
TOWNSHIP OF LUCAN BIDDULPH

**ASSESSMENT OF POTENTIAL FUTURE SETTLEMENT
LANDS (VILLAGE OF LUCAN)**



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1. INTRODUCTION

The Village of Lucan is an urban settlement area within the Township of Lucan Biddulph that is experiencing sustained residential growth and development. Development within the village is bounded by the extent of the urban settlement area, as specified in the Township of Lucan Biddulph Official Plan (2015), Township of Lucan Biddulph Zoning By-law (2018) and the County of Middlesex Official Plan (2006), as well as servicing capacity. Presently, there are still future development lands available within the urban boundary and servicing capacity, but they are being taken up at an increasing rate.

Looking forward, the Township recognizes that an expansion of the urban boundary will be required in the future in order to ensure an adequate supply of lands available for development. Under the Provincial Policy Statement, municipalities are required to ensure a 10-year supply of land designated for residential growth as well as a 3-year supply of serviceable residential land. In order to maintain an adequate supply of residential lands available to accommodate growth, the potential for suitable future growth lands outside of the existing village boundary must be examined.

The purpose of this review is to examine existing planning policies related to future development; infrastructure conditions and capacity; natural environment and cultural heritage constraints; and social conditions. This review will serve to provide a preliminary direction for growth of the urban boundary to aid in municipal planning efforts. The findings of this assessment will also direct future studies and engineering review required prior to the expansion of the settlement area of Lucan.

1.1. Framework for Report

This report is a summary of a preliminary evaluation of constraints and opportunities related to the potential expansion of the Lucan urban area. This evaluation is a high-level assessment that will provide direction for future studies and planning purposes. To evaluate constraints and opportunities related to an expansion of the urban area, a number of factors were examined. These factors or considerations fall within the following categories:

Figure 1.1 Categories of Factors Influencing Urban Expansion



Aspects of these factors and considerations are often interrelated, such as planning policies directing growth away from significant woodlands or requiring municipal water and wastewater services to new development. Some factors represent definite constraints (e.g. hazard lands), whereas others may be evaluated in a more relative or subjective manner.

From a planning perspective, the 2014 Provincial Policy Statement, County of Middlesex Official Plan, and Township of Lucan Biddulph Official Plan and Zoning By-law provide the policy framework for future growth. They serve to direct growth to suitable areas so that resources, including land and infrastructure, are utilized in an efficient manner that protects the natural environment. The policies from these documents inform the requirements associated with a potential urban area expansion.

Planning for future growth is also integrally linked with infrastructure. To support growth, consideration should be given to planning for infrastructure expansions that are timely, cost-effective and maintain efficiency. Given the potential for growth within Lucan, constraints and opportunities related to water, wastewater, stormwater and

transportation infrastructure are included in this assessment. The assessment does not include a technical evaluation of these infrastructure systems to identify specific future needs, but rather the overall potential to support growth.

From a natural environment perspective, the factors that could influence the direction of potential growth include significant natural areas (such as woodlands and wetlands), hazard lands and habitat areas. In the Lucan Biddulph area, hazard lands are primarily found around the Little Ausable River and its tributaries.

Social and cultural factors may also exert influence on the direction of future growth. From a cultural perspective, consideration should be given to cultural heritage and archaeological resources in the area. Social factors include proximity to the downtown core of Lucan and community destinations (schools, recreation facilities) as well as opportunities for active transportation.

This report summarizes a broad assessment of the above noted factors to identify opportunities or constraints to an expansion of the urban boundary. The first step of the evaluation is a review of the existing conditions and policy framework. The summary of the review completed for the assessment is included in Section 3. Building on the review of existing conditions, a constraints and opportunity mapping exercise was undertaken and is summarized in Section 4. The analysis has been completed at a high level to serve as a first step to guide further, more detailed investigations. It does not include detailed technical analysis of infrastructure capacity or components or an examination of market value of lands.

2. STUDY AREA AND POTENTIAL GROWTH

2.1. Study Area and Current Lucan Settlement Area

The amalgamation of the Township of Biddulph and the Village of Lucan The Township of Lucan Biddulph formed the Township of Lucan Biddulph in January of 1999. The Township is bounded by Whalen Line to the north and east, Elginfield Road to the south, and Denfield Road and Provincial Highway 4/County Road 20 to the west. The landscape throughout the township is predominately rural in nature, with three settlement areas. In 2016, the population of the Township was 4,700 persons, with over half of the population (2,541 persons) residing in the Village of Lucan, the largest settlement area. Smaller settlement areas within the Township include Granton and Clandeboye.

The Village of Lucan is located within the west-central portion of the Township and is the largest settlement area. Lucan is situated along Provincial Highway 4, which provides access to the City of London to the south. Resulting from the proximity to London and availability of single, detached residential homes, Lucan has evolved into primarily a bedroom community. The community does support a downtown core along

Richmond Street/Main Street (Highway 4) and a number of commercial, industrial and institutional uses. The urban settlement area of Lucan, as set out in 'Schedule A' of the Township of Lucan Biddulph Official Plan (2015) is shown in Figure 2.1.

For the purposes of this report, the study area incorporates the current urban settlement area of Lucan as well as the agricultural lands outside of it (Figure 2.2). The study area is bounded to the north by Fallon Drive (Country Road 47), Roman Line to the east, and Airport Line to the south. The western boundary of the study area falls approximately halfway between Coursey Line and Denfield Road (Country Road 20).

2.2. Potential Future Growth

Lucan has experienced sustained residential growth over the past 20 years. Much of this growth has been in the form of single family detached units, although in recent years there has been a moderate increase in the number of higher density units planned. The sustained residential growth in the community is most likely attributed to its proximity to the City of London and the availability of land and services to support development.

Between 2008 and 2018, there was a total of 468 building permits issued for new units. Of these, the majority (394) were for single, detached units. That equates to an average of 46.8 new detached units per year over the past 10 years. Within the last 5 years, the average number of new units per year has increased to 54.8 single detached units per year.

It is expected that Lucan will continue to attract residential development, primarily in the form of single, detached units. Within the existing urban boundary, areas for future developed are designated through the Zoning By-law. The majority of these lands are primarily towards the northeastern and eastern extent of the urban area. There are limited opportunities for infilling within the community.

To calculate an estimate of potential future land needs, the 5-year annual average of new single detached units was extrapolated forward over 20 and 40-year time periods. The land requirement for the estimated number of new units was calculated assuming 12.5 units per hectare. The land requirements are shown in Table 2.1.

Table 2.1 Estimated Potential Residential Growth and Associated Land Requirements for the next 20 and 40-years in Lucan.

Time Period	Additional Units	Land Required (at 12.5 units per hectare)
20 years (2019-2039)	1,096	88 ha
40 years (2019-2059)	2,192	176 ha

Figure 2.1 Current Urban Settlement Area, Lucan



Figure 2.2 Study Area



Should development continue at a comparable pace, it is expected that an additional 1,096 units will be constructed in Lucan over the next 20 years. A portion of these units may be accommodated within existing draft approved and registered plans of subdivision and future development lands. In 2016, there were approximately 37 ha of vacant residential lands. At 12.5 units/ha, these lands could accommodate an estimated 462 single detached units. Between existing planned developments and future development lands, there is a sufficient supply of residential lands to meet the 10-year supply as required under the Provincial Policy Statement. However, should residential development occur at an increased pace, additional residential lands, outside of the current urban area, may be required to maintain a 10-year supply of lands.

3. EXISTING POLICIES AND CONDITIONS

3.1. Planning Context

3.1.1. Provincial Planning Statement (2014)

The Provincial Policy Statement (PPS) released in 2014 provides guidance and policy direction for the province with respect to planning, development and land uses, issued under Section 3 of the Planning Act. Of particular interest to the purpose of this review, the PPS includes policies related to rural settlement areas, land use, infrastructure and the management of resources. To aid in the implementation of provincial policies, planning documents prepared by upper and lower tier municipalities, such as Official Plans, must be consistent with the PPS.

Section 1.1 of the PPS sets out policies to achieve efficient and resilient development and land use patterns (Ministry of Municipal Affairs and Housing, 2014). With respect to settlement areas, the PPS promotes expansions within areas adjacent or close to existing settlements to avoid inefficient land use patterns. This supports policy direction to minimize land consumption and servicing costs. Specific policies relating to settlement areas are outlined in Section 1.1.3 of the PPS, including those related to the expansion of urban areas. These policies promote efficient development of infrastructure and land use patterns to ensure the long-term prosperity of communities.

New development should be directed to designated growth areas, where all potential redevelopment and intensification development have been utilized. Prior to an expansion of a settlement area, the PPS requires that a comprehensive review is completed. This review must demonstrate that growth needs cannot be met through intensification, redevelopment or existing future growth areas; the long-term suitability of infrastructure and public services; minimum distance separation requirements are met; specialty crop areas are not compromised, and there are no reasonable alternatives to avoiding prime agricultural lands.

When determining the direction of expansion, policies within Section 2 (Wise Use and Management of Resources) and Section 3 (Protecting Public Health and Safety) of the PPS must be adhered to. The policies contained within these sections aim to ensure resources are protected and preserved for the long-term viability of the community. The wise use and management of resources includes considerations of natural features and areas, avoidance of significant wetlands and woodlands, and habitat of endangered and threatened species. Development is directed away from designated vulnerable areas related to surface and groundwater, as well as mineral extraction areas. Provincial policy also directs that archaeological and cultural heritage resources should be protected from development (Ministry of Municipal Affairs and Housing, 2014).

Section 3 of the PPS directs development away from areas considered public health and safety risks. These hazards include dynamic beaches, flooding, erosion, mines, and oil and gas operations (Ministry of Municipal Affairs and Housing, 2014). Upper and lower tier Official Plans are tasked with providing direction related to buffers for future development adjacent to these areas in accordance with the PPS.

3.1.2. Middlesex County Official Plan (2006)

The Middlesex County Official Plan (OP) provides goals, objectives, and policies relating to land use and future development within the County, in accordance with the PPS. The County OP provides direction on a broad scale across the entire county (Middlesex County, 2006).

Any change in the defined limits of a settlement area requires the local municipality to complete a comprehensive review for justification of the expansion, as per Section 2.3.5 (General Policies) of the County OP (Middlesex County, 2006). A comprehensive review includes evaluations of population and employment projections; need for expansion of the settlement area versus availability within the remainder of the municipality; intensification and redevelopment opportunities; impacts on resources, servicing, speciality crop areas, and the consideration of alternative locations in prime agricultural areas. In Middlesex, the comprehensive review must also address servicing as related to groundwater resources; drinking water sources available; long-term sustainability of receivers to accept sewage effluent; existing restrictions on future development; surface drainage; and impacts to the natural environment, transportation services and the condition of existing servicing infrastructure.

The Middlesex OP directs expansions of settlement areas are phased and compact, avoiding strip pattern development. It requires that efforts are made to ensure historic characters of existing settlement areas are preserved and incorporated into new development.

Natural heritage features and systems are outlined within the Middlesex OP. Policies in the OP direct new development away from these areas to ensure their long-term protection and maintenance of their ecological significance. For areas within 120 m of a

natural heritage feature (such as a wetland or significant woodland), a Development Assessment Report is required (Middlesex County, 2006).

3.1.3. Local Planning Policies

The Township of Lucan Biddulph Official Plan (2015) incorporates local policies and implementation strategies based on the policy direction from the PPS and County OP. The purpose of the Township Official Plan is to provide direction on land use, development, resources, existing and future direction of settlement areas, specific to the existing conditions within the Township. Growth within the Township, as stated in the OP, is to be directed firstly to the village of Lucan, and secondly to the village of Granton. There are limited residential development opportunities in the remainder of the Township, reflecting the lack of water and sanitary servicing infrastructure. Future residential development is directed to occur adjacent to existing development, to ensure the cost-efficient extension of existing services.

Section 2.1 of the OP provides the overall goals and objectives for Lucan in relation to future development needs. Opportunities exist within the existing settlement area for redevelopment and infilling, with the Township requiring 15% of development to occur by the way of intensification and redevelopment, as outlined in section 2.1.5.11 the Plan (Township of Lucan Biddulph, 2015). The Plan recognizes the need for additional medium density residential development to support the socio-economic needs of the community. Future development in the form of medium density housing should be in proximity to arterial or collector roads, appropriate community services and where municipal infrastructure services are available.

The OP also recognizes and supports Highway Commercial and Industrial uses. It supports appropriate development within areas designated as Highway Commercial, as well as industrial developments where they will not impact sensitive uses.

The Township Official Plan and Zoning By-law specify the requirement for buffers surrounding specific land uses. Within the study area, there are the following setback requirements (Township of Lucan Biddulph, 2015):

- 150 m buffer surrounding the existing sewage treatment plant and the sewage lagoons;
- 300 m buffer surrounding commercial grain-handling facilities; and
- 300 m buffer surrounding portable asphalt plants.

No future residential development is permitted within these defined areas based on their potential to impact sensitive land uses. Local policies also require soil testing prior to development within 500 m of a former landfill site.

The OP and Zoning By-law identify hazard lands associated with the Little Ausable River, its tributaries, and municipal drains. Based on their potential risk to life and

property due to 'flooding, erosion, subsidence, slumping, inundation, and the presence of steep slopes', development within these areas is limited. Although these areas are considered hazard lands, they also exhibit natural heritage value that is deemed significant. Due to the potential risk to life and property, as well as the natural heritage value, development and site alteration in these areas is restricted.

North of Lucan along Fallon Drive, west of Saintsbury Line there is a municipally owned and serviced industrial park. This area is outside of the current urban settlement boundary for Lucan. The Township OP suggests that appropriate buffering and setback measures to be used to ensure that industrial development does not conflict with any future residential development.

The Zoning By-law (updated 2018) regulates permitted land uses and structures. Within the existing Lucan settlement area, there is a mix of residential, commercial, industrial, open space, institutional, and utility zones. Outside of the settlement area, much of the land is zoned for agricultural purposes; however, there are also rural and mixed use residential, industrial, institutional, and open space designations. Figure 3.1 shows a summary of the land uses and their location within the study area and existing settlement area.

