Town of Wasaga Beach

Environmental Study Report

Class EA for West End Depot

and Water Storage

January 2017

Ainley GROUP
CONSULTING ENGINEERS & PLANNERS

Town of Wasaga Beach
Class EA for West End Depot and Water Storage

Project No. 114137

Prepared for:
Town of Wasaga Beach

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January 17, 2017

File No. 114137

Town of Wasaga Beach
30 Lewis Street
Wasaga Beach, Ontario
L9Z 1A1

Attn: **Mr. Mike Pincivero, P.Eng.**
Manager of Engineering Services, RMO/RMI

Ref: **Town of Wasaga Beach, Class EA for West End Depot and Water Storage**

Dear Mr. Pincivero:

Please find enclosed 1 digital copy and 2 hard copies of the Final Environmental Study Report for the West End Depot and Water Storage Class EA.

If you have any questions or require further assistance with this matter, please feel free to contact the undersigned.

Yours truly,

AINLEY & ASSOCIATES LIMITED

Victoria Giangrande, M.A.Sc., E.I.T.

Executive Summary

The Town of Wasaga Beach retained Ainley Group to conduct the West End Water Storage Facility and Maintenance Depot Class Environmental Assessment (Class EA) planning process (Schedule C) in September 2014 to consider storage options and sites for a new water reservoir that will enhance potable water delivery in the west end of the community. The assessment also considered layout options and site locations for a new (satellite) maintenance depot in the west end of Town.

The Study Area includes all areas to be considered in the Class EA and is described as the existing Town limit west of 58th Street.

Class EA Process

The Class EA was approved under Ontario's Environmental Assessment Act and identifies the process by which municipal infrastructure projects are to be planned. The process identifies an approved procedure that classifies projects in terms of schedules based on varying environmental impact.

- **Schedule A** – minimal adverse environmental impact
- **Schedule A+** – minimal adverse environmental impact, requires public notification
- **Schedule B** – Potential for some adverse environmental effects, requires mandatory contact with public and review agencies
- **Schedule C** – potential for significant environmental effects, requires mandatory contact with public and review agencies, requires completion of Environmental Study Report (ESR)

The planning process follows a five (5) step planning process.

- Phase 1 – Problem or Opportunity Definition
- Phase 2 – Identification and Evaluation of Alternative Solutions to Allow a Preferred Solution to be Recommended
- Phase 3 – Evaluation of Alternative Design Concepts for the Implementation of the Preferred Solution
- Phase 4 – Documentation of the Rationale, Planning, Design and Consultation Process
- Phase 5 – Implementation and Monitoring

The Wasaga Beach West End Water Storage and Maintenance Depot Class EA was identified as a Schedule C project. For a Schedule C project, all 5 planning process steps are to be completed. This assignment does not include Phase 5 of the Class EA activities, since that is expected to be undertaken as a future engineering and construction assignment. At this point, only preliminary design has been completed. An ESR is prepared for each project that proceeds through the Schedule C planning process. The ESR provides a complete account of the planning process that was followed for the project.

The project team for the Class EA consisted of members of the Town of Wasaga Beach and Ainley Group. The project team met on a number of occasions to discuss the project's progress and develop content for the PICs.

Public, review agency and Aboriginal community consultation is mandatory during the Schedule C planning process to allow for participation during the development and evaluation of the servicing alternatives. The public, review agencies and Aboriginal communities were contacted with four notices throughout the Class EA process. The four notices were to inform the public of:

- Study Commencement – October 7, 2014
- Phase 1 PIC – July 22, 2015
- Phase 2 PIC – August 18, 2106
- Study Completion – January 26, 2017

The comments and input received from the public, review agencies and aboriginal communities were taken into consideration during the planning process.

Existing Conditions

The existing Wasaga Beach infrastructure related to this project includes:

- Water Storage
  - East End Tower No.1 located at River Road W. with a capacity of 2,837m^3,
  - Sunnidale Road Tower No.2 with a volume of 9,550m^3,
  - In-ground reservoir located at the Veterans Way Water Plant with a volume of 3,405m^3.
- Maintenance Depot
  - The existing maintenance depot is located at 150 Westbury Road on the east end of Wasaga Beach. The current location covers 3.5 ha with two buildings, outdoor storage and parking. The existing Maintenance Depot is capable of storing eight snow plows with additional snow removal equipment and 6,000 tonnes of sand.

Future Conditions

Wasaga Beach has seen significant growth in recent years that will continue in the years to come. In 2011 the population of Wasaga beach was 17,537. The Statistics Canada webpage, ‘Focus on Geography Series, 2011 Census –Census Subdivision of Wasaga Beach, Ontario, Population’ indicates that Wasaga Beach had a 16.7% growth in population from 2006 to 2011 (Annual rate of 3.1%/year). At this rate the population is expected to increase to approximately 32,300 by the year 2031.

As determined by the 2013 Water Model Update analysis, there is enough water storage for between approximately 7 – 8 years of growth. The model update study recommended that that a Class EA be initiated in 2014, given the length of time it takes to complete a Class EA and to build a storage facility.

Problem Identification

Water Storage

To understand the infrastructure that will be necessary during full build out conditions, additional storage calculations were completed. Based on MOECC Guidelines the total amount of required storage was calculated. The following is a breakdown of existing storage and the need for additional storage for ultimate growth.

East End Elevated Tank	2,841 m^3
Veterans Way In-Ground Reservoir	3,410 m^3
Sunnidale Elevated Tank	9,550 m^3
Total Existing Storage	**15,801 m^3**
Full Build Out Storage Requirement	24,641 m^3
Additional Storage Required	**8,840 m^3**

Maintenance Depot

Proposed development will result in the construction of:

- New roads,
- Sidewalks,
- Reclassification of existing roads.

To maintain the current level of service more maintenance equipment and salt/sand will be required. The existing public works maintenance depot is located in the east end. The addition of a satellite maintenance depot in the west end will enhance the current level of service and ensure that there is adequate capacity to services approved developments and growth.

Site Identification

The following site characteristics were identified:

- Preliminary Site Size
    - The public works yard will need 3 ha
    - The water storage will need 0.5 – 1.5 ha
    - A maximum of 4.5 ha will be needed
- Potential area
    - Thirteen areas were identified as potential sites
    - A short list of seven feasible sites was subsequently identified

Alternative Solutions and Evaluation

A list of alternatives was formulated for each part of the project with the Do Nothing and Limit/Manage Growth evaluated for both. An evaluation was completed to determine a preferred solution to be obtained. The evaluation criteria are set out in the approved Class EA document based on the nature of the study area, the potential projects and the values of the community. The criteria and appropriate rating were developed for use in the evaluation process. The alternatives for each project are listed below:

General Options

- Do Nothing
- Limit/Manage Growth

Water Storage

- 9,000 m^3 elevated tank in the west end
- 9,000 m^3 in-ground tank in the West end to be built in 2 stages (2 – 4,500 m^3 cells)
- 4,500 m^3 elevated tank in the West end and 4,500 m^3 in-ground at Veterans Way site
- 4,500 m^3 in-ground tank in the West end and 4,500 m^3 in-ground at Veterans Way site

A 4,500 m^3 elevated tank in the West end and 4,500 m^3 in-ground at Veterans Way site was identified as the preferred solution based on the evaluation completed.

Maintenance Depot

The following is a description of each component of the maintenance depot:

- Salt/sand storage

- Parking
- Outdoor material storage
- Main building
    - Office
    - Mechanical bay
    - Storage garage
    - Wash bay
    - Storage rooms
    - Flammable storage room
- Fuel station
- Stormwater treatment (site drainage)
- Stormwater management pond

<u>Site</u>

- Area 1 - Northwest of George Avenue
- Area 2 – Beachwood Road, West of Joan Avenue
- Area 3 – South of Ayling Reid Court
- Area 4 – West of Lyons Court
- Area 5 – 62nd Street to Lyons Court
- Area 6 – North and South of Ramblewood Drive and West of Cherry Sands Crescent and Green Pine Crescent
- Area 7 – East Side of Lyons Court, South of Bay Sand Drive

Site 2 was identified as the preferred solution as it has the least impact on development in Wasaga Beach with minimal impact to the surrounding area.

Preferred Alternative Assessment

The following site assessments were completed to determine if Site 2 was viable for a water tower and maintenance depot.

- Geotechnical Assessment
- Noise Assessment
- Natural Environment Assessment
- Archaeological Assessment
- Water Distribution System Assessment

The assessments identified that Site 2 was viable for this project. The assessments also identified possible impacts which allowed mitigation measures to be developed.

Alternative Designs and Preferred Solutions

Water Tower

Three elevated water tower design alternatives were examined and evaluated to determine the best option for the 4,500 m^3 storage in the west end.

- Alternative 1 - Composite elevated water storage
- Alternative 2 – Glass lined composite elevated water storage
- Alternative 3 – Glass lined composite partially elevated storage

Alternatives 1 and 2 were identified as equal preferred elevated storage alternatives. Both options will be carried forward to Phase 5 before a final determination is made.

Maintenance Depot

A list of requirements for the maintenance depot were developed and used to create an evaluation table that identified the preferred location of each site component. The evaluation assisted in reducing the viable site layout options and provides guidance to determine a preferred layout.

The location of each site component is as follows:

- Salt and sand storage – southeast quadrant
- Water tower – northwest quadrant
- Office and garage – northeast quadrant
- Outdoor storage – southwest quadrant
- Large vehicle parking – southwest quadrant
- Car parking – northeast quadrant

Stormwater Management Pond Location

Through discussion with the land owner it was decided that a larger SWMP would be constructed to deal with runoff from the maintenance depot site and surrounding land. The four SWMP locations alternatives are:

- Alternative 1 – SWMP located in the existing wetland area
- Alternative 2 – SWMP located south of existing wetland area
- Alternative 3 – SWMP located along north side of the maintenance depot
- Alternative 4 – SWMP only servicing the maintenance depot and located on the maintenance depot site

Alternative 3 was identified as the preferred location as it will provide the least environmental impact while providing room for future development in the area.

Phased Site Construction

To ensure optimal site construction it was established that phased construction will be implemented for this site. Each component of the site has different triggers resulting in the following phased construction schedule:

- 2017 – Purchase Land
- 2017 – Stormwater Management Pond and Joan Road Construction
- 2018 – elevated Water Storage Construction
- 2019 – Salt and Sand Storage Construction
- 2021 – Maintenance Depot Office and Garage Construction
- 2032 – Additional Water Storage

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Appendices

1.0 Introduction and Background

1.1 Terms of Reference

The Terms of Reference as outlined in the Request for Proposal issued by the Corporation of the Town of Wasaga Beach on August, 2014 is attached in ***Appendix A.***

1.2 Purpose of Environmental Assessment

The Town of Wasaga Beach initiated the West End Water Storage Facility and Maintenance Depot Class Environmental Assessment (Class EA) planning process (Schedule C) in August 2014 to consider storage options and sites for a new water reservoir that will enhance potable water delivery in the west end of the community. Ainley Group was retained by the Town in September 2014 to complete this project in accordance with the Town's Official Plan. The assessment also considers layout options and site locations for a new (satellite) maintenance depot in the west end of the Town.

The project involves the completion of a Municipal Class EA including all investigations, studies and analyses in accordance with the requirements of the Municipal Engineers Association (MEA) Municipal Class Environmental Assessment dated October 2000, as amended in 2007, 2011 and 2015. This project has been undertaken as a Schedule C Class EA, with the key deliverable being an Environmental Study Report (ESR) based on the completion of Phases 1 to 4 of the Class EA planning and design process.

1.3 Study Area

The Study Area (as shown on the Figure 1) includes all areas to be considered in the Class EA and is described as the existing Town west of 58th Street.

Figure 1 – Study Area

1.4 Project Background

1.4.1 Previous Reports

Throughout this assessment background documents were reviewed to gain further knowledge on the existing conditions and make use of previous studies and assessment that have been conducted. A list of the reviewed background documents is contained herein.

- Official Plan of the Town of Wasaga Beach (September 2013)
- The Corporation of the Town of Wasaga Beach Comprehensive Zoning By-Law 2003-60 (February 2016)
- Town of Wasaga Beach West End Drainage Study (Ainley Group, March 2004)
- Town of Wasaga Beach Public Works Department – Winter Control Policy
- Town of Wasaga Beach Ultimate Water Supply and Distribution System 2013 Model Update (Ainley Group, March 2014))
- Geotechnical Investigation – Proposed West End Sanitary Sewer and Watermain Servicing Extensions (Terraprobe Limited, December 2003)

2.0 Summary of Class Environmental Process

2.1 Background

The purpose of the Class EA is to document the planning process undertaken to identify the problem, identify and evaluate alternative solutions, select the preferred solution and design through a public consultation process and resolve any issues that arise during the planning process. Major capital works for municipal water supply systems and facilities, such as construction of water storage and maintenance depot, are subject to the requirements of the *Environmental Assessment Act* (EA Act). The EA Act identifies two types of environmental assessment planning and approval processes including Individual Environmental Assessments (Part II of the EA Act) and Class Environmental Assessments (Part II.1 of the EA Act). Generally, the Class EA process is applicable to municipal projects where either a new facility is to be established or where an existing facility requires modification beyond maintenance or operational improvements. Under the Class EA, projects are subject to varying levels of environmental review depending on the extent of their potential impact.

The process classifies projects with varying environmental impact in terms of schedules:

Schedule A projects have minimal adverse environmental impact and are limited in scale. These projects include normal or emergency operational and maintenance activities. They are pre-approved and may proceed without formal contact with the public.

Schedule A+ projects are pre-approved; however, require public notification prior to project implementation.

Schedule B projects have the potential for some adverse environmental effects including improvement projects and minor expansions to existing facilities. A screening process is required involving mandatory contact with directly affected public and relevant review agencies.

Schedule C projects have potential for significant environmental effects including the construction of new facilities and major expansions to existing facilities. Due to the adverse environmental impact, Schedule C projects must proceed under the full Class EA planning and documentation procedure and require that an Environmental Study Report be completed.

The planning process follows a five-step planning process.

- Phase 1 – Problem or Opportunity Definition
- Phase 2 – Identification and Evaluation of Alternative Solutions to Allow a Preferred Solution to be Recommended
- Phase 3 – Evaluation of Alternative Design Concepts for the Implementation of the Preferred Solution
- Phase 4 – Documentation of the Rationale, Planning, Design and Consultation Process
- Phase 5 – Implementation and Monitoring.

The Class EA Planning and Design Process Flow Chart (Figure 2) provides more detail on each phase of the planning process. The process identifies that due to varying project-specific problems, environmental issues, community issues and solutions, a varying level of project complexity is required. To accommodate this, the Class EA defines the minimum requirements for environmental assessment planning allowing the process to be customizable. A key feature to the Class EA process is early and continuous mandatory consultation with the public and those who may be affected by the undertaking. The consultation allows for the public to be informed about the project and allowed to provide input that will be integrated into the study and decision-making process.

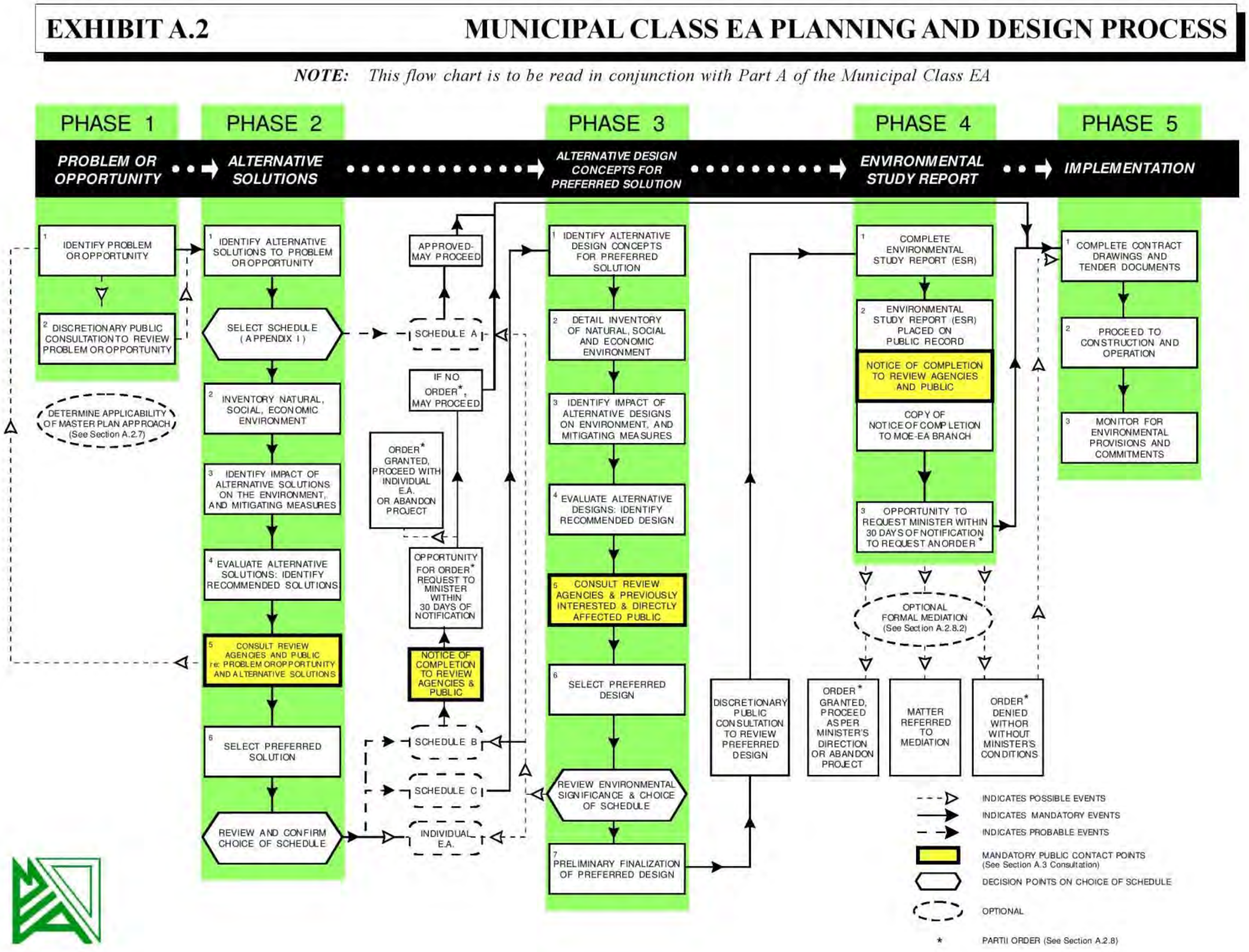

EXHIBIT A.2 MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS

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

Figure 2 –Class EA Planning and Design Process

2.2 Schedule C Procedure for Class Environmental Assessment

The Wasaga Beach West End Water Storage and Maintenance Depot Class EA has been identified as a Schedule C project. For a Schedule C project, all 5 planning process steps are to be completed. This assignment does not include Phase 5 of the Class EA activities, since that is expected to be undertaken as a future engineering and construction assignment. At this point, only preliminary design has been completed.

An ESR is prepared for each project that proceeds through the Schedule C planning process. The purpose of an ESR is to deliver a traceable and easily understood record of the proponent's decision making process. The ESR provides a complete account of the planning process that was followed for the project. Included in the report are an account of public involvement and communication, detailed studies and data collection and identification of all alternatives developed and the evaluation to obtain the preferred solution. The ESR must be placed on the public record for at least 30 calendar days and made available for inspection by the public or by other interested parties.

2.3 Participation by Public, Review Agencies and Others

Public and agency consultation is mandatory for Schedule C projects under the Class EA process. For this project, public and agency participation was integral to the development and evaluation of the servicing alternatives at different points in the planning process.

The public and review agencies were contacted with four different notices throughout the Class EA process. A notice of commencement was sent out on October 7, 2014 to provide information on the project, process and how to get involved. The second notice to provide the date and advance information for the Phase 2 Public Information Centre (PIC) was sent out on July 9, 2015. Notices for the Phase 2 PIC were mailed to each household in the study area. The Phase 2 PIC took place on July 22, 2015 from 7-9pm at the Wasaga Rec Plex located at 1724 Mosley Street. Comments regarding the Phase 2 PIC were received until August 21, 2015. The third notice was sent out on July 28, 2016 regarding the Phase 3 PIC which took place on August 18, 2016 from 7-9pm at the Wasaga Rec Plex. The Phase 3 PIC identified the project component design alternatives and comments were received until September 19, 2016. The final notice was sent out on January 26, 2017 advising of the study completion. The notices were published in the Wasaga Sun and copies of the notices were sent to each of the review agencies separately. A copy of the notices and PIC boards is included in ***Appendix B***. The comments and input received were taken into consideration during the planning processes following the PICs.

The review agencies that were included in the mailing list are shown in Table 1.

Table 1 – List of Review Agencies Contacted During Class EA Process

Provincial & Federal Agencies

- Aboriginal Affairs and Northern Development
- Department of Indian & Northern Affairs
- Department of Fisheries & Oceans
- Environment Canada
- Ministry of Agriculture Food & Rural Affairs
- Ministry of Economic Development and Trade
- Ministry of Environment & Climate Change
- Ministry of Labour
- Ministry of Municipal Affairs & Housing
- Ministry of Natural Resources & Forestry
- Ministry of Transportation
- Ministry of Tourism, Culture and Sport
- Office of the Federal Interlocutor for Metis and non-status Indians
- Ontario Clean Water Agency
- Ontario Provincial Police
- Transport Canada

Local Government & Other Agencies

- County of Simcoe
- MHBC
- Nottawasaga Valley Conservation Authority
- Simcoe County District Health Unit
- Simcoe County District School Board
- Simcoe County Paramedic Services
- Simcoe Muskoka Catholic District School Board
- Town of Wasaga Beach

Aboriginal Consultation

- Alderville First Nations
- Beausoleil First Nations
- Chippewas of Georgina Island
- Chippewas of Nawash First Nation
- Conseil de la Nation huronne-wendat
- Curve Lake First Nation
- Georgian Bay Metis Council
- Hiawatha First Nations
- Metis Nation of Ontario
- Mississaugas of Alderville First Nation
- Mississaugas of Scugog Island
- Moon River Metis Council
- Moose Deer Point First Nation
- Ojibways of Hiawatha First Nation
- Rama First Nation
- Saugeen (First Nation)
- Scugog First Nations
- Wahta Mohawk
- Wasauksing First Nation
- Williams Treaties First Nations

Utilities

- Bell Canada
- Enbridge Gas
- Rogers Cable Systems
- Wasaga Distribution

PHASE 1

3.0 Existing Conditions

3.1 Existing Water Storage Infrastructure

3.1.1 Existing Water Supply System

The Town of Wasaga Beach's existing water supply system includes:

1. Two Water Plants and seven supply wells with a total capacity of 31.4ML/d (Veterans Way WP and Jenetta Street WP)

2. Approximately 200km of watermain (150mm to 500mm in diameter)

3. Three storage facilities with a total volume of 15,800m^3

The water distribution system is maintained by the Town and the supply works and reservoirs are operated by Ontario Clean Water Agency (OCWA), under contract.

3.1.2 Types of Water Storage

Two of the water storage facilities are elevated tanks and include the East End Tower No. 1 located at River Road W. with a capacity of 2,837m^3 and the Sunnidale Road Tower No. 2 with a volume of 9,550m^3. The third storage facility is an in-ground reservoir located at the Veterans Way Water Plant with a volume of 3,405m^3.

The system operation is based on high-lift pump turn on / off controlled by water levels in the west end Sunnidale Road water tower. In the summer the tower is currently operated between 41% & 82% full and in the winter between 41% & 65% full.

3.2 Existing Maintenance Depot

The existing maintenance depot is located at 150 Westbury Road on the east end of Wasaga Beach, Figure 3. The current location covers 3.5 ha with two buildings, outdoor storage and parking.

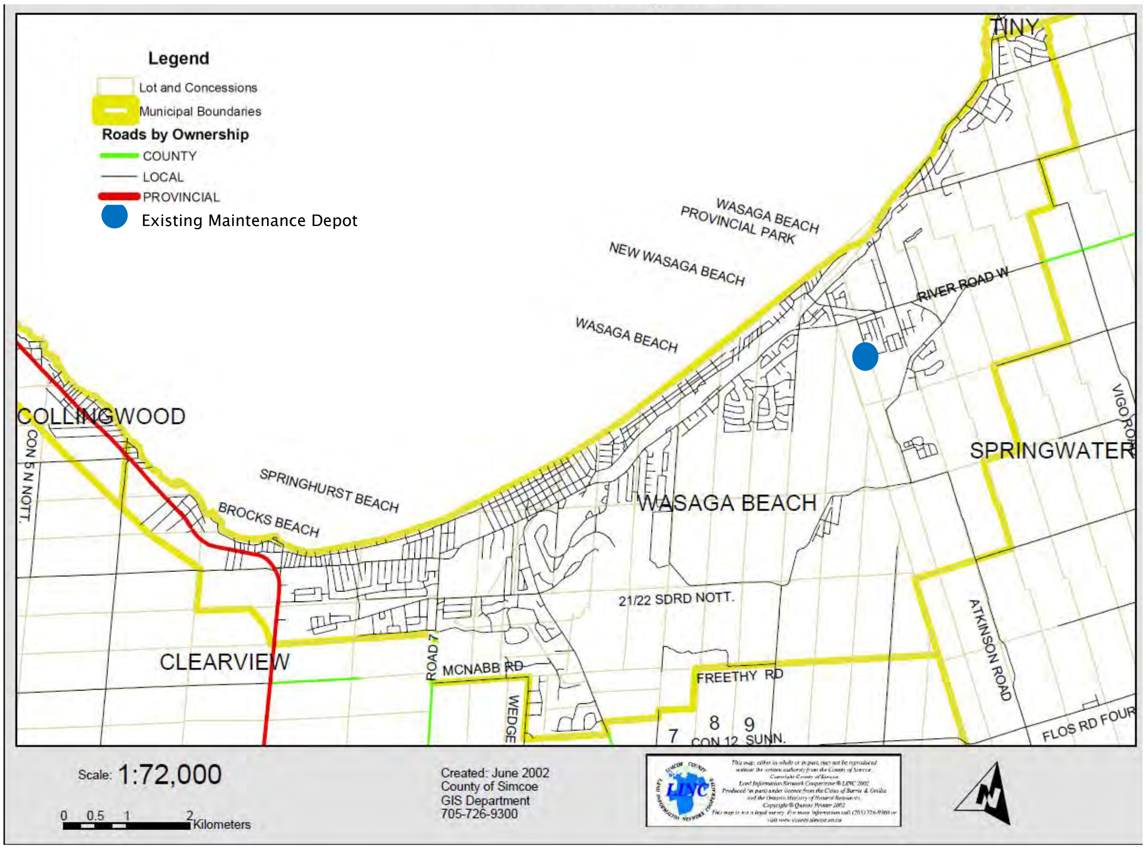

Figure 3 – Location of Existing Public Works Facility in the Town of Wasaga Beach.

The Existing Maintenance Depot Facilities and Infrastructure include:

- Stockpiling of construction supplies and material
- Salt storage dome with storm water runoff containment and treatment
- Construction equipment storage and parking
- Office space, reception area, meeting and training space, filing and storage
- Lunch room, locker room, mud room, dispatch area, washrooms and shower facilities and utility areas
- Fleet storage and parking including maintenance and wash bays, parts and tools storage, small equipment and machinery storage, indoor headed parking and external vehicle parking
- Above ground fuel tanks complete with spill containment system
- Transit vehicle storage and transit operations office

The existing Maintenance Depot is capable of storing 8 snow plows with additional snow removal equipment and 6,000 tonnes of sand.

It is the responsibility the Town's Public Works Department to provide winter maintenance services that include maintaining roads and sidewalks for public use in accordance with The Town of Wasaga Beach Public Works Department – Winter Control Policy.

4.0 Future Conditions

4.1 Population Growth

Wasaga Beach has seen significant growth in recent years that will continue in the years to come. In 2011 the population of Wasaga beach was 17,537. The Statistics Canada webpage, 'Focus on Geography Series, 2011 Census – Census Subdivision of Wasaga Beach, Ontario, Population' indicates that Wasaga Beach had a 16.7% growth in population from 2006 to 2011 (Annual rate of 3.1%/year). At this rate the population is expected to increase to approximately 32,300 by the year 2031.

Schedule 7 (Distribution of Population and employment for the city of Barrie, City of Orillia and County of Simcoe to 2031) for Ontario Ministry of Infrastructure's Places to Grow Report titled, 'Growth Plan for the Greater Golden Horseshoe, 2006' consolidated in June 2013, gives a 2031 projected population of 27,500, with projected employment of 3,500 for the Town Wasaga Beach.

The 'Town of Wasaga Beach Housing Strategy' (2013) presents an expected increase of 4,500 households over the next 20 years. There are currently 7,330 proposed new dwellings in various planning stages showing even more expansion into the future (Figure 4). Over 4,000 of these units are expected to be located in the west end.

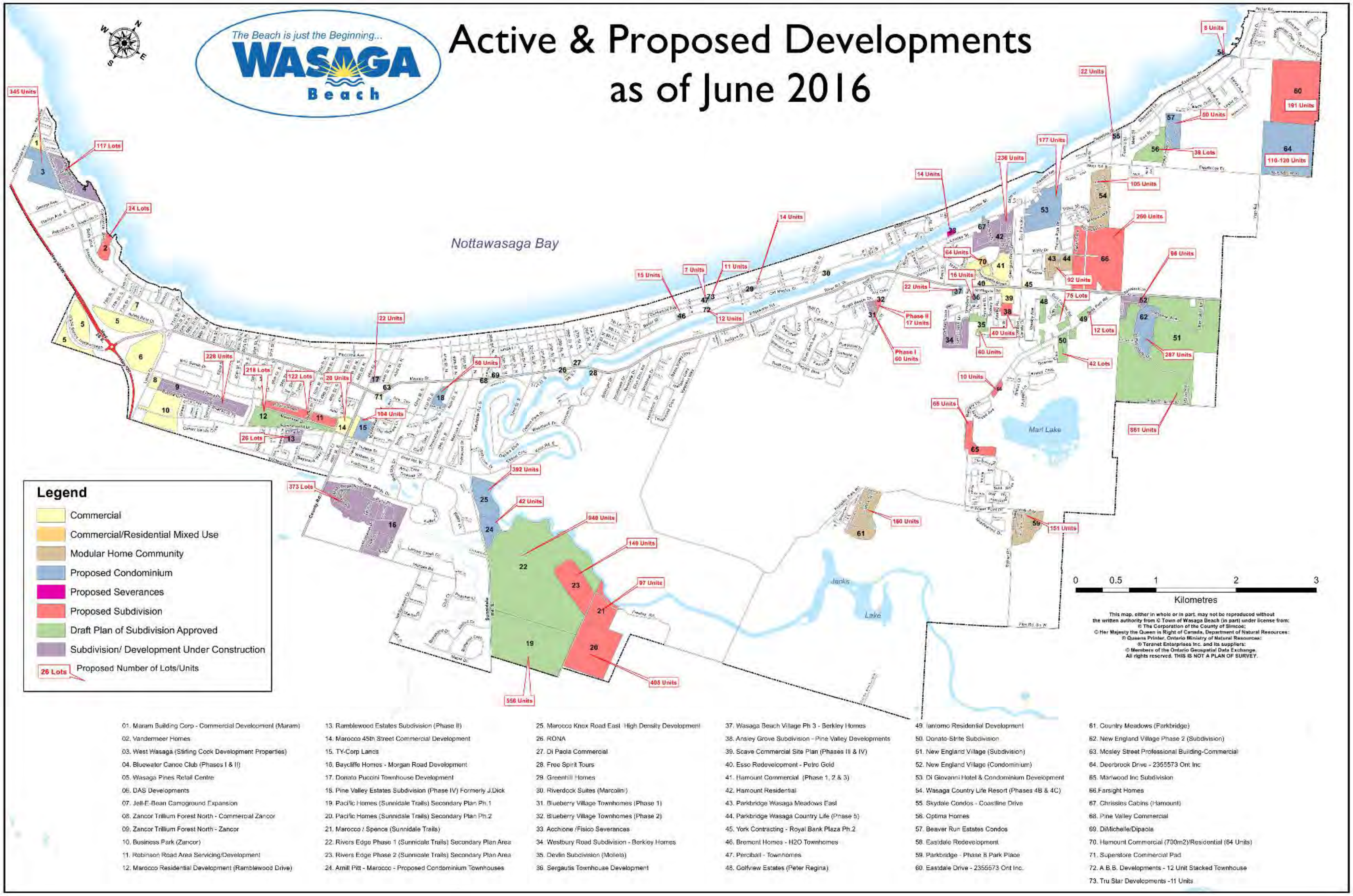

Figure 4 –Active and Proposed Developments for the Town of Wasaga Beach

4.2 Future Demand on Water System

The design criteria for the Class EA is based on findings and updates of previous studies including the 2013 Town of Wasaga Beach Ultimate Water Supply and Distribution System, Model Update done by the Ainley Group.

The results of the 2013 model update indicate that the existing water storage in the system, both in terms of volume and location, is adequate for the current demands. To determine ultimate fire flow requirements the total ultimate storage was calculated in Technical Memorandum 1A and determined to be 24,641m^3. Since the existing available storage is 15,801m^3, the required additional storage for full build out was determined to be 8,840m^3.

Additional analysis was completed to better identify when it is necessary to build a new water storage facility. The analysis was based on the 2013 Water Model Update. The information is identified in Table 2 which identifies the timing of new connections to the network and timing of a new water storage facility.

Table 2 – Remaining Storage Capacity from 2012 to 2041

Connections	**Number of Equivalent Residential Units**	**Cumulative Number of Equivalent Units**	**Storage Requirements - m^3**	**Remaining Storage Capacity - m^3**
Connected to the System (Dec. 2012)	*12,881*	*12,881*	*10,724*	5,076
2013 to 2017 new connections	*2,490*	*15,371*	*13,316*	2,484
2018 to 2022 new connections	*2,490*	*17,861*	*15,764*	36
2023 to 2027 new connections	*2,490*	*20,351*	*17,854*	-2,054
2028 to 2032 new connections	*2,490*	*22,841*	*19,753*	-3,953
2033 to 2041 new connections	*4,171*	*27,012*	*24,284*	-8,840

*Based on the historical rate of growth for the period of 2009 to 2012, which is estimated at approx. 498 New Connections per year

As depicted in Table 2, the system's reserve capacity is sufficient until about 2023 based on the current maximum day demand per unit plus 30%.

The model update study recommended that that a Class EA be initiated in 2014, given the length of time it takes to complete a Class EA and to build a storage facility.

5.0 Problem Identification

5.1 Problem Statement

The function of the problem statement for this Class EA is to outline the starting point of the undertaking and define the project scope. Two separate problem statements were developed to properly define the separate sections of this assessment.

The Problem Statements are as follows:

Water Storage: In order to enhance potable water delivery in the west end of the community, the Town of Wasaga Beach is undertaking a Class Environmental Assessment planning process (Schedule C) to consider storage options and sites for a new water reservoir. The assessment will investigate all aspects of the water system including water pressure, fire flow volumes, adequate storage volume, existing servicing and future development. The Town intends to ensure that all areas within the current Town boundary limits are adequately serviced by the municipal water system.

