MUNICIPALITY OF BLUEWATER

MUNICIPAL CLASS ENVIRONMENTAL ASSESSMENT FOR DEVELOPMENT OF A STORMWATER SERVICING MASTER PLAN (COMMUNITY OF BAYFIELD)

MASTER PLAN REPORT

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MASTER PLAN REPORT

July 14, 2014
Revised December 1, 2014

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File No. 13129

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MASTER PLAN REPORT

1.0 INTRODUCTION

1.1 Purpose of the Report

The Municipality of Bluewater initiated a Stormwater Servicing Master Plan process in August 2013 to define the best strategy for resolving deficiencies with existing stormwater infrastructure servicing the Community of Bayfield, and to establish stormwater servicing policies for future development lands located adjacent to the former Village boundary. The process followed the procedures set out in the Municipal Class Environmental Assessment (Class EA) document, dated October 2000, as amended in 2007 and 2011. B. M. Ross and Associates Limited (BMROSS) was engaged to conduct the Class EA process on behalf of the proponent.

The purpose of this report is to document the Master Planning process followed for this project. The report includes the following major components:

- An overview of the general project area.
- An inventory of existing stormwater infrastructure serving the community.
- A summary of deficiencies associated with the existing stormwater infrastructure.
- A description of the alternative solutions considered for resolving the defined problems.
- A synopsis of the decision-making process conducted to select a preferred alternative.
- A detailed description of the preferred alternative.

The Stormwater Servicing Master Plan established through this process sets out a preferred long-term strategy for storm drainage infrastructure within the defined study area. In this regard, the Master Plan will become the basis for, and be used in support of, future investigations for specific projects required to implement this strategy.

1.2 General Description of Master Plans

Master Plans are long-range plans which integrate infrastructure requirements for existing and future land uses with environmental assessment planning principles. These plans examine existing infrastructure systems within defined areas in order to outline a framework for planning subsequent works. Master Plans typically exhibit several common characteristics. They:

- Address the key principles of successful environmental planning.
- Provide a strategic level assessment of various options to better address overall system needs and potential impacts and mitigation.
- Address at least the first two phases of the Municipal Class EA process.
- Are generally long-term in nature.
- Apply a system-wide approach to planning which relates infrastructure either geographically or by a particular function.
- Recommend an infrastructure servicing plan which can be implemented through the completion of separate projects.
- Include a description of the specific projects needed to implement the Master Plan.

1.3 Integration with the Class EA Process

a) Class EA Project Phases

The Stormwater Servicing Master Plan has been completed in accordance with the planning and design process of the Municipal Class Environmental Assessment. The Class EA is an approved planning document which describes the environmental assessment process that proponents must follow in order to meet the requirements of the Environmental Assessment Act (EA Act).

The Class EA approach allows for the evaluation of alternative methods of carrying out a project, and identifies potential environmental impacts. The Class EA process is self-regulatory and municipalities are expected to identify the appropriate level of environmental assessment based upon the project they are considering. The Class EA planning process is divided into five project phases which are described below and illustrated in Figure 1.1.

- Phase 1 - Problem identification.

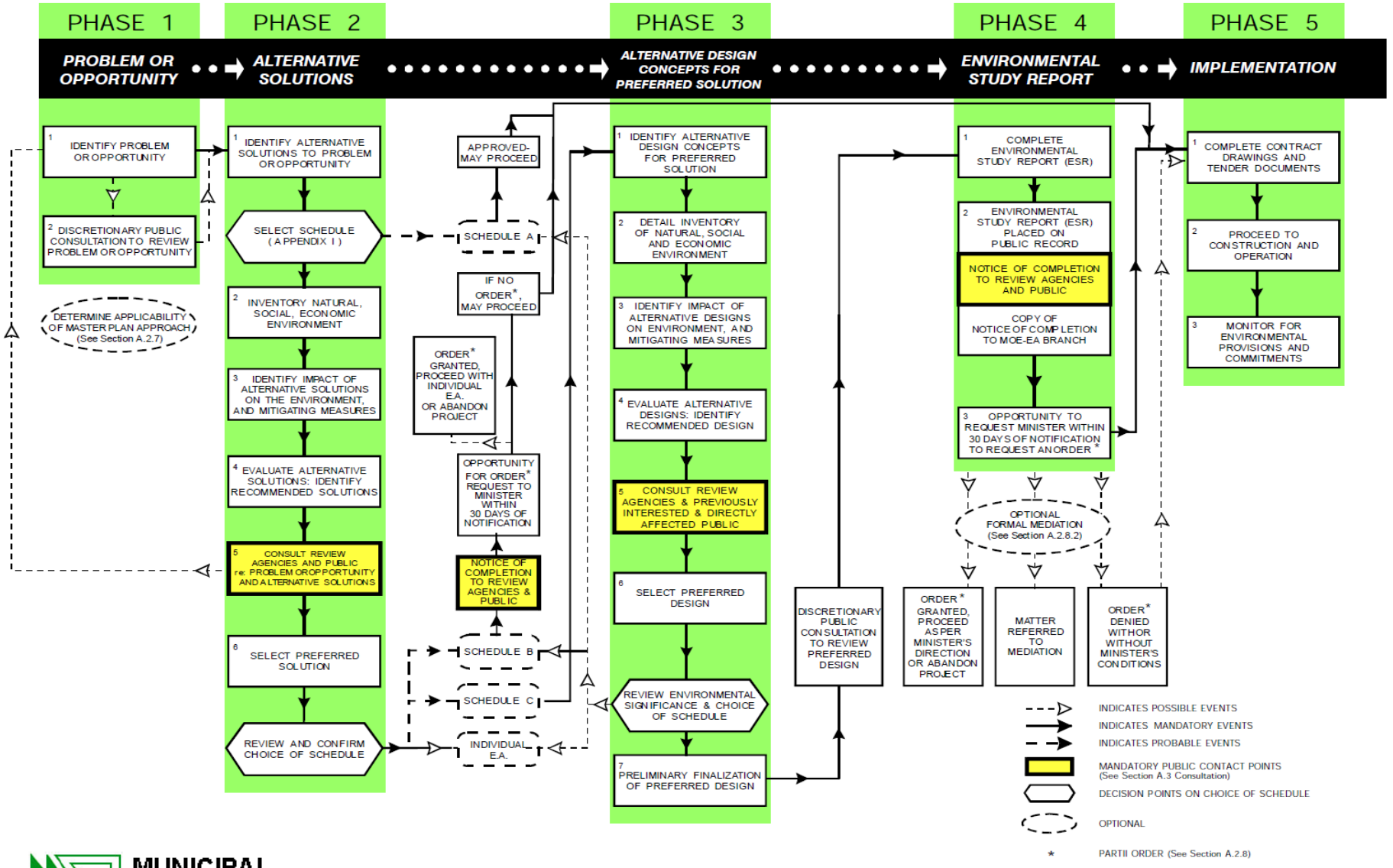
- Phase 2 - Evaluation of alternative solutions to the defined problems and selection of a preferred solution.

- Phase 3 - Identification and evaluation of alternative design concepts in selection of a preferred design concept.

- Phase 4 - Preparation and submission of an Environmental Study Report (ESR) for public and government agency review.

- Phase 5 - Implementation of the preferred alternative and monitoring of any impacts.

NOTE: This flow chart is to be read in conjunction with Part A of the Municipal Class EA



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MUNICIPALITY OF BLUEWATER
CLASS EA TO DEVELOP A
STORMWATER SERVICING MASTER PLAN
CLASS EA PROCESS

DATE: MAY 5, 2014

PROJECT No. 13129

FIGURE No. 1.1

b) Classification of Project Schedules

Projects associated with Master Plans are classified to different project schedules according to the potential complexity and the degree of environmental impacts that could be associated with the project. There are four levels of schedules:

Schedule A – Projects that are approved with no need to follow the Class EA process.

Schedule A+ – Projects that are pre-approved but require some form of public notification.

Schedule B – Projects that are approved following the completion of a screening process that incorporates Phases 1 and 2 of the Class EA process, as a minimum.

Schedule C – Projects that are approved subject to following the full Class EA process.

The Class EA process is self-regulatory and municipalities are expected to identify the appropriate level of environmental assessment based upon the project they are considering.

1.4 Master Plan Framework

a) Alternative Approaches

The Class EA document provides proponents with four approaches for conducting Master Plan investigations, given the broad nature and scope of these studies. Proponents are encouraged to adapt and tailor the Master Planning process to suit the needs of the study being undertaken, providing that at a minimum, the assessment involves an evaluation of servicing deficiencies followed by an review of possible solutions (i.e., Phases 1 and 2 of the Class EA process).

Table 1.1 summarizes the primary components associated with the four Master Plan approaches outlined within the MEA Class EA document.

Table 1.1
Summary of Master Planning Approaches

Approach	Key Characteristics	Project Implementation
# 1	- Master Plan prepared at the conclusion of Phases 1 and 2 of the Class EA process. - Completed at a broad level of assessment. - Serves as basis for future investigations associated with specific Schedule B and C projects.	- Schedule B and C projects would require further Class EA investigations.
# 2	- Master Plan prepared at the conclusion of Phases 1 and 2 of MEA Class EA process. - More detailed level of investigation and consultation completed, such that it satisfies requirements for Schedule B screenings. - Final public notice for Master Plan serves as Notice of Completion for individual Schedule B projects.	- Schedule B projects are approved. - Schedule C projects must complete Phase 3 to 4 of Class EA process.

Approach	Key Characteristics	Project Implementation
# 3	- Master Plan prepared at the conclusion of Phase 4 of Class EA process. - Level of review and consultation encompasses Phases 1 to 4 of the Class EA process. - Final public notice for Master Plan serves as Notice of Completion for Schedule B and C projects reviewed through the Master Plan.	- Class EA investigations are not required for projects reviewed through the Master Plan.
# 4	- Integration of Master Plan with associated Planning Act approvals. - Establishes need and justification in a very broad context. - Best suited when planning for a significant geographical area in the long term.	- Depending on level of investigation associated with the Master Plan, Class EA investigations may be required for specific projects.

b) Applied Framework

For the purposes of the Stormwater Servicing Master Plan, it was determined during the course of the investigation that Approach #1 would be the most appropriate planning framework to utilize for this assessment. The Master Plan therefore defines broad infrastructure requirements within the study area and will serve as a basis for additional infrastructure works associated with the implementation of project specific components.

The decision to apply Approach #1 for this Master Plan was based upon the following rationale:

- The level of review completed in conjunction with the Master Plan was not sufficient to satisfy the MEA Class EA process associated with Schedule B Activities;

- A majority of the works identified through the Master Plan are Schedule A or Schedule A+ activities therefore the additional level of assessment was not warranted in conjunction with the study.

Upon completion, the Master Plan document will form the basis for additional assessment required in support of Schedule B or Schedule C projects identified as part of the preferred infrastructure plan.

c) Approval Requirements

The Stormwater Servicing Master Plan is subject to approval from the Municipality of Bluewater, but does not require formal approval under the EA Act. The Master Plan will be made available for public review. Subject to consideration of the proposed works and any comments received through consultation, the Master Plan will be approved by Municipal Council.

If significant environmental impacts are identified during subsequent Class EA processes to implement Schedule B projects specified within the Master Plan, a person/party may request that the Municipality of Bluewater voluntarily elevate the project(s) to a higher level of environmental assessment. If the proponent declines, or if it is believed that the concerns are not properly dealt with, any individual or organization has the right to request that the Minister of the Environment make an order for the project(s) to comply with Part II of the EA Act which addresses individual environmental assessments. This request must be submitted to the Minister within 30 days of the publication of the Notice of Completion of the Class EA process for any specific project.

2.0 DESCRIPTION OF THE SERVICE AREA

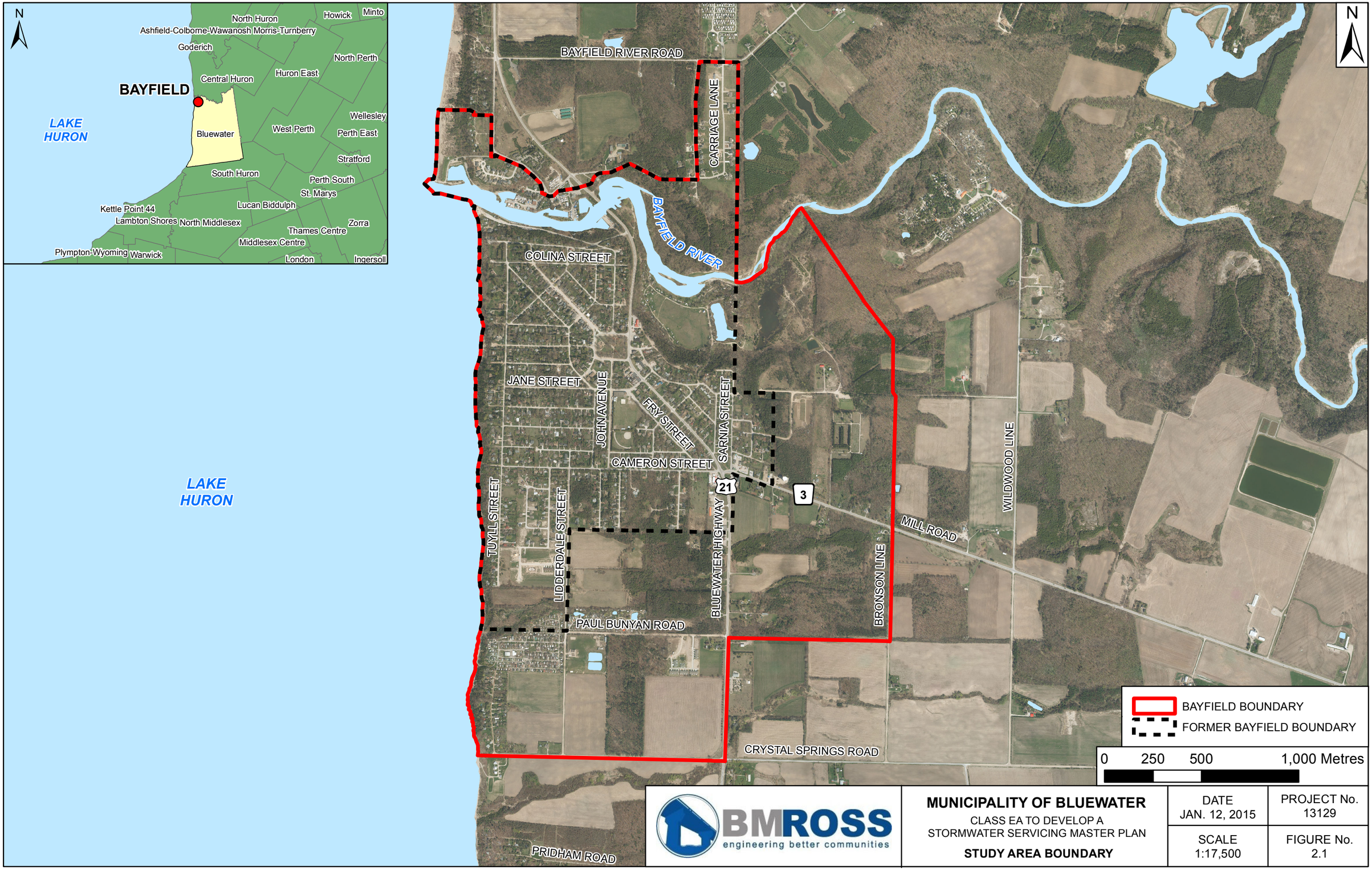
2.1 General Environmental Setting

a) Municipality of Bluewater

In January 2001, the Villages of Bayfield, Hensall and Zurich and the Townships of Hay and Stanley amalgamated to form the Municipality of Bluewater. The new Municipality has a land base of approximately 417 km^2 and a population of almost 7,000 permanent residents, with an additional seasonal population of approximately 2,500 persons. In general, Bluewater is comprised of a number of small urban settlements dispersed throughout a predominately rural landscape. A significant amount of seasonal development also is situated along the Lake Huron shoreline and a large rural area extends approximately 15 km inland from the shoreline of Lake Huron. The new Municipality incorporates a ward structure which generally corresponds to the jurisdictional boundaries of the former incorporated municipalities. However, for Hay and Stanley Townships, the former municipal boundaries were divided into East and West Wards with Provincial Highway No. 21 representing the ward boundary. In general, the East Wards reflect rural communities of interest while the West Wards reflect recreational (shoreline) communities of interest.

b) Bayfield Ward

The community of Bayfield represents one of the larger urban settlements in Bluewater, with a permanent population of approximately 900 persons and an estimated seasonal population of approximately 650 persons. The community is situated along the Lake Huron shoreline at the mouth of the Bayfield River; approximately 20 km south of the Town of Goderich and 40 km north of the community of Grand Bend. Bayfield is characterized as a retirement and seasonal recreational community, which includes a **s**trong tourist commercial sector attributable, in part, to its proximity to Lake Huron. Bayfield is largely residential in nature, although the community contains an established downtown commercial core, a limited amount of highway commercial activity, and a well-developed recreational/commercial harbour. Figure 2.1 illustrates the study area boundary identified in conjunction with the Master Plan Study.