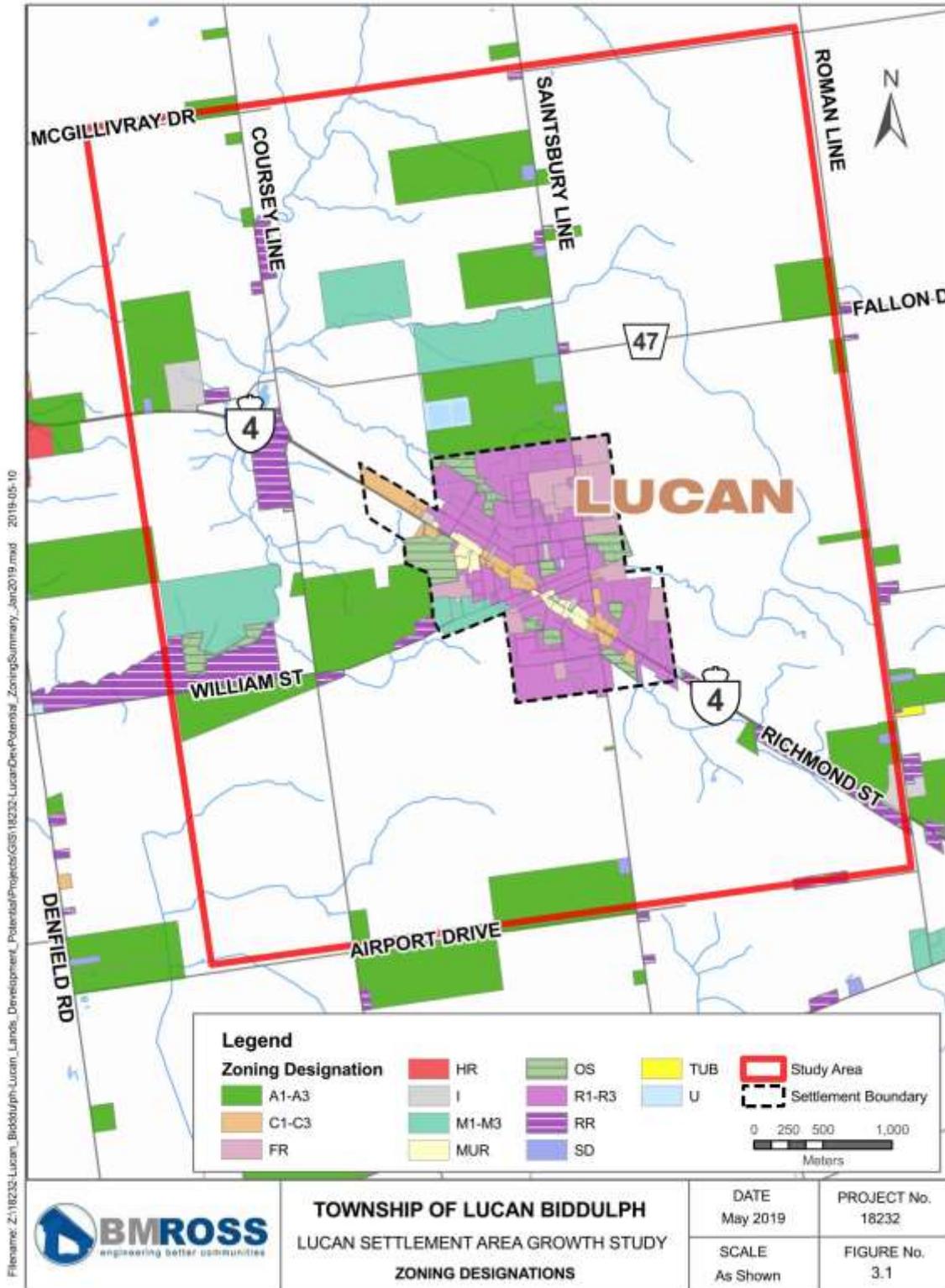
The location of available Future Residential (FR) zones is important to understanding the planning context for the existing settlement area. Future residential parcels are generally located in the northeast, central east and central west areas of the village, as shown as FR on Figure 3.1. Permitted uses for this zone are a single unit dwelling and home occupation.

3.1.4. Minimum Distance Separation (MDS)

In order to ensure that there is adequate separation between livestock barns, manure storage facilities and anaerobic digesters from adjacent land uses, a Minimum Distance Separation (MDS) calculation is used. The MDS formulae were developed by the Ontario Ministry of Agricultural and Rural Affairs (OMAFRA) to calculate the required setback for proposed new development (MDS I) and for proposed new or expansions of existing livestock facilities (MDS II) (Ontario Ministry of Agriculture, Food and Rural Affairs, 2016).

The intent of MDS is to minimize conflict between land uses and reduce complaints related to potential odours from livestock and manure facilities. Separation distances calculated using the formulae are based on the type of livestock housed; potential number of livestock housed (barn capacity or lot size); percentage of increase in the size of the operation; type of manure system and storage; and the type of encroaching land use. These variables will determine the minimum setback between the livestock or manure facility and the proposed development.

Figure 3.1 Summary of Zoning Designations in the Study Area



Prior to any land use planning approval adjacent to a property with a barn, manure storage, or an anaerobic digester, an MDS calculation must be completed to determine the required setback. In relation to the expansion of a settlement area, Section 1.1.3.8 the Provincial Policy Statement (2014) states that any expansion to a settlement area is required to conform with MDS setbacks.

3.2. Existing Infrastructure

3.2.1. Sanitary Sewage Infrastructure

Treatment of sewage from the community of Lucan is provided by the Lucan Wastewater Treatment Plant (WWTP), located on Fallon Drive. The facility was constructed in 1992 to replace the former lagoon-type system as a means to lift a development freeze imposed by the Ministry of Environment. The location of the WWTP and the former two cell lagoon system are shown in Figure 3.2. The facility consists of a raw sewage pumping station with five submersible pumps and an extended aeration component.

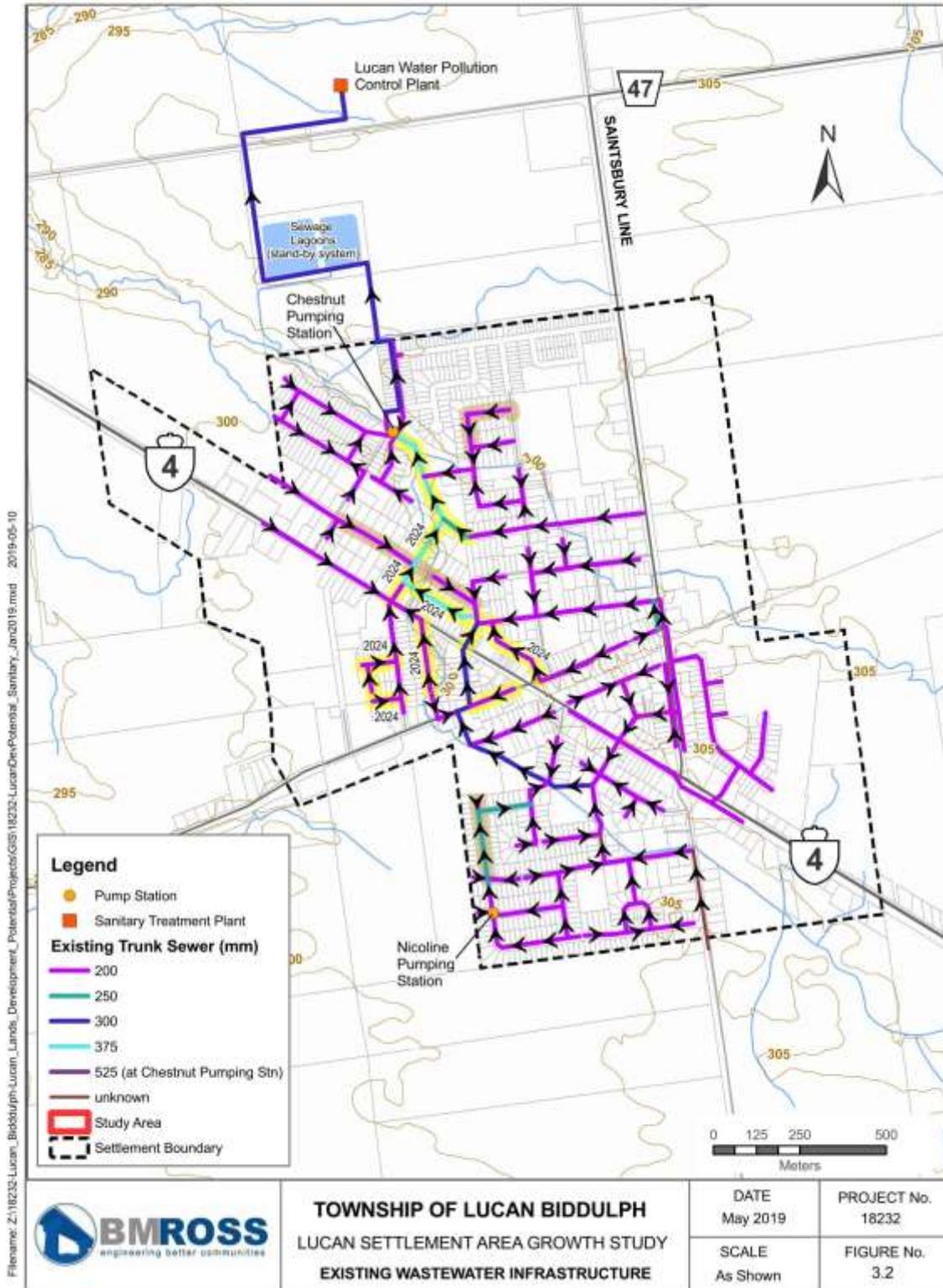
Sewage from Lucan is pumped to the WWTP via a Sewage Pumping Station (SPS) at Chestnut Street. At the south end of Lucan there is another pumping station, located at Joseph Street and Watson Street. Known as the Nicoline Pumping Station, this facility was built in 2009 to accommodate flows from the surrounding area and convey them north towards the Chestnut Street SPS.

Treated effluent from the WWTP outfalls to the Heenan Drain, which eventually converges with the Little Ausable River. As of January 2018, the WWTP services approximately 1,154 users. The design capacity of the system is equivalent to an estimated 3,000 users. In January 2019, the capacity of the WWTP was reviewed. Presently, it is estimated that the system is operating at 63% of its rated capacity. There is remaining capacity for 690 additional customers, or approximately the next 7 years based on current development rates.

The collection system consists of sewers ranging from 200 mm to 525 mm, with the majority being 200 mm in size. A 300 mm trunk sewer extends from Elm Street Park towards William Street and along Frank Street to Market Street. A 375 mm trunk sewer conveys sewage along east along Butler Street to Stanley Street, north to Walnut Street and then to the Chestnut Street SPS.

A two-cell lagoon system which previously provided the primary sewage treatment to the community remains connected to the WWTP. It now serves to provide storage during peak flow events and stand-by treatment in the event of a failure of the WWTP that requires it be shut down for the completion of repairs. Currently, excess flows can be manually discharged directly to the existing lagoons from the Chestnut Street SPS and then pumped to the WWTP for treatment and discharge when flows are lower. In the first two quarters of 2018, the former lagoon system accommodated raw

Figure 3.2 Existing Sanitary Sewage Infrastructure in Lucan



sewage on 15 occasions in January, February and April due to flows in excess of daily rated capacity at the plant. The peak flow capacity of 3,600 m³ was not exceeded during these events.

Figure 3.2 shows the existing WWTP, former two cell lagoons and the locations of the two SPS connected to the system and the collection system including pipe sizing for the existing sanitary sewage services within the study area. The figure also identifies upgrade and reconstruction projects as identified within the Township's Asset Management Plan.

Policies outlined in the Township's OP state that all new development in the village of Lucan shall be serviced by the municipal sanitary sewage system. In areas outside of the Benn/Whitfield Drainage Area, a servicing study will be required to identify optimal location of a pumping station and forcemain routing either to the Chestnut Street SPS or to a trunk sewer with sufficient design capacity.

3.2.2. Water Infrastructure

The village of Lucan is serviced by the Lake Huron Primary Water Supply System (LHPWSS). It supplies treated drinking water to the Lucan Biddulph Water Distribution (LBWD) via the Lucan Booster Station located on Denfield Road (Country Road 20). The capacity of the Booster Station is 3,600m³/day. The LBWD services approximately 1,195 connections between Lucan and Granton. Storage of 2,273 m³ of treated water is provided by an elevated tank located on the west side of Lucan (Community Drive at William Street). An 8 km trunk watermain extends from the distribution system from Lucan to Granton, via County Road 47, to provide approximately 117 homes in that community with treated drinking water.

An update to the Lake Huron Primary Water Supply System Master Plan was completed in 2014 to examine future supply demands and future infrastructure needs (CH2M HILL Canada Limited, 2014). The update examined future demands based on growth scenarios within the serviced area. Overall, water demands have declined since 2002, despite an increasing service population.

This decline is attributed to metering and water conservation efforts. The Master Plan Update found that water demands under the medium and high growth scenarios can be met to 2035 with current infrastructure. Under the high growth scenario, the preferred long-term strategy (2030 and beyond) to ensuring adequate water supply is the monitoring and replacement of distressed pipeline segments within the main transmission line.

From the Booster Pumping Station, located west of the urban boundary, a 350 mm trunk watermain conveys water to distribution system. The trunk watermain continues along William Street to Saintsbury Line, then north to Fallon Road/County Road 47 and onto Granton. Watermain in Lucan ranges in size from 50 mm to 350 mm. Most of the

watermains are 150 mm in size. Figure 3.3 shows the water distribution system throughout the study area, location of the elevated storage tank and the Lucan Booster Pumping Station.

Within the local OP, policies related to the public water supply system provide direction that new development in the village of Lucan must be connected and serviced by the LBWD system. The connection to the public water supply system ensures that an adequate, secure and safe drinking water is provided.

3.2.3. Stormwater Infrastructure

Stormwater infrastructure throughout the built-up area consists of a range of storm sewers sized from 200 mm to 1200 mm. There are also stormwater detention ponds located throughout the community. These ponds are primarily located within relatively new subdivisions. In Lucan, stormwater generally drains to the Benn Drain or Whitfield Drain and eventually to the Little Ausable River. Other subwatersheds in the area include the Engel Drain, Hardy Drain, and Haskett Drain.

Under the local OP, the preparation of a Master Drainage Plan must be completed for development (including Plan of Subdivision or other significant development) within the watersheds associated with the Engel Drain, Hardy Drain and the Haskett Drains.