Maintenance Depot: In order to meet servicing requirements and enhance delivery of Public Works Maintenance services, the Town of Wasaga Beach is undertaking a Class Environmental Assessment planning process (Schedule C) to consider layout options and site locations for a new (satellite) maintenance depot in the west end of Town. Given the geographic layout of the Town, the current Public Works Maintenance facility located in the east end, does not efficiently support present operations. Projected growth in demand for services will further overload the current facility and diminish current levels of service.

5.1 Need for Water Storage

The Design Criteria for this study is based on findings and updates of previous studies including the 2013 Town of Wasaga Beach Ultimate Water Supply and Distribution System, Model Update done by Ainley Group. The results of the 2013 model update indicate that the existing water storage in the system, both in terms of volume and location, is adequate for the current demands.

To understand the infrastructure that will be necessary during full build out conditions, additional storage calculations were completed. Based on MOECC Guidelines the total amount of required storage is calculated using the following equation:

Total Storage Requirement = Fire Storage + Equalization Storage (25% of MDD) + Emergency Storage (25% of A + B)

The 2013 Model Update ultimate fire flow requirement was determined to be 378L/s for 6 hours (8,164.8m^3) based on a projected future population that is greater than 40,000 (for an ultimate equivalent number of units projected for full build out of 27,012). The MDD was established to be 46,192m^3/d (535L/s), giving a total ultimate storage requirement of 24,641m^3. Since the existing available storage is 15,800m^3, the required additional storage for full build out was determined to be 8,840m^3. Table 3 shows a breakdown of the existing storage in the Wasaga Beach water distribution network and the need for additional storage for ultimate growth.

Table 3 – Additional Required Storage for Ultimate Growth Based on Current Available Water Storage in Wasaga Beach.

Location of Storage	**Available Storage (m^3)**
East End Elevated Tank	2,841
Veterans Way In-Ground Reservoir	3,410
Sunnidale Elevated Tank	9,550
Total Existing Storage	15,801
Additional Storage Required	**8,840**

Assuming that the full water storage volume of 24,641m^3 will be required within a 25 year growth span the storage demand can be shown as a straight line graph (Figure 5).

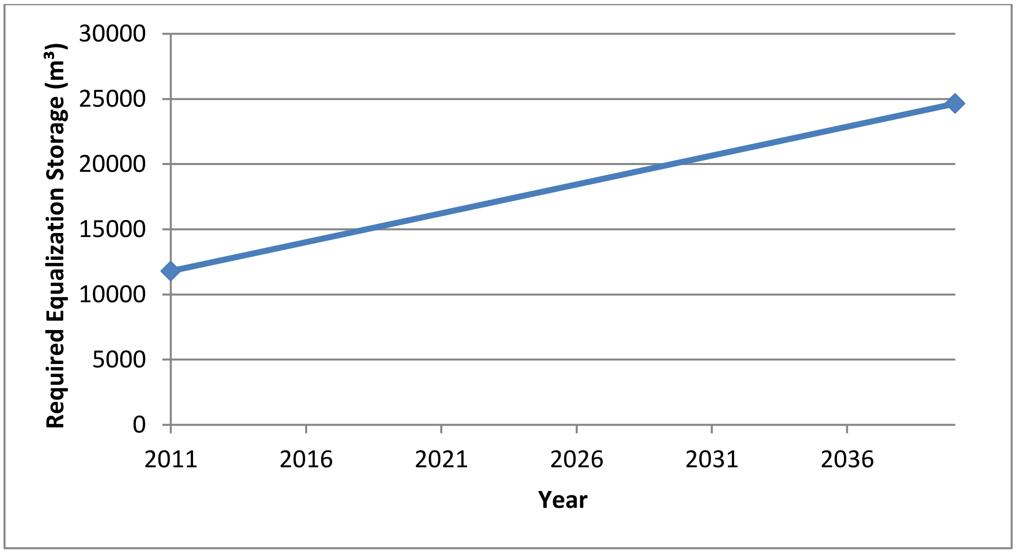

Figure 5 – Projection of Required Water Storage for The Town of Wasaga Beach until 2040.

This Class EA addresses all required water storage through to full build-out and specifically addresses the first phase of the storage, including size, location and type of storage, in the West End of the Town within the project area.

5.2 Need for Maintenance Depot

The Town's proposed development plan will lead to an increase in the amount of required maintenance resulting from construction of new roads, sidewalks, and reclassification of existing roads. More maintenance equipment and salt / sand will be required, as outlined in Technical Memorandum No. 1B, to ensure that the current levels of service are maintained and this will lead to an increase in the maintenance equipment / material storage requirements.

The Town's west end is currently serviced with one winter plow route out of a total of eight routes. More winter plow routes will be required to service planned expansion in the west end and since the existing depot is located in the Town's east end, service will be improved by providing another depot in the west end.

Enhanced Public Works Maintenance delivery will be required to service the proposed development and growth. The existing Public Works Maintenance depot will not be able to provide adequate levels of service to the proposed development, especially in the west end, because it has limited capacity and is located at the east end of the Town. The addition of a satellite maintenance depot in the west end will enhance the current level of service and ensure that there is adequate capacity to service approved developments and growth.

The new facility will be located between 58th Street and the west limit of town. The depot needs to be easily accessible by Town vehicles while mitigating the nuisance of frequent passage of vehicles to and from the depot.

5.3 Site Identification

5.3.1 Preliminary Site Size Considerations

Based on a previous Works Yard design, it was estimated that an area of 3ha will be needed for the works yard itself. An additional 0.5ha is needed for an elevated water storage tank and an additional 1ha is needed if the water storage is in-ground or grade level. Therefore, for analysis purposes, a combined total area of 4.5ha for both facilities is assumed as the largest footprint required. This does not allow for any setbacks that might be required from residential areas or highway corridor protection setback of 45m from the property line.

5.3.2 Identification of Potential Areas

Commencing at the Town's west limits, all potential sites in the study area were considered. From this evaluation, a total of thirteen areas were identified for consideration. The assessment of these thirteen areas is provided in Technical Memorandum No. 2.

The long list of thirteen sites was reduced to a short list of seven feasible options. More detail on each of these sites is outlined in Technical Memorandum 2. The location of each of these seven sites is shown in Figure 6. These seven alternatives were evaluated to determine the preferred site for this Class EA.

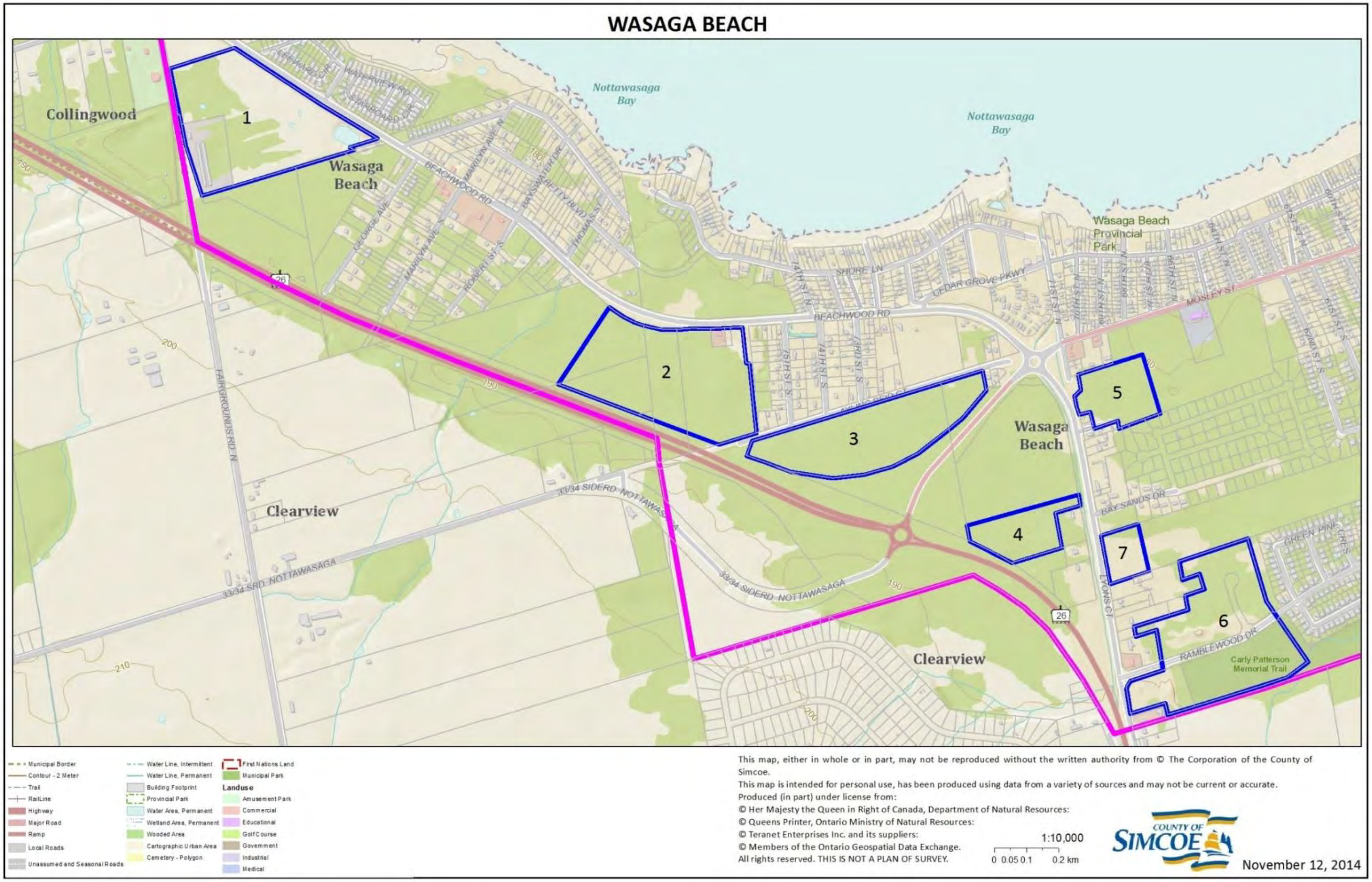

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Figure 6 – Location of the Seven Alternative Sites

5.4 Phase 1 Public and Agency Consultation

During Phase 1 the public and review agencies were notified of the commencement of the Class EA by an advertisement published in the Wasaga Sun on October 7, 2014 and October 14, 2014. The review agencies were also mailed copies of the advertisement.

Comments were received from both the public and review agencies and are summarized in Table 4. The Phase 1 notice of commencement advertisement and comments received are attached in ***Appendix B***.

Table 4 – Comments Received During Phase 1 of the Class EA

CONTACT	DATE OF CONTACT	REPLY RECEIVED DURING PHASE 1	MAJOR ITEMS OF CONCERN COMMENTS	AINLEY'S RESPONSE & DATE	
Rosi Zirger, Ministry of Tourism, Culture and Sport (MTCS)	Notice of Commencement Oct. 9, 2014	Email to JM (Ainley) Oct. 22, 2014	Thank you for providing the Ministry of Tourism, Culture and Sport (MTCS) with the Notice of Study Commencement for your project. MTCS's interest in this EA project relates to its mandate of conserving Ontario's cultural heritage, which includes: - Archaeological resources, including land-based and marine; - Built heritage resources, including bridges and monuments; and, - Cultural heritage landscapes. Under the EA process, the proponent is required to determine a project's potential impact on cultural heritage resources. Project Summary We understand that the purpose of this EA is to investigate all aspects of the water system for the Town of Wasaga Beach, including consideration of water storage options and sites for a new water reservoir. This EA will also consider layout options and site locations for a new (satellite) maintenance depot in the west end of Town. MTCS Comments While some cultural heritage resources may have already been formally identified, others may be identified through screening and evaluation. Aboriginal communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Aboriginal communities includes a discussion about known or potential cultural heritage resources that are of value to these communities. Municipal Heritage Committees, historical societies and other local heritage organizations may also have knowledge that contributes to the identification of cultural heritage resources. Archaeological Resources Please be aware that there are numerous known archaeological sites within the Town of Wasaga Beach and also within or near the study area as indicated in the notice. As such an archaeological assessment will be needed for this project. For further information please refer to the MTCS *Criteria for Evaluating Archaeological Potential* which is used to determine if an archaeological assessment is needed. MTCS archaeological sites data are available at *archaeologicalsites@ontario.ca*. The archaeological assessment (AA) should be undertaken by an *OHA* licensed consultant archaeologist, who is responsible for submitting the report directly to MTCS for review. Built Heritage and Cultural Heritage Landscapes The attached MTCS checklist *Screening for Impacts to Built Heritage and Cultural Heritage Landscapes* helps determine whether your EA project may impact cultural heritage resources. The Clerk the Town can provide information on property registered or designated under the *Ontario Heritage Act*. Municipal Heritage Planners can also provide information that will assist you in completing the checklist. If potential or known heritage resources exist, MTCS recommends that a Heritage Impact Assessment (HIA), prepared by a qualified consultant, be completed to assess potential project impacts. Our Ministry's *Info Sheet #5: Heritage Impact Assessments and Conservation Plans* outlines the scope of HIAs. Please send the HIA to MTCS and to the Town's (heritage) planning staff for review, and make it available to local organizations or individuals who have expressed interest in heritage. Environmental Assessment Reporting All technical heritage studies and their recommendations are to be addressed and incorporated into EA projects. Please advise MTCS whether any technical heritage studies will be completed for your EA project, and provide them to MTCS before issuing a Notice of Completion. If your screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the EA report or file. MTCS is in no way liable if the information in the completed checklists is found to be inaccurate or incomplete. Thank-you for circulating MTCS on this project: please continue to do so through the EA process, and contact me for any questions or clarification.	No response needed.	1
Hiawatha First Nation	Notice of Commencement Oct. 9, 2014	Letter to JM (Ainley) Oct. 17, 2014	As per the Hiawatha First Nation Consultation Protocol, your proposed project is deemed to have little, if any, impact on Hiawatha First Nation's traditional territory and/or rights. Please keep us apprised of any updates, archaeological findings, and/or of any environmental impacts, should they occur. Hiawatha First Nation requests you contact us if any First Nation archaeological artifacts are found as we require our trained archaeological liaisons be present at the archaeological sites during the assessments. We also ask that you forward any archaeological reports to Hiawatha First Nation as they are completed. Any maps pertaining to the project should be sent to Hiawatha First Nation in a shape file. Hiawatha First Nation reserves the right to provide additional comment should further development result in additional potential impact on our traditional territory and rights. Please be aware that while we request to be kept appraised throughout all phases of this project, we may not always have representation at all stakeholders meetings.	No response needed.	2
[redacted]		Email to G.Reu (Town)	Please add name to mailing list.	No response needed.	3

CONTACT	DATE OF CONTACT	REPLY RECEIVED DURING PHASE 1	MAJOR ITEMS OF CONCERN COMMENTS	AINLEY'S RESPONSE & DATE	
[redacted]		Oct. 31, 2014		Added to contact list.	
[redacted]		Email to G.Reu (Town) Nov. 8, 2014	Please add name to mailing list.	No response needed. Added to contact list.	4
Alderville FN	Notice of Commencement Oct. 9, 2014	Email to JM (Ainley) Nov. 5, 2014	As per the Alderville First Nation Consultation Protocol, your proposed project is deemed a level 3, having minimal potential to impact our First Nations' rights, therefore, please keep Alderville apprised of any archaeological findings, burial sites or any environmental impacts, should any occur. I can be contacted at the mailing address above or electronically via email, at the email address below.	No response needed.	5
Lee Bull NVCA	Notice of Commencement Oct 9, 2014	Email to JM (Ainley) Nov.4, 2014	Please accept this email as a formal request for Notification for Public Information Centres, further project information once available, and applicable timings/deadlines for input and comment on the Study.	No response needed.	6
Corwin Troje Ministry of Aboriginal Affairs	Notice of Commencement October 9, 2014	Letter to JM (Ainley) received Nov. 14, 2014	With respect to your project, and based on the brief materials you have provided, we can advise that the project appears to be located in an area where First Nations may have existing or asserted rights or claims in Ontario's land claims process or litigation that could be impacted by your project.	No response needed.	7

PHASE 2

6.0 Alternative Solutions

6.1 General Alternatives

The existing water storage facilities and maintenance depot in Wasaga Beach require expansion to allow future population growth to be accommodated. The Wasaga Beach Official Plan identifies zoning for growth that results in the need for the expansion of these facilities in the near future. A list of alternatives was formulated for each component of this project and evaluated based on established criteria. The following two general alternatives were also identified and evaluated for both the water storage facility and maintenance depot:

- Do nothing
- Limit/manage growth

6.1.1 Do Nothing

The ESR must effectively deal with all aspects of the problem statement. The Do Nothing alternative does not provide any additional capacity to Wasaga Beach's water storage or enhance delivery of Public Works maintenance services to the west end and therefore does not meet the requirements of the Official Plan. With a growing population in Wasaga Beach additional water storage will be required in order to remain in compliance with Provincial Regulations and to maintain the health and safety of the citizens of Wasaga Beach. The Do Nothing Alternative in these cases was therefore considered not viable and was screened out of the detailed comparative assessment.

6.1.2 Limit/Manage Growth

The purpose of this Class EA is to enhance municipal services in the west end due to population growth and therefore this alternative is in conflict with the purpose of this project. Additionally, placing a limit on growth does not align with the Town of Wasaga Beach approved Official Plan and because of this the Limit/Manage Growth Alternative was screened out of the detailed comparative assessment.

6.2 Water Storage Alternatives

6.2.1 Identification of Water Storage Types

The two main types of municipal water storage include floating and pumped storage. Pumped storage consists of a reservoir that can be located above ground, in-ground or partially in-ground and a pumping station. Common elevated tanks are elevated steel tanks and standpipes.

Pumped water storage consists of a concrete basin, which can be made up of multiple cells, and a pumping station. This type of storage allows for staged construction and is less visible to the public. Pumped storage results in high yearly hydro costs incurred due to necessary pumping. All three types of pumping options allow for similar function however, in-ground water storage allows for the land to be used for additional purposes making it the ideal type of pumped storage.

Elevated tanks provide water at or above the required system pressure. Recently the elevated tanks pedestal support has made this type of storage more aesthetically pleasing than previous designs. This type of construction has large upfront capital costs; however, no pumping is necessary, reducing annual operation and maintenance costs.

The standpipe combines functions of both elevated and in-ground storage. The standpipe is a steel or concrete cylindrical storage option which is partially gravity feed. The water below the required system pressure is unusable without the addition of a pumping station. Since the use of concrete pedestals for elevated steel tanks few standpipe designs have been seen as cost effective. The disadvantages of this option combine those of both in-ground and elevated storage. Due to the vast disadvantages associated with this type of storage the standpipe was not considered a viable option.

For the Wasaga Beach project both in-ground storage and elevated tank storage were evaluated as these types of storage were considered to be the best storage options available.

6.2.2 Water Storage Type Comparison

Both of the two water storage types have advantages and disadvantages which are important in the decision-making process. Table 5 outlines the advantages and disadvantages of both elevated storage and in-ground storage.

Table 5 – Advantages vs. Disadvantages of Elevated and In-Ground Storage Options.

Storage Type	Advantages	Disadvantages
Elevated Storage	• Secure Floating Storage • Identifiable landmark to some (subjective) • Requires less land • No future capital costs	• Unpleasing aesthetics to some (subjective) • Access to storage cell is via a long ladder with climb assist equipment • Storage cell is a confined space • Painting cost

	Low energy costs Ease of operation	Initial capital cost Volume cannot be staged Initially, maintaining water quality (chlorine residual) is difficult due to large volume and low demand
In-Ground Storage	Can be built in stages No Painting cost Low Initial Capital Cost More aesthetically pleasing to some (subjective) Access to storage cell is a shorter ladder Easier to maintain water quality (chlorine residual) due to smaller volume	Need standby power Complex to operate Storage cell is a confined space Requires more land Future capital costs Energy costs More complex operation and maintenance

6.2.3 Identification of Water Storage Alternatives

As a result of water analysis that was completed and identified in Technical Memorandum No.4A and summarized above, the following general alternatives were considered. The additional water storage volumes are as follows:

Alternative 1	9,000m^3 - elevated tank in the west end
Alternative 2	9,000m^3 - in-ground tank in the west end to be built in two (2) stages (2 – 4,500m^3 cells)
Alternative 3	4,500m^3 - elevated tank in the west end and 4,500m^3 in-ground at Veterans Way site
Alternative 4	4,500m^3 - in-ground tank in the west end and 4,500m^3 in-ground at Veterans Way site

The four alternatives all offer different water storage alternatives to meet the necessary 9,000m^3 of additional storage needed for the Wasaga Beach water distribution system. Alternative 1 would be built in a single phase increasing the network storage capacity to full Build-Out levels immediately. Alternatives 2, 3 and 4 can all be built in stages allowing for the second stage of storage to be constructed in the future when it becomes necessary. Both elevated and in-ground storage options are incorporated into the different alternatives. A cost analysis and evaluation of the four alternatives is provided in the following sections.

6.2.4 Water Storage Alternative Cost Comparison

A cost analysis was completed for the estimated capital costs and operation and maintenance costs over a 50-year life span for each scenario. The calculation spreadsheets are included in Technical Memorandum No. 4. A summary of the cost comparison of each alternative is presented in Table 6.

Table 6 – Estimated Cost Comparison of Four Storage Alternatives.

	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**
Capital Cost	$11,675,000	$ 9,513,942	$10,455,836	$ 9,513,942
Operation and Maintenance Costs	$ 550,000	$ 4,540,800	$ 1,804,000	$ 3,834,000
Major Maintenance Costs	$ 1,800,000	$ 500,000	$ 1,000,000	$ 500,000
Total Cost	$ 14,300,000	$14,413,709	$13,259,835	$13,706,909
Present Value Cost	**$ 11,832,095**	**$ 8,956,188**	**$ 9,170,138**	**$ 8,756,159**

All costs represent 2014 values except for the net present value cost which takes into account a discount rate of 4% over the time period analyzed.

6.2.5 Evaluation of Water Storage Alternatives

To assess the four alternatives a criteria assessment table was developed rating each option as best, moderate or worst for the various criteria. No weighting was assigned to any of the criteria. Numbers associated with each rating are: worst = 1, moderate = 2 and best = 3. The total value was obtained by summing all of the criteria ratings shown in Table 7. The criterion incorporates the advantages and disadvantages of elevated and in-ground storage as well as the costs associated with each of the four alternatives.

Table 7 – Rating Criteria

	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**
Land Requirement	3	1	3	2
Aesthetics	3	1	2	1
Opportunity to Create Wasaga Beach Landmark	3	1	2	1
Security of Supply (Need for Standby Power)	3	1	2	1
Water Quality*	2	6	4	4
Storage Distribution Across Network*	2	2	6	4
Access to Storage (Health and Safety)	1	3	2	3
Initial Capital Cost*	2	6	4	6
Future Capital Cost	3	1	1	1
Long Term Operation and Maintenance Cost	3	1	3	2
Energy Costs	3	1	2	1
Total	**28**	**24**	**31**	**26**

*Rating criteria that was identified as more significant was given a weighting of 2.

From the assessment completed Alternative 3 (4,500 m^3 elevated tank in the west end and a 4,500 m^3 in-ground tank at Veterans Way) is the best option with the highest total score of 31.

6.3 Maintenance Depot Alternatives

Given the geographic layout and linear shape of the Town, the current Public Works Maintenance facility located in the east end does not efficiently support present operations. Projected growth in demand for services will further overload the current facility and diminish current levels of service. The growth will cause increased road lengths and widening of existing road. This will greatly increase the duration of time to complete all maintenance tasks.

A list of required components was identified to allow the west end maintenance depot to effectively act as a satellite depot in the Town of Wasaga Beach. To allow for an optimal site design each component was identified and sized accordingly. The following is a description of each component of the maintenance depot:

6.3.1 Salt/Sand Storage

The sand and salt storage facility at the west end maintenance depot is required to store 6,000 tonnes of sand and 500 tonnes of salt. The salt and stand storage will be separated with a dividing wall to reduce the chances of mixing. Additional space inside the storage facility will be available to allow for trucks loading and unloading. This will help reduce the amount of salt and sand that is unnecessarily deposited into the environment. To further reduce the loss of salt and sand the storage facility will have proper drainage and pretreatment before the runoff is deposited into the onsite SWMP.

6.3.2 Parking

Two parking locations will be present on the property to accommodate both regular vehicles and large vehicles and equipment. The regular vehicle parking will be located near the entrance of the property and be used for public and employee parking. This area can also be used for small Town vehicles, such as pickup trucks. The large vehicle parking is located on the back side of the building. It will be used for large maintenance vehicles, equipment and transportation vehicles. Both parking locations are located within close proximity to the main building to allow convenient access for employees.

6.3.3 Outdoor Material Storage

Outdoor material storage will allow for storage of soil/granular materials as well as materials necessary to maintain and repair the Town’s infrastructure. Separated storage will prevent mixing of soil/granular materials and facilitate organization of the yard. A sufficient area for outdoor material storage will be provided to allow for possible expansion if necessary when the Town approaches full Build-Out conditions.

6.3.4 Main Building

6.3.4.1 Office

The office area includes separate washrooms and change rooms for men and women, a lunch room, office space for reception, office manager, transit, foreman and dispatch, and a meeting/training room. Everything will be located on the main floor to make it fully accessible.

6.3.4.2 Mechanical Bay

The proposed maintenance depot is intended to be a satellite depot to the existing maintenance depot and therefore requires a single drive-through mechanical bay. This bay will have sufficient room for two vehicles to be stored/ worked on. The bay will include a vehicle hoist, crane and trench drainage. A majority of the mechanical maintenance will continue be done at the existing maintenance depot.

6.3.4.3 Storage Garage

The storage garage will have six bays (three drive-through) for vehicle and machinery storage. This storage area will be openly connected to the mechanical bay.

6.3.4.4 Wash Bay

A drive-through wash bay will be located at the end of the storage garage with separation walls to allow for water to remain within the wash bay and not affect any other part of the garage.

6.3.4.5 Storage Rooms

Five storage rooms have been designed to allow for organized storage of all parts and tools needed at the maintenance depot. The storage rooms include; vehicle parts storage, tool room, general storage, utility parts storage and flammable storage room. The flammable storage room is located in a separate area of the building to allow for safe storage and to reduce the risk of a fire. The remaining four rooms are located between the office area and Mechanical Bay. This allows for easy access to the storage rooms while working in the garage.

6.3.4.6 Flammable Storage Room

Flammable items used at the maintenance depot are to be storage in a secured and safe location to reduce the risk of these products on the site. The flammable storage room will be beside the wash bay, isolated from the office. This will allow for these items to be safely contained while remaining accessible and in a temperature controlled environment throughout the year.

6.3.5 Fuel Station

A fuel station will be located on site to allow for allocation for Town vehicles and machinery to fill up. To accommodate different types of machinery both diesel fuel and gasoline will be available.

6.3.6 Storm Water Treatment (Site Drainage)

An onsite stormwater treatment facility will allow for treatment of runoff from around the main building, fuel station and sand and salt storage building. These areas are expected to cause some runoff contamination and therefore should be pretreated before entering the stormwater management pond. Site drainage will collect runoff from the main building, fuel station and sand and salt storage building through catch basins and storm sewer and transport it to the onsite stormwater treatment facility.

6.3.7 Stormwater Management Pond (SWMP)

The site is currently covered in trees and bush that allow for natural stormwater management. The development of the site will change the land from a permeable surface to a partially impermeable surface. The site will be cleared of most of the trees and portions of the property will be covered in asphalt, concrete and buildings which do not allow for natural stormwater management. To ensure no negative affect on the downstream drainage area a SWMP is needed on the site. The SWMP will provide both water quality and water quantity control. The SWMP will be designed prior to site development following the completion of this class EA.

6.4 Site Screening and Site Alternatives

A desktop study was completed for the seven short-listed sites. The following information was reviewed and used and assisted in the evaluation of the sites:

- Geotechnical
- Land Use Plan
- National Heritage Plan
- Wellhead Protection Areas and Vulnerable Aquifer Areas
- Proposed Development
- Existing Sewers and Watermains

The information that was used in the evaluation for each of these reviewed areas is identified in Technical Memorandum No. 3

6.4.1 Preliminary Site Layout

Preliminary site layouts were developed to identify the amount of land that would be required at each site. The layouts include:

- Elevated water storage tank, communication tower and fence surrounding water tower.
- Stormwater management pond.
- Maintenance building with office, garage and wash bay.
- Fuel Station, Vehicle parking, material storage and sand storage building.

Preliminary site layouts are provided in Technical Memorandum No. 3.

6.4.2 Evaluation of Sites

6.4.2.1 Evaluation Criteria

To identify a preferred alternative solution a set of rating criteria were developed based off of the criteria set out in the approved Class EA document. The criteria and weighting are presented in Table 8.

Table 8 – Site Evaluation Criteria

Criteria	Sub-Criteria	Weighting (%)
Land Use Planning		**10**
	Existing Land Use	5
	Proposed/Potential Land Use	5
Natural Environment		**15**
	Well Head Protection	3
	Surface Water/Drainage	5
	Geotechnical	2
	Trees/Habitat	5
Social Environment		**30**
	Noise Impact	5
	Light Impact	5
	Residential Impact	10
	Traffic Impact	5
	Visibility of Water Reservoir	5
Cultural Environment		**5**
	Supporting Town Policies	5
Technical Considerations		**25**
	Site Servicing (Power, Sewer, Water)	5
	Adequate Size	5
	Tank Hydraulics Performance	5
	Depot Location	5
	Truck Access	5
Economic Considerations		**15**
	Cost	10
	Commercial/Industrial Impact	5
Total		100

The evaluation criteria were used to compare the seven viable alternative sites for the Wasaga Beach West End Water Storage and Maintenance Depot Class EA. Each alternative site was rated on a scale between 0 and 1 on its performance under each criterion, where 0 is poor performance and 1 is exceptional performance. Each rating was than multiplied by its associated weighting. The alternative site that scored the highest based on the ranking system became the recommended site for this Class EA. An explanation of each criterion can be found in Technical Memorandum No. 3.

6.4.2.2 Site Evaluation of the Seven Sites

Using the evaluation criteria, explained above, the sites were assessed to determine the preferred solution. Site 7 was considered as a potential site; however due to limited size, it was unable to meet the requirements needed for this project and therefore was not evaluated any further. The evaluation of the six remaining site options is shown in Table 9.

Table 9 – Evaluation of Alternative Sites

Criteria	Sub-Criteria	Weighting (%)	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Land Use Planning		**10**	**4**	**9**	**7**	**6**	**4**	**6**
	Existing Land use	5	2	4	4	4	3	5
	Proposed/Potential Land Use	5	2	5	3	2	1	1
Natural Environment		**15**	**9**	**10**	**13**	**15**	**8**	**12**
	Well Head Protection	3	3	3	3	3	3	3
	Surface Water/Drainage	5	1	2	5	5	1	2
	Geotechnical	2	1	1	2	2	2	2
	Trees/Habitat	5	4	4	3	5	2	5
Social Environment		**30**	**8**	**24**	**22**	**26**	**25**	**18**
	Noise Impact	5	1	5	4	4	4	3
	Light Impact	5	1	5	4	4	4	3
	Residential Impact	10	2	8	8	10	8	4
	Traffic Impact	5	3	4	2	3	5	3
	Visibility of Water Reservoir	5	1	2	4	5	4	5
Cultural Environment		**5**	**1**	**4**	**4**	**3**	**2**	**1**
	Supporting Town Policies	5	1	4	4	3	2	1
Technical Considerations		**25**	**17**	**21**	**21**	**20**	**22**	**22**
	Site Servicing (Power, Sewer, Water)	5	3	4	5	5	5	5
	Adequate Size	5	5	5	5	3	3	5
	Tank Hydraulic Performance	5	3	4	5	5	5	5
	Depot Location	5	1	3	4	4	4	4
	Truck Access	5	5	5	2	3	5	3
Economic Considerations		**15**	**11**	**13.5**	**11**	**10.5**	**8.5**	**9**
	Cost	8	6	6.5	7	7.5	7.5	8
	Commercial/Industrial Impact	7	5	7	4	3	1	1
Total		**100**	**50**	**81.5**	**78**	**80.5**	**69.5**	**68**

From the evaluation completed Site 2 is the best alternative with the highest score of 81.5 out of a possible 100. Site 2 will have the least impact on development in Wasaga Beach with minimal impact to the surrounding area.

More detailed site assessments were completed for Site 2 to assist in developing a finalized site layout. Acoustic testing was completed to obtain information about the type of attenuation barrier necessary to comply with Ministry guidelines.

6.5 Phase 2 Public and Agency Consultation

A Phase 2 PIC was held on July 22, 2015 to allow public and agency consultation during this phase of the Class EA process. It was held from 7-9 pm at the Wasaga Rec Plex located at 1724 Mosley Street. To inform the public of this PIC a notice was published in the Wasaga Sun on July 9 and 16, 2015 and the notice was also mailed to each resident within the study area. The review agencies contacted for this project were also mailed the notice.

The information provided at the Phase 2 PIC included a summary of the project background, an overview of the Class EA process, identification and evaluation of the project alternatives, and the recommended solutions. There were 67 residents in attendance. The PIC gave residents an ability to get questions and concerns answered and allowed the project team to further understand the community needs with respect to this project. The Phase 2 PIC advertisement, attendance sign in sheet and PIC boards are attached in ***Appendix B***.

Comments for this phase of the Class EA were received starting from July 14, 2015 until August 21, 2015. All of the comments were reviewed and taken into consideration in Phase 3. A summary of the comments is provided in Table 10, with full comment sheets attached in ***Appendix B***.

