Appendix ‘J’

Development Assessment Report

BUCHANAN CROSSINGS

DEVELOPMENT ASSESSMENT REPORT

DECEMBER 11 – 2022

CHRIS HART & ASSOCIATES

ACKNOWLEDGMENTS

This document was created by the timely assistance of Jordan Fohkens and Alex Jackman both of B.M. Ross.

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INTRODUCTION

This report has been prepared on behalf of SLD Group Limited in support of a proposed Draft Plan of Subdivision application in the Municipality of Strathroy Caradoc to create a 359-lot residential subdivision with access from Albert Street and Saulsbury Street. (Figure 5)

This subdivision (Buchanan Crossings) is intended to be developed on the lands at Pt. Lot 19, Concession 4 SER, Geographic Township of Adelaide, Municipality of Strathroy – Caradoc) between Saulsbury St. and Albert St. in the south-west of the Town of Strathroy. (Figure 1)

In accordance with the Middlesex County Official Plan (2007), development applications within or adjacent to Natural Heritage Features shown on Schedule 'C' shall require submission of a Development Assessment Report (DAR). The DAR shall describe the ecological processes creating and maintaining the affected elements of the Natural System and indicate the potential impacts of the proposed development upon those processes. Where the Development Assessment Report indicates that there will be a negative impact on the natural system or ecological process that cannot be adequately mitigated, the development applications shall not be approved. If local municipalities require a Development Assessment Report or equivalent impact assessment document or equivalent impact assessment document as part of their approval process, the County will waive its requirement, provided the impact assessment submitted to the local municipality meets the County's requirements as set out below

The Development Assessment Report shall be undertaken to a professional standard and approved by the County. The DAR shall address the following:

A) Description of the development;

B) Description of the natural features;

C) Identification of Potential Impacts;

D) Identification and Recommendation of Mitigation Measures.

This report is the Development Assessment Report for the Buchanan Crossing project.

THE PROJECT

The proposed mixed housing subdivision will have an area of approximately 15.2 hectares (37.6 acres) and is proposed to have: 12 single detached dwellings, 103 semi-detached dwellings (link homes), 19 street multiple attached dwellings (freehold town houses) and 225 multiple attached dwellings (condominium town houses). (Figure 5)

The proposed development lands are currently under agriculture. Adjacent land uses are residential housing and institutional retirement and nursing homes. The natural areas on the subject lands are primarily along the corridor which contains the Ward and Cable Drains and also on immediately adjacent lands; all other lands are under agriculture. Access is from Saulsbury St. in the north east and Albert St. in the south.

The lands described above are described as 'Phase I' and are located east of the Cable Drain. Development is anticipated to begin in the next two years. The lands located west of 'Phase I' are also owned by the SLD Group. These lands are described as 'Phase 2' and are located north of the Seasons

Retirement Community, on the periphery of the Strathroy-Caradoc boundary. However, these lands are located outside of the Settlement Area and cannot be developed at this time. (Figure 5)

For this reason, this Development Assessment Report applies to Phase I only. At such time in future if Phase 2 is proposed for development a second DAR will be prepared for that Phase.

The proposed study areas for the two proposed development Phases are shown on the attached

(Figure 2) "Property Inquiry County Lands (Napperton Drive)".

NATURAL HAZARDS

Correspondence from the St. Clair Region Conservation Authority notes that, "The subject property contains areas within the flooding and erosion hazard of the Cable Drain. The hazard is made up of the meander belt erosion hazard and associated allowance (30 meters on either side of the drain) and the estimated engineered floodplain as shown on the map included with this report. The limit of the floodplain is defined by the extent of flooding expected under the regulatory storm as established by the Authority. The regulatory storm for the Municipality is based upon the Hurricane Hazel storm centered event." (Figure 3)

A portion of the hazard on the subject property is shown on Schedule 'K' of the Municipality of Strathroy-Caradoc's Official Plan and in the Zoning By-law through the 'Natural Environment Overlay'. The PPS and Official Plan generally prohibit buildings and structures within Hazard Land areas. The PPS may permit development where the effects and risk to public safety are minor, could be mitigated in accordance with provincial standards and if the following can be demonstrated and achieved:

a) development and site alteration is carried out in accordance with floodproofing standards, protection works standards, and access standards;

b) vehicles and people have a way of safely entering and exiting the area during times of flooding, erosion and other emergencies;

c) new hazards are not created and existing hazards are not aggravated; and

d) no adverse environmental impacts will result.

Aligned with the PPS, Strathroy-Caradoc's Official Plan policy 6.1.1.3 requires that if development is proposed in 'Hazard Land' areas the proponent may be required to undertake, at his expense, studies to provide the technical information necessary to evaluate the proposal in accordance with the following:

a) the degree of existing or potential physical hazard;

b) the potential impact of these hazards on proposed buildings, structures or additions thereto;

c) the proposed methods by which these impacts may be overcome in a manner consistent with accepted resource management practices and engineering techniques;

d) minimum building setbacks in relation to the kind, extent, and severity of both the existing and potential hazard.

In addition to the Official Plan policies, the Zoning By-law further regulated development in Hazard Land areas by prohibiting buildings and structures on lands exhibiting hazardous characteristics and through the following setbacks from Municipal Drains:

c) Municipal Drain (greater than 7.5 m wide) – 30 m from top-of-bank.

The approval of the authority will be required and may only be given where the control of flooding, erosion, pollution or the conservation of land will not be affected by the development. The completion of the above technical studies does not guarantee that the development proposal will be supported by the authority. All design parameters for stormwater management are to be reviewed by SCRCA. Any outlet for the drainage works will require written approval from the authority. As per the PPS policy 3.1.5 institutional uses and essential emergency services will not be permitted within the hazard area.

NATURAL HERITAGE

The woodland feature along the drain on the property has been identified in the Middlesex Natural Heritage System Study (MNHSS) (2014). This feature is not identified in the Official Plan or the Zoning By-law. It is expected that the natural heritage features will be retained within the natural hazard setbacks. Should significant encroachment into the erosion hazard of the drain be proposed, additional review may be required through a scoped Development Assessment Report, to be reviewed by SCRCA.

St. Clair Region Conservation Authority – Ontario Regulation 171/06

SCRCA staff have provided the following comments as part of SCRCA's Regulatory Authority under Ontario Regulation 171/06 "Development, Interference with Wetlands and Alterations to Shoreline and Watercourses" made under Section 28 of the Conservation Authorities Act.

"The subject property has been identified as being regulated under Ontario Regulation 171/06. The policies of the Authority regulated development including: construction/reconstruction of a structure; placement or removal of fill; regrading; altering a watercourse; altering/developing a shoreline; or interfering with the function of a wetland. Written approval from this Authority will be required in order to undertake any of these activities within the regulated area.

Based on SCRCA's best available mapping for the Regulated Area on the property includes the estimated floodplain and meander belt for the Cable Drain (approximately 30 meters on each side of the drain). If development is located outside of the regulated area as shown on the attached mapping, then further written permission from the Conservation Authority will not be required."

MIDDLESEX COUNTY GENERAL POLICIES

Middlesex County

The Middlesex County Official Plan section 2.2.1.2 General Policies notes that: "The boundaries and extent of the specific elements of the natural system designated on Schedule 'A' as Natural Environment Areas, and shown on Schedule C as natural Heritage Features are approximate. Refinements to boundaries may occur through environmental evaluations such as a Development Assessment Report (DAR) in consultation with the Ministry of Natural Resources, the Conservation Authority having jurisdiction and the County. Changes to the boundaries as a result of more detailed shall not require an amendment to the Plan.

Development applications within or adjacent to Natural Heritage Features shown on Schedule 'C' shall require submission of a Development Assessment Report (DAR).

The DAR shall describe the ecological processes creating and maintaining the affected elements of the Natural System and indicate the potential impacts of the proposed development upon those processes.

Where the Development Assessment Report indicates that there will be a negative impact on the natural system or ecological process that cannot be adequately mitigated, the development application shall not be approved.

If local municipalities require a Development Assessment Report or equivalent impact assessment document as part of their approval process, the County will waive its requirement, provided the impact assessment submitted to the local municipality meets the County's requirements as set out below.

The Development Assessment Report shall be undertaken to a professional standard and approved by the County. The DAR shall address the following:

a) Description of the development

b) Description of Natural Features

c) Identification of Potential Impacts

d) Identification and Recommendation of Mitigation measures.

Also noted in Section 3.4 "Natural Environment Areas" of the Middlesex County Official Plan is the provision that, ..." For new development proposed within 50 meters of a flood regulated watercourse and within 120 m of wetland components of the Natural Environment Area boundary, the applicant may be required to submit a DAR in accordance with the policies of Section 2.2.1.2."

Strathroy-Caradoc

Section 3.3.7 "Natural Heritage" of the Strathroy-Caradoc Official Plan (April 2018) notes that:

Natural heritage features in the Settlement Area of Strathroy are primarily associated with the Sydenham River and its tributaries. They include wetlands, woodlands and Valleylands. Areas designated as "Wetlands" may also include adjacent lands that do not constitute wetlands as defined; yet are considered an integral part of the wetland complex. Natural heritage features warrant protection on account of their ecological and social value as well as their contribution to the natural landscape and the character of Strathroy. It is intended that such features shall be left in their natural or undisturbed state and that any adjacent land use or land use activity be controlled so as not to adversely impact on the natural and ecological integrity of the feature.

Wetlands

Section 3.3.7.2 of the Strathroy-Caradoc Official Plan (April 2018) notes that:

Areas designated as 'wetlands' on Schedule 'D' shall be maintained in their natural state and protected from development and site alteration that would threaten their ecological integrity. Within a wetland or wetland complex, development shall not be permitted. On adjacent lands (generally lands being within 120 meters of the wetland or wetland complex) development and site alteration shall not be permitted

unless it can be demonstrated that there will be no negative impacts on the natural features or on the ecological functions. These areas are regulated by Conservation Authorities. Uses permitted shall be restricted to existing agricultural uses, conservation, outdoor education, and passive recreation uses. Buildings or structures shall not be permitted. Other activities permitted may include hunting, trapping and fishing.

Woodlands

Section 3.3.7.3 of the Strathroy-Caradoc Official Plan (April 2018) notes that:

Areas designated as 'Woodlands' on Schedule 'D' have been identified by the Middlesex Natural Heritage Study, 2003 as meeting one or more landscape criteria established by the study. They are generally four hectares or greater in size and are considered to be significant as a result of their contribution to the ecology, quality and natural diversity of the Municipality. It is intended that these woodlands be protected and enhanced wherever possible. They shall be maintained in their natural state wherever possible and protected from incompatible development.

Development and Site Alteration Affecting Woodlands

Section 3.3.7.4 of the Strathroy-Caradoc Official Plan (April 2018) notes that:

Development and site alteration may be permitted within a 'woodland' designated on Schedule 'D' and on adjacent land (generally the lands being within 50 meters of the woodland) where it is demonstrated that there will be no negative impacts on the woodlands or the ecological functions for which it was identified.

Evaluation of Development Proposals

Section 3.3.7.5 of the Strathroy-Caradoc Official Plan (April 2018) notes that:

Where development is proposed on land lying adjacent to a 'Wetland' or lying within or adjacent to an area designated as a 'Woodland', the proponent shall submit a Development Assessment Report (or DAR) in accordance with Section 7.5.3.2 of this Plan.

Reports/Studies Relating to Environmental and Natural Matters

Section 7.5.3.2 of the Strathroy-Caradoc Official Plan (April 2018) notes that:

The required reports/studies are to identify the environmental and natural features which may be affected by the proposed development and/or change in land use; identify the areas that are to be employed as a buffer between the environmental and/or natural features and the proposed development and/or change in land use; and identify any other mitigative measures to be undertaken to protect the environmental and natural features from any adverse impacts associated with the proposed development and/or change in land use. These studies may include, but not be limited to Development Assessment Reports as outlined in sections 3.4.7.5, 4.4.6.4 and 5.4.2.4 of the Official Plan. Study components may be determined in consultation with the applicable Conservation Authority or other agency.

A GUIDELINE FOR DEVELOPMENT ASSESSMENT REPORTS

Appendix C of the Middlesex County Official Plan provides 'A Guideline for Development Assessment Reports' (August 2007).

This guideline is written for landowners and developers to assist in the review and approval of development applications and/or site alterations that may affect the Natural System shown or described in the County of Middlesex Official Plan.

The Ontario Provincial Policy Statement (2020) provides policy direction on matters of provincial interest related to land use planning and development including the Natural Environment. The Planning Act requires that municipal decisions affecting planning matters "shall be consistent with" policy statements issued under the Act. As a result, the County of Middlesex Official Plan sets out a policy framework that encourages the protection of the County's Natural System which comprises the following elements:

- Natural Hazards
    - Steep slope hazards
    - Unstable soils
    - Fill regulated areas
- Natural Environment Areas
    - Floodplains
    - Flood regulated watercourses
- Natural Heritage Features
    - Significant woodlands
    - Wildlife habitat
    - Habitat of endangered and threatened species
    - Aquatic ecosystems including fish habitat
    - River, stream, ravine and upland corridors
    - Significant valley lands
    - Aggregate Resource Areas
    - Petroleum Resource Pool Areas
    - Areas of natural and scientific interest (ANSIs)
- Ground water Features
    - Groundwater recharge areas
    - Groundwater discharge and headwater areas
    - Well head protection areas

Development shall not be permitted on lands designated as 'Natural Environment Areas' on Schedule "A" of the County Official Plan which are:

- Wetlands
- Flood regulated water courses and associated flood plain
- Thedford Marsh Floodplain
- Significant portions of the habitat of threatened and endangered species

PROCESS OF THE DEVELOPMENT ASSESSMENT REPORTS

Appendix 'C' notes that before starting a Development Assessment Report, a work plan will be prepared to the satisfaction of the County, in consultation with the relevant agencies. Depending on the extent of the proposed development and the potential for impact on natural features, the County may approve a work plan for a Development Assessment Report that is reduced in scope and content; referred to as a 'scoped' Development Assessment Report.

A Development Assessment Report shall be required to show that development will have no negative impact on the natural features or on their ecological functions. The public, particularly adjacent property owners, may be notified of the preparation of a Development Assessment Report and given the opportunity to comment.

Content of Development Assessment Report

The County requires the Development Assessment Report to be completed to a professional standard, in consultation with the relevant public agencies. The detailed content required for Development Assessment reports is as follows:

- Description of the Development
- Description of Natural Features
- Identification of Potential Impacts
- Identification and Recommendation of Mitigation Measures
- Demonstration of Consistency

ST. CLAIR REGION CONSERVATION AUTHORITY REQUIREMENTS

Correspondence from Sarah Hodgkiss of SCRCA (November 10, 2021) outlines the requirements of SCRCA in this instance.

"I had the opportunity to discuss the DAR requirements with Tim Williams yesterday. I am providing a high-level outline to you of what we would like to see covered in the DAR. Then we ask that you prepare a term of reference with the details of the study, proposed timing, etc. for review by me and Tim. The report will need to review the natural heritage policies of the County and Strathroy-Caradoc Official Plans, and the Middlesex Natural Heritage System Study."

The Natural Heritage System identified in the Middlesex Natural Heritage System Study for the property is made up of the watercourse, meadow along the watercourse, and the woodland. The report should outline the existing site conditions, significance and functional connections between these features, and to the greater natural heritage system.