Figure 3.4 shows the existing stormwater infrastructure including the location of the Benn Drain and Whitfield Drain and the associated stormwater pipe and catch basin infrastructure within the study area.

3.2.4. Transportation Infrastructure

The transportation system surrounding the village of Lucan is comprised of a mix of arterial, collector and local roads, typical of a rural settlement. Provincial Highway 4 bisects Lucan and serves as the major transportation route through the community. Saintsbury Line and William Street are two major collector roads that intersect with Highway 4/Richmond Street in Lucan. Within the urban settlement area, local roads are built to an urban standard. Outside of the settlement area the roads are generally constructed to a rural standard.

Figure 3.5 shows the transportation road network and water crossings located within the study area.

Figure 3.3 Existing Water Infrastructure in Lucan

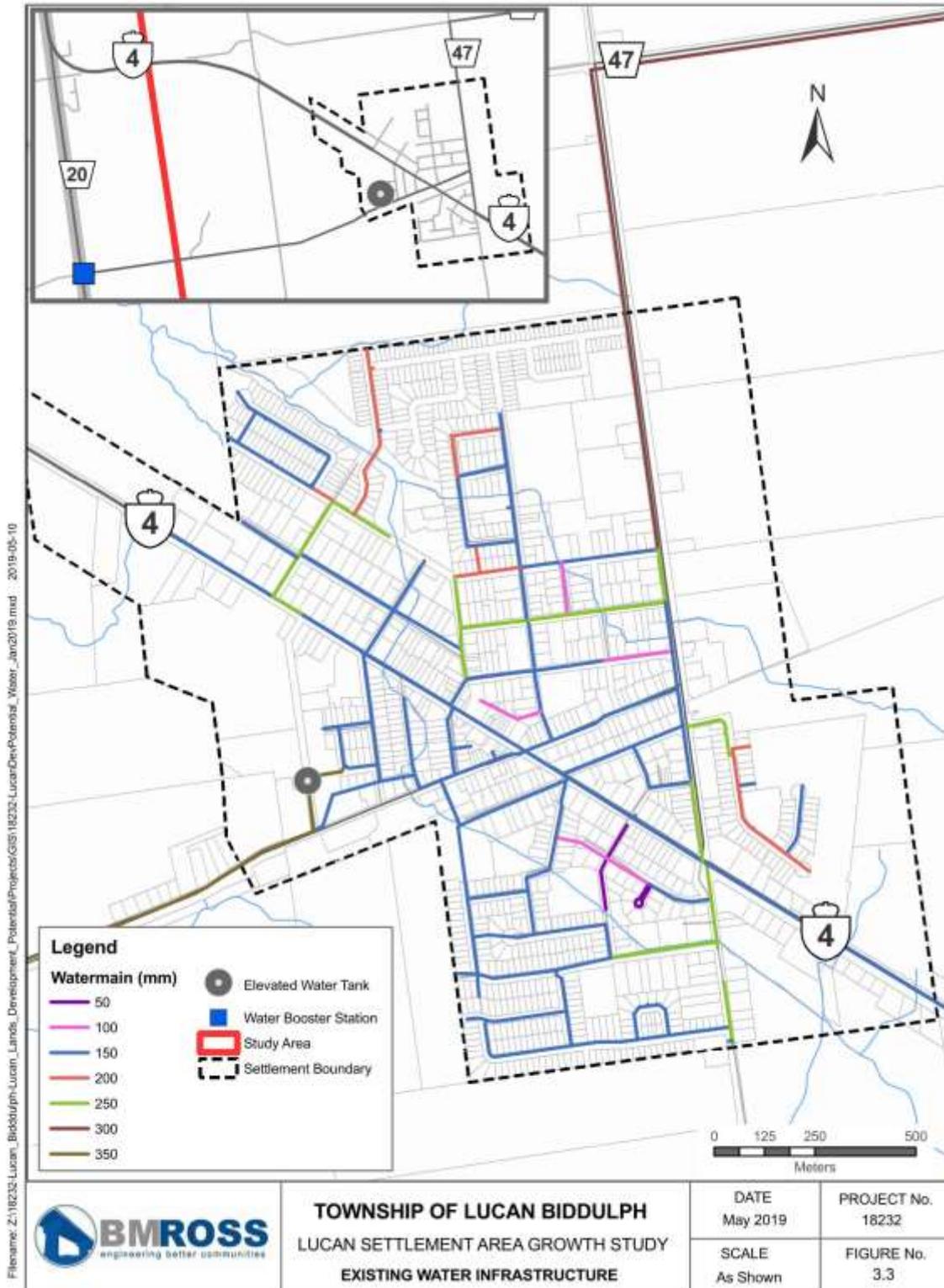


Figure 3.4 Existing Stormwater Infrastructure in Lucan

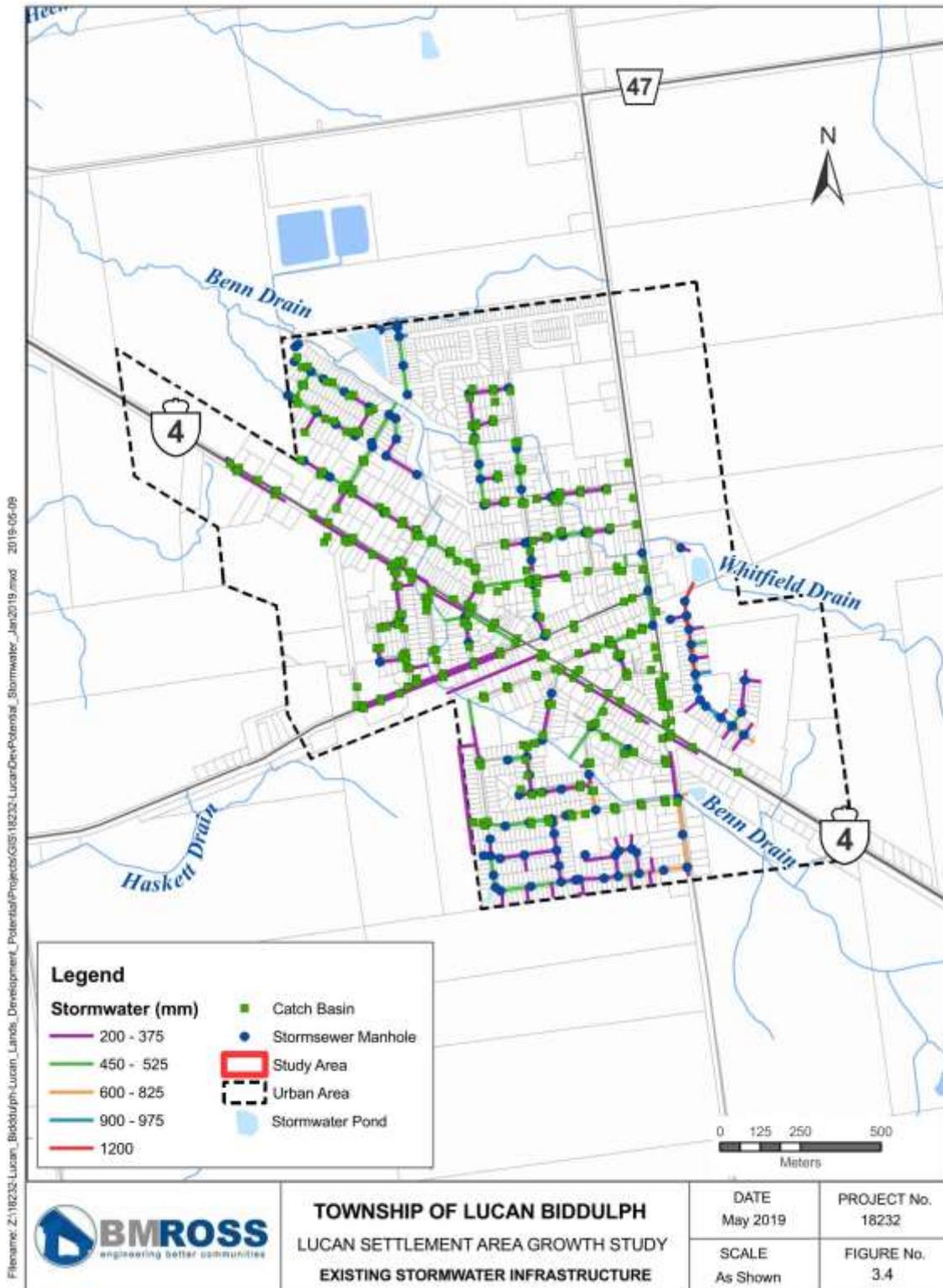


Figure 3.5 Existing Transportation Network, Lucan



Under the direction of the Township OP, the purpose of local roads is to provide access to a destination rather than accommodate through traffic. Where new local roads intersect provincial or county roads, including Main Street, Sainsbury Line, and William Street – Alice Street, approval from the Ministry of Transportation and the County of Middlesex will be required. The OP also includes policies in support of an active transportation network, including the installation of sidewalks. For the settlement area of Lucan, the installation of sidewalks is particularly important to promote pedestrian movement and provide connectivity to all areas of the village. Sidewalks are encouraged in OP policies to promote pedestrian movement and connectivity and should be considered for all new road and road reconstruction projects.

It should be noted discussions regarding the intersection at Sainsbury Line and Provincial Highway 4 have been initiated between the Township and the Ministry of Transportation. As per the requirements for a comprehensive review, future development will require investigations into traffic impacts at this intersection and any other potentially impacted intersections. Specific impacts related to increased traffic levels are not included within the scope of this report.

3.3. Natural Heritage

The area surrounding the village of Lucan is predominantly a rural landscape with a focus on agriculture as a primary use. The existing village boundary is surrounded by little riparian forested habitat and limited aquatic habitat. A general review of the natural heritage features was completed utilizing the Natural Heritage Area mapping provided by the Ministry of Natural Resources and Forestry (MNRF), Middlesex Natural Heritage Study (2014), Township of Lucan Biddulph Official Plan and the Ausable Bayfield Conservation Authority Watershed report cards.

Natural heritage features within the study area and shown in Figure 3.6 include:

- South Lucan wetland complexes;
- Significant Vegetation Patches;
- Little Ausable River; and
- Benn, Whitfield, Haskett, Hennan, Engel and Hardy Drains.

3.3.1. Wetlands

Two wetland complexes are found within the Lucan Woodlot and Lucan Crossing natural areas, located south and southwest of the village boundary. These wetlands are shown in Figure 3.6. These wetlands are considered to be locally significant within the watershed landscape. The wetland and adjacent lands are regulated by the Ausable Bayfield Conservation Authority under O. Reg 147/06 (Regulation of development, interference, with wetlands and alterations to shorelines and watercourses).

Figure 3.6 Natural Heritage Features in the Study Area



3.3.2. Woodlands

Woodlands surrounding Lucan appear relatively fragmented and disconnected based on historic and present agricultural land uses. Lucan Woodlot and Lucan Crossing are two woodlands located south and southwest of the village, which surround the two locally significant wetlands (Upper Thames River Conservation Authority, 2014). Woodlands within the study area have been also identified as Significant Vegetation Patch within the *Middlesex Natural Heritage Study (2014)* based on the woodland size and survey findings completed. These woodlands are shown in Figure 3.6.

3.3.3. Aquatic Habitat and Associated Species

Aquatic Species at Risk are aquatic based species that either live in, or rely on, an aquatic habitat for a significant portion of their life cycles. In conjunction with information gathering from the MNR and Environment Canada Species at Risk Registry, a publicly available aquatic species at risk mapping tool was utilized in determining the potential presence of aquatic species at risk and their associated critical habitat within the vicinity of the proposed project. These findings will be discussed within each aquatic feature described below.

Little Ausable

The Little Ausable River is located approximately 1.5 km west and northwest of the existing village boundary flowing south and eventually making a significant meander to flow west to connect to the Ausable River. A Significant Valley System (SVS) associated with the Little Ausable was identified by the Middlesex Natural Heritage Study (2014). An SVS designation recognizes the importance of valleys for linkages and corridors for wildlife movement, habitat opportunities and a large-scale connectivity of natural areas. The SVS lands coincide with the hazard lands associated with the municipal drains and the Little Ausable River.

The Little Ausable River is regulated by the Ausable Bayfield Conservation Authority under O. Reg 147/06 (Regulation of development, interference, with wetlands and alterations to shorelines and watercourses).

Based on the background information compiled, there are records of Rainbow and Wavy-rayed Lampmussel, two species at risk mussels and their associated habitats exist within the Little Ausable River, west of the study area near its convergence with the Ausable River.

Municipal Drains

Within the existing village boundaries, there are two open municipal drains: the Benn Drain and Whitfield Drain. Both drains collect runoff from the area and flow towards the northwest, eventually reaching the Little Ausable River. A significant valley system (SVS) associated with the Little Ausable River and a portion of these two drains were

identified in the *Middlesex Natural Heritage Study* (2014). An SVS designation recognizes the importance of valleys for linkages and corridors for wildlife movement, habitat opportunities and a large-scale connectivity of natural areas.

Other drains outside of the existing built up area include the Engel, Hardy and Haskett Drains.

Based on the background information compiled, there are no known aquatic species at risk and/or associated habitat known to exist within the Benn and Whitfield Drains in the existing village boundary.

Figure 3.6 shows the locations of the Little Ausable, Benn Drain and Whitfield Drain in relation to the study area.

3.3.4. Species at Risk

An evaluation for the presence of significant species and their associated habitats within the study area was undertaken. A review of available information on species and habitat occurrences determined that the study area may contain species and/or associated habitats that are legally protected under Provincial and Federal species at risk legislation.

The protection for species at risk and their associated habitats is directed by the following federal and provincial legislation:

- The Federal Species at Risk Act, 2002 (SARA) provides for the recovery and legal protection of listed wildlife species and associated critical habitats that are extirpated, endangered, threatened or of special concern and secures the necessary actions for their recovery on lands not federally owned, only aquatic species, and bird species included in the Migratory Bird Convention Act (1994), are legally protected (Environment Canada, 2017); and
- The Provincial Endangered Species Act, 2007 (ESA) provides legal protection of endangered and threatened species and their associated habitat in Ontario. Under the legislation, measures to support their recovery are also defined.

Based on the information available for the occurrence of species at risk and their associated habitats from the following sources, a summary of federally and provincially recognized species with the potential to be present within the project study area are listed in Table 31.

