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Hannan Hills Subdivision

Hydrologic Impact Study

Prepared for: 1384341 Ontario Ltd. (Cavanagh Developments)

Hydrologic Impact Study
Hannan Hills Subdivision
Almonte, ON

Prepared By:

NOVATECH

Suite 200, 240 Michael Cowpland Drive
Ottawa, Ontario
K2M 1P6

June 12, 2024

Novatech File: 118201
Ref: R-2024-046

June 12, 2024

Lanark County
99 Christie Lake Road
Perth, ON K7H 3C6

Attention: Koren Lam, Senior Planner

**Reference: Hannan Hills Subdivision
Hydrologic Impact Study
Our File No.: 118201**

Please find enclosed the report entitled "Hydrologic Impact Study" dated June 12, 2024 prepared in support of an amended application for Draft Plan approval for the Hannan Hills Subdivision.

This report has been prepared in response to the MVCA comments letter (September 20, 2021), in which the MVCA provided the following comment, "*A discussion of the current on-site hydrology will need to be coordinated with the EIS findings.*".

This report is to be read in conjunction with the Environmental Impact Study (EIS, CIMA+, June 2024) and the Serviceability and Conceptual Stormwater Management Report (Novatech, June 12, 2024).

Yours truly,

NOVATECH



Alex McAuley, P.Eng.
Senior Project Engineer | Land Development Engineering
Cc: Cavanagh Developments
MVCA

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1.0 INTRODUCTION

Novatech has been retained by Cavanagh Developments to prepare a Hydrologic Impact Study (HIS) in support of an amended application for Draft Plan Approval for the proposed Hannan Hills Subdivision.

1.1 Purpose

This report outlines the characteristics of the existing wetlands located on the subject property, the effects of the proposed development on these existing wetlands, and the proposed mitigation measures. This report has been prepared in response to the MVCA comments letter (September 20, 2021), in which the MVCA provided the following comment: “A discussion of the current on-site hydrology will need to be coordinated with the EIS findings.”

This report is to be read in conjunction with the Environmental Impact Study (EIS, CIMA+) and Serviceability and Conceptual Stormwater Management Report (Novatech). The EIS provides discussion on the environmental impacts on the wetland and the Serviceability and Conceptual Stormwater Management Report provides further discussion on implementation of mitigation measures.

1.2 Site Location and Description

The proposed Hannan Hills Subdivision is approximately 4.15 hectares (10.3 acres) in size and located in Almonte, within the Municipality of Mississipi Mills.

The site is bound by undeveloped lands to the north and the Spring Creek Municipal Drain runs adjacent to the east property boundary. The existing Mill Run Residential Subdivision is located immediately east of the Municipal Drain. The site abuts the road allowance for Adelaide Street to the south, with existing residential lands and a future subdivision (Menzie Enclaves) located on the south side of Adelaide Street. The site abuts Florence Street to the west, with existing residential lands on the west side of Florence Street.

Refer to **Figure 1 (Key Plan)** for the site location.

1.3 Existing Conditions

The existing lands, and those to the north, include non-evaluated wetlands. The property is located at the south / downstream end of these wetlands. The total area of the existing wetlands and the area of the on-site wetlands are shown in Table 1 below. The EIS (CIMA+) notes three wetland communities present, tall shrub swamp (willow), deciduous treed swamp (ash), and marsh (reed canary). Refer to **Figure 2 (Existing Conditions)** for an aerial photograph of the property.

Table 1: Area of Non-Evaluated Wetlands

Total Area of Wetlands (ha)	Area of wetland within Subdivision Property Boundary (ha)	Percentage of Wetland within Property Boundary (%)	Approximate Area of wetland within Subdivision Property Boundary to be Retained (ha)
46.5	2.69	5.8	0.36

There is an existing drainage feature (North Feature) adjacent to the north property boundary and an existing drainage channel (Spring Creek Municipal Drain) adjacent to the east property boundary, both of which drain along the perimeter of the existing wetland. The existing drainage feature/channel and ground surface topography are shown on **Figure 3 (Existing Topography)**.

The EIS (CIMA+) contains additional details on the existing site conditions, such as existing soil characteristics, existing drainage features, and qualitative descriptions of the existing wetlands.

Refer to **Figure 4 (Existing Non-Evaluated Wetlands and Drainage Courses)** for approximate limits of the existing wetlands.

1.4 Proposed Development

It is proposed to develop a residential subdivision of 106 townhomes and four single family homes. The development would include three connections to the proposed extension of Adelaide Street and a connection to existing Florence Street which would be upgraded as part of this development. A pedestrian connection would be made to the existing Mill Run Subdivision to the northeast east via a pathway from Adelaide Street to Honeyborne Street. Refer to **Figure 2 (Existing Conditions)** for the proposed lotting and street layout.

The proposed development would maintain the general surface drainage pattern and drainage split between drainage to the Spring Creek Municipal Drain and the North Feature running from west-to-east along the north property boundary. Refer to **Figure 5 (Pre-development vs. Post-development Drainage Areas)** for a comparison of pre-development and post-development drainage areas.

2.0 STEPS 1 TO 5 OF MVCA REGULATION POLICIES DOCUMENT – DEVELOPMENT, INTERFERENCE WITH WETLANDS AND ALTERATION TO SHORELINES AND WATERCOURSES (FIGURE 8, PAGE 85/86)

As outlined in the MVCA Policy Document “*Development, Interference with Wetlands and Alteration to Shorelines and Watercourses*”, this Hydrologic Impact Study is required as part of the Environmental Impact Assessment. The Policy Document outlines the requirements for the Hydrologic Impact Study, included and responded to in steps 1 to 5 below.

2.1 Proposed Development Aspects that Could Trigger Hydrologic Impacts

Step 1: Identify aspects of the Proposed Development or Alteration that could trigger impacts

- Will overland flow pathways to or from the wetland be altered by regrading of surface contours or re-routing of existing ditches or watercourses?
- Does the application involve the installation of any temporary or permanent drainage works, including surface ditches or channels and subsurface piped systems, with or without pumping equipment?
- Will the project result in the removal of native soil and its replacement by structures or materials with different water retention and hydraulic conductivity characteristics?
- Will grades be raised in such a way as to cause consolidation of subgrade materials and changes in their water retention and hydraulic conductivity characteristics?
- Will site runoff, evapo-transpiration or infiltration amounts change (annually, seasonally) due to changes in site imperviousness, land cover, or topography, or due to maintenance practices such as snow removal?
- Is the proposed development or site alteration for the purpose of establishing a land use or activity that will require the withdrawal of water from the wetland?

Overland Flow Pathways

- The proposed development would include alteration to the existing topography within the property boundary. However, the major overland flow route would be similar to the pre-development condition, with the majority of the stormwater runoff from the site entering the Spring Creek Municipal Drain adjacent to the east property boundary. No re-routing of existing ditches or watercourses is proposed.

Permanent Drainage Works

- The proposed development would include the installation of storm sewers. The storm sewers would outlet to a dry pond located at the southeast corner of the property before outletting to the Spring Creek Municipal Drain.