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MUNICIPALITY OF BLUEWATER

CLASS EA TO DEVELOP A STORMWATER SERVICING MASTER PLAN

STUDY AREA BOUNDARY

DATE	PROJECT No.
JAN. 12, 2015	13129
SCALE	FIGURE No.
1:17,500	2.1

c) Future Development (Urban) Lands

In 2003 the Municipality of Bluewater, in conjunction with the Huron County Planning Department, began the process of preparing a draft Official Plan for the amalgamated Municipality of Bluewater. The key objectives of the process can be summarized as follows:

- To consolidate the Official Plans of the five former municipalities; plans which remained in effect following amalgamation; and
- To bring local planning policies into general conformity with provincial policies and legislation.

During the course of the Official Plan review process, a needs assessment was carried out comparing the existing inventory of vacant residential land with anticipated growth requirements over the planning period. This assessment was conducted for all urban settlements and the shoreline areas (i.e., designated growth centres). For Bayfield, it was concluded that the existing supply of residential land within the established urban area was not sufficient to accommodate the growth forecasted for this community. To address this potential deficiency, the Municipality proposed to expand the local urban boundary to include approximately 40 ha of land situated immediately east and south of the community in the Stanley West Ward. Figure 2.1 illustrates the location of the subject lands relative to the historic Bayfield urban limit.

The subject lands were previously designated "Rural Residential" by the former Township of Stanley Official Plan. For the new Official Plan, the Municipality proposed to incorporate the lands into the (urban) "Residential" designation. The re-designation would permit properties located within these areas to be developed for more intensive residential activities, subject to the availability of full municipal servicing and receipt of applicable approvals. The proposed land use re-designation was contemplated by review agencies and the general public as part of the *Planning Act* approval process.

In June 2005, the new Official Plan was approved by Huron County Council incorporating the additional lands as an urban development area. Along with general policies on the type of developments permitted within the residential designation, the Official Plan also contains guidelines which encourage development to occur in a contiguous manner with the benefit of full municipal servicing.

2.2 Environmental Setting

a) General Physiography

Highway No. 21 is located adjacent to a narrow fringe of land extending along the Lake Huron shoreline between Sarnia and Tobermory. This geologic formation, known as the Huron fringe, is comprised of wave-cut terraces of glacial Lake Algonquin and Lake Nippissing. Between the communities of Port Elgin and Grand Bend, the Huron fringe is bordered by a bluff ranging in height from 15 m to 30 m, with a terrace located below the shore cliff. Soils in the Huron fringe are typically sandy and gravely loam (overlying clay) and are well to imperfectly drained. The presence of raised glacial shorelines and bluffs in the vicinity of Lake Huron has resulted in the formation of deep-cut valleys in the relatively soft soil-forming materials. The Bayfield River Valley represents an excellent example of this formation. The river valley is deeply incised and the valley walls, floodplain and slope vegetation are well developed.

b) Bayfield River

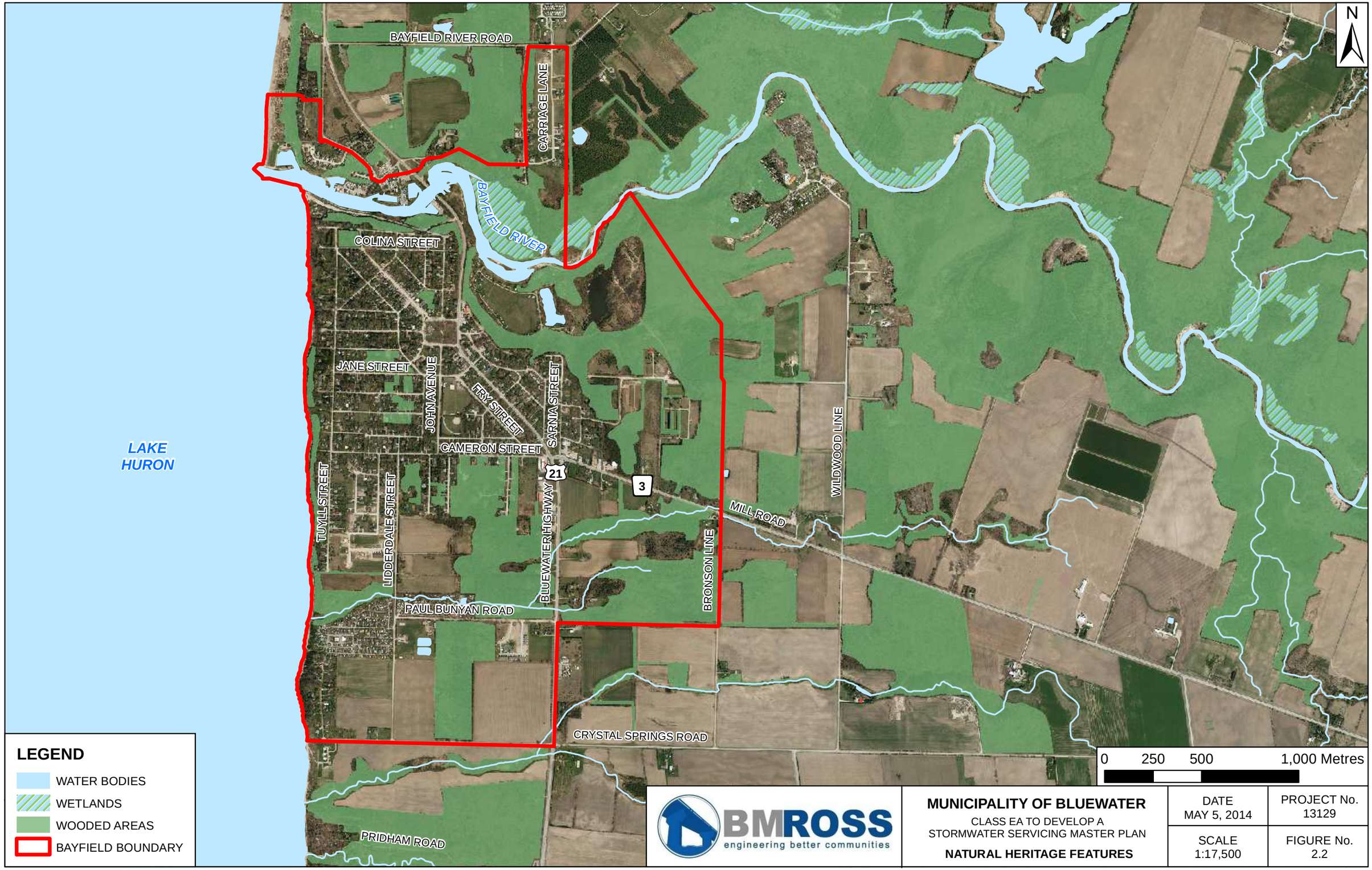
The Bayfield River drains an area of approximately 520 km^2 located between the drainage basins of the Maitland and Ausable Rivers. The topography of the drainage area is predominately composed of relatively smooth moraines, a limited amount of swamp and woodlot, and broad spillways. The tributaries exhibit a trellis pattern at the upper part of the river, with a considerably more defined main channel nearer Lake Huron due to entrenchment by the moraines. The confluence of the main tributaries is located approximately 2 km northeast of Varna. The river maintains a permanent flow, given the large drainage area and the multiple tributaries. The land base of the study area slopes westward towards Lake Huron, exhibiting an elevation difference of approximately 70 m.

c) Natural Heritage Features: Areas of Natural and Scientific Interest (ANSI)

Two provincially-significant Areas of Natural and Scientific Interest (ANSI) are situated within the Study Area (being the Bayfield River ANSI and the Bayfield North ANSI). The Ministry of Natural Resources (MNR) has characterized both of these sensitive areas within its inventory of natural heritage sites. ANSI's take two forms; Earth Science, which are representative of significant land forms and Life Science, which are representative of significant terrestrial features within the landscape such as wetlands and woodlands. Both ANSI's located adjacent to Bayfield are Life Science ANSI's. Figure 2.2 illustrates the extent of natural heritage features located adjacent to the study area.

i. Bayfield River ANSI

The Bayfield River ANSI is a long, narrow river valley corridor which extends east along the main river channel to County Road No. 31 north of Varna (excluding lands west of Hwy. 21 adjacent to Bayfield). Lands within the ANSI are located in both Bluewater and Central Huron as the river forms the boundary between the two municipalities. In total, the ANSI incorporates approximately 850 ha of land within the river corridor.



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CLASS EA TO DEVELOP A STORMWATER SERVICING MASTER PLAN

NATURAL HERITAGE FEATURES

DATE	PROJECT No.
MAY 5, 2014	13129
SCALE	FIGURE No.
1:17,500	2.2

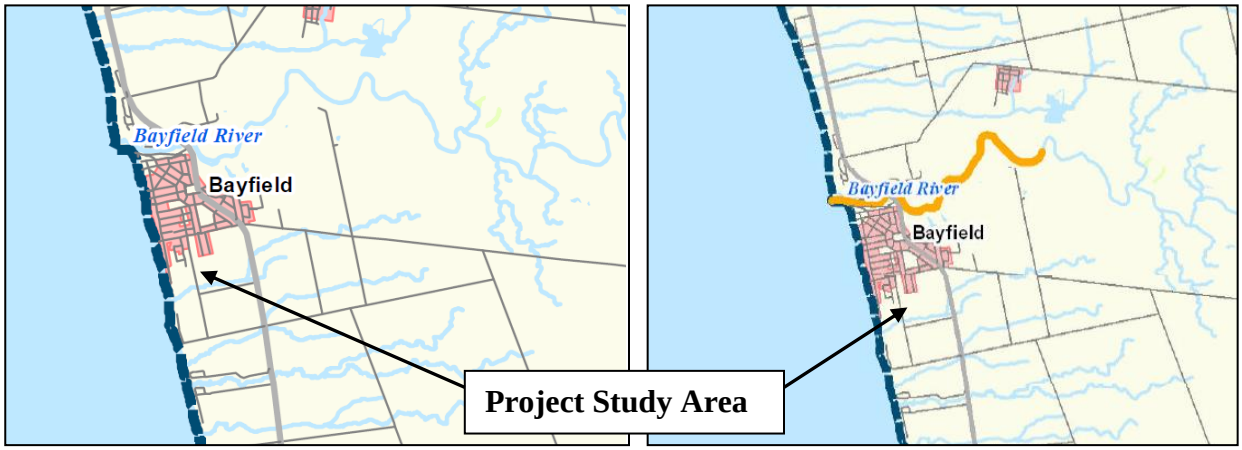
ii. Bayfield North ANSI

The Bayfield North ANSI is generally situated northeast of the Highway No. 21/ County Road No. 13 intersection. This woodlot and wetland complex encompasses approximately 275 ha of land in Central Huron (formerly Goderich Township). The site was selected as the best representative of an upland woodlot on sand plain and bevelled till plain within the site district.

2.3 Aquatic Species at Risk Habitat

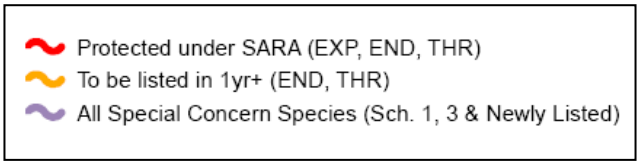
Aquatic Species at Risk are aquatic based species that either live in, or rely on, an aquatic habitat for a significant portion of their life cycles. Federal and Provincial authorities have recently released screening maps to aid in the identification of these rare, threatened or endangered species. Figure 2.3 (below) at left indicates the potential presence of fishes at risk within the project study area, while the image at right illustrates the potential presence of mussels at risk. The arrows indicate the general location of the proposed watermain extension.

Figure 2.3: Aquatic Species at Risk Screening Maps



Fish at risk screening map ▲ **Mussels at risk screening map ▲**

Map Legends:



Common Name	Colour
Kidney shell	Red
Northern Riffleshell	Red
Snuffbox	Red
Wavy-Rayed Lampmussel	Red
Mapleleaf	Orange
Rainbow	Orange

As indicated on the screening maps, which are provided in their complete form in Appendix 'A', two species of mussels, the Rainbow Mussel and the Mapleleaf Mussel, are potentially present within the Bayfield River. Input will be sought from the Ausable Bayfield Conservation Authority and the Ministry of Natural Resources (OMNR) as part of any permitting requirements associated with implementation of the Master Plan to ensure that potential impacts to Species at Risk are addressed.

2.4 Preliminary Problem Identification

2.4.1 Inventory of Existing Stormwater Servicing Facilities

a) General

As part of the Master Plan Study process, an inventory of existing stormwater facilities within the project study area was completed. The inventory included a review and inspection of the existing facilities in order to identify the current the age and general condition of the infrastructure. Current deficiencies were also noted and are described in general terms below. Exhibits 1-3 in the back of the report illustrate the current inventory of stormwater drainage facilities within the community.

b) Former Village South of Bayfield River

The older portions of Bayfield which were settled originally as a cottage resort community, contain a mixed bag of facilities ranging in size, location and condition. In general the existing infrastructure is undersized and in poor condition. In some locations storm drains direct water to catch basins that have no outlets. Lot grading is also haphazard with some properties located at elevations that are lower than the adjacent road surface. The extent of drainage infrastructure on many streets in the traditional 'cottage' areas of Bayfield consist of only roadside ditches with no associated piped conveyance system. There have been some upgrades over the years, completed to address individual problem areas, but no comprehensive drainage work has been completed in this part of the community.

c) Storm Drainage Outlets

There are three primary storm drainage outlets servicing the Bayfield settlement area. These facilities were constructed in the 1980s and were sized to accommodate total drainage flows from the entire sub-catchment. In general the outlets were determined to be in good condition although minor maintenance issues were noted for follow-up. It was determined that each of the outlets had sufficient capacity to handle any additional drainage directed to the outlet in conjunction with the project. A brief description of each outlet is included below.

i) Delevan Street Outlet

- Constructed in 1987
- Generally in good condition
- Minor overland erosion on path from top of bank
- Small wetland feature has formed at the base of the slope in the sand dunes

ii) Cameron Street Outlet

- Constructed in 1987
- Generally in good condition
- Small wetland feature has formed at the base of slope in the sand dunes
- Outlet to Lake Huron meanders over sand dunes and changes direction over time

iii) Troy Street Outlet

- Constructed in 1978
- Generally in good condition
- Erosion has occurred around tile above the head wall
- Pond has formed at beach level near the outlet and becomes stagnant during the summer

d) Newer Residential Developments

In recent years, a number of new residential developments have been constructed in Bayfield which contain stand-alone stormwater facilities. These developments are generally located around the perimeter of the original village boundary and contain relatively new stormwater drainage facilities. The inventory determined that all of these facilities are in good condition and require no upgrades in conjunction with the current Master Plan investigation. Figure 2.4 illustrates the location of existing storm drainage outlets within Bayfield as well as newer SWM facilities, such as detention ponds, located within newer Plans of Subdivision.

e) Recommendations

- As noted in the discussion above, newer residential developments located north of the Bayfield River and near the south limit of the former Village, contain relatively new stormwater servicing infrastructure and will not require additional upgrades in conjunction with the Master Plan.
- Existing storm drainage outlets serving the community are also in relatively good condition requiring only minor remedial measures to address localized erosion issues. The facilities were initially sized to accommodate the entire community and can easily accommodate additional flows associated with the proposed upgrades.