The following sources were consulted to identify the federally and provincially listed species that may be present or have habitat in the study area as noted in Table 3.1:

- Natural Heritage Information Centre, *Make a Natural Heritage Map* (Ministry of Natural Resources and Forestry, 2019).

- Ministry of Natural Resources and Forestry, Township of Lucan Biddulph Municipal Species at Risk Reference Guide (Ministry of Natural Resources and Forestry, email communication, 2018)
- Environment Canada, Species at Risk Public Registry. SARA Schedule 1 Species List (Environment Canada, 2017)

Table 3.1 Potential Species at Risk within the Township of Lucan Biddulph and the Study Area

Type of Species	Common Name	Scientific Name	Federal SARA Schedule 1 Status	Provincial ESA Status
Bird	Acadian Flycatcher	<i>Empidonax vireescens</i>	Endangered	Endangered
Bird	Barn Swallow	<i>Hirundo rustica</i>	-	Threatened
Bird	Bobolink	<i>Dolichonyx oryzivorus</i>	-	Threatened
Bird	Cerulean Warbler	<i>Setophaga cerulea</i>	Special Concern	Threatened
Bird	Chimney Swift	<i>Chaetura pelagica</i>	Threatened	Threatened
Bird	Eastern Meadowlark	<i>Sturnella magna</i>	-	Threatened
Bird	Least Bittern	<i>Ixobrychus exilis</i>	Threatened	Threatened
Bird	Prothonotary Warbler	<i>Protonotaria citrea</i>	Endangered	Endangered
Bird	Yellow-breasted Chat	<i>Icteria virens</i>	Special Concern	Endangered
Insect	Monarch	<i>Danaus plexippus</i>	Special Concern	Special Concern
Insect	Rusty-patched Bumble Bee	<i>Bombus affinis</i>	Endangered	Endangered
Mammal	American Badger, jacksoni subspecies	<i>Taxidea taxus jacksoni</i>	Endangered	Endangered
Mammal	Eastern Small-footed Myotis	<i>Myotis leibii</i>	-	Endangered
Mammal	Little Brown Bat	<i>Myotis lucifugus</i>	Endangered	Endangered
Mammal	Northern Myotis	<i>Myotis septentrionalis</i>	Endangered	Endangered
Mammal	Tri-colored Bat	<i>Perimyotis Subflavus</i>	Endangered	Endangered
Plant and Lichen	American Chestnut	<i>Casanea dentata</i>	Endangered	Endangered
Plant and Lichen	American Ginseng	<i>Panax quinquefolius</i>	Endangered	Endangered

Type of Species	Common Name	Scientific Name	Federal SARA Schedule 1 Status	Provincial ESA Status
Plant and Lichen	Butternut	<i>Juglans cinerea</i>	Endangered	Endangered
Plant and Lichen	Dense Blazing Star	<i>Liatris spicata</i>	Threatened	Threatened
Plant and Lichen	Eastern Flowering Dogwood	<i>Cornus florida</i>	Endangered	Endangered
Plant and Lichen	Heart-leaved Plantain	<i>Plantago cordata</i>	Endangered	Endangered
Reptile and Amphibian	Eastern Ribbonsnake	<i>Thamnophis sauritus</i>	Special Concern	Special Concern
Reptile and Amphibian	Queensnake	<i>Regina septemvittata</i>	Endangered	Endangered
Reptile and Amphibian	Blanding's Turtle	<i>Emydoidea blandingii</i>	Endangered	Threatened
Reptile and Amphibian	Spiny Softshell	<i>Apalone spinifera</i>	Endangered	Endangered
Reptile and Amphibian	Spotted Turtle	<i>Clemmys guttata</i>	Endangered	Endangered

Three (3) species have been identified as occurring within the study area based on historical observation records provided through the Ontario Ministry of Natural Resources and Forestry's (MNR) Natural Heritage Information Centre (NHIC) database (Ministry of Natural Resources and Forestry, 2017):

- Heart-leaved Plantain (*Plantago cordata*), an endangered species both provincially and federally has been known to occur in the general area. This species is found within stream channels and emergent zones between open water and upland vegetation along stable, low-gradient streams and their adjacent floodplains. The species has been recognized as being extirpated for the area by the MNR (Ontario Ministry of Natural Resources, 2017). Based on the habitat needs of the species, the preferred habitat would be within the Little Ausable River and adjacent floodplain area.
- Bobolink (*Dolichonyx oryzivorus*), a threatened bird species provincially has been known to occur in the general area. The species is found across southern Ontario. There is the potential for this species to occur within the agricultural lands, particularly where there are hayfields.
- Dense Blazing Star (*Liatris spicata*), a threatened species both provincially and federally has been known to occur in the general area. This species is known to occur in open habitat types such as prairie, grasslands, wet meadows between abandoned fields and sand dunes.

3.3.5. Breeding Birds

The Atlas of Breeding Birds of Ontario was used to identify the bird species with confirmed, probable and possible breeding habitat in proximity to the study area (Bird Studies Canada, 2009). The study area lies within of the 100 km² area identified by the Atlas as Square 17MH68, in Region 4: London. Within that square, a total of 79 species were observed within the square. A total of 54 species of breeding birds were confirmed to have habitat within the area. In addition to the confirmed species, 21 species are considered to have probable and 4 possible breeding habitat in the area. The Eastern Meadowlark (*Sturnella magna*) and Barn Swallow (*Hirundo rustica*), threatened species in Ontario are identified as being confirmed within the atlas square and Bobolink (*Dolichonyx oryzivorus*), a threatened as identified as being probable within the square.

3.3.6. Reptiles and Amphibians

The mapping tool provided by the Ontario Nature was utilized to identify the known ranges of all reptile and amphibians that may be present within the study area. The following species were identified as potentially residing within the study area based on their known range: American Toad, Eastern Gartersnake, Grey Treefrog, Green Treefrog, Green Frog, Midland Painted Turtle, Northern Leopard Frog, Snapping Turtle, and Spring Peeper.

All species identified as potentially residing within the study area are not legally protected under provincial or federal legislation.

3.4. Cultural Resources

The Township OP outlines in Section 4.0 (Heritage Resources) that where appropriate, all heritage resources shall be protected, conserved and preserved. Development is encouraged to occur in harmony with heritage resources and these resources are to be incorporated and utilized, where feasible. Furthermore, prior to development occurring, the Township requires the site to be assessed in order to verify the potential of archaeological resources. Where archaeological resources are found, appropriate measures to remove and document, in accordance with the Ontario Heritage Act is required. In order to evaluate the potential for archaeological concerns within the settlement area of Lucan, a review of the registered archaeological sites, historic plaques, cemeteries, known settlement areas and previous archaeological assessments within and surrounding the village of Lucan was completed by Timmins Martelle Heritage Consultants Inc. in February of 2019.

The following is a summary of the findings from the review:

- **Archaeological Sites:** There are two registered archaeological sites within the existing village boundary. These sites were completely excavated, so there is no further archaeological potential associated with them.

- Previous Archaeological Assessments: Six archaeological assessments have been completed within the existing village boundary for residential development. No archaeological resources were found with these sites based on reports available.
- Historic Plaques: A historic plaque is located on the Main Street in Lucan adjacent to Lucan Area Heritage and Donnelly Museum. This historic plaque is identified as designated under the Ontario Heritage Act in the Official Plan.
- Cemeteries and Burial Sites: Three known cemetery locations and three burials are known to exist; however, the locations of these burials are unknown. Further investigation into the definitive boundary of the three known cemeteries and confirmation of the three burial locations is required.
- 19th Century Structures: Several 19th-century structures and travel routes exist within the study area. There is the potential for archaeological sites to exist on the property, other than the buildings themselves. St. Patrick's Church is identified as designated under the Ontario Heritage Act in the Official Plan.

Of interest, two important historical settlements were identified for the Lucan area, the Wilberforce Settlement and the Donnelly Family settlement.

The review identified an early Black settlement, the Wilberforce Settlement area is known to be in the area surrounding the village of Lucan. The Wilberforce Settlement purchased 325 hectares of land in the Lucan area in 1830. Records indicate that the Wilberforce settlement dwindled in the mid-19th century when the area experienced an influx in Catholic Irish settlers. Background information suggests the location of the settlement may extend beyond the known location. Additional review of the Wilberforce Settlement is required in order to identify the extent of the settlement boundary and any connection between the known 19th century archaeological structures. The potential for additional archaeological concerns associated with this settlement is possible and requires further investigations to be completed.

The other potential source of archaeological potential that was identified is associated with the Donnelly Family in the mid-19th century. Although the location of where the family lived is known and outside of the existing study area, any work occurring immediately adjacent to the area may require additional archaeological work to be completed.

The archaeological review that was completed is a summary of all known information for the study area. The review concluded that the entire study area, given the settlement history, has the potential for additional archaeological concerns to be present. Further in-depth archaeological studies, including a Stage 1 Assessment and further background research will be required for projects related to specific locations of residential development and servicing, prior to their construction.

3.5. Social Resources

Within the local context, the settlement area of Lucan is heavily centralized around Main Street (Provincial Highway 4). Commercial and mixed use residential make up majority of land uses within the Main Street corridor. Of interest in terms of location destinations, the sole grocer in Lucan is located on Main Street. Gas stations, churches, banks, private healthcare facilities, bowling alley and restaurants are all located along the Main Street corridor. Some other commercial and industrial uses are located outside of the corridor, along William Street.

Community facilities such as schools, libraries, parks and community facilities play an integral role in social context at the local scale. Located along the Main Street corridor, the Lucan Library, Municipal Office and the Lucan Community Memorial Centre (including arena, two baseball diamonds, skatepark, outdoor pool and soccer fields) are considered primary community facility destinations in the village. There are two municipal parks located in the southern area of the village. The Lucan Optimist Elm Street Park features a baseball field, basketball court, splash pad, playground equipment and walking trails. Lion’s Market Street Park includes playground equipment, a large pavilion and hall, baseball field and walking trails. Wilberforce Elementary School located on Beech Street at the north end of Lucan is the only school located within the village boundary and offers education to 600 students ranging from Junior Kindergarten to Grade 8. A catholic elementary school, St. Patrick’s, is located at the intersection of Richmond Street and Roman Line.

In 2015, the County of Middlesex approved an update to the Township’s OP to include policies in support of an active transportation network. Walking, biking, rollerblading, skateboarding, and other types of non-motorized transportation are forms of active transportation. Human-powered and non-motorized transportation in Lucan is supported and encouraged to promote health through outdoor activities. Outlined in section 2.1.14 of the update, the policies direct development to include ‘the connectivity of parks and recreation facilities, institutional facilities to existing and proposed public or private trail systems, both locally and regionally’.

The development of sidewalks to promote pedestrian movement within Lucan was noted in the update. Lucan’s built up area currently contains dedicated paved sidewalks on at least one side of every roadway, apart from Saintsbury Line (north of Main Street (Highway 4)), William Street (east of George Street) and a small portion of Wellington, Clarence, and Maple Streets. The sidewalks on Main Street end at Saintsbury Line to the south and the Lucan Public Library to the north. A signalized intersection at Main Street at the Foodland and a designated school crosswalk at Stanley Street provide safe crossing areas. Currently, there are no dedicated bike lanes in the village.

Outside of the settlement area, there are several recreational hiking trails. Lucan Conservation Area, managed by the Ausable Bayfield Conservation Authority (ABCA), is located on William Street, east of Denfield Road. This area provides a hiking trail

along the Little Ausable River. The Lucan Area Trail Association also manages a number of trails; the Martens Trail along the Little Ausable River south of Highway 4 is the only other trail within the study area.

4. CONSTRAINTS AND OPPORTUNITY ANALYSIS

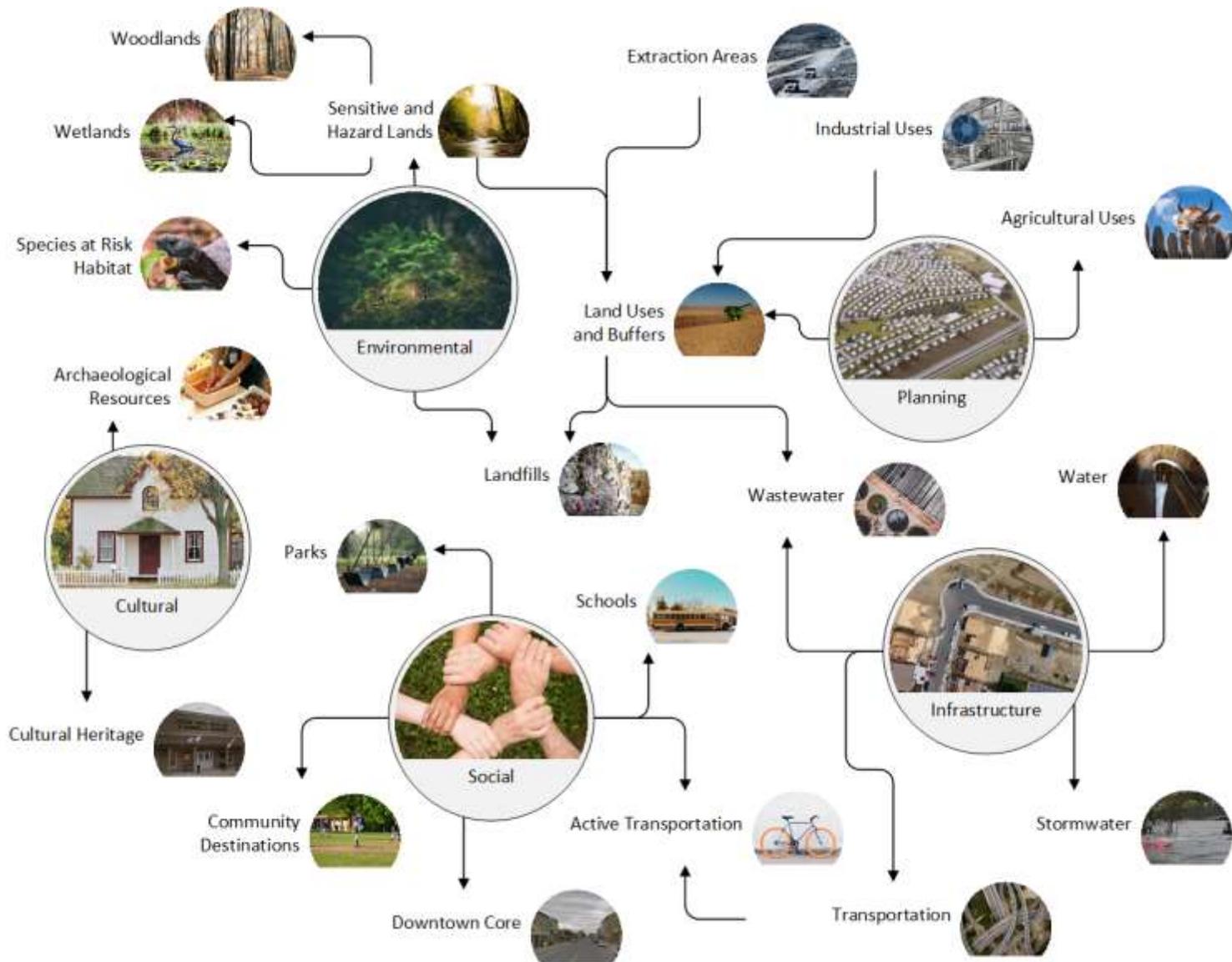
4.1. Analysis of Potential Growth Lands

To assess areas surrounding Lucan as potential future growth areas, a constraint and opportunity exercise was undertaken. Constraints and opportunities relating to environmental, social, cultural, planning and infrastructure factors were considered and assessed. Using this approach, lands within the study area as previously identified in Figure 2.2, were evaluated. For each category of factors, potential constraints of opportunities were mapped. The constraints and opportunities for the factors were then combined to see areas which could be further investigated for the future expansion of the urban boundary. For the purposes of this report, the constraints and opportunities for each factor are discussed individually. The combined analysis is discussed in Section 4.7.