Table 10 – Comments Received During Phase 2 of the Class EA

CONTACT	DATE OF CONTACT	REPLY RECEIVED DURING PHASE 2	MAJOR ITEMS OF CONCERN COMMENTS	AINLEY'S RESPONSE & DATE	
Wasauksing First Nation	PIC Notice – July 9, 2015	July 14, 2015	Wasauksing First Nation would like to request more information. If you could please send the study document at your earliest convenience.	Email response on July 14, 2015 indicating we will send the PIC slides but at this point are only at the stage for preparing for the first PIC. No further information required. Email response on July 22, 2015 with attached PIC boards.	1
Alderville First Nation	PIC Notice – July 9, 2015	July 14, 2015	The project is not on AFN's Traditional/Treaty Territory.	Email response on July 14, 2015 thanking AFN for their timely response.	2
Ministry of Transportation	PIC Notice – July 9, 2015	July 15, 2015 Email	The MTO has no concerns however should be contacted for review and permit approvals. In accordance with Sec. 38(2) of the Public Transportation and Highway Improvement Act, a Building & Land Use permit is required for any installation within 45m of highway limit, or within 395m of the centrepoint of any intersection.	Email response on July 15, 2015 indicating we will keep the MTO informed if we are within any of the limits.	3
[redacted]	PIC Notice – July 9, 2015	July 15, 2015 Email	Site number 6 should be doubled studied as contamination of brook in Carly Paterson Park is already occurring.	Email response on July 15, 2015 identifying that this issue of contamination will be taken into consideration.	4
[redacted]	PIC Notice – July 9, 2015	July 15, 2015	Phone conversation – unclear map, would like PIC boards, does not want to use their site for this type of development and does not want to sell property.	Email response on July 15, 2015 with new map of the sites. The email indicated that Site 2 was the recommended site. Email response on July 22, 2015 with PIC boards.	5
[redacted]	PIC Notice – July 9, 2015	July 16, 2015	Would like the boundaries of site 6 as it appears to be on Ramblewood near where we live and we are trying to determine our level of interest in this study/project.	Email response on July 17, 2015 indicating that site 2 is the recommended preferred solution. Any comments received through the public consultation process will be considered in our final decision.	6
[redacted]	PIC Notice – July 9, 2015 Letter	July 17, 2015	The map was illegible. Both requirements (tower and depot) should be considered for visual merits. Site 6 should be considered for the water storage reservoir as it would be visible from HWY 26. Site 3 would also be good for similar reason the site should also be incorporated into the community with walking paths. Site 1 and 2 would be the best location for the maintenance depot since it is most westerly where expansion is most likely to occur. Site 4, 5 and 7 would not be ideal for either situation. Planning needs to go into the materials used to avoid an eye sore. Additionally poor planning so far has gone into the west end.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	7
[redacted]	PIC Notice – July 9, 2015	July 17, 2015	Please keep informed.	Email response on July 17, 2015 indicating Ainley Group will keep him informed. Added to contact list.	8
[redacted]	PIC Notice – July 9, 2015	July 17, 2015 Email	The map on the PIC notice is illegible. Is it possible to be provided with a new one?	Email response on July 18, 2015 with a new map of the sites.	9
[redacted]	PIC Notice – July 9, 2015	July 19, 2015 Email	Could not attend the PIC but would like a more legible map. Please keep informed.	Email response on July 20, 2015 with new map of the sites. Added to contact list.	10
[redacted]	PIC Notice – July 9, 2015	July 20, 2015	Wanted an additional version of the map because it was unclear.	Email response on July 20, 2015 with attached maps of the sites.	11
[redacted]	PIC Notice – July 9, 2015	July 20, 2015 Email	If there is any information available from the PIC as I will be unable to attend. I am interested in the proposed water storage solution. Please keep informed.	Email response on July 20, 2015 with attached maps of the sites and description of recommended water storage solution. Added to contact list.	12
Nottawasaga Valley Conservation Authority	PIC Notice – July 9, 2015	July 21, 2015 Email	All reference sites are fully or partially located within the regulatory jurisdiction of the NVCA. Area 1 – contains wetland and associated buffer over most of the property; Area 2 – contains small portion of wetland buffer at north end of property: Area 3 – contains small portion of wetland buffer in south east corner of property; Area 4 – is completely within a wetland and associated buffer; Area 5 – contains wetland and associated buffer in central portion of property; Area 6 – contains floodplains that is likely overestimated; Area 7 – contains a small portion of wetland buffer that has been previously disturbed A permit is required for any work done within the regulated area under Section 28 of the *Conservation Authorities Act*.	Email response July 21, 2015 indicating that this information does not change our identification of Site 2 as preferred. We will keep the NVCA informed of results to ensure we follow all NVCA regulations.	13

CONTACT	DATE OF CONTACT	REPLY RECEIVED DURING PHASE 2	MAJOR ITEMS OF CONCERN COMMENTS	AINLEY'S RESPONSE & DATE	
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Identified that serious negative impacts would result from option #1 as it is across the street from the property owner. Please keep informed.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	14
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Site 1 would affect semi-retirement as well as young families. The traffic would be dangerous. Please keep informed.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	15
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Is opposed to Site 1 as it would be located near a semi-retirement community and is aesthetically unappealing. Please keep informed.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	16
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Site 2 is their preferred site. Please keep informed.	No response needed. Added to contact list.	17
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Identified that Site 1 is not preferred as it would affect home owners and truck noise is also of concern.	Response acknowledging comments mailed on October 22, 2015.	18
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Site 2 is the preferred site. Sites 3 and 4 would be the second choice as they are further from residential areas and would prevent excess traffic on Beachwood Rd. Please keep informed.	No response needed. Added to contact list.	19
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Please keep informed.	No response needed. Added to contact list.	20
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	The project should be as far away from subdivisions as possible. Site 2 looks like a good option. Please keep informed.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	21
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet with Attachment	Project must stay away from large subdivisions as there is more than enough traffic now. Site 2 is a good option as the other areas are too close to multiple residents. Please Keep informed.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	22
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Site 2 is recommended if it is not opposed by nearby residents on 75th St. Room for site expansion. Please keep informed.	No response needed. Added to contact list.	23
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Site 2 is okay as long as the proposed road happens and traffic does not go to 73rd, 74th or 75th St. Please keep informed.	No response needed. Added to contact list.	24
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Site 1 would not be a good idea as the site would cause increase noise and dust. There was no mention of a water shortage and a possibility of large tanks encroaching on the Bluewater Subdivision. Please keep informed.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	25
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Site 1 is not preferred as it is within a very short distance of the Bluewater Subdivision. Large trucks would cause noise level increases at all hours of the day. Please keep informed.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	26
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Site 1's entrance would be right across from the Bluewater Subdivision with is not recommended because of the speed of the road, noise levels would increase, lights would be on 24/7 and there would be excess congestion in area. Please keep informed.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	27
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Location 2 should be chosen as the site. Please keep informed.	No response needed. Added to contact list.	28
Mike Rawn Township of Clearview	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	The Township of Clearview is looking into options for servicing lands near the airport and also in a checkerboard subdivision known as "The Schell Fam". These properties are closer to "potential area 2" than they are Stayner. There may be an opportunity for (beneficial) cost sharing servicing agreement. Further discussions should result between Clearview and Wasaga Beach. Please keep informed.	No response needed. Added to contact list.	29
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Site 1 would be dangerous for kids and adults catching the bus. The area across the street from the Bluewater Subdivision is supposed to be residential and include a bike path. Please keep informed.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	30
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Site 2 makes sense as it causes minimal intrusion to existing residential, business and allows for future expansion. Site 1 is across from the Bluewater Subdivision and has residential zoning. The maintenance depot and water tower would have tremendous negative impacts on house values. Please keep informed.	No response needed. Added to contact list.	31
[redacted]	PIC Notice – July 9, 2015	July 22, 2015	Site 2 appears to be the best choice causing the least natural environment and the population.	Response acknowledging comments mailed on October 22, 2015.	32

CONTACT	DATE OF CONTACT	REPLY RECEIVED DURING PHASE 2	MAJOR ITEMS OF CONCERN COMMENTS	AINLEY'S RESPONSE & DATE	
		Comment Sheet	Please keep informed.	Added to contact list.	
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Thanks for the interesting and informative presentation. Please keep informed.	No response needed. Added to contact list.	33
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Site 2 seems good as it has the least impact on residential outlook. Please keep informed.	No response needed. Added to contact list.	34
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Site 2 is the preferred site. Please keep informed.	No response needed. Added to contact list.	35
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Site 2 appears to be a good option but neighbours to the east may have objections. The analysis was well presented. Please keep informed.	No response needed. Added to contact list.	36
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Site 2 should impact the least number of people especially if it could be shifted a little westward. Why is alternative 2 (water storage) not being preferred? Site 1 is not a good location as it is opposite a subdivision. A few other sites could also be located to have less impact on tax payer and homes. Please keep informed.	Email response on July 24, 2015 explained why Alternative 2 was not identified as the preferred solution for water storage.	37
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Site 2 is the most suitable for the project.	No response needed.	38
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Site 1 is the least desirable. Off Beachwood Rd. the tree buffer to residential could be increased by planting more trees. Please keep informed	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	39
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Comment Sheet	Traffic has recently increased on Beachwood Rd and people are speeding. Please keep informed.	No response needed. Added to contact list.	40
[redacted]	PIC Notice – July 9, 2015	July 22, 2015 Email	Please explain the affected area, where is the boundary? How will residents on 70th Street be affected? The map is illegible.	Email response on July 22, 2015 with a new map of the sites.	41
[redacted]	PIC Notice – July 9, 2015	July 27, 2015 Comment Sheet through email	Have a concern about the location of the storage facility and maintenance depot. Will it increase traffic? Will it be secure with a locked gateway/fencing? Will there be water problems with it being close to the Bay? Please keep informed.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	42
[redacted]	PIC Notice – July 9, 2015	July 27, 2015 Letter & Email	I would like to be informed of any discussions, reports, upcoming meetings and receive copies of any report, memos etc. prior to public works department's presentation to council.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	43
Transport Canada	PIC Notice – July 9, 2015	July 29, 2015 Email	The *Canadian Environmental Assessment Act, 2012,* requires that Transport Canada to determine the likelihood of significant adverse environmental effects on federal lands. It is the responsibility of the project proponent to review the Directory of Federal Real Property to determine if the project will potentially interact with any federal property and review the list of Acts that Transport Canada administer and assists in administering that may apply to the project.	No response needed.	44
[redacted]	PIC Notice – July 9, 2015	July 31, 2015 Comment Sheet	The storage pond should be separated from the rest of the site and implemented as a public area with walking trails. At the preferred site the entrance to the site should be on the west side of the site to remove truck traffic near current houses and so heavy equipment would not have to drive between the water tower and the pond. Please keep informed	No response needed. Adde to contact list.	45
[redacted]	PIC Notice – July 9, 2015		The map is illegible. Please keep informed.	No response needed. Added to contact list.	46
[redacted]	PIC Notice – July 9, 2015	Aug. 7, 2015 Letter	This was a cover letter for the following 11 comment sheets. Additional residents oppose the maintenance depot at site 6 but language, reading, and/or writing skills have reduced the number of comments.	Response acknowledging comments mailed on October 22, 2015.	47
[redacted]	PIC Notice – July 9, 2015	Aug. 7, 2015 Comment Sheet attached letter	Site 2 – safety, geographic, town growth, noise, land use appropriate I/we agree with the preferred location. Site 6 not safe due to children and families in the area, the noise would be a problem, the appearance would be a negative in the residential community, the tower would cause a shadow for several homes, the traffic would increase. I think the Town should meet with the site 6 property owner with the purpose of amending the zoning to permit residential. Please keep informed.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	48
[redacted]	PIC Notice – July 9, 2015	Aug. 7, 2015	Site 2 – safety, geographic, town growth, noise, land use appropriate I/we agree with the preferred location.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	49

CONTACT	DATE OF CONTACT	REPLY RECEIVED DURING PHASE 2	MAJOR ITEMS OF CONCERN COMMENTS	AINLEY'S RESPONSE & DATE	
		Comment Sheet attached letter	Site 6 not safe due to children and families in the area, the noise would be a problem, the appearance would be a negative in the residential community, the tower would cause a shadow for several homes, the traffic would increase. I think the Town should meet with the site 6 property owner with the purpose of amending the zoning to permit residential. Please keep informed.		
[redacted]	PIC Notice – July 9, 2015	Aug. 7, 2015 Comment Sheet attached letter	Supports Site 2 as the preferred location as it has minimal impact when compare to the other sites. Site 6 and 7 should be eliminated because these areas should be used for future residential and/or commercial properties. Please keep informed.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	50
[redacted]	PIC Notice – July 9, 2015	Aug. 7, 2015 Comment Sheet attached letter	Agrees that Site 2 would be the best site. Site 6 would be a bad choice for reasons such as traffic, noise and house devaluation.	No response needed.	51
[redacted]	PIC Notice – July 9, 2015	Aug. 7, 2015 Comment Sheet attached letter	I don't like anything other than houses in my area (near site 6). Site 2 is the best location. Please keep informed.	No response needed. Added to contact list.	52
[redacted]	PIC Notice – July 9, 2015	Aug. 7, 2015 Comment Sheet attached letter	No to Site 6. Site 2 is okay.	No response needed.	53
[redacted]	PIC Notice – July 9, 2015	Aug. 7, 2015 Comment Sheet attached letter	No to Site 6. Yes to Site 2.	No response needed.	54
[redacted]	PIC Notice – July 9, 2015	Aug. 7, 2015 Comment Sheet attached letter	I would prefer residential around my house not commercial or industrial. I don't like Site 6. Site 2 is a great location. Please keep informed.	No response needed. Added to contact list.	55
[redacted]	PIC Notice – July 9, 2015	Aug. 7, 2015 Comment Sheet attached letter	I don't like anything other than houses in my neighbourhood. Site 2 is the best location.	No response needed.	56
[redacted]	PIC Notice – July 9, 2015	Aug. 7, 2015 Comment Sheet attached letter	Site 6 is in a residential area. Site 2 is preferred. Please keep informed.	No response needed. Added to contact list.	57
[redacted]	PIC Notice – July 9, 2015	Aug. 7, 2015 Comment Sheet attached letter	After attending the open house I agree with Site 2 as the location will best suit present and future needs. Site 6 would be a bad choice with numerous reasons (residential property devaluation, safety, etc.)	No response needed.	58
[redacted]	PIC Notice – July 9, 2015	Aug. 12, 2015 Comment Sheet	They do not want a noise truck terminal in their area (Site 6). A truck terminal is noise and pollutes. We agree with Site 2. Please keep informed.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	59
[redacted]	PIC Notice – July 9, 2015	Aug. 19, 2015 Email	Looking for more information regarding the Ramblewood location. Why is this land not deemed residential and why is it even up for debate?	Response acknowledging comments mailed on October 22, 2015. The response provided additional information on the decision making process and property zoning.	60
[redacted]	PIC Notice – July 9, 2015	Aug. 20, 2015 Comment Sheet	We concur with the position of the engineer (Site 2). We do not want it along Ramblewood, as this area should be designated strictly residential. Please keep informed.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	61
[redacted]	PIC Notice – July 9, 2015	Aug. 21, 2015 Comment Sheet with Attachment	We oppose the maintenance depot in our neighbourhood for the following reasons: - It will be located in a historic neighbourhood and result in excess noise 24 hours a day; - The land will need to be rezoned to industrial; - Increased vehicular traffic and noise on Beachwood Road; - Serious surface drainage issues in the area which are well documented by the Town; - Effect on trees, habitat and other environmental factors; - Concerns of washing away salts in sands into our water system; - Air pollution from maintenance depot and trucks; and - The trucks, communication tower and water tower are an eyesore that should not be located in a residential neighbourhood. We do not contest the proposed water reservoir in our neighbourhood.	Response acknowledging comments mailed on October 22, 2015. Added to contact list. The response detailed the assessment that will be completed to ensure there will be no negative impact the local environment.	62

CONTACT	DATE OF CONTACT	REPLY RECEIVED DURING PHASE 2	MAJOR ITEMS OF CONCERN COMMENTS	AINLEY'S RESPONSE & DATE	
			Please keep informed.		
[redacted]	PIC Notice – July 9, 2015	Aug. 21, 2015 Comment Sheet	We agree with Site 2. We do not want it anywhere near site 6 as it would increase traffic and truck noise. Please keep informed.	Response acknowledging comments mailed on October 22, 2015. Added to contact list.	63
[redacted]	PIC Notice – July 9, 2015	Aug. 24, 2015 Comment Sheet	Site 2 is ideal because it is in a less populated area and in closer proximity to the highway allowing easy traffic flow to the Town vehicles. Opposed to site 6 because of safety issues for children (elementary school on Ramblewood). Please keep informed.	No response needed. Added to contact list.	64

7.0 Preferred Alternative Assessment

7.1 Site Assessments

Site assessments were completed to determine if the preferred site was viable for the proposed works.

7.1.1 Geotechnical Assessment

The purpose of the preliminary geotechnical investigation, completed by Peto MacCallum Ltd., was to explore the subsurface conditions at Site 2 and based on the information provide a preliminary geotechnical assessment of the subsurface conditions that would impact the following:

- Earthworks
- Foundations for buildings and elevated water tower
- Site servicing
- Pavement design

To determine the subsurface conditions, field work was conducted and 4 boreholes were completed. The boreholes varied in depth from 6.2 to 6.6m and ground water conditions were closely monitored. During the site visit standard penetration tests were carried out to assess the strength characteristics of the stratigraphy. The borehole locations were determined based off of the initial site layout and placed in locations of site structures.

The geotechnical report, “Preliminary Geotechnical Investigation – Wasaga Beach West End Water Storage Facility and Maintenance Depot” (***Appendix C***), was completed by Peto MacCallum in December 2015 to summarize the results of the geotechnical investigation. The soil encountered during the investigation was topsoil over local fill over native deposits of granular till and local cohesive till. In one of the boreholes silt was encountered below the till. No ground water or wet cave was observed in any of the boreholes during the site visit. The following comments and recommendations were made with regards to developing the site:

- Minor site grading is expected on the site as it is relatively flat. Where regrading is necessary under structures, engineering backfill must be used and all existing top soil and fill must be removed.
- The existing fill on site is not suitable for building foundations or services. Existing fill will need to be removed and replaced with engineering fill. Slab-on-grade construction can be supported on engineering fill or the native soil.
- The western part of the site appears better suited for the elevated tank as the soil consists of compact to very dense silty/sandy till. A geotechnical bearing

resistance at SLS of at least 300kPa appears to be available in the west portion of the site however the east Serviceability Limit State bearing resistance is reduced greatly to around 100kPa. It is recommended that a detailed geotechnical investigation be carried out, comprising of four additional boreholes for the elevated tank foundation.
- Site servicing will be installed in till with no bearing capacity or anticipated settlement issues.
- Additional information on excavation, ground water control and pavement design is provided in the geotechnical report.

7.1.2 Noise Assessment

A noise feasibility impact study was completed by J.E. Coulter Associates Limited to determine the potential noise impact from the proposed west end maintenance depot facility. The study also included the potential noise impacts from vehicles on the proposed Joan Avenue. The most sensitive receiver locations were identified to determine the necessary noise attenuation measures for the site.

MOECC's *NPC-300* noise criteria were followed to determine the acceptable noise levels and determine the required noise control measures. Ambient noise levels at receptor points were recorded as a base level to determine if noise attenuation is necessary. Measurements of maintenance depot noise levels were taken from the existing Wasaga Beach maintenance depot. Three scenarios were considered; the site with existing tree cover remaining in the surrounding area, the site without the tree cover and the noise levels on proposed Joan Avenue.

The first scenario identified no expected noise impact. The tree cover helped provide noise protection for the surrounding properties. The second scenario identified a need for an acoustic barrier 5.5 m high or its equivalent along the north limit of the property to meet MOECC noise criteria. Noise levels were exceeded at the receptor points along Beachwood Road. The third scenario identified no expected noise impact. The noise levels created by snowplows on Joan Avenue met the MOECC noise criteria.

The report also identified that backup beepers are not included in the MOECC criteria as they are a safety device. When the noise from backup beepers is included in the analysis, the sound generated results in noise levels exceeding the minimum MOECC criteria. To reduce the noise, current backup beepers could be replaced with a version that creates a "rushing" sound, rather than the high-pitched beep.

7.1.3 Natural Environment Assessment

A preliminary review was completed to identify environmental features at the seven Alternative Sites. The review was used to assist in the evaluation to determine the preferred site.

Following Site 2 being identified as the preferred site a scoped Environmental Impact Study was completed. The investigation included a background desktop study, consultation with the Ministry of Natural Resources and Forestry (MNRF) and the Nottawasaga Valley Conservation Authority (NVCA), and site studies. The site studies were completed throughout different seasons to properly determine existing vegetation and wildlife habitats on the site and adjacent sites. The site studies consisted of a vegetation mapping and vascular plant survey, two dawn breeding bird surveys, three whip-poor-will nocturnal surveys and a bat snag survey.

Throughout the study the following site information was identified:

- The subject property is located more than 120 m from significant wetland and is not located within an NVCA-regulated area.
- Three vegetation communities were identified on site.
    - Fresh-Moist White Cedar-Hardwood Mixed Forest Type
    - Green Ash Deciduous Swamp
    - Cultural Meadow
- No plant species of federal or provincial rarity were identified on the subject property.
- A habitat assessment of the property identified species at risk (SAR) including eastern hog-nose snake, eastern wood-pewee, red-headed woodpecker, northern myotis, little brown myotis, tri-coloured bat, and wood thrush. The habitat for these species was not Significant Wildlife Habitat and therefore there will not be significant impact on wildlife provided the recommended mitigation measures described below are implemented.
- The area will not affect Provincially Significant Wetlands, Areas of Natural and Scientific Interest, Significant Woodlands, Valley Lands, Wildlife Habitat or fish Habitat on or adjacent to the property.

The following conclusions and recommendations were made to reduce potential environmental impacts that could arise during or following the development of the site.

- All onsite workers should be notified of SAR that could potentially be found in the area. If any SAR are encountered during construction work should be stopped and the MNRF contacted.

- Sediment and erosion control should be installed along the limit of the development.
- Construction activities involving removal of vegetation should be restricted from occurring during breeding season (April 1st through August 31st).
- All proposed tree removal should be overseen by a certified arborist.
- The perimeter of the development should be revegetated with native trees and shrubs combined with native seed mix.
- The development should incorporate directional lighting to reduce light pollution within the retained woodland features.
- Efforts should be made throughout construction and operation of the development to remove invasive species within the retained wood lot and the prevention of invasive species establishment.

7.1.4 Archaeological Assessment

7.1.4.1 Stage 1 Archaeological Assessment

A Stage 1 Archaeological Assessment was completed for the seven Alternative Sites. The assessment consisted of reviewing property geography, history, previous archaeological fieldwork and current land condition to determine the potential of archaeological potential on each site.

The Stage 1 review identified elevated potential for the recovery of archaeologically significant materials within the study area. Archeological potential was determined because the study area is located in close proximity to historic transportation routes and a primary water source (Nottawasaga Bay). Sites 5, 6 and 7 and a large portion of Property 1 have been previously assessed by archaeological firms identifying no archaeological significances. Additionally, disturbances were identified within the remaining area of Property 1 and a small portion of Property 2. The archaeological assessment identified that for the remaining balance of the study area archeological concerns exist. A Stage 2 Archaeological Assessment was identified as necessary for all disturbed and undisturbed land in the study area that has yet to be assessed by an archaeological firm.

7.1.4.2 Stage 2 Archaeological Assessment

After Site 2 was identified as the preferred site a Stage 2 Archaeological Assessment was completed. The Stage 2 Assessment consisted of a more extensive review of background documents and a field assessment. A test pit form of survey was completed on the site to determine or recover anything of historical significance. A total of 1,880 tests pits were excavated to depths ranging from 10-25 cm within sandy loam soil.

During the assessment no archaeological resources were encountered on the site. From this Stage 2 Assessment no further archaeological investigation is required on the site. Before construction can take place confirmation from the Archaeological Programs Unit (MTCS) in writing indicates that all archaeological licensing and technical review requirements have been met.

7.2 Water Distribution System Assessment

A review in Wasaga Beach's WaterGEMS model updated to 2012 existing conditions was completed for the proposed west end water storage. This review included an analysis of theoretical pressures and available fire flows under Maximum Day Demand (MDD) conditions, 5 hour MDD extended period scenarios with a single point large demand to represent an emergency flow added at various locations (including a demand of 283 L/s at the proposed DAS development, the required Phase 3 fire flow per C.F. Crozier's May 2012 Functional Servicing and Stormwater Management Report, a demand of 350 L/s on Lyons Court and various demands on Waterview Road) and a 72-hour MDD Extended Period Simulation (EPS) scenario. The following variables were reviewed:

Tank Connection Location

- Connection on Beachwood Road
- Connection on Ayling Reid Court
- Dual connection at both Beachwood Road and Ayling Reid Court

Diameter of Inlet/Outlet Watermain from Tank

- 300 mm
- 400 mm

Watermain Infrastructure Improvements

- Watermain loop on Ayling Reid Court /Lyons Court
- Watermain loop on Beachwood Road west of the site

The results of the modelling exercise are presented in ***Appendix D***.

The WaterGEMS modeling review for the proposed west end storage reservoir in Wasaga Beach confirms the need for both the Alying Reid Court/Lyons Court watermain loop and the Beachwood Road watermain loop. Both of these trunk watermains are listed in the Town of Wasaga Beach 10 Year Capital Works Forecast, 2016 – 2026. The construction of both loops allow for an increase in fire flows and system pressures in the west end. The proposed west end water tower can be constructed without these connections and system pressures and available fire flows will still meet MOECC guidelines.

The modeling review and cost analysis identified that the watermain on Joan Ave., connecting the 400mm diameter watermain inlet/outlet pipe from the proposed tower to Ayling Reid Court and to Beachwood Road, be 300mm diameter.

The location of the tank connection did not have a significant impact on the pressures and fire flows however it is suggested that both connections be constructed to allow for redundancy.

7.3 Identification of Impact and Mitigation Measures

Throughout the Class EA, environmental impacts have been identified as an important part of the evaluation criteria. Environmental impacts included in the evaluation were natural, social and cultural. In addition to incorporation of environmental impacts into the evaluation criteria, site assessments were conducted by industry specialists (as outlined above) to determine the potential impacts of this project and the associated mitigation measures.

Environmental impact was identified as a significant criterion when selecting the preferred site for this project. During Phase 2 of the Class EA process the following information was reviewed.

- Natural Heritage Study
    - The Natural Heritage System map (***Appendix E***) identifies the following areas of concern
        - Area of Natural and Scientific Interest
        - Provincially Significant Wetland Complex
        - Natural Heritage System Category 1 and 2 Lands
    - Site 2 does not have any natural heritage systems located within its boundary. A small area north of the site is identified as a Natural Heritage System Category 1 and 2 Land. Through onsite natural heritage assessment, it was determined that this area is not of concern for the proposed site. During future development of the site additional assessments must be completed to determine the environmental impacts and necessary mitigation measure.
- Land Use Plan
    - The land use for the preferred site does not negatively impact the Wasaga Beach land use plan. Schedule ‘A-1’ of the land use plan (***Appendix E***) identifies the site as residential. This area will need to be rezoned to correspond to the change in land use. The change in land use will have an insignificant effect on the large amount of residential land use located in the west end of Wasaga Beach.

- Wellhead Protection Area and Vulnerable Aquifer Areas
  - The Wellhead Protection Areas and Vulnerable Aquifer Areas map (***Appendix*** E) identifies the following areas of concern.
    - Well Head Protection Area –A: 100 Metre Fixed Radius Area Capture Zone
    - Well Head Protection Area –B: 2 Year Capture Zone
    - Well Head Protection Area –C: 2-10 Year Capture Zone
    - Well Head Protection Area –D: 10-25 Year Capture Zone
    - Area of High Aquifer Vulnerability
    - Special Hydrogeological Study Area
  - Site 2 is not located in any of the areas identified on the Wellhead Protection Areas and Vulnerable Aquifer Areas map.

No environmental concerns were identified during Phase 2 of the Class EA for the preferred site. In Phase 3 of the Class EA environmental site assessments were completed. These site assessments included:

- Geotechnical Assessment
- Noise Assessment
- Natural Environment Assessment
- Archaeological Assessment

The full results of these studies are outlined in section 7.1.

Following the site assessments conducted in Phase 3 it was concluded that the site was a viable location. Information from the assessments was used to allow for mitigation measures to be incorporated into the preliminary design to reduce any negative effects on the natural, social and cultural environment in the area. Below is a list of mitigation measures that have been incorporated into the design.

Effect	Mitigation
Species Protection	- An expert on natural environment has been integral in the preliminary design and will continue to be used during detailed design to reduce or eliminate and negative effect on the natural environment - If a species is being effected by the project, off-site habitat compensation will occur - A significant tree barrier will remain around the site to allow some habitat to remain on the site - All site workers should be informed of SAR that could be found in the area. Work should be stopped and MNRF contacted if any SAR are encountered

	- Efforts will be made to remove invasive species from the site and prevent invasive species establishment
Natural Environment	- All tree removal will be overseen by a certified arborist - Sediment and erosion control will be installed along the limits of the development during construction - All disrupted areas will be stabilized with vegetation prior to the removal of the sediment fencing - Undeveloped disturbed areas will be revegetated with native trees and shrubs combined with native soil mix.
Surface Water Drainage	- A stormwater management pond (SWMP) will be constructed on the site to provide water quality and water quantity control for the maintenance depot site and surrounding land - Additional studies will be conducted during detailed design to help with existing drainage problems
Contamination of Surface Water	- There will be pre-treatment of all runoff from the site before it goes to the SWMP to ensure no water contamination occurs - The SWMP will provide additional water quality control
Residential/ Social Impacts	- The maintenance depot will be located on the south west corner of the property to provide a buffer to residential properties while still providing the residents in the west end with better water service - A tree boundary will be located around the entire site to create an additional boundary for residents. - A new entrance road will be constructed to reduce / eliminate any disruption to existing residential roads
Recreational	- Site 2 is not located near any recreational land in Wasaga Beach
Noise	- A noise barrier will be placed along the north side of the site to ensure no elevation in existing noise levels - A tree barrier will be placed around the entire site to further reduce any noise created on the site - The preliminary site layout was designed to keep heavier machinery further away from residential areas when on the maintenance depot site
Light	- Directional lighting will be incorporated into the development to reduce light pollution
Air Quality	- No additional trucks will be added to the works department fleet until it is required by population growth - With a second maintenance depot there will be a reduction in travel time for machinery and vehicles needed in the west end

7.4 Preferred Alternatives

The preferred alternatives determined during Phase 2 of the Class EA are summarized below.

7.4.1 Water Storage

Alternative 3 was identified as the preferred solution to meet the MOECC water storage requirements in Town of Wasaga Beach under full Build-Out conditions.

- 4,500m^3 elevated tank in the west end
- 4,500m^3 in-ground at Veterans Way site

7.4.2 Maintenance Depot

A review of the maintenance requirements and the existing maintenance depot in the Town of Wasaga Beach assisted in developing a list of requirements for the proposed satellite maintenance depot in the west end. The components that will be constructed at the proposed west end maintenance depot are:

- Salt/Sand Storage
- Parking
- Outdoor Material Storage
- Office Building and Garage
- Fuel Station
- Stormwater Treatment
- Stormwater Management Pond

7.4.3 Site

All viable land located within the study area was assessed for the proposed maintenance depot and water storage facility and Site 2 was identified as the preferred alternative.

PHASE 3

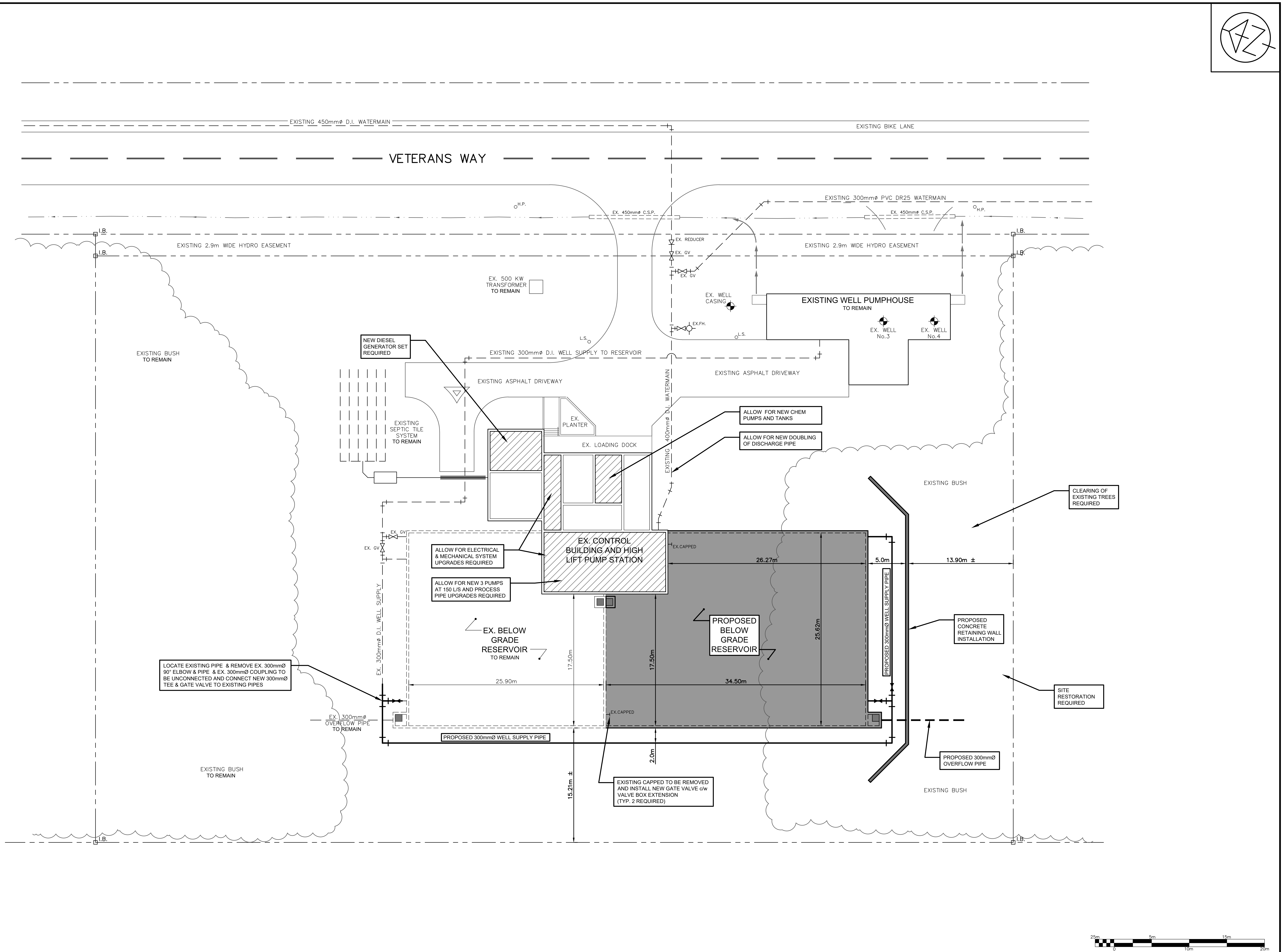
8.0 Alternative Designs

8.1 Veterans Way In-Ground Reservoir Expansion

An expansion of the existing reservoir at Veterans Way was identified as part of the preferred solution during Phase 2 of the Class EA. The existing in-ground reservoir at Veterans Way provides 3,405 m^3 of storage to the Town of Wasaga Beach's water distribution system.

A review of the existing reservoir and surrounding property was completed to determine how an additional 4,500m^3 could be incorporated on the site. A preliminary layout was developed for the 4,500 m^3 expansion at the Veterans Way (Figure 7).

Since implementation of this expansion is not imminent, additional detailed design will be developed when it proceeds to implementation.



PLOT 1=1

NOTES

NO.	REVISIONS	DATE	INITIAL

Not Valid Unless Signed And Dated

PRELIMINARY

SCALE: 1:250
DESIGN: V.E.G.
DRAWN: P.C.S.
CHECKED: R.M.
DATE: FEB. 2015

TOWN OF WASAGA BEACH
WESTEND STORAGE FACILITY & MAINTENANCE DEPOT

FIGURE 7
VETERANS WAY WATER SUPPLY WORKS
PROPOSED RESERVOIR EXPANSION

Ainley GROUP
CONSULTING
ENGINEERS
PLANNERS

CONTRACT No.
DWG. No. 114137–OP1

8.2 Water Tower Alternative Designs

8.2.1 Identification of Elevated Water Storage Types

Different types of elevated water storage have been developed and each has benefits with regard to different storage requirements. Common types of elevated water storage include spheroid, multi-column, composite and glass lined water storage.