N
HARBOUR LIGHTS OUTLETS
CARRIAGE LANE OUTLET
DEVELAN OUTLET
CAMERON OUTLET
TROY OUTLET
CRYSTAL SPRINGS OUTLET
LAKE HURON
OLD RIVER ROAD
LONG HILL ROAD
BAYFIELD TERRACE
COLINA STREET
CHINIQUY STREET
BLUEWATER HIGHWAY
LOUISA STREET
CHARLES STREET
DOW STREET
JANE STREET
GLASS STREET
CHRISTY STREET
TUYLL STREET
BLAIR STREET
JOHN AVENUE
VICTORIA STREET
CAMERON STREET
HAMILTON STREET
EUPHEMIA STREET
FRY STREET
KEITH CRESCENT
DAVID STREET
SARNIA STREET
DAVID STREET EAST
WILDWOOD LINE
21
3
MILL ROAD
BUNYAN AVENUE
PAUL BUNYAN ROAD
BRONSON LINE
LIDDERDALE STREET
0 200 400 800 Metres
LEGEND
EXISTING STORMWATER MANAGEMENT FACILITIES
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CLASS EA TO DEVELOP A STORMWATER SERVICING MASTER PLAN
OUTLETS AND STORMWATER MANAGEMENT FACILITIES
DATE MAY 5, 2014
PROJECT No. 13129
SCALE 1:13,000
FIGURE No. 2.4

- Stormwater drainage facilities servicing the existing developed areas of Bayfield were determined to be undersized, deteriorated and non-existent in many locations. Upgrades to these facilities will be required in conjunction with the Master Plan study process.

2.4.2 Questionnaire

a) General

In August 2014, a questionnaire was developed by BMROSS to gather background information from local property owners on the status of existing drainage in the vicinity of their properties. The survey was mailed to all property owners located within the study area limits and included general questions about the nature of existing development on their property as well as the condition of existing drainage conditions in the area. Of the surveys that were initially mailed out, 279 were completed and returned representing an approximate return rate of 25%. Copies of all correspondence associated with the questionnaire are included within Appendix 'B'.

b) Results

The completed questionnaires were compiled in a database and the results tabulated. The information was utilized in order to understand the type of properties affected by the project as well as to identify areas within the community where existing drainage was a concern. Based upon the results, a series of maps were created which highlighted problem drainage areas within Bayfield. The intent was not to highlight individual drainage concerns, but rather to identify general areas within the community where several properties or clusters of homes were experiencing drainage issues. It is problem areas impacting a number of homes that will be targeted through this project when identifying priority areas for drainage.

Figure 2.5 illustrates the results of the first two questions on the questionnaire, being whether the properties are developed or vacant. The next chart indicates whether the properties are utilized on a year round basis or more seasonally.

Figure 2.5
Property Status/Residency

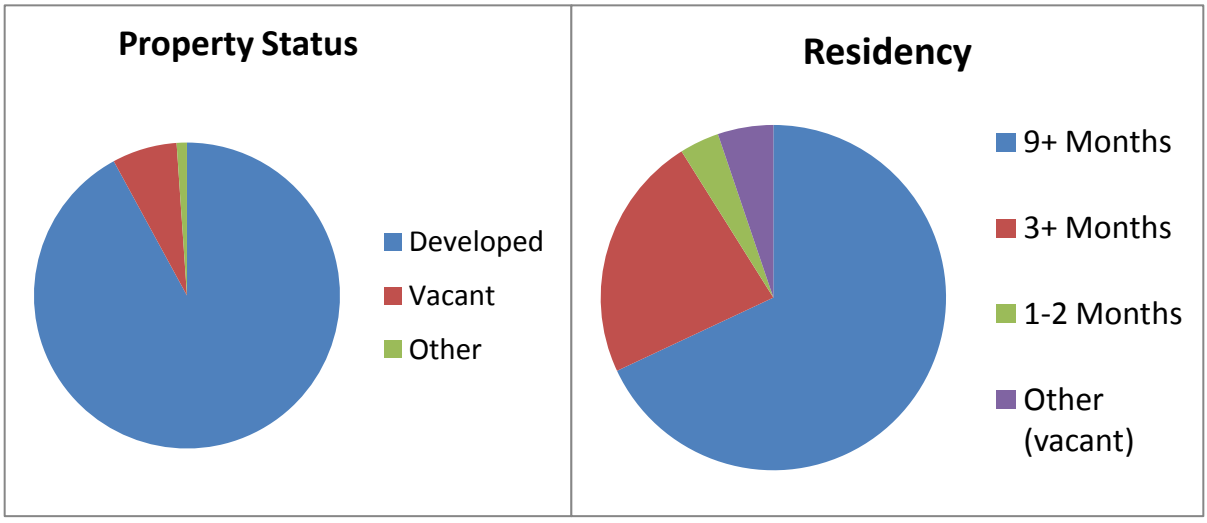
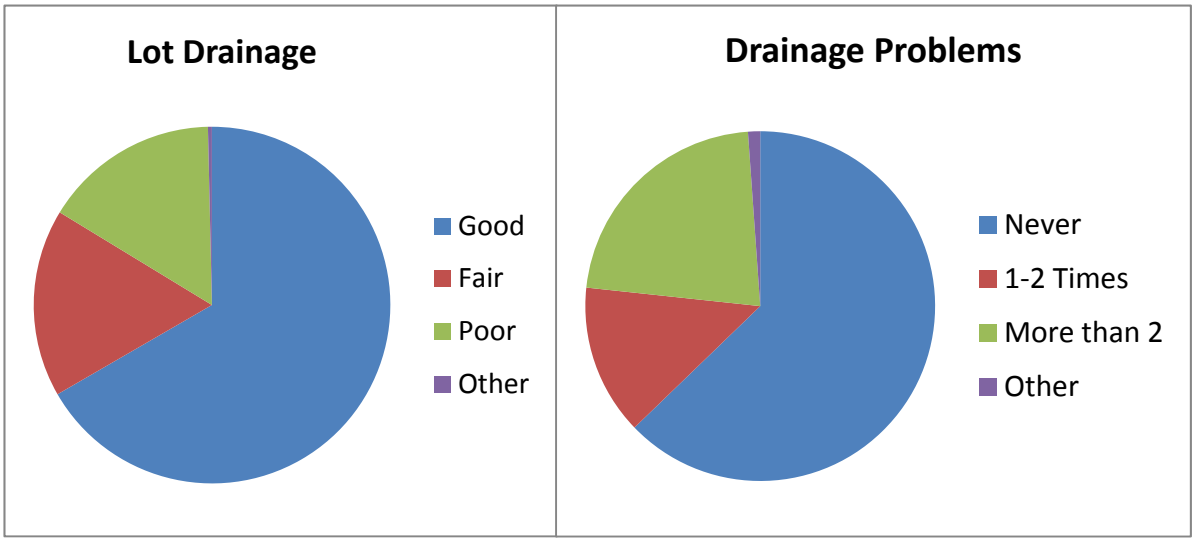


Figure 2.6 indicates that a majority of the respondents felt that drainage on their property is currently characterized as either good or fair, while a similar number of residents indicated that they had never or rarely experienced drainage problems on their property. This information is useful to the Municipality to better understand the extent of current drainage problems needing to be addressed. By targeting the few areas where drainage is a concern, scarce resources can be better utilized elsewhere in the community rather than improving drainage facilities where there are few problems.

Figure 2.6
Lot Drainage/Drainage Problems



2.5 Bayfield Sewage Collection and Treatment System

The community of Bayfield is serviced by a communal sanitary sewage system, commissioned in 2001. The system consists of traditional gravity sewers, three sewage pumping stations and a lagoon treatment facility with sand filters for final polishing of effluent before discharging to the Bayfield River. The original facility was designed to accommodate existing and future flows from the community. The current Environmental Compliance Approval (formerly a C. of A.) for the Bayfield Sewage Treatment Plant (STP) states that the plant has a rated capacity of 391,186 m^3 expressed as “Annual Total Sewage Volume”.

Gravity sewers, by their nature, are not expected to be a closed system. A certain amount of inflow and infiltration enter the system through joints in the pipes and through manholes. The volume of inflow and infiltration can increase significantly in older collection systems when the sewer pipes become more prone to cracking, allowing greater volumes of “clean” water to enter the collection system. This stresses both the collection and treatment systems by increasing the volume of flows within the collection system and sewage pumping stations and also requiring greater volumes of sewage to be treated at the STP.

The collection system servicing the community of Bayfield is relatively new (constructed in 2001) therefore it is not expected that inflow and infiltration volumes would be significant. However, the lack of a comprehensive stormwater management system within the urban areas of Bayfield may lead to increased inflow and infiltration into the system by not collecting stormwater runoff in a timely manner and allowing uncontrolled runoff and an elevated high groundwater table within many areas of the community.

The Municipality of Bluewater has initiated a Class EA process to consider expansion of the Bayfield sewage treatment facility. It is the intention of the Municipality to include the elements of a Pollution Prevention and Control Plan (PPCP) in the scope of this assessment which would investigate more fully the current condition of the Bayfield collection system and determine to what extent inflow and infiltration may be increasing the volume of sewage being discharged to the treatment facility.

2.6 Stormwater Servicing Sub-Basins

a) General

At the outset of the Master Planning process, a preliminary review of the project study area was conducted in order to obtain a general understanding of physical constraints which may impact upon future servicing options. As a result of this assessment, fifteen separate drainage catchments were delineated based upon a review of the existing drainage features and sub-catchment areas for the urban development areas. A brief description of these drainage catchments are included below and are illustrated on Exhibits 1-3 in the back of the report.

b) Northwest Drainage Areas (D.A.1 & D.A.2)

The northwest drainage areas are located immediately north of the Bayfield River within the former village limits; abutting the north boundary of the Municipality of Bluewater. Two major residential developments are located within this sub-catchment, being the Harbour Lights Subdivision and the Carriage Lane Subdivision. Both of these developments are serviced by individual stormwater drainage systems with separate outlets to the Bayfield River.
The west boundary of this drainage area is the Lake Huron shoreline, while the south is formed by the Bayfield River. Existing residential developments comprise a good proportion of the area with existing natural features associated with the Bayfield River ANSI bounding the east portion of the sub-catchment. With relatively low density of development and abutting natural areas, environmental conditions within this sub-watershed would be characterized as good. The photo below illustrates existing residential developments and harbour commercial activities located adjacent to the Bayfield River within this sub-basin.

View looking north from south side of Bayfield River ▲

c) Old Bayfield Drainage Areas (D.A.3 & D.A.4)

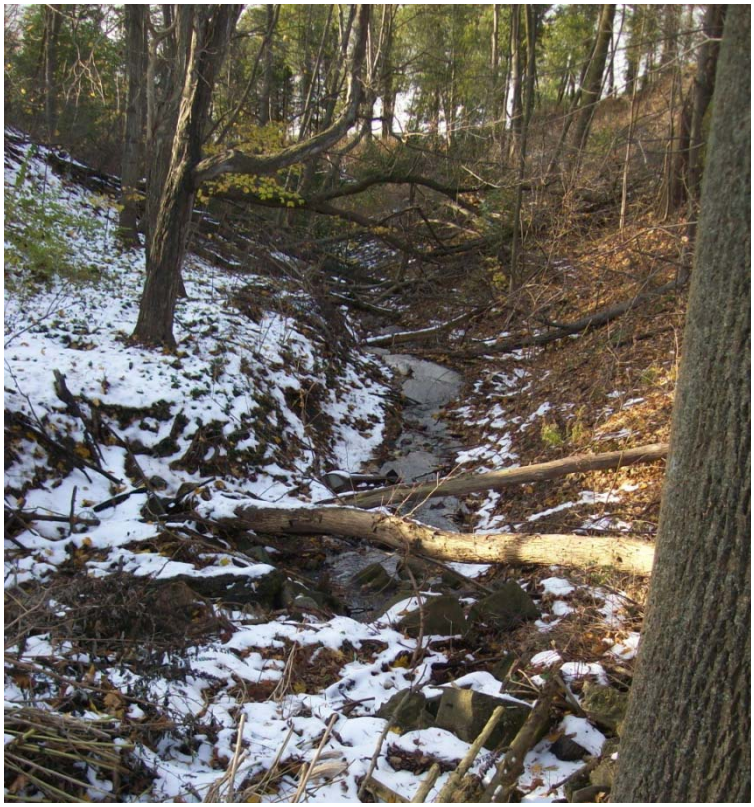
The drainage areas which service the established areas of Bayfield are generally located south of the Bayfield River, west of Highway No. 21 and north of Cameron Street to the south. This area contains the historic Main Street commercial district and the bulk of existing residential development within the community. The majority of this drainage area is highly urbanized, with few natural features, except for the Lake Huron shoreline and Bayfield River forested bluffs and a few pockets of vacant undeveloped parcels that have remained forested.

Photo illustrating typical roadside ditch servicing established areas of Bayfield ▲

These drainage areas are serviced by a mixture of aging and some newer drainage infrastructure, with many streets serviced by roadside ditches and swales. Development is largely residential, with some commercial development located along the historic Main Street and abutting Clan Gregor Square. Environmental conditions within these sub-catchments would be categorized as moderate, due to the density of existing development and the lack of natural features present.

d) South Bayfield Drainage Areas (D.A.4, 5, 6 & D.A.7)

The drainage areas encompassing the south portion of Bayfield are bounded on the north by Cameron Street, on the east by Provincial Highway No. 21, to the west by the Lake Huron shoreline, and to the south by the watercourse forming the north boundary of the Paul Bunyan Trailer Park. This sub-catchment is also largely residential in nature with generally larger lot areas and more remnant natural features. Developed areas located closer to the established areas of Bayfield, were typically constructed in the 1960s to 1980s, although several newer subdivision developments are located within the southwest portion of this drainage catchment. Older cottage developments are also located along the Lake Huron shoreline at the westerly extent of this catchment.



Given the larger lot areas and the presence of several tracts of undeveloped woodlands, the environmental conditions of this drainage sub-catchment would be described as good. The photo above illustrates a ravine drainage outlet near the south portion of this drainage sub-catchment.

e) Bayfield East Drainage Areas (D.A.9, 10, 11, 12 & D.A.13)

Drainage areas located in the east portion of Bayfield are generally bounded by the Highway No. 21 corridor to the west, the Bayfield River to the north and the study area limit to the east. This sub-catchment includes lands within the former Village boundary, as well as future development lands located east of the original village limit. Development within the sub-basin is generally residential in nature with a small amount of Highway Commercial development located adjacent to the Highway No. 21 and Mill Road corridors. Lot sizes are larger on average and there is a limited amount of agricultural lands in the south portion of the drainage area.

Approximately 25% – 30% of the area is comprised of wooded natural areas, with the north portion of the sub-basin draining directly to the Bayfield River corridor and the south portion draining toward Lake Huron through the Paul Bunyan ravine. With the high percentage of natural areas and larger lot sizes that comprise this drainage catchment, the environmental conditions within this drainage basin would be characterized as good to high. The photo below illustrates some of the lands located within this drainage area east of the Highway No. 21 corridor.

