMIT DOCUMENT PREPARATION

- Perform HEC-RAS 1D steady flow hydraulic analysis for the daylighting/relocation of Bishop Creek and for the design of new crossings of Bishop Creek for Lee Begole Drive and for the Crescent Boulevard extension, to include characterization of hydraulic grade line and scour potential at a range of discharges up to the 500-year event.
- Provide documentation of the conduct and findings of the hydraulic analysis to support JPA package preparation and submittal.
- Provide documentation of stream functional loss assessment resulting from the extension of Crescent Boulevard and the realignment of Lee Begole Drive to support the JPA submittal, if so directed by EGLE.
- Provide a stream mitigation plan and a stream mitigation monitoring work plan to support the JPA submittal, if so directed by EGLE.
- Provide documentation of coordination with MDNR and USFWS for mitigation of impacts to threatened and endangered species to support JPA package preparation and submittal.
- Develop horizontal and vertical alignments for proposed stream crossing structures.
- Attend one meeting with the City to review existing site conditions and finalize proposed improvements.
- Prepare preliminary permit drawings with necessary details.
- Coordinate with the Geotechnical Engineer to prepare for future work.
- Prepare and submit JPA package to EGLE.

EXCLUSIONS, ASSUMPTIONS AND CLARIFICATIONS

The following summarizes our assumptions associated with this proposal:

- Bishop Creek has a detailed FEMA Flood Insurance Study (FIS) and a regulatory stream alignment, base flood elevation, floodway boundary, and floodplain boundary (Zone AE). EGLE may require FIRM revision through a CLOMR/LOMR process prior to or as a condition of permit approval for stream daylighting/realignment or for crossing removal, revision or construction. This scope of work does not include preparation or submittal of a CLOMR/LOMR package or other coordination with FEMA. OHM can provide professional services for FIRM revision as part of a separate or amended work order.
- Bishop Creek at Lee Begole Drive has a drainage area of less than two square miles and EGLE is not required to provide peak discharge estimates for hydraulic analysis. The FEMA Flood Insurance Study for Oakland County (FIS Number 26125CV001B) and associated HEC-2 hydraulic model provide design discharges for Bishop Creek which will be used for hydraulic analysis. This scope of work does not include any additional hydrologic analysis.
- This scope of work provides for 1) a field survey for bat roosting habitat within the project area of impact, 2) reconnaissance survey for native mussels within the project area of impact, and 3) and desktop review for other state listed or federally listed Threatened and Endangered species within the project area of impact. Should further coordination with regulatory agencies and/or additional surveys or relocations for protected species be required for permit approval, a separate proposal can be prepared for additional services.
- Stream mitigation for stream impacts resulting from the extension of Crescent Boulevard or the realignment of Lee Begole Drive will be performed along Bishop Creek between the confluence of Bishop Creek and an unnamed tributary immediately south of US I-96, at the upstream limit, and the eastern limit of City-owned property approximately 1000 ft east of Lee Begole Drive, at the downstream limit. Mitigation design or permitting outside of these limits is not provided for in this scope of work.
- The City has acquired all necessary property/right-of-way required for the project and no additional property/easements will need to be acquired.
- Utility relocations will be coordinated with DTE by the City.



- Geotechnical services are anticipated to be required for the design and construction of this project but are not included in this scope of work. These services will be provided by the City's Geotechnical Consultant under a separate contract.
- The City will be responsible for all permit application fees and permit fees.
- This scope does not cover the remediation or removal of contaminated or hazardous soils or materials.

SCHEDULE

The following outlines our anticipated schedule milestones related to the main tasks of the described work:

- 50% permit package – July 18, 2025
- 100% permit package – August 22, 2025

FEE

Based on the above outlined scope of services and assumptions, our proposed lump sum fee to perform this work is one hundred fourteen thousand dollars (\$114,000.00). Our fee derivation is based on the following breakdown:

Task	General Consulting				Cost
	Engineer		Senior Engineer		
	Hours	Rate	Hours	Rate	
1: Survey and Data	420	\$125.00	100	\$175.00	\$70,000
2: Permit Documents	170	\$125.00	130	\$175.00	\$44,000
Total	590		230		\$114,000

Thank you for the opportunity to be of service. If you have any questions or require additional information, please contact us. We look forward to working with you on this project.

Sincerely,
OHM Advisors

Authorization to Proceed

Timothy J. Juidici, P.E.
Principal-in-Charge

Signature

Date

Printed Name

Title

Encl: Project Schematic

cc: Ben Croy, City
Rebecca Runkel, City
Valerie Novaes, OHM
David Conn, OHM
Alex Parent, OHM
File



memorandum

Date: January 16, 2025

To: Jeff O'Brien, PE (RCOC)
cc: Tim Juidici, PE (OHM)
David Conn, PE (OHM)
From: Valerie Novaes, PE (OHM)
John Barbatano, EIT (OHM)

Re: Stream Mitigation at Bishop Creek for 12 Mile Road Reconstruction, Crescent Boulevard/Lee Begole Drive Connection, and Lee Begole Drive Realignment—Requirements, Potential, and Recommendations

The purpose of this memorandum is to 1) present estimates of stream mitigation requirements for the reconstruction of 12 Mile Rd, for the anticipated connection of Crescent Blvd and Lee Begole Dr, and for the anticipated realignment of Lee Begole Dr near the intersection of 11 Mile Rd; 2) summarize stream mitigation potential on City-owned properties along Bishop Creek in the vicinity of the DPW site; and 3) recommend a coordinated stream mitigation strategy for the three projects.