Aquatic Habitat Assessment – The watercourse should be described, including permanency, amount of flow, type of substrate, description of vegetation, habitat, etc. If fish habitat is present, we may require additional details re: thermal regime, water quality, etc.

Woodland: The woodland should be assessed on site and mapped. Please provide a description of the tree species, age class and general health. There should be a description of understory/ground cover, etc.

Meadow: the vegetation along the riparian corridor (e.g., the non-agricultural areas) should be described.

The site should be reviewed for Significant Wildlife Habitat and Habitat for Species at Risk. MECP should be contacted regarding the SAR screening. I am attaching a list of potential SAR for Strathroy-Caradoc to assist you in scoping your review.

The Development Master Plan prepared by B. M. Ross can be used for discussion, but the actual development setbacks should be determined through the findings of the technical studies, including the DAR and the floodplain assessment."

PROPOSED METHODOLOGY FOR SAULSBURY SUBDIVISION DAR

Introduction

As requested by the SCRCA a fairly comprehensive approach has been taken in developing the Terms of Reference for the Buchanan Crossings Phase I Subdivision DAR. A review of policy and planning documents and also technical information has ensured that an accurate and sensitive approach will provide the information required.

First and foremost, this approach is to consider a regional ecosystem perspective as informed by the MNHSS. It is most important to determine how the stream and stream corridor relate to the goals, objectives and criteria of the MNHSS and what is this level of significance with regard to natural heritage features, areas and linkages intended to provide connectivity (at the regional or site level) and support natural processes which are necessary to maintain biological and geological diversity, natural functions, viable populations of indigenous species, and ecosystems.

The DAR was developed from an overall synthetic perspective based on the information gathered from background research and collected from field surveys based on scientific protocols and government agency and Ministry criteria.

BACKGROUND STUDIES

In order to fulfill the DRAFT TOR a records review was undertaken along with other background research.

The following information sources were reviewed:

- Provincial Policy Statement, 2020.
- Natural Heritage Reference Manual for Natural Heritage Policies of the Provincial Policy Statement, 2005 (Second Edition), 2010.
- Middlesex County Official Plan (September 9, 1997; Amended July 11, 2006)
- Municipality of Strathroy-Caradoc Comprehensive Zoning By-law, august 4, 2021.
- Municipality of Strathroy-Caradoc Municipal Species at Risk Reference guide, may 2018.
- Municipality of Strathroy-Caradoc Official Plan: 2018.
- Middlesex Natural Heritage Systems Study – 2014.
  Upper Thames River Conservation Authority.
- O. Reg. 171/06: St. Clair Region Conservation Authority: Regulation of Development, Interference with wetlands and alterations to shorelines and water courses.

- OMNRF. 2022. N.H.I.C. Make A Map.
- United States Department of Agriculture, Natural Resources Conservation Service, Plants Data Base. (plants.usda.gov/java/profile?symbol)
- The Physiography of Southern Ontario, 3 rd. Edition, L. J. Chapman and D. F. Putnam, Ministry of Natural Resources, 1984.
- VASCAN, Database of Vascular Plants of Canada. http://data.canadensys.net/vascan/
- Manual of Vascular Plants of Northeastern United States and Adjacent Canada, 2nd Edition. The New York Botanical Garden. H. A. Gleason and A. Cronquist, 1999.
- Illustrated Companion to Gleason and Cronquist's Manual, Illustrations of the Vascular Plants of Northeastern United States and Adjacent Canada. The New York Botanical Garden. Noel H. Holmgren, 1998.
- Canadian Wildlife Species At Risk, October 2011. Committee on the Status of Endangered Wildlife in Canada.
- Atlas of the Breeding Birds of Ontario, 2001- 2005. Bird Studies Canada, Environment Canada, Ontario Field Ornithologists, Ontario Ministry of Natural Resources, Ontario nature. M. D. Cadman et al, 2007.
- Field Guide to Birds of Eastern and Central North America, 6th Edition. Houghton Mifflin. R. T. Peterson, 2010.
- The ROM field Guide to Birds of Ontario. McClelland and Stewart. J. M. Hughes, 2001.
- Interim report on Ontario's Biodiversity, 2008. Ontario Biodiversity Council.
- Natural Heritage Resources of Ontario, Rare Vascular Plants, 3rd Edition. Natural Heritage Information Centre, Ontario Ministry of Natural Resources. Mike J. Oldham, 1999.
- Floristic Quality Assessment System for Southern Ontario. ONTDEX. Natural Heritage Information Centre, Ontario Ministry of Natural Resources. Mike J. Oldham et al, December 1995.
- Appendix 'C' - Floristic Quality Assessment System for Southern Ontario. Natural Heritage Information Centre, Ontario Ministry of Natural Resources. Mike J. Oldham et al, December 1995.
- Significant Wildlife Habitat Technical Guide. Ontario Ministry of Natural Resources, October 2000.
- DRAFT Significant Wildlife Habitat Ecoregion Criteria Schedule, SWH Ecoregion 6E Criterion Schedule, Identification of Significant Wildlife Habitat. Ontario Ministry of Natural Resources, February 2012.
- DRAFT Significant Wildlife Habitat Ecoregion Criteria Schedules, Addendum to Significant Wildlife Habitat Technical Guide. Ontario Ministry of Natural Resources, January 2009.
- A Field Guide to Reptiles and Amphibians of Eastern and Central North America, 2nd Edition. Houghton Mifflin. R. Conant, 1975.
- Ecological Land Classification for Southern Ontario: First Approximation and Its Application. OMNR, South Central Science Section, Science Development and Transfer Branch. SCSS Field Guide FG-02. North Bay, Ontario. Lee, H.T., W.D. Bakowsky, J. Riley, J. Bowles, M. Puddister, P. Uhlig and S. McMurray. 1998.

- Ontario, Endangered Species Act, 2007, S.O. 2007, Chapter 6. (Consolidation Period: June 30, 2008 to June 11, 2012). Ontario, 2007.
- Ontario Regulation 176/13 made under the Endangered Species Act, 2007. (Made: May 15, 2013, Filed: May 31, 2013, Published on e-Laws: May 31, 2013, Printed in The Ontario Gazette: June 15, 2013; Amending O. Reg. 242/08).
- Manual of the Grasses of the United States. Volume One. 2nd edition. Dover Publications Inc. New York, N.Y. Hitchcock, A.A. 1971.
- Manual of the Grasses of the United States. Volume two. 2nd edition. Dover Publications Inc. New York, N.Y. Hitchcock, A.A. 1971.
- Grasses of Ontario. Research Branch Agriculture Canada Monograph 26, 1980. Minister of Supply and Services Canada. Hull, Quebec. W. G. Dore and J. McNeill. 1980.
- Michigan Flora Part III, Dicots (Pyrolaceae-Compositae). Cranbrook Institute of Science Bulletin 61 and University of Michigan Herbarium. University of Michigan Press. Ann Arbor, Michigan. E.G. Voss, 1996.
- Michigan Flora Part II, Dicots (Saururaceae-Cornaceae). Cranbrook Institute of Science Bulletin 59 and University of Michigan Herbarium. University of Michigan Press. Ann Arbor, Michigan. E.G. Voss, 1985.
- Michigan Flora Part I, Gymnosperms and Monocots. Cranbrook Institute of Science and University of Michigan Herbarium. University of Michigan Press. Ann Arbor, Michigan. E.G. Voss, 1972.
- Goldenrods of Ontario (Solidago and Euthamia), University of Waterloo Biology Series, Number 36, Revised Edition. Semple, J. and Gordon Ringius, 1992.
- A Revision of Heterotheca sect. Phyllotheca (Nutt.) Harms (Compositae: Asteracea) The Prairie and Montane Goldenasters of North America. University of Waterloo Biology Series, Number 37. John Semple,1996.
- Cultivated and Native Asters of Ontario (Compositae: Asteraceae). University of Waterloo Biology Series, Number 41. Semple, J., Heard, S., and L. Brouillet. 2002.
- Grasses of Ontario. Research Branch Agriculture Canada Monograph 26, 1980. Minister of Supply and Services Canada. Hull, Quebec. W. G. Dore, and J. McNeill. 1980.
- Flora of North America, North of Mexico, Volumes 24 and 25, *Magnoliophyta Commelinidae: Poaceae*, Parts 1 & 2. Oxford University Press, 2007.
- Common Wetland Delineation Sedges of the Northeast. Engineer Research and Development Center, Cold Regions Research and Engineering Laboratory, Hanover, New Hampshire. June 2005.

Online Information Sources:

The following is a list of links to key online information sources:

- **Endangered Species Act, 2007**
  http://www.e-laws.gov.on.ca/html/statutes/english/elaws_statutes_07e06_e.htm
- **Species at Risk in Ontario List** (Ontario Regulation 230/08)
  http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_080230_e.htm

- **Local MNR office locations**
  http://www.mnr.gov.on.ca/en/ContactUs/2ColumnSubPage/STEL02_179002.html
- **Species specific habitat regulations under the ESA** Ontario Regulation 242/08) http://www.e-laws.gov.on.ca/html/regs/english/elaws_regs_080242_e.htm
- **Natural Heritage Information Centre (NHIC)**
  http://nhic.mnr.gov.on.ca/
- **Rare Species Reporting Form - Natural Heritage Information Centre (NHIC)**
  http://nhic.mnr.gov.on.ca/species/species_report.cfm
- **Biodiversity Explorer**
  https://www.biodiversityexplorer.mnr.gov.on.ca/nhicWEB/mainSubmit.do
- **Department of Fisheries and Oceans Canada (DFO)**
  http://www.dfo-mpo.gc.ca/species-especes/index-eng.htm
- **Ontario Breeding Bird Atlas**
  http://www.birdsontario.org/atlas/index.jsp

  http://www.sararegistry.gc.ca/default_e.cfm
- **SAR Bulletin 4.2 "*Explanation of key terms relating to habitat identification, description and protection under the Endangered Species Act, 2007*"**
  http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/241604.html
- **SAR Policy 4.1 "*Habitat protection for endangered, threatened and extirpated species under the Endangered Species Act, 2007*"**
  http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/241604.html
- **Committee on the Status of Species at Risk in Ontario (COSSARO) webpage**
  http://www.mnr.gov.on.ca/en/Business/Species/2ColumnSubPage/244543.html
- **Species at Risk Website**
  http://www.mnr.gov.on.ca/en/Business/Species/index.html

The following personal contacts were made:

- Sarah Hodgkiss, Senior Planner, Sydenham River Conservation Authority
- Tim Williams, Senior Planner, Middlesex County
- Cheryl Dickson, MNRF, Senior Resources Planner
- Darren Unger, MNRF, Wildlife Management Biologist

Other than the planning and regulatory documents and online information sources as described above there was little applicable documentation to review.

FOCUSSED STUDIES

Middlesex Natural Heritage System Study

The Middlesex Natural Heritage System Study (2014) was reviewed to obtain a regional perspective. This document provided information on how the development lands relate to the landscape of the Middlesex Natural System.

Wetland Boundary Delineation

There are no Provincially Significant Wetlands found within the subject lands or adjacent lands. However, from a preliminary site review there are floodplain areas that may be determined to be wetland features with further studies. If the landscape feature(s) is determined to be a wetland the boundary will be staked by Chris Hart who is a Certified Ontario Wetland Evaluator. Further to this staking the feature will be reviewed and confirmed by a wetland specialist/ecologist from the SCRCA. Boundaries will be determined using vegetation community borders and soil probes to a depth of up to 60 cm for water and hydric soil detection, as per the Ontario Wetland Evaluation system (OWES 2013). Wetland boundaries are established where vegetation is comprised of 50% wetland and 50% upland species and where soils display hydric conditions (e.g., presence of mottles and/or gleys), per the Ontario Wetland Evaluation system (OWES 2013). Detailed dates and weather information will be provided.

Buffer Recommendation and Setbacks

Recommended buffers and setbacks for wetland boundaries and other natural heritage features were determined through a variety of resources including the SCRCA wetland policies.

Ecological Land Classification and Vegetation Surveys

Ecological Land Classification (ELC) surveys were completed in mid-May, August, and late-September by Chris Hart who is a certified ELC examiner and ecologist. Vegetation communities within the study area were characterized and delineated following the ELC system for Southern Ontario 1st approximation; community codes usually follow the 2nd approximation (Lee, et al, 1998, 2008). Boundaries of ELC communities were mapped by using aerial images and field observations. As part of this mapping process, soils were characterized and the study area was systematically searched in order to provide an inventory of vascular plants to provide a three season Botanical Inventory of the Study Area. Detailed survey dates and weather information was noted.

Identified ELC communities were cross referenced with the NHIC Ontario Plant Community List (NHIC 2018) to determine the presence of rare plant communities (S1-Critically Imperiled, S2-Imperiled, or S3-Vulnerable). The Subnational or Provincial Ranks (S Rank) are assigned by the Ontario Ministry of Natural Resources and Forestry (NHIC) in order to help assign protection priorities. Detailed descriptions of each ELC community are provided in this report.

Identified vascular plant species were compared to Provincial and Federal SAR lists (COSARO, SARA), PROVINCIAL RANKS (NHIC 2018), global ranks and Distribution and Status of the Vascular Plants of Southwestern Ontario (Oldham 1993) in order to assess Federal, Provincial, regional and local conservation status of each species. Final definitive identification was provided by the "Field Manual of Michigan Flora" (Voss, E. G., and A. Reznicek, 2012). The taxonomic nomenclature of plant species were further defined by the Database of Vascular Plants of Canada (VASCAN 2016).

Identification of environmentally sensitive plant species was based on the assignment of a coefficient of conservatism value (CC) for each native species (Oldham et al, 1995). The value of CC, ranging from 0 (low) to 10 (high) is based on a species tolerance of disturbance and fidelity to specific natural habitat parameters. Species with a CC value of 9 or 10 generally exhibit a high degree of fidelity to a narrow range of habitat parameters. These species may be more sensitive to environmental changes.

A list of all identified plant species has been provided in Appendix 'A'. The list provides botanical names, common names, provincial rarity rank (S-rank), global rarity rank (G-rank), provincial Species at Risk status (SARO), federal Species At Risk status (SARA), coefficient of conservatism (CC) and coefficient of wetness (CW).

Wildlife Habitat

A list of all identified wildlife is provided in Appendix 'A'.

Amphibians (Anurans)

Evening point count surveys to detect the breeding calls of anurans (frog and toad) were conducted by an experienced ecologist in accordance with the Marsh Monitoring Program Participants Handbook for Surveying Amphibians (Bird Studies Canada 2008). Three surveys were completed during the recommended windows for the spring and early summer, in order to maximize the chances of detecting all potential species. Surveys were intended to coincide with optimum weather conditions for anuran breeding activity and detection of calls, i.e., suitable temperature relative to each survey window, humid or damp but not raining, and low wind. Call level Codes were applied to each species detected. Suitable habitat and numbers of individuals were counted or estimated where applicable. The surveys took place in mid-April, mid to late-May and late June.

Breeding Birds

Breeding Bird Surveys were conducted by an experienced ecologist in order to determine if significant bird breeding habitat occurs within or adjacent to the study area. Two surveys were conducted and comprised of 10-minute point counts position at pre-determined locations approximately 150 m apart. Where appropriate (stream corridor) a wandering transect was used to capture nests and calling birds. Surveys followed the Ontario Breeding Bird Atlas: Guide for Participants (Federation of Ontario Naturalists, March 2001) and Ontario Breeding Bird Atlas, Instructions for Point Counts (Birds Canada, June 2021).