View looking southeast from Highway No. 21▲

f) Bayfield South Urban Development Areas (D.A.8, 14 & D.A.15)

The most southerly drainage catchment includes the Paul Bunyan Trailer Park and lands to the south and east of this development. The drainage area is bounded on the west by the Lake Huron shoreline, to the south by the Crystal Spring Road, and to the east by the Highway No. 21 corridor. Much of the lands within this sub-basin were identified for future urban development by the Municipality, when the Bluewater Official Plan was updated in 2005. Existing development is a mix of rural residential, agricultural, natural environment and recreational residential. The most intensive development within the sub-catchment is an existing trailer park development (Paul Bunyan) and a residential cottage development (Crystal Springs) located on the shoreline immediately south of the Paul Bunyan Trailer Park (D.A.15). A new residential condominium development is also located in the east central portion of the drainage area with access off of the Paul Bunyan Road.

The remainder of the lands comprising this drainage catchment have very limited development and are largely comprised of actively farmed agricultural lands and wooded natural areas. The landscape slopes very gradually westward toward outlets at Lake Huron. Given the low density of development through most of this drainage catchment and the presence of several tracts of undeveloped woodlands, the environmental conditions of this drainage sub-catchment would be described as good. The photo at right illustrates a view of typical farmland located within this drainage area.

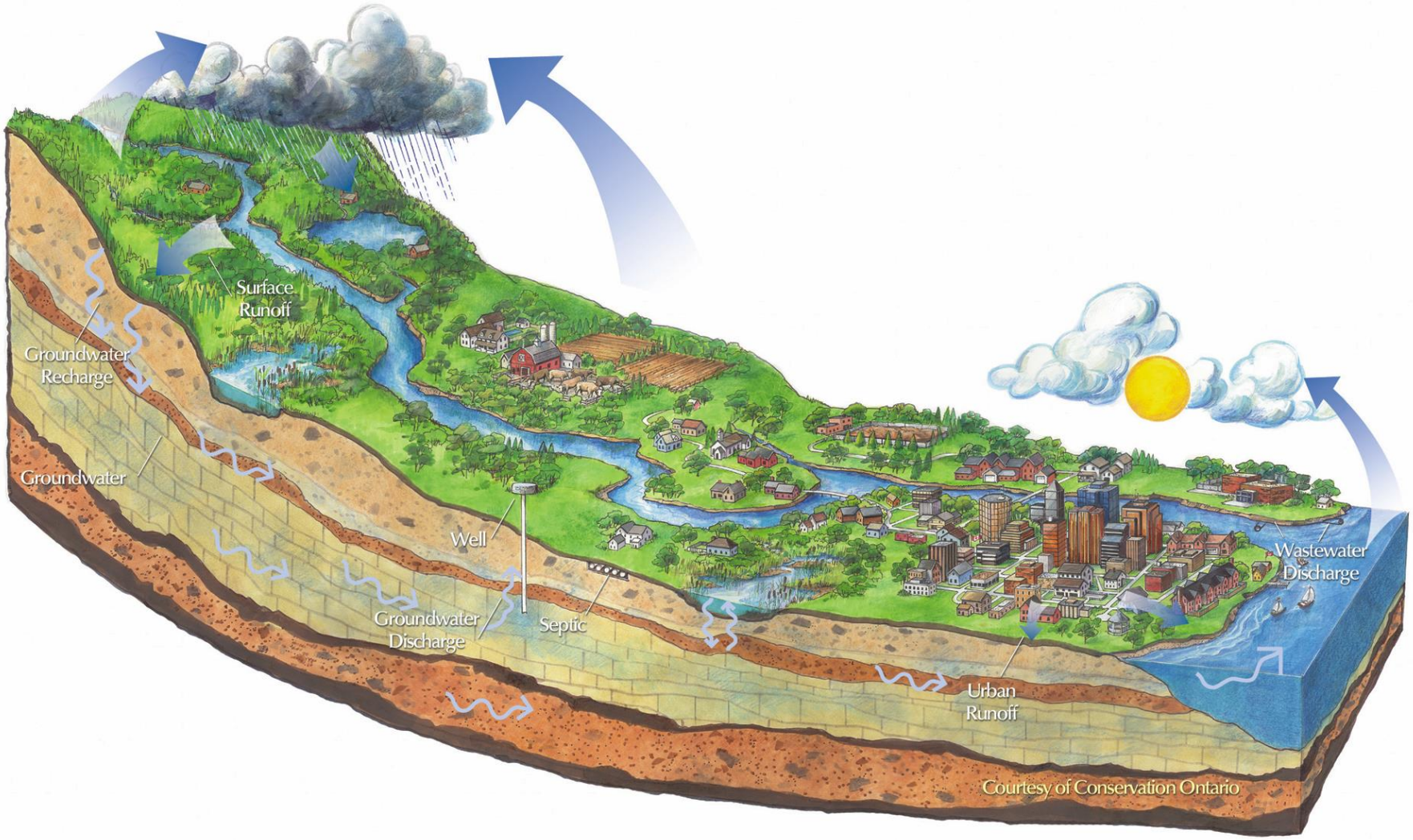
2.7 Stormwater Management

a) What is Stormwater Management?

To fully understand what is being contemplated in conjunction with this Master Plan study, it is important to have an understanding of how stormwater is defined and what is meant by stormwater management. Stormwater is simply defined as any precipitation, be it rainfall or snow melt, that either runs off the surface of the land or is allowed to infiltrate through the soil and ultimately reach the water table. How we manage this precipitation as it interacts with municipal infrastructure (roads and storm drains) before ultimately being absorbed into the soil or being discharged to a receiving water body, is stormwater management.

b) Hydrologic Cycle

The Hydrologic Cycle Schematic, illustrated on Figure 2.7, provided by Conservation Ontario (Ref. 4), illustrates how water takes different forms as it moves through the hydrologic cycle. In a natural system, more water is absorbed into the soil or is taken up by plants, replenishing groundwater supplies and base flows for adjacent watercourses. However, as a system becomes more urbanized and ground surfaces are hardened through man-made activities such as road construction and the construction of buildings, less stormwater is absorbed or taken up by natural plant material. This results in increased runoff which can create flooding and erosion problems and can also flush pollutants and sediments into receiving watercourses.



BMROSS engineering better communities

MUNICIPALITY OF BLUEWATER
CLASS EA TO DEVELOP A
STORMWATER SERVICING MASTER PLAN
HYDROLOGIC CYCLE

DATE: MAY 5, 2014

PROJECT	FIGURE
No. 13129	No. 2.7

c) Stormwater Management

In implementing stormwater management concepts we are trying to replicate the natural hydrologic cycle by utilizing man-made measures to slow stormwater down. This allows water to infiltrate into the soil, or evaporate and allows sediment and pollutants to be filtered out. The technology of stormwater management is evolving and has changed significantly from early efforts which simply sought to direct stormwater to a piped drainage system and then to an outlet as quickly as possible. Guidelines have been developed by local conservation authorities and by the Ministry of the Environment to assist municipalities with designing the most suitable stormwater management systems for the type of development which is proposed.

d) Stormwater Design Concepts

i) Lot Level Controls

Lot level controls are typically implemented at the individual property level, with the intent to slow down and reduce the volume of stormwater before it enters a piped conveyance system. A number of measures are available which can be described as lot level controls such as directing roof leaders onto grassed areas, use of rain barrels, constructing infiltration gardens, reducing the amount of hard surfaces such as driveways and sidewalks or by using more absorptive material to construct driveways and walkways such as gravel or stone. Lot grading can also be utilized as a lot level control measure, with flatter slopes and the incorporation of grassed swales helping to slow down stormwater before it leaves the property.

ii) End of Pipe Solutions

End of pipe solutions, in contrast, refer to stormwater measures which are typically implemented at the end of the piped conveyance system, prior to the stormwater being discharged to the receiving stream or water body. Types of facilities which are characterized as end of pipe would be stormwater management ponds, wetlands, infiltration basins and oil/grit separators. End of pipe facilities can be utilized as the only form of stormwater management being implemented or they can be used as part of an overall management system in partnership with other control measures. Often these facilities include a water quantity, as well as a water quality, component. The water quantity aspect will typically require that a certain volume of stormwater be retained following a storm event and then be allowed to enter the receiving stream at a reduced rate over a longer period. Stormwater quality controls try to slow down the stormwater to allow suspended sediments and pollutants to settle out or be filtered out before stormwater leaves the facility.

iii) Conventional Stormwater Management Measures

Conventional stormwater management measures typically refer to techniques which are widely utilized in new and existing stormwater drainage systems such as grassed swales, a piped conveyance system typically designed to handle a 5 year return storm event and often a stormwater management pond installed at the end of the pipe, to provide quantity and quality control prior to discharge to the receiving stream.

iv) Low Impact Development (LID) Measures

A relatively new concept in stormwater management, low impact development (LID) has gained popularity in recent years as approval agencies seek to minimize the impact of increased urbanization on natural systems. Low impact development sets a higher standard for new development by incorporating a landscape based standard for new development, which significantly reduces the amount of runoff generated by a development. Many of the lot level controls described above, would be included as a component of this design concept, however additional measures would also be incorporated, including green roofs, cisterns, infiltration trenches, reduced road and parking lot surfaces, as well as other innovative techniques designed to hold back and retain stormwater before it enters the piped conveyance system. LID concepts can be best implemented in conjunction with new development, where the innovative design concepts can be incorporated into every aspect of the development design. Some of these measures can be implemented within existing developed areas, although with more difficulty, given that existing infrastructure is already in place.

3.0 CLASS EA MASTER PLAN PROCESS

3.1 Overview

The Municipality of Bluewater is planning to develop a stormwater servicing Master Plan for the Community of Bayfield to address deficiencies present within existing aging and undersized facilities currently servicing portions of the community, as well as to develop comprehensive policies which would apply to new development applications brought forth within the community in the future. In order to address this situation the Municipality authorized BMROSS to undertake a Stormwater Servicing Master Plan utilizing the Class Environmental Assessment planning process, to investigate potential outcomes associated with the study.

The overall goal of the Master Planning process can be summarized as follows:

To develop a long range Stormwater Servicing Master Plan for the community of Bayfield to address deficiencies with existing infrastructure servicing the community and to develop policies for new development proposals. These recommendations will be considered in conjunction with other road and infrastructure needs within the study area and will be implemented over a 20 year timeframe.

The following sections of this report document the environmental assessment process conducted during the Master Planning process, as well as the identification of a preferred outcome for the Bridge Infrastructure Master Plan. The key components of the process are summarized below:

- A description of the identified stormwater infrastructure deficiencies.
- Identification of practical options to resolve deficiencies in the long-term
- An evaluation of potential impacts associated with the identified alternatives
- Selection of a preferred infrastructure alternative.
- Identification of a conceptual implementation plan.
- Synopsis of issues related to the implementation of the stormwater servicing plan.

3.2 Problem Identification

Section 1.4 of this report indicates that the investigation followed Master Plan Approach #1, which addresses Phases 1 and 2 of the Class EA process and satisfies the requirements for Schedule 'A' & 'A+' activities. Phase 1 of this process involves the identification of the problem, or problems, which need to be addressed. Given the infrastructure deficiencies identified in conjunction with the Master Plan, the following problem statement has been developed to summarize issues central to this analysis:

Existing storm drainage infrastructure servicing portions of the community of Bayfield are aging, undersized, and in poor condition. These facilities have insufficient capacity to service the needs of the existing community.

Bayfield has been identified as a growth centre within the Municipality of Bluewater. Areas located adjacent to the developed urban boundary have been identified for future urban growth. Comprehensive stormwater management policies are required to ensure that new development occurs in a manner that does not result in negative impacts to the surrounding natural features and receiving watercourses.

3.3 Identification of Alternative Solutions

a) General

The second phase of the Class EA process involves the identification and evaluation of alternative solutions to address the defined problems. The evaluation of alternatives is conducted by examining the technical, economic, and environmental considerations associated with implementing any of the alternatives. Mitigation measures that could lessen environmental impacts are also defined. A preferred solution or solutions is then selected.

b) Identification of Practical Alternatives

A limited number of practical solutions to the defined problem were identified at the outset of this Class EA Master Plan process. The alternatives, stated below, build upon the findings of the engineering investigations conducted during the process as well as input received from members of the general public and review agencies.

Alternative 1 – Replace existing infrastructure and develop policies for new development areas using conventional stormwater servicing concepts. This alternative would involve the replacement of aging or deteriorated drainage infrastructure, and the development of policies for new development, using conventional stormwater servicing design concepts.

Alternative 2 - Replace existing infrastructure and develop policies for new development areas using low impact stormwater servicing concepts. This alternative would involve the replacement of aging or deteriorated drainage infrastructure, and the development of policies for new development, using low impact stormwater servicing design concepts.

Alternative 3 - Replace existing infrastructure and develop policies for new development areas using a combination of conventional and low impact stormwater servicing concepts. This alternative would involve the replacement of aging or deteriorated drainage infrastructure, and the development of policies for new development, using a combination of low impact and conventional stormwater servicing design concepts.

Alternative 4 - Do Nothing. This option proposes that no improvements or changes be made to address existing deficiencies with storm drainage infrastructure servicing the residents of Bayfield or to develop policies to address future development. During the Class EA Master Plan design process, the "Do Nothing" alternative may be implemented at any time prior to the commencement of construction. A decision to "Do Nothing" would typically be made when the costs of all other alternatives, both financial and environmental, significantly outweigh the benefits.

3.4 Evaluation of Alternatives

a) General

The next component of the investigation involved the evaluation of the identified alternatives. The purpose of the evaluation was to examine the potential environmental impacts associated with the proposed works and to examine potential mitigation for any identified impacts. The evaluation generally involved the following activities:

- Preliminary technical review of alternatives;
- Selection of a preferred option (preliminary);
- Consultation with the general public and review agencies;
- Selection of a preferred option (final).

b) Summary of Required Works

Based upon the results of a preliminary engineering analysis, a brief description of the works associated with each of the Master Plan alternatives is being considered in conjunction with the review of alternatives is described in Table 3.1.

Table 3.1
Primary Components of the Identified Alternatives

Stormwater Options	Related Works
Conventional stormwater servicing concepts	- Replace aging or deteriorated storm drainage infrastructure within developed areas of Bayfield with new stormwater servicing infrastructure designed using conventional stormwater drainage practices. - Develop policies for future development lands located in the east and south portions of Bayfield, using conventional stormwater drainage design methods.

Low impact design concepts	- Replace aging or deteriorated stormwater drainage infrastructure within developed areas of Bayfield with new stormwater servicing infrastructure designed using low impact development standards. - Develop policies for future development lands located in the east and south portions of Bayfield, using low impact development standards.
Combination of conventional and low impact storm drainage concepts	- Replace aging or deteriorated stormwater drainage infrastructure within developed areas of Bayfield with new stormwater servicing infrastructure designed using a combination of traditional and low impact development standards. - Develop policies for future development lands located in the east and south portions of Bayfield using a combination of traditional and low impact development standards.
Do Nothing	- No works would occur to address existing stormwater drainage infrastructure deficiencies or to develop policies which would apply to future development within urban development lands.

c) Environmental Considerations

Section 3.3 of this report lists the alternative solutions that were identified to resolve deficiencies with existing stormwater drainage infrastructure servicing Bayfield. As part of the evaluation process, it is necessary to assess what effect each option may have on the environment and what measures can be taken to mitigate the identified impacts. The two main purposes of this exercise are to:

- Minimize or avoid adverse environmental effects associated with a project.
- Incorporate environmental factors into the decision-making process.

Under the terms of the EA Act, the environment is divided into five general elements:

- Natural environment
- Social environment
- Cultural environment
- Economic environment
- Technical environment

The identified environmental elements can be further subdivided into specific environmental components that have the potential to be affected by the implementation of the alternative solutions. Table 3.2 provides an overview of the Specific Environmental Components considered of relevance to this investigation. These components were identified following the initial round of public and agency input, and after a preliminary review of each alternative with respect to technical considerations and the environmental setting of the project area.