Introduction

OHM has been engaged by the Road Commission for Oakland County (RCOC) to design a reconstruction of 12 Mile Road between Beck Road and Novi Road in Novi, Michigan. Proposed work includes:

- Widening of the road corridor to accommodate new bike/pedestrian paths, additional travel lanes, and the separation of eastbound and westbound traffic with a vegetated median.
- Abandonment of a section of the Davis Drain, removal of the existing CSX/Lake State Railroad culvert crossing of the Davis Drain, and construction of a new culvert crossing of the Davis Drain through the railroad embankment immediately north of the proposed 12 Mile Rd corridor.
- Realignment of the Walled Lake Branch channel, removal of the existing 12 Mile Rd stream crossing of the Walled Lake Branch, and construction of a new stream enclosure beneath 12 Mile Rd

The reconstruction of 12 Mile Rd is expected to result in a net loss of stream function along the Davis Drain and along the Walled Lake Branch. The Michigan Department of Environment, Great Lakes, and Energy (EGLE) has indicated that stream mitigation will be required prior to or concurrent with the reconstruction of 12 Mile Rd as a condition of permit approval, and the stream mitigation will need to be done within the framework of the Michigan Stream Quantification Tool (MISQT).

A planned extension of Crescent Blvd to connect with Lee Begole Dr northwest of the City of Novi's Department of Public Works site off Lee Begole Dr ("the DPW site") and a planned realignment of Lee Begole Dr near the intersection of 11 Mile Rd could also result in net losses of stream function depending on its footprint and adjacent impacts resulting in a very slight risk of mitigation. Stream mitigation for all three projects is contemplated along Bishop Creek on City-owned parcels in the vicinity of the DPW site. OHM has estimated the stream mitigation requirements for each of the three projects and the mitigation potential along Bishop Creek, and prepared a recommendation for stream mitigation focus areas and treatments.

Summary of Findings & Recommendations

The reconstruction of 12 Mile Road is expected to require up to 111 functional feet of stream mitigation. The Crescent Blvd connection is expected to require approximately 85 functional feet of stream mitigation. If mitigation is required for the



realignment of Lee Begole Dr near the intersection with 11 Mile Rd, approximately 10 functional feet of stream mitigation would likely be required. The total combined stream mitigation requirement would be 206 functional feet.

The recommended mitigation strategy for the reconstruction of 12 Mile Rd is removal of a poor condition, 50 ft double barrel RCP culvert across Bishop Creek approximately 130 feet upstream of the DPW stream enclosure ("assumed to be a relic access culvert"; estimated yield: 32 functional ft) and daylighting of approximately 136 ft of the DPW stream enclosure (estimated yield: 79 functional feet) (see Figure 1). The estimated functional feet yield for these two improvements is 111 functional feet.

The recommended mitigation strategy for the Crescent Blvd connection and the realignment of Lee Begole Dr near the intersection with 11 Mile Rd would be to daylight a further 174 ft of the DPW stream enclosure (estimated yield: 101 functional ft) (see Figure 1).

The combined estimated mitigation yield for the three improvements discussed above is 212 functional feet, slightly greater than the anticipated requirement of 206 functional feet. These mitigation strategies represent the best balance between minimizing challenges with site access and constructability, parcel boundaries, utilities conflicts, clearing and revegetation extents, and maximizing mitigation yield efficiency (per stream ft) while maintaining flexibility for future uses of City-owned property.

Detailed design for the Crescent Blvd connection and the Lee Begole Dr realignment have not yet been done and estimates of mitigation requirements refer to conceptual drawings. Estimates of the mitigation requirement from an anticipated Crescent Blvd culvert and estimates of the mitigation yield from the removal of the culvert and the daylighting of the stream enclosure