Surveys were undertaken during the peak breeding season for the bulk of species in southern Ontario (last week of May through early July) and were spaced at least 10 days apart in order to determine presumed permanent territories through territorial singing males. The two surveys were undertaken in the early morning between 30 minutes before dawn and 5 hours after dawn.

Incidental Wildlife Observations

Incidental observation of insects, mammals, birds and reptiles were recorded during all field visits.

Significant Wildlife Habitat

With the guidance of the Significant Wildlife Habitat Technical Guide (2000) and the SWH Ecoregion Schedule 7E (2015), the proposed development and adjacent lands (within 120 m) were considered for the presence of Significant Wildlife Habitat (e.g., specialized habitats for wildlife and habitat for species of conservation concern).

Species at Risk Habitat

The subject property and the study area were reviewed for the presence of habitat that may be suitable for Species at Risk. Guidance was provided by the MNRF-Aylmer District as to what SAR may have the potential to occur in or near to Strathroy-Caradoc. A review of the site along with habitat requirements for each species was be conducted. A variety of sources including the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) documents was used to determine habitat suitability. The site was then evaluated for potential habitat using Ecological Land Classification, guidance from MNRF documents and on-site knowledge acquired through field surveys. An assessment of the study area of candidate habitat for SAR is provided in the following report sections.

Other Project Details:

- Existing Site Conditions in general from a landscape perspective.
- Significance of features – common, rare or unusual on a regional or provincial basis.
- Potential Impacts (cumulative impacts) occurring in the surrounding area as a result of the proposed development.
- Potential impacts associated with changes related to drainage of the site, water quality and water quantity.
- Mitigative measures that may be undertaken as part of the design process (Low Impact Design) to prevent, minimize or offset anticipated negative impacts of the proposed land development.

DAR – TASK SCHEDULE

TASK	TIMING	REFERENCE
Background Review	March to April	NA
Organize equipment and supplies	March to May	NA
Amphibian Calling Surveys	April, May, July	Bird Studies Canada – Marsh Monitoring Program Participants handbook for Surveying Amphibians, Revised 2008
Incidental Wildlife Observations	April to October	Various field guides and monographs
ELC and Vegetation Surveys	May to August	Ecological Land Classification for Southern Ontario First Approximation and Its Application (Lee, H. et al 1998) Southern Ontario Ecological Land Classification Vegetation Type List (Lee, H. May 2008) Field Manual of Michigan Flora (Voss, E. G., A. Reznicek. 2012) Floristic Quality Assessment System for Southern Ontario (Oldham, M. J. and W. Bakowsky, December 1995)
Fish and Aquatic Habitat Surveys (as needed)	May to June	Ontario Stream Assessment Protocol - 2017
Species At Risk Habitat	May to September	MNRF NHIC - Make A Map 2008 MECP – information inquiry MNRF – information inquiry MNHSS - 2014
Breeding Bird Surveys	Late May to early July	Ontario Breeding Bird Atlas Guide for Participants, March 2001 Ontario Breeding Bird Atlas, Instructions for Point Counts, June 2021
Significant Wildlife Habitat	July	SWHTG – 2000 SWH – ECS 6E – 2015 MNRF NHIC Make A Map MNHSS - 2014
Wetland Boundary Delineation	August to September	Ontario Wetland Evaluation System, 2013
Buffer Recommendations and Setbacks	August to September	Natural Heritage Reference Manual, 2010
Draft Report	November - December	NA

MASTER ELC ANALYSIS – VEGETATION

This section provides a summary and analysis of Landscape Polygons within the study area for Phase I of Buchanan Crossings. (Figure 4) In most cases while there are distinct landscape polygons more than one ELC classification of vegetation can be found within a polygon. The result is that as many as 4 different ELC classifications for habitat have been used to describe the landscape feature.

This approach has been found to be more accurate in describing the landscape because gradation in plant communities can be understood by the use of ELC codes and where they occur across the landscape.

The focus of this study has been the Cable Drain and lands adjacent to it from Albert Street to the property boundary to the north-west.

POLYGON 1

This is the portion of the Cable Drain between the north property boundary and the Black Walnut grove along the drain. Consideration has been given to adjacent lands within 10 meters of the top of bank and plants in these areas have been included. We have considered those areas of the Cable Drain that has been colonized by trees, shrubs, vines, forbs and grasses. As well, the bottom of the drain with swampy conditions, where there are seeps, small floodplains and periodic inundation from snow melt and storm events surveyed. Upper elevations of ditch sides to adjacent cropland verges have shrub copses (dogwoods and willows).

Components of Polygon 1 include:

SWTM2 – Dogwood Mineral Deciduous Thicket Swamp Ecosite

- Mineral and peaty phase mineral (organic accumulations 20-40 cm) substrates
- Areas where flooding duration is short-substrate aerated by early to mid-summer

MEFM4 – Fresh-Moist Forb Meadow Ecosite (Open Graminoid Meadow Type)

- Upper ditch areas and adjacent lands transitional to cropland

THDM2- Dray-Fresh Deciduous Shrub Thicket Ecosite (Gray Dogwood Deciduous Shrub Thicket Type)

- Upper ditch areas and adjacent lands transitional to cropland
- May include Red Osier Dogwood and/or shrub willow

POLYGON 1 VEGETATION

TREES: Silver maple, Green Ash, Black Walnut

SHRUBS: Gray Dogwood, Red Osier Dogwood, Black Raspberry, Highbush Cranberry

VINES: River Bank Grape, Virginia Creeper

FORBS: Canada Goldenrod, Gray goldenrod, Yellow Avens, Little White Aster, Common Mustard, Garlic Mustard

GRASSES: Smooth Brome, Orchard Grass, Reed Canary Grass

POLYGON 2

This feature is a grove of Black Walnut trees in a widening of the drain bottom and side slopes including a localized floodplain at the north end of the study area. This appears to be a natural feature that may have started with a cultural planting that spread across the site. Trees appear to be actively regenerating with the oldest about 40 years and up to 30 cm dbh. There are about 60 trees of all ages. Other trees include White Pine, Manitoba Maple, Green Ash and Aspen Poplar.

Components of Polygon 2 include:

WODM-4 – Dry Fresh Black Walnut Deciduous Woodland Type

- Dominated by Black Walnut 35% < tree cover < 60%; semi-closed treed communities; natural areas have unique floras (e.g. tall grass woodland) areas with a cultural legacy typically dominated by more invasive herbaceous, shrub and tree species; tree cover more closed and shaded
- Mineral soil > 15cm deep; areas with intermediate levels of environmental limitations (e.g. fire, drought) intensity of cultural disturbances, or time since last disturbance)

SWTM2 – Dogwood Mineral Deciduous Thicket Swamp Ecosite

- Mineral and peaty phase mineral (organic accumulations 20-40 cm) substrates
- Areas where flooding duration is short-substrate aerated by early to mid-summer

POLYGON 2 VEGETATION

TREES: Black Walnut, Aspen Poplar, White Pine, Green Ash, Manitoba Maple

SHRUBS: Black Raspberry, Highbush Cranberry, Gray Dogwood, Common Buckthorn

VINES: Virginia Creeper, Wild Cucumber, River Bank Grape

FORBS: Canada Goldenrod, Gray Goldenrod, Enchanters Nightshade, Sunflower, Yellow Avens, Garlic Mustard, Little White Aster, Narrow Leaved Goldenrod, Motherwort, Common Mustard, Jewelweed

GRASSES: Smooth Brome, Orchard Grass, Reed Canary Grass, Blue Grass

POLYGON 3

This feature is the vegetation community along the drain including adjacent lands to 10 meters from top of bank to either side. This includes the wet area in the bottom of the drain, side slopes and level areas beyond the top of bank and areas transitioning to croplands.

Upland areas have random trees, large shrubs, shrub copses and mixed areas of forbs and grasses. Much of this vegetative representation appears due to natural representation.

The dominant canopy is formed of Gray Dogwood and Willow copses surrounded by individual shrubs.

SWTM2 – Dogwood Mineral Deciduous Thicket Swamp Ecosite

This is the area of lower side slopes of the drain and shallow floodplain areas.

Areas where flooding duration is short and the lower substrate is aerated early to mid-summer.

There is some flowing and standing water in the drain which promotes a lower emergent macrophyte component which is suppressed by intense shading of shrubs and collapsing graminoid and forb communities on the drain side slopes. This is less than 5% of community representation and biomass.

THMM 1-1 – Native Mixed Regeneration Thicket Type

This is the predominating side slope community of the drain along its length on the subject lands. Composed primarily of common local plants including shrubs, forbs and grasses.

Shrubs are primarily dogwoods and willows. Forbs are Goldenrods and Asters. Grasses are Reed Canary Grass and Tall Fescue grasses.

- This form of thicket has a shrub cover of >25%; tree cover <25%; shrub cover varies from scattered and patchy to continuous; natural areas typically have unique floras; areas with a cultural legacy typically dominated by more invasive shrub species.
- Mineral soil>30 cm deep; tree establishment inhibited by environment or have been removed by land use practices; areas subjected to natural disturbance (e.g. fire) or recovering from cultural disturbance (e.g. clearing pasture); drain maintenance; often found associated with the drier verges of wetlands.

THDM 2-4 – Dry-Fresh Deciduous Shrub Thicket Ecosite (Gray Dogwood Deciduous Shrub Thicket Type)

This is found on the upper drain side slopes and adjacent lands that are transitional to cropland. May include Red Osier Dogwood, Gray Dogwood and/or shrub willow copses and clusters.

- Upper side slopes and lands adjacent to the top of bank include meadow areas that are interspersed among shrub copses and trees clustered with larger shrubs.
- These meadow aera appeared to be derived from natural regenerative processes and include:
- MEFM 1-1 – Goldenrod Forb Meadow Type
- MEFM 1-2 – Aster forb Meadow Type

There may or may not be areas with special characteristics or higher species concentrations

POLYGON 3 - VEGETATION

TREES: Silver Maple, Eastern Red Cedar, Black Walnut, Green Ash, Manitoba Maple, White Pine, Bitternut Hickory, Basswood, feral Malus, Aspen Poplar

SHRUBS: Missouri Willow, Sandbar Willow, Shining Willow, Chokecherry, Gray Dogwood, Red Osier Dogwood, Downy Hawthorn, Red Osier Dogwood, Honey Suckle, Common Buckthorn

VINES: Wild Cucumber, Riverbank Grape, Virginia Creeper

FORBS: Common Milkweed, Sunflower, Brown Eyed Susan, Dame's Rocket, Jewelweed, Stinging Nettle, Phragmites, Evening Primrose, Motherwort, Canada Thistle, Common Burdock, Meadow Hawkweed, Stinging Nettle, Common Burdock, Herb Robert, Canada Goldenrod, Gray Goldenrod, Little White Aster, Azure Aster, Common Mustard, Daisy Fleabane, Alfalfa, Wild Basil, Bladder Campion, Wild Carrot, Comfrey, Field Horsetail, Jewelweed, Common Milkweed, Dandelion, New England Aster

GRASSES: Reed Canary Grass, Phragmites, Orchard Grass, Sheep Fescue

POLYGON 4

This feature is a transitional area between polygon 3 and 5. There is a strong influence of shrubby growth and larger trees set in a matrix similar to that of Polygon 3. The drain is still central with a larger component to the east on table lands.

Polygon 4 has many of the same characteristics of Polygon 3 but it has some larger and older trees and is not as disturbed as the drain; it is more natural. It is not a woodland but biologically part of forested residential lands to the south.

This area has most of the characteristics of the drain thicket vegetation communities upstream above it.

THMM 1-1 – Native Mixed Regeneration Thicket Type

As above it, this plant community is the predominant side slope vegetation. In this case the same vegetation is found beyond the top of bank and spreads into the level tableland where it shares habitat with a forb meadow (MEFM4).

MEFM4 – Fresh-Moist Forb Meadow Ecosite

This is an open meadow type with a high graminoid component. Found in the upper drain areas and adjacent lands transitional to groomed institutional lands and naturalistic areas of residential lands.

POLYGON 4 - VEGETATION

TREES: White Oak, Aspen Poplar, Black Walnut, Siberian Elm

SHRUBS: Bush Honey Suckle

VINES: River Bank Grape, Virginia Creeper

FORBS: Black Medick, Wild Carrot, Yellow Sweet Clover, Common Plantain, Goatsbeard, Russian Knapweed, Daisy Fleabane, Canada Goldenrod

GRASSES: Smooth Brome, Blue Grass, Rye Grass

POLYGON 5

Polygon 5 is an area that is predominantly meadow. This ELC feature has a tree and shrub cover of <25% open herbaceous communities; cover varies from scattered and patchy to continuous meadow; natural areas typically have unique floras (e.g. Tallgrass Prairie), areas with a cultural legacy, typically dominated by alien plant species.

These plant communities are based on mineral soil substrate .30cm deep; shrub and tree establishment inhibited by environment or have been removed by land use practices; areas subjected to natural disturbance (e.g. fire) or recovering from cultural disturbance (e.g. clearing, pasture)

Polygon 5 includes components of the following ELC communities:

MEFM4 – Fresh-Moist Forb Meadow Ecosite (Open Graminoid Meadow Type)

As in Polygon 4 this type of community was found in the upper elevation of the drain sides and in the adjacent table lands. It was included in a larger meadow area which transitioned at least 20 meters west

to institutional lands which are groomed turf and also south to naturalistic lands (forested) of residential areas.

In this case there are trees with shrub copses (Silver maple, Black Walnut, Aspen Poplar) on large centers nearest to the drain. Other trees include Eastern White Cedar, Norway Spruce, Sycamore, and Sugar Maple.

Providing a solid forb complement to the graminoid meadow are ELC habitat areas dominated by:

MEFM 1-1 – Goldenrod Forb Meadow Type; and,

MEFM 1-2 – Aster Forb Meadow Type.

There may or may not be areas with special characteristics or higher species concentrations depending on overall site conditions.

POLYGON 5 - VEGETATION

TREES: Manitoba Maple, Black Walnut, American Elm, Eastern White Cedar

SHRUBS: -none-

VINES: River Bank Grape

FORBS: Russian Knapweed, Common Milkweed, Common Plantain, Mullein, Yarrow, Meadow Hawkweed

GRASSES: Smooth Brome, Little Bluestem, Switch Grass

POLYGON 6

This area is linear and runs adjacent to a country lane (Napperton Drive) which is entirely within the tableland area and does not include the drain.

This is a culturally affected area that includes streetside plantings and cropland.

This feature has Silver Maple street trees with other trees on adjacent lands including Eastern White Cedar, Black Walnut, White Elm and Blue Spruce.

Other components include ground covers such as turf grass and white clover and other adventitious alien species.

The predominant habitat components include:

MEFM 4 – Fresh Moist Forb meadow Ecosite (open Graminoid Meadow Type)

MEFM 1-1 – Goldenrod Forb Meadow Type

MEFM 1-2 – Aster Forb Meadow Type

As found in Polygon 4 the ELC classifications of THMM 1-1 describes areas of this polygon at the northern end which are closest to naturalistic lands (forested) of residential areas to the west.