The criteria considered for each factor are shown in Figure 4.1. The analysis of potential future growth lands must incorporate a wide range of criteria, some of which are considered only in terms of restrictions (such as significant wetlands) and others which may be a constraint in one area and an opportunity in another (such as water infrastructure). Some of the criteria overlap or are related, such as lands identified through zoning as hazards coincide with natural environment features such as wetlands and riverine areas. Some specific criteria could not be included in this analysis, but may be incorporated into later, more detailed reviews. For example, impacts related to increased traffic on local roads and intersections were not considered. For the environmental, planning, social and infrastructure factors, the criteria were mapped and are discussed in the follow sections. The cultural factors are discussed in Section 4.5, but due to the site-specific nature of identifying potential for archaeological and cultural heritage resources, opportunities or constraints could not be mapped at the broad spatial scale used in this analysis.

To delineate between constraints and opportunities, specifically for infrastructure factors, a red-yellow-green colour scheme was adopted; red applies to constraints, green to areas where there may be opportunities and yellow to areas where there may some constraint or limited opportunity. This methodology assumes that there may be the ability to provide water and wastewater services in certain areas with additional infrastructure, such as booster pumps. The analysis of infrastructure includes a cursory review of water supply and sewage treatment but does not specifically examine collection or distribution pipe capacities. Such an analysis would require modelling of these systems, which is beyond the scope of this assessment.

Figure 4.1 Factors Considered for Analysis



This evaluation has been completed at a broad spatial scale, primarily from a desktop setting using 2015 aerial photography. It is intended to guide future, more detailed studies and to support long-term municipal planning efforts. Many of the assumptions made in this report should be further evaluated and investigated in a more detailed manner and prior to any expansion of the urban boundary, a comprehensive review will have to be undertaken. It should be noted that changes in land use since 2015 are not represented in the mapping included in this report. Also, moving forward it should be recognized that changes in land use, such as construction of industrial or agricultural facilities could impact the feasibility of future growth in specific areas.

4.2. Environmental Constraints and Opportunities

The analysis of environmental constraints included the identification of environmentally protected or hazard lands, potential for species at risk and their associated habitat, and former landfill sites. Within the study area, significant wetlands and wooded areas were identified as constraints to development. There are only two locally significant wetlands within the study area, both found south of Lucan. These areas, identified as Lucan Woods and Lucan Crossing, are not provincially significant wetlands but are identified as wetland areas in the Middlesex Natural Heritage Study, as well as in the OP mapping. In these areas, development and site alteration is prohibited, with OP and Zoning By-law policies directing development away from these sites. The wetland and adjacent lands are regulated by the Ausable Bayfield Conservation Authority under O. Reg 147/06 (Regulation of development, interference, with wetlands and alterations to shorelines and watercourses).

Significant woodlands are typically wooded areas greater than 4 ha in size. These areas were identified as part of the County's 2014 Natural Heritage Study and incorporated into the Township's OP. Similar to wetlands, policies do not permit development in these areas. To the south of Lucan, woodland areas are associated with the Lucan Woods and Lucan Crossing wetlands. To the east of the current village boundary, there are three woodland areas where development would be restricted. West of Lucan, there are significant woodland areas within the Little Ausable River valley. Many of these areas overlap with hazard areas associated with river, either due to flooding or erosion risk.

In the study area, there are hazard lands around the Little Ausable River and its tributaries, as well as the Whitfield, Benn and Heenan municipal drains. These areas are constrained from future development to avoid erosion and flood hazards. The Heenan Drain is located north of the Lucan Industrial Park while the Benn Drain is located west of Richmond St. (Highway 4). The Whitfield Drain originates near Roman Line, southeast of Lucan and flows through the eastern and north portions of the village. Similar to the planning policies for wetlands and wooded areas, development is restricted in hazard areas. The hazard area associated with the Benn Drain constrains development potential southwest of the current urban boundary, between Richmond St.

and Saintsbury Line. A small area of hazard lands, associated with the Whitfield Drain, is located at the eastern edge of Lucan, north of Lucan Estates.

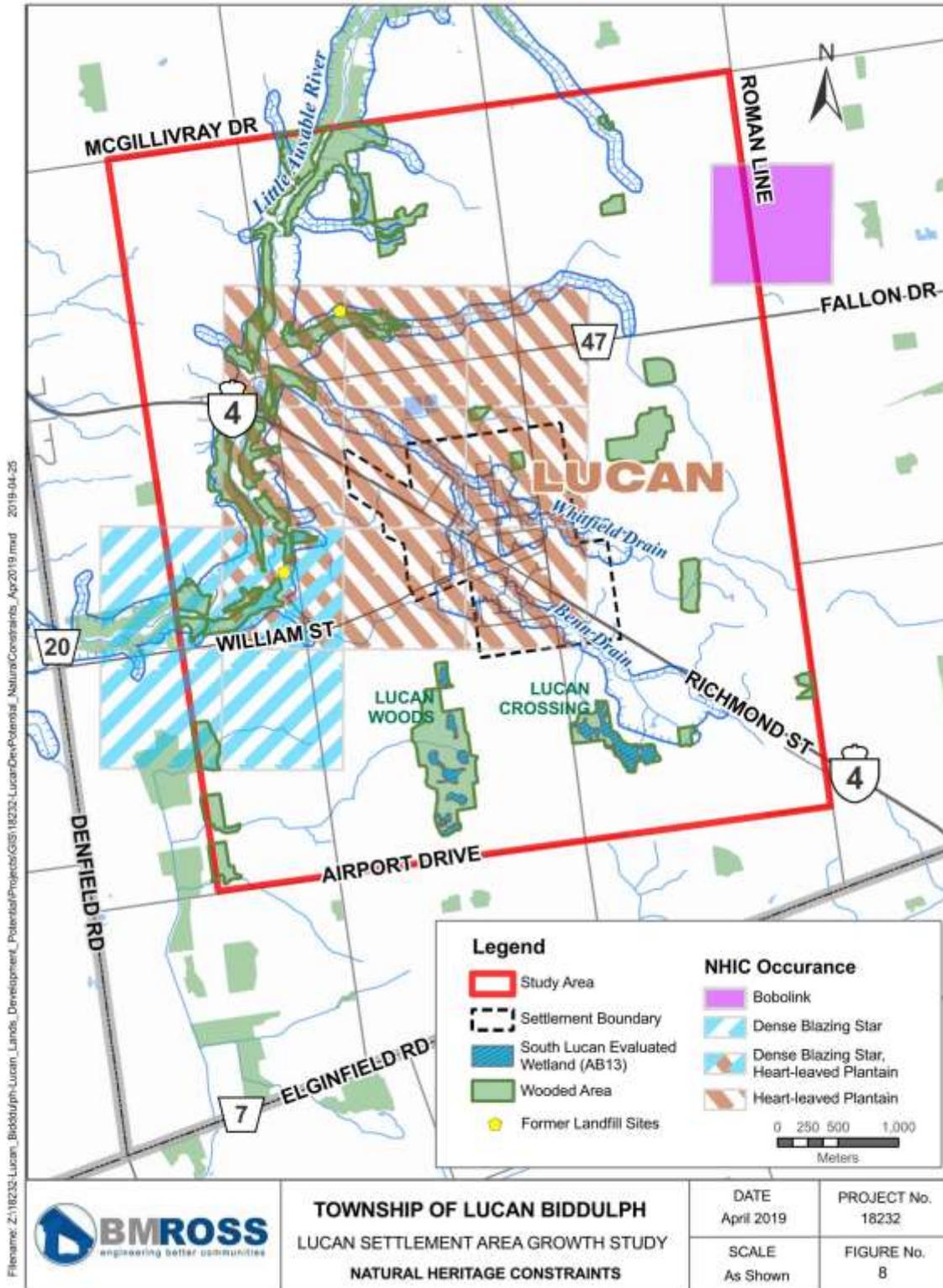
There are three species at risk with known occurrences within the study area (see Section 3.3.4), whose habitat is protected under provincial legislation: Heart-leaved Plantain, Dense Blazing Star and Bobolink. Heart-leaved Plantain habitat includes undisturbed, wet woods making it most likely to be found west of Lucan along the Little Ausable River and its tributaries. This makes these areas less favourable for development as Heart-leaved Plantain is sensitive to impacts related to changes in water quality or quantity resulting from development. Dense Blazing Star is found in moist tallgrass prairies, which is relatively rare throughout southwestern Ontario. In the Lucan area, a population of Dense Blazing Star was identified west of the village, however, given the lack of suitable habitat it is unlikely to represent a major constraint to future development.

Bobolink prefer open meadows and hayfields. Given the agricultural areas around Lucan, there is significant potential for the presence of Bobolink outside the village. Cropping patterns and crop rotation will influence the presence of Bobolink habitat. Given this, the potential for Bobolink habitat is considered variable year to year and specific areas cannot be identified as development constraints; however, the potential for Bobolink occurrences should be considered on a site-specific basis as development occurs in the future.

Three former landfill sites are identified in mapping from the Township. These landfill sites are located north and west of the village, along the Little Ausable River and the Heenan Drain. These landfills are no longer active; however, there is potential for soil and groundwater contamination within the vicinity of these sites. Under the Official Plan, prior to any development within 500 m of the fill area of a former landfill, soil, air quality and groundwater testing would likely be required prior to permitting any sensitive land uses, such as residences.

Figure 4.2 identifies the environmental-related constraints to expansion of the urban settlement area around Lucan. The habitat potential for Heart-leaved Plantain constrains development in a westerly direction (i.e., along William Street), in addition to potential hazard lands along the Little Ausable River and the former landfill sites. Development in a south and southwest direction is also constrained by the presence of wetlands, significant woodlands and the Benn Drain. To the east, there are few environmental constraints, with the exception of three woodland areas. North of the current urban boundary is potentially habitat for Heart-leaved Plantain and will require detailed habitat assessment to determine whether or not that species is present.

Figure 4.2 Environmental Constraints



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4.3. Planning Considerations

Planning policies, including provincial, County and local-level documents, provide guidance on future development – specifically, goals and constraints. The multiple levels of policy complement each other together, with provincial policies providing broad policy guidance and the County and local Official Plans identifying local issues and opportunities. Generally, future development should promote efficient land use and avoid environmental, public health and safety concerns. Efficient land use should strive to minimize additional land required, use of prime agricultural lands, and reduce servicing costs. These policies promote development adjacent to existing settlement areas and the avoidance of ‘leap-frogging’ new development. The effect of leap-frogging is increased servicing costs if servicing can be extended or a different standard of servicing if it cannot. There is also the potential to increase the amount of prime agricultural land taken out of production to accommodate growth. This pattern of development also hinders active transportation.

The Middlesex and Lucan Biddulph OP identify goals for growth as well as constraints based on local hazards and land uses. Policies direct growth away from natural areas, as discussed in the previous section. There are also policies in place to protect extraction areas and existing oil wells and avoid conflict with other land uses through buffers. Similar to provincial policy, the Official Plans promote orderly growth, avoiding strip development and striving for efficient land development. Policies also recognize the need for highway commercial areas and industrial lands where they will not impact sensitive uses.

Specific to Lucan Biddulph, there are buffers in place restricting development around existing commercial grain handling facilities, portable asphalt plants, and sewage treatment facilities (including lagoons). For the commercial grain handling facilities and portable asphalt plants, sensitive land uses (residential and institutional for example) are not permitted within 300 m. There is a 150 m buffer around the sewage treatment plant and lagoon.