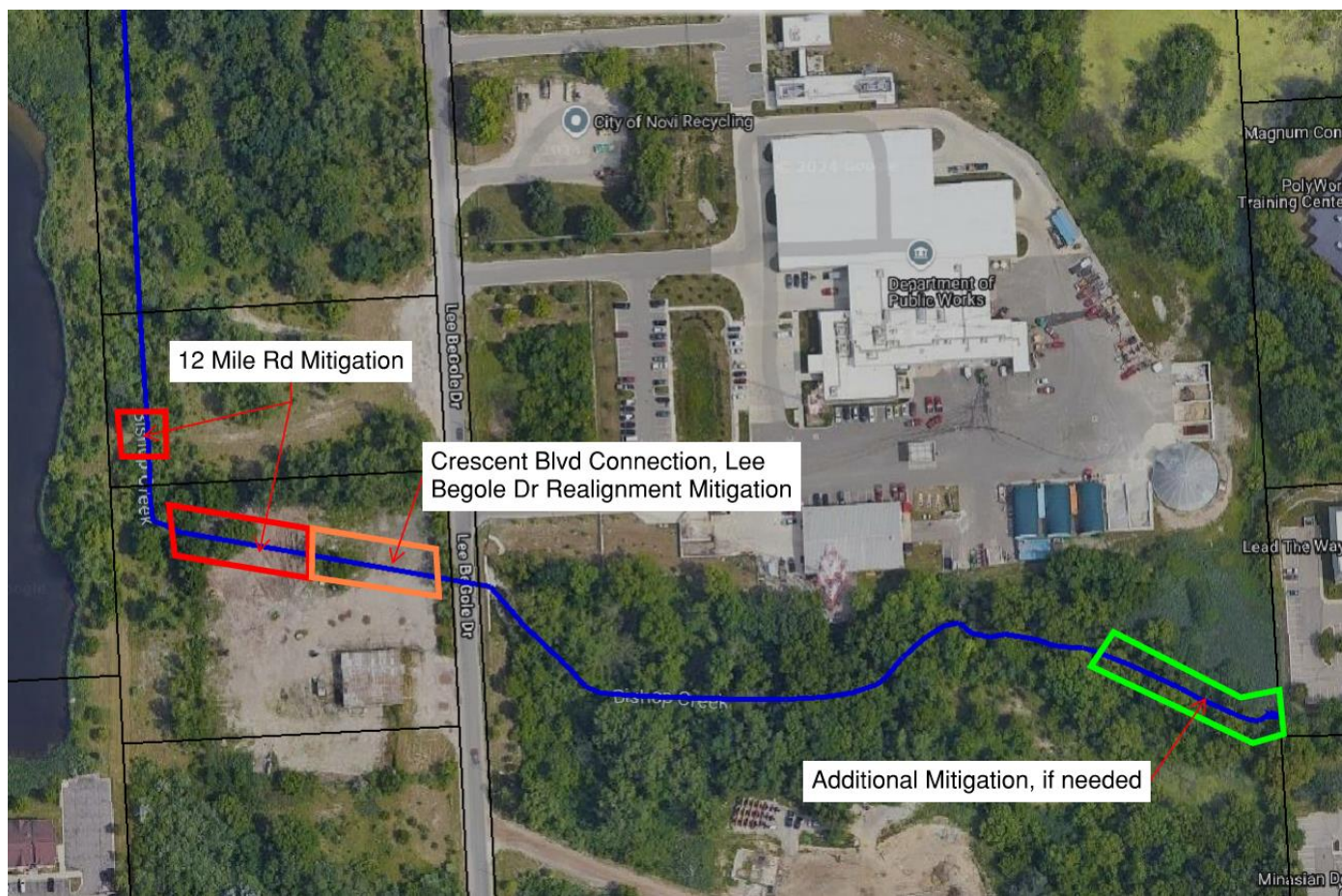
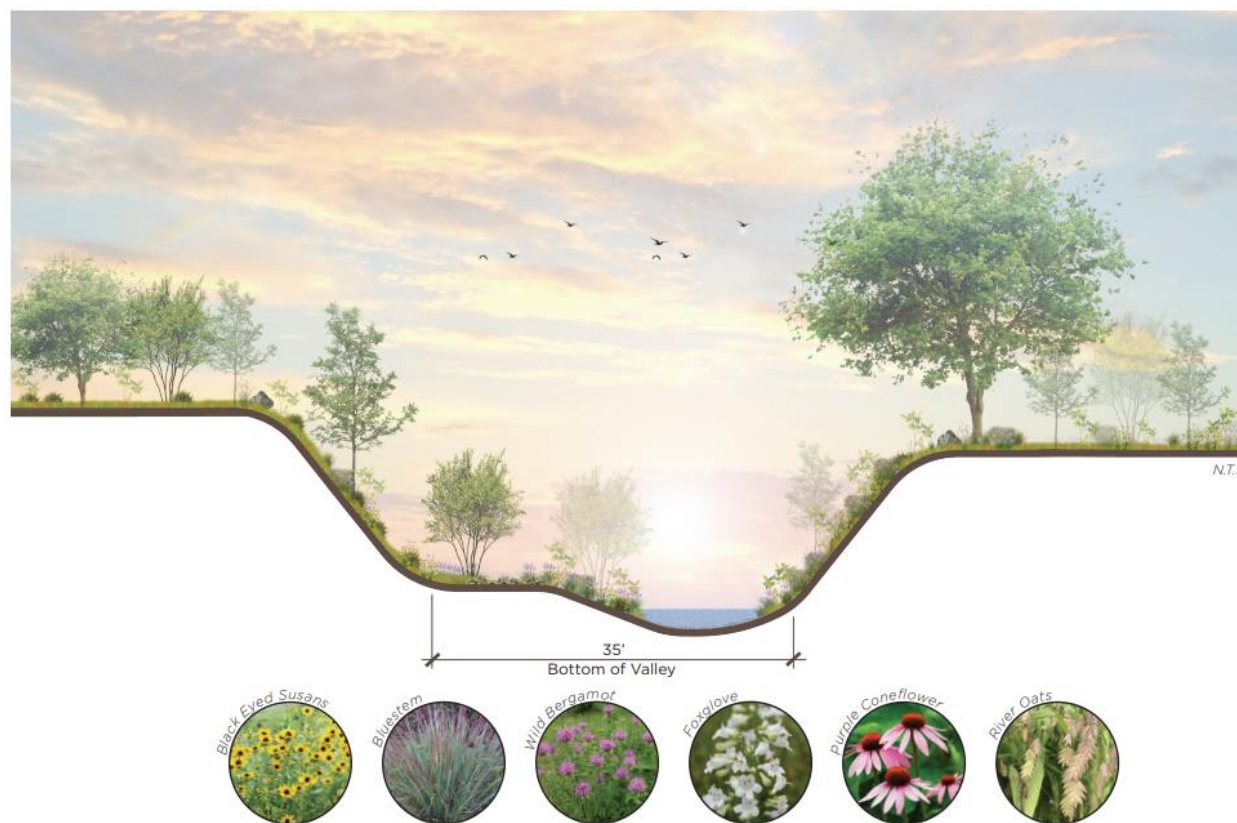


Figure 1. Scenario 1, stream mitigation for 12 Mile Rd reconstruction, Crescent Blvd connection and Lee Begole Dr realignment.

If additional mitigation yield is needed—beyond what can be achieved from removal of the access culvert and the daylighting of the DPW stream enclosure—the recommended mitigation strategy would be to reconnect up to 294 ft of Bishop Creek to a historic floodplain by removing a relic berm along the channel (estimated yield: up to 55 functional feet). This work would begin at the eastern limit of the City-owned parcel to the east of Lee Begole Dr and progress upstream as needed to provide the required mitigation yield (see Figure 1).

A conceptual rendering of the design cross section for culvert removal, stream enclosure daylighting and valley widening mitigation approaches is provided in Figure 2.



Stream Mitigation and the Michigan Stream Quantification Tool (MISQT)

OHM Advisors®
34000 PLYMOUTH ROAD
LIVONIA, MICHIGAN 48150

T 734.522.6711
F 734.522.6427

OHM-Advisors.com



which composites measures of many hydrologic, hydraulic, geomorphological, physicochemical, and biological aspects of stream function.

Functional feet are lost by reducing unenclosed stream length and/or lowering the stream functional score. Functional feet are gained by adding unenclosed stream length and/or increasing the stream functional score. Design performance is expressed in terms of the total provision of functional feet, which allows overperformance in some measures of stream function to compensate for underperformance in others. Dissimilar segments of the same stream are evaluated independently, and stream function may vary significantly between adjacent segments. Enclosed stream segments are assumed to have a functional score of 0.00 and to provide 0.0 functional feet, regardless of the length of the enclosure.

In stream mitigation, the loss of functional feet resulting from project work in one location is offset by an equivalent gain of functional feet resulting from project work in another location (the mitigation site). This analysis refers to the net gain in functional feet at the mitigation site as “mitigation yield.”