POLYGON 6 - VEGETATION

TREES: Manitoba Maple, Black Walnut, American Elm, Eastern White Cedar, Silver Maple

SHRUBS: -none-

VINES: River Bank Grape

FORBS: Russian Knapweed, Common Milkweed, Common Plantain, Mullein, Yarrow, White Pigweed, Jimson Weed, Meadow Hawkweed

GRASSES: Smooth Brome, Little Bluestem, Switch Grass

SIGNIFICANT WILDLIFE HABITAT

Significant Wildlife Habitat is considered within the Provincial Policy Statement (2020) section 2.1 as natural features, natural heritage systems, significant landscapes and significant landscape features.

Consideration of the meaning of "Significant" with regard to landscapes and landscape features and habitat is described in Section 6 "Definitions". This section also notes that "Wildlife Habitat" means areas where plants, animals and other organisms live and find adequate amounts of food, water, shelter and space needed to sustain their populations. Specific wildlife habitats of concern may include areas where species concentrate at a vulnerable point in their annular life cycle and also areas which are important to migratory or non-migratory species.

The PPS (2020) notes that:

Significant means

A) In regard to wetlands, coastal wetlands and areas of natural and scientific interest, an area identified as provincially significant by the Ontario Ministry of Natural Resources and forestry using evaluation procedures established by the Province, as amended from time to time;
B) In regard to woodlands, an area which is ecologically important in terms of features such as species composition, age of trees and stand history; functionally important due to its contribution to the broader landscape because of its location, size or due to the amount of forest cover in the planning area; or economically important due to site quality, species composition, or past management history. These are to be identified using criteria established by the Ontario Ministry of Natural Resources and Forestry;
C) In regard to other features and areas in policy 2.1, ecologically important in terms of features, functions, representation or amount, and contributing to the quality and diversity of an identifiable geographic area or natural heritage system;
D) In regard to mineral potential, an area identified as provincially significant through evaluation procedures developed by the Province, as amended from time to time, such as the Provincially Significant Mineral Potential Index.

Criteria for determining significance for the resources identified in section (D) are recommended by the Province, but municipal approaches that achieve or exceed the same objective may be also be used.

While some significant resources may already be identified and inventoried by official sources, the significance of others can only be determined after evaluation

IDENTIFICATION OF SIGNIFICANT WILDLIFE HABITAT

A review of the Significant Wildlife Habitat Technical Guide (Ontario Ministry of Natural Resources, October 2000) lays the ground work for identifying habitat features.

Section 8, Evaluation of Significant Wildlife Habitat (SWH) describes the evaluation process and Evaluation Criteria and Guidelines. Although somewhat outmoded this information is still valuable today in a planning context for designing wildlife surveys and understanding wildlife landscapes.

Since the development of the Ecological Land Classification for Southern Ontario, First Approximation and its Application (Lee, H. et al., September 1998) there has been a more landscape-oriented approach to wildlife habitat. This has resulted in the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E, January, 2015 (Ontario Ministry of Natural Resources and forestry).

The approach taken in this latter document has largely taken over from the Significant Wildlife Habitat Technical Guide. Within the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E, Schedule 6E: Identification of Significant Wildlife Habitat is designed to provide the recommended criteria for identifying Significant Wildlife Habitat within Ecoregion 7E. Tables 1.1 through 1.4 within the Schedules provide guidance for SWH designation for the four categories of SWH outlines in the Significant Wildlife Habitat Technical Guide and its Appendices. Table 1.5 contains and provides descriptions for exceptions criteria for ecoregional SWH which will be identified at an ecodistrict scale. Exceptions occur when criteria for a specific habitat are different within an ecodistrict compared to the remainder of an ecoregion or if a habitat only occurs within a restricted area of the ecoregion.

The schedules, including description of wildlife habitat, wildlife species, and the criteria provided for determining SWH, are based on science and expert knowledge. The ELC Ecosite codes are described using the Ecological Land Classification (ELC) for Southern Ontario (1998). The information within these schedules will require periodic updating to keep pace with changes to wildlife species status in the Species at Risk (SARO) list, or as new scientific information pertaining to wildlife habitats becomes available. Therefore, MNRF will occasionally need to review and update these schedules and provide addenda. A reference document for all SWH is found after the schedules and includes citations for all ecoregional schedules. Each citation used to assist with the criteria for SWH will be indicated by a roman numeric symbol. Where no reference exists, MNRF expert opinion was used for determination of criteria.

CRITERIA FOR SIGNIFICANT WILDLIFE HABITAT IN ECOREGION 7E

Criteria for the designation of SWH fall under 4 categories:

1.1 Seasonal Concentration Areas of Animals

1.2 Rare Vegetation Communities or Specialized Habitat for Wildlife
1.2.1 Rare Vegetation Communities
1.2.2 Specialized Habitat for Wildlife

1.3 Habitat for Species of Conservation Concern (Not including Endangered or Threatened Species)

1.4 Animal Movement Corridors

1.5 Exceptions for Eco-Region 7E

(Exceptions are candidate wildlife habitats that will have different criteria than what is proposed in the above schedules for an area within the Eco-region. The exceptions will be based on Eco-Districts and municipalities can apply the exception for the eco-district within their planning area.

SIGNIFICANT WILDLIFE HABITAT REVIEW

A site review of landscape features and species of conservation concern has considered both the direction of the Significant Wildlife Habitat Technical Guide (Ontario Ministry of Natural Resources, October 2000) and the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E, January, 2015 (Ontario Ministry of Natural Resources and forestry).

SIGNIFICANT WETLANDS

The background information review and site investigations conducted as part of the EIS review revealed that there are no significant wetlands within 120 meters of the proposed development lands. Smaller pocket wetlands occur within the bottom of the Cable Drain on site and on adjacent lands floodplains. These features will be protected with planned vegetated setbacks and habitat corridors that are enhanced with a re-naturalized buffer.

Development envelopes will avoid stream corridors and low-lying areas. As well, zoning setbacks and restrictive covenants could be drafted to ensure development does not impact these features. Renaturalization of stream corridors, that have been historically negatively affected by agriculture, as well as vegetated buffers will be implemented to offset impacts. Potential ecological enhancement areas will be identified prior to detailed landscape design.

It is noted that the Sydenham River Wetland Complex occurs downstream of the subject lands on the south side of Albert Street; four kilometers to the west of the Cable Drain lie the Kerwood Woods and Kerwood Swamp. This wetland is primarily a marsh which is evaluated and has a Provincial status. It is noted that significance is limited to those areas south of Albert Street. While the section of the Cable Drain within the Subject lands is mapped as part of the MNHS this reach and adjacent lands have no special significance or designation.

SIGNIFICANT WOODLANDS

The woodlands along the Cable Drain are not large enough to be considered as significant primarily because of size and a lack of landscape contiguity.

Polygon 2 at the upper end on the subject lands contains Black Walnut, Aspen Poplar, White Pine, Green Ash and Manitoba Maple. However even though this feature is within the MNHS it is not significant on its own.

The woodland will not be negatively affected by the proposed development because of setbacks and planned vegetative buffers which will use native species that are bioregionally appropriate and grown from native stock.

SIGNIFICANT VALLEYLANDS

According to the Natural Heritage Reference Manual 2010 (NHRM), section 8.1, "Valleylands means a natural area that occurs in a valley or other landform depression that has water flowing through or

standing for some period of the year." In accordance with Section 8.3 of the NHRM there are no significant Valleylands on or within 120 m of the proposed development lands.

The development intent is to optimize recharge potential and have the predevelopment hydrograph mirrored in the post-development condition.

AREAS OF NATURAL AND SCIENTIFIC INTEREST

A review of current background information sources searched as part of this DAR did not identify any candidate or designated Areas of Natural and Scientific Interest (ANSI) on or within 120 meters of the proposed development site.

NATURAL HERITAGE SYSTEM

The MNHS includes the Cable Drain and provides a link to the Sydenham River corridor. This primary corridor contains the Sydenham River Wetland Complex. The Kerwood Woods and Kerwood Swamp are 4 km distant to the SW.

SIGNIFICANT WILDLIFE HABITAT / SPECIES AT RISK

A review of historical data from the St. Clair Region Conservation Authority and the MNRF was used along with site investigations at the study area to determine if significant wildlife habitat exists within or adjacent to the proposed development lands. Wildlife habitat was investigated in the study area to identify candidate Significant Wildlife Habitat (SWH).

Municipal Species at Risk Reference Guide for the Municipality of Strathroy-Caradoc

The ELC community mapping completed for this DAR was used as the basis for determining the presence (or absence) of candidate SWH that are found in the Municipality of Strathroy-Caradoc: Municipal Species at Risk Reference Guide. These include: Acadian Flycatcher, Bank Swallow, Barn Owl, Barn Swallow, Bobolink, Cerulean Warbler, Chimney Swift, Eastern Meadowlark, King Rail, Least Bittern, Louisiana Waterthrush, Prothonotary Warbler, Yellow-breasted Chat, Fish and Mussel SAR, American Ginseng, Drooping Trillium, False Hop Sedge, Goldenseal, Willowleaf Aster, American Badger, Eastern Small-footed Myotis, Little Brown Myotis, Northern Myotis, Tri-colored Bat, Spoon-leaved Moss, Eastern Hog-nosed Snake, American Chesnut, Blue Ash, Butternut, Eastern Flowering Dogwood, Blanding's Turtle, Spiny Softshell Turtle, Spotted Turtle.

None of these species was found in field studies.

Natural Heritage Information Centre

Other potential species of fauna on the subject lands were determined through a search of Natural Heritage Information Centre data. A 1 km square (17MH4756) contains all of the subject lands and the following species were listed as having the potential to exist in this general geographic area: Midland Painted Turtle, Least Bittern, Eastern Meadowlark, Snapping Turtle, American Burying Beetle, Tawny Emperor.

Potential Species of Conservation Concern out of those listed include: Acadian Flycatcher, Barn Swallow, Bobolink, Eastern Meadowlark, Least Bittern, Little Brown Myotis, Eastern Hog-nosed Snake, Butternut,

Eastern Flowering Dogwood, Blanding's Turtle, Spotted Turtle, Midland Turtle, Least Bittern, Eastern Meadowlark, Snapping Turtle and Tawny Emperor.

None of these species was found in field studies.

OMNR Significant Wildlife Habitat Technical Guide (OMNR, 2000) and Significant Wildlife Ecoregion Criteria Schedules (OMNR, January, 2015)

The OMNR Significant Wildlife Habitat Technical Guide (OMNR, 2000) and Significant Wildlife Ecoregion Criteria Schedules (OMNR, January, 2015) were the primary documents used to identify and evaluate wildlife habitat. The Significant Wildlife Habitat Technical Guide describes five broad categories of wildlife habitat which includes: (1) seasonal concentration areas; (2) rare vegetation communities; (3) specialized habitat for wildlife; (4) habitat for species of conservation concern; and (5) animal movement corridors.

A review of these documents as well as technical monographs for individual species were used to determine if there is potential habitat for species of conservation concern.

Field Studies

Field studies using the protocols provided by OMNRF were undertaken during every site visit. The actual stream channel of the Cable Drain was walked with a collecting net to search for flora and fauna, especially SAR. In breeding bird studies and also observations for incidental bird sightings special attention was paid to species of conservation concern.

CONCLUSIONS:

No SAR or species of conservation concern were present during the field season of 2022.

SEASONAL CONCENTRATION OF ANIMALS

The Significant Wildlife Habitat Technical Guide (OMNR) 2000 has identified 14 potential types of seasonal concentration areas:

WINTER DEER YARDS

- The OMNRF has undertaken mapping for "Areas of Wintering Deer Yard Habitat". While there are deer game trails in the woodlands along the north and west edges of the proposed development lands there is no habitat within these lands which are under intensive agricultural usage.

MOOSE LATE WINTER HABITAT

- Not applicable in Middlesex County

COLONIAL BIRD NESTING SITES

- No observations of colonial nesting birds were made during the site field visits. Landscape use, terrain characteristics and habitat types are not conducive to colonial bird nesting within the study area.

WATERFOWL STOPOVER AND STAGING AREAS

- The Aylmer District of OMNRF, Canadian Wildlife Service and Ducks Unlimited Canada have jointly undertaken historical land reviews for potential significant waterfowl stopover and staging areas in Middlesex County. The subject lands have not been identified nor do they have suitable habitat to support this ecological function within the proposed licensed boundary or adjacent lands.

WATERFOWL NESTING HABITAT

- Waterfowl nesting habitat does not occur within the subject lands or the adjacent lands for Canada Geese.

SHOREBIRD MIGRATORY STOPOVER SITES

- No lands for shorebird migratory stop over occurs at the site lands.

LAND BIRD MIGRATORY STOP OVER AREAS

- There are no habitat opportunities within the agricultural lands which make up over 90% of the subject lands.
- Woodland and wetland areas provide opportunities for seasonal migrants and these areas will remain as they are and will not be impacted by the proposed development.

RAPTOR WINTERING AREAS

- There is potential for hawks such as Red-tailed hawk, Coopers Hawk and American Kestrel to find habitat at this site. All birds favor a landscape habitat mix of open fields, scrub land and woodlands. In this case with land use dominated by agriculture opportunities are limited and will be about the same in a developed state. It is noted that Red-tailed Hawks were seen flying over the site on a number of occasions in 2022. Since the surrounding regional landscape is largely rural and natural it is expected that raptors are commonly sighted.

WILD TURKEY WINTERING AREAS

- There is little to no potential for Wild Turkey at the subject lands.

TURKEY VULTURE SUMMER ROOSTING AREAS

- No suitable habitat or surrounding habitat features to support this ecological function were found within the subject lands or adjacent lands.

REPTILE HIBERNACULA

- No suitable habitat or surrounding habitat features to support this ecological function were found within the subject lands or adjacent lands.

BAT HIBERNACULA

- No suitable habitat or surrounding habitat features to support this ecological function were found within the subject lands or adjacent lands.

BULLFROG CONCENTRATION AREAS

- At the time of the spring field survey (May 23, 2021) no bull frogs were seen or heard calling. It is noted that habitat conditions were not suitable for any sizeable amphibian concentrations and there is no open water within the subject lands.

MIGRATORY BUTTERFLY STOPOVER AREAS

- The subject lands are under intensive agriculture with little old field character. Therefore, there is no suitable habitat or surrounding habitat features to support this ecological function within the proposed development lands or on adjacent lands.

WILDLIFE MOVEMENT CORRIDORS

No provincially or regionally significant corridors are designated for this area of Ontario. There are game trails within the woodlands and along the edges of farm fields but these are small and incidental. Field investigations confirmed that no significant wildlife corridor functions occur within the subject lands or adjacent lands. It is noted that there are game trails at the woodland edges that lead into the adjacent woodlands and disperse thereafter.

RARE VEGETATION COMMUNITIES OR SPECIALIZED HABITAT

- RARE VEGETATION COMMUNITIES
    - No rare or unusual vegetation communities are found within the proposed development lands. Most of the land use is for agricultural purposes and the vegetation and ELC units within the subject lands and adjacent lands have been described as not significant in the foregoing.
- SPECIALIZED HABITAT FOR WILDLIFE
    - The Significant Wildlife Habitat Technical Guide (OMNR, 2000) identifies 12 categories for the evaluation of specialized habitat for wildlife:
    - Sites supporting area sensitive species:
        - No suitable habitat or surrounding habitat features were observed to support this ecological function within the subject lands or the adjacent lands. The majority of current land use within the subject lands is predominantly agricultural.
    - Forest stands providing a diversity of habitat:
        - The results of field studies indicate that the only forest stands of significance are in ELC polygons 7, 8, 9, and 10 and also on adjacent lands. The subject lands have only a very small fringe of woodland to the north and west.
    - Old Growth or mature forest stands:
        - There are no old growth characteristics, as defined by the Province for Old Growth Forests at the subject lands.