Table 3.2
Evaluation of Alternatives:
Identification of Environmental Components

Element	Component	Sub-Component
Natural	Aquatic	• Aquatic Resources
	Atmosphere	• Air Quality/Noise
	Surface Water	• Water Quality/ Quantity • Drainage Characteristics
	Terrestrial	• Amphibians & Reptiles • Birds & Mammals • Vegetation
	Geologic	• Physiographic Features • Groundwater Quality/ Quantity
Social	Neighbourhood	• Disruption
	Community	• Health and Safety • Quality of Life
Cultural	Heritage	• Historical/ Cultural Resources
Economic	Project Area	• Capital and Operational Costs
	Community	• Property Taxes
Technical	Transportation	• Traffic Patterns/ Volumes • Pedestrian/ Vehicular Safety
	Infrastructure	• Condition/ Age • Servicing Capacity • Technologies • Utilities

The environmental effects of each study alternative on the specific components are generally determined through an assessment of various impact predictors (i.e. impact criteria). Given the works associated with the alternative solutions, the following key impact criteria were examined during the course of this assessment:

- Magnitude (e.g. scale, intensity, geographic scope, frequency, duration).
- Technical complexity.
- Mitigation potential (e.g. avoidance, compensation, degree of reversibility).
- Public perception.
- Scarcity and uniqueness of affected components.
- Likelihood of compliance with applicable regulations and public policy objectives.

The evaluation process described above provides the proponent with a methodology to predict the potential effects of alternative solutions. The significance of the identified impacts is largely based on the anticipated severity of the following:

- Direct changes occurring at the time of project completion (e.g., habitat disruption);
- Indirect effects following project completion (e.g., increased sedimentation/ erosion);
- Induced changes resulting from a project (e.g., additional activity in sensitive areas).

d) General Review of Alternatives

Table 3.3 provides a summary of the key considerations for each alternative with respect to the environmental components described in Table 3.2. To this end, the table identifies those benefits and impacts that were identified as significant during the initial evaluation of alternatives. Potential mitigation measures for the identified impacts are also presented.

Table 3.3
Preliminary Evaluation of Alternatives

Study Alternative	Benefit	Impacts	Remediation
Alternative 1 (Conventional storm drainage design)	- Results in an improved drainage system for local road infrastructure and Bayfield residents. - Minimizes potential impacts to natural and cultural environments, as works occur predominately within existing road allowances. - Integrates effectively with the existing storm drainage conveyance system. - Presents few long-term impacts to air quality, noise levels and local aesthetics. - Utilizes technology that is familiar to local public works staff. - Is the most cost effective.	- Will result in impacts to traffic movement due to the installation of infrastructure within local roads. - May result in disturbances to terrestrial and aquatic habitat during construction due to increased sedimentation. - May result in economic impacts to municipal residents due to capital and operating costs associated with project.	- Implement traffic control measures to limit construction-related impacts (lane restrictions may be required). - Implement sediment and erosion control measures during construction to minimize impacts to environmental features. - Consult with Ausable Bayfield Conservation Authority regarding additional mitigation measures required to limit construction-related impacts. - Municipality will seek grant funding to help with implementation costs.
Alternative 2 (Low Impact storm drainage design)	- Results in some drainage improvements to local road infrastructure and Bayfield residents. - Minimizes potential impacts to natural and cultural environments, as works occur predominately within existing road allowances. - Presents few long-term impacts to air quality, noise levels and local aesthetics.	- Low impact design concepts will be difficult to implement in an existing developed condition. - May not result in adequate drainage for existing road infrastructure. - May not provide sufficient relief for areas experiencing existing drainage problems.	- May only be able to utilize low impact design components in selected areas of the community or within future development areas.
	- Results in fewer impacts to receiving water bodies through increased retention and absorption of stormwater.	- Unfamiliar technology may pose maintenance issues for public works staff.	- Public works staff can be trained in how to maintain facilities and will become familiar with new technology over time.
	- More expensive option than conventional stormwater management techniques when utilized within existing developed areas.	- May result in economic impacts to municipal residents due to capital and operating costs associated with project.	- Municipality will seek grant funding to help with implementation costs.

Alternative 3 (Combination of Conventional and Low Impact (LID) storm drainage design)	- Results in an improved drainage system for local road infrastructure and Bayfield residents. - Presents fewer long-term impacts to air quality, noise levels and local aesthetics. - Utilizes some technology that is familiar to local public works staff.	- Will result in impacts to traffic movement due to the installation of infrastructure within local roads.	- Implement traffic control measures to limit construction-related impacts (lane restrictions may be required).
	- Most components should integrate effectively with the existing storm drainage conveyance system.	- Some components of LID system may not be suitable for all areas of the community.	- System design will integrate LID concepts where possible within existing municipal infrastructure. - Homeowners will be encouraged to implement LID concepts on private property wherever possible.
	- Minimizes potential impacts to natural and cultural environments, as works occur predominately within existing road allowances and utilize some low impact design measures to minimize long term impacts to receiving streams.	- May result in disturbances to terrestrial and aquatic habitat during construction due to increased sedimentation.	- Implement sediment and erosion control measures during construction to minimize impacts to environmental features. - Consult with Ausable Bayfield Conservation Authority regarding additional mitigation measures required to limit construction-related impacts.
	- May be more expensive than conventional stormwater measures	- May result in economic impacts to municipal residents due to capital and operating costs associated with project.	- Municipality will seek grant funding to help with implementation costs.
Alternative 4 (Do Nothing)	- Least expensive option. - Will result in no construction related impacts to the natural, social and economic environments.	- May prove to be more costly in the long term as existing storm drainage infrastructure continues to deteriorate. May have a negative impact on other municipal infrastructure such as roads and utilities.	- Impact cannot be mitigated.
	-	- Will result in negative impacts to existing residents experiencing significant drainage issues.	- Impact cannot be mitigated.

d) Analysis

Based upon the results of the preliminary analysis and discussions with the Municipality, Alternative 3, replace existing deficient storm drainage infrastructure and develop policies for new development, utilizing a combination of conventional and LID stormwater management concepts, appeared to have fewer unmitigable impacts associated with implementation than the other alternatives. To further examine this preliminary conclusion a more comprehensive environmental effects analysis was completed which examined potential interactions between the identified alternatives and environmental components (Table 3.2). The purpose of this analysis was to determine the environmental effects of constructing and operating each identified option on the environmental components and sub-components. The level of effect for the environmental interactions was rated as High, Moderate, Low and Minimal/ Nil. Potential mitigation measures were also considered as part of this evaluation. Table 3.4 summarizes the outcome of this analysis.

Table 3.4
Alternative Solutions:
Environmental Effects Analysis

Environmental Component	Alternative Solution	Level of Effect	Impact Considerations (Construction and Operational Activities)
Natural			
• Aquatic	**(1)** Conventional SWM	Low	• Aquatic habitat impacts may occur during construction of the proposed works. Impacts are expected to be minor in nature providing that suitable sediment and erosion control measures are implemented during construction to minimize potential impacts. • Impacts to aquatic habitat could escalate over time if significant portions of the community are upgraded with no additional measures implemented to address cumulative impacts.
	(2) LID	Low	• Aquatic habitat impacts may occur during construction of the proposed works. Impacts are expected to be minor in nature providing that suitable sediment and erosion control measures are implemented during construction to minimize potential impacts. • No impacts anticipated with operation of the proposed works.
	(3) Combination of LID & Conventional	Low	• Aquatic habitat impacts may occur during construction of the proposed works. Impacts are expected to be minor in nature providing that suitable sediment and erosion control measures are implemented during construction to minimize potential impacts. • No impacts anticipated with operation of the proposed works.
	(4) Do Nothing	Low	• Existing deficient drainage network could result in uncontrolled flows during extreme storm events, resulting in increased erosion and pollution at the outlets.
• Terrestrial	**(1)** Conventional SWM	Low	• Limited vegetation removal will be required to facilitate implementation of this option as a majority of the work will occur within existing disturbed road allowances. • No impacts anticipated from the operation of the proposed works.

Environmental Component	Alternative Solution	Level of Effect	Impact Considerations (Construction and Operational Activities)
	(2) LID	Minimal/ Nil	• Limited vegetation removal will be required to facilitate implementation of this option as a majority of the work will occur within existing disturbed road allowances. • No impacts anticipated from the operation of the proposed works.
	(3) Combination of LID & Conventional	Minimal/ Nil	• Limited vegetation removal will be required to facilitate implementation of this option as a majority of the work will occur within existing disturbed road allowances. • No impacts anticipated from the operation of the proposed works.
	(4) Do Nothing	Minimal/ Nil	• No impacts anticipated.
• Hydrogeology	**(1)** Conventional SWM	Low	• No impacts anticipated during construction. • May result in lowering of elevated groundwater elevations in some areas which are creating drainage issues for some properties.
	(2) LID	Low to Moderate	• No impacts anticipated during construction. • Could aggravate elevated groundwater conditions in some areas due to increased infiltration and retention concepts associated with LID.
	(3) Combination of LID & Conventional	Low to Moderate	• No impacts anticipated during construction. • Conventional methods would be utilized in areas with high groundwater conditions so as not to aggravate existing conditions, while LID concepts could be encouraged on private properties and in areas where groundwater conditions are not a concern.
	(4) Do Nothing	Low to Moderate	• No relief would be provided for residents experiencing drainage problems associated with high groundwater conditions.
Social			
• Community	**(1)** Conventional SWM	Low to Moderate	• Implementation of this alternative may cause disruption to local residents during the construction component of the project. Traffic control measures will be implemented to minimize the impact on residents. • No immediate impacts anticipated during operation of the proposed works, although impacts may accumulate over time with increased discharges to the receiving streams that may trigger erosion and pollution issues.

Environmental Component	Alternative Solution	Level of Effect	Impact Considerations (Construction and Operational Activities)
	(2) LID	Low to Moderate	• Implementation of this alternative may cause disruption to local residents during the construction component of the project. Traffic control measures will be implemented to minimize the impact on residents. • Residents may not be satisfied with the efficacy of storm drainage works on problem areas with the LID concept alone.
	(3) Combination of LID & Conventional	Low	• Implementation of this alternative may cause disruption to local residents during the construction component of the project. Traffic control measures will be implemented to minimize the impact on residents. • No immediate impacts anticipated during operation of the proposed works, although impacts may accumulate over time with increased discharges to the receiving streams that may trigger erosion and pollution issues.
	(4) Do Nothing	Low to Moderate	• No relief would be provided for residents experiencing drainage problems associated with high groundwater conditions. Poor drainage of roads and other infrastructure could impact the entire community.
Cultural			
• Heritage	**(1)** Conventional SWM	Low	• Some potential for impacts were identified given that the Bayfield Historic Shopping District has been identified as a Conservation District by the Municipality. Additional assessments will need to be completed once a final design for reconstruction of Main Street is completed. • No impacts anticipated with operation of the proposed works.
	(2) LID	Low	• Some potential for impacts were identified given that the Bayfield Historic Shopping District has been identified as a Conservation District by the Municipality. Additional assessments will need to be completed once a final design for reconstruction of Main Street is completed. • No impacts anticipated with operation of the proposed works.

Environmental Component	Alternative Solution	Level of Effect	Impact Considerations (Construction and Operational Activities)
	(3) Combination of LID & Conventional	Low	• Some potential for impacts were identified given that the Bayfield Historic Shopping District has been identified as a Conservation District by the Municipality. Additional assessments will need to be completed once a final design for reconstruction of Main Street is completed. – No impacts anticipated with operation of the proposed works.
	(4) Do Nothing	Low	– Existing drainage issues in the downtown core, as well as in other areas of the community may negatively impact existing heritage structures if not addressed.
Economic			
• Municipal	**(1)** Conventional SWM	Low	• Capital costs of construction would hopefully be offset through Provincial or Federal grant programs.
	(2) LID	Low to Moderate	• Capital costs of construction would hopefully be offset through Provincial or Federal grant programs. Some components of LID may be more expensive to install initially.
	(3) Combination of LID & Conventional	Low to Moderate	• Capital costs of construction would hopefully be offset through Provincial or Federal grant programs. Some components of LID may be more expensive to install initially.
	(4) Do Nothing	Low to Moderate	• As existing infrastructure continues to age and deteriorate, repair costs may grow and result in bigger inputs in the future to address drainage issues.
• Community	**(1)** Conventional SWM	Low	• The Municipality is hoping to utilize grant funding to help offset project costs.
	(2) LID	Minimal/ Nil	• The Municipality is hoping to utilize grant funding to help offset project costs.
	(3) Combination of LID & Conventional		• The Municipality is hoping to utilize grant funding to help offset project costs.
	(4) Do Nothing		• If no community wide drainage improvements are implemented, costs to individual homeowners may increase if they are forced to address drainage issues on their own.
Technical			
• Transportation	**(1)** Conventional SWM	Minimal/ Nil	• Traffic movement in the vicinity of the project site will be temporarily impacted during construction (traffic control measures will be implemented to maintain traffic flow along the affected street sections). Impacts are anticipated to be low given the volume of traffic along the affected roadways. • No impacts are anticipated from the operation of the proposed works.

Environmental Component	Alternative Solution	Level of Effect	Impact Considerations (Construction and Operational Activities)
	(2) LID	Minimal/ Nil	• Traffic movement in the vicinity of the project site will be temporarily impacted during construction (traffic control measures will be implemented to maintain traffic flow along the affected street sections). Impacts are anticipated to be low given the volume of traffic along the affected roadways. • No impacts are anticipated from the operation of the proposed works.
	(3) Combination of LID & Conventional	Minimal/ Nil	• Traffic movement in the vicinity of the project site will be temporarily impacted during construction (traffic control measures will be implemented to maintain traffic flow along the affected street sections). Impacts are anticipated to be low given the volume of traffic along the affected roadways. • No impacts are anticipated from the operation of the proposed works.
	(4) Do Nothing	Low to Moderate	• Lack of adequate drainage may have a long term impact on the integrity of the road network.
• Infrastructure	**(1)** Conventional SWM	Minimal/ Nil	• Conventional SWM concepts are well known and would integrate easily with existing infrastructure.
	(2) LID	Low to Moderate	• LID concepts may be difficult to integrate with existing infrastructure in some locations.
	(3) Combination of LID & Conventional	Low	• Conventional technology would be utilized primarily within existing developed areas where it will integrate more easily with existing infrastructure with the LID technology being utilized wherever possible and within future development areas.
	(4) Do Nothing	Low to Moderate	• Lack of adequate drainage may have a long term impact on the integrity of the road network and adversely impact existing municipal infrastructure if not addressed over the long term.

3.5 Identification of a Preliminary Preferred Solution

The relative merits of each option were examined during the preliminary technical review of the study alternatives. Based on this assessment, the Municipality indicated a preference for **Alternative 3 – Utilize a combination of Conventional and LID Technologies when developing a Stormwater Servicing Master Plan for the Community of Bayfield.** There were a number of attributes associated with Alternative 3 which justified its consideration as the preliminary preferred Master Plan alternative.

- Provides the Community of Bayfield with a comprehensive plan to upgrade existing drainage infrastructure and to deal effectively with new development proposals.
- Provides an infrastructure plan which will minimize impacts to receiving streams while providing improved drainage where required.
- Incorporates new technologies while still addressing existing deficiencies.
- It would integrate effectively with existing storm drainage infrastructure within the community.
- It is the most cost effective solution over the long term.