Spheroid elevated storage consists of an elevated spherical water storage tank supported by a single circular support pedestal with a flared conical base (Figure 8). Spheroid elevated tanks are better suited for smaller volume requirements ranging between 750 to 2,000 m^3 but can be used for larger volumes as well. They have a relatively small base, therefore requiring less land than other elevated storage options. The design also allows for a reduced surface area when compared to other elevated storage options of the same volume which reduces the overall surface maintenance that is required throughout its life span.

Figure 8 – Spheroid Elevated Tank located on the East End of Wasaga Beach

Multi-column elevated storage is a traditional design that has been used for over 100 years. It consists of an elevated water storage tank that is supported by a series of support columns and cross braces. This type of storage has no interior to the support braces resulting in exterior access to the tower, which most new designs have eliminated. This design is still used as it provides an economical solution for small and medium capacity tanks (< 4,000 m^3). It provides a more efficient use of support material when compared to other elevated tower designs.

Figure 9 – Multi-Column Elevated Water Storage

Composite elevated water storage is a modern design, comprised of an elevated water storage tank supported by a large diameter steel-reinforced concrete support tower that extends vertically from a steel-reinforced concrete foundation. This style of elevated storage is the most common and typically the most economical for storage capacities greater than 4,000 m^3 because the design utilizes the valuable strength characteristics of each material. Maintenance costs are also reduced when compared to other traditional types of storage because only the tank portion of the tower requires coating. This style of tank has a life expectancy of 80 years.

Composite elevated tanks require repainting of both the inside and outside of the tank on a 20 year basis. At 20 years and 60 years no paint removal is necessary. The coating is placed on top of the existing coating of the tank. At 40 years a full removal and recoating of the tank is required. The costs of repainting are high; however with new technologies and coating materials the cost of repainting has been reduced in recent years. Some cost reduction techniques include using newer coatings that are easier to remove and non-scafolding techniques during recoating.

This style of tank has been used in the construction of the Sunnidale Road elevated tank. The Town has had to remove and repaint the tank after 22 years.

Figure 10 – Composite Elevated Water Storage

The newest type of elevated storage that is being used for municipal potable water storage is a glass lined bolted tank. This type of tank is composed of a bolted steel tank with factory applied glass-fused-to-steel coating. This type of construction has the least maintenance because it never requires repainting and requires minimal upkeep over its service life (replacement of cathode protection bars). If the tank does become damaged individual panels can be replaced which additionally reduces maintenance costs. This type of tank has a reduced construction time because the tank is constructed of factory-coated panels that do not require on site welding. A top down construction approach of the tank allows for it to be constructed in remote and environmentally sensitive areas.

Glass lined elevated water tanks are a newer form of construction. There are currently no specific standards developed for this style of elevated tank. A combination of standards is being used which may not completely cover all aspects of the product. Since these tanks are a newer form of construction the estimated life expectancy varies between different manufacturers and there is not a sufficient database to establish an industry-wide standard. In general research suggests that the bolted design reduces the life span of this type of elevated tank to approximately 40-60 years. At 40-60 years, the glass lined panels can be replaced on the same pedestal which would result in a large cost to be incurred by the Town. This style of tank is also more susceptible to damage caused by seismic activity, wind and ice due to the bolted construction when compared to welded tanks. Glass lined bolted tanks are accessed from the outside which creates additional risks when compared to traditional composite tanks that are accessed through the interior of the pedestal. The structural design of a glass lined elevated tank does not allow for interior access.

For the West End Water Storage Class EA two different designs of glass lined tanks were considered.

Composite elevated glass lined tanks are similar to traditional composite elevated tanks with a steel-reinforced concrete support tower and foundation, however instead of a traditional steel water storage tank; a glass lined tank is used. Due to the materials used in this style of construction, glass lined elevated tank panels are less versatile than traditional welded panels, resulting in the need for a larger diameter pedestal.

Figure 11 – Composite Glass Lined Elevated Water Storage

The second type of glass lined storage considered was a partially elevated glass lined composite tank. This style of tank is similar to the traditional glass lined elevated tank; however it has a shorter pedestal and provides comparatively more emergency and fire storage than equalization storage (Figure 12). Only equalization storage is used during normal system operation to maintain minimum system pressures; therefore, the large fire/emergency volume in this type of facility can result in water quality (dead water) issues as less water from the storage is regularly circulated. An adequate mixing system would be necessary to sustain water quality in the storage facility. If additional equalization volume is needed pumps would be required to increase the water pressure above the minimum acceptable level. If pumps were installed at the storage facility, stand by power would also be required. The pedestal for this type of construction is the same diameter as the tank.

Figure 12 – Composite Glass Lined Partially Elevated Water Storage

Due to the size of the tank being constructed for the Wasaga Beach project the spheroid and multi-column tanks were not further considered for this project. Both of these types of elevated tanks are better suited to water storage less than 4,000 m^3 which does not satisfy the design parameters of this project. The composite elevated tank and both styles of glass lined tanks were further examined as possible alternatives for the elevated tower to be constructed in the west end of Wasaga Beach.

8.2.2 Identification of Elevated Water Storage Alternatives

As a result of the project parameters and the above identification of elevated water storage types, the following alternatives were considered:

- Alternative 1 - Composite elevated water storage
- Alternative 2 – Glass lined composite elevated water storage
- Alternative 3 – Glass lined composite partially elevated storage

Each of the alternatives offers unique design characteristics able to meet the necessary 4,500 m^3 of additional storage needed for the Wasaga Beach west end. Alternative 1 offers a more traditional design that has already been used in the construction of the Sunnidale Road elevated tank. Alternatives 2 and 3 provide a more innovative product but with varying designs that each have their benefits and disadvantages. An extensive analysis of each type of storage is shown below. Design parameters for each alternative are outlined in Technical Memorandum No. 5A.

8.2.3 Elevated Water Storage Alternatives Cost Comparison

Capital costs and operation and maintenance costs were estimated over an 80-year life span of the three different elevated storage tank alternatives. An 80-year life span was used in the analysis as it represents the longest lifespan of the three alternatives. Estimates are based on quotes provided by industry manufacturers of composite welded and glass lined tanks. Additional operation and maintenance costs not included by the manufacturers were calculated based on similar, recently completed projects. A summary of the analysis is provided in Table 11 below and a cost breakdown is provided in Technical Memorandum No. 5A.

Table 11 – Cost Comparison of Three Different Elevated Storage Alternatives

	Alternative 1	**Alternative 2**	**Alternative 3**
Capital Cost *	$ 2,908,500	$ 2,992,500	$ 3,612,000
Operation and Maintenance Costs	$ 810,000	$ 848,000	$ 848,000
Major Maintenance Costs	$ 2,620,000	$ 1,680,500	$ 1,680,500
Total Cost	$ 6,338,500	$ 5,521,000	$ 6,140,500
Net Present Value	**$ 4,407,400**	**$ 3,944,800**	**$ 4,564,300**

*The capital cost includes just the cost of the water tower. Additional costs may result if additional features (not included in the price) are included with the water tower construction.

Costs were provided by Greatario Engineered Storage Systems and Landmark Structures. The quotes provided by each company are included in Technical Memorandum No. 5A.

The capital costs represent the upfront costs including tank construction and engineering costs. The annual operation and maintenance costs represent the yearly costs over the next 80 years including hydro, diesel generator operation, site maintenance, equipment maintenance, labour and trucks. Each of the elevated facilities will result in the same general maintenance costs as the designs of each tank result in the same upkeep requirements. Major maintenance cost represents maintenance that is not completed yearly and includes repainting every 20 years for the welded composite tank or replacement of the glass lined panels every 60 years for the glass lined tanks.

The total estimated net present value cost is a sum of all of the cost associated with the project. The net present value cost is the total cost taking into account a discount rate of 4% with 2% inflation over the 80-year period analyzed.

8.2.4 Evaluation of Elevated Water Storage Alternatives

To assess the three alternatives a criteria assessment table was developed rating each alternative as best, moderate or worst for the various criteria. Numbers associated with each rating are: worst = 1, moderate = 2 and best = 3. The total value was obtained by summing all of the criteria ratings shown in Table 12. The criteria incorporate the advantages and disadvantages of each type of elevated storage as well as the costs associated with each of the three alternatives.

Table 12 – Rating Criteria of Three Elevated Storage Alternatives

	Alternative 1	Alternative 2	Alternative 3
Land Requirement	3	3	3
Construction Time	2	3	3
Maintenance	2	3	3
Aesthetics	3	1	2
Opportunity to Create Landmark	3	2	3
Security of Supply (Need for Standby Power)	3	3	1
Water Quality *	6	6	2
Access to Storage	2	1	1
Capital Cost *	6	6	4
Long Term Operation and Maintenance Cost	1	3	3
Normal Operation and Maintenance	2	2	2
Total	**33**	**33**	**27**

*A weighting of 2 has been applied because these criteria are of higher importance resulting in ratings of worst = 2, moderate = 4 and best = 6.

From the assessment completed Alternatives 1 and 2 are the highest ranked options with a score of 33. Therefore, this evaluation identifies Alternatives 1 and 2 equally as the recommended design alternatives for this project and that both should be carried forward to Phase 5 for final selection.

8.3 Maintenance Depot Alternative Designs

The following site components have been identified as part of the proposed maintenance depot:

- Salt/sand storage
- Parking
- Outdoor material storage
- Main building and garage

Additional items that are being constructed on the same site as part of the Class EA are:

- Elevated water storage
- Storm water management pond
- Access road (Joan Avenue)

A list of requirements for the maintenance depot were developed and presented in Technical Memorandum No. 5B. These requirements were used to develop an evaluation table that identifies the preferred location of each site component (Table 13). The evaluation assists in reducing the viable site layout options and provides guidance to determine a preferred layout.

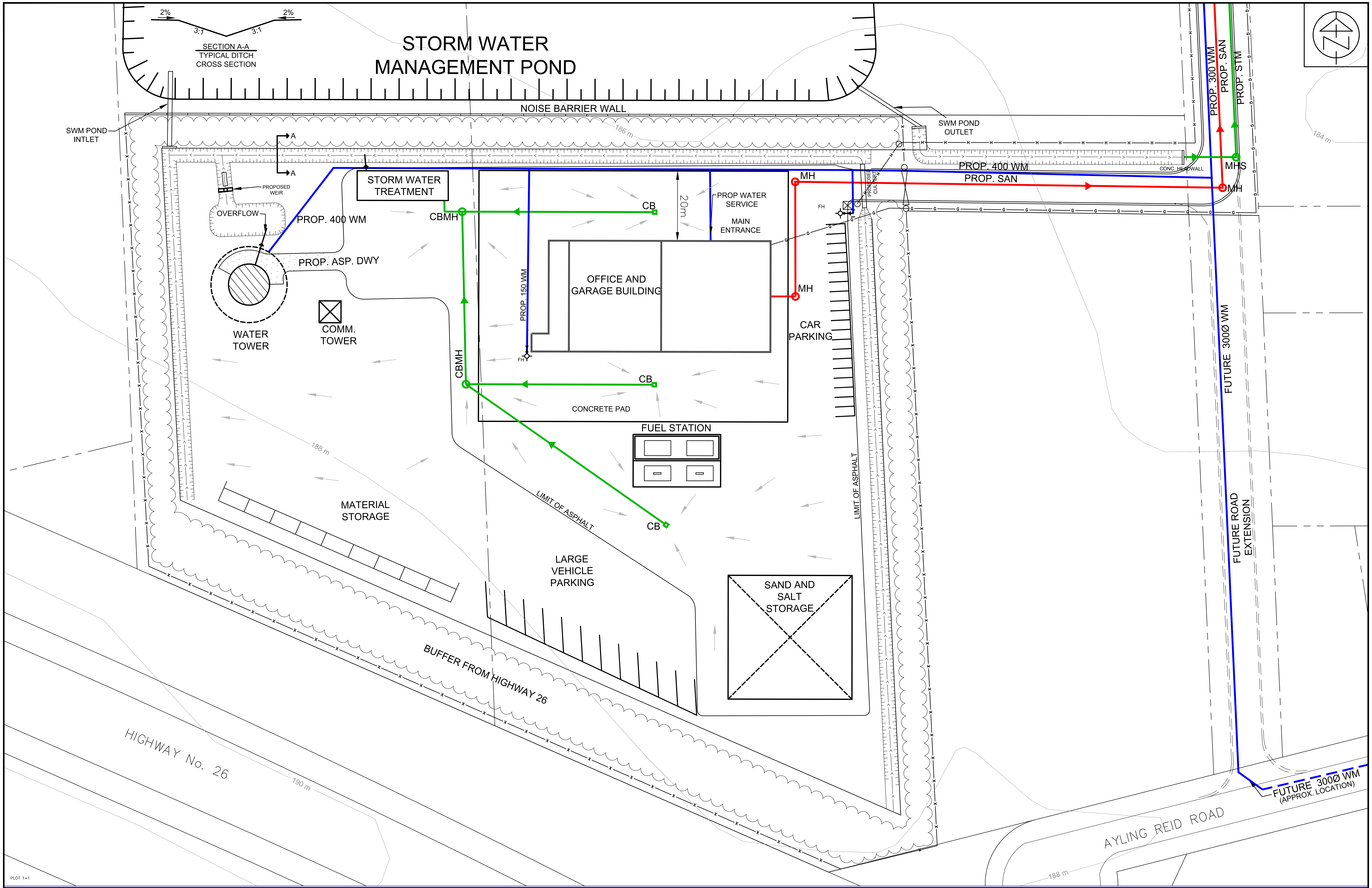
From the evaluation completed a preliminary site layout was developed. The preliminary site layout, Figure 13, allows for the best layout to address the needs of the Town.

Table 13 – Evaluation of Each Component's Location

	Northeast Quadrant	Northwest Quadrant	Southeast Quadrant	Southwest Quadrant	**Preferred Location**
Salt and Sand Storage	– Near storm water management pond, easier to contain and treat runoff ● – Too close to entrance – security concern o	– Near storm water management pond, easier to contain and treat runoff ● – Further from entrance – more secure ●	– Away from storm water management pond, harder to contain and treat runoff ◑ – Further from entrance – more secure ●	– Away from storm water management pond, harder to contain and treat runoff ◑ – Further from entrance – more secure ●	**Northwest Quadrant** *
Water Tower	– Too close to entrance – security concern o – Close to surrounding residential properties o – Close to water distribution system ● – Not ideal soil conditions o – Potential landmark for Wasaga Beach o	– Further from entrance – more secure ● – Close to potential residential properties ◑ – Further from water distribution system ◑ – Ideal soil conditions ● – Potential Landmark for Wasaga Beach ◑	– Further from entrance – more secure ● – Further from surrounding residential ● – Further from water distribution system ◑ – Not ideal soil conditions o – Landmark for Wasaga Beach ●	– Further from entrance – more secure ● – Close to potential residential properties ◑ – Furthest from water distribution system o – Ideal soil conditions ● – Landmark for Wasaga Beach ●	**Northwest Quadrant**
Office and Garage	– Easy access for public ● – Added security for site ●	– Difficult access for public o – Reduced site security o	– Difficult access for public o – Reduced site security o	– Difficult access for public o – Reduced site security o	**Northeast Quadrant**
Outdoor Storage	– Increased danger near entrance o – Reduced security of storage material o	– Decreased danger away from entrance ◑ – Increased security of storage material ●	– Decreased danger away from entrance ◑ – Increased security of storage material ●	– Decreased danger far away from entrance ● – Increased security of storage material ●	**Southwest Quadrant**
Large Vehicle Parking	– Increased danger near entrance o – Reduced security of machinery o	– Deceased danger away from entrance ◑ – Increased security of machinery ●	– Deceased danger away from entrance ◑ – Increased security of machinery ●	– Decreased danger far away from entrance ● – Increased security of machinery ●	**Southwest Quadrant**
Car Parking	– Near entrance allowing easy access ● – Keeps public away from machinery ●	– Away from entrance reducing ease of access o – Increases danger of public near machinery o	– Away from entrance reducing ease of access o – Increases danger of public near machinery o	– Away from entrance reducing ease of access o – Increases danger of public near machinery o	**Northeast Quadrant**

Evaluation Key: o – Least preferred ◑ – Partially Preferred ● – Most Preferred

*No items were identified to have a preferred location in the southeast quadrant of the property. Both the water tower and the sand and salt storage preferred locations were in the northwest quadrant. This quadrant will not be able to accommodate both items and therefore the salt and sand storage will be located in the southeast quadrant of the site. The salt and sand storage received all partially preferred or most preferred rankings in the evaluation chart for the southeast quadrant making it a suitable location.



NOTES

— — —	EXISTING WATERMAIN
- - - - - -	EXISTING SEWER
———	PROPOSED WATERMAIN
———	PROPOSED SANITARY SEWER
—H—	PROPOSED HYDRO
—X—	PROPOSED FENCE
—G—	PROPOSED GAS
○⊳⊲○	PROPOSED GATE
• • • • • • •	FUTURE WATERMAIN
▬▬▬	PROPOSED STORM SEWER
⟶	PROPOSED DIRECTION OF SURFACE FLOW
—188 m—	EXISTING CONTOUR ELEVATION
○ MH	PROPOSED MAINTENANCE HOLE
○ CBMH	PROPOSED CATCH BASIN MAINTENANCE HOLE
▣ CB	PROPOSED CATCHBASIN
FH	PROPOSED FIRE HYDRANT

The Beach is Just the Beginning...

WASAGA Beach

EXACT LAYOUT TO BE CONFIRMED THROUGH FINAL DESIGN

SCALE:	1:500
DESIGN:	R.M.
DRAWN:	J.M.M.
CHECKED:	R.M.
DATE:	FEB. 2015

TOWN OF WASAGA BEACH
WEST END STORAGE FACILITY
AND MAINTENANCE DEPOT

FIGURE 13
PREFERRED SITE PLAN

Ainley GROUP
CONSULTING
ENGINEERS
PLANNERS

CONTRACT No.

DWG. No. 114137–A2

8.4 Stormwater Management Pond Location Alternatives

Initially a SWMP was to be located on the maintenance depot site to allow for proper containment of stormwater for the site. After discussion with the land owner it was decided that a larger SWMP would be constructed to deal with runoff from the maintenance depot site and surrounding land. Several locations were discussed that would allow for different benefits to the land owner and the Town. Four SWMP locations were identified as possible alternatives. The four SWMP location alternatives are identified in Figures 14-17, respectively.

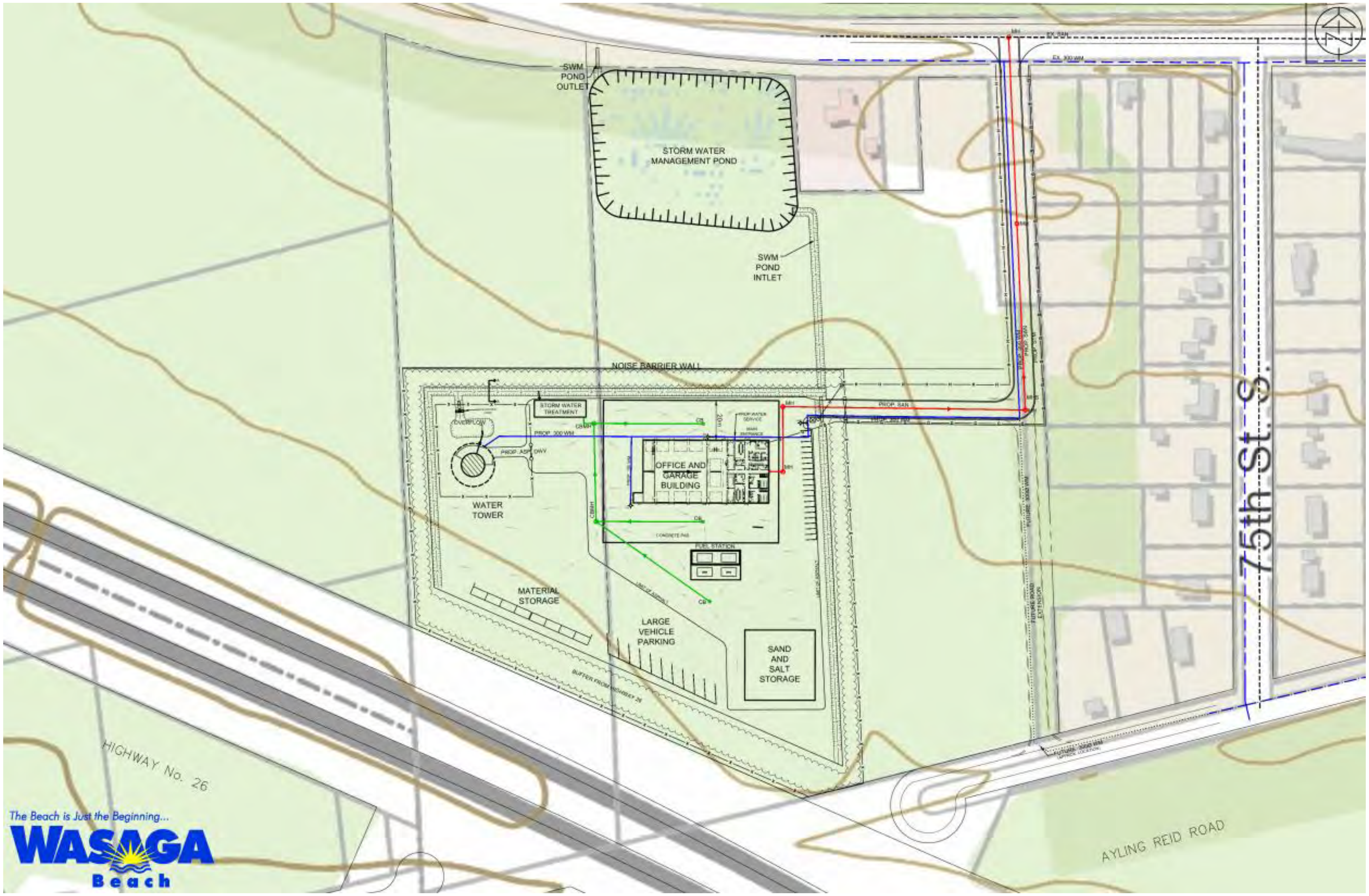


Figure 14 – Alternative 1: SWMP located in the existing wetland area.

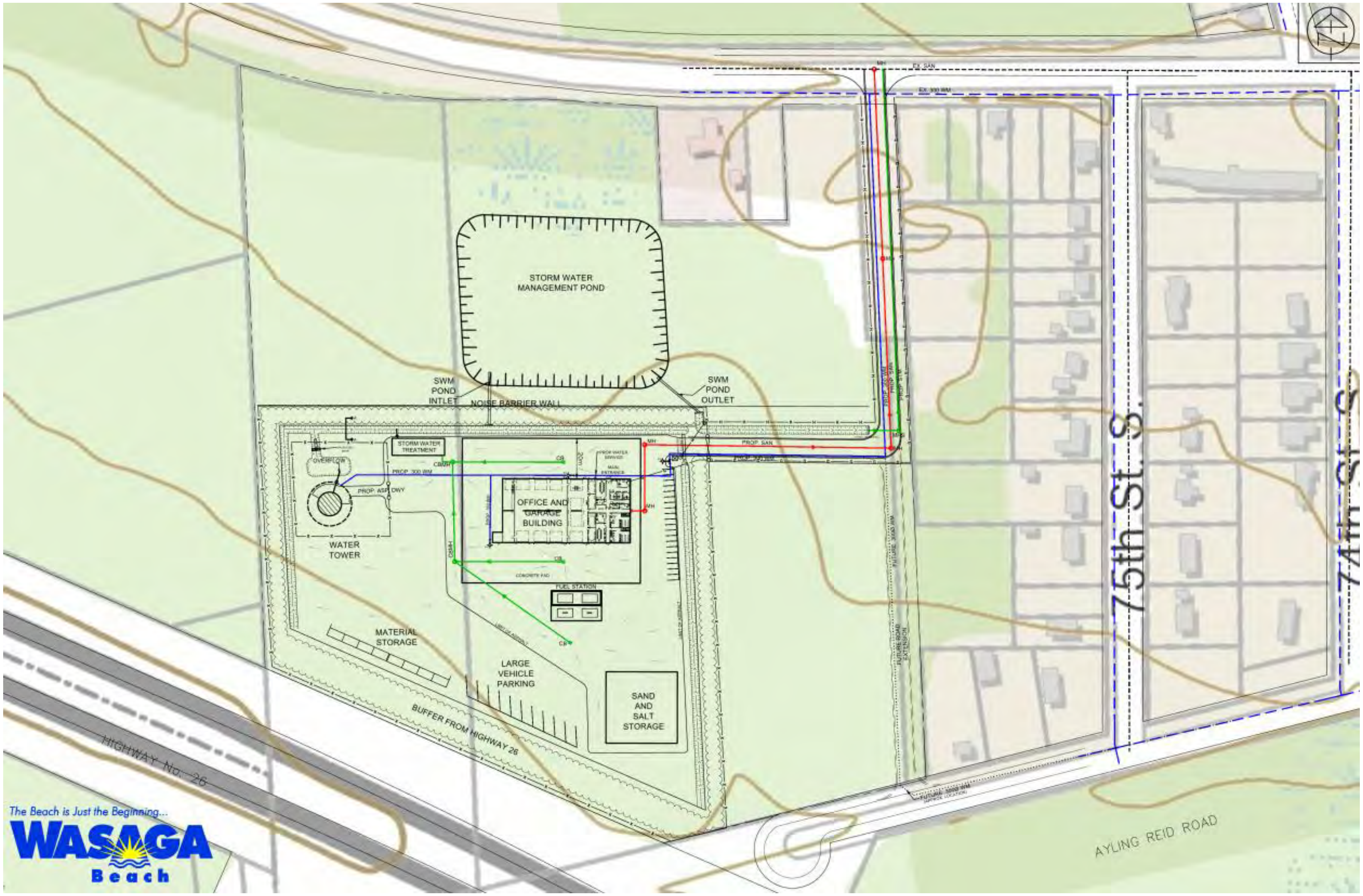


Figure 15 – Alternative 2: SWMP located south of existing wetland area.

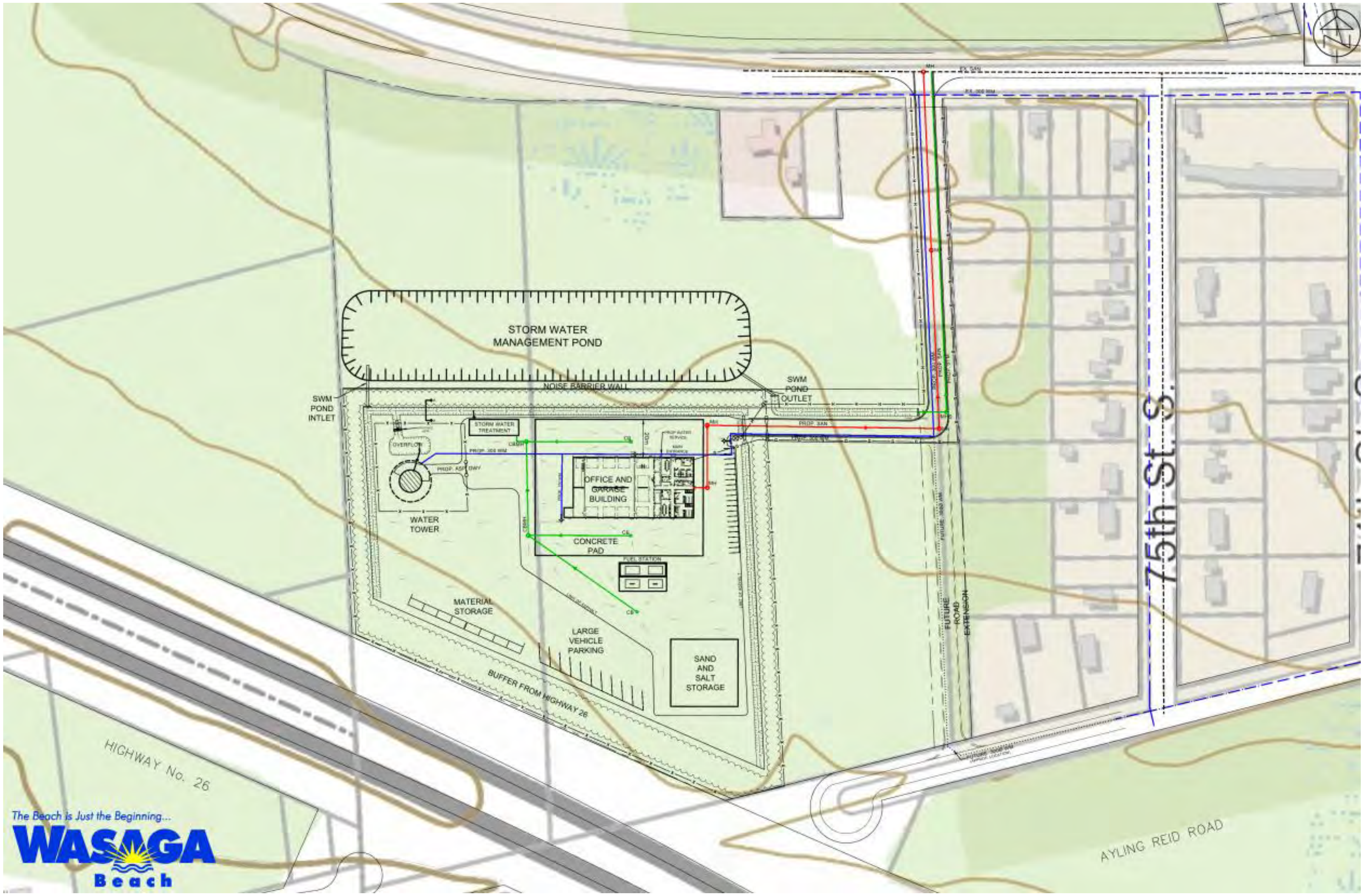


Figure 16 – Alternative 3: SWMP located along the north side of the maintenance depot site.

Figure 17 – Alternative 4: SWMP only servicing the maintenance depot and located on the maintenance depot site

A description of each alternative is presented in Technical Memorandum No. 5C. Each alternative location was evaluated to determine the preferred location of the SWMP. An evaluation table (Table 14) was developed with a set of criteria to assess each alternative. Each alternative was rated as least preferred, partially preferred and most preferred.

Table 14 – Evaluation Table of SWMP Locations

	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**
Ground water Influence Zone/ Impact to Surrounding Properties	Near properties with existing flooding problems. Could result in negative impact. o	Near properties with existing flooding problems. Could result in negative impact. o	Located away from properties with existing flooding problems, reducing potential impact. ●	Located away from properties with existing flooding problems, reducing potential impact. ●
Benefit to Entire Property	Intended to service maintenance depot site and surrounding property. ●	Intended to service maintenance depot site and surrounding property. ●	Intended to service maintenance depot site and surrounding property. ●	Intended to service only the maintenance depot site. o
Drainage Path	Drainage to culvert 16 (west of the site) where drainage issues are currently experienced. o	Drainage to culvert 17 (east of the site). ●	Drainage to culvert 17 (east of the site). ●	Drainage to culvert 17 (east of the site). ●
Best Use of Land	Incorporates the existing undefined wetland which may not be useful for development, allowing for the best use of the land. ●	Located on developable land. Remaining land left in sections making it less useful for development. ◑	Located on developable land. Remaining land remains useful for development. ◑	Only incorporates drainage for the maintenance depot site. Additional land would be required to build an additional SWMP when remaining land is developed. o
Environmental Impact	Large negative impact on existing wetland environment. o	Potential negative impact on existing wetland environment. ◑	Further from wetland reducing potential impact. ●	Further from wetland reducing potential impact. ●
Elevation of SWMP	At lowest site elevation, therefore best suited for draining entire site ●	1-2 m above lowest site elevation ◑	1-2 m above lowest site elevation ◑	3-4 m above lowest site elevation therefore least suited for draining entire Site. o
Adequate Size	Can be expanded to accommodate final design. ●	Can be expanded to accommodate final design. ●	Can be expanded to accommodate final design. ●	Only services maintenance depot site. Is not adequate to service entire site.o
Future Considerations	Incorporates drainage of future development on the site. ◑	Incorporates drainage of future development on the site. ◑	Incorporates drainage of future development on the site. Could be incorporated into drainage plan for the property to the west.●	Does not incorporate drainage of any future development. o
Rank	3	2	1	4

Evaluation Key: o – Least preferred ◑ – Partially Preferred ● – Most Preferred

The preferred alternative is Alternative 3. Alternative 3 was assessed as partially preferred or most preferred for all of the criteria. This alternative will provide the least environmental impact while providing room for future development in the area.

8.5 Phase 3 Public and Agency Consultation

A Phase 3 PIC was held on August 18, 2016 to allow public and agency consultation during this phase of the Class EA process. It was held from 7-9 pm at the Wasaga Rec Plex located at 1724 Mosley Street. To inform the public of this PIC a notice was put in the Wasaga Sun on July 28 and August 11, 2016; as well the notice was mailed to residents that have previously indicated they would like to stay informed throughout the entire project and residents located within close proximity to the proposed site. The review agencies contacted for this project were also mailed the notice to inform them about the Phase 3 PIC.

The information provided at the Phase 3 PIC included a summary of the project background, an overview of the Class EA process, a summary of Phase 2 of the Class EA, an evaluation of design alternatives and identification of the preferred design alternatives. There were 14 residents in attendance. The PIC gave residents an opportunity to have questions and concerns answered and provided the project team further understanding of the community needs with respect to this project. The Phase 2 PIC advertisement, attendance sign in sheet and PIC boards are attached in ***Appendix B***.

Comments for this phase of the Class EA were received starting from August 17, 2016 until October 4, 2016. All of the comments were reviewed and taken into consideration in Phase 3. A summary of the comments is provided in Table 15, with full comment sheets attached in ***Appendix B***.