Removal of Native Soil

- The proposed development would involve the removal of native soil (marl and topsoil) which is unsuitable for use beneath roadways and house foundations. Replacement material would consist of clean imported fill, as specified by the geotechnical engineer.

Grade Raise / Consolidation of Subgrade

- The proposed development would include general grade raise throughout the site.

Site Runoff

- The proposed development would provide post-development stormwater runoff flows equal to that of the pre-development condition. Groundwater infiltration measures such as servicing via grassed swales, where possible, and discharge of roof leaders to grassed areas would be implemented.

Proposed Development / Land Use

- The proposed development would be a residential subdivision and would not require the withdrawal of water from the wetland.

2.2 Hydrologic Characteristics and Functions of Existing Wetland

Step 2: Characterize the key hydrologic characteristics and functions of the wetland, from a watershed management perspective

To understand the impact of the development on the wetland and its role in the hydrology of the catchment and sub-watershed in which it is located, the following information is required, at a minimum:

- connectivity of the wetland to the local stream fabric (in terms of streams flowing into the wetlands and streams flowing out of the wetland)
- a conceptual understanding of the surficial geology of the wetland's surroundings, the wetland's catchment area, the wetland's position within and areal extent relative to the subwatershed in which it is located; watershed report cards and associated catchment reports / data sheets may be of assistance
- a conceptual understanding of the subsurface conditions within the wetland (the nature of its substrate and underlying materials, depth to bedrock, etc.)
- an understanding of water table elevations within the wetland and adjacent areas and their normal range of fluctuation throughout a typical year; and characterization of the hydroperiod of the wetland
- if available for the subcatchment, historical streamflow and water level records should be obtained and interpreted

Watercourse Connectivity

- The existing wetland is adjacent to the local stream fabric. The North Feature captures runoff from existing residential lands to the west and from the undeveloped land to the north of the site. The Spring Creek Municipal Drain drains to the south, ultimately outletting to the Mississippi River. Refer to **Figure 4 (Existing Non-Evaluated Wetlands and Drainage Courses)** for approximate limits of existing wetlands and existing stream fabric.

Surficial Geology of Wetland's Surroundings

- Location of existing wetlands, as shown on **Figure 4 (Existing Non-Evaluated Wetlands and Drainage Courses)**, obtained from MVCA online mapping tool (<https://mvc.on.ca/development-permits/interactive-property-map/>). The area of wetland located within the property boundary (2.69 ha), is a relatively small portion of the total wetland area (46.5 ha). The property is located at the downstream end of the existing wetland area, therefore the area of wetland lost within the property boundary would not reduce the drainage area contributing to the remaining wetland.

Subsurface Conditions

- A preliminary Geotechnical Investigation Report was prepared by Paterson Group (January 17, 2019). The investigation included test pits to determine the subsurface conditions, including bedrock elevations. Per the Geotechnical Investigation Report *“Generally, the subsurface profile at the test pit locations consists of topsoil overlying a thin layer of brown silty sand or glacial till consisting of gravel and cobbles mixed with clayey silt fine soil matrix over a shallow bedrock. The north and eastern portion of the site contained a layer of marl was observed directly under the topsoil surface layer, underlain by a layer of brown clayey silt over a dense grey layer of silty clay.”* Bedrock was encountered between 0.33m and 1.7m below ground surface.

Water Table Elevations

- The Geotechnical Investigation included test pits to determine the subsurface conditions, including groundwater elevations. Groundwater elevations were observed between 0.5m and 1.1m below ground surface at the time of observation.

Historical Streamflow and Water Level Records

- Refer to EIS (CIMA+) for water level records associated with CIMA+ field work.

2.3 Drainage and Groundwater Characteristics

Step 3: Characterize drainage and groundwater characteristics of the site

Depending on the nature of the proposed development or alterations and the aspects of it that triggered the need for a hydrologic impact assessment, the following information about the site may be needed:

- topographic mapping of the existing surface, and identification of surface flow pathways that will be interfered with or re-directed
- characterization of the subsurface determined through test pits or bore holes carried out to a depth below grade that is at least as much as the deepest excavation that is proposed as part of the undertaking; this should include classification of the soil structure and hydraulic properties as they vary with depth, observation the static water levels, and determination of flow directions (to or from the wetland) in the subsurface
- water balance calculations for the site of the proposed undertaking under existing conditions, and under the proposed conditions, and estimation of the change in infiltration, evapo-transpiration and runoff amounts from the site that can be expected on an average annual basis and during representative dry and wet years (or seasons)

Topographic Mapping of Existing Surface

- The existing ground surface slopes generally from west to east, towards the Spring Creek Municipal Drain, with an approximate elevation difference of 1.5m across the site (0.5% slope). The proposed area of the site to be developed is generally flat and drains overland with no defined drainage channels.
- There is an existing North Feature adjacent to the north property boundary which drains from west to east and connects into the Spring Creek Municipal Drain which runs along the east boundary of the property.
- The existing drainage channels and ground surface topography are shown on **Figure 3 (Existing Topography)**.
- The proposed development would maintain the general drainage pattern from west to east. Stormwater runoff would be conveyed via the proposed storm sewers to the proposed stormwater management facility / dry pond located at the southeast corner of the site prior to outletting to the existing Spring Creek Municipal Drain.
- A portion of the existing wetland, located within proposed buffers recommended by the EIS (CIMA+) would be enhanced and would continue to sheet drain (uncontrolled) directly to the existing North Feature and Spring Creek Municipal Drain adjacent to the north and east property boundaries. The buffers are shown on **Figure 3 (Existing Topography)**, and buffer cross sections are provided on **Figure 6 (Enhanced Buffer Sections)**.

Subsurface Characteristics

- Per the Geotechnical Investigation Report, “Generally, the subsurface profile at the test pit locations within the south and west portion of the subject site consists of topsoil overlying a thin layer of brown silty sand or glacial till consisting of gravel and cobbles mixed with a clayey silt fine soil matrix over a shallow bedrock. At the test pit completed within the north and eastern portion of the site, a layer of marl was observed directly under the topsoil surface layer underlain by a layer of brown clayey silt over a dense grey layer of silty clay. Ground water was found to be on top of the grey silty clay layer in the northern section of the property.”
- Groundwater elevations were observed between 0.5m and 1.1m below ground surface at the time of observation.

Water Balance

- Post-development drainage areas and surface runoff to the North Feature and Spring Creek Municipal Drain would be similar to pre-development conditions; The surface water component of water balance, to the North Feature and Spring Creek Municipal Drain, would be maintained in the post-development conditions.
- Wetland that would be removed is at the downstream end of the overall wetland area and would not negatively impact the drainage area / recharge of the remaining wetland.
- The proposed development would not affect surface or subsurface drainage to the remaining wetland and therefore would not result in a change to the water balance of the remaining wetland.
- Infiltration measures are not required to maintain water balance to the wetland within the subdivision property boundary as this area of the wetland is being removed.

2.4 Hydrologic Impacts

Step 4: Qualitative description of Potential Hydrologic Impacts

Based on a synthesis of the information obtained in Steps 2 and 3, the potential effects of the development on the hydrologic functions of the wetland should be described in a qualitative fashion.