- Seeps and Springs:
  - There are no seeps or clear springs on the subject lands.
  - There is no potential for over-wintering habitat for Wild Turkeys.
- Woodlands Supporting Amphibian Breeding Ponds:
  - As noted earlier no open water was found at the subject lands or on adjacent lands. Amphibian breeding habitat was not identified in the spring field season.
- Special Woodland Feeding Habitat:
  - There is no special woodland feeding habitat found in the subject lands or adjacent lands. No mast trees were found here.
  - It is not expected that development of the subject lands would negatively affect wildlife.
- Osprey and specialized raptor nesting habitat:
  - No suitable habitat was found within the subject lands
- Turtle Nesting Habitat:
  - Habitat suitable for Snapping Turtles was found along the Cable Drain but evidence of turtle nesting was not found within the subject lands or adjacent lands.
- Special Moose Habitats:
  - Not applicable in Middlesex County.
- Mink and Otter Feeding/Denning Sites; Marten and Fisher Denning Sites:
  - No suitable habitat for Otter was found at the subject lands or adjacent lands.
  - Mink feeding and denning habitat was not found at the subject lands or adjacent lands due to low quality of eutrophic waters.
- Areas of High Diversity:
  - There are no areas of high diversity and specialized microhabitat on the subject lands.
- Cliffs and Caves:
  - No geological features of this nature were identified within the subject lands or the adjacent lands.

HABITAT OF SPECIES OF CONSERVATION CONCERN

FLORA

Field investigations of the subject lands and adjacent lands included plant surveys which were used to complete Ecological Land Classification inventories and habitat descriptions. Plants are described in Appendix "A" – Plant Species List. *It is noted that no plant species of Conservation Concern at any level of classification was found.*

FAUNA

The results of the background information review, ELC mapping and field surveys showed that the subject lands do not contain significant wildlife habitat features. Wildlife is described in Appendix 'A', Wildlife Species List

Scattered Monarch Butterflies were found associated with the same areas where Milkweed was flowering along the edges of cropland.

FISHERIES HABITAT

Section 34 of the Fisheries Act notes that, "..." fish habitat" means spawning grounds and nursery, rearing, food supply and migration areas on which fish depend on directly or indirectly in order to carry out their life processes ...". *Due to physical barriers to fish migration and a sluggish low flowing eutrophic condition of the Cable Drain there is no significant fish habitat at this site.*

NATURAL HERITAGE INFORMATION CENTRE

A search of the 1 km square information in the "Make A Map" function of the NHIC website revealed 6 species of conservation concern within the 1 km square which contains the subject lands. These species have the potential of being at the subject lands if adequate habitat is available.

- Midland Painted Turtle – SC - Special Concern: The midland painted turtle is currently listed as Special Concern under the federal Species at Risk Act (2018) and has yet to be assessed by the Committee on the Status of Species at Risk in Ontario. The species has been designated as a Specially Protected Reptile under the Ontario Fish and Wildlife Conservation Act which offers protection to individuals but not their habitat. This species was searched for along with other potential turtles and was not found. It is expected that the natural habitat at the subject lands is too degraded to meet their needs.
- Least Bittern – THR - Threatened: The Least Bittern is currently listed as Threatened under both the federal Species at Risk Act and the provincial Endangered Species Act. "Threatened" means the species lives in the wild in Ontario, is not endangered, but is likely to become endangered if steps are not taken to address factors threatening it. In Ontario the Least Bittern is found in a variety of wetland habitats, but strongly prefers cattail marshes with a mix of open pools and channels.

  Small numbers of this bird breed in southern Ontario but this species has disappeared from much of its former range, especially in southwestern Ontario, where wetland loss has been most severe. This is the situation at the subject lands where habitat is very limited and the aquatic habitat is degraded and eutrophic. This species was searched for during field studies over the course of the summer and was not found.
- Eastern Meadowlark – THR - Threatened: There is potential habitat along the length of the subject lands but no birds were detected at any time in field surveys. Though still common and wide spread, the Eastern Meadowlark was recently designated as a threatened species in Ontario, primarily as a result of strong population declines that have been occurring in Ontario and across most of their breeding ranges. This species was searched for during field studies over the course of the summer and was not found. It is suspected that this absence is due to habitat disturbance and that the crop rotations on agricultural lands surrounding the study area do not include hay or pasture.
- Snapping Turtle – SC – Special Concern: habitat with the potential for life cycle and overwintering is found in the main lower creek and associated floodplain. Despite extensive searches for this species and other turtles none were found in 2022. The SC designation means that the species lives in the wild in Ontario, is not endangered or threatened, but may become threatened or endangered due to a combination of biological characteristics and identified threats.

- American Burying Beetle – EXP – Extirpated: This species is believed to be extirpated in this area of Ontario and has not been seen since 1972. Its preferred habitat is in a woodland setting which is limited at the subject lands.
- Tawny Emperor – G5 – apparently Secure: This species of butterfly does not have a ranking under SARO or CSEWIC. It was not detected over the course of field studies.

SIGNIFICANT WILDLIFE HABITAT CRITERIA SCHEDULES

A review of the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (January, 2015) indicates that the following significant wildlife habitat and related species may be found at this site.

Identification of Significant Wildlife Habitat

Raptor Wintering Area

There is potential for Red-tailed Hawk to over winter at the site lands.

The habitat association is with deciduous woodlands and open lands where prey such as meadow voles or rabbits may be found.

The overall habitat provides a combination of fields and woodlands that provides roosting, foraging and resting habitats for wintering raptors. It is noted that Red-tailed hawks have been observed in incidental sightings overhead at the subject lands from March to September.

Turtle Wintering Areas

There may be over wintering sites for Snapping Turtles in swamps with both standing and flowing water.

For most turtles wintering areas are in the same general areas as their core habitat. Water has to be deep enough not to freeze and have soft mud substrates.

Over-wintering sites are permanent water bodies, large wetlands and bogs or fens with adequate dissolved oxygen.

The mapped ELC ecosite area with potential for over wintering turtles is associated with polygon 4 and adjacent sections of the Cable Drain and adjacent lands downstream.

It is noted that ditches and lower wetland areas on the main stream in the south end of the site were searched and no turtles were found.

Reptile Hibernaculum

Despite a concerted effort from March to September no snakes were found at the site. This is likely due to a lack of habitat in the agricultural fields.

Deer Yarding Areas

Deer yarding areas or winter concentration areas (yards) are areas deer move to in response to the onset of snow and cold.

Despite a limited amount of potential SWH and deer (signs in the agricultural fields at the site there is no mapped habitat for the subject lands.

Deer Winter Congregation Areas

As above for Deer Yarding Areas.

Woodlots are below a typical threshold (4 Hectares) of recognized habitat.

Rare Vegetation Communities or Specialized Habitat for Wildlife

Seeps and Springs are typical of headwater areas and are often at the source of coldwater streams.

This would have been true at one time before headwater drainage was put in the existing tile drains and the Ward and Cable Drains were created. However the general habitat has been degraded and water quality has been generally degraded and is now eutrophic.

Seeps and springs that are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species but this is not found at the subject lands.

Amphibian Breeding Habitat (Woodland)

This type of habitat does not occur at the subject lands.

These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations.

Wildlife associated with this habitat include: Eastern newt, Blue-spotted Salamander, Spotted Salamander, Gray Treefrog, Spring Peeper, Western Chorus Frog, Wood Frog.

A combination of observational study and call count surveys could detect very few frog calls and only those of *pickerel frogs from the vicinity of polygon 4 in July*; there were very few calls. This situation is probably due to low water quality.

HABITAT FOR SPECIES OF CONSERVATION CONCERN (NOT INCLUDING ENDANGERED OR THREATENED SPECIES)

OPEN COUNTRY BIRD BREEDING HABITAT

This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly over the past 40 years based on CWS (2004) trend records.

The site species for this category includes Savannah Sparrow which is apparently secure.

Habitat Criteria and Information Sources

Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years)

Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older.

The indicator bird species are area sensitive requiring larger grassland areas than the common grassland species.

Defining Criteria

A field with 1 or more breeding Short-eared Owls is considered SWH.

The area of SWH is the contiguous ELC ecosite field areas.

Conduct field investigation of the most likely areas in spring and early summer when birds are singing and defending their territories.

Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects.

SHRUB/EARLY SUCCESSIONAL BIRD BREEDING HABITAT

This wildlife habitat is declining throughout Ontario and North America.

The site species for this category includes Field Sparrow.

Habitat Criteria and Information Sources

Large field areas succeeding to shrub and thicket habitats >10 ha in size.

Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years).

Shrub thickets habitats (>10 ha) are most likely to support and sustain a diversity of these species.

Shrub and thicket habitat sites considered significant should have a history of longevity, with abandoned fields or pasturelands.

Defining Criteria

Field Studies confirm:

Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species.

A habitat with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat.

The area of the SWH is the contiguous ELC ecosite field/thicket area.

Conduct field investigation of the most likely areas in spring and early summer when birds are singing and defending their territories.

Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects".

OTHER POTENTIAL SWH CHARACTERISTICS AND FEATURES.

Other potential SWH characteristics and features as described in the Significant Wildlife Habitat Criteria Schedules for Ecoregion 7E (January, 2015) are not included here due to a lack of necessary and defining criteria such as wildlife species or habitat characteristics.

ENGINEERING CONSIDERATIONS

HYDROLOGY / HYDROGEOLOGY / SITE SERVICING

A Functional Servicing Report (FSR) was completed by B.M. Ross and Associates Limited (BMROSS) in December 2022. The report includes information on the servicing and stormwater management for the proposed residential management. The report includes the following information on the road, water, sanitary and storm networks.

ROADS

AS mentioned in the FSR, "... the proposed site access will be provided through a 20.117m wide road allowance from the existing Saulsbury Street right-of-way extending south through the south limit of the proposed subdivision with a connection to the existing Albert Street right-of-way."

The proposed roads will have an 8m asphalt width and semi-mountable curb and gutter as per OPSD-600.060 providing a total width of 8.55m gutter to gutter, a 6.3m asphalt width and semi-mountable curb and gutter providing a total width of 6.85m (gutter to gutter).

WATER

As mentioned in the FSR, "...water servicing for the proposed development will be provided by municipal watermains with isolation gate valves, hydrants, and individual 25mm Series 160 HDPE water service connections to each residential lot all in accordance with the current Strathroy-Caradoc Standards."

SANITARY

As mentioned in the FSR "... sanitary servicing within the development will be by conventional gravity sewers with an outlet to a proposed sewage pumping station wet well.

The lots in the Plan of Subdivision will be provided with individual 150mm diameter PVC sanitary service connections with cleanouts at the property line in accordance with the current Strathroy-Caradoc Standards."

STORM DRAINAGE

Existing Drainage Outlets

As mentioned in the FSR, "the existing Cable Municipal Drain runs south from Pike Road and Saulsbury Street towards Napperton Drive, and is currently the legal outlet for all the development lands. The predevelopment conditions are overland flow through most of the development areas. However, some of the flow is tributary into existing storm sewers along the north edge of Napperton Drive and conveyed to the Cable Drain at the Napperton Drive culvert crossing."

As mentioned in the FSR, due to a redistribution of floodwater to achieve a balanced flood volume, an area will be cut from the southern most section of Block 137, (approximately 700 cubic meters

Storm Sewers

As mentioned in the FSR, "... storm drainage within the proposed development will be by conventional gravity sewers, discharging to the existing Cable Municipal Drain.

The storm sewers will be designed using a 5-year design storm for the minor system each and each residential lot will have a 150mm PVC storm service connection and a rear yard catch basin connected to the storm service."

Stormwater Management

AS mentioned in the FSR, "... the proposed SWMFs will be designed to provide storage for surplus runoff from a 100-yr storm event for the entirety of the proposed Plan of Subdivision. The SWMF located in Block 137 will be an extended detention wet pond with a sediment forebay and permanent pool sized for Enhanced 80% long-term TSS removal under 60% imperviousness. The SWMF will consist of a control structure with a reverse slope pipe and orifice plates to restrict flow to predevelopment rates and achieve a 24hr draw-down time for the treatment events. The SWMF basin will utilize stepped side slopes of 3:1 and 7:1 for safety as per MECP guidelines."

The FSR also provides the following information on the proposed infiltration basin:

The infiltration basin located in Block 136 will have 4:1 side-slopes, an inlet headwall with energy dissipation features, and rip rap protection over the basin bottom to reduce erosion potential and protect the soils from compaction during rainfall events. The outlet from the SWM basin will consist of a grated outlet structure with an outlet pipe with an orifice sized as a flow restrictor to control discharge to the downstream system to pre-development levels. The minor storm events will be infiltrated through the bottom of the pond with major events using the orifice to control flows to within predevelopment rates.

The hydrograph of the two (2) SWMFs will be used to determine that the cumulative flows are restricted to the predevelopment flow rates."

To address stormwater quality, The FSR mentioned that, "... it is proposed to implement a combination of lot level and end-of-pipe quality control measures in the development. Roof drainage shall be discharged to the ground surface and directed to flow overland through landscaped areas towards rear yard catch basins and the road to promote filtration and absorption of runoff. The catch basins on the proposed road shall be provided with appropriate sumps per Strathroy-Caradoc Standards. The gravity collection sewers tributary to SWMF in Block 136 shall flow through an oil-grit-separator (OGS) to collect suspended sediments, oils, and floatable debris and reduce the potential for the conveyance of contaminants to the downstream receiver. The proposed OGS unit will be a Stormceptor® EF-8 unit or approved equivalent sized to provide an 80% TSS removal rate meeting the Enhanced level of treatment.

In order to ensure the stormwater quality control features continue to function properly the catch basins, manholes, and Stormceptor® devices shall be inspected annually to monitor the amount of oil and sediment collected. The catch basin and OGS sumps should be pumped out and accumulated deleterious materials disposed of as required. The inlet and outlet devices in the OGS unit shall also be checked for any trapped debris or blockages and be cleaned as required."

POTENTIAL PROJECT IMPACTS

NATURAL HERITAGE

VEGETATION

Field studies have determined that there are no species of conservation concern within the designated study area. Bitternut Hickory (Carya cordiformis) (S3) and Black Walnut (Juglans nigra) (S4) are the only species of interest. These are apparently secure and within the study area. These species would only be impacted if natural areas were disturbed.

WILDLIFE

Species of Conservation Concern were determined to be Carolina Wren (Thyrothorus ludovicianus) (S3, S4), Field Sparrow (Spizella pusilla) (S4B), and Kildeer (Charadrius vociferus) (S45). These species are apparently secure and habitat is found within the study area. Field studies did not find appropriate habitat for these species within adjacent lands. If the study area is disturbed then species will be disturbed.

MNHSS

The corridor of the Cable Drain is within the MNHS. No special status is given to this reach of the corridor. A disturbance of the corridor could negatively impact on habitat through fragmentation and a direct loss of suitable wildlife habitat which is on-site and downstream beyond the study area.