Some aspects of stream function can be manipulated directly with infrastructure improvements, land use changes, earthwork, or native plantings. Other aspects of stream function appeal to stream processes that can be encouraged through earthwork, woody debris placement, or native plantings, but generally cannot be lastingly assigned during construction. Still other aspects of stream function are strongly influenced by conditions immediately upstream and downstream of the project area and may respond only faintly or not at all to project work.

The mitigation approaches and estimates of mitigation yield discussed below focus almost exclusively on those aspects of stream function which can be manipulated directly during construction, with only a small, risk-adjusted benefit assessed for process-driven aspects of stream function. Aspects of stream function which are strongly influenced by conditions outside of the project area are assumed to be constant.



MISQT Assessments

Between April and July 2024, OHM performed an MISQT field assessment of the Walled Lake Branch and Davis Drain in the vicinity of 12 Mile Road. OHM identified three distinct unenclosed reaches along the Walled Lake Branch and one distinct reach along Davis Drain (Figure 3).

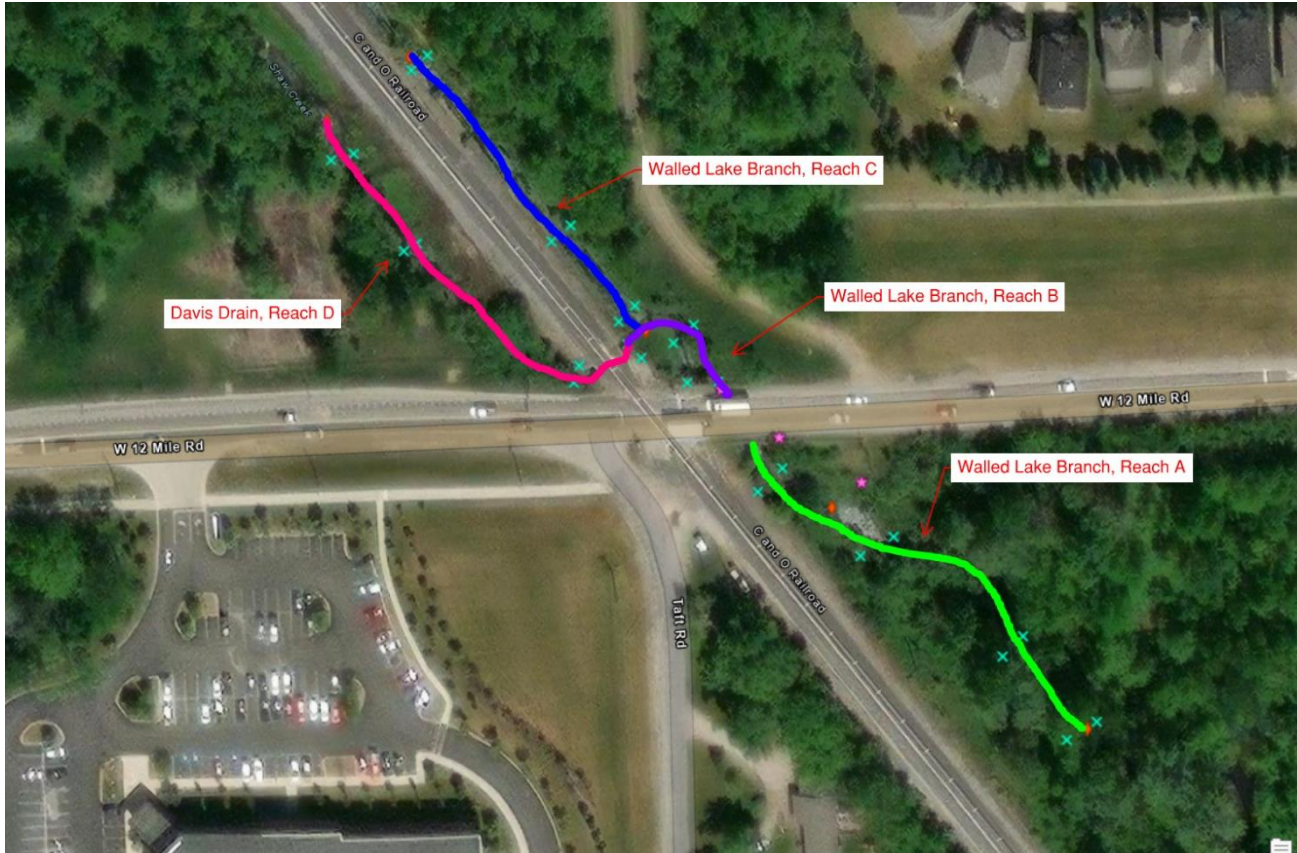


Figure 3. Walled Lake Branch and Davis Drain reaches.

Between November and December 2024, OHM performed an MISQT field assessment of Bishop Creek and the West Tributary. OHM identified eight distinct unenclosed reaches and two enclosed stream segments along Bishop Creek between I-96 and the eastern limit of the City-owned parcel to the east of Lee Begole Dr, and two distinct reaches along the West Tributary between the confluence with Bishop Creek and the eastern limit of Crescent Blvd (Figure 4, Figure 5).