Hydrologic Impacts

- The development is anticipated to have minimal impact on the on-site wetlands that remain. The post-development drainage areas and stormwater runoff flows would be similar to pre-development conditions.
- The development is anticipated to have minimal impact on the on-site wetlands that remain. The post-development drainage areas and stormwater runoff flows would be similar to pre-development conditions. The proposed development would not affect surface or subsurface drainage to the remaining wetland and therefore would not result in a change to the water balance of the remaining wetland.

2.5 Potential Mitigation Measures

Step 5: Identification of Preventive or Mitigation Measures

Measures that are necessary to prevent or mitigate the potential for adverse effects as described in Step 4 should now be identified and incorporated into the application for permission. These could include design changes and structural or non-structural best management practices to be applied during and/or after implementation of the undertaking.

Depending on the anticipated severity or significance of the potential impacts, it may be necessary to undertake quantitative analyses to support the selection and design of proposed preventive/mitigation measures. The need for and scope of such quantitative analyses should be discussed with CA specialists in hydrology, groundwater sciences and wetland ecology prior to the analyses being undertaken.

Refer to the EIS (CIMA+) which discusses proposed mitigation measures.

2.5.1 Implementation of Mitigation Measures

The following measures would be implemented to address the hydrologic impact of the proposed development. These measures are discussed further in the Serviceability and Conceptual Stormwater Management Report (Novatech, June 12, 2024).

- A Stormwater Management Pond is proposed to provide quantity control, located in the southeast corner of the site.
- A Hydrodynamic Separator (HDS) providing quality control would be located within the SWM Facility block. The HDS unit would treat the stormwater runoff to Enhanced water quality level of 80% TSS removal prior to outletting to the Spring Creek Municipal Drain.
- The Stormwater Management Pond block would provide opportunity for planting of shrubs and vegetation that would increase the features and functions of the habitat.
- An approximate 9.0m buffer from the top of slope of the North Feature is proposed along the north property boundary. A minimum 15.0m buffer from the top of slope of the Spring Creek Municipal Drain is proposed along the east property boundary. The buffers will *“provide retention of a representation of the wetland habitat and protection for the adjacent fish habitat”* (EIA, Muncaster). The buffer zone would allow opportunity for enhancement to the remaining wetland via plantings.
- The existing North Feature and Spring Creek Municipal Drain along the north and east property boundaries would remain in the post-development condition.

- Post-development drainage areas and drainage patterns would remain generally consistent with pre-development drainage. The overall drainage area contributing to the downstream Spring Creek Municipal Drain would remain the same in post-development conditions.
- Measures such as roof leaders directed to grassed areas and grassed swales would be implemented to mitigate the reduction in groundwater infiltration/recharge resulting from the development.
- Off-site compensation for loss of on-site wetland would be implemented via “*Enhancement to the off-site wetland, including turtle habitats, as developed in consultation with the Municipality, the Conservation Authority, and the MECP.*” (EIA, Muncaster)

3.0 SUMMARY AND CONCLUSION

This report outlines the hydrologic characteristics of the existing wetlands located on the subject property, the impact of the proposed development on these existing wetlands, and the proposed mitigation measures. The EIS (CIMA+) and EIA (Muncaster), provide discussion on the environmental impacts on the wetland and the Serviceability and Conceptual Stormwater Management Report (Novatech, June 12, 2024), provides recommendations for implementation of mitigation measures.

Hydrologic Characteristics (Steps 2 and 3)

- The hydrologic characteristics of the existing wetlands are described in sections 2.2 and 2.3 of this report.

Impact of Proposed Development (Step 1)

- The impact of the proposed development on the existing wetlands is discussed in section 2.1 of this report.

Hydrologic Impacts (Step 4)

- The hydrologic impacts of the development are discussed in section 2.4 of this report.

Mitigation Measures (Step 5)

- Potential mitigation measures are described in section 2.5 of this report.

NOVATECH

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Reviewed by:



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Senior Project Manager | Land
Development Engineering

Reviewed by:



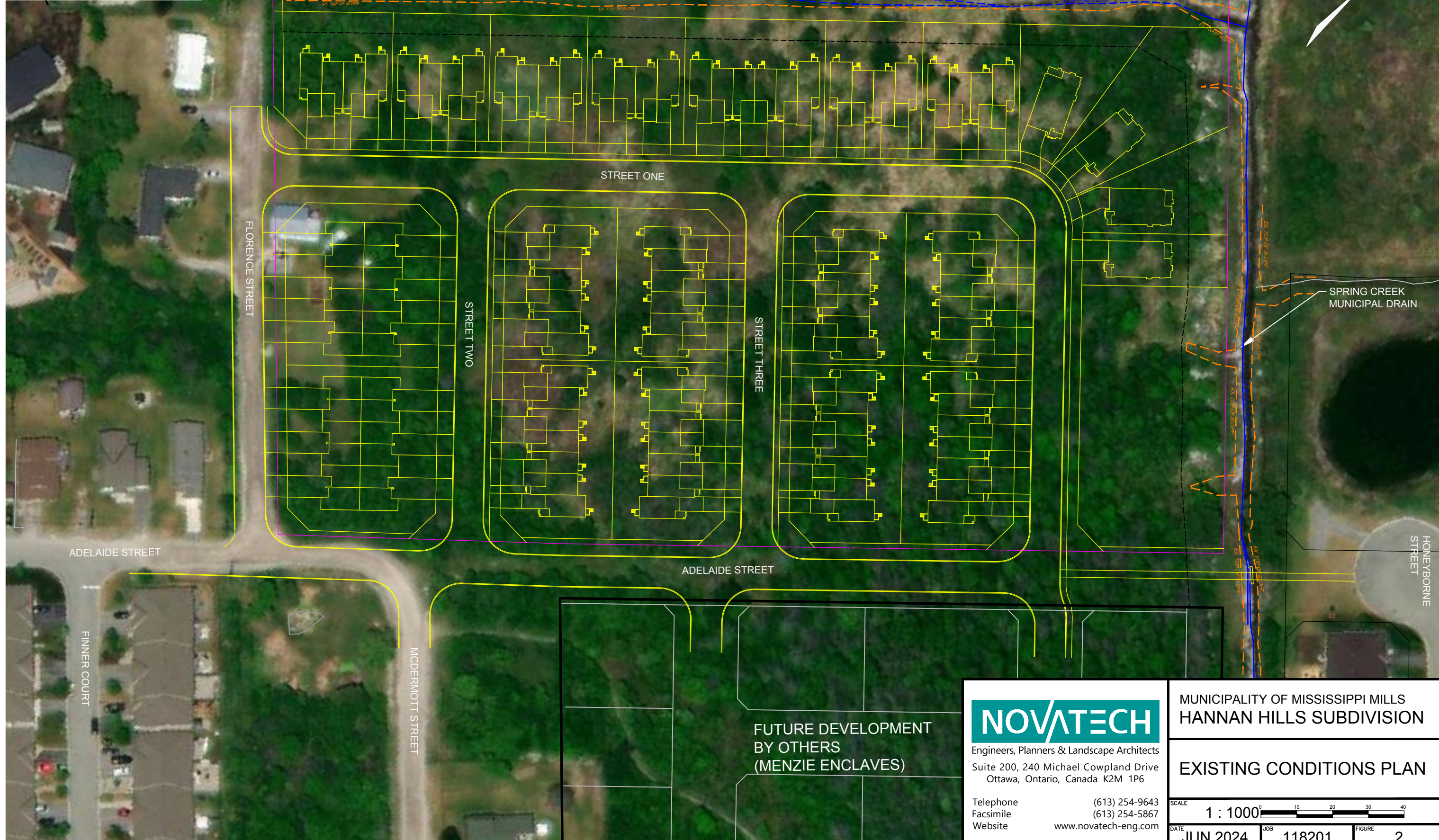
Susan Gordon, P.Eng.
Director | Land Development