4.0 PUBLIC CONSULTATION PROGRAM

4.1 General

Public consultation is an integral component of the Class EA process. Public consultation allows for an exchange of information, which assists the proponent in making informed decisions during the evaluation of alternative solutions. During Phases 1 and 2 of the study process, consultation was undertaken to obtain input from the general public, stakeholders and review agencies that might have an interest in the project. The components of the public consultation program employed during the initial phases of the Class EA study are summarized in this section of the screening report and documented in Appendix 'B'. Comments received through the consultation program and related correspondence are also discussed below and documented in the appendix.

4.2 Initial Public Notice

Contents:	General study description, summary of proposed works, key plan
Issued:	August 7, 2013
Placed In:	Clinton News Record (August 7 & 14, 2013), Bayfield Breeze (On-Line Magazine)
Input Period:	Concluded September 20, 2013

Two comments were received from members of the public as a result of the Initial Notice. These are summarized in Table 4.1.

Table 4.1
Summary of Public Comments

Individual	Comments/Concerns	Action Taken/Future Action
Bayfield Resident August 14, 2013 (via phone)	- Advised of remedial bank work proposed for the lake bank near his property. Wondered if stormwater drainage improvements could be incorporated into the proposed work.	- Discussed comments with the Municipality and Project Engineer.
Bayfield Resident Aug. 20, 2013 (via phone)	- Concerned with long term impact of increased farm drainage on the river and lake. Lives on the river and has notice changes in the flow regime over time. - Is concerned that increased drainage will have a negative impact on river.	- Explained that project was to develop a Master Plan for the community and that it should have very limited impact on the river.
Bayfield Resident September 11, 2013 (via phone)	- Lives on Charles Street in Bayfield not far from Main Street. - Has experienced significant flooding within the roadside ditch encroaching onto their property with recent heavy rainfall events. - Concerned that amount of water could be a safety risk and wants to ensure that this area is identified as an area of concern. - Will forward photos of the flooding.	- Indicated that I was familiar with the area and had seen flooding there in the past. - Agreed that photos would be very helpful and that I would pass concerns along to the Municipality.
Bayfield Resident September 18, 2013 (via phone)	- Lives near the Bayfield River off of Long Hill Road. - Drainage from the road is directed onto his property during intense rainfall events. - They have experienced flooding in their basement because of this.	- Indicated that I was familiar with the area. - Forward comments to the Municipality and project engineer.

4.3 Questionnaire

As noted in Section 2.4.2, a questionnaire was developed at the start of the project to solicit background information from residents on the condition of existing drainage infrastructure within the community. A copy of the Notice of Study Commencement was also attached to the Questionnaire in order to explain to residents the purpose of the questions. The Notice and questionnaire were circulated to all property owners located within the study area limits and was also posted on the Municipal website and made available at the Bayfield public library. Information about the study and questionnaire was also advertised in the Bayfield Breeze, a local on-line magazine.

4.4 Review Agency Circulation

Input into the Class EA Master Plan process was solicited from government review agencies by way of direct mail correspondence. Agencies that might have an interest in the project were sent an information package detailing the nature of the project and an outline of the assessment process being completed. The information was circulated to nine review agencies August 2, 2013. Appendix 'C' contains a copy of the information that was circulated to the review organizations and a list of the agencies that were requested to comment on this project. Table 4.2 summarizes the comments received.

Table 4.2
Summary of Agency Comments

Review Agency	Comments	Action Taken
Bayfield Chamber of Commerce (BACC) August 22, 2013 (Via mail)	- Particularly interested in any remedial works that will allow for Main Street to be reconstructed. - Interested in solutions that will reduce the flow of stormwater and contaminants to the lake. - Wondered if options incorporating infiltration can be utilized along Main Street.	- Comments noted and filed.
Ministry of the Environment (MOE) August 22, 2013 (via e-mail)	- Requesting additional information on the Master Plan including a summary of the problem statement, copies of presentation material and any related Land Use Planning documents. - Indicated that they would like an opportunity to review the draft Master Plan before it is finalized.	- Formal response compiled which addressed comments in letter.
Ausable Bayfield Conservation Authority (ABCA) January 14, 2014 (via mail)	- Received notice of the Master Plan study. - Would like to see measures incorporated into the Master Plan that would reduce stormwater from reaching the piped system. - Concerned with increased flows to the lake and water quality concerns that might be associated with these flows. - Would like to see an education component incorporated into the Master Plan to educate residents on alternative methods of dealing with stormwater.	- Formal response compiled which addressed concerns expressed in correspondence.
Ministry of Tourism, Culture and Sport (MTCS) January 20, 2014 (via mail)	- Received notification of the project. - Interested in preserving and protecting archaeological, cultural heritage and built heritage resources potentially impacted by the project.	- Completed screening check-lists to identify potential impacts.

4.5 Aboriginal Consultation

As directed by the MOE an email was forwarded to the Consultation and Accommodation Unit (CAU) of Aboriginal Affairs and Northern Development Canada (AANDC), in order to identify Aboriginal Communities potentially impacted by the proposed Master Plan study. A response was received on August 12, 2013 indicating that four Aboriginal Communities should be contacted in regards to the project. An information package was subsequently prepared and was circulated to the identified Aboriginal communities. A response was received from the Historic Saugeen Métis (HSM) requesting additional information on the project. Additional project information was compiled and was forwarded to the HSM for their review. Copies of all correspondence received or sent is included within Appendix 'C'.

4.6 Stakeholder Meeting

On September 3, 2013 a meeting was held with representatives from the Municipality, BMROSS and a committee of the BACC heading a campaign to revitalize the Main Street commercial district. At the meeting BMROSS staff reviewed the scope of the Master Plan study and discussed the group's concerns with the current drainage of Main Street. It was noted that as part of the project scope, a preliminary design for the drainage of Main Street is to be completed.

The group reviewed various approaches which could be considered for the stormwater management Master Plan and discussed possible timelines for completion of the Master Plan study as well as future engineering designs for Main Street.

4.7 Public Information Meeting

A Public Information Centre (PIC) was held on February 12, 2014 at the Stanley Recreation Complex from 6:00 p.m. to 8:00 p.m. with a formal presentation beginning at 6:30 p.m. The meeting included an open house component before the formal presentation with display boards explaining the study process and other project components. Representatives from the Municipality of Bluewater and BMROSS were available to answer questions from those in attendance. The meeting was arranged to serve several purposes:

- Provide local residents and other stakeholders with additional details on the Class EA Master Plan study investigations and a forum to express their views.
- Provide Bayfield area residents with an overview of the recommendations identified in conjunction with the Master Plan.
- Provide residents with an opportunity to ask questions and review mapping and other display material prepared in support of the Master Plan.
- Identify what residents can do on their own properties to assist with stormwater drainage measures.

Approximately 12 residents and stakeholders attended the meeting. A copy of the presentation material is included within Appendix 'B'.

4.8 Consultation Summary

The public consultation program developed for this project was directed toward all Bayfield property owners and residents located within the study area limits, federal/provincial review agencies and Aboriginal communities. The feedback received from residents was helpful in identifying problem areas and existing drainage concerns and was utilized in developing an implementation strategy for the project.

Agency consultation included feedback from the Ausable Bayfield Conservation Authority, the Ministry of the Environment and the Ministry of Tourism, Culture and Sport. Responses to each agency were prepared and submitted in order to address potential concerns identified within their correspondence. A response was received from one Aboriginal community, the Historic Saugeen Métis. Additional project information was compiled and forwarded for their review.

5.0 EVALUATION OF THE PRELIMINARY PREFERRED ALTERNATIVE

5.1 Framework of Analysis

Following selection of Alternative 3 as the preliminary preferred alternative, a study framework was developed to further evaluate the potential impacts of implementing this project. The purpose of this review was to assess the environmental interactions resulting from the construction and operation of the project, and to determine if the identified interactions would generate potential environmental impacts.

The assessment of the preferred alternative incorporated these activities:

- Assessment of the construction and operational requirements of the proposed works.
- Examination of the project implementation plan.
- Results of consultation with the public, stakeholder groups and government agencies.
- Review of engineering methodologies associated with the different SWM concepts.
- Evaluation of the potential impacts of the project on the environmental features, including residual effects following mitigation.

The following section of the report summarizes the findings of the evaluation process.

5.2 General Project Scope

a) Storm Drainage Design – Existing Urban Areas

Both recent and historical engineering investigations have identified deficiencies with the storm drainage collection system within the established area of Bayfield. Storm drainage facilities (existing swales and tile drains) generally lack sufficient capacity and in some cases (i.e., Main Street) the existing roadway also lacks the required relief to channelize stormwater flows toward existing drainage outlets.

Apart from a few streets in the Town (i.e., Catherine from Main Street to Tuyll Street) there has been no significant stormwater related infrastructure work completed in the past couple of decades. Accordingly, a major component of the preferred alternative is to provide the community of Bayfield with a strategy to upgrade and replace aged, existing (or non-existent) drainage infrastructure.

Exhibits 4-6 in the back of the report illustrate the proposed stormwater drainage facilities within the community. The majority of the proposed storm sewer work being proposed is within the original village area of the community where the existing infrastructure is aged or where it may not exist. The drainage areas identified on Exhibit 5 as D.A. 3, D.A. 4, and D.A. 9 are the primary focus of the proposed storm sewers within the developed portion of the community.

Where possible during the replacement of aged infrastructure, consideration should be given to retrofitting the system to include in-line devices to promote the separation of oil and grit from the stormwater runoff.

It is recognized that there is not a lot of opportunity to implement LID measures in the existing road allowance given the established nature of drainage areas D.A. 3, D.A. 4, and D.A. 9, however, where practical, efforts should be made to promote infiltration prior to discharge of storm runoff to the proposed pipe system.

i. Storm Sewer Design Criteria

In general, storm sewers should be provided to service all of the existing community, where drainage deficiencies have been identified and should be located in the street right-of-way or in an approved easement. The storm sewer discharge must be carried to an appropriate outlet with sufficient capacity so that no damage is done to lands or road. Storm sewers should be designed to accept all drainage from the contributing area and should be sized in accordance with the following:

- The system of street gutters, catch basins, storm sewers and road side swales, shall be designed for the 1:5 year storm (Goderich rainfall). Culverts or sewers crossing major County roads or Provincial highways shall be designed and approved in accordance with the requirements of the County Highways Department or the Ministry of Transportation, respectively.

- In general, the Rational Method shall be used for the sizing of the minor sewer system at the final design stage. Calculations based on a hydrologic simulation model are required for systems serving large areas or involving treatment and/or storage systems.

Although the current municipal standard cross section for new urban development includes an 8.5 metre road cross section with curb and gutter, the municipality may wish to consider a semi-urban cross section within the former village area of Bayfield to match existing conditions. This will ultimately be at the discretion of the municipality as it will be dependent on the existing drainage and topographic characteristics for each street.

b) Storm Drainage Recommendations – Future Development Lands

In 3.6 above, **Alternative 3 – Utilize a combination of conventional and LID technologies when developing a Stormwater Management Plan for the community of Bayfield,** was selected as the preliminary preferred Master Plan Alternative.

The implementation of this alternative will involve the construction of individual or communal stormwater management facilities at the downstream end of all future drainage areas established through the Master Plan. These facilities should be constructed to address quality and quantity control of stormwater run-off from the tributary drainage area.

i. Future Drainage Areas

The established future drainage areas are identified as drainage areas D.A. 7 to D.A. 15 inclusive (refer to Exhibit 4-6).

Although, future Class EA work and/or developer initiated projects will result in more detailed design information, Table 5.1 provides a summary of the conceptual design for the proposed Stormwater Management facilities identified:

Table 5.1
Stormwater Management Facility Design Summary
Future Drainage Areas

Drainage Area	Contributing Area (ha)	Impervious Level (%)	Required Storage (m^3/hr)	Total Storage Volume Requirements		
				Permanent Pool (m^3)	Extended Detention (m^3)	Total Storage (m^3)
7F	34.9	35	140	3,490	1,396	4,886
8F	61.8	35	140	66,180	2,472	8,652
9F	16.0	35	140	1,600	640	2,240
10F	17.8	35	140	1,80	712	2,492
11F	9.5	35	140	950	380	1,330
12F	28.1	35	140	2,810	1,124	3,934
13F	9.2	35	140	920	368	1,288
14F	4.9	35	140	490	196	686

Note:
1. All facilities designed as extended detention wet pond configurations
2. Water **quantity** extended detention requirements will be in addition to the volumes stated above and are to be addressed at final design of each facility.

ii) Stormwater Management Design Criteria and Suggested Standards

Design Guidelines

Current Stormwater Management Design Standards require the restriction of stormwater flows outletting from a development to existing values. The impact of future flows on downstream facilities should be no greater than at present, but will also be contingent on the condition of the outlet. All new development proposals should undergo a pre-consultation process with the Municipality and the Conservation Authority to review the design criteria relative to the proposal and the current environmental conditions of the sub-basin.

A Stormwater Management Report setting out the existing and proposed drainage pattern shall be submitted to and approved by the Municipal Engineer, the local Conservation Authority (Ausable Bayfield Conservation Authority) and the Ministry of the Environment. Should the development be of a size or location where the Conservation Authority has no requirement to regulate the stormwater management criteria, or in the event that specific design details are not provided by the Conservation Authority, the Municipality has the following objectives for the management of storm drainage within its boundaries:

- Reduce to acceptable levels, the potential risk of health hazards, loss of life and property damage from flooding.
- Reduce to acceptable levels, the incidence of inconvenience caused by surface ponding and flooding.
- Ensure that any development or redevelopment minimizes the impact of change to the groundwater regime; increased pollution; increased erosion or increased sediment transport, especially during construction; and impact to surrounding lands and areas of existing development.
- Maintain, where applicable, any natural stream channel geometry insofar as it is feasible, while achieving the above objectives.

The following general requirements shall apply:

- Quality and quantity control – as dictated by the local Conservation Authority and/or the MOE. Quantity control shall restrict post-development runoff flows to pre-development flows between the 2 year and regional storm events.
- In general, the Municipality supports the concept of drainage having two separate and distinct components – the minor drainage system and the major drainage system. The minor system comprises swales, street gutters, ditches, catch basins and storm sewers. The major system comprises the natural streams and valleys and man-made channels, roads, or other overland conveyance systems.
- The major system shall be designed to convey the Regional storm event.

- The design storm for the minor systems shall be the 5 year storm for new local storm sewers (the system of street gutters, catch basins, storm sewers or open ditches, where permitted). Culverts or sewers crossing major County roads or Provincial highways shall be designed and approved in accordance with the requirements of the County Highways Department or the Ministry of Transportation, respectively.
- Sediment and erosion control measures associated with the stormwater management requirements shall be identified for works to be included during the construction and for permanent measures.
- For large site developments, approximately 5% (minimum, up to what is required) of the proposed development lands should be used for storm water retention in order to satisfy the storage and retention requirements established through the pre-consultation process. This will ideally be located in lower areas of the site.
- Use of shallow grassy swales for storm water conveyance is recommended where it can be practically implemented.
- The impact of climate change should be considered in consultation with the Municipality and the Conservation Authority. This should include the impact of extreme storm events on stormwater collection systems and end of pipe facilities as well as the resultant implications on the ongoing maintenance of the facilities.
- Restoration of the SWM facilities should have regard for landscape ecology and is to be reviewed with the Municipality prior to plan finalization.
- The storm sewers shall be connected to the municipal storm sewer system (where feasible) or discharged to a natural watercourse as approved by the Municipality, Conservation Authority, and the Ministry of the Environment.
- The stormwater management system shall be designed using an approved hydrologic model. The Conservation Authority should be contacted with respect to the appropriate storm distribution and duration to be used. The Developer's Engineer shall advise the Municipal Engineer in writing as to the Authority's requirements. The design of the stormwater management system shall be in accordance with the latest version of the “Stormwater Management Practices, Planning and Design Manual”, as prepared by the Ministry of the Environment.
- In general, the Rational Method shall be used for the sizing of the minor sewer system at the final design stage. Calculations based on a hydrologic simulation model (such as MIDUSS, OTTHYMO or other such methods as approved by the ABCA and the Municipality) are required for systems serving large areas or involving treatment and/or storage systems.
- Low Impact Development methods should be incorporated into the design of the facilities as much as practical, as determined through consultation with the Municipality and the Conservation Authority.