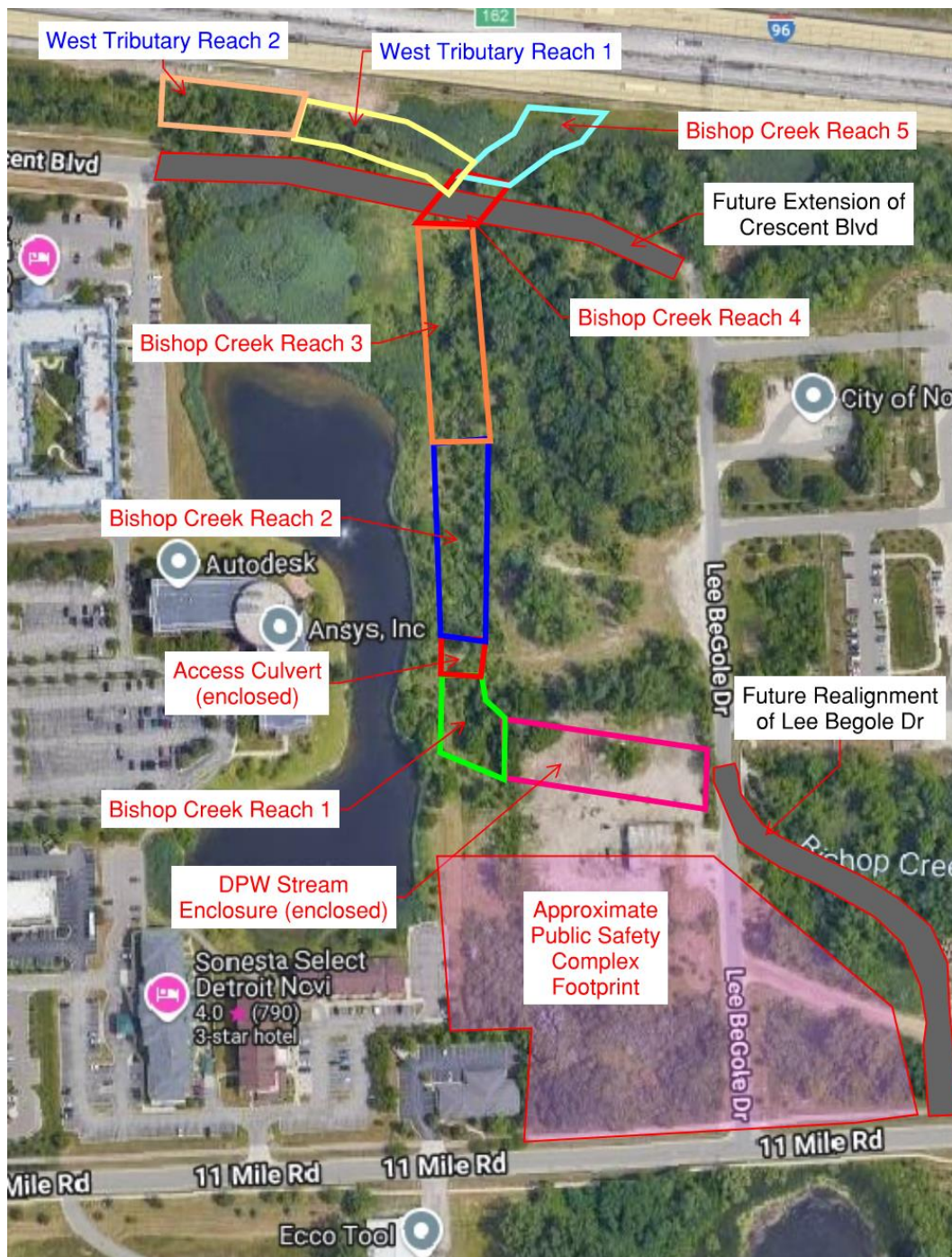


Figure 4. West Tributary Reaches 1 and 2, Bishop Creek Reaches 1-5, the access culvert, and the DPW stream enclosure.

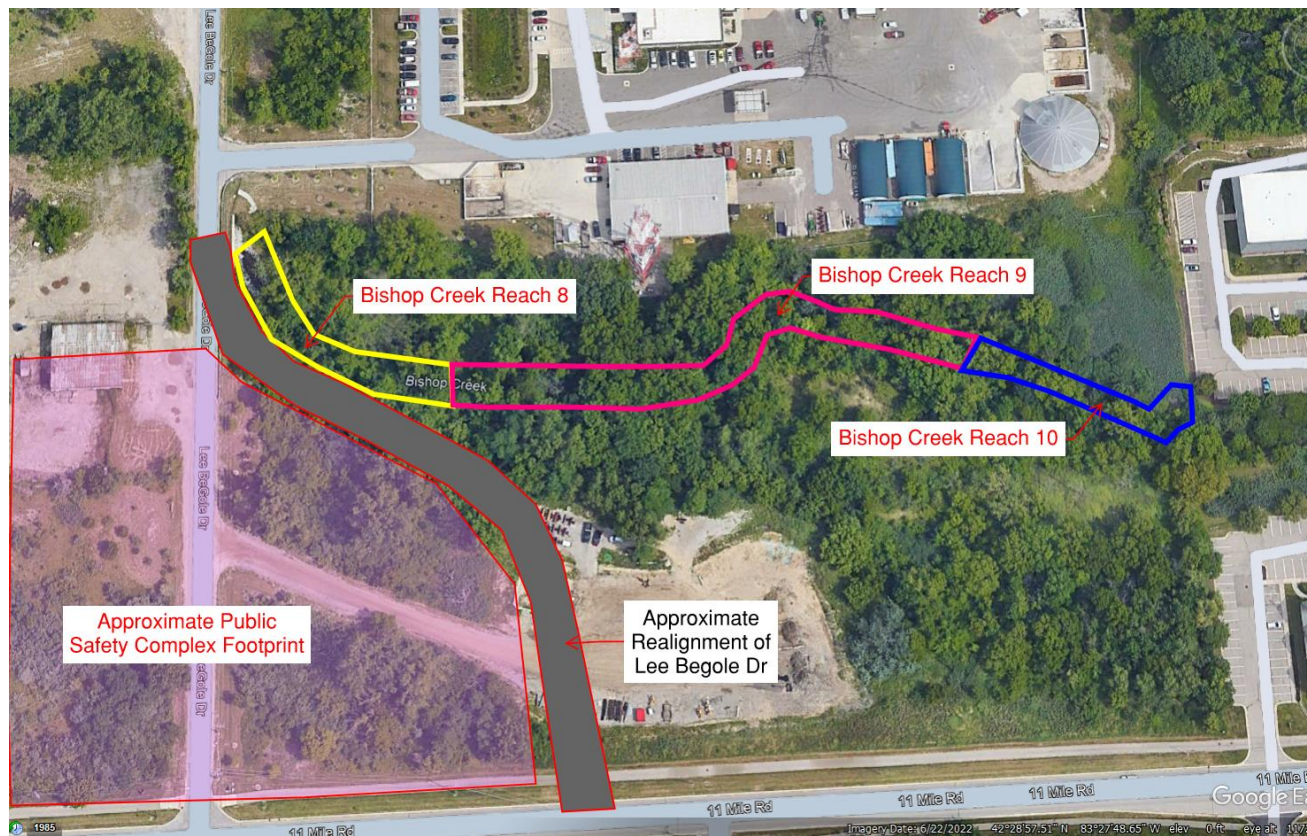


Figure 5. Bishop Creek Reaches 8-10.