ENGINEERING CONSIDERATIONS

The disturbance of development lands during installation of services and infrastructure during various construction phases could cause problems with erosion and sediment runoff over land and into storm sewers.

STORM WATER MANAGEMENT

Storm water management for both quality and quantity needs to be considered. This is especially true to protect the stream corridor and stream itself. There is always the potential for SWMF to be overwhelmed by 100 year and larger storm events which could be damaging to property and wildlife habitat.

It is also important to maintain the pre-development stormflow characteristics to protect aquatic and terrestrial habitat; this is especially important within the context of the MNHSS.

QUALITY CONTROL

It is especially important to maintain quality control of SW where the discharge will go directly into a water course and a sensitive natural heritage corridor. This is important for maintaining integrity in the long term and the habitat of extant species which inhabit the corridor. Both sediment load and chemicals such as grease and oil need to be mitigated.

PROPOSED MITIGATION

The greatest mitigation from potential impacts is maintaining a 30 - meter offset from the Cable Drain top of bank as required by the municipality. The resulting buffer will be naturalized with plants that are bioregionally appropriate and help to create a habitat that is suitable for the wildlife that was found in the site surveys and grassland bird species.

The construction impacts requiring erosion control and sediment capture will be mitigated through the implementation of standard mandated approaches. Standard methods will be implemented and maintained through all phases of development.

STORM DRAINAGE

Pre-existing Storm Flow will be re-routed through new facilities with sufficient capacity prior to development. Larger capacity storm sewers will replace older storm sewers on Napperton Drive. Increased flood storage will be added in accordance with a cut and fill analysis that accommodates historic filled volume with a cut volume equal to what was filled elsewhere along the Cable Drain.

STORM WATER MANAGEMENT

QUANTITY

The existing lands or the proposed Plan of Subdivision and the adjacent properties have been analyzed to determine the proper catchment areas and pre-development flow rates that are tributary to the Cable Drain. The proposed SWMFs will be designed to provide storage for surplus runoff from a 100-yr storm event for the entirely of the proposed Plan of Subdivision.

As mentioned in the FSR completed by B.M Ross, "... the outlet from the SWM basin will consist of a grated outlet structure with an outlet pipe with an orifice sized as a flow restrictor to control discharge to the downstream system to pre-development levels. The minor storm events will be infiltrated through the bottom of the pond with major events using the orifice to control flows to within predevelopment flow rates.

The hydrographs of the two (2) SWMFs will be used to determine that the cumulative flows are restricted to the pre-development flow rates."

QUALITY

As mentioned in the FSR stormwater quality will be addressed through a combination of lot level and end-of-pipe quality control measures in the development ...", as previously described.

As mentioned in the FSR, "...the multi-component SWM approach will be designed to meet MECP guidelines for quantity and quality control for the proposed residential development. The storm sewer infrastructure will be designed to capture and convey runoff for the minor system. Major storm runoff in excess of what can be accommodated by the minor collection system will flow overland along the road allowances to the SWMF."

AS mentioned in the FSR, "... in order to endure the stormwater quality control features continue to function properly, there should be annual inspection and maintenance of all stormwater infrastructure.

CONCLUSIONS

In accordance with the Middlesex County Official Plan (2007), development applications within or adjacent to Natural Heritage Features shown on Schedule 'C' shall require submission of a Development Assessment Report (DAR). The DAR shall describe the ecological processes creating and maintaining the affected elements of the Natural System and indicate the potential impacts of the proposed development upon those processes. Where the Development Assessment Report indicates that there will be a negative impact on the natural system or ecological process that cannot be adequately mitigated, the development applications shall not be approved. If local municipalities require a Development Assessment Report or equivalent impact assessment document or equivalent impact assessment document as part of their approval process, the County will waive its requirement, provided the impact assessment submitted to the local municipality meets the County's requirements as set out below

The Development Assessment Report shall be undertaken to a professional standard and approved by the County. The DAR shall address the following:

A) Description of the development;

B) Description of the natural features;

C) Identification of Potential Impacts;

D) Identification and Recommendation of Mitigation Measures.

This report is the Development Assessment Report for the Buchanan Crossings project.

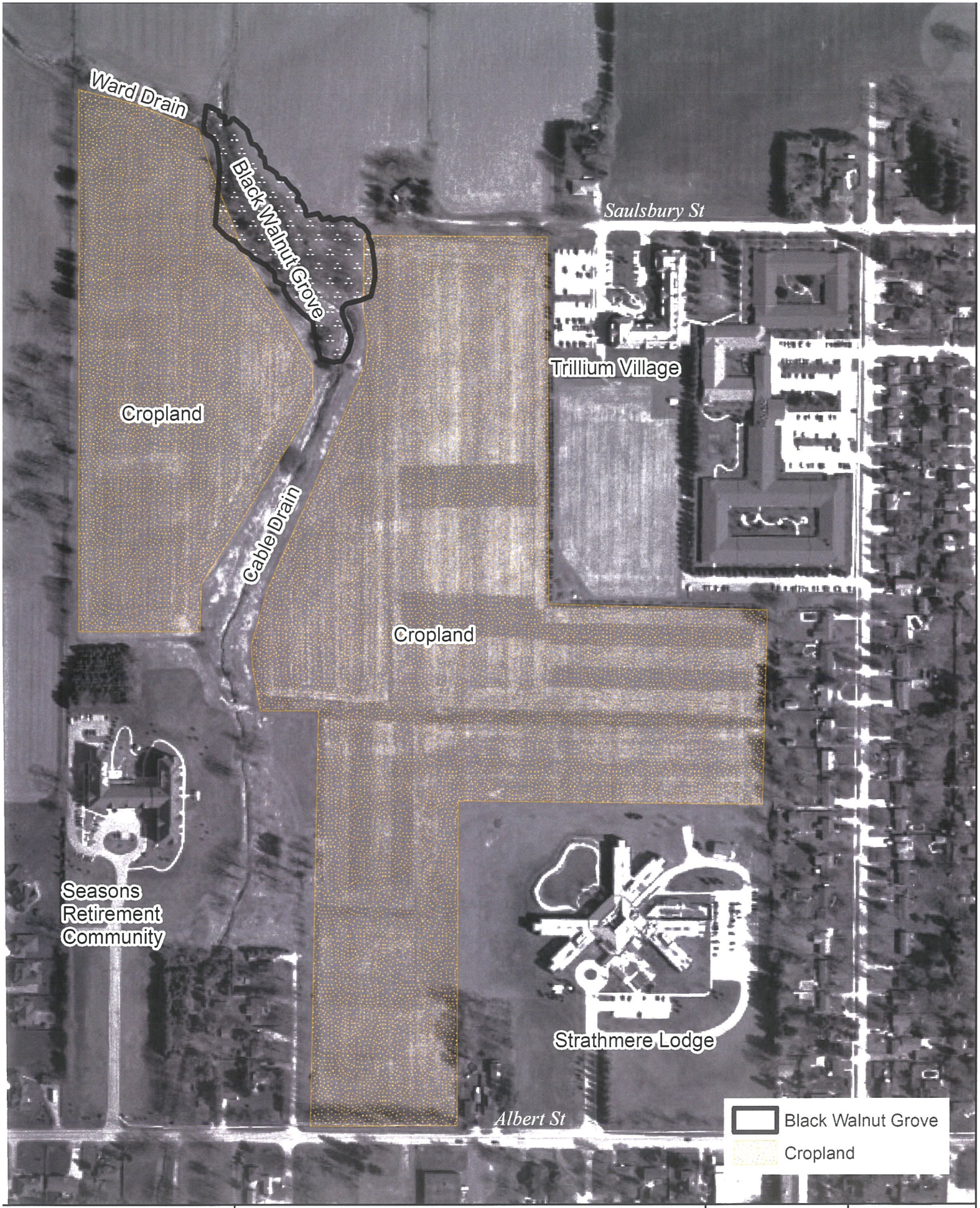
The above approach has been undertaken in accordance with Provincial and Municipal requirements.

It is the opinion of the author that the proposed development can be undertaken with minimal impact on the Cable Drain and the MNHS. It is anticipated that there will be no negative impact on the natural system or ecological processes that cannot be adequately mitigated.

Respectfully submitted (December 11, 2022)

Christopher Jay Hart, M.Sc., M.L.A., Ecologist – Landscape Architect

FIGURES



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Buchanan Crossings
Background and Inventory

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DATE	PROJECT No.
December 2022	21020
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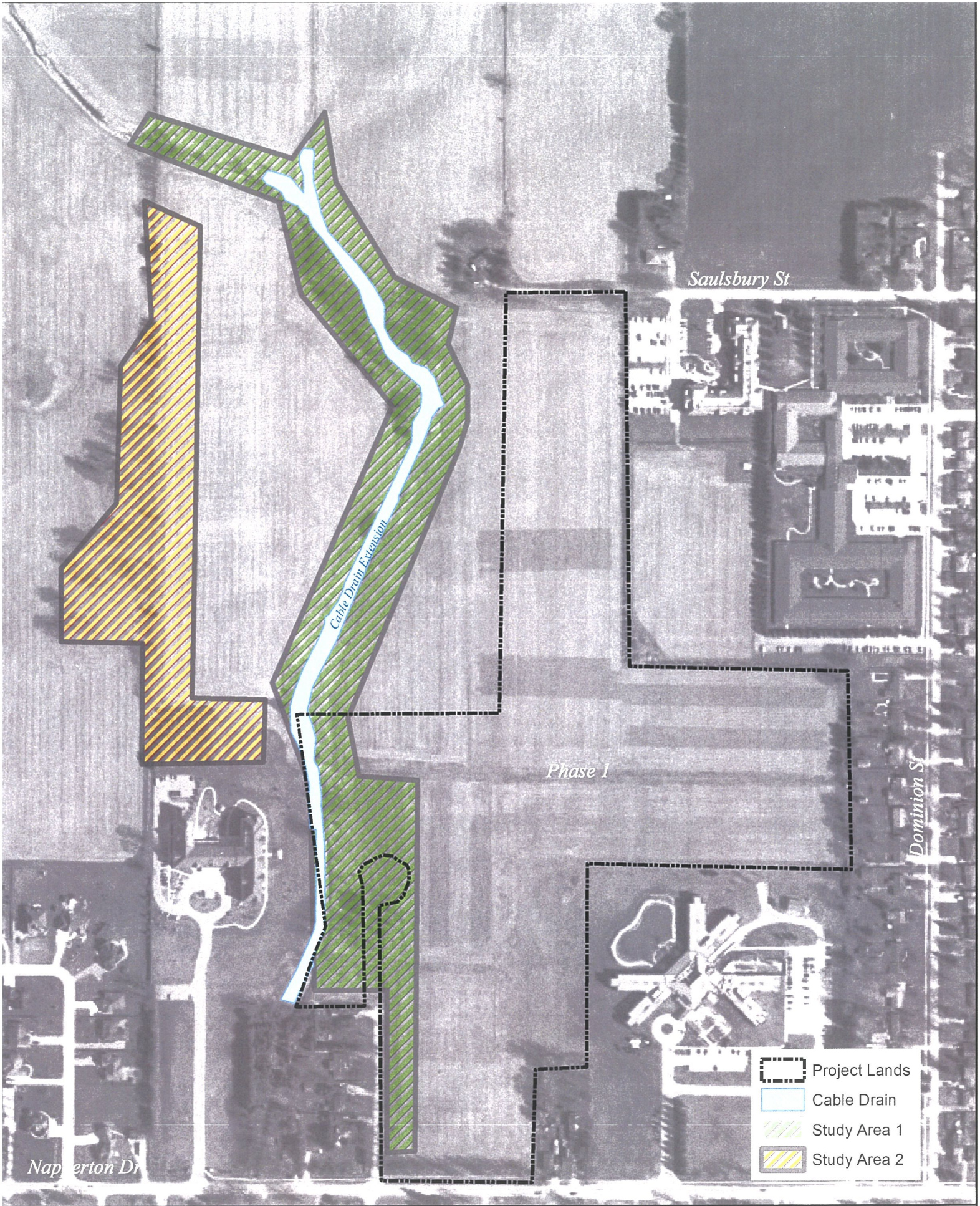

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Buchanan Crossings Study Areas

0 50 100 200 m

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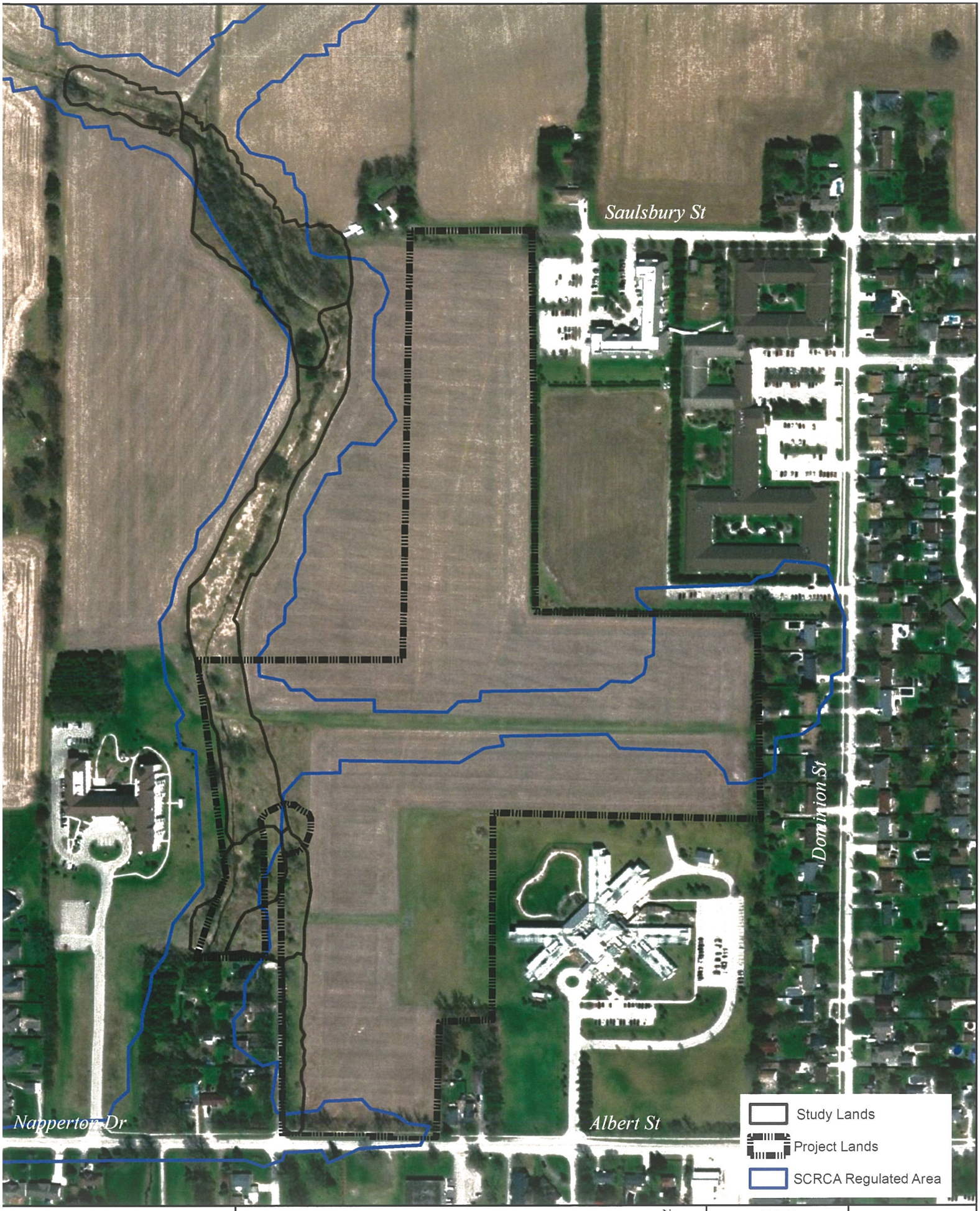
DATE: December 2022	PROJECT No. 21020
SCALE 1:4000	FIGURE No. 2