Table 15 - Comments Received During Phase 3 of the Class EA

PROPERTY OWNER NAME & CONTACT INFO	DATE OF CONTACT	REPLY RECEIVED FROM NOTICE NOTES/DATES/ETC/	MAJOR ITEMS OF CONCERN COMMENTS	AINLEY'S RESPONSE & DATE	
Wasauksing First Nation	PIC Notice – July 28, 2016	August 17, 2016	Wasauksing First Nations advised that they would review the information and provide additional feedback.	No response required	1
[redacted]	PIC Notice – July 28, 2016	August 18, 2016 Comment Sheet	Resident of Trillium Forest identifying that at the last PIC the residents made their views known regarding the site location. The residents are pleased to see their concerns were addressed. The concerns of the site in Trillium Forest are the impacts on property value, and that truck and equipment traveling at all hours would be disturbing and cause safety issues Please keep informed.	No response required	2
[redacted]	PIC Notice – July 28, 2016	August 18, 2016 Comment Sheet	Identified the following areas of concerns: Drainage, loss of property value, return drainage to status prior to MTO Highway construction. Please keep informed.	Continued communication throughout the project	3
[redacted]	PIC Notice – July 28, 2016	August 18, 2016 Comment Sheet	The letter provided by [redacted] after PIC #1 was again provided. A summary of the letter is provided below. We oppose the maintenance depot in our neighbourhood for the following reasons: - It will be located in a historic neighbourhood and result in excess noise 24 hours a day;	Email response sent on October 4, 2016.The response identified the site investigations and mitigation measures that have been developed throughout the Class EA to prevent any negative impacts on	4

PROPERTY OWNER NAME & CONTACT INFO	DATE OF CONTACT	REPLY RECEIVED FROM NOTICE NOTES/DATES/ETC/	MAJOR ITEMS OF CONCERN COMMENTS	AINLEY'S RESPONSE & DATE	
			- The land will need to be rezoned to industrial; - Increased vehicular traffic and noise on Beachwood Road; - Serious surface drainage issues in the area which are well documented by the Town; - Effect on trees, habitat and other environmental factors; - Concerns of washing away salts in sands into our water system; - Air pollution from maintenance depot and trucks; and - The trucks, communication tower and water tower are an eyesore that should not be located in a residential neighbourhood. We do not contest the proposed water reservoir in our neighbourhood. Please keep informed.	the surrounding community.	
Wasauksing First Nations	PIC Notice – July 28, 2016	October 4, 2016	Wasauksing First Nations indicated that they do not have any concerns from their review.	No response required	5

9.0 Project Description

9.1 Preliminary Water Tower Design

During the evaluation of alternative water tower designs two alternatives were identified as preferred solutions; composite elevated water storage and glass lined composite elevated water storage. Both styles of tank provide the same function with the use of varied materials to produced different designs. Moving forward both alternatives will be identified as potential options for this project.

9.2 Preliminary Maintenance Depot Design

From examining the requirements of the Town of Wasaga Beach a list of site components was determined:

- Salt/sand storage
- Large Vehicle and Car Parking
- Outdoor material storage
- Main building and garage
- Fuel Station
- Onsite Stormwater Treatment

Additional site components include:

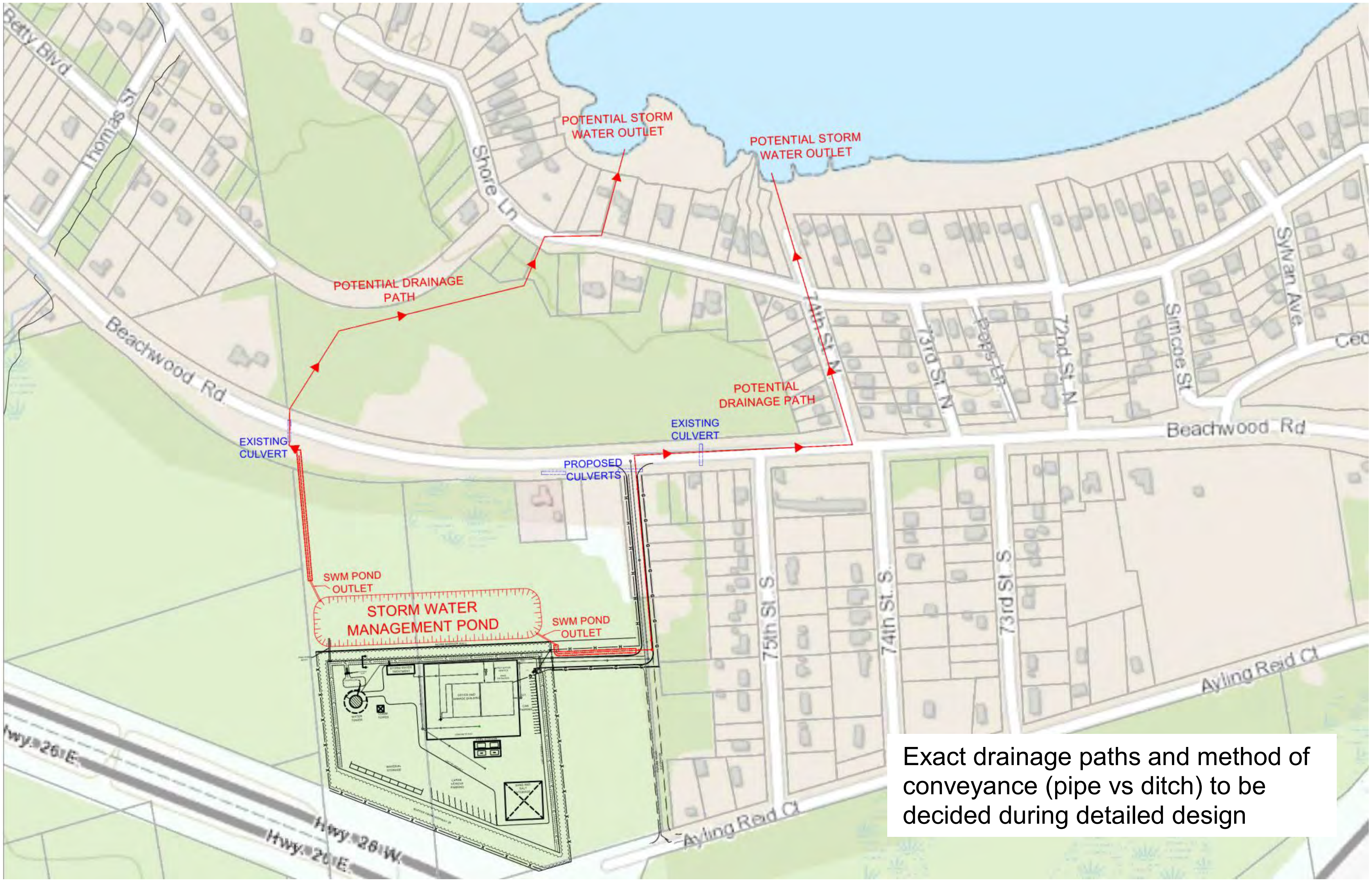
- Elevated water storage
- Storm water management pond
- Access road (Joan Avenue)

A set of criteria was developed and used in an evaluation process to determine the best location for each site component. From this evaluation process a preferred site layout was developed. The site layout is presented in Figure 17.

9.3 Stormwater Management Pond Location

The development of the preferred site will result in a change to the site drainage causing a SWMP to be required. The development will increase the amount of impermeable surface and increase runoff. The SWMP will help provide water quality and water quantity control for the maintenance depot and water tower site as well as for the surrounding land.

The preferred location for the SWMP was determined. The SWMP will be located to the north of the proposed maintenance depot and water tower site. Figure 18 shows the location of the SWMP and the possible SWMP drainage paths to Georgian Bay. The exact location and type of drainage will be determined during detailed design.



Exact drainage paths and method of conveyance (pipe vs ditch) to be decided during detailed design

Figure 18 – Stormwater Management Pond Drainage Path

9.4 Phased Site Construction

To ensure optimal site construction it has been identified that phased construction will be implemented for this site. Phased construction is a construction approach where each phase or element of design has a defined work scope and can be considered a separate project allowing design and construction phases to overlap. It also allows for each element to be completed independently of the other components.

Phased construction will allow for additional background information to be collected to make the most informed decision throughout detailed design of components that are not required immediately. Phased construction will reduce the overlapping of construction/different contractors working on site. This will result in a smoother construction phase for each component. Additionally, phased construction will reduce the initial capital costs, allowing the costs to be subsidized by development and the increasing population.

Each component of the site has different triggers resulting in its need for construction, outlined below.

Stormwater Management Pond – When the site is developed a stormwater management pond will be required to allow for proper site drainage.

Water Storage – A population increase and resulting increase in maximum day demand that causes the MOECC storage requirements to exceed the available storage.

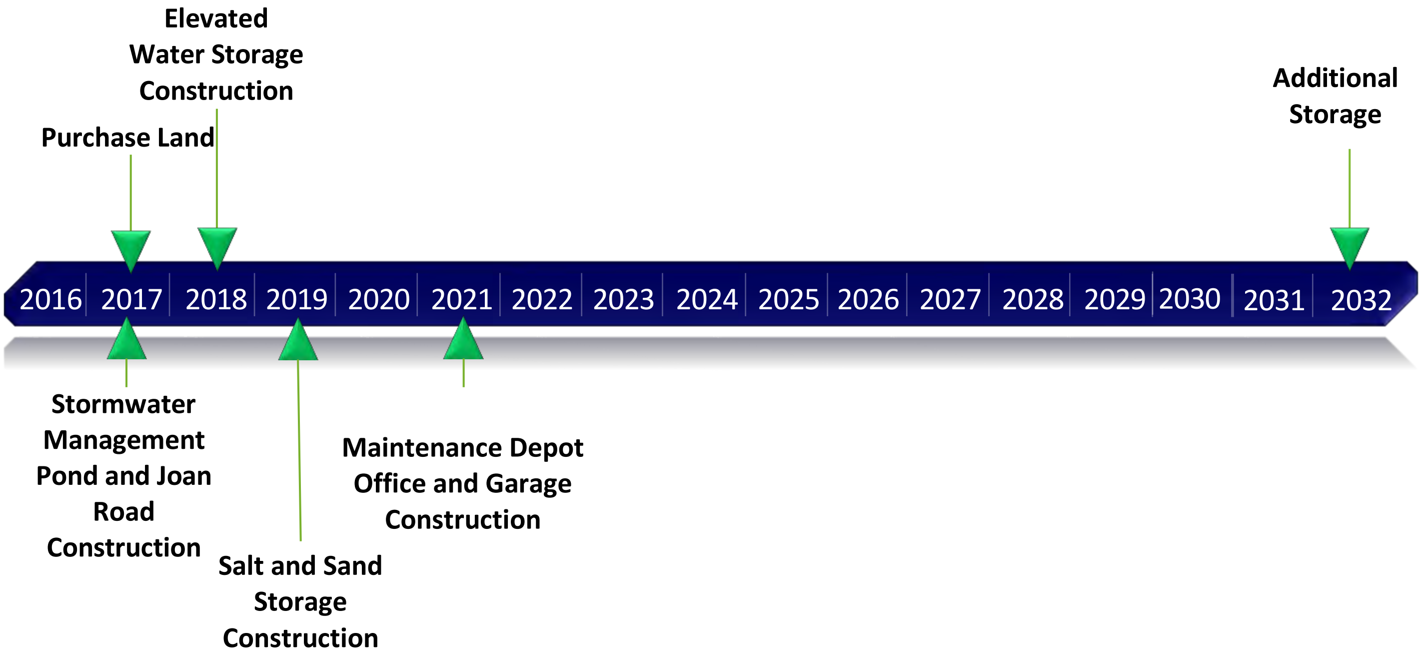
Salt and Sand Storage – An increase in development in the west end resulting in an increase of salt and sand needed during winter months.

Maintenance Depot Office and Garage – An increase in the Town's population causing a significant increase in staff needed to complete Public Works Department responsibilities.

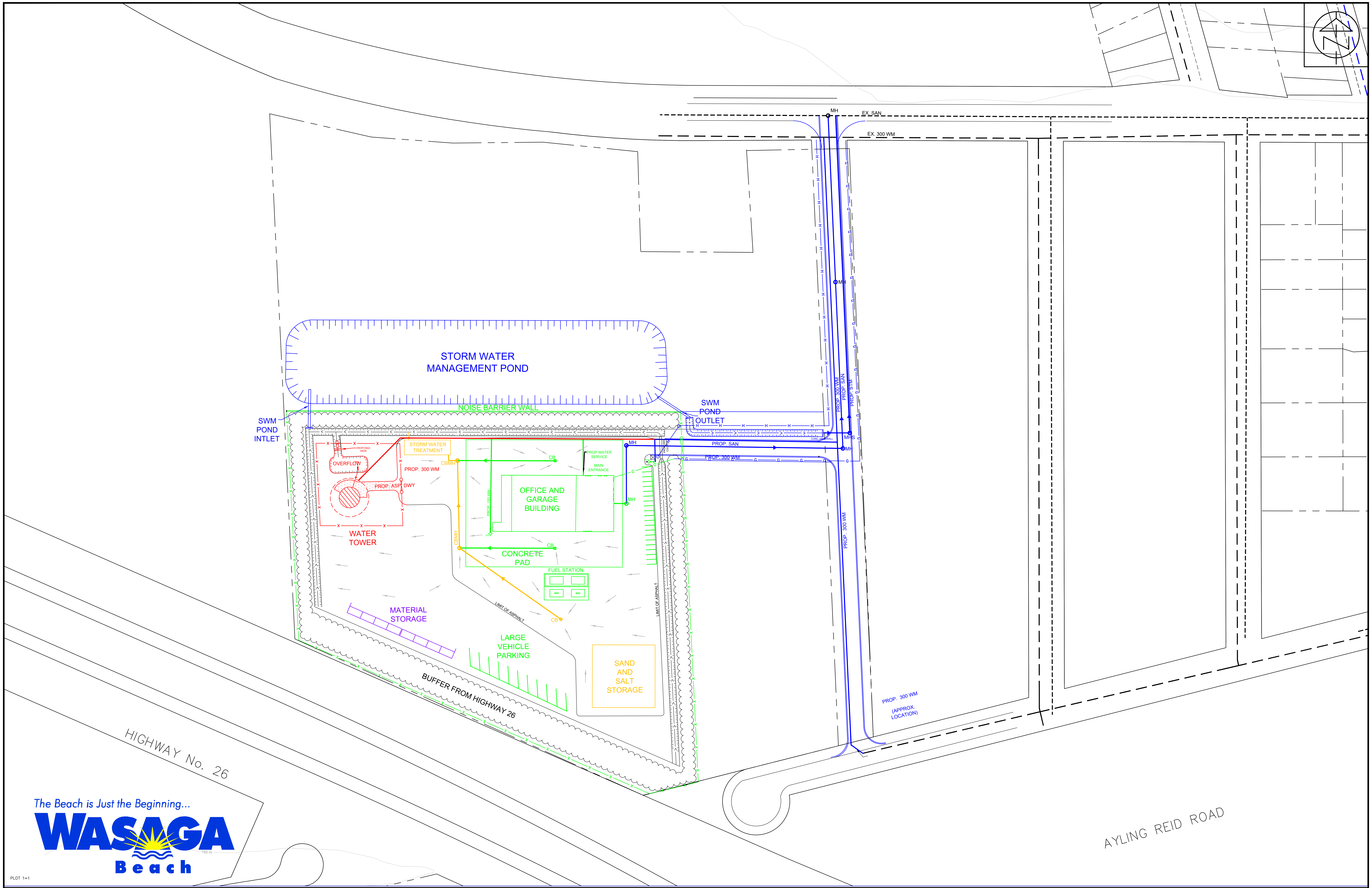
Additional Storage – Once the existing infrastructure and proposed maintenance depot storage is no longer adequate to serve the increasing population, additional storage will be required.

As outlined above each site component has a different trigger that will require it to be constructed. If the entire site was developed all together it would result in certain parts of the site remaining unused/underused. Phased construction allows for a more adaptive approach that meets the needs of the Town as it continues to grow and reach full build-out. The triggers allow for a general understanding of when each component will be necessary and in which order the site components will be developed. A timeline of when each component is expected to be required is shown in Figure 19. If the population does not increase as expected or other factors begin to play a role in the development of the site these dates may change.

Figure 19 – Timeline of Phased Construction of Maintenance Depot Site



Construction phasing was taken into account when developing the site layout to allow the site layout to be functional at each stage of the phased construction. A phased layout of the preferred site is presented in Figure 20.



NOTES

🟦	PHASE 1A
🟥	PHASE 1B
🟨	PHASE 2
🟩	PHASE 3
🟪	PHASE 4

SCALE:	1:500
DESIGN:	R.M.
DRAWN:	J.M.M.
CHECKED:	R.M.
DATE:	MAY 2016

TOWN OF WASAGA BEACH
WEST END STORAGE FACILITY
AND MAINTENANCE DEPOT

FIGURE 20
PHASED CONSTRUCTION FOR THE
PREFERRED SITE

Ainley GROUP
CONSULTING
ENGINEERS
PLANNERS

CONTRACT No.
DWG. No. 114137–A2

9.5 Study Completion Public and Agency Consultation

To inform the public of the study completion, a notice was published in the Wasaga Sun on January 26 and February 2, 2017; as well the notice was mailed to residents that previously indicated they would like to stay informed throughout the entire project and residents located within close proximity to the proposed site. The review agencies and Aboriginal communities contacted for this project were also mailed the notice to inform them about the study completion.

Following the notification of the study completion the Environmental Study Report (ESR) has been made available to the public for a 30-day review period. During the review period the public, review agencies and Aboriginal communities are encouraged to review the document and advise with the study team of any outstanding issues.

10.0 Recommendations and Conclusions

The Town of Wasaga Beach initiated the West End Water Storage Facility and Maintenance Depot Class Environmental Assessment (EA) planning process (Schedule C) to consider storage options and sites for a new water reservoir and maintenance depot that will enhance municipal services in the west end of the community. A summary of the Class EA evaluation process for each component of the project is outlined below.

10.1 Proposed Site

Throughout the Class EA an evaluation of 7 viable sites, listed below, was completed to determine the ideal site for a new maintenance depot and water storage facility in the west end of Wasaga Beach.

- Area 1 – North of George Avenue
- Area 2 –Beachwood Road, West of Joan Avenue
- Area 3 – South of Ayling Reid Court
- Area 4 – West of Lyons Court
- Area 5 – 62nd Street to Lyons Court
- Area 6 – Ramblewood Drive, East of Lyons Court
- Area 7 – East of Lyons Court, South of Bat San Drive

The evaluation criteria included land use planning, natural environment, social environment, cultural environment, technical considerations and economic considerations. Site 2 was identified as the preferred site as it has the least impact on development in Wasaga Beach with minimal impact to the surrounding area.

To confirm Site 2 as the recommended alternative, site assessments where completed during Phase 3 which included geotechnical, natural environment, archaeological, and noise assessments. The assessments confirmed that Site 2 was the preferred recommended alternative. The site assessments allowed for a list of mitigation measures to be developed to further reduce possible impacts of this project.

10.2 Proposed Water Storage Solution

Based on previous planning and hydraulic modeling work, an additional 8,840 m^3 (approximated to 9,000 m^3) of storage will be necessary based on full Build-Out projected population growth in Wasaga Beach over the coming decades. This Class EA addressed all required water storage through to full Build-Out and specifically addressed the first phase of the storage, including size, location and type of storage, in the west end.

During Phase 2 of the Class EA different storage tank types (elevated, in-ground and standpipe) were examined and four alternatives were developed.

- Alternative 1- A new 9,000 m^3 elevated tank in the West end
- Alternative 2 - A new 9,000 m^3 in-ground tank in the West end built in 2 stages (2 4,500 m^3 cells)
- Alternative 3 - A new 4,500 m^3 elevated tank in the West end and the addition of a new 4,500m^3 cell at the Veterans Way in-ground storage facility.
- Alternative 4 - A new 4,500 m^3 in-ground tank in the West end and the addition of a new 4,500 m^3 cell at the Veterans Way in-ground storage facility.

An evaluation and cost comparison was completed to determine which alternative would best serve the needs of Wasaga Beach. Alternative 3 was identified as the preferred recommended solution as it offered a cost-effective solution and incorporated the advantages and disadvantages of both storage alternatives. A preliminary design for the in-ground reservoir at Veterans Way was identified during Phase 2.

During Phase 3 an evaluation of three 4,500m^3 elevated tank design alternatives was completed. The following alternatives were assessed.

- Alternative 1 - Composite elevated water storage
- Alternative 2 – Glass lined composite elevated water storage
- Alternative 3 – Glass lined composite partially elevated storage

Both the construction of a composite elevated water storage tank (Alterative 1) and glass lined composite elevated water storage tank (Alternative 2) were identified as equally viable recommended solutions for the expansion of water storage in the west end of the

Town of Wasaga Beach and both will be carried forward to Phase 5 before one solution is ultimately selected.

10.3 Proposed Maintenance Depot Solution

The need for a satellite maintenance depot was identified because of anticipated growth and the existing location of the existing maintenance depot. Given the geographic layout and linear shape of the Town, the current maintenance depot, does not adequately support present operations. The existing maintenance depot infrastructure was catalogued to determine the needs of the proposed satellite maintenance depot.

The following components were identified as requirements for the satellite depot and were incorporated into the site layout.

- Salt/sand storage
- Parking
- Outdoor material storage
- Main building and garage

Additional components were identified as part of the Class EA and will be constructed on the same site.

- Elevated water storage
- Storm water management pond
- Access road (Joan Avenue) from Beachwood Road to Ayling Reid Court

To determine a preferred site layout a series of requirements were developed. These requirements assisted in reducing the viable site layout options and provided guidance to determine a preferred alternative. Once the preferred site layout was developed a phased construction plan was established to allow each component to be built when it is required. This construction approach will reduce the overlapping of construction/different contractors working on site.

10.4 Proposed Stormwater Management Pond Solution

The preferred site (Site 2) is a heavily treed and bushed site with natural stormwater management. To manage stormwater after development of the site a SWMP will be required to provide both water quality and water quantity control. Possible locations for the SWMP were examined and 4 alternatives were developed. The four alternatives are outlined below.

- Alternative 1 – SWMP located in the existing wetland area
- Alternative 2 – SWMP located south of the existing wetland

- Alternative 3 – SWMP located along the north side of the maintenance depot site
- Alternative 4 – SWMP only servicing the maintenance depot and located on the maintenance depot site

An evaluation of the four alternatives was completed and alternative 3 was identified as the preferred alternative. Alternative 3 was identified to have the lowest environmental impact and can incorporate runoff from future development in the surrounding area.

Following the Class EA, detailed design of each component will be required. The evaluation throughout this report presents preliminary findings. Additional assessments and surveys may be required to develop the detailed design.

Appendix – A

Terms of Reference

REQUEST FOR PROPOSALS
RFP # PW2014-07

Consulting Engineering Services for the Environmental Assessment of West End Water Storage Facility and Maintenance Depot

DATE: **Monday August 18, 2014**

TIME: **3:00 P.M. E.S.T.**

LOCATION: **The Corporation of the Town of Wasaga Beach**
Public Works Office
30 Lewis Street
Wasaga Beach, Ontario
L9Z 1A1

LATE SUBMISSIONS WILL NOT BE ACCEPTED.

DEADLINE FOR QUESTIONS (must be in writing): **Friday August 8, 2014**
4:00 P.M. E.S.T.

PROCUREMENT CONTACT: **Mike Pincivero, P. Eng.**
Manager of Engineering Services, RMO/RMI
E-mail – pwengineer@wasagabeach.com
Phone – 705-429-2540 ext. 2307
Fax – 705-429-8226

PROPOSAL SUMISSION LABEL

PROJECT NO: PW2014-07

PROJECT DESCRIPTION: Environmental Assessment for West End Water Storage Facility and Maintenance Depot

FROM: ____

TO: Mike Pincivero, P. Eng.,
Manager of Engineering Services RMO/RMI
COMPANY NAME: Town of Wasaga Beach
ADDRESS: Public Works Office
30 Lewis Street
Wasaga Beach, Ontario
L9Z 1A1

CONTACT NAME: ____
PHONE NO: ____
CLOSING DATE: ____
DATE/TIME RECEIVED:____
CLOSING TIME: ____
RECEIVED BY: ____

Table of Contents

1. Introduction

The Town of Wasaga Beach Public Works Department is soliciting proposals for the provision of engineering services relating to a Schedule C Municipal Class Environmental Assessment (EA) for provision of a new water storage facility and Public Works maintenance depot for maintenance equipment and storage at the Town's west end. The exercise shall include the EA and planning process for selection of a location and preliminary property sizing and layout requirements necessary for the water storage facility and maintenance depot.

The project will involve the understanding of the water distribution system and the requirements to enhance all aspects of the water system including but not limited to water pressure, fire flow volumes, adequate storage volume, ideal property selection (with alternatives and preliminary sizing of the property) to ensure that all aspects of operation and storage are accommodated. The project will include the preliminary design of an acceptable operations depot capable of supporting the growth in demand for municipal services that will meet current Ontario legislative requirements.

The project study area limits for potential site locations includes the area west of 58th Street to the west limit of the Town of Wasaga Beach, as shown on the map below. However, the entire Town's water distribution system is to be reviewed through the available water system model and existing available data.

The primary source of data for the water distribution system is the Town's "Ultimate Water Supply and Distribution System, 2013 Model Update". Additionally, the 2013 Water Supply

Works and Water Pollution Control Plant Capacity Allocation Update provides important information on the water distribution system.

The Town wishes to complete the EA within a reasonable timeframe as scheduled by the proponent / successful Consultant. Based on the current Town of Wasaga Beach 10 Year Capital Works Forecast, this project may proceed to construction as early as 2017/2018.

2. Definitions

The following definitions apply to the interpretation of the Proposal Document.
"**RFP**" means Request for Proposals.
"**Proposal**" means all the documentation submitted by the Proponent in response to this RFP, which has been accepted by the Town, in whole or in part.
"**The Town**" means the Town of Wasaga Beach.
"**Proponent**" means the legal entity submitting a response to a Proposal.
"**Services**" means the goods and/or services to be provided by the Consultant to the Town.
"**Consultant**" means the successful Proponent that has signed the Agreement.
"**Addenda**" or "**Addendum**" means such further additions, deletions, modifications or other changes to any Proposal Document.
"**Council**" means the elected Council for the Town of Wasaga Beach.
"**Contract**" means the most recent MEA/CEO agreement in writing, governing the performance of the Work, which has been executed by the Town and selected Consultant following acceptance by the Town for the selected Proponent's submission.
"**Work**" means the Work to be undertaken by the Consultant pursuant to the provisions of the Contract.
"**Working Day**" means Monday through Friday inclusive by excluding Saturday and Sunday and any recognized statutory holiday.

3. Background

Given the geographic layout of the Town, the current Public Works maintenance facility does not efficiently support present operations. Projected growth in demand for services will further overload the current facility and diminish current service levels.

The West End Water Storage Facility is proposed to enhance potable water delivery to accommodate all aspects of the water system including but not limited to water pressure, fire flow volumes, adequate storage volume, existing servicing and future development. In looking to the future, the Town of Wasaga Beach needs to ensure that all areas within the current Town boundary limits as well as serviced areas beyond the boundaries have the ability to be supplied by the municipal water system. As part of this enhancement, so is the provision of adequate water supply.

The 2013 Town Water Model and Water Supply Works and Water Pollution Control Plant Capacity Allocation Update, 2013 Year End Report have estimated that approximately 9,000m^3 storage volume is required for the 25 year projected system. The timing for introducing this additional storage with a west end facility is driven by proposed commercial development in the west end.

Within the study area, there are sectors of land that are privately owned and there are sectors of land that are municipally owned. The successful proponent will be required to examine all options and combinations to recommend at least three (3) alternative locations and provide a comparison matrix proving the feasibility of the locations and provide the subsequent recommended for the preferred location.

The Capacity Study and model Update will be available as reference resources to the successful proponent. In addition, the 2012 Transportation Study Update will be available as a reference along with available 'As Constructed' plan and profile drawings.

It is anticipated that the Public Works Depot will emulate the existing depot at 150 Westbury Road. Proponents may reference the site to obtain a familiarization of the existing facility with modifications to fit a smaller area if selected as the preferred location.

Minimum property required for the depot is estimated to be 1.5ha; however, this is to be confirmed during the assessment.

4. Scope of Work

The successful Consultant shall provide engineering services in accordance with the guidelines prepared by Professional Engineers of Ontario. The Consultant shall provide a detailed breakdown including time frame and associated consulting fees, for the provision of the Schedule 'C' Municipal Class EA as follows:

- Provide confirmation of the appropriate Municipal Class EA; it is noted however that although this assignment may qualify as a Schedule 'B', the Town has opted to enhance the level of public consultation and elevate the project to a Schedule 'C' to address potential concerns with the maintenance depot site activities
- Consult with Town to develop a comprehensive evaluation framework
- Completion of the Environmental Study Report, phase by phase, from start to finish, including but not limited to the following tasks:
  - Arrange and attend Project Initiation meeting
  - Review background information to identify volume, pressure and system requirements
  - Develop a conceptual layout(s) for a cost effective, environmentally conscious and operationally efficient depot, ensuring that full operations will fit the site.
  - Provide options for water storage facility locations and their evaluation comparisons of the pros and cons of each location
  - Provide piping and infrastructure cost estimates and associated phasing for construction installation
  - Provide private property acquisition estimates based on the various alternatives

  - Examine routes and provide alternative solutions for the conveyance of the potable water with regard for the Town's 10-Year Capital Works Forecast maps (available on the Town's website)
  - Consult the NVCA and DFO with regard to the proposed locations of the water storage facility
  - Emphasise the utilization of existing Municipal property / limiting cost for property acquisition and 'outside the box' options
  - Prepare a Notice of Study Commencement, outlining the need for the storage facility and works depot at the west end
  - Prepare a Communication Plan including but not limited to review agencies, public interest groups, First Nation groups, conservation authorities and surrounding land owners and review any comments received
  - Provide assessment of the water storage facility and maintenance depot location with regard to natural environment, geotechnical impacts, floodline identification, topographical analysis
  - Determination if there is any archaeological assessment required
  - Preliminary assessment of existing infrastructure
  - Coordinate meetings with Town staff to discuss options and alternatives and prepare a summary of meeting discussions
  - Prepare for Public Information Centres and prepare a summary for each PIC including comments received
  - Record and address all public and agency comments
  - Discuss with Town staff the preferred solution
  - Prepare and submit all documentation required for all planning processes in the Class Environmental Assessment
  - Identify facility location and layout options for each option
  - Determine the limits of property requirements for acquisition to accommodate the proposed layout
  - Review property acquisition requirements (Town owned property / property purchase) to accommodate the selection of a preferred site of adequate size for future expansion
  - Contact applicable agencies as required including but not limited to:
    - Ministry of Natural Resources
    - Ministry of Culture,
    - Nottawasaga Valley Conservation Authority
    - Federal Department of Fisheries and Oceans
    - First Nations Groups
    - Ministry of the Environment
    - Director of Public Works
  - Submit the Draft Environmental Study report and the Final report following completion of the Environmental Assessment
- Provide the Town of Wasaga Beach with a list of viable alternatives including but not limited to the following:
  - multiple alternative or combination solutions
  - recommendation of the preferred alternatives

  - recommendation of the preferred location for a combined water storage facility and operations depot
- Provide three (3) potential, conceptual Site Plan layouts for the site at the preferred location, including benchmark cost estimates for each layout

The successful Consultant will need to confirm that the design of the facility addresses the following:

West End Water Storage Facility

- Adequate commercial fire flow volumes, pressure and storage requirements are met
- Existing watermain infrastructure requirements and capabilities
- Future watermain infrastructure requirements to attain adequate water volume and pressure, including a phased construction program
- Determination of whether a reservoir or an elevated tower is the preferable option
- Offer new technology options for system operation optimization
- Confirmation / recommendation of estimated property size of approximately 0.7 hectares for the storage facility plus an option to accommodate a future west end Town works depot requiring an additional 1.3 to 1.8 hectare area, resulting in an ultimate area of approximately 2.0 to 2.5 hectares
- Determining the ultimate location for the storage facility that will best suit immediate and future needs
- Consider the filling / emptying characteristics of the storage facility based on the selected location, with consideration of a tower versus at-grade reservoir
- Examine the possibility of the storage facility acting as an entry feature to the Town
- Assess the environmental impacts of the preferred site while maintaining environmental best practices

Public Works Maintenance Depot

- Develop and evaluate solutions for a long term operations depot and maintenance facility
- Complete servicing of the facility (water, sanitary, storm, hydro, gas, telephone, cable etc…)
- Stockpiling of granular supplies, construction materials, appurtenances
- Salt storage dome with storm water runoff containment and treatment
- Construction equipment storage and parking
- Noise abatement measures applicable for residential protection
- Traffic impact on adjacent streets
- Air quality assessment, storm water management (quantity and quality) of the site
- Terrestrial, aquatic and wildlife assessments
- Archaeological assessment
- Office space, reception area, meeting and training space, filing and storage
- Lunch room, locker room, mud room, dispatch area, washrooms and shower facilities, utility areas and consideration for all health and safety factors

- Fleet storage and parking including maintenance bays, wash bays, parts and tools storage, small equipment and machinery storage, indoor heated parking, external vehicle parking
- Above ground fuel tanks complete with spill containment system
- Transit vehicle storage, transit operations office
- Operations and operating hours: 24 hours a day, seven days a week
- AODA compliant

Proponents are advised that the Town will complete a consultant / project evaluation at the end of the exercise to gauge the Consultant's performance on deliverables, schedule, quality control, cost control, etc.

5. Deliverables

The consultant shall see the Class Environmental Assessment through to completion.

The consultant shall provide the Town a preferred location through the use of an evaluation matrix comparing all suggested site locations and recommending a preferred site location.

The consultant shall provide the Town with three (3) site plan concepts for the preferred site selected, including benchmark cost estimates for each layout.

All submissions shall include a minimum of two (2) hard copies of drawings and documents for the Town's review or record. Final submission shall include one (1) digital copy of final drawings (drawings in both geo-referenced AutoCAD (unlocked) and Adobe Acrobat (.pdf) formats) and final documents in both Microsoft Word (.doc) and Adobe Acrobat (.pdf) formats.

All design drawings shall be in accordance with the Town's Engineering Standards, which is available for download from the Town's website.

The successful Consultant will be responsible for preparing minutes of meetings and summary reports related to Public Information Centres to accommodate the following proposed project schedule with meetings:

- Project Team Meeting #1 – Start-up meeting
- Public Works Committee (End of Phase 1)
- Project Team Meeting # 2 – Pre-PIC # 1 Meeting (Phase 2)
- Project Team Meeting # 3 – Post-PIC # 1 Meeting (review results from PIC and confirm preferred solution (Phase 2)
- Public Works Committee (End of Phase 2)
- Project Team Meeting # 4 – Pre-PIC # 2 Meeting (Phase 3)
- Project Team Meeting # 5 – Post PIC # 2 Meeting (review results from PIC and preferred design concept (Phase 3)
- Project Team Meeting # 6 – Draft ESR Meeting

- Public Works Committee (ESR, End of Phase 4)

6. Information for Proponents

6.1. Proposal Submission

6.1.1. Proposal Content

The Proponent shall confirm a clear understanding of the work to be undertaken as described in the scope of work. The proposal must demonstrate that the consultant and its team have recent and significant experience with this type of work.

When noting examples of experience gained on similar projects, the proposal must also note which current staff members worked on that project and what their role was. The proposal must specifically address all requirements of the work and any matters related to its successful implementation. The proposal must indicate what role each of the consultant's team will be carrying out for the project.

The Proponent may not substitute the project team members noted in the proposal without permission of the Town.

When proposing a schedule, the consultant must also indicate that their workload is such that they will have time to complete the project as promised. If the consultant is very busy, they should either decline the work or propose a longer schedule at the time of the RFP submission.