LEGEND

PROPERTY BOUNDARY

NORTH FEATURE

NORTH FEATURE



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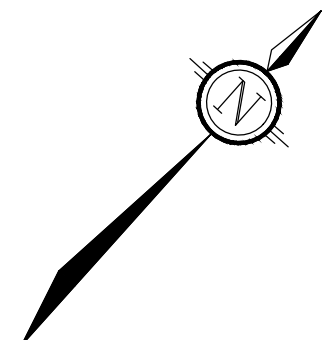
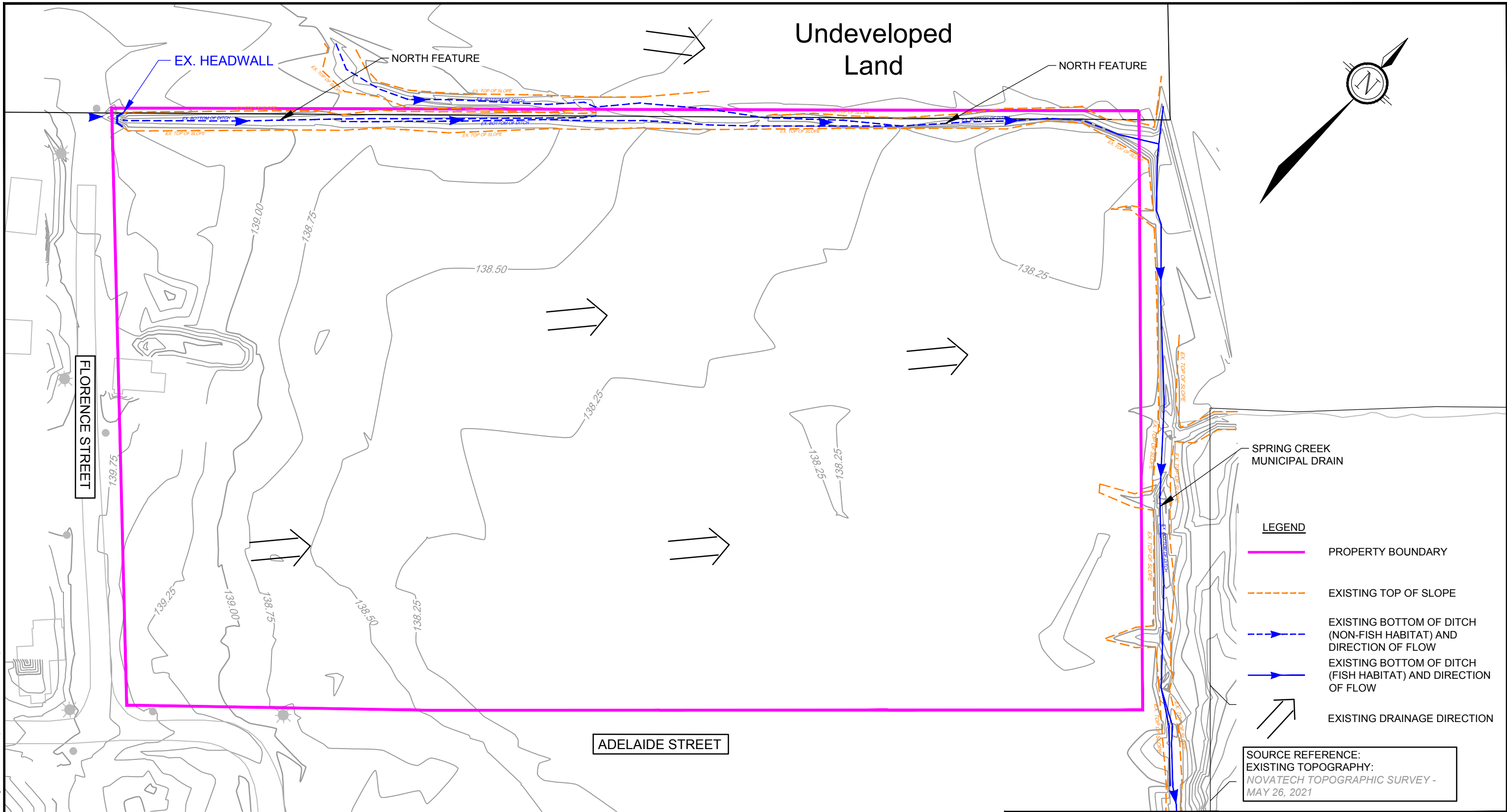
MUNICIPALITY OF MISSISSIPPI MILLS
HANNAN HILLS SUBDIVISION

EXISTING CONDITIONS PLAN

SCALE 1 : 1000

DATE JUN 2024 JOB 118201 FIGURE 2

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- LEGEND**
- PROPERTY BOUNDARY
 - - - EXISTING TOP OF SLOPE
 - - - EXISTING BOTTOM OF DITCH (NON-FISH HABITAT) AND DIRECTION OF FLOW
 - EXISTING BOTTOM OF DITCH (FISH HABITAT) AND DIRECTION OF FLOW
 - ⇨ EXISTING DRAINAGE DIRECTION