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Buchanan Crossings
SCRCA Regulated Area

0 50 100 200 m

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DATE	PROJECT No.
December 2022	21020
SCALE	FIGURE No.
1:4000	3

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Buchanan Crossings
Ecological Land Classification

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DATE	PROJECT No.
December 2022	21020
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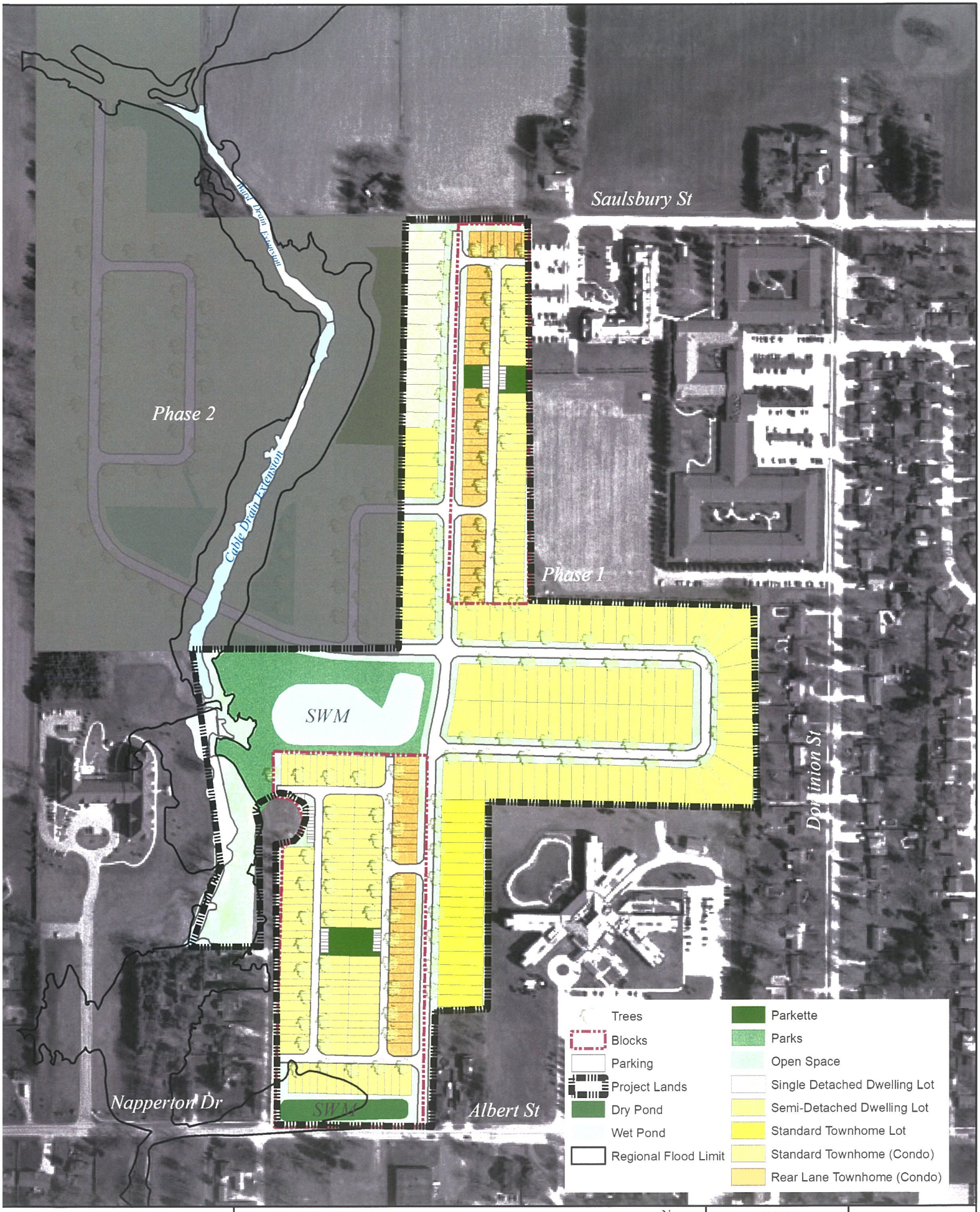

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Buchanan Crossings Conceptual Plan

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DATE	PROJECT No.
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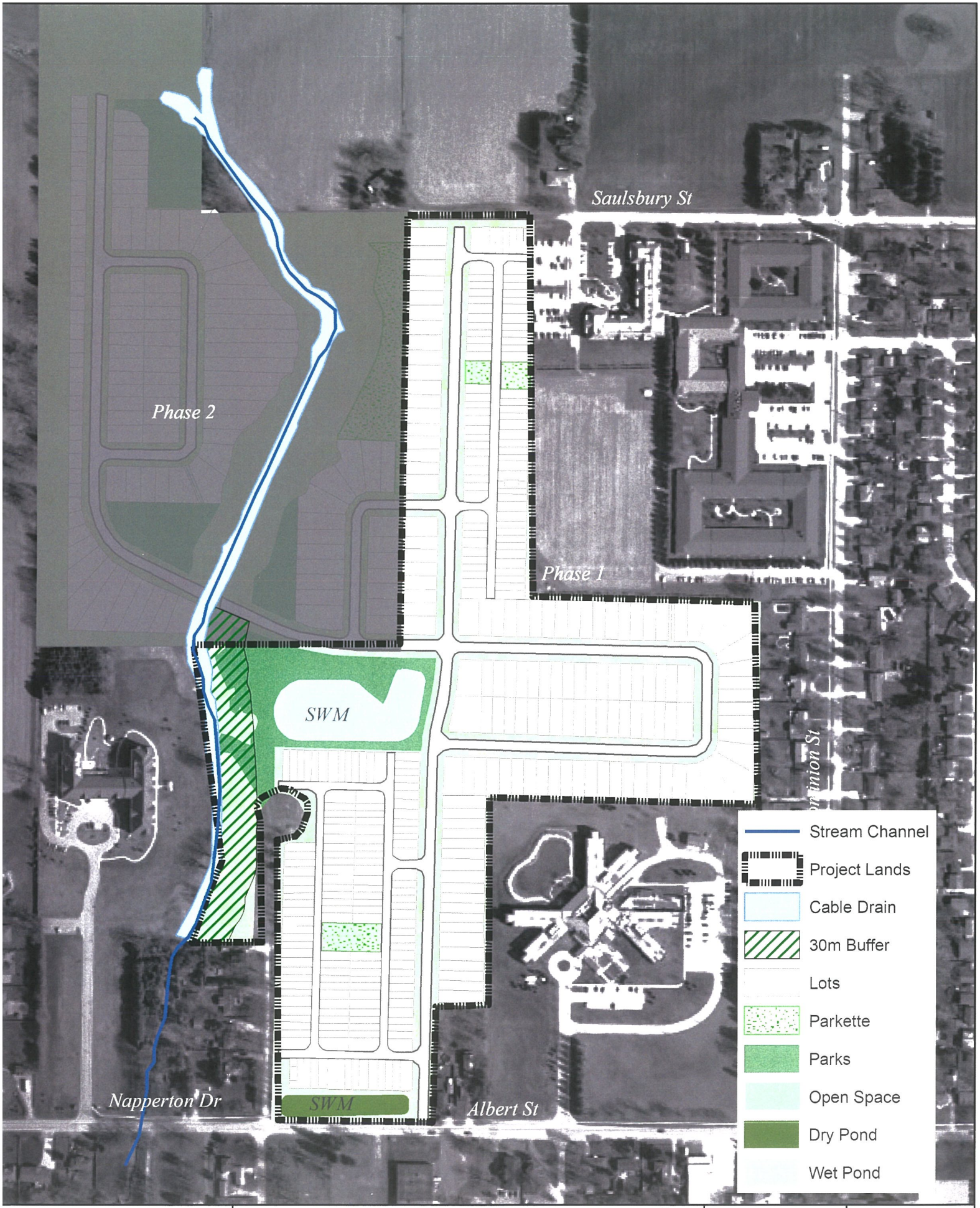

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Buchanan Crossings
Mitigation Measures

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DATE	PROJECT No.
December 2022	21020
SCALE	FIGURE No.
1:4000	6

APPENDICES

- **PLANT LIST**

- **WILDLIFE SPECIES LIST**

PLANT LIST

BUCHANAN CROSSINGS - PLANT LIST		ELC POLYGON						CONSERVATION		WET-	SENSI-	WEED-
Dec-22		1	2	3	4	5	6	Global	Provincial			
Scientific Name	*Common Name*							GRANK	SRANK	NESS	TIVITY	INESS
Acer negundo	Manitoba Maple		X	X		X	X	G5	S5	-1	5	
Acer saccharinum	Silver Maple	X		X		X		G5T5	S5	-3	5	
Acer saccharum ssp. saccharum	Sugar Maple						X	G5T5	S5	3	4	
Achillea millefolium	Yarrow					X	X	GNR	SNA	5	0	3
Alliaria petiolata	Garlic Mustard	X	X					GNR	SNA	0	0	-3
Arctium minus ssp. minus	Common Burdock			X				GNRTNR	SNA	0/5?	5/8?	-2
Asclepias syriaca	Common Milkweed					X	X	G5	S5	5	0	
Aster azureus	Azure Aster			X				G5	S5	3		
Brassica rapa	Field Mustard	X	X	X				GNR	SNA	0/5?	0	-1
Bromus inermis ssp. inermis	Smooth Brome	X	X		X	X	X	GNR	SNA	5	0	-3
Carya cordiformis	Bitternut Hickory			X				G5	S3	0	6	
Chenopodium album	White Pigweed						X	GNR	SNA	3		
Circacea canadensis	Enchanter's Nightshade		X					GNR	SNA	5		
Cirsium arvense	Canada Thistle					X		GNR	SNA	3	0	-1
Clinopodium vulgare	Wild Basil			X				G5	S5	5	4	
Cornus racemosa	Gray Dogwood	X	X	X				G5	S5	3		
Cornus stolonifera	Red Osier Dogwood	X		X				G5	S5	-3	2	
Crataegus mollis	Downy Hawthorn			X				G5	S5	-2	4	0
Dactylis glomerata	Orchard Grass	X		X				GNR	SNA	3	0	0
Datura stramonium	Jimsonweed						X	GN3	SE5	3		
Daucus carota	Wild Carrot			X	X			GNR	SNA	5	0	-2
Dactylis glomerata	Orchard Grass		X					GNR	SNA	3		
Diervilla lonicera	Bush Honeysuckle		X		X			G5	S5	5	5	
Echinocystis lobata	Wild Cucumber		X	X				G5	S5	-2		
Equisetum arvense	Field Horsetail			X				G5	S5	0	0	
Erigeron annuus	Daisy Fleabane			X	X			G5	S5	1	0	
Euthamia graminifolia	Narrow Leaved Goldenrod		X					G5	S5	-2	2	
Fraxinus pennsylvanica	Green Ash	X	X	X				G5	S5	-3	3	
Festuca ovina	Sheep Fescue			X				GNR	SE4	5		
Geranium robertianum	Herb Robert			X				G5	S5	3		
Geum aleppicum	Yellow Avens	X	X					G5	S5	-1		
Helianthus annuus	Common Sunflower		X	X				G5	S5	3		
Hesperis matronalis	Dames Rocket			X				G4C5	Exotic	5		-3

	POLYGON	1	2	3	4	5	6					
Impatiens capensis	Jewelweed		X	X				G5	S5	-3	4	
Juglans nigra	Black Walnut	X	X	X	X	X	X	G5	S4	3	5	
Juniperus virginiana	Eastern Red Cedar			X				N5	S5	3		
Leonurus cardiaca	Motherwort		X					GNR	SE5	3		
Lolium perenne	Ryegrass				X			GNR	SNA	1		
Malus sp.	Feral Apple			X				NA	NA	0	5	
Medicago lupulina	Black Medick				X			GNR	SNA	1	0	-1
Medicago sativa ssp. sativa	Alfalfa			X				GNRTNR	SNA	5	0	-1
Melilotus officinalis	Sweet Yellow Clover				X			GNR	SNA	3		
Oenothera biennis	Evening Primrose			X				G5	S5	3	0	
Panicum virgatum	Panic Switch Grass					X	X	G5	S4	-1	6	
Parthenocissus quinquefolia	Virginia Creeper	X	X	X	X			G5	S5	1	6	
Phalaris arundinacea	Reed Canary Grass	X	X					G5	S5	-4	0	
Phragmites communis	Phragmites			X				GNR	N5	3		
Picea abies	Norway Spruce					X		GNR	Exotic	3	0	-1
Pilosella caespitosa	Meadow Hawkweed					X	X	GNR	SNA	5	0	
Pinus strobus	Eastern White Pine		X	X				G5	S5	3	4	
Plantago major	Common Plantain				X	X	X	G5	S5	-1	0	-1
Poa compressa	Canada Bluegrass		X					GNR	SNA	3		
Populus tremuloides	Aspen Poplar		X	X	X			G5	S5	0	2	
Prunus virginiana ssp. virginiana	Choke Cherry			X				G5	S5	1	2	
Quercus alba	White Oak				X			G5	S5	3		
Rhamnus cathartica	Common Buckthorn		X	X				GNR	SNA	3	0	
Rhaponticum repens	Russian Knapweed				X	X	X	GNR	SNA	3		
Rubus idaeus ssp. Idaeus	Wild Red Raspberry		X					G5T5	SE5	-2	0	
Rubus occidentalis	Black Raspberry	X	X					GNR	SNA	5	2	
Rudbeckia triloba	Brown-eyed Susan			X				G5	S5	3	0	
Salix eriocephala	Missouri Willow			X				G5	S5	-3	4	
Salix exigua	Sandbar Willow			X				G5	S5	-3	4	
Salix lucida	Shining Willow			X				G5	S5	-4	5	
Schizachyrium scoparium	Little Bluestem					X	X	G5	S5	3		
Solanum nigrum	Black Nightshade					X		GNR	SNA	0	0	-1