Proposal content shall include the following minimum information:

- List of personnel to be assigned to the project with their related qualifications (CV's not required) identifying experience with water reservoirs and operations depots;
- Description of understanding of Town of Wasaga Beach project requirements;
- List of sub-consultants to be engaged for the project;
- Work program including but not limited to:
    - General approach, project objectives and issues;
    - Detailed work program; and
    - Deliverables.
- Schedule of project tasks and total duration in GANTT chart format identifying critical path items; and
- The technical part of the proposal shall include the following section:
    - Table of Contents
    - Work Plan and Schedule
    - Project Team
    - Experience with Similar Projects

6.1.2. Pricing Information

The pricing shall be clearly marked “Pricing Information” within the proposal document, and include the following:

- Hourly billing rates for each person to be assigned to the project and breakdown time estimates for each (NOTE: hourly billing rates shall be consistent with the rates identified in each Proponent’s Rate Bid Form provided under RFP# PW2014-07)
- Estimate of billable expenses
- Maximum or Upset Fee(s) for each task of the Environmental Assessment
- Indicate time and costs for any proposed sub-consultants (i.e. survey, geotechnical, archaeological, fisheries etc.). The lump sum or unit price quoted for each Deliverable and Service will form the basis of payment. The summation of prices quoted for all Deliverables and Services will constitute the "Maximum Ceiling Price". **The Totals should not include HST**. A separate sealed envelope is **not** required for the pricing information.

Proponents are advised that the Town’s budgeted amount for this Environmental Assessment is $150,000.

Proponents shall detail allocated budgets related to geotechnical investigation, noise assessment, archaeological assessment and Environmental Impact Study(s) for the project.

6.1.3. Alternative Proposal

The Proponent may submit one or more Proposals as a solution with the Town’s requirements. However, each alternate Proposal shall be submitted on the formal proposal document and in a separate envelope supplied for this purpose and the words “Alternative Proposal” shall appear on the envelope.

6.1.4. Address for Submission and Proposal Submission Deadline

Four (4) copies of the proposals shall be delivered in a sealed envelope marked “Environmental Assessment of West End Water Storage Facility and Maintenance Depot”, not later than the Proposal Submission Deadline of:

3:00 P.M., Monday August 18, 2014 to:

Mike Pincivero, P. Eng., Manager of Engineering Services, RMO/RMI
Town of Wasaga Beach
30 Lewis Street
Wasaga Beach, Ontario
L9Z 1A1
Phone: (705) 429-2540 ext. 2307
Fax: (705) 429-8226
Email: pwengineer@wasagabeach.com

6.1.5. Hard Copies

Four (4) copies of the proposal shall be submitted. All proposals must be in hard copy form. No facsimile transmissions or emailed proposals will be accepted. However, amendments to the original document will be accepted by facsimile or email, if received before the Proposal Submission Deadline. Originals must be forwarded to the above address so that they may be attached to the original hard copy for validity.

6.1.6. Late Submissions

The date and time of receipt of a Proposal shall be the date and time indicated by the Town's date and time stamped on the Proposal. Under no circumstance will proposals received after the Proposal Submission Deadline be accepted.

6.1.7. Proposal Revision

Any changes or revisions to this RFP will be issued to all proponents in writing as a formal addendum to this RFP. Prior to the Proposal Submission Deadline, the Town may modify any provision or part of the RFP at any time upon notice in writing to the proponents, if a reasonable time is allowed by the Town for the proponents to respond to such modifications including, without limitation, the opportunity to make any necessary revisions to their respective proposals.

6.1.8. Proponent Contact

Each Proponent shall designate in their Proposal the name of the Contact to who any additional information deemed relevant to the RFP may be communicated.

6.1.9. Request for Clarification

Any proponent who has questions as to the meaning or intent of any part of this RFP or of the project, or who believes this RFP contains an error, inconsistency or omission, should submit a request for clarification. All requests for clarification or inquiries concerning this RFP should be forwarded in writing no later than Friday August 8, 2014 to the Town representative identified below:

Mike Pincivero, P. Eng., Manager of Engineering Services RMO/RMI
Town of Wasaga Beach
30 Lewis Street
Wasaga Beach, Ontario
L9Z 1A1
Phone: (705) 429-2540 ext. 2307
Fax: (705) 429-8226
Email: pwengineer@wasagabeach.com

Responses to all requests for clarification will be provided by the Town in writing to all proponents.

6.1.10. Review and Evaluation Criteria

The details of each proposal will be kept confidential by the Town. The recommendation to Council of the Town will be based on the following criteria and evaluated utilizing a standard weighed score evaluation form:

Criteria	Maximum Points
Quality and Completeness of Proposal	**10%**
Experience with Similar Projects	**20%**
Value Added Service	**10%**
Project Understanding/Methodology	**20%**
Project timing and schedule	**10%**
TOTAL TECHNICAL COMPONENT	**70%**
COST / FINANCIAL COMPONENT	**30%**

Proponents are advised that proposals will be evaluated solely on the basis of information submitted in accordance with the request for proposals. The Town reserves the right, if deemed necessary, to short-list the proposals and to request an additional verbal presentation from each short-listed proponent. The Consultant may supplement their presentation with a summary in written format to clarify points raised during the process.

Proponents are also advised that the cost / financial component for each proposal will be based on the proposed maximum ceiling price compared with the Town's budgeted amount ($150,000) and compared with other proposals based on a proportionate linear regression.

The Town reserves the right to reject any or all proposals and not necessarily to accept the lowest priced proposal. The Town also reserves the right to waive formality or technicality in any proposal.

An award recommendation will be based on merit, relying on the information in the proposal and presented to Council of the Town for approval.

6.1.11. Time Table

The following dates are tentative and are subject to change without penalty to the Town provided that all Proponents are given written notice of the change.

Activity	Date/Deadline
RFP Posting Date	July 25, 2014
Clarification Submission Deadline	August 8, 2014
Deadline for Issuing Addenda	August 13, 2014
Proposal Submission Deadline	August 18, 2014
Recommendation to Public Works Committee	September 4, 2014

Activity	Date/Deadline
Anticipated Award Date following Council Resolution	September 9, 2014
Anticipated Project Start Date	September 15, 2014
Anticipated Project Completion Date	(as established by the proponent / consultant)

6.2. Execution of Contract

6.2.1. Selection of Proponent

The Town anticipates that a Proponent will be selected by the Town within thirty (30) Calendar Days of the Proposal Submission Deadline. Recommendation for the selected Proponent shall be made to the Public Works Committee at the September 4, 2014 meeting, which will require adoption by Council at the September 9, 2014 monthly meeting.

Notice of selection by the Town to the selected Proponent will be in writing. The selected Proponent shall execute the Agreement presented to the successful Proponent and satisfy any other applicable condition of this RFP within seven (7) Calendar Days of notice of selection.

6.2.2. Failure to Execute Agreement

In the event that a selected Proponent fails or refuses to commence the Agreement or satisfy any other applicable condition within seven (7) Calendar Days of notice of selection, the Town reserves the right, in its sole discretion, to cancel the award and award the contract to another Proponent, not to accept any Proposal, or to issue a new RFP, and the defaulting Proponent shall be liable for all losses, damage, costs and expenses (including consequential losses and damage, and legal fees) suffered or incurred by the Town as a direct or indirect result thereof, including but not limited to any increase in the price of performance over the price submitted by the defaulting Proponent in its Proposal.

6.3. General Information

6.3.1. Right to Accept or Reject

The Town reserves the right to reject any and all Proposals, whether or not completed properly and whether or not they contain all required information.

The Town may request clarification where any Proponent's intent is unclear and may waive or request amendment where, in the opinion of the Town, there is a minor irregularity or omission in the information that has been submitted in a required document.

The Proponent understands and agrees that the Town may, if deemed necessary, verify any information provided in any Proposal. If there is any evidence of misleading or false information having been submitted, the Town may, in its sole discretion, reject the Proposal.

6.3.2. Ownership and Copyright

All materials and information prepared, conceived or produced and delivered to the Town in the preparation of the Proposal and the negotiation and performance of any Agreement by the Proponents shall be the sole property of the Town.

6.3.3. Irrevocable Response

The Proposal submitted is irrevocable by the Proponent following the Proposal Submission Deadline and will remain in effect and open for acceptance by the Town for a period of ninety (90) Calendar Days only, unless all Proponents explicitly agree to extend their financial proposal(s) for a longer period. Otherwise, all Proponents may be requested to resubmit Financial Proposal.

6.3.4. No Liability for Expenses or Damages

The Town will not be liable for any loss or damage suffered by any Proponent including, without limitation, any expenses incurred in the preparation and submission of the Proposal.

6.3.5. Confidential Responses

The Town will consider all Proposals as confidential, subject to the provisions and disclosure requirements of the Freedom of Information and Protection of Privacy Act R.S.O., 1990, c.F.31, as amended. The Town will, however, have the right to make copies of all proposals received for its internal review process.

6.3.6. Bribery/Fraud

Should any prospective Proponent or any of their agents give or offer any gratuity or attempt to bride any employee of the Town or attempt to commit fraud, the Town shall be at liberty to cancel the prospective Consultant's submission or contract.

6.3.7. Conflict of Interest

Each Proponent shall declare in their Proposal, any situation which may be a conflict of interest or that may appear as a potential conflict of interest in submitting a Proposal.

6.3.8. Insurance

The Consultant shall, at his own expense, obtain and maintain until the termination of the contract, with insurers acceptable to the Town, the following insurance, and provide evidence thereof:

1. Comprehensive general liability insurance on an occurrence basis for an amount of not less than Two Million Dollars ($2,000,000) and shall include the Town of Wasaga Beach as an Additional Insured with respect to the Consultant's operations, acts and omissions relating to his obligations under this Agreement, such policy to include, but not be limited to, non-owned automobile liability; personal injury; broad form property damage; blanket contractual liability; contingent employers' liability; and, cross liability and severability of interest clauses.

2. Automobile liability insurance for an amount not less than Two Million Dollars ($2,000,000) on forms meeting statutory requirements covering all licensed vehicles used in any manner in connection with the performance of the terms of this Agreement.
3. Professional liability Insurance in an amount not less than Two Million Dollars ($2,000,000) per claim covering losses arising out of an insurable error or omission in the rendering of, or failure to render, professional services in connection with this Agreement.

The Consultant shall be entirely responsible for the cost of any deductible that is maintained in any insurance policy.

The polices shown above shall be endorsed to provide the Town with not less than Thirty (30) Days written notice of cancellation, change or amendment restricting coverage.

The Consultant shall not commence work under this Contract until such time as evidence of insurance has been approved by the Town. The Consultant shall provide evidence of the continuance of this insurance at each policy renewal date for the duration of the Contract.

The Town reserves the right to request such higher limits of insurance or other types of policies appropriate to work as the Town may reasonably require.

6.3.9. Workplace Safety and Insurance Board

The Consultant shall submit to the Town, prior to the issuance of the Consultant's last payment of each year and at any other time when requested to do so, a statement from the Workers' Safety Insurance Board that all of the assessments the Consultant or any Sub-consultant is liable to pay under the Worker's Safety Insurance Board Act of successor legislation have been paid.

6.3.10. Occupational Health and Safety

The following requirements and conditions shall be included in all Agreements with Proponents (and Sub-Proponents) engaged by on behalf of the Town:

- Proponents with known poor safety records or with inadequate qualifications or equipment shall not be considered for award.
- Proponents acknowledge that they have read and understood the Occupational Health and Safety Act OHSA (R.S.O. 1990 C. 01) and regulations made under that statute.
- The Consultant shall comply with all health and safety requirements established by the Occupational Health and Safety Act and Regulations, the Town and any applicable industry standards. The Proponent shall agree to assume full responsibility for the enforcement of the same.
- The Consultant shall participate in a pre-project meeting to verify his full understanding of the major contractual requirements and expectations in the area of health and safety before the start of any work.

- The Consultant shall understand that his performance shall be monitored and that his overall performance shall be a major consideration for future contracts with the Town. The frequency and detail of ongoing project monitoring shall be dependent on the nature of the work and safety precautions specified.
- The Consultant shall allow access to the work site on demand to representatives of the Town.
- The Town shall take all action necessary to support the Consultant's health and safety efforts and to ensure that the Town-owned and controlled environments in the vicinity of the project are free of hazards.
- The Consultant acknowledges and agrees that any breach or breaches of health and safety requirements, whether by the Consultant of any of his Sub-Consultants, may invalidate the Contract.
- The Consultant acknowledges and agrees that any damages or fines that may be assessed against the Town by reason of a breach or breaches of the OHSA by the Consultant or any of his Sub-Consultants shall entitle the Town to offset the damages so assessed against any monies that that Town may from time to time owe the Consultant under this Contract or any other Contract whatsoever.

The Consultant shall have a clearly defined safety plan/rescue plan for his workers involved in hazardous activities. This plan shall include, but not be limited to, procedures for entering a confined space on the worksite, traffic control for surveying, etc.

The Consultant agrees at all times to comply with the Occupational Health and Safety Standards in the workplace and further agrees to adhere to Health and Safety Standards set out in applicable statutes and regulations and to comply with written Health and Safety Policies of the Town.

6.3.11. Payment Terms

The Town shall pay the successful consultant on a monthly basis upon review and acceptance of monthly invoices complete with explanation of works completed, up to a maximum amount of the "Maximum Ceiling Price" as identified in the proposal.

Engineering fees are not based on a percentage of the construction costs; therefore the approved upset prices will not be changed due to the final construction costs being different from the current budget estimate. A change in the fees may be considered only if the scope of the engineering work is changed at the request of the Town's Director of Public Works or designate. No additional payments will be considered unless authorized in writing by the Town.

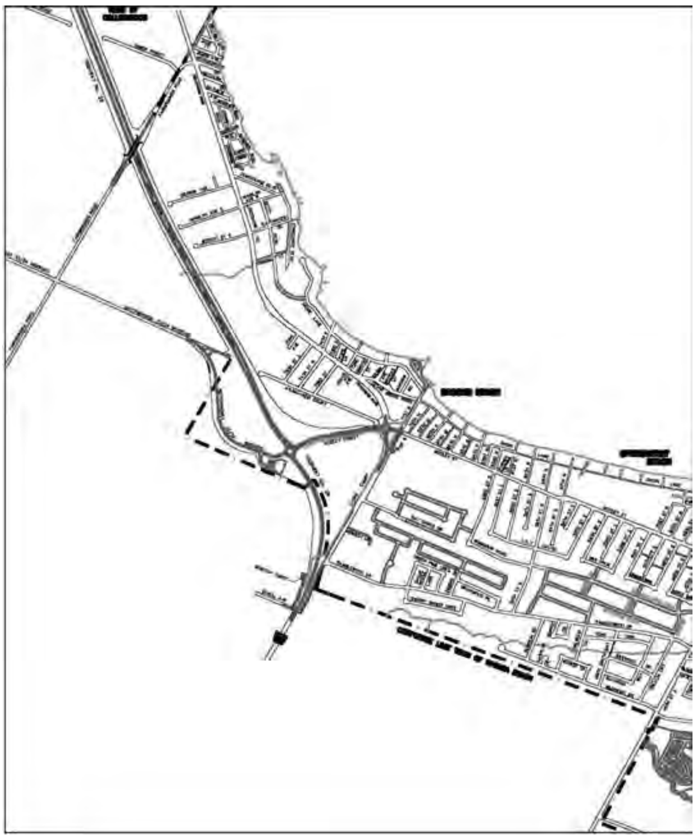
Appendix – B

Public Consultation Documentation (Communication Plan, Correspondence, PICs, Notices)

Town of Wasaga Beach
West End Water Storage Facility and Maintenance Depot
Municipal Class Environmental Assessment
NOTICE OF STUDY COMMENCEMENT

In order to enhance potable water delivery in the west end of the community, the Town of Wasaga Beach is undertaking a Class Environmental Assessment planning process (Schedule C) to consider storage options and sites for a new water reservoir. The assessment will investigate all aspects of the water system including water pressure, fire flow volumes, adequate storage volume, existing servicing and future development. The Town intends to ensure that all areas within the current Town boundary limits are adequately serviced by the municipal water system.

In addition, the Town is also considering layout options and site locations for a new (satellite) maintenance depot in the west end of Town. Given the geographic layout of the Town, the current Public Works Maintenance facility located in the east end, does not efficiently support present operations. Projected growth in demand for services will further overload the current facility and diminish current levels of service.



As illustrated on the accompanying map, the study area for these two projects is described as the existing Town limit west of 58th Street. The study will examine all feasible site location options for both facilities including an overall site for both facilities. A comparison matrix proving the feasibility of the locations will be presented to the public for comment prior to the selection of the preferred location.

The Town has retained Ainley Group to complete and document the Schedule C Class EA planning process as outlined by the Municipal Class EA Document, October 2000, as amended in 2007 and 2011.

Public consultation is a key component of the Class EA process. The Town will hold informal drop-in style Public Information Centres (PICs) in Phases 2 and 3 of the planning process.

Advance notice will be provided to allow all interested parties an opportunity to attend the PICs and to comment. For further information regarding this project, or to provide input or comments or to be placed on the mailing list to receive further project information, please contact either of the following members of the study team:

Mr. John Mabira, P. Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, Ontario, L9Y 4J5
Tel: (705) 445-3451
Fax: (705) 445-0968
mabira@ainleygroup.com

Mr. Gerald Reu, C.E.T
Project Manager
Town of Wasaga Beach
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Public Works Tel: (705) 429-2540
Public Works Fax: (705) 429-8226
g.reu@wasagabeach.com

This Notice issued October 7, 2014.

Any input received during this process will be maintained on file for use during the project and may be included in project documentation. Information collected will be used in accordance with the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.

Ministry of Tourism,
Culture and Sport

Culture Services Unit
Programs and Services Branch
401 Bay Street, Suite 1700
Toronto ON M7A 0A7
Tel: 416 314-7159
Fax: 416 212 1802

Ministère du Tourisme,
de la Culture et du Sport

Unité des services culturels
Direction des programmes et des services
401, rue Bay, Bureau 1700
Toronto ON M7A 0A7
Tél: 416 314-7159
Téléc: 416 212 1802

October 22, 2014 (EMAIL ONLY)

Mr. John Mabira, Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, ON L9Y 4J5
E: mabira@ainleygroup.com

MTCS file #: **0002123**
Proponent: **Town of Wasaga Beach**
Subject: **Notice of Study Commencement for**
West End Water Storage and Maintenance Depot – Municipal Class EA
Location: **Town of Wasaga Beach**

Dear Mr. Mabira,

Thank you for providing the Ministry of Tourism, Culture and Sport (MTCS) with the Notice of Study Commencement for your project. MTCS's interest in this EA project relates to its mandate of conserving Ontario's cultural heritage, which includes:

- Archaeological resources, including land-based and marine;
- Built heritage resources, including bridges and monuments; and,
- Cultural heritage landscapes.

Under the EA process, the proponent is required to determine a project's potential impact on cultural heritage resources.

Project Summary
We understand that the purpose of this EA is to investigate all aspects of the water system for the Town of Wasaga Beach, including consideration of water storage options and sites for a new water reservoir. This EA will also consider layout options and site locations for a new (satellite) maintenance depot in the west end of Town.

MTCS Comments
While some cultural heritage resources may have already been formally identified, others may be identified through screening and evaluation. Aboriginal communities may have knowledge that can contribute to the identification of cultural heritage resources, and we suggest that any engagement with Aboriginal communities includes a discussion about known or potential cultural heritage resources that are of value to these communities. Municipal Heritage Committees, historical societies and other local heritage organizations may also have knowledge that contributes to the identification of cultural heritage resources.

Archaeological Resources
Please be aware that there are numerous known archaeological sites within the Town of Wasaga Beach and also within or near the study area as indicated in the notice. As such an archaeological assessment will be needed for this project.

For further information please refer to the MTCS *Criteria for Evaluating Archaeological Potential* which is used to determine if an archaeological assessment is needed. MTCS archaeological sites data are available at *archaeologicalsites@ontario.ca*. The archaeological assessment (AA) should be undertaken by an *OHA* licensed consultant archaeologist, who is responsible for submitting the report directly to MTCS for review.

Built Heritage and Cultural Heritage Landscapes

The attached MTCS checklist *Screening for Impacts to Built Heritage and Cultural Heritage Landscapes* helps determine whether your EA project may impact cultural heritage resources. The Clerk the Town can provide information on property registered or designated under the *Ontario Heritage Act*. Municipal Heritage Planners can also provide information that will assist you in completing the checklist.

If potential or known heritage resources exist, MTCS recommends that a Heritage Impact Assessment (HIA), prepared by a qualified consultant, be completed to assess potential project impacts. Our Ministry's *Info Sheet #5: Heritage Impact Assessments and Conservation Plans* outlines the scope of HIAs. Please send the HIA to MTCS and to the Town's (heritage) planning staff for review, and make it available to local organizations or individuals who have expressed interest in heritage.

Environmental Assessment Reporting

All technical heritage studies and their recommendations are to be addressed and incorporated into EA projects. Please advise MTCS whether any technical heritage studies will be completed for your EA project, and provide them to MTCS before issuing a Notice of Completion. If your screening has identified no known or potential cultural heritage resources, or no impacts to these resources, please include the completed checklists and supporting documentation in the EA report or file. MTCS is in no way liable if the information in the completed checklists is found to be inaccurate or incomplete.

Thank-you for circulating MTCS on this project: please continue to do so through the EA process, and contact me for any questions or clarification.

Sincerely,

Rosi Zirger
Heritage Planner
rosi.zirger@ontario.ca

Copied to: Gerald Reu, Project Manager, Town of Wasaga Beach

HIAWATHA FIRST NATION
123 Paudash Street
Hiawatha, ON K9J 0E6

Chief: **Greg Cowie**

Councillor: **Kirk Edwards**
Councillor: **Brian Cowie**
Councillor: **Duane Cowie**
Councillor: **Trisha Shearer**
Councillor: **Art Vowles**

October 17, 2014

Dear Mr. Mabira;

Thank you for the information you sent to Hiawatha First Nation regarding the Wasaga Beach West End Water Storage Facility and Maintenance Depot Municipal Class EA which is being proposed within Hiawatha First Nation's Traditional and Treaty Territories. Hiawatha First Nation appreciates that Wasaga Beach and Ainley Group recognize the importance of First Nations Consultation and that your office is conforming to the requirements within the Duty to Consult Process. The correspondence Hiawatha First Nation has received is not considered meaningful consultation but rather information sharing.

As per the Hiawatha First Nation Consultation Protocol, your proposed project is deemed to have little, if any, impact on Hiawatha First Nation's traditional territory and/or rights. Please keep us apprised of any updates, archaeological findings, and/or of any environmental impacts, should they occur. Hiawatha First Nation requests you contact us if any First Nation archaeological artifacts are found as we require our trained archaeological liaisons be present at the archaeological sites during the assessments. We also ask that you forward any archaeological reports to Hiawatha First Nation as they are completed. Any maps pertaining to the project should be sent to Hiawatha First Nation in a shape file.

Hiawatha First Nation reserves the right to provide additional comment should further development result in additional potential impact on our traditional territory and rights. Please be aware that while we request to be kept appraised throughout all phases of this project, we may not always have representation at all stakeholders meetings.

Further correspondence may be directed to my attention at the mailing address above or the e-mail address below.

In good faith and respect,

Lori Loucks
Core Consultation Worker
Hiawatha First Nation

lloucks@hiawathafn.ca
Tele: (705) 295-7771
Fax: (705) 295-7131

Barb Bell

From: Reid Mitchell <mitchell@ainleygroup.com>
Sent: November 1, 2014 10:51 AM
To: Barb Bell
Subject: FW: west end water storage, maintenace depot notification. I would like to be put on the information mailing list regarding any information re: this project. My address is Mike Threader 9019 Beachwood Rd Wasaga Beach L9Z2X9 Thank You.

Barb. Please create new mailing list and add this Gentleman. File 114137. Thanks.

From: Gerald Reu [mailto:g.reu@wasagabeach.com]
Sent: October 31, 2014 4:17 PM
To: Reid Mitchell; scott@ainleygroup.com
Subject: FW: west end water storage, maintenace depot notification. I would like to be put on the information mailing list regarding any information re: this project. My address is Mike Threader 9019 Beachwood Rd Wasaga Beach L9Z2X9 Thank You.

Good afternoon;

Please include Mike Threader on the mailing list as requested in the e-mail below.

Thanks

Gerald Reu, C.E.T.
Project Coordinator
Town of Wasaga Beach

Phone: 705-429-2540 Ext. 2342
Fax: 705-429-8226
Cell: 705-443-7800
Email: g.reu@wasagabeach.com

From: MIKE THREADER [mailto:mfthreader@rogers.com]
Sent: October-31-14 1:36 PM
To: g.reu@wasagabeach.com
Subject: west end water storage, maintenace depot notification. I would like to be put on the information mailing list regarding any information re: this project. My address is Mike Threader 9019 Beachwood Rd Wasaga Beach L9Z2X9 Thank You.

Barb Bell

From:	Reid Mitchell <mitchell@ainleygroup.com>
Sent:	November 10, 2014 9:54 AM
To:	Barb Bell
Subject:	FW: West End Water Storage Facility & Maintenance Depot

Barb. Please add to File 114137. Thanks.

From: Gerald Reu [mailto:g.reu@wasagabeach.com]
Sent: November 10, 2014 8:18 AM
To: Mabira, John
Cc: Reid Mitchell; scott@ainleygroup.com; Mike Pincivero
Subject: FW: West End Water Storage Facility & Maintenance Depot

Good morning John;

Please add the Marshall's to the list of circulation for the project.

Regards;

Gerald Reu, C.E.T.
Water / Sewer Foreman
Town of Wasaga Beach

Phone: 705-429-2540 Ext. 2306
Fax: 705-429-8226
Cell: 705-446-5102
Email: g.reu@wasagabeach.com

From: Linda [mailto:l_marshall@rogers.com]
Sent: November-08-14 9:51 AM
To: Gerard Reu
Subject: West End Water Storage Facility & Maintenance Depot

Mr. Reu,
We read a notice in the October 16th Sun regarding the West End Water Storage Facility and Maintenance Depot. As residents of the west end of Wasaga Beach, we are interested in this project. Would you add our names to the mailing list to receive further project information.
Thank you,
Sincerely,

John (Jack) and Linda Marshall
10 Cherry Sands Crescent
WB, L9Z 1P5

Barb Bell

From: John Mabira <mabira@ainleygroup.com>
Sent: November 10, 2014 12:01 PM
To: bell@ainleygroup.com
Subject: FW: Town of Wasaga Beach Class Environmental Assessment

Barb,

See below and add info to contact list and comments. Thanks

Regards,

J. Mabira, M.Sc., P.Eng., PMP
Senior Project Engineer
www.ainleygroup.com
Tel: (705) 445-3451 Ext. 146
Cell: (705) 441-2556

From: Collingwood General [mailto:collingwood@ainleygroup.com]
Sent: November 6, 2014 8:50 AM
To: 'John Mabira'
Subject: FW: Town of Wasaga Beach Class Environmental Assessment

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From: James Bigwin [mailto:jbigwin@alderville.ca]
Sent: November 5, 2014 10:37 AM
To: collingwood@ainleygroup.com
Cc: jbigwin@alderville.ca
Subject: Town of Wasaga Beach Class Environmental Assessment

November 5, 2014

Ainley & Associates Limited
280 Pretty River Parkway
Collingwood ON L9Y 4J5

Attn: John Mabira, P. Eng.

Re: Town of Wasaga Beach
Class Environmental Assessment
West End Water Storage & Maintenance Depot
Notice of Study Commencement

Dear Mr. Mabira:

Thank you for your consultation request to Alderville First Nation regarding the Town of Wasaga Beach Class Environmental Assessment West End Water Storage & Maintenance Depot Notice of Study Commencement which is being proposed within our Traditional and Treaty Territory. We appreciate the fact that URS Canada Inc. recognizes the importance of First Nations Consultation and that your office is conforming to the requirements within the Duty to Consult Process.

As per the Alderville First Nation Consultation Protocol, your proposed project is deemed a level 3, having minimal potential to impact our First Nations' rights, therefore, please keep Alderville apprised of any archaeological findings, burial sites or any environmental impacts, should any occur. I can be contacted at the mailing address above or electronically via email, at the email address below.

In good faith and respect,

Dave Simpson dsimpson@aldervillefirstnation.ca
Lands and Resources
Communications Officer Tele: (905) 352-2662
Alderville First Nation Fax: (905) 352-3242

Barb Bell

From: John Mabira <mabira@ainleygroup.com>
Sent: November 10, 2014 12:02 PM
To: bell@ainleygroup.com
Subject: FW: Town of Wasaga Beach - West End Water Sotage Facility and Maintenance Depot - Municipal Class Environmental Assessment

Barb,

See below and add info to contact list and comments. Thanks

Regards,

J. Mabira, M.Sc., P.Eng., PMP
Senior Project Engineer
www.ainleygroup.com
Tel: (705) 445-3451 Ext. 146
Cell: (705) 441-2556

From: Lee Bull [mailto:lbull@nvca.on.ca]
Sent: November 4, 2014 2:31 PM
To: John Mabira (mabira@ainleygroup.com)
Subject: Town of Wasaga Beach - West End Water Sotage Facility and Maintenance Depot - Municipal Class Environmental Assessment

Good Afternoon John

We have received a "Notice of Study Commencement" for the above referenced Class EA.

Please accept this email as a formal request for Notification for Public Information Centres, further project information once available, and applicable timings/deadlines for input and comment on the Study.

Thank you in advance for your time on this matter.

Enjoy the day.

Lee Bull, MCIP, RPP
Development Review Planner **| Nottawasaga Valley Conservation Authority**

✉ 8195 8th Line | Utopia, Ontario LOM 1T0 | ☎ (705) 424-1479 x 231 | 🖱 lbull@nvca.on.ca | 🌐www.nvca.on.ca

Ministry of Aboriginal Affairs

160 Bloor St. East, 9th Floor
Toronto, ON M7A 2E6
Tel: (416) 326-4740
Fax: (416) 325-1066
www.aboriginalaffairs.gov.on.ca

Ministère des Affaires Autochtones

160, rue Bloor Est, 9e étage
Toronto ON M7A 2E6
Tél. : (416) 326-4740
Téléc. : (416) 325-1066
www.aboriginalaffairs.gov.on.ca

RECEIVED
NOV 14 2014

JM
BCB

FILE NO.
114137

Reference: EA#365

Mr. John Mabira, P. Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, ON L9Y 4J5

Re: Town of Wasaga Beach
Class Environmental Assessment
West End Water Storage & Maintenance Depot
Notice of Study Commencement

Dear Mr. Mabira:

Thank you for informing the Ministry of Aboriginal Affairs (MAA) of your project. Please note that MAA treats all letters, emails, general notices, etc. about a project as a request for information about which Aboriginal communities may have rights or interests in the project area.

As a member of the government review team, the Ministry of Aboriginal Affairs (MAA) identifies First Nation and Métis communities who may have the following interests in the area of your project:

- reserves;
- land claims or claims in litigation against Ontario;
- existing or asserted Aboriginal or treaty rights, such as harvesting rights; or
- an interest in the area of the project.

MAA is not the approval or regulatory authority for your project, and receives very limited information about projects in the early stages of their development. In circumstances where a Crown-approved project may negatively impact a claimed Aboriginal or treaty right, the Crown may have a duty to consult the Aboriginal community advancing the claim. The Crown often delegates procedural aspects of its duty to consult to proponents. Please note that the information in this letter should not be relied on as advice about whether the Crown owes a duty to consult in respect of your project, or what consultation may be appropriate. Should you have any questions about your consultation obligations, please contact the appropriate ministry.

You should be aware that many First Nations and/or Métis communities either have or assert rights to hunt and fish in their traditional territories. For First Nations, these territories typically include lands and waters outside of their reserves.

In some instances, project work may impact aboriginal archaeological resources. If any Aboriginal archaeological resources could be impacted by your project, you should contact your regulating or approving Ministry to inquire about whether any additional Aboriginal communities should be contacted. Aboriginal communities with an interest in archaeological resources may include communities who are not presently located in the vicinity of the proposed project.

With respect to your project, and based on the brief materials you have provided, we can advise that the project appears to be located in an area where First Nations may have existing or asserted rights or claims in Ontario's land claims process or litigation, that could be impacted by your project. Contact information is below:

Chippewas of Georgina Island R.R. #2, P.O. Box N-13 Sutton West, Ontario L0E 1R0	Chief Donna Big Canoe (705) 437-1337 (Fax) 437-4597 dbigcanoe@georginaisland.com
Beausoleil First Nation (Christian Island) 11 O-Gema Miikaan Christian Island, ON L9M 0A9	Chief Roland Monague (705) 247-2051 (Fax) 247-2239 bfnchief@chimnissing.ca
Chippewas of Rama 5884 Rama Road, Suite 200 Rama, Ontario L0K 1T0	Chief Rodney Noganosh (705) 325-3611 (Fax) 325-0879 chief@ramafirstnation.ca

For your information, MAA is aware of Métis communities that have asserted rights near your project. Contact information is below:

Georgian Bay Métis Council 355 Cranston Crescent P.O. Box 4 Midland, ON L4R 4K6	Michael Duquette, President (705) 526-6335 (Fax): 705-526-7537 website: www.georgianbaymetiscouncil.com

Please copy any correspondence to Georgian Bay Métis Council to the Métis Nation of Ontario. Contact information is below:

Métis Nation of Ontario Head Office 500 Old St. Patrick Street, Unit D Ottawa, Ontario, K1N 9G4	Métis Consultation Unit Fax: (613) 725-4225

The information upon which the above comments are based is subject to change. First Nation or Métis communities can make claims at any time, and other developments can occur that could result in additional communities being affected by or interested in your undertaking.

Through Aboriginal Affairs and Northern Development (AANDC), the Government of Canada sometimes receives claims that Ontario does not receive, or with which Ontario does not become involved. AANDC's Consultation and Accommodation Unit (CAU) established a "single window" to respond to requests for baseline information held by AANDC on established or potential Aboriginal Treaty and rights. To request information from the Ontario Subject Matter Expert send an email to: UCA-CAU@aadnc-aandc.gc.ca.

Additional details about your project or changes to it that suggest impacts beyond what you have provided to date may necessitate further consideration of which Aboriginal communities may be affected by or interested in your undertaking. If you think that further consideration may be required, please bring your inquiry to whatever government body oversees the regulatory process for your project. MAA does not wish to be kept informed of the progress of the project; please be sure to remove MAA from the mailing list.

Yours truly,

Corwin Troje
Manager, Ministry Partnerships Unit
Aboriginal Relations and Ministry Partnerships Branch

Ainley GROUP CONSULTING ENGINEERS PLANNERS

Ainley & Associates Limited
280 Pretty River Parkway, Collingwood, Ontario L9Y 4J5
Tel: (705) 445-3451 • Fax: (705) 445-0968
E-mail: collingwood@ainleygroup.com

July 8, 2015

File No. 114137

Ref: **Town of Wasaga Beach**
Class Environmental Assessment
West End Water Storage & Maintenance Depot
Notice of Public Information Centre No. 1

Dear Sir and/or Madam:

The Town of Wasaga Beach has retained the service of the Ainley Group to document a Class EA planning process to consider storage options and sites for a new water reservoir, and layout options and site locations for a new maintenance depot in the west end of the Town.

The purpose of the project is to ensure that all areas within the Town are adequately serviced by the municipal water system. In addition, the study will ensure efficient maintenance of Public Works operations and current levels of service by supplementing the existing Public Works Maintenance facility located in the Town's east end. The Class EA is being prepared in accordance with the Municipal Class Environmental Assessment October 2000, as amended in 2007 & 2011 as a Schedule 'C'.