SOURCE REFERENCE:
EXISTING TOPOGRAPHY:
NOVATECH TOPOGRAPHIC SURVEY -
MAY 26, 2021

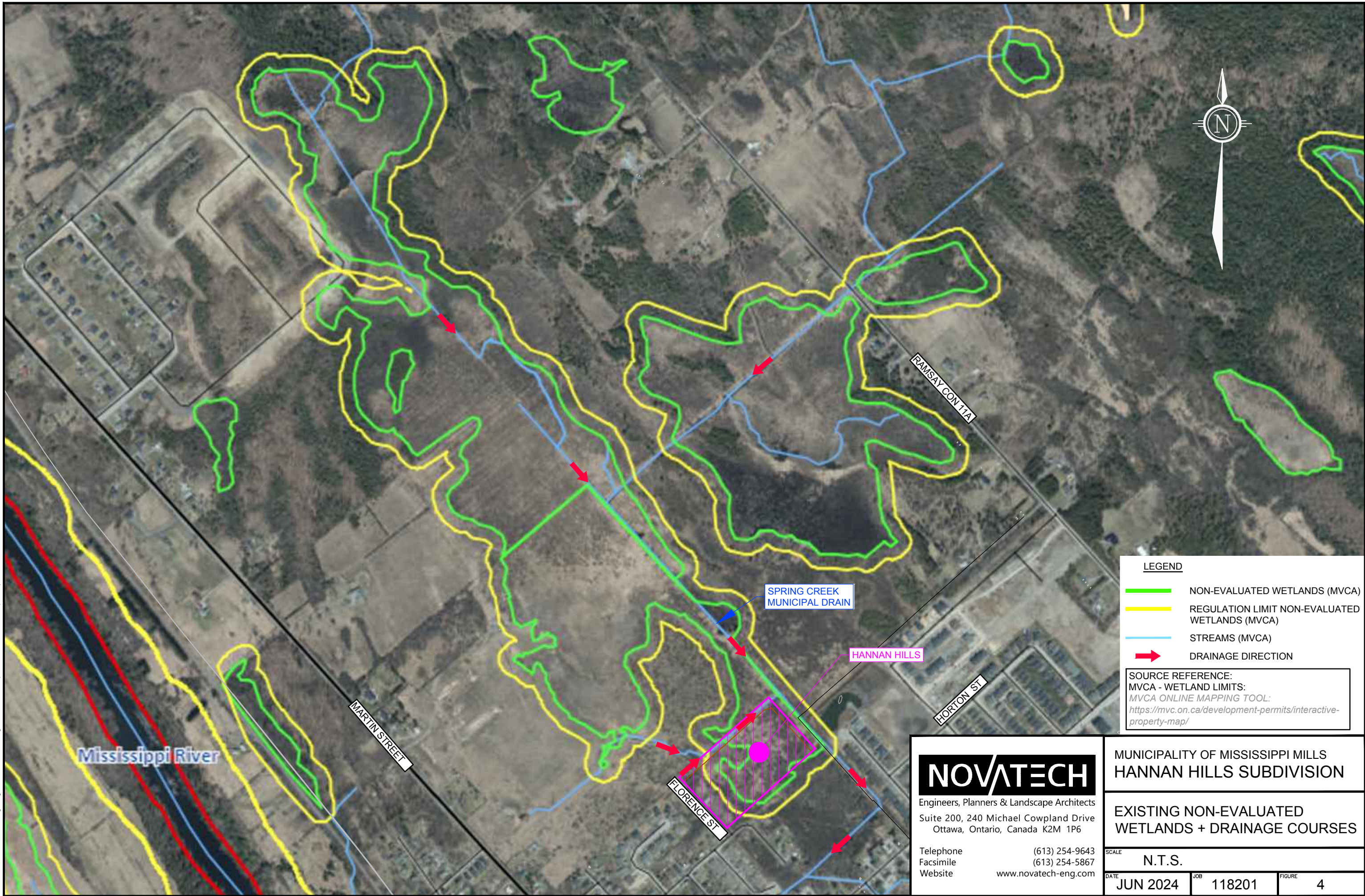
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MUNICIPALITY OF MISSISSIPPI MILLS
HANNAN HILLS SUBDIVISION

EXISTING TOPOGRAPHY

SCALE	N.T.S.	
DATE	JUN 2024	FIGURE
JOB	118201	3

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LEGEND

- NON-EVALUATED WETLANDS (MVCA)
- REGULATION LIMIT NON-EVALUATED WETLANDS (MVCA)
- STREAMS (MVCA)
- ➔ DRAINAGE DIRECTION

SOURCE REFERENCE:
 MVCA - WETLAND LIMITS:
 MVCA ONLINE MAPPING TOOL:
<https://mvc.on.ca/development-permits/interactive-property-map/>

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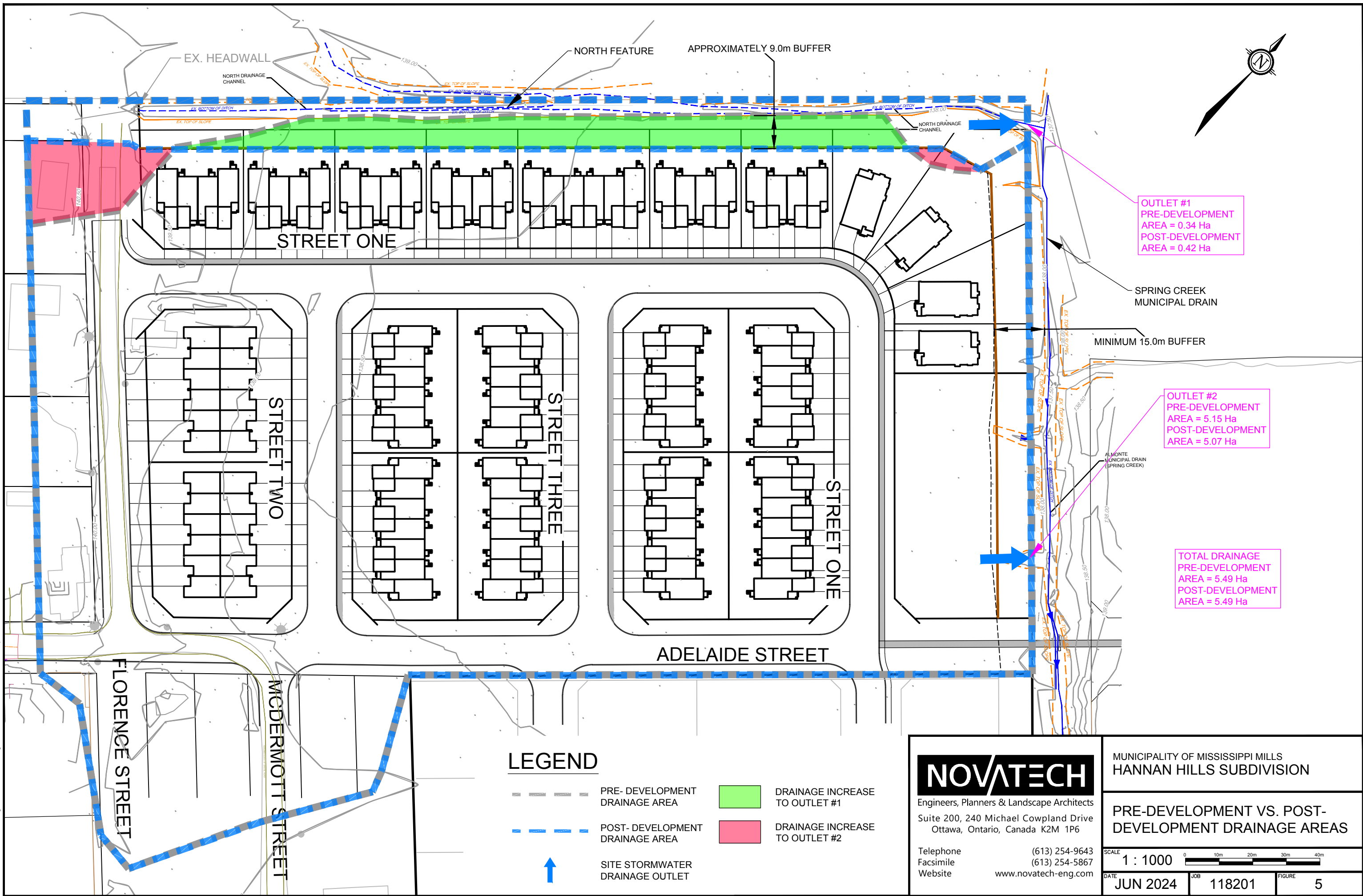
MUNICIPALITY OF MISSISSIPPI MILLS
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EXISTING NON-EVALUATED
 WETLANDS + DRAINAGE COURSES