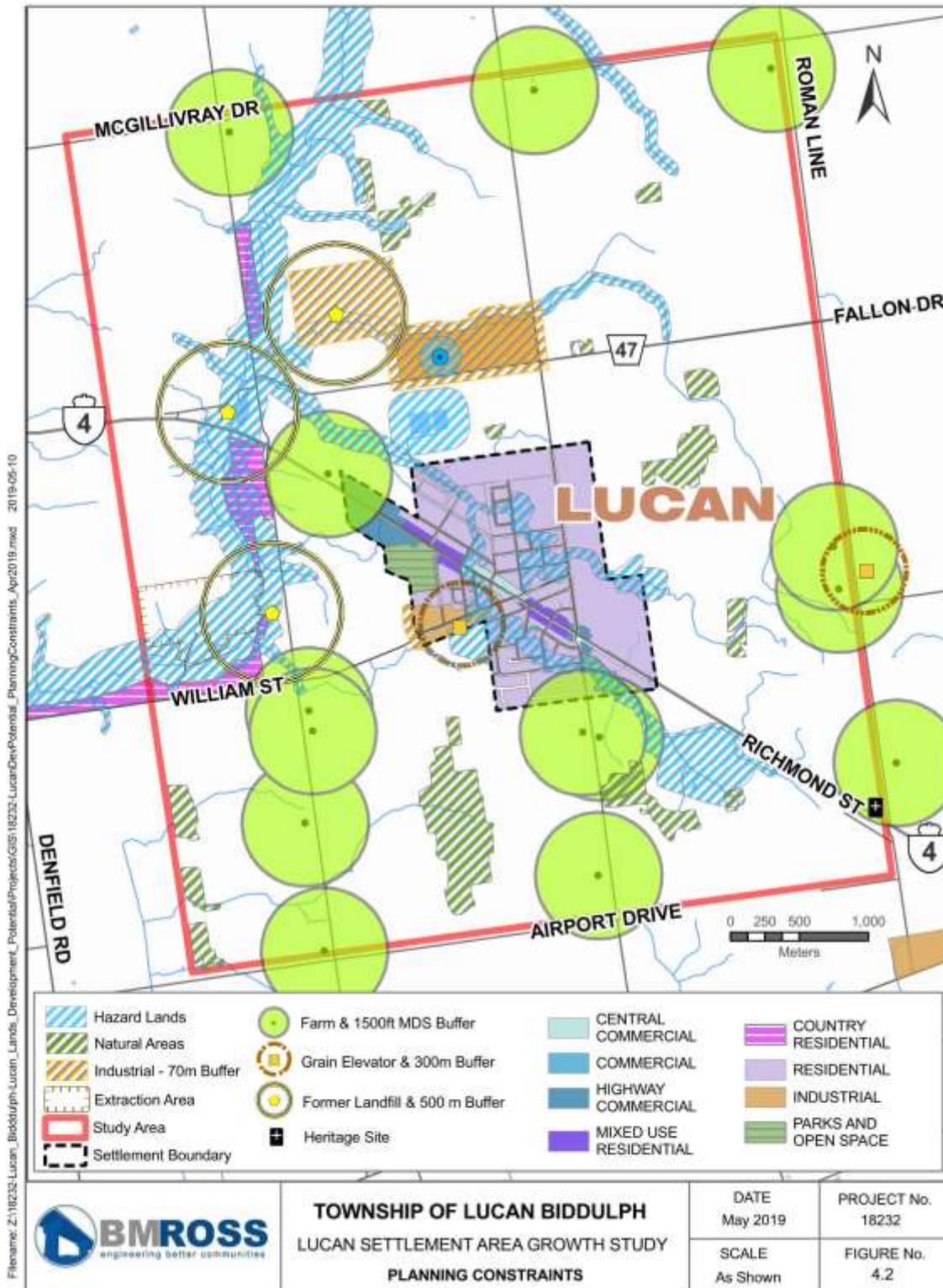
Planning policies also require that future development meets the Minimum Distance Separation (MDS) requirements from livestock and manure transfer facilities. MDS 1 is the formula used when new development or expansion of a settlement area is proposed within proximity to an existing facility. The variables of the formula include the type and number of livestock, type of storage facility, as well as type of land use proposed (i.e. construction of a single dwelling or creation of a subdivision or expansion of a settlement area). There are a number of livestock operations within the study area. For the purposes of this exercise a generalized approach to MDS constraints was used, based on the general absence of industrialized or large-scale operations within the study area. From aerial photography, it appears that most agricultural facilities within the study area have either cattle or horses, with either solid manure storage or liquid manure tanks. Without the means to verify the number and type of livestock in order to

provide a reasonable and conservative estimate of potential MDS setbacks, an average herd of 100 dairy cattle with an uncovered liquid manure storage tank was used. Based on this assumption, for an expansion of the settlement area, the MDS setback is 1,500 ft or 457 m. For any future studies, MDS will need to be assessed in greater detail, as this relatively conservative approach may overestimate the setback from smaller agricultural operations. Conversely, should any large or intensive agricultural operations develop, the setbacks will be larger.

To identify opportunities and constraints for future growth related to planning factors, buffers, hazard areas and agricultural operations were mapped. Figure 4.3 shows the natural area and hazard lands, in addition to the single extraction area, west of Lucan, north of William Street. To promote efficient use of land and to avoid leapfrogging, the areas adjacent to the existing urban boundary should be first considered for development. There are constraints to developing south of Lucan as a result of natural and hazard lands, as well as setbacks from agricultural operations. At the western edge of Lucan, there is a commercial grain handling facility. The 300 m buffer around this facility, to address potential noise and air quality impacts, is shown on Figure 4.3. The buffer, in addition to the natural area to the southwest of Lucan (Lucan Woods) limit the potential for future residential development, following an efficient land use pattern south of William Street. The area to the southwest of Lucan also has a larger concentration of potential livestock facilities, along Coursey Line, which could constrain development. The area north of William Street is relatively clear of planning constraints, east of Coursey Line; however the industrial lands at the western edge of Lucan may require a setback from residential land uses.

To the northwest and north of the existing urban boundary, the sewage lagoons, an agricultural facility and hazard lands associated with the Whitfield Drain, limit the available lands south of Fallon Drive. North of the lagoons, along Fallon Drive is the Lucan Industrial Park, which may require setbacks from sensitive uses depending on the types of industries that develop there. For the purposes of this assessment, a buffer of 70 m was assumed around industrial development. This is based on an assumption of Class I Industrial Facilities, as described in the D-6 Guideline for Compatibility between Industrial Facilities. Class I Industrial Facilities are generally light industrial land uses at a small scale with low probability of noise, dust or odour emissions. To the north and northeast of Lucan, there planning constraints are limited to the wooded areas. Currently, there are only a few livestock operations located along Roman Line. This provides a much greater potential area for future development. There are also few planning constraints to the southeast of the village, along the northside of Richmond Street, however, consideration should be given to avoiding strip-type development along this road.

Figure 4.3 Planning Constraints



4.4. Social Considerations

From a social perspective, future development lands should provide access or connection to existing community facilities and destinations. Generally, distances were considered through the lens of active transportation, based on the Middlesex-London Health Unit suggestion that a walking distance of 2 km is a reasonable distance to a destination for most people. Access and connectivity from future growth lands was assessed based on distance from the following places:

- Lucan Memorial Community Centre;
- Lucan sport fields;
- Lions Market Street Park;
- Lucan Optimist Elm Street Park;
- Lucan Library; and
- Downtown core.

The largest community facilities, the community centre and sports fields are located in the northwestern area of the village. The library is also located in this area. The central area of Lucan features the downtown core and Lions Market Street Park. There are also two churches in this area. The Optimist Elm Street Park is located in the southern part of the village. These destinations are noted in Figure 4.4. Presently, there are no community parks or destinations in the northeastern part of the village. The Parks and Recreation Master Plan recommends securing additional lands for additional soccer fields. Given the location of the existing soccer fields west of the Community Centre, it is likely that additional parklands would be located adjacent to the current facilities.

Another important consideration from a social perspective is the distance from local schools. There are two elementary schools in the Lucan area, a public school located on Beech Street in the northeast of the village and a Catholic school near the intersection of Richmond Street and Roman Line, just outside the study area. Proximity to schools is considered an opportunity with respect to future development. In the Thames Valley District Schoolboard, elementary-aged children are bused from areas beyond 1.6 km from a school. Given this, future development sited within 1.6 km of a school is considered an opportunity to promote active transportation and to reduce transportation costs. In Figure 4.4, areas within 1.6 km of Wilberforce Elementary School and St. Patrick Elementary School are identified.

Figure 4.4 Social Constraints



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The draft Middlesex County Cycling Strategy identifies potential cycling routes in the Lucan area (WSP, 2018). Within the study area, a paved shoulder is proposed along Fallon Road/County Road 47 to Saintsbury Line. Along Saintsbury Line from Fallon Drive to the edge of Lucan the Cycling Strategy includes a buffered paved shoulder. Within the village, a signed route is proposed along Saintsbury Line and William Street. These routes, while not yet established, may be an opportunity for future development with respect to active transportation.

From a constraint perspective, the lands to the south of the existing village are beyond 1.6 km from both local elementary schools. Future development in these lands would require bus transportation to both schools. This area will also be isolated from the proposed future cycling routes. It is generally within walking distance of the downtown core, but development in this area may be beyond walking distance to the library, community centre and sports fields.

The areas to the east of the current urban boundary, both north and south of William Street have greater potential for connections to the proposed cycling route. These lands are also relatively close to the downtown core, parks and community facilities in the northwestern part of village. Lands north of William Street are generally within 1.6 km of Wilberforce Elementary School; however, only a portion of the lands to the south are considered within walking distance to the school.

The lands to the north and northwest of Lucan are walking distance of the library, sports fields and Wilberforce Elementary School. Development in the northwest would be a moderate walking distance from the downtown core and to Lions Market Street Park. It is unlikely residents would walk from the northwest area to the Optimist Elm Street Park. The northwest area is also isolated from the proposed cycling routes. The lands north of Gilmour Drive would have better connection the cycling route along Saintsbury Line. These lands are also within a moderate walking distance of the downtown area and park on Market Street. Similar to the northwest area, it is unlikely that residents would walk from north of Gilmour Drive to the park on Elm Street.

The area east of Saintsbury and northeast of William Street, is within close walking distance to Wilberforce Elementary School. The proposed cycling routes are also easily accessed from this area, either at Saintsbury Line or Fallon Drive. Lions Market Park is within an easy walking distance. The downtown is also within a relatively walkable distance, however the distance increases from the more northerly lands. The Community Centre and sports fields are beyond a kilometer from these areas; however there is a relatively direct route via residential streets from the northeast to the library, Community Centre and sports fields.

The area to the southeast of the current settlement area is the most isolated from many of the destinations within the village, especially the library, community centre and sports fields. The lands immediately adjacent to Richmond Street are outside the walkable area for Wilberforce Elementary School. With respect to St. Patrick Elementary School,

the area to the southwest may be within 1.6 km, however, there is no infrastructure in place to support active transportation to the Catholic school. The southeast area is also isolated from the proposed cycling routes.

4.5. Cultural Considerations

There is potential for archaeological and cultural heritage resources in the areas surrounding Lucan. The preliminary examination of potential, conducted by Timmins Martelle Heritage Consultants, identified that the presence of two historic settlements in the vicinity of Lucan: the Wilberforce Settlement and Lucan village itself. Given the presence of these settlements, the lands within the study area will likely require further investigations with respect to archaeological and cultural heritage resources. It should also be noted that there may also be the potential for First Nation archaeological resources with the study area. With the widespread potential for resources, specific constraints or opportunities with respect to an expanded urban settlement area cannot be identified.

4.6. Infrastructure Considerations

4.6.1. Transportation Infrastructure

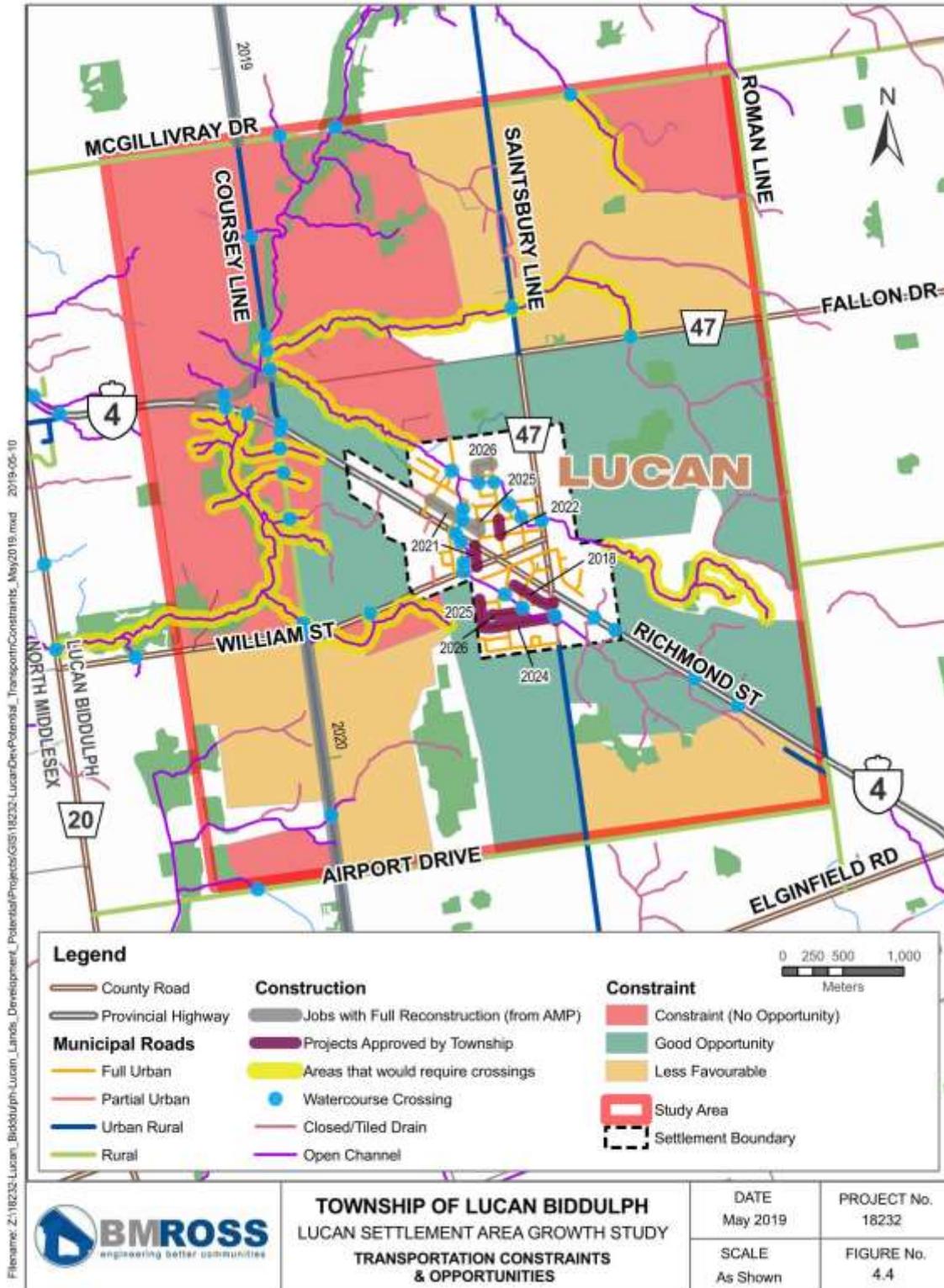
To assess the potential for constraints and opportunities as related to transportation infrastructure needs, the existing road network, crossings, access to Provincial and County roads, and connectivity to the village's downtown core and major facilities were all considered. The most recent update of the municipal Asset Management Plan was also consulted to identify any potential upgrades or construction projects related to roads (see Figure 4.5).