For all reaches, field assessments included cross section surveys of the channel and overbanks, a longitudinal profile survey, bedform characterization, a Bank Erosion Hazard Index/Near Bank Stress assessment, a Large Woody Debris Index survey, a vegetation survey, and documentation of concentrated flow points. For all reaches, field assessments were preceded by desktop reviews of USGS lidar topographic data and aerial imagery to provide estimates of the width of the riparian buffer and the land use composition of the drainage area lateral to the channel which were subsequently verified in the field.

At EGLE's direction, field assessments of the Walled Lake Branch and Davis Drain reaches also included spot sampling of July water temperature and dissolved oxygen concentration and the result of an earlier P51 macroinvertebrate survey was used in lieu of macroinvertebrate monitoring.

Physicochemical and biological stream function parameters can only be assessed during the summer months. OHM does not have data for these parameters for Bishop Creek and the West Tributary and EGLE has not responded to requests for guidance on alternative data sources. Measures of physicochemical and biological function are assumed to remain constant under all mitigation scenarios, but the absolute values of these parameters matter for the mitigation requirement resulting from stream enclosure for the Crescent Blvd connection and for the mitigation yield from enclosure daylighting and culvert removal, since stream enclosures and culverts are assumed to have physicochemical and biological function scores of 0.00.

For want of field data at Bishop Creek and the West Tributary, or guidance from EGLE, physicochemical and biological function values along Bishop Creek and the West Tributary have been assumed to match those of Walled Lake Branch A.

Mitigation Requirement

The upper estimate of the mitigation requirement from the reconstruction of 12 Mile Rd is 111 functional feet (Table 1; Figure 3).



The Crescent Blvd alignment, road corridor, and crossing at Bishop Creek have not yet been designed and mitigation estimates refer to conceptual drawings. This estimate considers both direct impacts from a presumed enclosure of 60 ft of Bishop Creek Reach 4 to accommodate the Crescent Blvd crossing and indirect impacts to Bishop Creek Reach 5, West Tributary Reach 1, and West Tributary Reach 2 from clearing, topographic changes, and land use changes (Table 1, Figure 4). It is not clear whether EGLE will require mitigation for indirect impacts, or only for direct impacts to Bishop Creek Reach 4. Table 1 assumes that EGLE will require mitigation for direct and indirect impacts to all four reaches. The connection of Crescent Blvd and Lee Begole Dr is expected to result in a mitigation requirement of 85 functional feet.

The realignment of Lee Begole Dr in the vicinity of 11 Mile Rd related to the development of the Public Safety Complex may require mitigation for stream impacts resulting from clearing, topographic changes, and land use changes. The anticipated mitigation requirement for the Lee Begole Dr realignment would be approximately 10 functional feet (Table 1; Figure 5).

The total mitigation requirement would be 206 functional feet (Table 1).

Table 1. Estimated stream function loss from the reconstruction of 12 Mile Rd, the Crescent Blvd Connection, and the Lee Begole realignment.

Stream Function Loss, by Project, Watercourse and Reach							
Project	Watercourse	Reach	Existing Unenclosed Stream Length (ft)	Existing Functional Score	Proposed Unenclosed Stream Length (ft)	Proposed Functional Score	Estimated Functional Change (functional ft)
Reconstruction of 12 Mile Rd	Walled Lake Branch	Reach A	369	0.58	289	0.58	-43
		Reach B	85	0.47	88	0.49	+3
		Reach C	275	0.43	219	0.43	-24
	Davis Drain	Reach D	328	0.62	248	0.63	-47
	Project Mitigation Requirement						111
Crescent Blvd Connection	Bishop Creek	Reach 4	138	0.68	68	0.63	-51
		Reach 5	162	0.66	162	0.62	-7
	West Tributary	Reach 1	300	0.58	300	0.52	-18
		Reach 2	212	0.33	212	0.29	-9
	Project Mitigation Requirement						85
Lee Begole Dr Realignment	Bishop Creek	Reach 8	259	0.46	259	0.42	-10
	Project Mitigation Requirement						10
Total Mitigation Requirement							206



Mitigation Strategies

Table 2 presents recommended and alternative stream mitigation strategies. Several combinations of the recommended mitigation strategies could satisfy the mitigation requirement from the reconstruction of 12 Mile Rd while preserving sufficient mitigation potential for the Crescent Blvd connection and the Lee Begole Dr realignment. The total anticipated mitigation requirement can be met by implementing only the recommended mitigation strategies.

None of the recommended or alternative mitigation strategies would be expected to produce a rise in base flood elevations or require a change in stream alignment, which are notable triggers for additional EGLE/FEMA scrutiny.

Table 2. Stream mitigation strategies along Bishop Creek.

Recommended Mitigation Strategies	Potential Yield (functional ft)
Access Culvert Removal	32
DPW Stream Enclosure Daylighting	180
Bishop Creek Reach 10 Floodplain Reconnection	55
Total	267
Alternative Mitigation Strategies	Potential Yield (functional ft)
Bishop Creek Reach 1, 2, and 3 Valley Widening	80
Bishop Creek Reach 9 Valley Widening	100
Total	180

Scenario 1 (Recommended Course of Action)

Project	Mitigation Strategy
12 Mile Road Reconstruction	Remove access culvert, daylight 136 ft of the DPW stream enclosure
Crescent Blvd Connection, Lee Begole Dr Realignment	Daylight additional 174 ft of the DPW stream enclosure
Additional Mitigation, if needed	Bishop Creek Reach 10 floodplain reconnection

Removing culverts and daylighting stream enclosures is by far the most efficient (per stream foot) mitigation strategy.