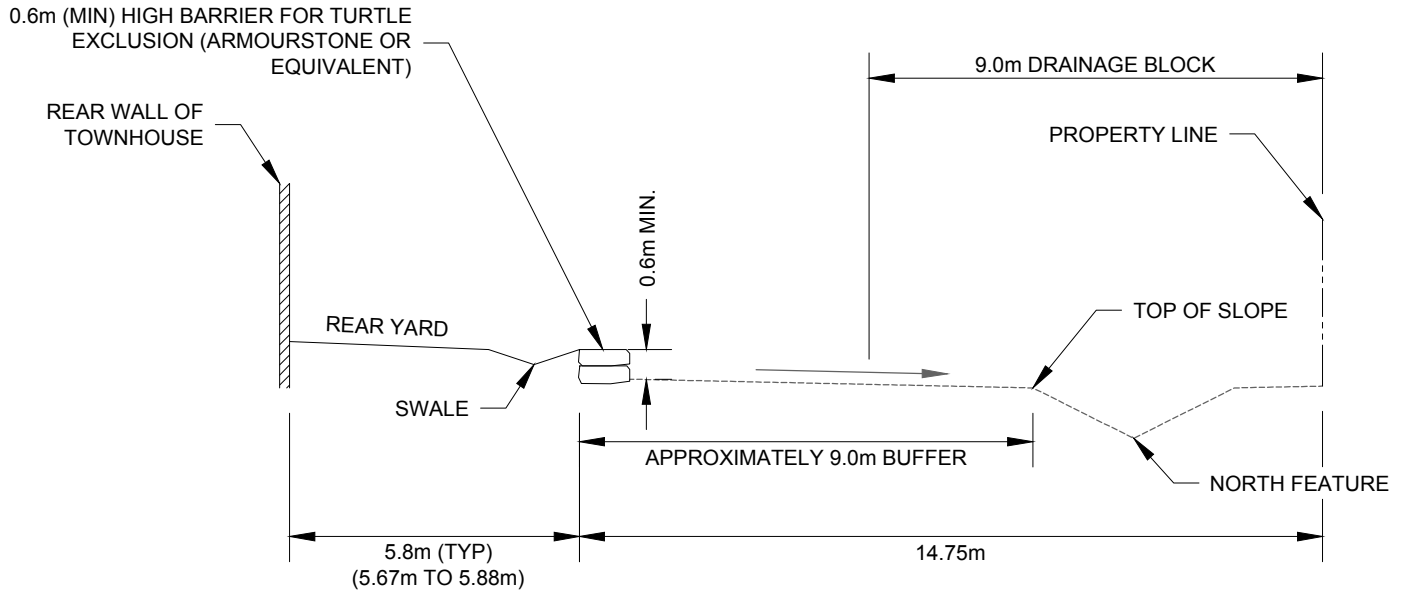
SCALE N.T.S.

DATE JUN 2024	JOB 118201	FIGURE 4
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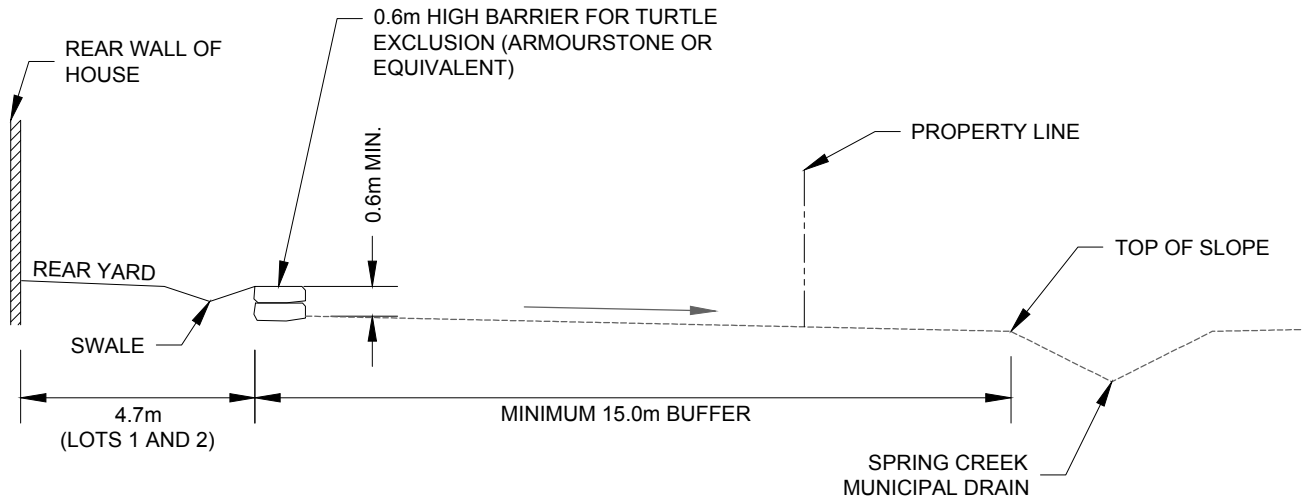
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<p>Engineers, Planners & Landscape Architects Suite 200, 240 Michael Cowpland Drive Ottawa, Ontario, Canada K2M 1P6</p> <p>Telephone (613) 254-9643 Facsimile (613) 254-5867 Website www.novatech-eng.com</p>	MUNICIPALITY OF MISSISSIPPI MILLS HANNAN HILLS SUBDIVISION	
	PRE-DEVELOPMENT VS. POST-DEVELOPMENT DRAINAGE AREAS	
	SCALE 1 : 1000 DATE JUN 2024	JOB 118201



**TYPICAL CROSS SECTION
APPROXIMATELY 9m BUFFER
(NORTH PROPERTY LINE)**
1:150



**TYPICAL CROSS SECTION
MINIMUM 15m BUFFER
(EAST PROPERTY LINE)**
1:150

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HANNAN HILLS SUBDIVISION

**ENHANCED BUFFER
CROSS SECTIONS**

SCALE 1 : 150

DATE	JUN 2024	JOB	118201	FIGURE	6
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Appendix A

Conservation Partners Partenaires en conservation



09-T-20002; PMMSB-26

September 20, 2021

Julie Stewart
County of Lanark
99 Christie Lake Rd.
Perth, ON K7H 3C6

Dear Ms. Stewart:

**Re: 09-T-20002, Hannan Hills
Town of Mississippi Mills (Almonte)
Florence Street**

The Mississippi Valley Conservation Authority (MVCA) is in receipt of the Draft Plan of Subdivision and associated reports. These reports have been reviewed by MVCA within the context of Natural Hazards, Natural Heritage and Water Quality and Quantity policies of the Provincial Policy Statement under Section 3 of the Planning Act.