	POLYGON	1	2	3	4	5	6					
Solidago canadensis	Canada Goldenrod	X	X	X	X			G5	S5	3	1	
Solidago nemoralis ssp. nemoralis	Gray Goldenrod	X	X	X				G5T5	S5	5	2	
Symphyotrichum lanceolatum	Little White aster	X	X	X	X			G5T5	S5	-2	3	
Symphyotrichum novae-angliae	New England Aster			X				G5	S5	-3	2	
Symphytum officinale	Common Comfrey			X				GNR	SNA	3		
Taraxacum officinale	Common Dandelion				X	X	X	G5	SNA	3	0	-2
Thuja occidentalis	Easterm White Cedar					X	X	G5	S5	-3	4	
Tilia americana	Basswood			X				G5	S5	3	4	
Tragopogon dubius	Goat'sbeard				X			GNR	SNA	5	0	
Ulmus americana	American Elm					X	X	G5	S5	-2	3	
Ulmus pumilla	Siberian Elm				X			GNR	SNA	3		
Urtica dioica	Stinging Nettle			X				GNR	SNA	3		
Verbascum thapsus	Common Mullein					X	X	GNA	Exotic	5		-2
Viburnum trilobum	Highbush Cranberry	X	X					G5T5	S5	-3	5	
Vitis riparia	Riverbank Grape	X	X	X	X	X	X	G5	S5	3	3	

WILDLIFE SPECIES LIST

BUCHANAN CROSSINGS					ELC POLYGON						
WILDLIFE SPECIES LIST -DECEMBER 2022		Conservation			1	2	3	4	5	6	Comments
Common Name	*Scientific Name*	*G-RANK*	S-RANK	COSEWIC							
MAMMALS											
Cottontail Rabbit	Sylvilagus floridanus	G5	S5					X			sight
Coyote	Canis latrans	*G5*	S5		X	X	X				sign
Eastern Grey Squirrel	Sciurus carolinensis	*G5*	S5			X	X	X	X	X	sight
Raccoon	Procyon lotor	*G5*	S5			X	X				sign
White-tailed Deer	Odocoileus virginianus	*G5*	S5		X	X	X				sign
BIRDS											
American Crow	Corvus brachyrhnchos	G5	S5B,SZN						X	X	sight-song
American Goldfinch	Spinus tristis	G5	S5B,SZN				X	X	X		sight-song
American Robin	Turdus migratorius	G5	S5B			X		X	X	X	sight-song
Black-capped Chickadee	Poecile atricapillus	G5	S5			X	X	X	X		sight-song
Canada Goose	Branta canadensis	G5	S5B			X					sight-song
Cardinal	Cardinalis cardinalis	G5	S5				X	X	X		sight-song
Carolina Wren	Thyrothorus ludovicianus	G5	S3,S4						X	X	sight-song
European Starling	Sturnus vulgaris	G5	SE			X	X	X	X		sight-song
Field Sparrow	Spizella pusilla	G5	S4B, SZN	NAR			X	X	X		sight-song
Great Horned Owl	Bubo virginianus	G5	S5			X	X				sight-song
Kildeer	Charadrius vociferus	G5	S4B	SC				X	X		sight-song
Mallard Duck	Anas platyrhynchos	G5	S5					X			sight-song
Mourning Dove	Zenaida macroura	G5	S5			X	X	X	X		sight-song
Red-winged Blackbird	Agelaius phoeniceus	G5	S5B, SZN			X	X	X	X		sight-song
Spotted Sand Piper	Aetitus macularis	G5	S5B	SC		X	X	X			sight-song
Savannah Sparrow	Passerculus sandwichensis	G5	S5B, SZN	SC				X		X	sight-song
Song Sparrow	Melospiza melodia	G5	S5B, SZN			X	X	X	X		sight-song
European Starling	Sturnus vulgaris	G5	SB						X	X	sight-song
AMPHIBIANS											
Pickerel Frog	Lithobates palustris	*G5*	S5	NAR					X	X	song

QUALIFICATIONS OF AUTHOR

CHRISTOPHER J. HART, M.Sc., M.L.A., OALA, CSLA

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BIOGRAPHICAL INFORMATION: ECOLOGIST/LANDSCAPE ARCHITECT

Chris Hart is an Ecologist/Landscape Architect and an experienced project manager who has worked with Conservation Authorities, Ministry of Natural Resources & Forestry and Environmental Consultants for over 20 years. Chris has experience with both qualitative and quantitative botanical field studies for scientific research (phytogeography and species typing) and habitat characterization for environmental planning projects and restoration projects. Chris is a specialist in the use of native plants and the management of natural areas for environmental restoration and habitat mitigation for a wide range of habitat types; he has specialized in wetland habitat.

Through a progressive range of regional projects Chris has been able to develop a truly regional perspective that lends itself to watershed and ecosystem restoration. Chris has 26 years of experience with the Public Interest Advisory Committee of the Niagara Escarpment Commission and understands the unique planning issues of the Niagara Escarpment Plan Area and the Ontario Greenbelt. Chris has experience with land development planning and design and N.E.C. Plan Amendment Applications as well as development peer reviews for conservation authorities and municipalities.

Chris has worked with E.A., E.I.S. and N.E.T.R. projects as a proponent and reviewer for 15 years. He has undertaken many field studies of both aquatic and terrestrial environments using recognized scientific protocols and those of the MNRF for S.A.R. He is primarily a botanist but can undertake wildlife studies for Breeding Birds, small mammals, bats and amphibians and reptiles for the provision of full E.I.S. reports. He has experience with radio-telemetry tracking of S.A.R. turtles, use of PIT Tags and data loggers. While not certified as an arborist Chris undertakes tree inventories and writes tree management plans.

Chris has a keen interest in natural heritage systems and natural areas management. He has experience with Environmental Restoration, Hydrology, Conservation Biology, Landscape Ecology, Ecological Land Classification (E.L.C.), Wetland Delineation (O.W.E.S.) and GIS analysis (ArcGIS). Chris is recognized for his writing ability, for every level of comprehension from the lay public to government scientists and managers. He is an able presenter and is comfortable meeting the public as well as providing presentations at conferences and large public open houses.

WORK EXPERIENCE:

Present) <u>Chris Hart & Associates</u>

(12_2015 Chris provides consulting services for natural heritage assessment, management and environmental planning projects. He undertakes ELC Studies, Wetland Delineation, Woodland Delineation, Breeding Birds, Wetland Birds, Amphibian call monitoring & Botanical inventories. He works as a sub-consultant on consulting teams to provide technical support as an ecologist and environmental planner. He provides design services for environmental restoration, habitat mitigation and enhancement.

01_2022) Lincoln Environmental Consulting – Ecologist

(12_2020 Chris provided management support to the Environmental Science and Planning group at LEC. This group provides consulting services for natural heritage assessment / management and environmental planning. Chris undertook landscape analysis, natural habitat assessment and planning policy analysis. Chris also worked on consulting teams to provide technical support as an ecologist and environmental planner for EA. EIS and NETR (aggregate license) projects. He contributed design services for environmental restoration, habitat mitigation and enhancement.

12_2022) Independent Environmental Consultant

(12_2015 Chris provided consulting services for natural heritage assessment, management and environmental planning projects. He undertook ELC Studies, Wetland Delineation, Woodland Delineation, Breeding Birds, Wetland Birds, Amphibian call monitoring, Botanical inventories. He worked as a sub-consultant on consulting teams to provide technical support as an ecologist and environmental planner. He provided design services for environmental restoration, habitat mitigation and enhancement.

2017 Professor at Fanshawe College, London - 2017)

Chris was a part-time Professor in the School of Design at Fanshawe College. He taught courses in Professional Practice and Presentation Skills.

12_2015) Senior Ecologist/Project Manager - Manager of Natural Science Services (AET Group Inc.)

(03_2011- Provided consulting services for natural heritage assessment and management, recreational systems, parkland development, cultural heritage resources, sustainable communities and social marketing practices. Chris worked with green infrastructure projects that provided recreation opportunities through trail access and linear corridors that linked SWM facilities with ESAs, parkland and other public lands. Chris was involved in all phases of project management and contract administration. Other project work included renewable Energy, ARA License Natural Environment Studies, Land Development EIS and monitoring of environmental effects. Other responsibilities included report writing, junior staff supervision and business development. (*Position was terminated when Environmental Group was closed by AET Group Inc.* in 2016)

10_2010) Planning Ecologist – Project Coordinator (Greenlands Centre Wellington – Contract)

(08_2008- Development of a Landscape Analysis for the Township of Centre Wellington incorporating Urban green infrastructure, cultural heritage features, trails and recreational greenways. This Project involved the sourcing and analysis of all relevant policy with respect to municipal and Environmental planning at local, watershed and provincial levels. This project included a study of all urban and near-urban natural heritage features in detail with recommendations for planting and other habitat enhancement including management of invasive species, retirement of cultural landscapes, enhancement and restoration of stream corridors and strategic reforestation. Also produced was a set of "Development Guidelines for Sustainable Rural Communities".

06_2008) Area Biologist (Ontario Ministry of Natural Resources & Forestry- Contract)

(04_2007- Management and participation in a wide range of conservation programs involving fish and wildlife, species at risk, and land stewardship for rural lands. Coordinated the Canada Ontario Agreement program funding for environmental enhancement projects oriented to Great Lakes water quality enhancement. Undertook environmental restoration projects in rural and urban environments with private landowners and volunteers for municipal lands. Supervised and trained seasonal staff in field and administrative procedures. Represented MNR on technical and management committees involving regional municipalities and local conservation authorities. Field work included botanical studies, mapping and assessment of SAR habitat, radio-telemetry tracking of SAR turtles and creation, maintenance and monitoring. of turtle

nesting habitat. Design projects included gravel pit restoration with S.A.R. turtle nesting habitat, pilot wetland creation and enhancement and stream corridor erosion control and reforestation.

03_2007) **Ecologist/Project Manager (Maitland Valley Conservation Authority - Contract)**

(12_2006- Developed and delivered a program for the promotion and implementation of environmental conservation projects for rural municipalities involving parks natural areas and water courses. Encouraged the protection, conservation, enhancement and restoration of these features. Also provided a new focus to promote energy efficient and sustainable landscapes with private rural landowners. Sourced funding and managed a wide variety of community environmental enhancement / restoration projects.

09_2006) **Ecologist/Project Manager (Grand River Conservation Authority - Contract)**

(01_2006- Coordinated a project involving the development of Grand River watershed regional trail systems. Responsibilities included renewing the administrative structure of the Grand Valley Trail Association, developing a feasible 5-year strategic plan, promoting new trails and trail linkages within the Grand Valley and to other external regional trail systems. Maintained liaison with planners and recreational specialists in all municipalities involved including Ministry of Health Promotion and Trail Groups.

01_2006) **Sustainable Landscape Specialist (Maitland Valley Conservation Authority - Contract)**

(02_2005- Developed and delivered educational materials and program workshops to teach the principles of environmental stewardship of natural areas and wildlife habitat enhancement on rural lands. Conducted farm tours and created environmental farm plans based on current best management practices and the principles of conservation biology and restoration ecology.

02_2005) **Ecologist/Project Manager (Ecoplans Ltd. - Contract)**

(02_2004 As a Biologist and Environmental Planner provided project management on development related projects by providing landscape analysis, field studies and planning solutions.

- Project management, Environmental Assessment and Environmental Impact Studies
- Biological field studies (ELC, G.I.S.), sub-watershed analysis, wetland delineation
- Design for environmental restoration and mitigation of development impacts

01_2004) **Ecologist/Project Manager (Conestoga-Rovers & Associates - Full Time)**

(12_1999- Provided design and management solutions on a project basis for the environmental cleanup of contaminated sites, design of mitigation and treatment wetlands at landfill sites and for agricultural runoff, stream channel bioengineering and erosion control.

- Project management, natural science field studies (ELC,G.I.S.), monitoring studies for Conformance reports, Environmental Assessment, Environmental Impact Studies

12_1999) **Independent Ecologist/Project Manager and Contractor**

(06_1996- Independent consulting Ecologist and specialty landscape contractor for environmental restoration, site reclamation, stream geomorphic analysis for fisheries habitat and bioengineering design, stream channel and ravine stabilization with bioengineering design, and conservation lands master planning. Continued many ongoing projects for Cumming Cockburn Ltd.

06-1996) **Senior Environmental Scientist Architect (Cumming Cockburn Ltd. - Full Time)**
(11_1995- Project management for a wide variety of projects involving new residential development throughout Ontario, urban infrastructure, storm water management and erosion control.
- Project management, Environmental Assessment, Environmental Impact Studies
- Bioengineering designs, urban storm water naturalization design, tree saving plans
- Water quality monitoring net design, data analysis, report writing, public information centers
- Sub-watershed planning

11_1995) **Ecologist (Maitland Valley Conservation Authority - Full Time)**
(05_1991- Ecologist with a focus on landscape restoration and rural community development for the creation of public greenways, naturalized parks, wetland/wildlife pilot projects in Huron and Perth Counties (swamp restoration, agricultural drain habitat enhancement, millpond habitat enhancement); sourced grant funding and managed community projects

- Coordinated public planting programs for parks, greenway reforestation and renaturalization
- Secured grant funding, scheduled projects, sourced and requisitioned plants and supplies
- Conservation lands master planning including design for reforestation and renaturalization
- Large river channel manipulation for construction of fisheries habitat and stone placement

EDUCATION

M.L.A. University of Guelph, S.E.D.R.D., (Landscape Architecture/Planning), 1991

M.Sc. University of Waterloo, Ecology (Botany/Limnology), 1983

B.E.S. University of Waterloo, Joint Honours Geography/Biology, 1979

Courses: Low Impact Development - design course by Credit Valley Conservation, 2015
O.B.B.N. – Benthic Invertebrate Identification, 2014
O.M.N.R. - Aboriginal Relations Management Consultation, 2008
St. John's Ambulance - CPR/First Aid Level II, 2013, (Certificate)
O.M.N.R. - Ecological Land Classification System for Ontario, 2002, (Certificate)
O.M.N.R. - Ontario Wetland Evaluation System Training, 2001, (Certificate)
Wilfrid Laurier School of Business & Economics – Small Business Management, 1999

MEMBERSHIPS

- Ontario Association of Landscape Architects, Full Member (1992-current), Councillor (2013-2017); Secretary (2015-16); Treasurer (2016-17)
- Ontario Nature
- Field Botanists of Ontario
- Society of Canadian Ornithologists

PRESENTATIONS

- **"Green Infrastructure and Active Lifestyles in Rural Ontario"**

  Presented at the Grey to Green Conference

  Toronto, August 2014

- **"Planning for Green Infrastructure in Rural Communities"**

  A tour presented for the Ontario Association of Landscape Architects in Elora and Fergus, ON

  August 2014

- **"A Landscape Analysis of the Township of Centre Wellington"**

  Presented to Heritage Elora,

  November 2009

- **"Sustainable Landscape Management"**

  A workshop prepared and presented under contract to the Ecological

  Farmers Association of Ontario, Winter 2006

- **"The Milton Mill Pond – Historic Mill Pond Restoration"**

  Presented at the 14th Annual Conference of the Society for Ecological Restoration

  October, 2002, Niagara Falls, Canada.

- **"Completing Ontario's Greenways"**

  Presented jointly with Bryan Howard, Ontario Ministry of Natural Resources, at the Ontario Parks Heritage Symposium, Heritage Resources Center

  March, 1994, University of Waterloo, Canada.

- **"Wooded Swampland Restoration with Hydroperiod Control"**

  Presented jointly with Jane Bowles, Ph.D., University of Western Ontario, at the 54th Midwest Fish and Wildlife Conference -"In Pursuit of Ecosystem Integrity"

  December, 1992, Toronto, Canada

- **"Wooded Swampland Restoration"**

  Presented at the 4th Annual Conference of the Society for Ecological Restoration

  August, 1992, University of Waterloo, Canada