This notice is to advise you of an upcoming Public Information Centre No. 1 scheduled for this project. The problem statement and identification and evaluation of alternative solutions of this project will be presented at the upcoming Public Information Centre No. 1. For additional details please refer to the attached notice, which will appear in the local newspaper on July 9th and July 16th, 2015.

Should you have any further questions or concerns, please contact the undersigned or Mr. Michael Latimer, Project Coordinator, Town of Wasaga Beach at 705-429-2540 or via email at m.latimer@wasagabeach.com

Yours truly,

AINLEY & ASSOCIATES LIMITED

Gary Scott, M.Sc., P. Eng.
Project Manager
Phone: 905-595-6859
scott@ainleygroup.com

cc. Michael Latimer, Project Coordinator, Town of Wasaga Beach

TOWN OF WASAGA BEACH
CLASS ENVIRONMENTAL ASSESSMENT
WEST END WATER STORAGE FACILITY AND MAINTENANCE DEPOT
NOTICE OF PUBLIC INFORMATION CENTRE NO. 1

Further to the Notice of Study Commencement issued October 7, 2014, the Town of Wasaga Beach is continuing to undertake a Class Environmental Assessment (Schedule C) to consider alternative sites for a new water storage reservoir, and alternative sites for a new maintenance depot in the Town's west end.

The area west of 58th Street to the Town boundary was identified as suitable for a maintenance depot to serve the west end and to provide sufficient water storage to the west end. Based on the site requirements, seven (7) alternative sites were identified for the west end facility. The study area with the location of the seven (7) Alternative Sites is shown on the map.

Public Information Centre

A Public Information Centre is planned to provide further information to the public on the evaluation process and Recommended Preferred Solution and to receive input and comment from interested persons.

Time: Open House: 7:00 pm to 9:00 pm
Date: Wednesday, July 22, 2015
Location: Wasaga Rec Plex – 1724 Mosley Street

Public input and comment on the recommended solution will be incorporated into the planning process. Comments received before August 21, 2015 will be taken into consideration in Phase 3. A future Public Information Centre (Phase 3) will be held to present Design Alternatives for the recommended preferred solution. A Notice will be issued prior to the future PIC date.

If you have any comments or questions, or if you would like to be placed on the mailing list to receive project information, please contact either:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540
Fax: (705) 429-8226
m.latimer@wasagabeach.com

Mr. Gary Scott, M. Sc., P. Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, ON L9Y 4J5
Phone: (705) 445-3451
Fax: (705) 445-0968
scott@ainleygroup.com

This notice issued July 9, 2015.

West End Water Storage Facility and Maintenance Depot
Class Environmental Assessment
Phase 2 Public Information Centre No. 1
Wednesday, July 22, 2015

WELCOME

- Please sign in
- Representatives are available to answer questions
- Please complete a comment sheet
  - Place it in the box or send it to the Consultant undertaking the study or to the Town of Wasaga Beach at the address provided on the comment sheet

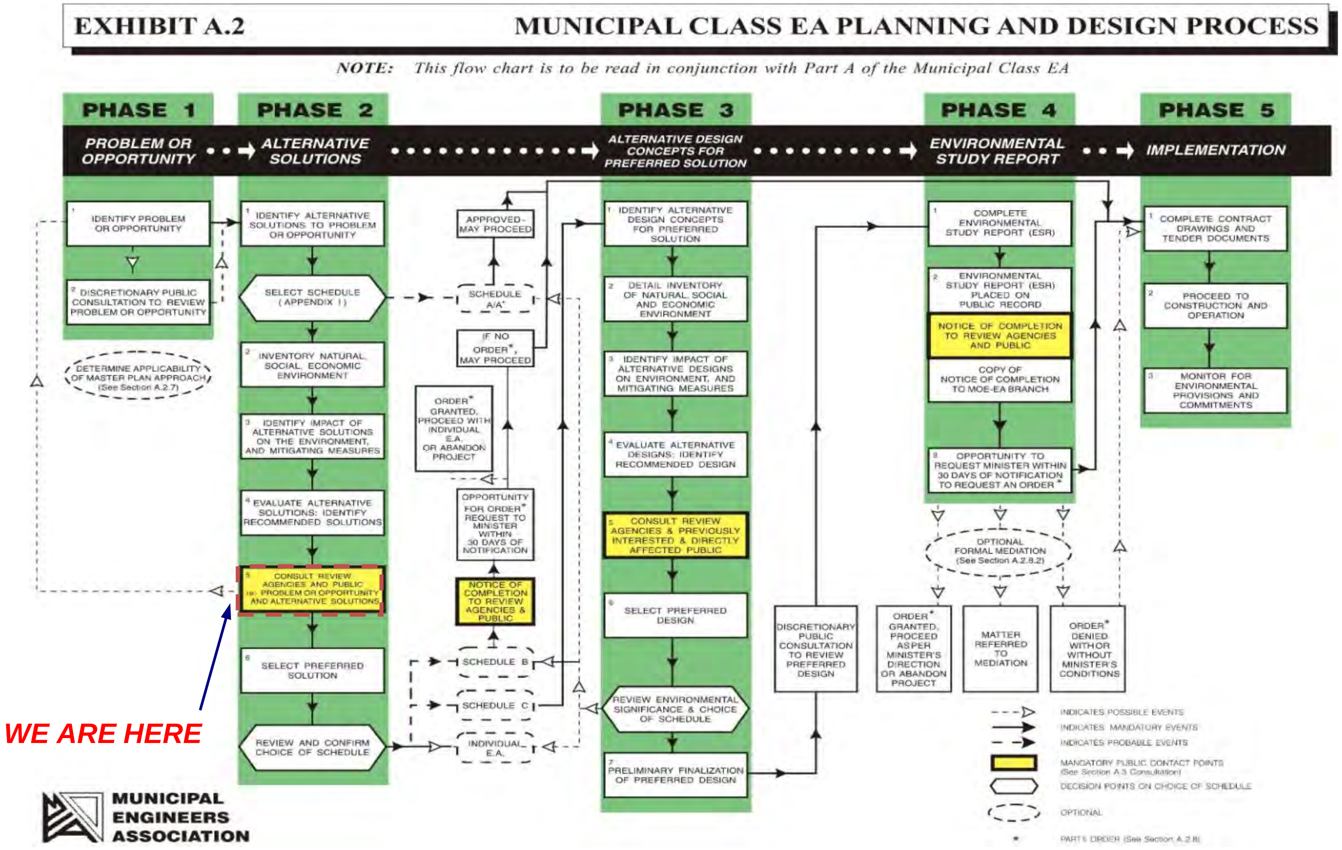
Problem Statement

In order to enhance potable water delivery in the west end of the community, the Town of Wasaga Beach is undertaking a Class Environmental Assessment planning process (Schedule C) to consider storage options and sites for a new water reservoir. The assessment will investigate all aspects of the water system including water pressure, fire flow volumes, adequate storage volume, existing servicing and future development. The Town intends to ensure that all areas within the current Town boundary limits are adequately serviced by the municipal water system.

In addition, the Town is also considering layout options and site locations for a new (satellite) maintenance depot in the west end of Town. Given the geographic layout of the Town, the current Public Works Maintenance facility located in the east end, does not efficiently support present operations. Projected growth in demand for services will further overload the current facility and diminish current levels of service.

West End Water Storage Facility and Maintenance Depot
Class Environmental Assessment
Phase 2 Public Information Centre No. 1
Wednesday, July 22, 2015

This Project is being planned in accordance with the Municipal Engineer's Association's (MEA) Municipal Class Environmental Assessment (October 2000, as amended in 2007 & 2011) document. The MEA Planning and Design Process Flow Chart is provided for public information. At the present time, the Wasaga Beach West End Water Storage Facility and Maintenance Depot Class Environmental Assessment is in Phase 2.

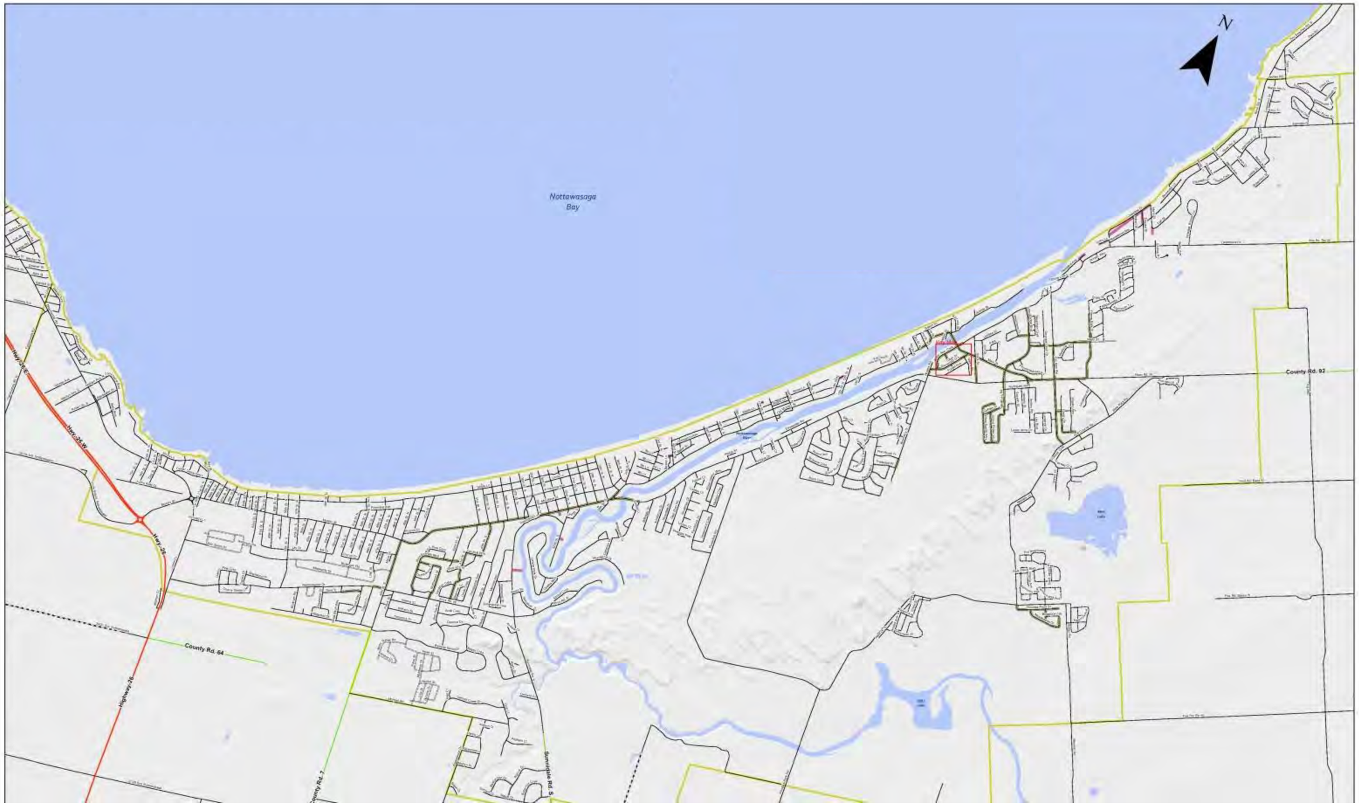


WE ARE HERE

Map of Study Area

The study area for these two projects is described as the Town limit west of 58th Street.

Map of Service Area



Water Storage Requirements

- The need for additional water storage was identified in a Report titled:
  "Ultimate Water Supply and Distribution System Model Update" prepared by Ainley & Associates Limited, March 2014.
- A total water storage requirement of 24,641 m^3 was identified for full build out of the Town (27, 012 units)
- Based on the following:
  - MDD = 1.478 m^3/ day / unit
  - 30% increase in per unit demand to allow for long term future planning (1.921 m^3/ day / unit)
  - Fire flow of 378 L/s for 6 hours
- The additional storage requirement was derived as follows:

Location of Storage	Available Storage (m^3)
East End Elevated Tank	2,841
Powerline Road In-Ground Reservoir	3,410
Sunnidale Elevated Tank	9,550
Total Existing Storage	15,801
Additional Storage Required	8,840

Water Storage Distribution Analysis

It was determined that the additional water storage volume (rounded to 9,000 m^3) should be distributed across the Town in order to provide better distribution capabilities. Six water storage alternatives were considered for the additional required capacity as follows:

- Alternative 1
  - 9,000 m^3 elevated tank in the west end
- Alternative 2
  - 9,000 m^3 in-ground tank in the west end built in 2 stages
- Alternative 3
  - 4,500 m^3 elevated tank in the west end and 4,500 m^3 in-ground at Powerline Road site
- Alternative 4
  - 4,500 m^3 in-ground tank in the west end and 4,500 m^3 in-ground at Powerline Road site
- Alternative 5
  - Do Nothing
- Alternative 6
  - Limit Growth

Identification of Alternative Solutions

In order to deal effectively with the aspects of the problem statement, a range of practical alternative solutions were identified for the water reservoir, including ‘Do Nothing’ and ‘Limit/Manage Growth’.

- Do Nothing
  - Due to the capacity of the existing water storage the Municipality will inevitably be required to increase their water storage in order to remain in compliance and to maintain the health and safety of the citizens of Wasaga Beach. The Do Nothing alternative is therefore considered not viable and was not carried forward to the detailed evaluation stage.
- Limit/Manage Growth
  - Placing a limit on growth does not align with the Town of Wasaga Beach approved Official Plan.

Viable alternative solutions for the water reservoir were evaluated to identify a recommended preferred solution.

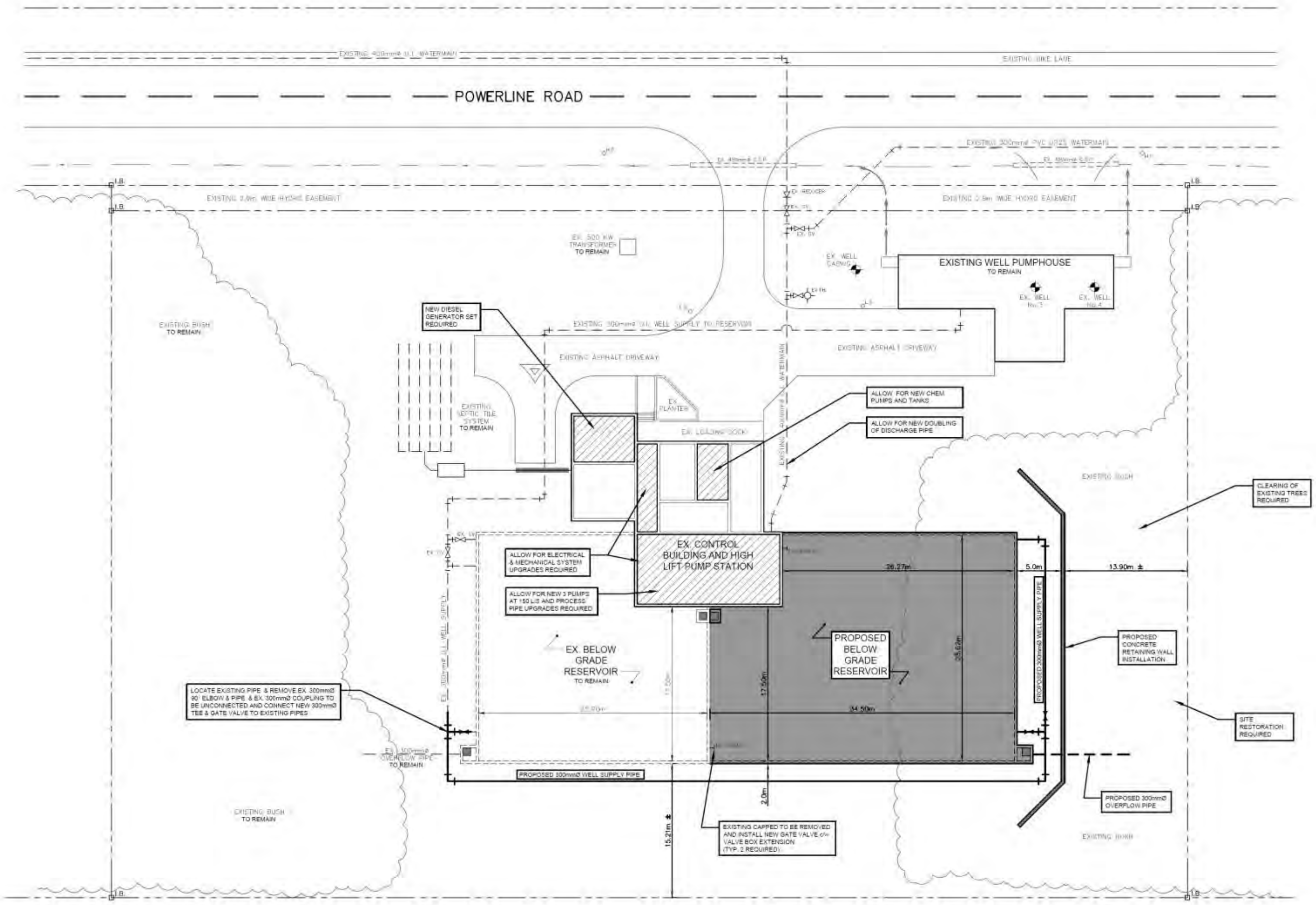
Recommended Water Storage Solution

- A criteria assessment table was developed rating each of the options as best (3), moderate (2) or least preferred (1)
- Alternative # 3 is the recommended water storage solution ($4500m^3$ elevated tank in the west end and $4500m^3$ in-ground reservoir on Powerline Rd.)

	West End Elevated Tank	West End In-Ground Tank	West End Elevated & East End In-Ground	West End In-Ground & East End In-Ground
Land Requirement	3	1	3	2
Aesthetics	3	1	2	1
Opportunity to Create Wasaga Beach Landmark	3	1	3	1
Security of Supply (Need for Standby Power)	3	1	2	1
Water Quality*	2	6	6	6
Meeting all Demands Across Future Network*	2	2	6	6
Access to Storage (Health and Safety)	1	3	2	3
Initial Capital Cost*	2	6	4	6
Future Capital Cost	3	1	1	1
Long Term Operation and Maintenance Cost	3	1	3	2
Energy Costs	3	1	2	1
Total	28	24	34	30

*A weighting of 2 has been applied because this criteria is of higher importance resulting in ratings of least preferred = 2, moderate = 4 and best = 6.

Proposed Upgrades to Powerline Road Facility



Maintenance Depot Requirements

A Needs Assessment was conducted which determined the need of a satellite maintenance depot in the west end of Wasaga Beach. The Assessment identified that the depot will allow for more timely repairs and services, improved winter maintenance and is necessary to service the proposed developments in the west end. The area necessary to provide these services was identified as 3.5 hectares.

To adequately serve the Wasaga Beach community, the new satellite maintenance depot requirements are as follows:

- Office Area
    - For office staff and dispatch
    - Will include meeting, training rooms and washroom
- Utility Area
    - For building utilities, cleaning materials and storage
- Staff Facilities
    - Incudes kitchen, lunch room, locker rooms and washrooms
- Depot
    - Includes storage and vehicle bays for parking, truck washing and repair
- Sand and Salt Shed - Storage
- Yard
    - Gas facility, parking, material storage and a communication tower

Potential West End Sites – Phase 2 Options

- All potential site options within the study area were considered.
- 7 sites were identified as feasible options and were short listed for additional consideration.
- A location map outlines the location of the sites on the next slide.

Map of Seven West End Sites

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Background Information

A desktop study was completed for the seven proposed sites. The following information was reviewed with respect to these sites:

- Geotechnical
  - Information from previous geotechnical study
- Land Use Plan,
  - Information from the Town Official Plan
- National Heritage Plan,
  - Information from the Town Official Plan
- Well Head Plan and Active
  - Information from the Town Official Plan
- Proposed Developments
  - Information from the Town Official Plan
- Existing Sewers and Water Mains
  - Information from engineering records

Geotechnical Information

Based on the previously completed geotechnical investigations the general ground conditions at the seven sites are summarized as follows:

- Soils
  - Sites 1 and 2 have soils consisting of silt and clay with possibility of silty sand
  - Sites 3 and 4 consist of fine sand underlain by impervious soils
  - Site 5 is in an area of well graded, fine or gravely sand
  - Sites 6 and 7 consist of fine sand possibly underlain by impervious soil
- Ground water levels
  - Sites 1, 2 ,3 and 4 have a deeper ground water table.
  - Sites 5, 6 and 7 have a more shallow ground water table.

All sites are suitable (geotechnically) for the proposed use

Potential Layout Identified Area No. 1

CONCEPT ONLY

Potential Layout Identified Area No. 2

CONCEPT ONLY

West End Water Storage Facility and Maintenance Depot
Class Environmental Assessment
Phase 2 Public Information Centre No. 1
Wednesday, July 22, 2015

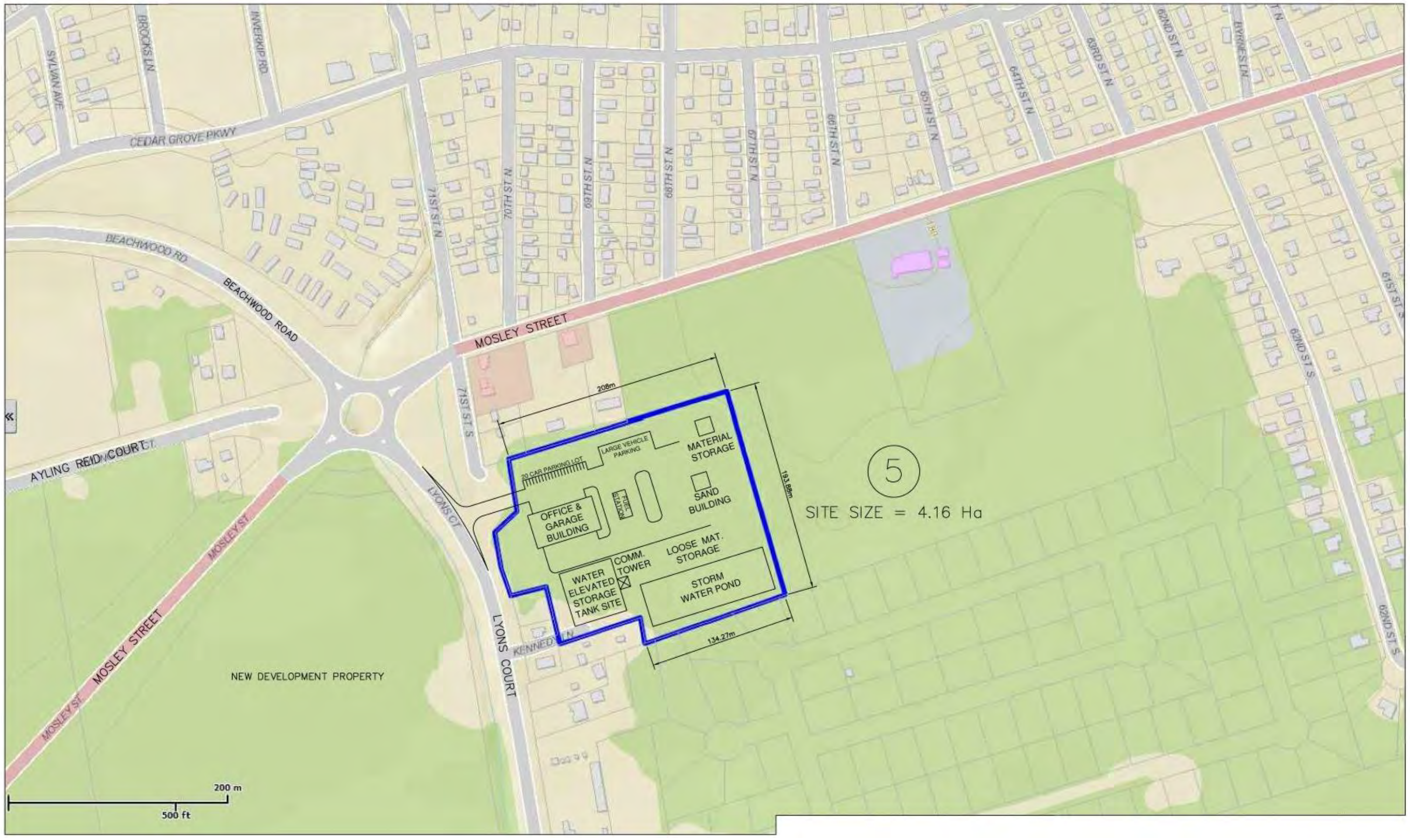
Potential Layout Identified Area No. 3

CONCEPT ONLY

Potential Layout Identified Area No. 4

CONCEPT ONLY

Potential Layout Identified Area No. 5



CONCEPT ONLY

Potential Layout Identified Area No. 6

CONCEPT ONLY

Potential Layout Identified Area No. 7

This property was considered as a potential site however due to limited size, it was unable to meet the required needs of the project.

CONCEPT ONLY

Evaluation of Phase 2 Site Options

Criteria	Sub-Criteria	Weighting (%)	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Land Use Planning		**10**	**4**	**9**	**7**	**6**	**4**	**6**
	Existing Land use	5	2	4	4	4	3	5
	Proposed/Potential Land Use	5	2	5	3	2	1	1
Natural Environment		**15**	**9**	**10**	**13**	**15**	**8**	**12**
	Well Head Protection	3	3	3	3	3	3	3
	Surface Water/Drainage	5	1	2	5	5	1	2
	Geotechnical	2	1	1	2	2	2	2
	Trees/Habitat	5	4	4	3	5	2	5
Social Environment		**30**	**8**	**24**	**22**	**26**	**25**	**18**
	Noise Impact	5	1	5	4	4	4	3
	Light Impact	5	1	5	4	4	4	3
	Residential Impact	10	2	8	8	10	8	4
	Traffic Impact	5	3	4	2	3	5	3
	Visibility of Water Reservoir	5	1	2	4	5	4	5
Cultural Environment		**5**	**1**	**4**	**4**	**3**	**2**	**1**
	Supporting Town Policies	5	1	4	4	3	2	1
Technical Considerations		**25**	**17**	**21**	**21**	**20**	**22**	**22**
	Site Servicing (Power, Sewer, Water)	5	3	4	5	5	5	5
	Adequate Size	5	5	5	5	3	3	5
	Tank Hydraulic Performance	5	3	4	5	5	5	5
	Depot Location	5	1	3	4	4	4	4
	Truck Access	5	5	5	2	3	5	3
Economic Considerations		**15**	**11**	**13.5**	**11**	**10.5**	**8.5**	**9**
	Cost	8	6	6.5	7	7.5	7.5	8
	Commercial/Industrial Impact	7	5	7	4	3	1	1
Total		**100**	**50**	**81.5**	**78**	**80.5**	**69.5**	**68**

* A higher rating indicates that the site option is more preferred when compared against the respective criteria.

Phase 2 Recommended Site

Site 2 is the recommended preferred site

- Overall site 2 presents the best alternative based on the evaluation criteria.
- This site will have the least impact on development in Wasaga Beach with minimum impact to the surrounding area.
- This site will provide increased water security and performance as well as increased maintenance and service to the residents located in the west end of Wasaga Beach.

Site 2 Preferred Site

Next Steps

Phase 2

1. Review PIC #1 Comments (August 21, 2015)
2. Confirm recommended preferred west end site(s)

Phase 3

3. Identify and evaluate design options
4. Complete investigations and studies including a detailed archeological assessment, geotechnical investigation, natural environment assessment and a storm water management study to confirm the impacts of the tower and depot.
5. PIC #2
6. Review PIC #2 comments
7. Confirm recommended preferred design option

Phase 4

7. Draft ESR
8. Publish Notice of Completion of Class EA
9. Public and Agency review of DRAFT Environmental Study Report
10. Finalize Environmental Study Report based on comments received
11. Memo to Ministry of Environment – Completion of Class EA

What Can you Do?

- Fill out a comment sheet
- Send your comments to:

Mike Latimer, C.E.T.
Project Coordinator
Town of Wasaga Beach
30 Lewis Street
Wasaga Beach
L9Z 1A1
Tel: (705) 429-2540
Fax: (705) 429-8226
Email: m.latimer@wasagabeach.com

Gary Scott, M.Sc., P.Eng.
Vice President, Water Business
Ainley Group
280 Pretty River Parkway
Collingwood, Ontario
L9Y 4J5
Tel: (705) 445-3451 ext. 147
Fax: (705) 445-0968
Email: scott@ainleygroup.com

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

PUBLIC INFORMATION CENTRE
July 22, 2015

SIGN IN SHEET – PLEASE PRINT

NAME	ADDRESS	TELEPHONE NO.	E-MAIL ADDRESS
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
KEVIN LALONDE	PW		

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

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July 22, 2015

SIGN IN SHEET – PLEASE PRINT

NAME	ADDRESS	TELEPHONE NO.	E-MAIL ADDRESS
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]
[redacted]	[redacted]	[redacted]	[redacted]

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

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NAME	ADDRESS	TELEPHONE NO.	E-MAIL ADDRESS
[redacted]			

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

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July 22, 2015

SIGN IN SHEET – PLEASE PRINT

NAME	ADDRESS	TELEPHONE NO.	E-MAIL ADDRESS
[redacted]	[redacted]	[redacted]	[redacted]

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

PUBLIC INFORMATION CENTRE
July 22, 2015

SIGN IN SHEET – PLEASE PRINT

NAME	ADDRESS	TELEPHONE NO.	E-MAIL ADDRESS
[redacted]	[redacted]	[redacted]	[redacted]

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

PUBLIC INFORMATION CENTRE
July 22, 2015

SIGN IN SHEET – PLEASE PRINT

NAME	ADDRESS	TELEPHONE NO.	E-MAIL ADDRESS
[redacted]	[redacted]	[redacted]	[redacted]
MIKE RAWN	CLEARVIEW	705-441-6935	mrawn@clearview.ca
[redacted]	[redacted]	[redacted]	[redacted]

Wendy Smeh

From: Gary Scott <scott@ainleygroup.com>
Sent: July-14-15 11:50 AM
To: Hali Tabobondung
Cc: m.latimer@wasagabeach.com; Smeh, Wendy
Subject: RE: Request for Info Re: Class EA Water Storage & Maintenance Depot

Thanks for your response Hali.
At this stage we are preparing for the first public information meeting. We have have not yet documented the study, however, we will send you a copy of the display boards (in PDF) we intend to use for the information meeting.
Gary

From: Hali Tabobondung [mailto:ccc@wasauksing.ca]
Sent: July-14-15 10:16 AM
To: Gary Scott
Cc: m.latimer@wasagabeach.com
Subject: Request for Info Re: Class EA Water Storage & Maintenance Depot

Hello, Scott!

Wasauksing First Nation has received your letter dated July 8, 2015, and would like to request more information on the proposed Water Storage & Maintenance Depot. If you could please send the study document in pdf format at your earliest convenience, that would be greatly appreciated!

Thank you,

Hali Tabobondung

Hali Tabobondung
Community Consultation Coordinator
Wasauksing First Nation
T: (705)746-2531 X. 2248
C: (705)988-2204
F: (705)746-5984
ccc@wasauksing.ca
www.wasauksing.ca

From:	Gary Scott <scott@ainleygroup.com>
Sent:	July-14-15 11:45 AM
To:	Skye Anderson
Cc:	Mike Latimer; Smeh, Wendy
Subject:	FW: Consultation Response
Attachments:	Ainley & Ass. - Wasaga.pdf

Thank you for your timely response.

From: Skye Anderson [mailto:sanderson@alderville.ca]
Sent: July-14-15 10:47 AM
To: Gary Scott
Subject: Consultation Response

Good morning,

Please find attached a letter from Alderville First Nation's Lands and Resources department.

Miigwech,

Skye Anderson
Consultation Clerical Support
Alderville First Nation
11696 Second Line
Roseneath, ON
K0K 2X0
(905) 352-2011
Fax: (905) 352-3242

ALDERVILLE FIRST NATION
ALDERVILLE FIRST NATION
P.O. Box 46
11696 Second Line
Roseneath, Ontario K0K 2X0

Chief: James R. Marsden
Councillor: Dave Mowat
Councillor: Julie Bothwell
Councillor: Angela Smoke
Councillor: Jody Holmes

July 14, 2015

Ainley & Associates Limited
280 Pretty River Parkway
Collingwood, ON
L9Y 4J5

ATTN: Gary Scott

Re: Town of Wasaga Beach
Class Environmental Assessment
West End Water Storage & Maintenance Depot
Notice of Public Information Centre No. 1

Dear Gary,

Thank you for the information to Alderville First Nation (AFN) regarding the Notice of Public Information Centre No. 1. However, this project is not in AFN's Traditional/Treaty Territory, therefore I would suggest that Ainley & Associates Limited contact the First Nation that this project is being proposed in.

AFN appreciates the fact that Ainley & Associates Limited recognizes the importance of First Nations Consultation and that your office is conforming to the requirements within the Duty to Consult Process.

In good faith and respect,

Dave Simpson dsimpson@aldervillefirstnation.ca
Lands and Resources

Communications Officer Tele: (905) 352-2662
Alderville First Nation Fax: (905) 352-3242

From: Gary Scott <scott@ainleygroup.com>
Sent: July-15-15 12:02 PM
To: Dorton, Peter (MTO)
Cc: Tuz, Sylvester (MTO); m.latimer@wasagabeach.com; Smeh, Wendy
Subject: RE: Town of Wasaga Beach Class EA, West End Water Storage & Mtnc Depot, Notice of PIC #1

Thanks for the speedy response Peter. We will keep you informed if we are within any of your limits Gary

-----Original Message-----
From: Dorton, Peter (MTO) [mailto:Peter.Dorton@ontario.ca]
Sent: July-15-15 11:55 AM
To: Gary Scott; m.latimer@wasagabeach.com
Cc: Tuz, Sylvester (MTO)
Subject: Town of Wasaga Beach Class EA, West End Water Storage & Mtnc Depot, Notice of PIC #1

Gary / Michael:

Concerning the attached Notice, while MTO has no concerns, please be aware that any associated works proposed within MTO permit control area for Highway 26, as well as for old Highway 26 (Lyons Ct. and Beachwood Rd.) should be forwarded to this office for review and permit approvals. In accordance with Sec. 38(2) of the Public Transportation and Highway Improvement Act, a Building & Land Use permit is required for any installation within 45m of a highway limit, or within 395m of the centrepoint of any intersection.

Please feel free to contact me if you have any questions.

Thanks,
Peter Dorton
Senior Project Manager
MTO Central Region
Corridor Management Section
7th Floor, Building D
1201 Wilson Avenue
Downsview, ON M3M 1J8
Ph: 416-235-4280
Fx: 416-235-4267
Email: peter.dorton@ontario.ca

Wendy Smeh

From: Gary Scott <scott@ainleygroup.com>
Sent: July-15-15 5:49 PM
To: [redacted]
Cc: Mike Latimer; Smeh, Wendy; 'Mike Pincivero'
Subject: RE: west end water storage !!

[redacted]

Thank you for your comment. We will inform the town and take your comment into consideration in our evaluation.
Gary

From: [redacted]
Sent: July-15-15 4:19 PM
To: Gary Scott
Subject: west end water storage !!