Reporting Criteria

Hydrologic studies should describe the model parameters and criteria for their selection as well as input and output data. Reports shall include a section outlining the following:

Run-off Quantity Control

- Address the impact of the minor and major storm as required in these guidelines for both pre development and post development regimes.

Run-off Quality Control

- Address best management practices proposed to achieve desired treatment.
- Make reference to MOE Stormwater Management Planning and Design manual.

Erosion and Sediment Control Plan

- Provide comments and detail on a Site Plan or a separate plan as part of the submission.

Major System/Overland Flow Routes

- Provide extent of flood for the Major Storm or Site Plan
- Show major storm route
- Comment on a right to access of major storm routes based on land ownership on adjacent lands

Maintenance Considerations

- Address ownership and obligation for maintenance
- A maintenance manual outlining maintenance tasks and frequency of maintenance activities shall be provided as part of the Stormwater Management Report process.

Facility Access

- Access to all areas of any proposed facility needs to be detailed and commented on in the report.

In general maintenance considerations for both existing and proposed facilities should follow the requirements detailed in Chapter 6.0 of the Stormwater Management Planning & Design Manual, (MOE 2003) regarding "Operation, Maintenance and Monitoring" with meet the following requirements:

Monitoring

- As noted in the SWM Planning & Design Manual (MOE 2003), "the consensus of opinion among practitioners is that monitoring for chemistry of biotic parameters cannot be justified for each individual facility because to have any scientific validity a large and costly sampling program is required". Where it is deemed necessary for monitoring to be completed, the program shall be developed based on the requirements of the ABCA and/or the MOE.

Inspection

- Observations made during the collection of inspection data will provide an indicator of overall system performance and help identify when maintenance is required for the various components of the stormwater management system. The maintenance activities performed over the first few years will also provide the basis for recommendations of long-term maintenance schedules. In order to identify the need for maintenance, the following inspection program is recommended.

- Inspection of the facility is to be completed during and after significant rainfall events (if possible) and should include a review of the following:
    - The integrity of the basin side slopes and vegetated areas;
    - The condition of the pond inlet and overflow facilities;
    - The depth of water in the basin;
    - The colouring of the top few centimetres of the soil;
    - The depth of the accumulation in the pond bottom.

- Photographs should be taken to document the condition of the stormwater management facility and the surrounding area at the time the inspection is completed.

Maintenance:

- Maintenance requirements will be identified and scheduled based on field observations made during both scheduled and unscheduled inspections of the facility. The types of maintenance activities needed, and the frequency with which they are required, will provide the basis for scheduling long-term maintenance operations. Anticipated maintenance requirements have been categorized as: General Maintenance Operations, Sediment Removal and Disposal Operations; and Remedial Works.

- General Maintenance Operations
    - General maintenance operations are defined as minor, routine maintenance activities required to ensure that the stormwater management system provides the intended stormwater management functions. Example activities include, but are not limited to:
        - Removal of debris from the inlet swale to the facility;
        - Minor structural repairs to the overflow pipes as may be necessary;

- Sediment Removal and Disposal Operations
    - The frequency with which sediment will have to be removed will vary depending on the effectiveness of erosion and sediment control measures implemented during construction, the frequency and magnitude of winter sanding applications, the frequency and magnitude of rainfall events, and other related factors.
    - If there is a visible accumulation of sediment in the bottom of the pond or if there is standing water in the basin 24 hours after a storm event this may be an indication that the permeability of the underlying soils has decreased and sediment removal may be necessary.

- In order to establish protocols for disposal of the excavated material, a quality evaluation of sediment deposits will be required prior to removal of the sediment. Two separate sediment samples should be collected from different locations within the SWM facility to obtain a representative cross section of the facility's sediment characteristics.
- All sediment samples are to be initially screened for contaminant levels by undertaking the bulk analysis testing of the MOE Guidelines for Use at Contaminated Sites in Ontario (GCSO). If sample contaminants exceed GCSO criteria then leachate toxicity analyses will be completed on each sample as per the requirements of the appropriate regulation of the Environmental Protection Act. Following the completion of the sample analyses, the results shall be documented together with recommendations for sediment disposal methods.
- SWM facility sediment accumulations are to be removed down to the original elevation of the facility bottom using a small rubber-tired backhoe and a dump truck. The excavated material is to be disposed of off-site in accordance with the recommendations of the sediment quality analyses.
- After the sediment has been removed and disposed of, the bottom of the pond should be tilled to maintain the infiltration potential of the soil and reverse any soil consolidation that may have occurred as a result of the sediment removal.

Remedial Works and Contingencies

- Remedial works are considered to be major maintenance activities completed to repair failed components of the stormwater management system. Example activities include, but are not limited to:
    - Structural modifications to the existing overflow piping and chamber;
    - Reconfiguration of the basin to increase storage capacity;
    - Restoration of eroded areas at the facility inlet.
    - The need for remedial works will typically be identified by structural failures in the basin, erosion sites, and sediment accumulations in the overflow chamber. If contingencies are determined necessary, the MOE would be contacted in order to involve them in the reassessment procedure.
- Any significant remedial works will require the submission of a revised engineering design for the stormwater management system to the Municipality, the Conservation Authority and the Ministry of Environment.

c) Storm Drainage Recommendations – Privately Owned Lands

One component of the preliminary preferred alternative is to encourage the implementation of Low Impact Development (LID) concepts on privately owned lands within the community. Incorporation of these measures on private property can significantly reduce the volume of flows entering the piped conveyance system and ultimately Lake Huron. A number of measures are available which, depending on the size and lot grading of the property, can reduce runoff rates significantly. These measures are described briefly below and are explained in more detail within Appendix 'D'. The Ausable Bayfield Conservation Authority (ABCA) is currently offering programs that provide assistance with the installation of many of these measures on private property. Contact the ABCA directly for information regarding these programs.

i) Rain Barrels and Cisterns

Rainwater from roof leaders is diverted to a rain barrel or a cistern where it is stored temporarily for later use in your garden or home. If used properly, this measure can significantly reduce runoff and lower water consumption rates for your home. Rain barrels can be installed in tandem to provide greater storage capacity.

ii) Soaker Hoses

Soaker hoses can be a much more efficient method of watering outdoor vegetation than the traditional use of a hose or sprinkler due to reduced water losses from evaporation and runoff. This measure can be used in conjunction with rain barrels and cisterns to allow stored water to slowly water surrounding vegetation following a rainfall event.

iii) Downspout Control

If not discharging directly to a rain barrel or cistern, roof leaders are commonly directed onto grassed areas or into a piped conveyance system where they are directed toward the road allowance. By directing this flow away from hard surfaced areas and into existing vegetated areas where it can gradually be absorbed into the ground, runoff rates can be significantly reduced. Disconnecting the piped conveyance system and allowing roof leaders to discharge onto grassed areas, will improve the quality of storm water and also reduce discharge rates.

iv) Rain Gardens

A rain garden is an area of the property where runoff from roof leaders, driveways and sidewalks can be directed to gradually soak into the ground. Designed to mimic a natural system, rain gardens should be located in natural depressions where water can be retained following rainfall events and also provide habitat for insects and other wildlife.

v) Permeable (Porous) Surfaces

Hard surfaces on residential properties such as asphalt or concrete driveways, patios and sidewalks, can prevent rainwater from infiltrating naturally into the ground. The use of porous materials like wood chips, stepping stones, interlocking brick and gravel can serve the intended purpose while allowing for infiltration of stormwater. If the use of these materials is not possible, runoff collected from these areas can be directed to rain gardens or onto grassed areas where infiltration is possible.

d) Storm Drainage Recommendations – Municipally Owned Lands

The Municipality owns and maintains a number of parks and other municipal properties within the community such as Clan Gregor Square, the Bayfield Public Library and several unopened municipal road allowances scattered throughout the village.

Where practical, LID measures such as those described above, will be incorporated into the design and maintenance plans for these properties. Where significant upgrades are being undertaken on these properties, consideration should be given to incorporating LID measures into the design of the drainage and landscaping design for the facilities.

e) Construction Details

Upon implementation of the preferred Master Plan alternative, the construction plan for this project would include the following general tasks:

- Contractor mobilization to the site.
- Provide traffic signs and barricades at the limits of the construction area, as required.
- Complete site layout, including service locates.
- Remove deteriorated or undersized facilities, if present.
- Place new piping, including bedding (native or granular backfill).
- Install structures and complete additional grading around inlets to create storage.
- Install trash screens to improve water quality.
- Re-grade roadside ditches and swales as required to facilitate overland flow.
- Restore site: topsoil and sod to the property line.
- Remove traffic barricades and signs, as appropriate.
- Complete all required documentation and reporting on the works.

f) Construction Mitigation

Construction-related activities associated with project implementation have the potential to impact upon existing environmental features, the general public and construction workers. The Contractor will therefore be responsible for carrying out these activities in accordance with industry safety standards and all applicable legislation. Mitigation measures will also be incorporated into the construction specifications to ensure that operations are conducted in a manner that limits detrimental effects to the environment.

Table 5.2 outlines a series of mitigation measures that are typically incorporated into construction specifications. For this project, contract specifications may need to be modified depending upon the nature of the construction activity and any additional requirements of the regulatory agencies.

Table 5.2
Typical Mitigation for Construction-Related Activities

Construction Activity	Typical Mitigation Measure
Refuelling and Maintenance	- Identify locations for designated refuelling and maintenance areas. - Restrict refuelling or maintaining equipment near watercourses. Non-spill equipment is required within 30 m of any watercourse. Fuelled equipment shall be stored overnight not less than 30 m from the edge of water. - Avoid cleaning equipment in watercourses and in locations where debris can gain access to sewers or watercourses. - Prepare to intercept, clean up, and dispose of any spillage that may occur (whether on land or water).
Traffic Control	- The Contractor shall prepare and submit a traffic plan to the Project Engineer for review and acceptance. - Traffic flow should be maintained at all times during construction for private access. The Contractor will provide adequate signage and barricades.
Disposal	- Dispose of all construction debris in approved locations. - Do not empty fuel or lubricants into sewers or watercourses.
Pesticides	- Co-ordinate the use of pesticides and herbicides with affected landowners and the local pesticide control officer.
Sensitive Areas	- Avoid encroachment on unique natural areas; do not disturb habitats of rare or endangered species.
Silt Control	- Silt fences shall be installed and maintained down slope from any stockpile locations or disturbed areas.
Dust Control	- Cover or wet down dry materials and rubbish to prevent blowing dust and debris. - Avoid the use of chemical dust control products adjacent to wetlands and watercourses.
Site Clearing	- Protective measures shall be taken to safeguard trees from construction operations. - Equipment or vehicles shall not be parked, repaired or refuelled near the dripline area of any tree not designated for removal. Construction and earth materials shall also not be stockpiled within the defined dripline areas. - Restrict tree removal to areas designated by the Contract Administrator. - Minimize stripping of topsoil and vegetation.
Sedimentation/ Erosion Control	- Erect sediment fencing to control excess sediment loss during construction period. - Minimize removal of vegetation from sloped approaches to watercourses.

Construction Activity	Typical Mitigation Measure
	- Protect watercourses, wetlands, catch basins and pipe ends from sediment intrusion. - Complete restoration works following construction. - Install straw bale check dams in ditch lines following rough grading of ditches.
Noise Control	- Site procedures should be established to minimize noise levels in accordance with local by-laws. - Provide and use devices that will minimize noise levels in the construction area. - Night time or Sunday work shall not be permitted, except in emergency situations.

6.0 IMPACT ASSESSMENT AND MITIGATION

6.1 Environmental Impacts

Based upon the findings of the general impact assessment (Table 3.3) and the environmental effects analysis (Table 3.4), the project has the potential to impact upon a limited number of specific environmental components. They are as follows:

- Natural Environment
- Social Environment
- Cultural Environment

The potential impacts to each identified feature are described in detail within this section of the report. Measures designed to minimize the impacts are also presented. The determination of appropriate mitigation measures incorporated an assessment of previous studies and investigations, site specific requirements and an evaluation of a broad range of alternatives. This assessment was based on consideration of three broad approaches to impact mitigation; avoidance, minimization of adverse effects and compensation.

6.2 Natural Environment – Aquatic Habitat

Existing storm drainage outlets serving that portion of Bayfield located south of the Bayfield River, discharge to the shoreline of Lake Huron at three locations. Due to lowering lake levels and a build-up of sand dunes in the vicinity of the outlets, small ponds with wetland features have formed downstream of the outlet structure. These features may serve some water quality function by slowing down the flows and filtering storm water through the existing vegetation, although this has never been quantified. It is the intent of the Municipality to undertake the identified storm drainage upgrades on an as required basis to primarily address existing problem areas identified within Bayfield in conjunction with this study.

Due to funding limitations and adequate drainage in most of Bayfield, it will be unnecessary to install new storm drainage facilities throughout the entire community.

Where upgraded facilities are required to address an existing problem area, measures will be incorporated into the engineering design to increase retention and improve water quality, while still providing for adequate drainage of the road bed and adjacent properties. Homeowners will be encouraged to implement additional low impact development measures on private property to reduce the overall volume of stormwater entering the municipal system.

6.3 Social Environment - Community Level Impacts

a) Disruption Posed by Construction

Installation of new stormwater drainage works will primarily occur within the limits of the existing road allowance. Construction activities associated with the project may therefore inconvenience local residents by restricting vehicular traffic movement and disturbing private property. Traffic-related impacts resulting from the proposed works are expected to be similar to those experienced during normal road construction activities. The mitigation measures discussed in Table 5.1 of this report will therefore be implemented to minimize the restrictions to vehicular movement, as well as other construction-related impacts (e.g. excessive dust and noise levels). Certain additional measures may also be implemented to ensure adequate traffic flow through work areas. For example, construction will occur predominately within untraveled portions of the road rights-of-way and at least one lane of travel will remain open at all times during construction. These measures should ensure that the affected roadways remain open during construction periods, although lane reductions will likely be necessary.

b) Impacts to Private Property

i) Construction Related Impacts

Some residual impacts to private property may result from construction-related activities such as vegetation removal and disturbance to driveways and lawns. Disturbed areas will be restored following construction with material of a similar nature to pre-construction conditions. In addition, temporary access limitations may occur during installation of watermains along road right-of-ways.

ii) Implementation

As discussed in more detail below, the Municipality has developed the Stormwater Servicing Master Plan in order to provide guidelines for future development applications and to address existing drainage problems within the community. However, the funding needed to implement the proposed upgrades is currently not available. Therefore, residents within the community that are currently experiencing drainage issues that may be resolved by implementation of the plan, will be impacted if it is a number of years before the planned upgrades can occur. Some remedial measures may be completed in the interim (minor ditch re-grading/private drainage initiatives) however until sufficient funding can be obtained, this impact cannot be mitigated.

c) Capital Costs

Implementation of all recommendations associated with the Stormwater Servicing Master Plan would represent a significant capital cost to the Municipality. At present, the Municipality has only committed to moving forward with implementation of the plan if suitable grant funding can be obtained to assist with capital construction costs. Alternatively, some components of the plan could be implemented in conjunction with other planned construction works such as road reconstruction.

6.4 Cultural Environment

Based upon feedback received from the Ministry of Tourism, Culture and Sport (MTCS), as well as additional consultation with the Bluewater Heritage Committee, the proposed works have the potential to impact existing heritage buildings in Bayfield. A number of structures have been identified as significant heritage buildings and the historic downtown shopping district has been designated as a Heritage Conservation District. To ensure that no negative impacts occur to these structures as a result of the proposed works, additional assessment will be required once final engineering designs are complete for the proposed works.