The area southeast of the urban limit, along Richmond Street provides access to Highway 4 (Richmond St), and Roman Line could be used to access County Road 47 (Fallon Drive). It is likely crossings (either a bridge or culvert) would be needed to utilize lands north of the Whitfield Drain. This area would also present a challenge in terms of connections with the existing road network, as the points of connection would be limited. It would also be relatively poorly connected the downtown and other facilities.

The lands immediately south of Watson Street can be accessed via Saintsbury Line. From there, there is a connection to Richmond Street/Highway 4 and County Road 47. This area would also have access to Highway 7 to the south. There is no opportunity to connect to Watson Street, and the only other connection points are to at the west ends of Joseph Street, Nicoline Avenue and north end of Klienfedt Avenue. It is expected however, that the majority of traffic from these lands would travel via Saintsbury Line. Similar to the lands to the southeast, these lands would have a relatively poor connection to the downtown core and other facilities.

The area west of Lucan Woods on either side of Coursey Line is not considered a favourable location for future development in terms of transportation. There is no ability

Figure 4.5 Transportation Constraints and Opportunities



to connect this area to the existing road network of the village, and it is remote from the downtown core and other destinations in the village. While there is the opportunity to access Highway 7 from Coursey Line and County Road 13 (William Street), it is remote from Highway 4.

Immediately west of the village, south of William Street, there is an open channel drain. This drain runs essentially parallel to William Street and may present a constraint to the construction of a transportation network in that location. North of William Street, there are fewer constraints to establishing a road network. This area has access to William Street (County Road 13), Coursey Line, and potentially to Highway 4 to the north. The presence of the sport fields, however, limits the ability to connect to the existing roads in Lucan.

Between the western extent of the study area and Coursey Line, north of William Street and south of Highway 4, opportunity for development of an efficient road network is limited by the presence of the Little Ausable River. Major river crossings would be required to access Coursey Line to the east or William Street to the south. Given this, these lands are most likely only accessed via Highway 4.

Along the north side of Highway 4, to the west of the current urban boundary, there is some opportunity to connect with the existing road network at Walnut Street and Butler Street. It is unlikely that a connection could be made to Walnut Grove Place, given the presence of a stormwater pond to the west of the cul-de-sac. This area also has good access to the Community Centre, Library, sports field and Wilberforce Elementary School. A constraint to the transportation network in this area is the Whitfield Drain, between Richmond Street and Fallon Drive. It is likely a crossing would be required to access lands north of the drain.

The area north of Gilbert Street can be accessed via Saintsbury Line, as well as from connections with the existing road network at Campanale Way and Beech Street. Given this, this area can access the school, library and community centre relatively easily. It is a moderate distance from the downtown core, but the existing road network from a northerly direction allows for multiple routes to access Richmond Street. The connection to Saintsbury line provides access to County Road 47 but would require travelling either south or east (via Fallon Drive and Roman Line) to reach Highway 4 utilizing paved roads.

The lands east of Saintsbury are similar in terms of their access to County Road 47 and Highway 4. These lands have a shorter distance to travel to reach Highway 4 than the lands located north of Gilmour Drive. There is also an opportunity to integrate this area with connections to the existing road network, at Kent Avenue and Duchess Avenue. A link to Market Street and Alice Street is unlikely due to the stormwater pond to the east of Saintsbury Line. This area is also not expected to require major crossings as there are no open drains or watercourses.

The lands to the north of Fallon Drive/County Road 47 and south of Breen Drive, are not considered appropriate for development from a transportation point of view. These areas are too isolated from the village to allow for an efficient transportation network.

4.6.2. Stormwater Infrastructure

Lucan has a relatively new stormwater infrastructure, as reported in the Asset Management Plan (AMP). Given this, the AMP did not identify any needs associated with the current network within a 10-year timeframe. It is expected that new development in an expanded urban area will occur under a Plan of Subdivision, and as such will be required to complete a detailed stormwater management plan. Given this, this report stormwater infrastructure opportunities and constraints will focus on the availability of outlet locations and general topography.

North of the existing urban boundary, stormwater is expected to generally flow towards the northwest. There is an existing stormwater pond in the Lucan Industrial Park, but it is expected that the facility is sized only to service the lands within the Park. Given the topography in this area, the Heenan Drain may be a potential site for a stormwater outlet.

The area to the northeast of Lucan is relatively flat, with little opportunity for outlet into an existing open drain. There is a closed tile drain that flows to the northwest (eventually to the Heenan Drain), but this drain is located at a higher elevation than much of the land to the west. There may be some opportunity to outlet stormwater to the Whitfield Drain, although the capacity of this drain to accommodate additional flows would need investigated.

For the lands located to the southeast, there may be an opportunity to connect to the existing stormwater network along Richmond Street. Alternatively, stormwater could outlet on the north side of Richmond to the Whitfield Drain or to the Benn Drain on the south side. Again, the capacity of these drains would need to be further examined.

To the south of Lucan, the lands are relatively flat and generally slope towards the west. The Haskett Drain runs along the south side of William Street and another drain originates in the Lucan Woods wetland area and flows towards the west. Given the presence of the wetland, the more southerly drain is not considered a viable outlet location. There may be some opportunity to outlet stormwater from the lands south of Lucan to the Haskett Drain.

North of William Street and west of the village limit, the topography slopes west towards the Little Ausable River. There are several small tributaries and drains in this area that could be potential outlets for stormwater. The topography and potential for outlets appears to be an opportunity with respect to development for this area.

4.6.3. Water Infrastructure

Potable water for Lucan is supplied from the Lake Huron Primary Water Supply System to Lucan Booster Pumping Station. The pumps at the pumping station have a capacity of 3,600 m³/day. In addition to the pumping station, there is a 2,270 m³ elevated storage facility located on the eastern side of Lucan, just north of William Street.

In 2017, the average monthly flow per day in Lucan was 902.43 m³. Despite an increase in the number of customers, in 2018 the average monthly flow per day decreased to 836 m³. This follows a similar trend observed in the total water usage over the past few years. The Financial Plan for the Lucan Water System, as well as the Lake Huron Primary Water Supply System 2014 Master Plan Update, both identify these trends towards water conservation and improved water efficiency. The Master Plan for the Lake Huron Primary Water Supply System looked at projected future water demands and population projections to 2035. Over this time frame, no major capital works were identified, as there is sufficient capacity to meet water demands. The Financial Plan for the Lucan Water System does not identify any capital projects for the water system as required or planned between 2019 and 2021. Given this, there appears to be sufficient capacity to accommodate an expanded urban settlement area.

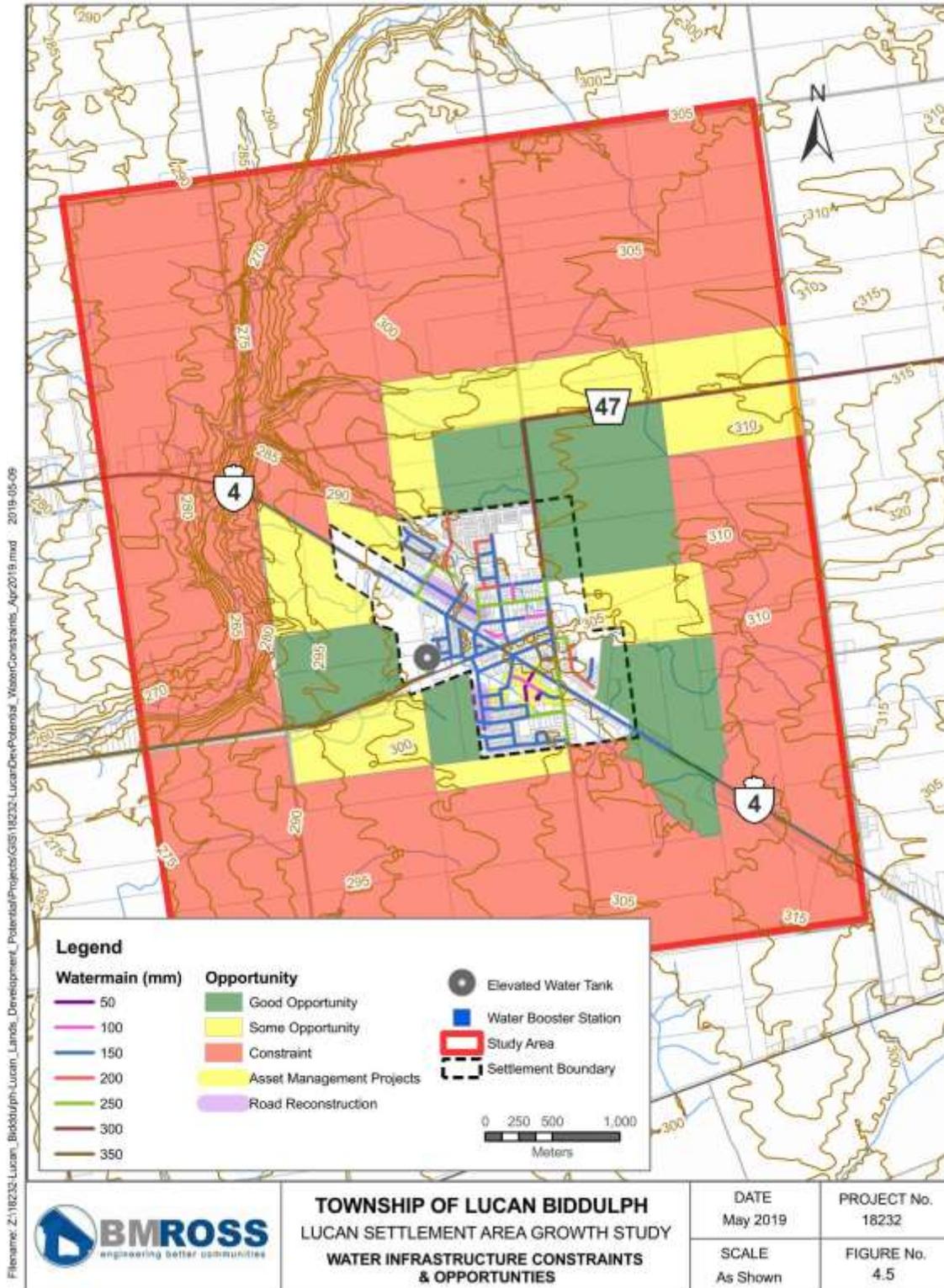
Discussions with staff identified a potential project to extend servicing along Richmond Street to provide municipal water to existing residents on a well system in the vicinity of the intersection of Roman Line and Richmond Street. This future project, should it proceed, may provide an opportunity for servicing additional areas and looping.

For water infrastructure development opportunities can include connections to large trunk watermains (250 mm or greater in size), proximity to storage, and the ability to create watermain loops. Constraints to development include the need for booster pumps (increases in elevation) and being remote from large trunk watermain or storage sites, a shown in Figure 4.6.

To the south end of the village, west of Saintsbury Line there is a large watermain (250 mm) along Saintsbury that could supply the area. It is, however, relatively remote from the large supply trunk along William Street and the elevated tank. Given the increase in elevation to the south, there may be a need for pumping facilities. From a long-term planning perspective, should the watermain along Richmond Street be extended to Roman Line, there would be an opportunity to do a large loop along Saintsbury and Airport Line.

Along William Street and southwest of urban boundary, water could be readily supplied from the trunk watermain along William Street. This area is also close to the water storage facility, which is an opportunity. There is the potential in this area to connect to existing dead-end watermains for looping at Nicoline Avenue and Joseph Street. It is also noted that in the AMP, a water project along Kleinfedlt Avenue is identified and could present another opportunity to establish a connection.

Figure 4.6 Water Infrastructure Constraints and Opportunities



To the west of Lucan, north of William Street, water could be supplied from the large trunk watermain along William Street. The topography generally decreases to the northwest, which would support development in that direction. It is also near the water storage facility, which would support fire flows and pressures. However, the area is relatively isolated from other potential connections and there is limited opportunity for looping.

Along Richmond Street (Highway 4), there is a 150 mm watermain. To support development further west, it may require potential watermain upgrades along Richmond Street. This area is also relatively remote from the storage and existing trunk watermains. In this area, there is an opportunity to connect to two existing watermains at Walnut and Butler Streets. There may also be the potential to connect to the watermain at Walnut Grove Place, if the existing stormwater pond can be avoided.

North of Gilmour Drive, these lands could be supplied from the 200 m watermain at Campanale Way as well as from the large trunk watermain at Saintsbury. There is also potential for an additional connection at Beech Street. Generally, the elevation decreases to the north, which makes it less likely that a booster pumping station would be required. These lands are remote from the storage facility but given their proximity to the 375 mm trunk watermain at Saintsbury, pressure and supply is likely not a limiting factor.

Similar to the area to the north of Lucan, the lands to the east of the urban boundary could be supplied from the trunk watermain along Saintsbury Line. Water could also be brought into the area from the same large supply watermain along Fallon Drive/County Road 47 or looped. The land in this area is relatively flat, but does gradually slope up to the east, so a booster pump may be required. There is the potential to connect to existing dead ends at Gilmour Street, Kent Avenue, Duchess Avenue and Market Street.

4.6.4. Sanitary Sewage Infrastructure

The current capacity of the Wastewater Treatment Plant (WWTP) as specified by the current Environmental Compliance Approval (ECA) is an annual average flow of 1,700 m³/day and a peak flow of 3,600 m³/day. In a recent memo, BMROSS staff calculated the reserve capacity for the sanitary sewage treatment.

Presently, the 5-year average flow per customer is 0.915 m³/day. The estimated number of customers in 2017 was 1,154; given this, the estimated existing flow (as of January 2018) is 1,062 m³/day. This is approximately 63% of the total capacity. Based on this, the reserve capacity is 638 m³/day.

Current commitments for capacity include infill and registered and draft approved units that have yet to be built. In Lucan, the current commitments are 479 units. This equates to 440.68 m³/day in terms of flow. The uncommitted capacity is therefore, 197m³/day

(638 m³/day – 440.68 m³/day). Assuming current rates of flow, the uncommitted capacity equates to approximately 214 units.