PROPOSAL

The Hannan Hills Residential Subdivision includes 166 residential units of two-story townhomes, stacked townhomes and back-to-back townhomes. In addition, a new road and extension of Adelaide Street to Honeyborne Street are proposed to connect to the Mill-Run Subdivision on the east. To the north and east of the site are two well-defined drainage features. The feature along the eastern edge is referred to as a municipal drain while the channel along the north is a tributary to the drain. A wetland has been identified on site and has been assessed by the proponent and MVCA staff. The wetland is regulated by the MVCA.

BACKGROUND and MVCA WETLAND POLICIES

In 2017, the MVCA Board of Directors approved policies to regulate all wetlands over 0.5 ha in size. Prior to approval, there was extensive consultation with member municipalities and draft

mapping was provided to all municipal staff for review. Several municipalities expressed concern with the regulation of wetlands where there were completed or proposed Environmental Assessments or areas where master servicing studies were completed. These areas were identified due to the significant municipal investment into servicing. As a result of municipal feedback, several wetland areas within some urban areas were exempt prior to the mapping being adopted.

Our records indicate the mapping and policy was circulated to Mississippi Mills staff in 2016, and no comments regarding the proposed wetland mapping were received.

The MVCA was approached in 2019 regarding possible development on this property. A letter was also received in July of 2019 from Mississippi Mills staff indicating that the property had been identified for development and had been in the existing urban area for 100 years. In preparation for the growth in Almonte, the Municipality undertook a Servicing Master Plan in 2012, which was updated in 2018, to provide structure to the prioritization of infrastructure development. MVCA staff provided feedback and direction related to possible development on the property which referenced a compensation plan to include improvements to existing wetland and water course features with the implementation of LID's, and clear demonstration that adjacent wetlands would not be impacted. Concerns and impacts were documented in correspondence to the proponent and municipality in an email dated January 24, 2020. A pre-consultation meeting was held on January 27, 2021.

MVCA staff completed a site inspection in 2020 to confirm the wetland boundary. The proponent submitted a revised wetland boundary for this property and the property to the north.

An Environmental Impact Statement and Hydrological Impact Statement with compensation plan is required to meet the policy requirements of the MVCA, detailed discussion is found below.

ENVIRONMENTAL IMPACT

Mississippi Valley Conservation Authority (MVCA) has reviewed the "Proposed Development (Hannan Hills), East Almonte (Florence Street) Environmental Impact Assessment" by Muncaster Environmental Planning Inc. May 14, 2021 and we offer the following comments:

Wetlands and Watercourses

The EIS documents that three forage fish species were captured in the municipal drain. Due to a back-water effect, the lower 1/3 of the northern channel is considered direct fish habitat. Further west, the northern channel is considered not-direct fish habitat. The quality of the fish habitat within the drain and northern channel is limited due to a lack of connection to larger natural water features, and the artificial nature of the channels.

Wetland habitat dominates the central and east portions of the site (2.6 ha). Communities consist of reed canary grass meadow marsh, willow thicket swamp and ash deciduous swamp. Many of the ash trees were impacted by the emerald ash borer beetle. Standing water was common in

the meadow marsh and thicket swamp on June 20th 2019, but generally absent on October 25, 2018 and May 24, 2019.

The on-site wetland vegetation community is described as “very common in the regional landscape and have limited features and functions due to a lack of standing water over an extended period and small size.” “The on-site wetlands provide local wildlife habitat but lack size and diversity to contribute in a meaningful way to the wetland features and functions of the regional landscape.” The wetland is also described as having flood storage and water purification function. No other service or functions are discussed in regards to the on-site wetland. **Further discussion is required on the ecological services and function of the wetland at the local and property scale.**

Directly to the north of the site is the southern edge of a large (approximately 1.8 km long) unevaluated wetland that flows south into the municipal drain. **The EIS should provide further details on the connectivity of the on-site vs off-site wetland as well as a discussion on the linkage between the wetlands and possible habitat and hydrologic impacts that altering the on-site wetland might have on the off-site feature.**

The development proposes a 15 m setback to the municipal drain and the fish habitat portion of the northern channel. A 9 m setback is proposed for the upstream portion of the northern channel. The rear lot lines of the properties backing onto the buffer areas will be permanently marked with a split rail fence or similar feature to prevent rear yard creep into the buffer areas.

As part of the proposed development, 0.33 ha of wetland habitat will be retained within the channel setbacks, and 2.63 ha will be removed. The Muncaster Report describes various types of habitat enhancements proposed to occur within the channel setback and stormwater pond block such as; amphibian pools, installation of root wads, woody debris and boulders, as well as planting native shrubs and grasses. Details regarding the location and size of these enhancement hasn't been provided. **In order to quantify the compensation in terms of meeting offset requirements for the removal 2.63 ha of wetland the EIS should include maps and tables to identify the locations and size of the enhancement features both on and off-site.**

The EIS states that the hydrologic function of the adjacent channels will be maintained. **MVCA requests clarification if this includes maintaining on-site infiltration and contributions to channel baseflow.**

While discussing Low Impact Development (LID) techniques the EIS states that they “are to be implemented where feasible as part of the development.” However, the EIS also states that “the on-site soils are not conducive to infiltration and would not appear to contribute to the recharge of the area and stream flow maintenance.” **MVCA requests clarification on if and where LID techniques can be implemented on-site to help maintain the local hydrologic conditions post-development.**

At this time a Hydrological Impact Assessment (HIA) has not been provided for review. The EIS references Novatech's Conceptual Stormwater Management Report (2021) however there is no

information provided on how the proposed dry pond will function in relation to the EIS's proposed mitigation measures. **A discussion of the current on-site hydrology will need to be coordinated with the EIS findings.**

Species at Risk (SAR)

In 2021 a Blanding's turtle was observed in a stormwater pond to the east of the site "and it's possible the municipal drain would be considered Category 2 Blanding's turtle habitat." **An MECP assessment process will determine if the channel and a 30 m buffer from the high-water mark of the drain are considered Category 2 habitat. If so, appropriate approvals and compensation may be required prior to development.**

Although standing water was present in June of 2019, the lack of larger and deeper areas of open water suggests the site does not support suitable turtle habitat. Potential turtle habitat appears to be present 500 m northeast of the site.

No other SAR or SAR habitat was observed on site or in the adjacent lands.