The access culvert barrels and headwalls are in poor condition. The barrel segments are separating, and a sinkhole has formed above the downstream headwall. The FEMA FIS report and OHM's preliminary hydraulic modeling suggest that the culvert significantly increases the upstream base flood elevation.

Bishop Creek Reach 10 is cut off from its historic floodplain by a berm which has been interpreted as spoils from past dredging. Unlike elsewhere along Bishop Creek, an appropriate floodplain already exists and would not need to be excavated wholesale out of the valley wall.



Scenario 2

Project	Mitigation Strategy
12 Mile Road Reconstruction	Daylight 191 ft of the DPW stream enclosure
Crescent Blvd Connection, Lee Begole Dr Realignment	Remove access culvert, daylight 136 ft of the DPW stream enclosure
Additional Mitigation, if needed	Bishop Creek Reach 10 floodplain reconnection

Similar to Scenario 1, but the access culvert is conserved for short term use.

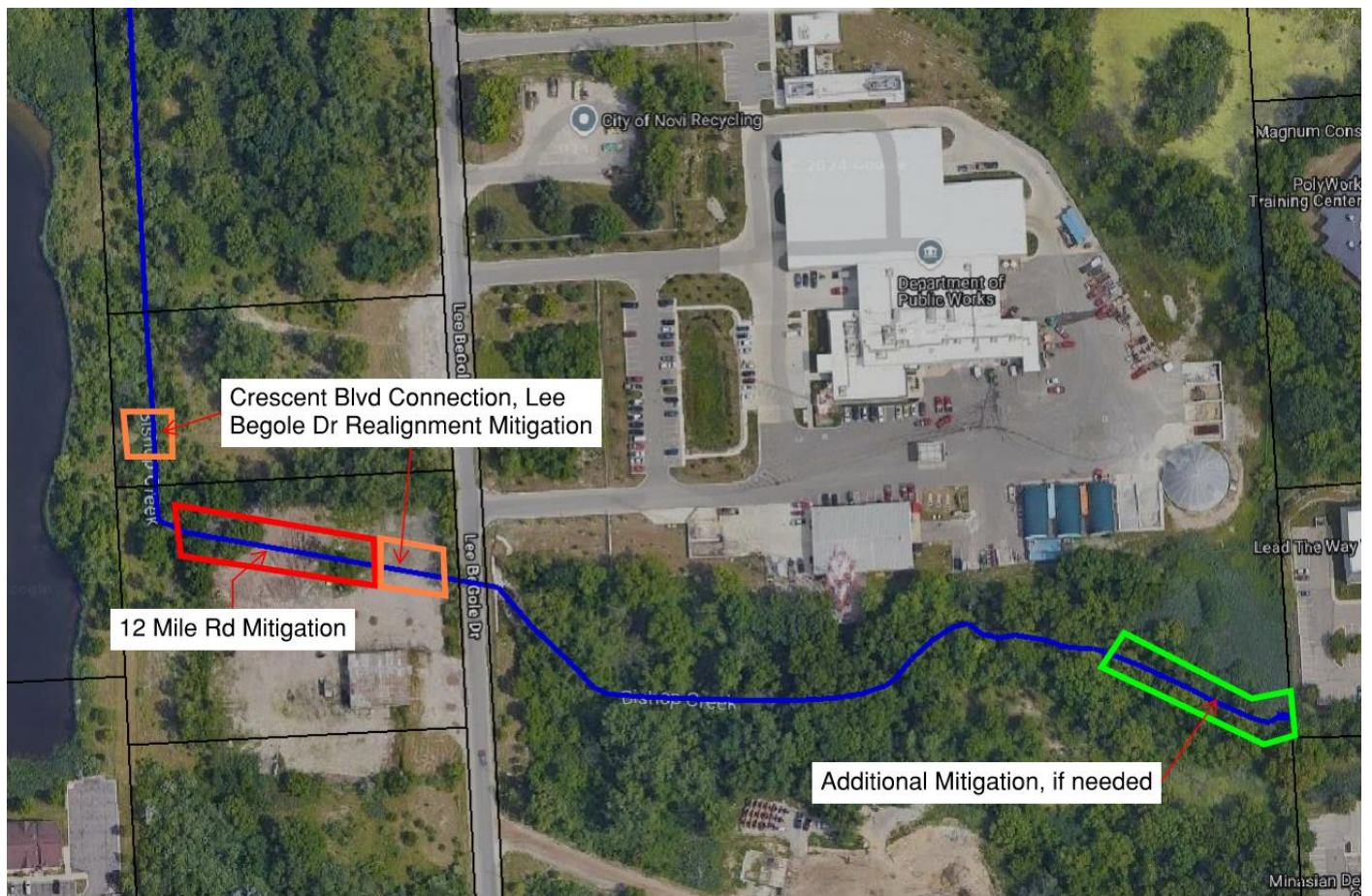


Figure 6. Scenario 2, stream mitigation for 12 Mile Rd reconstruction, Crescent Blvd connection and Lee Begole Dr realignment.



Scenario 3

Project	Mitigation Strategy
12 Mile Road Reconstruction	Bishop Creek Reach 10 floodplain reconnection, remove access culvert, daylight 41 ft of DPW stream enclosure
Crescent Blvd Connection, Lee Begole Dr Realignment	Daylight 164 ft of the DPW stream enclosure
Additional Mitigation, if needed	Daylight additional length of DPW stream enclosure.

Minimizes the mitigation footprint immediately north of the Public Safety Complex site, allowing flexibility in land use and development along Lee Begole Dr.