At present, the three largest vacant future development parcels within the urban boundary total 32.74 hectares. Assuming 12.5 units per hectare, this equates to 409 units. Given this, it appears that development within the current urban boundaries will accommodate the uncommitted capacity. Increased capacity will likely be required to fully service all the vacant lands within Lucan as well as any expansion to the urban boundary.

Similar to the analysis of water infrastructure, the evaluation of constraints and opportunities for sanitary sewage infrastructure focuses on identifying areas where sewage pumping may or may not be required and proximity to trunk sewers (see Figure 4.7). The sewer system modelling was not undertaken, so this evaluation does not include an examination of sewer or pumping station capacities.

The lands to the north of the urban boundary are near the sewage lagoons and sewage treatment plant. These lands, while close to the lagoons and treatment plant are not considered to have development potential, as they currently serve as buffer to the lagoons and sewage treatment plant.

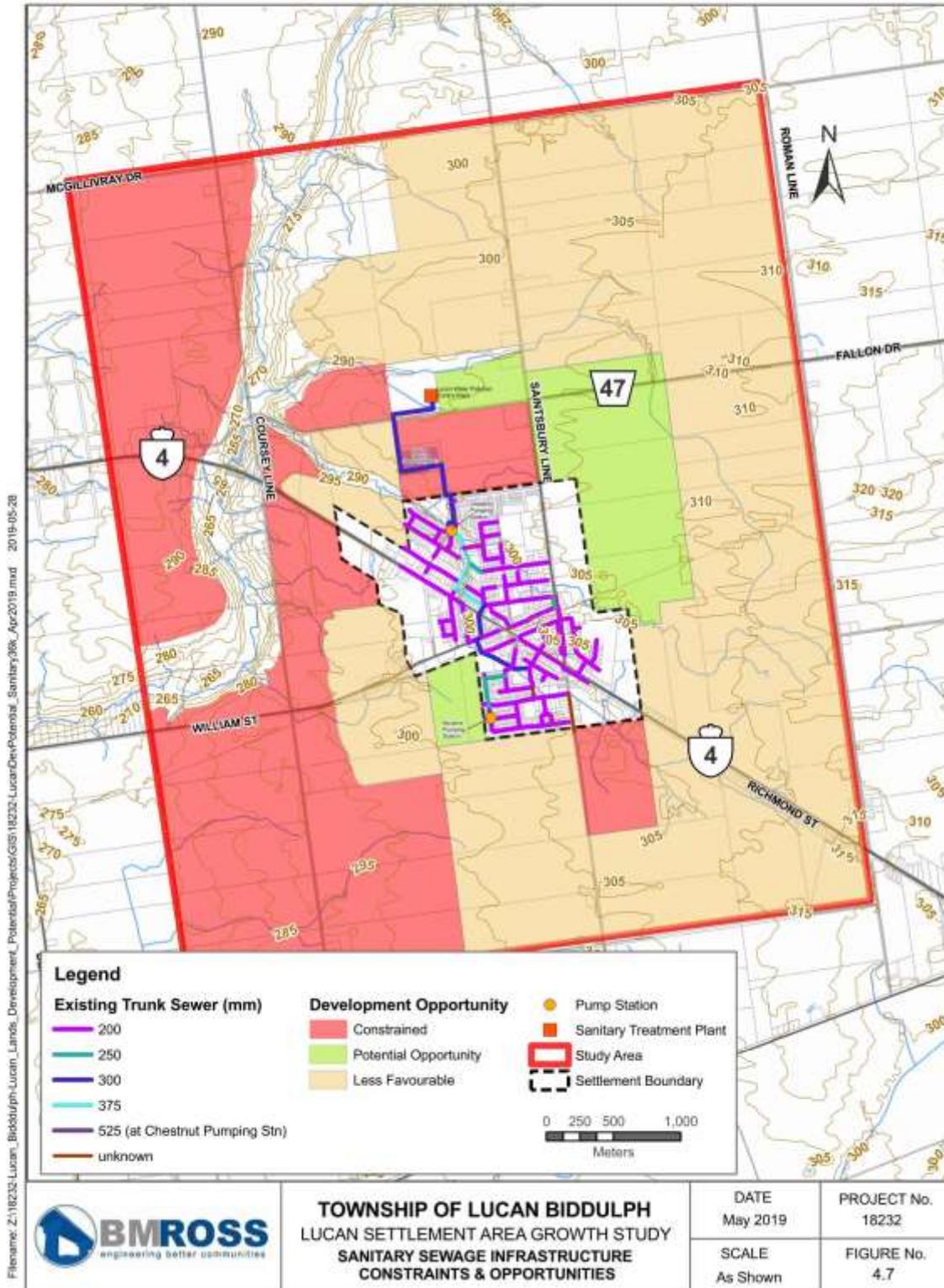
East of Lucan, there is the potential to service these areas by gravity. It is anticipated that flows could be directed either north along Fallon Drive or west towards the Chestnut Pumping Station. If flows are directed west it may require an increase in sewers along Kent Street to the trunk sewer at Walnut Street.

To the southeast of the urban boundary, sewage would flow by gravity towards the northwest. This area is furthest away from the sewage treatment plant, so flows would need to travel through the existing collection system to the Chestnut Street Pumping Station. Development in this area may require downstream upgrades or an additional trunk sewer.

At the south end of Lucan there is a pump station at Joseph Street and Watson Street. From discussions with staff, it is understood that the sewers in this area are relatively flat and that it may be difficult to accommodate development with gravity sewers. In this area, there is also limited opportunity to connect to the existing system, as there is not a sewer along Saintsbury Line. The potential connection points are limited to Joseph Street and Nicoline Avenue. An expansion of the trunk sewer along the Benn Drain.

If the urban boundary was expanded to the west along William Street, it would likely require sewage pumping facilities or a low-pressure system. Sewage would have to be pumped east along William Street to the trunk sewer at Frank Street.

Figure 4.7 Sewage Servicing Constraints and Opportunities



4.7. Combined Constraint and Opportunity Analysis

In order to identify potential areas for future investigations related to an expansion of the urban boundary, the planning, environmental, social and infrastructure constraint and opportunity maps were combined. The different layers were overlaid to identify the areas around Lucan with the fewest potential constraints to growth, as shown in Figure 4.8.

Generally, the lands to the northeast and east of the current urban boundary have the fewest constraints to future growth. These areas are generally free of environmental constraints, apart from the two woodland areas south of Fallon Drive and east of Saintsbury Line. The 1 km square NHIC data indicated the presence of Heart-leaved Plantain in the generally area. Given that the habitat of Heart-leaved Plantain is generally wet, wooded areas or along slow-moving stream, it is suspected that occurrences of this species are most likely along the tributaries of the Little Ausable River rather than the open, agricultural areas to the northeast and east of Lucan.

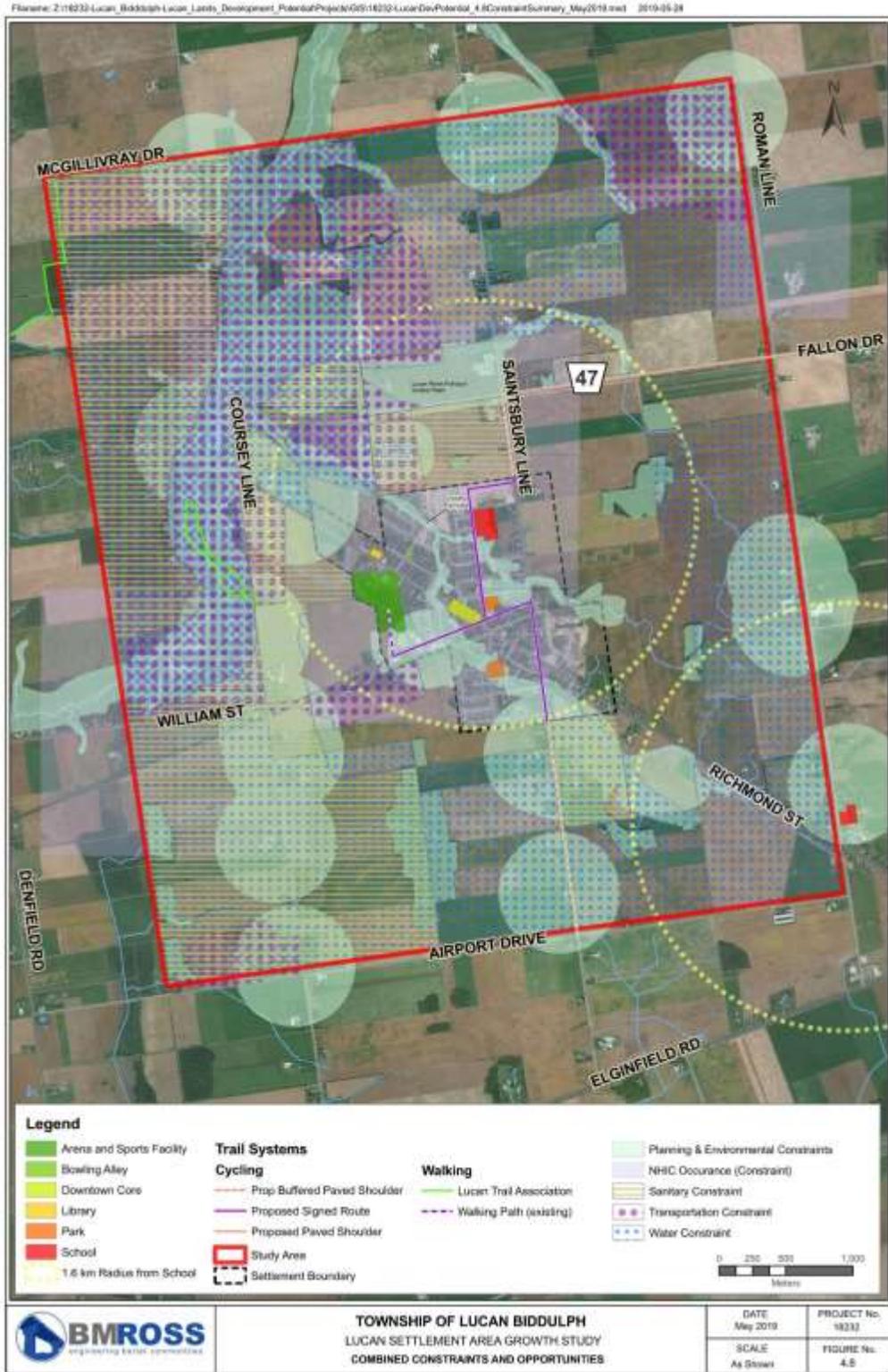
From a planning perspective, there are fewer livestock barns and/or manure facilities in this area, especially in comparison with the lands to the south and west of Lucan. This minimizes the potential setbacks required under the MDS I formula. The area could be serviced by municipal water via the trunk watermain along Saintsbury Line or Fallon Drive. It also located 'upstream' of the sewage treatment plant, and it is likely that sewage could be conveyed by gravity to the Chestnut Street Pumping Station, or by a trunk sewer to the Wastewater Treatment Plant. The area is also well connected to arterial roads, such as Saintsbury Line and Fallon Drive. The lands fall within walking distance of Wilberforce Elementary and located close to the proposed cycling route.

To the south of Lucan, the potential for these lands for urban expansion is limited by the availability of water, distance from community destinations and schools, and potential MDS setbacks. Future development in this area may also be limited due to the presence of the two wetland complexes.

Along Richmond Street, to the southeast, there are relatively few constraints with respect to infrastructure or the environment. However, in comparison to the areas to the east and north of the village, development in this area would likely occur in a strip pattern and is poorly connected to the downtown core and other community features.

To the west of the village, along the north side of William Street, there may be some opportunity for growth; however, it may be limited by proximity of livestock operations to the west. Water could be supplied from the trunk watermain along William Street. Further technical investigations would be required to determine if sewage would need to be pumped along William Street to the trunk sewer at Frank Street. With the presence of the sports field and Community Centre to the east, access to these lands is likely limited to a single access from William Street.

Figure 4.8 Summary of Constraints



Northwest of the Lucan, along Highway 4, potential expansion is likely limited by MDS setback requirement as well as infrastructure considerations. The area is isolated from a large watermain for supply and is 'downstream' of the sewage treatment infrastructure. It is likely that sewage would need pumped from this area into the existing sewage collection system. West of Coursey Line, development is limited by the presence of the Little Ausable River valley and the associated hazard lands.

5. CONCLUSIONS AND FUTURE STEPS

This report is an initial, high-level analysis of potential opportunities and constraints to the expansion of the urban settlement area of Lucan. From the spatial analysis completed, it appears based on a number of infrastructure, social, planning and environmental considerations, the most likely areas to support future residential growth are to the northeast of Gilmour Drive as well as east of Saintsbury Line. These areas, based on the broad assessment, appear to have the fewest constraints to future development. In these areas, it appears there are opportunities for sewage servicing, water service, good access to arterial roads and potential active transportation infrastructure, as well as fewer constraints related to hazards, significant natural features or livestock operations.

This report is a first step in investigating the expansion of the urban boundary. It is intended to guide future, more comprehensive studies and assist in long-term planning for municipal studies. The assumptions made in this report should be ground-verified as part of any future studies, as this report was primarily a desktop exercise. It should also be recognized that the factors considered as part of this exercise are not static. There may be changes in land use, regulations, and planning requirements in the future that could impact the direction of future growth. There are also other growth-related impacts that should be considered that were not evaluated as part of this report, such as solid-waste and recycling needs.

The next step for assessing the potential for future expansion of the urban area is to investigate servicing needs and capacity, particularly with respect to sewage servicing. It is understood the Township is currently investigating the sewage treatment plant performance, biosolids management and peak flows. If future growth is directed to either the north or east of the current urban limit, it would be prudent to start investigating potential routing options and the capacities within the collection system. It is expected that sewage servicing will be a major component of any future Settlement Capability Study, as required as part of the Comprehensive Review process.

This report will serve as a resource for a future Settlement Capability Study. A Settlement Capability Study will address the sustainability of future water quality and quantity needs; impacts of future growth on groundwater resources including private wells; identification of restrictions to future development; an assessment of surface drainage; impacts to natural systems; impacts to traffic and transportation services; and

impacts of future growth on the existing municipal infrastructure systems. It is recommended that the Township plan for initiating a Settlement Capability Study within the next few years. The completion of the Settlement Capability Study is required as a component of the Comprehensive Review need prior to expansion of the urban settlement area.

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