MVCA Review and Recommendations

In summary, for the EIS MVCA requests the following:

1. Further discussion on the ecological services and function of the wetland at the local and property scale.
2. Provide further details on the linkage between the on-site wetland and the adjacent off-site wetland; including sizes, functional linkages and possible habitat and hydrologic impacts that altering the on-site wetland might have on the larger feature.
3. Coordinate with the HIA and Stormwater Report to clarify how the hydrological function of the adjacent channels, and wetlands habitats will maintain pre-development conditions post-development.
4. Clarify if and where LID techniques can be implemented on-site to help maintain the local hydrologic conditions. This discussion should also be coordinated with the HIA and Stormwater Reports.
5. Define the amounts and proposed locations for the various proposed types of on-site habitat enhancements. MVCA requests a figure and summary table be created to show how and where the loss of 2.36 ha of wetland habitat will be compensated.
6. Provide comment on cumulative impacts of altering the natural heritage features in this area.
7. Integrate the recommendations and mitigation measures from the EIS with the results of a hydrologic study as well as with the stormwater management proposal.

STORMWATER MANAGEMENT PLAN (SWMP)

Mississippi Valley engineering staff have reviewed the following reports with a focus on stormwater quantity and quality control management from the receiving watercourse perspective:

- Serviceability and Conceptual Stormwater Management Report, Hannan Hills, Almonte, ON, prepared by Novatech Engineers, Planners, and Landscape Architects, dated May 2021.
- Technical Memorandum -Conceptual Stormwater Management Design-Hannan Hills Subdivision, prepared by Novatech Engineers, Planners, and Landscape Architects, dated May 13, 2021.

The stormwater management criteria for the site includes controlling the peak flows to the pre-development levels and providing an enhanced level of water quality treatment (80% TSS removal).

The proposed development was evaluated as part of the Municipal Master Plan Update Report in 2018 (J.L. Richards Master Plan Update Report, February 2018). The master plan assumed future developments in the Town of Almonte and recommended upgrades to the existing infrastructure.

Serviceability and Conceptual Stormwater Management Report Summary

Both the minor and major system flows will discharge to a proposed stormwater management facility, a 'Dry Pond', along the east side. The dry pond has capacity to store and convey runoff from all storms up to and including the 100-yr event. A hydrodynamic separator unit is proposed upstream of the outlet of the dry pond and will provide the required water quality treatment (enhanced).

Inlet control devices (ICDs) will restrict the flow to the minor system. The minor system is sized to convey 5-yr flows. There will be no surface ponding during a 5-yr storm event. Sump pumps with backwater valves connected to the storm sewers are proposed to drain dwelling foundations.

Best Management Practices (BMP) and Low Impact Development (LID)

The SWM plan should include BMPs and LID measures to mitigate any adverse impacts and reductions in groundwater infiltration and recharge. Roof runoff will be directed to rear yard areas. Perforated pipes are proposed with rear-yard catch basins to promote infiltration.

It is understood that the pre and post-development water balance analysis and measures to meet the pre-development infiltration will be included in the detailed design. Details of proposed infiltration trenches and rear-yard subdrains will be confirmed in the detailed design.

Conceptual Stormwater Management Design Summary

Currently runoff flows overland (from southwest to northeast) into the Almonte Municipal Drain. At the upstream end, the runoff from the front lots of the existing houses on the southwest side of Florence Street (drainage area of 0.58 ha) flows through this site to the Almonte Drain. Therefore, the total drainage area for the SWM plan is 4.92 ha.

A PCSWMM model was developed for the conceptual SWM plan. The model is used to simulate runoff from the site, size the dry pond for quantity control, and ensure the total peak flow leaving the site does not exceed pre-development levels. The 6-hour Chicago storm (10-minutes), among the various design storm events, generated the highest peak flows and storage volume for the post-development conditions. Therefore, a 6-hour Chicago storm (10-minutes) was selected as the critical storm for further analysis. Whereas, the 4-hour Chicago storm was used to design the water quality treatment unit (25mm event).

The PCSWMM model outputs indicate lower post-development peak flows than the pre-development rates for 2, 5 and 100-yr storm events. The simulated pre and post-development peak flows are 346 L/s and 335 L/s respectively, for a 100-yr storm.

Dry Pond:

The dry pond is to receive flows from both the minor and major systems. The pond has been sized to control post-development peak flows to pre-development levels for all storms up to and including the 100-year event. The pond will also provide water quality treatment through a low flow channel and 24 to 48-hr drawdown time. A quality treatment unit (no details had been provided) proposed upstream of the pond inlet will provide additional water quality treatment.

The outlet of the dry pond to the Almonte Municipal Drain includes a 75 mm diameter orifice (137.6 m invert elevation, which is the bottom of the low flow channel) for water quality storm event, a 250 mm diameter orifice (138.3 m invert elevation), a 0.8 m wide weir (138.85 m crest elevation, the bottom of the pond) and an emergency spillway (139.2 m crest elevation). The stage-storage-discharge calculation of the pond shows an elevation of 139.12 m for a 100-yr storm event.

Hydraulic Gradient Line:

The hydraulic gradient analysis shows that the dwellings might need sump pumps due to the lower elevation of the pond outlet to the Almonte Drain. The sump pump requirements will be analyzed further during the detailed design stage.

MVCA Review and Recommendations

For the Stormwater Management Plans, MVCA requests the following:

1. The Site Serviceability report describes that the site is approximately 4.15 ha in size, whereas the total drainage area given in the SWM memo is 4.34 ha (excluding external drainage area). References to the total drainage area should be corrected and made consistent in both reports.
2. Please confirm and rationalize the selection of the PCSWMM software for this site. Is PCSWMM software the best to model hydrology and hydraulics for rural area development?
3. The erosion and sediment control section proposes the use of sediment control bags under the grates of on-site and nearby catchbasins and manholes (page 6). The sediment control bags should be replaced with more robust erosion sediment control measures such as catchbasin inserts. The Erosion and Sediment Control Plan should indicate the

location of all catchbasin inserts at all catch basins, catch basin manholes, and storm manholes.

4. In the pre-consultation meeting (dated January 27, 2021), MVCA requested an Environment Impact Study (EIS) and a Hydrological Impact Assessment (HIA) as part of the SWM plan submission. The recommendations from these reports should be integrated into the SWM plan. The SWM report should evaluate the impact of the development on the adjacent watercourse, groundwater table and wetlands, and mitigation measures to address the loss of wetland.
5. Both the Serviceability report and the conceptual SWM memo have not provided details on the existing wetlands and loss of wetland. Please include these details in the SWM report and reference other technical documents.
6. Please acknowledge that matching total post-development infiltration to its pre-development levels is not conclusive for no adverse impact on the wetland. Changes in the water budget parameters, including but not limited to, infiltration, baseflow, evapotranspiration, runoff, etc., should be assessed for each hydroperiod.
7. The following details are to be provided in the detailed design:
 - ICD design details and their locations on the SWM drawing.
 - Calculations of surface storage, if any. The ponding volume, ponding depth, and ponding extend for 2 and 100-yr storm events are to be shown on the grading plan.
 - HGL calculations, sump pump details, as required.
 - Water quality treatment unit design details, design fact sheet etc.
 - At a minimum, a monthly water budget analysis should be carried out and the results should be provided in the report for pre-development, post-development, and post-development with mitigation.

If you have any questions, please contact the undersigned.

Yours truly,



Matt Craig
Manager of Planning and Regulations

cc. Ken Kelly, Town of Mississippi Mills, email