7.0 CONCLUSIONS AND PROJECT IMPLEMENTATION

7.1 Master Plan Study Conclusions

Based upon the findings of the environmental impact evaluation and input received from agencies, stakeholders and the general public following the public meeting, no significant impacts were identified with Alternative 2 that could not be adequately mitigated. In this regard, implementation of the proposed Master Plan projects appears to be appropriate for the study area and should not result in significant adverse environmental effects (particularly if the mitigation measures are incorporated into the construction plan).

7.2 Selection of a Preferred Alternative

Given the foregoing, **Alternative 3 – Replace existing infrastructure and develop policies for new development areas using a combination of conventional and low impact storm drainage concepts,** was selected as the preferred solution to the identified problem. This recommendation was presented to, and supported by, Municipal Council and staff. The works associated with the preferred alternative are summarized in section 5.2 of this report and illustrated on Exhibits 4-6 in the back of the report.

7.3 Approvals

Implementation of Master Plan projects will be subject to the receipt of all necessary approvals. Following a review of existing legislation, it was determined that two formal approvals will be required to permit construction of the proposed works.

a) Conservation Authorities Act

Implementation of some components of the preferred alternative may involve construction on lands regulated by the Ausable Bayfield Conservation Authority (ABCA). In accordance with the Conservation Authorities Act, applications will be submitted to the ABCA for approval prior to construction. The application will define measures to protect sensitive lands during construction in order to minimize the negative impacts of the project on the natural features of the area. Site restoration and post-construction enhancements to disturbed areas will also be presented.

b) Ontario Water Resources Act

Construction of stormwater management facilities, which are a component of the Master Plan implementation associated with future development lands, will be subject to the Ontario Water Resources Act. Consequently, the project cannot proceed until the Municipality has received the necessary Environmental Compliance Approvals from the MOE.

7.4 Implementation Phasing

Projects identified for implementation through the Master Plan process have been categorized into a proposed phasing plan, based primarily upon existing drainage concerns identified through the public consultation process, the state of deterioration of existing infrastructure, and the availability of funding. The design of stormwater detention facilities within future development lands should also include a consideration of impacts associated with extreme rainfall events related to climate change. Table 7.1 illustrates the proposed phasing plan and identifies the associated Class EA Schedule for each infrastructure project. The location of the proposed phases is also illustrated on Figure 7.1. A preliminary design for stormwater drainage on Main Street, which has been identified as Phase 1, is included within Appendix ‘E.

Table 7.1
Proposed Phasing Plan:
Preferred Master Plan Alternative – Alternative 3

Master Plan Project Component – Suggested Priorities	Class EA Schedule
Main Street: Clan Gregor Square to Catherine Street	A+
Dow Street and Tuyll Street: Charles Street to Delevan Street	A+
Delevan Street and Charles Street: Main Street to Tuyll Street	A+
Tuyll Street: Colina Street to Catherine Street	A+
Tuyll Street: Dow Street to Cameron Street	A+
Cameron Street: Lidderdale Street to Tuyll Street	A+
Louisa Street: Charles Street to Main Street Charles Street: Victoria Place to Main Street	A+ A+
Remaining Phases within the Developed Area	A+
Works Associated with Future Development Lands	
Construction of Communal Stormwater Detention Facility including new outfall to Lake Huron	B
Detention Facility planned in conjunction with Plan of Subdivision Review - This would only apply if the facility was self-contained, collecting and treating flows generated from within the proposed development, not flows generated from off-site.	N/A
Stormwater collection system to connect to detention facility - If located within existing road allowances - If located outside of existing road allowances or easements - If approved in conjunction with draft Plan of Subdivision	 A+ B N/A

LONG HILL ROAD
BAYFIELD TERRACE
BAYFIELD MAIN STREET NORTH
COLINA STREET
CHINIQUY STREET
LOUISA STREET
DELEVAN STREET
CHARLES STREET
THE SQUARE
DOW STREET
KEITH CRESCENT
JANE STREET
DAVID STREET EAST
GLASS STREET
TUYLL STREET
BLAIR STREET
JOHN AVENUE
EUPHEMIA STREET
SARNIA STREET
DAVID STREET
CHRISTY STREET
FRY STREET
ELIZABETH STREET
BAYFIELD MAIN STREET SOUTH
VICTORIA STREET
CAMERON STREET
WILDWOOD LINE
HAMILTON STREET
LIDDERDALE STREET
STARK STREET
GEORGE STREET
EUGENE STREET
MILL ROAD
TROY STREET
21
3
BLUEWATER HIGHWAY
BUNYAN AVENUE
BUSH ROAD
PAUL BUNYAN ROAD
BRONSON LINE
LAKE HURON
N
0 100 200 400 600 Metres

LEGEND

Priority Phases

1
2
3
4
5

Secondary Phases

BMROSS engineering better communities

MUNICIPALITY OF BLUEWATER

CLASS EA TO DEVELOP A STORMWATER SERVICING MASTER PLAN

PHASING PLAN

DATE	PROJECT No.
MAY 28, 2014	13129
SCALE	FIGURE No.
1:10,000	7.1

N

LAKE HURON

Fishermans Wharf Road
Long Hill Road
Short Hill Road
Bayfield Terrace
Bayfield Terrace
Bayfield Terrace
Colina Street
Colina Street
Chiniquy Street
Catherine Street
Victoria Place
Anne Street
Louisa Street
Tuyll Street
Chiniquy Street
Charles Street
Charles Street
Delevan Street
Tuyll Street
The Square
Howard Street
Howard Street
Charles Street
Keith Crescent
Hill Terrace
Tuyll Street
Dow Street
Municipal Road
John Street
Jane Street
Hill Terrace
Jane Street
Keith Crescent
Sarnia Street
Jane Street
Blair Street
Fry Street
David Street
David Street
Glass Street
William Street
Tuyll Street
Euphemia Street
Fry Street
Elizabeth Street
Christy Street
Christy Street
John Street
Blair Street
Sarnia Street
Macdavesh Crescent
Fry Street
Tuyll Street
Victoria Street
Victoria Street
John Street
Euphemia Street
Cameron Street
Cameron Street
Cameron Street
Cameron Street
Wildwood Line
Wildwood Line
Tuyll Street
Ducharme Crescent
Hamilton Street
Stark Street
George Street
Eugene Street
Lidderdale Street
Troy Street
Paul Bunyan Road
Bronson Line
Wildwood Line
Elliot Street
Lidderdale Street
Crystal Springs Road
Crystal Springs Road
Bronson Line
Crystal Springs Road

Legend

Priority Phases

1
2
3
4
5

Secondary Phases

6
7
8
9
10
11
12
13
14
15
16
17
18

0 50 100 200 300 400 500 METRES

BMROSS engineering better communities

BAYFIELD MASTER STORMWATER SERVICING STUDY
FUTURE STORM SEWER PLAN
COMMUNITY OF BAYFIELD

DATE	PROJECT No.
MAY 27, 2014	13129
SCALE	FIGURE No.
1 : 5000	7.2

7.5 Anticipated Costs

It is anticipated that the Master Plan will be implemented over a 15-20 year time frame with project costs potentially offset through provincial or federal grant programs. As noted, the suggested priority phasing projects for storm sewer drainage work is summarized on Figure 7.1. Figure 7.2 includes a highlighted map of all areas within the developed community where storm drainage works are proposed including the priority project phases. Table 7.2 illustrates anticipated costs for each component of the proposed plan within the existing developed areas of the community. The first five road sections (suggested priority phases) listed can be considered as part of the suggested phasing while the remaining highlighted areas could be completed as time, finances, and/or other drivers dictated.

Table 7.2
Anticipated Project Costs: Preferred Master Plan Alternative 3

Master Plan Project Component – Developed Community - Suggested Priority Phases	**Anticipated Cost**
Main Street: Clan Gregor Square to Catherine Street	$250,000
Dow Street and Tuyll Street: Charles Street to Delevan Street	$500,000
Delevan Street and Charles Street: Main Street to Tuyll Street	$340,000
Tuyll Street: Colina Street to Catherine Street	$200,000
Tuyll Street: Dow Street to Cameron Street	$400,000
Cameron Street: Lidderdale Street to Tuyll Street	$150,000
Louisa Street: Charles Street to Main Street Charles Street: Victoria Place to Main Street	$150,000
Subtotal	**$1,990,000**
Master Plan Project Component – Developed Community - Remaining Phases	**Anticipated Cost**
Bayfield Terrace: Tuyll Street to West Limit Colina Street: Catherine Street to Tuyll Street Chiniquy Street: Catherine Street to Tuyll Street	$320,000
West Howard Street: Clan-Gregor Square to Tuyll Street	$320,000
Jane Street: Lidderdale Street to Tuyll Street	$180,000
Glass Street: Blair Street to Tuyll Street Some work on Blair Street, John Street and Jane Street	$460,000
Keith Crescent, Sarnia Street, Elizabeth Street, and William Street	$850,000
Christy Street: Blair Street to Tuyll Street	$350,000
Victoria Street: Tuyll Street to Fry Street Euphemia Street: Fry Street to Victoria Street Fry Street: Agricultural Park to Victoria Street	$650,000
Lidderdale Street: Cameron Street to Troy Street	$190,000
Lidderdale Street: Troy Street to Paul Bunyan Road	$610,000
Colina Street: Louisa Street to Catherine Street Victoria Place: Catherine Street to Anne Street	$280,000
Subtotal	**$4,210,000**

Master Plan Project Component - Works Associated with Future Development Lands	Anticipated Cost
D.A. 7 : Construction of communal stormwater detention facility:	$270,000
D.A. 8 : Construction of communal stormwater detention facility including new trunk sewer and outfall:	$900,000
D.A. 9 : Construction of communal stormwater detention facility:	$130,000
D.A. 10 : Construction of communal stormwater detention facility:	$140,000
D.A. 11 : Construction of communal stormwater detention facility including new outfall:	$100,000
D.A. 12 : Construction of communal stormwater detention facility:	$200,000
D.A. 13 : Construction of communal stormwater detention facility including new outfall:	$100,000
D.A. 14 : Construction of communal stormwater detention facility including new outfall:	$115,000
Subtotal	**$1,455,000**

The above costs assume trench restoration only (i.e., not full road reconstruction) and include a contingency allowance (20%) and an engineering allowance of (15%).

It is anticipated that the costs associated with future development lands will be allocated to the benefitting properties either through an area rating by-law or future development charges should they come into effect.

7.6 Environmental Commitments

A series of remediation measures have been identified which should be implemented in order to minimize the environmental impacts associated with construction of the proposed works. The following represent the key measures of the proposed mitigation plan:

- Plans for erosion and sedimentation control will be formulated and implemented in accordance with the requirements of applicable regulatory agencies.

- Construction activities will be conducted in accordance with contract documentation and the impact mitigation requirements of various regulatory agencies. The work will be monitored through on-site supervision.

- Private property owners will be encouraged to implement Low Impact Development (LID) stormwater measures on their own property to help minimize the volume of stormwater reaching the piped conveyance system.

- The Municipality commits to incorporating LID concepts on municipally-owned lands, and in conjunction with municipal infrastructure projects, as much as feasible, providing that costs associated with the works are within anticipated budget amounts.

- Any areas which are disturbed as a result of construction will be restored following completion of the project.

- Any necessary approvals will be obtained from regulatory review agencies prior to implementation of the proposed works.

7.7 Class EA Requirements

a) Master Plan Approval

The Stormwater Servicing Master Plan for the Community of Bayfield was developed following an approved Master Planning process, as set out by the Class EA document. The Master Planning process incorporated the completion of Phases 1 and 2 of the Class EA process. The Master Plan will be approved for implementation subject to successful completion of the Class EA Master Plan Process.

b) Additional Class EA Investigations

As an outcome of this assessment, a series of projects have been identified to implement the Master Plan. These projects are classified as Schedule 'A', A+ or 'B' activities under the terms of the Class EA document. Schedule 'A', 'A+', activities have been assessed in conjunction with the current Master Plan process and do not require additional Class EA review prior to implementation. However additional environmental assessment will be required prior to implementation of Schedule 'B' Activities. Table 7.1 summarizes the proposed activities and the Class EA Schedule associated with implementation of specific phases of the Master Plan.

c) Requirements for Master Plan Completion

The following activities are required in order to complete the formal Class EA Master Plan process:

- Issue a Notice of Study Completion for the Master Plan.
- Make Master Plan Report available for public review in conjunction with publication of the Notice of Study Completion.
- Obtain feedback from public, stakeholders and agencies.
- Make the revised Master Plan report available for public/agency review.
- Address outstanding issues resulting from the Notice of Completion.
- Advise the Municipality and the Ministry of the Environment (MOE) when the Master Plan process is complete.

7.8 Final Public Consultation

A Notice of Master Plan Completion was recently circulated to local residents, stakeholders and government review agencies. The notice identified the preferred Master Plan alternative and indicated the approval process needed to move forward with implementation.

The following summarizes the distribution of the notice.

Contents:	Identification of preferred solution, key project components
Issued:	June 18, 2014
Placed In:	Clinton News Record (April 16 and April 23, 2014)
Distributed To:	9 review agencies
Concludes:	July 18, 2014

7.9 Master Plan Recommendations

The following represent the key study recommendations developed following the evaluation of alternatives phase of the Master Planning process:

1. That Alternative 3 be adopted as the preferred long-term strategy to address stormwater drainage deficiencies in the community of Bayfield.

2. Implementation of the Master Plan will require additional investigations to evaluate the potential environmental impacts of specific projects considered Schedule 'B' activities under the terms of the Class EA document (refer to Table 6.1). Schedule 'A' and 'A^+' projects have been approved through the Master Plan process.

3. Implementation of the Master Plan should be conducted with reference to the project phasing strategy detailed in section 7.0 of this report.

4. Impact mitigation measures discussed in Section 6.0 of this report should be incorporated into the detailed construction plans for each proposed activity, as appropriate.

5. Recommended components of the Preferred Master Plan Alternative should be considered for incorporation into the next Official Plan update for the Municipality of Bluewater.

6. The Master Plan should be reviewed on a regular basis to evaluate the accuracy of key assumptions (e.g., condition of existing infrastructure/availability of funding) and to confirm the suitability of the implementation sequence. The Master Plan should be modified, as required, to address changes to the environmental setting and local drainage conditions.

8.0 SUMMARY

This report documents the Master Plan process which was conducted by the Municipality of Bluewater to resolve deficiencies identified with existing stormwater drainage infrastructure serving the community of Bayfield and to identify stormwater servicing policies to be utilized for development of future development lands adjacent to the former Village limits.

The Master Plan process included a background review of the study area in order to characterize and identify potential impacts associated with the natural, cultural and built environments. In order to involve the general public and affected property owners in the process, a questionnaire was mailed to all property owners in the community seeking their input, and a public meeting was held to seek input on the proposed recommendations. Agencies and stakeholders were also engaged through a direct mail-out. The outcome of the Master Plan process, which identified a preferred implementation alternative, being to implement the Stormwater Servicing Master Plan using a combination of Conventional and Low Impact Development design concepts, was reached following an analysis of a range of potential Master Plan options.

The Stormwater Servicing Master Plan developed through the Class EA Master Planning process will require the construction of major infrastructure works (e.g., new stormwater drainage infrastructure, stormwater detention facilities, new outlet to Lake Huron), and will be implemented over a fifteen to twenty year time frame. The Master Plan sets out a series of recommendations for project implementation, including a proposed phasing plan for implementation of priority drainage upgrades. Schedule B activities identified through the plan will require additional Class EA investigation prior to implementation. All other projects identified in conjunction with the Master Plan have been reviewed in conjunction with the Class EA process and are therefore pre-approved.

All of which is respectfully submitted.

B. M. ROSS AND ASSOCIATES LIMITED

Per _____
Dale Erb, P. Eng.

Per _____
Kelly Vader, MCIP, RPP
Environmental Planner

:es

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