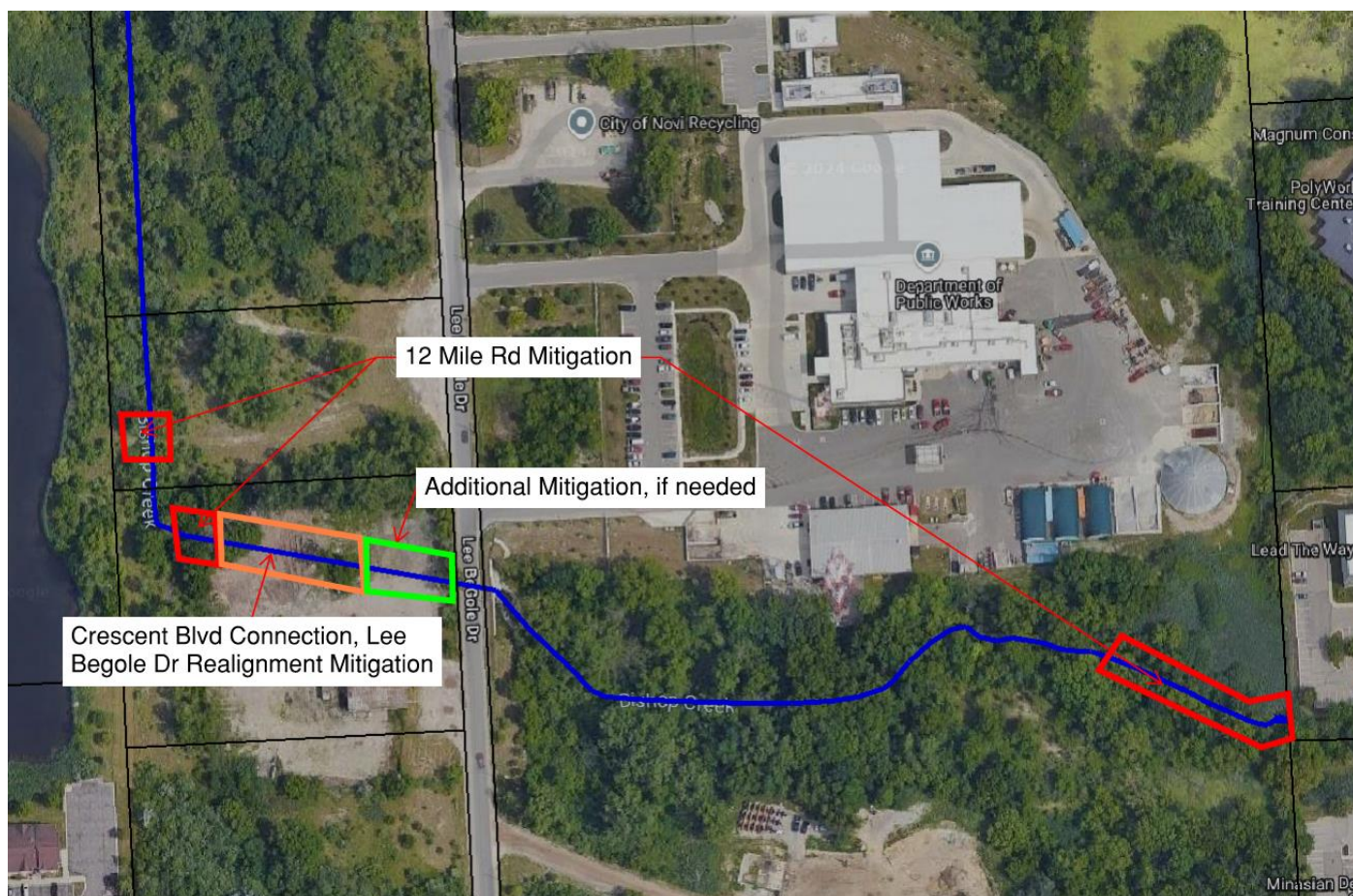


Figure 7. Scenario 3, stream mitigation for 12 Mile Rd reconstruction, Crescent Blvd connection and Lee Begole Dr realignment.



Viable Alternative Mitigation Strategies

Valley Widening

Valley widening along Bishop Creek Reaches 1, 2, 3, and 9 would require much more extensive clearing and excavation to provide the required mitigation yield for either the reconstruction of 12 Mile Road or the Crescent Drive connection.

Work along Bishop Creek Reaches 1, 2, and 3 would be complicated by the proximity of the parcel boundary to the west and by a 27" sanitary sewer running along the east side of the stream. Mitigation along Bishop Creek Reach 3 may complicate planning and design for the Crescent Drive connection.

Site access along some portions of Bishop Creek Reach 9 is poor and slope stability concerns may require significant regrading well above the OHWM. Work along Bishop Creek Reach 9 may complicate future uses of the existing equipment lot immediately to the south or future connections to the DPW facility to the north.

Adding Stream Length

Adding stream length by reintroducing meanders to artificially straightened streams is an efficient stream mitigation strategy, but changing the stream alignment is almost certain to trigger additional EGLE scrutiny, up to and including requests for map revision if done in FEMA-mapped streams like Bishop Creek. The mitigation strategies discussed above all assume no changes to the mapped stream alignment to minimize the likelihood of project delays from additional EGLE scrutiny. Incorporating channel meandering into the stream mitigation strategies discussed above would be expected to increase mitigation yields by approximately 50%.

FEMA and EGLE Considerations

Bishop Creek is a FEMA-mapped stream with a regulatory base flood elevation, floodway width, floodplain boundary, and stream alignment. Though all recommended and alternative mitigation strategies, separately or in conjunction, are expected to lower base flood elevation and reduce actual flood risk, EGLE may still require a Part 31 Hydraulic Review, detailed comparisons to the FEMA Flood Insurance Study (FIS) hydraulic model, and/or a Conditional Letter of Map Revision (CLOMR) from FEMA as a condition for issuing a permit or reviewing any permit application.

In October 2024 EGLE published additional guidance for hydraulic modeling and permitting in FEMA-mapped floodplains in which they emphasized that the rise/no-rise determination is made with reference to the published FIS base flood elevation, not the anticipated base flood elevation under actual existing conditions. Preliminary review of the flood profiles and streambed elevation in the FIS report does not suggest a large discrepancy between published and existing conditions at Bishop Creek, but OHM has not reviewed the FIS model files for Bishop Creek and a meaningful discrepancy may exist.