On your notice, area 6 should be double studied , I light of the fact Clearview has Trucking terminal, and I as a resident ,noticed contamination of brook in CARLY PATERSON PARK. Wasaga town has records, of this event.

From: Mike Pincivero <m.pincivero@wasagabeach.com>
Sent: July-16-15 9:37 AM
To: Gary Scott
Cc: Mike Latimer; Smeh, Wendy; Ray Kelso
Subject: RE: Wasaga Beach Water Stroage and Depot Class EA

Follow Up Flag: Follow up
Flag Status: Flagged

Thanks Gary.

Regards,

Mike Pincivero, P.Eng.
Manager of Engineering Services, RMO/RMI

Town of Wasaga Beach
30 Lewis Street
Wasaga Beach, Ontario
L9Z 1A1

Office: (705) 429-2540 ext. 2307
Fax: (705) 429-8226
Cell: (705) 441-4123
pwengineer@wasagabeach.com

From: Gary Scott [mailto:scott@ainleygroup.com]
Sent: July-16-15 8:27 AM
To: Mike Pincivero
Cc: Mike Latimer; Smeh, Wendy
Subject: RE: Wasaga Beach Water Stroage and Depot Class EA

Yes it's the Buckinham site. [redacted] is the sister of [redacted] (I believe has power of attorney) and no they are not interested in selling for a depot. They are interested in something that is more appropriate to the site and enhances the entrance to the town (though don't take my word for it). It might be a good idea if planning talks to her.

From: Mike Pincivero [mailto:m.pincivero@wasagabeach.com]
Sent: July-15-15 11:03 PM
To: Gary Scott
Cc: Mike Latimer; Smeh, Wendy
Subject: RE: Wasaga Beach Water Stroage and Depot Class EA

Gary,

Which site / owner is this referring to? Is it the "Buckingham Site"? If that owner is now interested in us obtaining her property for the depot it may have bearing on our (Steve Fournier and Town staff) discussions tomorrow (Thursday July 16th) with the NVCA re: the Bay Sand Drainage EA. Please let me and/or Steve Fournier know asap if this is the case.

Regards,

Mike Pincivero, P.Eng.
Manager of Engineering Services, RMO/RMI

Town of Wasaga Beach
30 Lewis Street
Wasaga Beach, Ontario
L9Z 1A1

Office: (705) 429-2540 ext. 2307
Fax: (705) 429-8226
Cell: (705) 441-4123
pwengineer@wasagabeach.com

From: Gary Scott [mailto:scott@ainleygroup.com]
Sent: July-15-15 1:39 PM
To: [redacted]
Cc: Mike Latimer; Smeh, Wendy; Mike Pincivero
Subject: Wasaga Beach Water Stroage and Depot Class EA

[redacted] thanks for the call. Apologies that the map is unclear and I confirm that we will send you a copy of the display boards to be used at the upcoming Public Information Centre.
At this time our recommended site is Site 2 which is about 1 km to the west of your site (west of 76th Street). After we completed our site identification and initial evaluation I know that the Town representatives talked to all the Owners of our candidate sites to indicate that their site was being considered. I know that your planner had conveyed to the town that you would not be interested in selling the property. After our discussion I have a deeper appreciation of this.

Following the Public Information Centre on July 22, 2015, we have allowed a 2 week period for comments. Assuming we are able to adequately deal with these and they do not affect the selection of the preferred alternative, we will move ahead with more detailed work for site 2.

We are just putting the final touches to our display boards and when they are complete we will send you a pdf version likely by next Monday. We will alos send you a copy of our comments sheet to be handed out at the PIC and we would be pleased to receive any comments you might have.

In the meantime, should you have any concerns please feel free to contact me or Mike Latimer who is the Project Manager for the Town.

Gary Scott, M. Sc., P. Eng.
Vice President, Water Business

Ainley
www.ainleygroup.com

2 County Court Blvd., 4th Floor
Brampton, ON L6W 3W8
scott@ainleygroup.com
Tel: (905) 595- 6859

Cell: (905) 767-1284

Wendy Smeh

From: Gary Scott <scott@ainleygroup.com>
Sent: July-17-15 9:10 AM
To: [redacted]
Cc: Simon Ainley; Wendy Smeh
Subject: RE: Town of Wasaga Beach site identification for the new west end water storage and maintenance depot

Thanks for your enquiry. At this time our recommended preferred site is Site 2. Our evaluation matrix, which will be shown at the PIC, recemmends this site. We will take any comments we receive through the public consultation process and provided Site 2 remains the preferred, we will be conducting more detailed studis on that site.
Hope this is sufficient for now.
Gary

From: [redacted]
Sent: July-16-15 2:09 PM
To: Gary Scott
Subject: Town of Wasaga Beach site identification for the new west end water storage and maintenance depot

Good afternoon Scott

We are trying to determine our level of interest in this study/project as we live at 463 Ramblewood Drive. Alternative site #6 appears to be on Ramblewood and immediately west of the Carly Patterson Trail. Would you please advise us of the boundaries of site 6.

We also understand there is an public information/open house on the 22nd, so the receipt of this information prior to the session, would be appreciated.

Respectfully

[redacted]

wls

RECEIVED
JUL 17 2015
AINLEY & ASSOC. LTD.

114137
FILE No

[redacted]

16th July 2015.

Mr. M. Latimer,
Cc Mr. Gary Scott.

Yesterday I received in the mail your correspondence in regards to the environmental study/ assessment for a new water storage reservoir and maintenance depot. One is assuming it is just one of each facility being considered in the seven locations identified. However the reproduction of the map is so poor that it is difficult to determine exactly where the seven sites are located – but I wanted to ensure my letters were received prior to the 22nd July.

Firstly, both requirements should be considered on their visual merits, e.g. the water storage reservoir can be developed and viewed as a pleasing to the eye facility – ***if considered, built in that manner.*** The maintenance facility should be away from eye site due to its visual aspect plus the noise from within, due to the heavy traffic of the cities equipment. Furthermore it should be away from view for residences now or future plans [unknown by the undersigned] living in Wasaga Beach and people/ visitors driving into Wasaga Beach from the South or West.

With the above said, **site 6** could be one of the sites considered for the water storage reservoir as it could be created into a visually pleasant site – seen from the people driving on 26 from the South who would see the site looking down over the partial wooded strip between the highway and down to the West end of Ramblewood. A similar experience would be created on **site 3**. However the site needs to be created so that it could have a double use of becoming what it is intended for plus create a walking area for families and also create a sanctuary for some wildlife. Too much of both has been poorly designed in the past and removed forever from a once beautiful area called Wasaga Beach.

Site 1 or site 2 with **site 1** being the best location for the maintenance depot as they are located the most Westerly and in time, I'm sure the West end of Wasaga will be built up so the parkland, trails, strip malls, malls, residences can be designed around the site with consideration.

I believe **sites 4, 5 and 7** ***would not be an ideal*** place for either situation. On saying this, all the three sites could be considered for the water storage reservoir but not maintenance depot based on my previous comments.

As a reminder, the water reservoirs at the South/ West corner on 58th Street South have been recently created along with an entrance way of various floors including interlock. However within a few weeks the interlock has weeds growing up between – this now is a poor sight for the eyes and shows how easily it is to create what could be a grand experience into a mess. I'm guessing little thought went into the approval of materials/ methods to be used. I'm guessing – "the cheapest route".

On a similar vain – this council/ planning group in the past have failed miserably [in my opinion and that of many others] in planning out this West end of town. Ramblewood has now become a parallel run for Mosley traffic yet we have a school on Ramblewood. They took away the chance for an ideal walk [extension of the Carly Patterson trail]. This now runs along streets – poor planning. Their is talk of some concrete/ asphalt demolishing company being placed just South of Ramblewood at the West end [adjacent to housing] poor planning again. Currently the West end of Ramblewood is designated "light industry", has been for a number of years – trees/ forest were removed, wildlife ignored, yet we have not seen one individual buy into the light industry park. It seems from all this that the once potentially high end all brick homes on and around Ramblewood once known as Trillium Forest is now a mishmash of brick and a catch all for the planning department to create their abortions [my personal opinion]. People who paid thousand of dollars to back onto bush also lost out and had to fight with the city and planning to at least retain some bush but even now as they are aware, along with the builder, this bush will be dead soon [due to higher elevations on both sides being created for housing] and some poor and inexpensive attempt by the city planning department will become evident to create their replacement barrier in a few years – if we are lucky !. Poor planning again.

Yours faithfully,

[redacted]

From: Gary Scott <scott@ainleygroup.com>
Sent: July-17-15 2:29 PM
To: Jim Fraser
Cc: Tori Giangrande; Wendy Smeh; Mike Latimer
Subject: RE: [redacted]

Will do.

From: [redacted]
Sent: July-17-15 2:25 PM
To: Gary Scott
Subject: [redacted]

Re- the notice I received, town of Wasaga beach, class environmental assessment, west end storage facility, ect
Please place me on the mailing list for information.
thanks [redacted]

Wendy Smeh

From: Gary Scott <scott@ainleygroup.com>
Sent: July-18-15 4:53 PM
To: [redacted]
Cc: m.latimer@wasagabeach.com; Smeh, Wendy
Subject: RE: West end water storage facility.
Attachments: Map of 7 sites.pdf

[redacted]
Our apologies. Attached is a map of sites. Our evaluation presently shows Site 2 as the recommended preferred site subject to comments and input through the public process.
Gary

-----Original Message-----
From: [redacted]
Sent: July-17-15 6:13 PM
To: m.latimer@wasagabeach.com; Gary Scott
Subject: West end water storage facility.

We just received your notice of public meeting.

Looking at the map you have provided it is impossible to read.

Is it possible to email one that is legible so that we can have question prepared.

[redacted]

From: Mike Latimer <m.latimer@wasagabeach.com>
Sent: July-20-15 8:23 AM
To: [redacted]
Cc: Gary Scott; Wendy Smeh (smeh@ainleygroup.com)
Subject: RE: Water west end Wasaga beach
Attachments: Map of 7 sites.pdf

Good Morning [redacted]

You will be added to the mailing list and please find attached a map of the 7 potential sites, currently site 2 is the preferred option subject to public comment. Let me know if you have any other questions.

Kind Regards,

Mike Latimer, C.E.T.
Project Coordinator

Town of Wasaga Beach
30 Lewis Street
Wasaga Beach, Ontario
L9Z 1A1

Office: (705) 429-2540 ex. 2342
Cell: (705) 443-7800
m.latimer@wasagabeach.com

-----Original Message-----
From: [redacted]
Sent: July-19-15 8:15 AM
To: Mike Latimer
Subject: Water west end Wasaga beach

Have rec'd notice of pubic meeting/open house on Wednesday evening but unfortunately cannot attend, could you please include me in your distribution of information pertaining to this project.

Also I was wondering if there is a more legible map of the location for the proposed site and the alternatives. I have tried to look at the Map both in the mailed version of the public meeting notice and the electronic version and cannot make out any of the street locations and names.

Thank you

[redacted]

Wendy Smeh

From: Wendy Smeh <smeh@ainleygroup.com>
Sent: July-20-15 11:01 AM
To: [redacted]
Subject: RE: Water Tower - West End Wasaga Beach
Attachments: Site 1 - map.pdf; Site 1.pdf

Hi [redacted]

I hope these maps are clearer for you. It is a close up of the proposed site 1 from our PIC slides. If you zoom in you can see the streets clearly including Constance Blvd. The other pdf is a map saved from Google Maps.

Sincerely,

Wendy Smeh, C.E.T.
Engineering Technologist

280 Pretty River Parkway
Collingwood, ON L9Y 4J5
smeh@ainleygroup.com
Tel: (705) 445-3460 Ext. 135
Fax: (705) 445-0968
Cell: (705) 443-9334

-----Original Message-----
From: Wendy Smeh [mailto:smeh@ainleygroup.com]
Sent: July-20-15 9:34 AM
To: [redacted]
Subject: Water Tower - West End Wasaga Beach

Good Morning [redacted]

As discussed, please find a map of the proposed tower sites in the west end of Wasaga Beach.

If you have any further questions, please do not hesitate to contact me.

Regards,

Wendy Smeh, C.E.T.

Engineering Technologist

280 Pretty River Parkway
Collingwood, ON L9Y 4J5
smeh@ainleygroup.com
Tel: (705) 445-3460 Ext. 135
Fax: (705) 445-0968
Cell: (705) 443-9334

Wendy Smeh

From:	Gary Scott <scott@ainleygroup.com>
Sent:	July-20-15 7:34 PM
To:	[redacted]
Cc:	Mike Latimer; Smeh, Wendy; Tori Giangrande
Subject:	RE: Class EA - West End Water Storage Facility
Attachments:	Map of 7 sites.pdf

[redacted]

We will place you on the contact list.
Our evaluation of water storage alternatives indicates a preferred recommended alternative based on a 4500 m3 elevated tank in the west end of Town and an additional 4500 m3 cell at the Powerline Road Facility.
We also identified and compared 7 sites for the combined elevated tank and depot site and the recommended preferred site is site 2. Attached is a clearer map of the sites.

From: [redacted]
Sent: July-20-15 4:50 PM
To: Gary Scott
Subject: Class EA - West End Water Storage Facility

Scott,

I will be unable to attend the open house on Wednesday and was wondering if you could please place me on the mailing list so I can receive information on how the project is proceeding.

Also if there is any information available from the meeting I would appreciate reviewing it as well. I am quite interested in hearing about what type of storage is being proposed - above ground or grade level and the preferred location.

Thanks for keeping me in the loop on the process.

Cheers,

[redacted]

From: Gary Scott <scott@ainleygroup.com>
Sent: July-21-15 10:16 PM
To: Barbra Perreault
Cc: m.latimer@wasagabeach.com; Smeh, Wendy; Tori Giangrande
Subject: RE: West End Water Storage and Maintenance Depot

Thank you Barbra
It would appear that your comments at this stage do not change our identification of the preferred site as Site 2. We have perhaps underestimated the environmental impact of Site 4 based on your comments however at this time it is not the preferred site. Assuming that site 2 remains the preferred alternative through the first public consultation process, we will be conducting more detailed studies of the site and will keep NVCA informed of results to ensure we develop a solution consistant with all of NVCA regulations.
Gary

From: Barbra Perreault [mailto:bperreault@nvca.on.ca]
Sent: July-21-15 3:20 PM
To: Gary Scott; m.latimer@wasagabeach.com
Subject: West End Water Storage and Maintenance Depot

Thank you for consulting with the Nottawasaga Valley Conservation Authority (NVCA) concerning:

Class Environmental Assessment – West End Water Storage and Maintenance Depot

It is our understanding that the Town is considering sites for a new water reservoir and a new maintenance depot.

Upon review of the submitted mapping, NVCA regulations staff note the following; That all referenced sites a fully or partially, as identified on the attached map approved under Ontario Regulation 172/06, located within the regulatory jurisdiction of the NVCA under the *Conservation Authorities Act*;

Area 1 – contains a wetland and associated buffer over most of the property;
Area 2 – contains a small portion of wetland buffer on the north end of the property;
Area 3 – contains a small portion of wetland buffer in the south east corner of the property;
Area 4 – is completely within a wetland and associated buffer;
Area 5 – contains wetland and wetland buffer over most of the central portions of the property;
Area 6 – is the least regulated of all identified areas containing floodplain that is likely overestimated and
Area 7 – contains a small portion of wetland buffer that has been previously disturbed.

That a permit (or approval) from the NVCA is required for any proposed works within the regulated area under Section 28 of the *Conservation Authorities Act*.

NVCA staff will not likely attend the Public Information Centre, however, we respectfully submit the aforementioned for your consideration.

Regards,

Barb Perreault C.E.T., MLEO(C)
Manager, Regulations and Enforcement
Nottawasaga Valley Conservation Authority
8195 8th Line, Utopia, ON, L0M 1T0
Phone: 705-424-1479 ext. 245
Fax: 705-424-2115

website: www.nvca.on.ca **Twitter:** @NottawasagaCA **Facebook:** Nottawasaga Valley CA

Frequently Asked Questions for the Permit Process
http://www.nvca.on.ca/Pages/AboutPermits.aspx

Looking to Make a Permit Application?
http://www.nvca.on.ca/Pages/Planning-Forms-and-Fees.aspx

NVCA Planning and Regulations Documents
http://www.nvca.on.ca/Pages/PlanningPolicies.aspx

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

Public Information Centre – July 22, 2015
7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

PROPERTY OWNER

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

If you don't pick option #1, I will make you a giant lasagna ☺

Seriously, we would be negatively impacted by having a maintenance depot across the street.

Thank you

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540
Fax: (705) 429-8226
m.latimer@wasagabeach.com

Mr. Gary Scott, M. Sc., P. Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, ON L9Y 4J5
Tel: (705) 445-3451
Fax: (705) 445-0968
scott@ainleygroup.com

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Please print all responses.

NAME OF RESPONDENT: [redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address): [redacted]

COMMENTS (Please use the back of this sheet if necessary)

SEMI RETIREMENT AS WELL AS YOUNG FAMILIES.
LOTS OF YOUNG KIDS. TRAFFIC WOULD BE DANGEROUS.
(ALREADY IS @ 80KM).

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

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Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540
Fax: (705) 429-8226
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Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

OPPOSED TO SITE 1. A SEMI RETIREMENT
COMMUNITY. SENIORS HAVE A DIFFICULT TIME
PULLING OUT OF BLUE WATER RES. AS IS.
~~D~~ AS WELL ASTETICALLY UNAPPEALING.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

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Please print all responses.

NAME OF RESPONDENT: [redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

We do not have a problem with SITE 2 (Preferred Site)

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
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Please print all responses.

NAME OF RESPONDENT: [redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.): [redacted]

ADDRESS (Including Postal Code, Telephone Number & Email Address): [redacted]

COMMENTS (Please use the back of this sheet if necessary)

REPRESENTING INTERESTS OF 115 HOMEOWNERS
WHO DO NOT WANT THE VISIBILITY OF WATER TOWERS
OR SERVICE YARDS.
HOMEOWNERS HAVE EXPRESSED CONCERN THEY BOUGHT
HOMES IN THE 1,000,000 RANGE AND WANT SURROUNDING
AREAS TO REMAIN R1 RESIDENTIAL
SITE #1 ENTRANCE WILL IMPACT BLUEWATER CONDO

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

TRUCK NOISE IS A GREAT ISSUE TO HOMEOWNERS.

☐ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

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Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

WE AGREE THAT SITE #2 IS THE PREFERRED LOCATION.
SITES 3&4 WOULD BE SECOND CHOICES BECAUSE THEY
ARE FARTHER FROM RESIDENTIAL AREAS & WOULD
PREVENT EXCESS TRAFFIC ON BEACHWOOD.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☒ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
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Tel: (705) 429-2540
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Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

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Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

Owner

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

①GET THIS PROJECT AS FAR AWAY FROM SUBDIVISIONS AS YOU CAN

②Site 2 looks good too me.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
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Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540
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Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

PROPERTY OWNER

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

SITE 2 AS IT IS PROPOSED

- MUST STAY AWAY FROM LARGE SUBDIVISIONS
- MORE THAN ENOUGH TRAFFIC NOW
- ALL OTHER AREAS TOO CLOSE TO MULTIPLE RESIDENCES

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
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Tel: (705) 429-2540
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	COLLINGWOOD	STAYNER	WASAGA - EAST	WASAGA - RAMBLEWOOD
On which road	10th Line	Nottawasaga 27/28	Westbury	Ramblewood
Road direction	N - S	W - E	N - S	W - E
	dead end	on Stayner bypass	dead end	throughfare
CURRENT				Lyons to 58th
distance	16,500 m	2,500 m	1,000 m	1,250 m
homes	0	2	9	54
business / farms	8	6	1	1
feeder streets	0	1	4	7
surrounding homes from feeders	0	12	194	152
FUTURE				
homes	0			200
CURRENT				58th - 45th
distance				1,350
homes				1
business / farms				1
feeder streets				5
surrounding homes from feeders				253
FUTURE				
homes				100
RECAP				Start to finish
distance	16,500 m	2,500	1,000 m	2,600 m
homes	0	2	9	55
business / farms	8	6	1	2
feeder streets (12)	0	1	4	12
surrounding homes from feeders	0	12		405
CURRENTLY	8	20	10	462
future homes				300
TOTAL CURR & FUTURE	8	20	10	762
HOMES facing road in question	**0**	**2**	**9**	**85**
Distance from Works to Subdivision	1,100 m	1,100 m	175 m	**DISECTS**
when subdivision bulit	after	nominal	after	------

[redacted]

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

Public Information Centre – July 22, 2015
7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT: [redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

#2 SITE RECOMENDED IF NOT
OPOSED BY NEARBY RESIDENCE.
ON 75TH St.
ROOM FOR FUTURE EXPANSION.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
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Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

SITE 2 – AS LONG AS PROPOSED
RD HAPPENS — AND NO
TOWN TRAFFIC UP 73 - 74 + 75TH
I'M OK. HOW ABOUT NOISE
ETC

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
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Tel: (705) 429-2540
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Please print all responses.

NAME OF RESPONDENT: [redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address): [redacted]

COMMENTS (Please use the back of this sheet if necessary)

Site 1 would not be a good idea – we do not want the noise, the dust, the traveling of trucks coming & going – the site should be away from any subdivisions new existing – when we bought our homes, there was no mention of water shortage and a possibility of large trucks encroaching our subdivision.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
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Tel: (705) 429-2540
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Class Environmental Assessment

Public Information Centre – July 22, 2015
7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

Property Owner

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

Site #1 not preferred
Location is within a very short distance to Blue Water Subdivision
* → an upscale community *
Large trucks would be turning at our entrance, noise level increases
* Lighting too bright * at all hours day or night.

We did not move to Wasaga for this - We moved here for the Solitude & enjoying the Nature.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☒ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540
Fax: (705) 429-8226
m.latimer@wasagabeach.com

Mr. Gary Scott, M. Sc., P. Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, ON L9Y 4J5
Tel: (705) 445-3451
Fax: (705) 445-0968
scott@ainleygroup.com

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

Public Information Centre – July 22, 2015
7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

Property Owner

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

SITE 1 – entrance to our subdivision would be right across
from proposed site – speed is 80 for safety→not recommended.
– noise level to increase; will have lights on 24/7.
– excess congestion in area.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

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Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

I agree that location #2 should be chosen.
- close to Hwy 26, and JC Cycle.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☒ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

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Project Coordinator
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Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

CLEARVIEW TOWNSHIP

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

TOWNSHIP OF CLEARVIEW IS LOOKING INTO OPTIONS FOR
SERVICING LANDS NEAR THE AIRPORT AND ALSO IN A
CHECKER BOARD SUBDIVISION KNOWN AS "THE SCHELL FARM"
THESE PROPERTIES ARE CLOSER TO "POTENTIAL AREA 2"
THAN THEY ARE TO STAYNER. THERE MAY BE AN
OPPORTUNITY FOR (BENEFICIAL) COST SHARING SERVICING
AGREEMENT. DISCUSSION FOR CLEARVIEW & WASAGA BEACH
CAOs.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540
Fax: (705) 429-8226
m.latimer@wasagabeach.com

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COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

Blue Water Sub

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

trucks going in and out across the street would be dangerous to children waiting for the bus .. adults catching the bus

Acaross the street from us is suppose to be residential. It is also a bike path joining Wasaga to Collingwood (blue water subdivision

Trucks going thru the roundabouts (salt trucks) would be very dangerous

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540
Fax: (705) 429-8226
m.latimer@wasagabeach.com

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West End Storage Facility and Maintenance Depot
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Public Information Centre – July 22, 2015
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COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT: [redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):
[redacted]

ADDRESS (Including Postal Code, Telephone Number & Email Address):
[redacted]

COMMENTS (Please use the back of this sheet if necessary)

- SITE 2 MAKES SENSE FROM MINIMAL INTRUSION TO EXISTING RESIDENCES & BUSINESSES & ALLOWS FOR FUTURE EXPANSION
- SITE 1 IS ACROSS THE STREET FROM UPSCALE (> $750,000 HOMES) WHICH WHEN BUILT WERE SHOWN SITE 1 AS BEING ZONED R1 (Residential)
- TREMENDOUS NEGATIVE IMPACT ON HOUSE VALUES (SITE 1)

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

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Tel: (705) 429-2540
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Fax: (705) 445-0968
scott@ainleygroup.com

THANK YOU FOR SPEAKING TO ME

[redacted]

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

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7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:
[redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):
[redacted]

COMMENTS (Please use the back of this sheet if necessary)

Site 2 appears to be the best choice - will service west end - least disturbance to natural environment, population etc.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

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Project Coordinator
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Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner,] Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

thank you, interesting & informative presentation

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
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m.latimer@wasagabeach.com

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Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

#2 LOOKS GOOD. LEAST IMPACT ON RESIDENTIAL OUTLOOK/SIGHT LINES.

[redacted]

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☒ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

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Project Coordinator
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Please print all responses.

NAME OF RESPONDENT: [redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

ACCORDING TO THE ENGINEERS' STUDY SITE 2 APPEARS
TO BE THE MOST SUITABLE FOR THE PROJECT.
IT IS ALSO MY PREFERRED CHOICE.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☒ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
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Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

OWNER.

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

#2 APPEARS TO BE A GOOD OPTION.
THE NEIGHBOURS TO THE EAST MAY HAVE OBJECTIONS.
ANALYSIS WAS WELL PRESENTED.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

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Please print all responses.

NAME OF RESPONDENT: [redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):
[redacted]

COMMENTS (Please use the back of this sheet if necessary)

The site chosen should impact as few people as possible. Site 1 is opposite a 115 home sub-division --- not a good Location. I agree with your site 2 preference especially if it could be shifted a little westward. If a few of the other sites could be located so as to have less impact on tax payers and homes. Why is alternative 2 (water storage) not being preferred ??

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☒ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

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Project Coordinator
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Please print all responses.

NAME OF RESPONDENT: [redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

AS PER THE ENGINEER'S STUDY SITE 2 IS THE PREFERRED AND MOST SUITABLE FOR THE PROJECT.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☒ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
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Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, Property [✓ Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

Site 1 - least desireable NIMBY
Site 2 - off Beachwood, tree buffer to residential could be increased by planting more trees.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

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Project Coordinator
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Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

TRAFFIC ON BEACHWOOD HAS INCREASED RECENTLY
PEOPLE ARE SPEEDING, EVEN IN 60 KM ZONE
IN EXCESS OF 100 KM.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

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scott@ainleygroup.com

From: Gary Scott <scott@ainleygroup.com>
Sent: July-22-15 9:43 AM
To: [redacted]
Cc: Mike Latimer; Wendy Smeh
Subject: RE: Wasaga Beach west end water storage
Attachments: Map of 7 sites.pdf

[redacted]

We apologise for the map. It was too small we agree.
Hope you find the attached map a bit better. Our evaluation shows that site 2 is the recommended preferred site. It is just west of 75th Street.
Gary

From: [redacted]
Sent: July-22-15 9:35 AM
To: Gary Scott
Subject: Wasaga Beach west end water storage

I received your notice regarding subject study.
Please explain the area affected, (west of 58th street to the town boundary) where is the boundary?
How will this affect residents on 70th st? The map that was supplied is not legible.

Thank you
[redacted]

From: Gary Scott <scott@ainleygroup.com>
Sent: July-27-15 11:48 AM
To: Tori Giangrande; Smeh, Wendy
Subject: FW: West End Storage Facility and Maintenance Depot
Attachments: img246.pdf

-----Original Message-----
From: [redacted]
Sent: July-27-15 11:30 AM
To: m.latimer@wasagabeach.com; Gary Scott
Cc: [redacted]
Subject: West End Storage Facility and Maintenance Depot

Thank you for allowing residents to voice their concerns.
We are certainly concerned and think that the location across from Blue Water condos on Beachwood road is not the best location for this.
However should it happen to be there we believe that you will do all you can to make sure the environment is properly protected and that any problems will not happen in the future.
Kind Regards,
[redacted]

Your message is ready to be sent with the following file or link
attachments:

img246

Note: To protect against computer viruses, e-mail programs may prevent sending or receiving certain types of file attachments. Check your e-mail security settings to determine how attachments are handled.

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

Public Information Centre – July 22, 2015
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COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:
[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):
Property Owners (Bluewater Condos)

ADDRESS (Including Postal Code, Telephone Number & Email Address):
[redacted]

COMMENTS (Please use the back of this sheet if necessary)

Concern about the location for the Storage Facility and Maintenance Depot
- will there be more traffic?
- will it have a locked gateway? fencing?
- will it be totally secure?
- will it be a problem being close to the Bay? (problem for water)

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☒ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
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Tel: (705) 429-2540
Fax: (705) 429-8226
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Tel: (705) 445-3451
Fax: (705) 445-0968
scott@ainleygroup.com

Wendy Smeh

From: Mike Latimer <m.latimer@wasagabeach.com>
Sent: July-28-15 10:03 AM
To: Gary Scott
Cc: Tori Giangrande; Smeh, Wendy
Subject: RE: West End Water Storage Facility

Perfect. Makes sense Gary.

Kind Regards,

Mike Latimer, C.E.T.
Project Coordinator

Town of Wasaga Beach
30 Lewis Street
Wasaga Beach, Ontario
L9Z 1A1

Office: (705) 429-2540 ex. 2342
Cell: (705) 443-7800
m.latimer@wasagabeach.com

From: Gary Scott [mailto:scott@ainleygroup.com]
Sent: July-28-15 9:30 AM
To: Mike Latimer
Cc: Tori Giangrande; Smeh, Wendy
Subject: FW: West End Water Storage Facility

Thanks Mike
We are accumulating all comments and would like to suggest we respond to them all at the same time at the end of the two week comment period.
Gary

From: Mike Latimer [mailto:m.latimer@wasagabeach.com]
Sent: July-28-15 9:24 AM
To: Gary Scott
Cc: Mike Pincivero
Subject: FW: West End Water Storage Facility

FYI. See below.

Kind Regards,

Mike Latimer, C.E.T.
Project Coordinator

Town of Wasaga Beach
30 Lewis Street

Wasaga Beach, Ontario
L9Z 1A1

Office: (705) 429-2540 ex. 2342
Cell: (705) 443-7800
m.latimer@wasagabeach.com

From: [redacted]
Sent: July-27-15 3:12 PM
To: Mike Latimer
Subject: West End Water Storage Facility

Hello Mike.
I trust that you received my letter; if not, please let me know. As I indicated on the phone, I would like to be informed about any discussions, reports, and/or upcoming meetings regarding this undertaking. In addition, I would like to review copies of any reports, memos, and so forth, prior to the public works department's presentation to council committees.and/or prior to land acquisition or other actions that moves the process forward. Thank you.
[redacted]

July 23, 2015

Mr. Gary Scott, M.Sc., P. Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, Ontario
L9Y 4J5

Re: West End Water Storage Facility and Maintenance Depot

Attention: Mr. Gary Scott – scott@ainleygroup.com

Dear Mr. Scott:

Thank you for taking the time to discuss the above-noted project at the open house. It would be difficult for [redacted] to fully understand the pros and cons of such a development without knowing or understanding the impacts on our property. I am confident however, that as the project proceeds through its various levels of studies and assessments, some of my concerns and questions will be addressed.

In the meantime, I do have a few questions that are more immediate and that perhaps you could address or for which you could refer the appropriate contact.

1. The design (layout) of the site at last night's meeting differs from the design shown in the PowerPoint slides on the Town of Wasaga Beach's website. Which better represents the site plan you hope to implement?

2. What is the actual lot area (length/width/irregular) to be purchased by the Town for this project? What is the distance between my *south boundary lot line* and the *project's north lot line*? What is the distance between my *south lot line* and the *nearest structure* on the site, with the parking lot area being a structure as in the above-noted photo?

3. What is the height and capacity of the water tower?

4. Also… on the photo above, there is a designation that reads: COMM TOWER. I assume this means Communication Tower (e.g Roger's). If so, has a contract been considered or accepted, and has consideration been given to the local airport and air traffic in the area? Health issues associated with communication towers – if any?

5. Will more land be purchased and used for the construction of Joan Avenue, and if so, from the west or east, or both?

6. Regarding the SWM pond, will this affect groundwater in our area (?); as you know, we would want to ensure proper drainage from our lot.

And, finally, I would like to understand more about the purpose/function of including a stormwater management pond on the site, as well as the size of the pond. My *very basic understanding* of a water tower is that there is a tower, tank, and pump. I would like to know more about the pumping **configuration (e.g. 500 gallons/minute; 1000 gallons/minute)**.

I would like to note that John and I are excited about a possible drainage study for this location, which I assume will be needed prior to the commencement of the project. We are not necessary opposed to the project, so please do not interpret my questions as a negative response; they are not intended to be such. I really just want to fully understand what the project means in relation to our property. I do hope to be kept informed as you move forward, including the acquisition of land and site planning stages, environmental and drainage studies, and so on.

Thank you.

[redacted]

Cc: Mr. Mike Latimer, C.E.T. Project Coordinator, Town of Wasaga Beach
m.latimer@waagabeach.com

Wendy Smeh

From: Gary Scott <scott@ainleygroup.com>
Sent: July-29-15 11:13 AM
To: Tori Giangrande; Smeh, Wendy
Subject: FW: Ref Town of Wasaga Beach Class Environmental Assessment West End Water Storage & Maintenance Depot Notice of Public Information Centre No. 1 --- NEATS 4024
Attachments: 2015-07-08 Ref Town of Wasaga Beach Class Environmental Assessment West End Water Storage & Maintenance Depot Notice of Public Information Centre No. 1.PDF

From: EnviroOnt [mailto:EnviroOnt@tc.gc.ca]
Sent: July-29-15 10:17 AM
To: Gary Scott
Subject: Ref Town of Wasaga Beach Class Environmental Assessment West End Water Storage & Maintenance Depot Notice of Public Information Centre No. 1 --- NEATS 4024

Hello Scott,

Please note that under *the Canadian Environmental Assessment Act, 2012*, Transport Canada is required to determine the likelihood of significant adverse environmental effects of projects that will occur on federal lands prior to exercising a power, performing a function or duty in relation to that project. To determine if the aforementioned applies, it is the responsibility of the project proponent to:

1. Review the Directory of Federal Real Property (http://www.tbs-sct.gc.ca/dfrp-rbif/) to determine if the project will potentially interact with any federal property; and

2. Review the list of Acts that Transport Canada administers and assists in administering that may apply to the project, available at: https://www.tc.gc.ca/eng/acts-regulations/acts.htm.

If a project will interact with a federal property **and** requires approval and/or authorization under any of the Transport Canada Acts, then correspondence should only be forwarded electronically to Environmental Assessment Coordinator at: EnviroOnt@tc.gc.ca – please ensure distribution lists are updated.

Below is a summary of the most common Acts that have applied to projects in an Environmental Assessment context:

> ***Navigation Protection Act (NPA)*** – the NPA applies primarily to works constructed or placed in, on, over, under, through, or across scheduled navigable waters set out under the Act. The Navigation Protection Program administers the NPA through the review and authorization of works affecting scheduled navigable waters. Information about the Program, NPA and approval process is available at: http://www.tc.gc.ca/eng/programs-621.html. Enquiries can be directed to NPPONT-PPNONT@tc.gc.ca or (519) 383-1863.
>
> ***Railway Safety Act (RSA)*** – the RSA provides the regulatory framework for railway safety, security, and some of the environmental impacts of railway operations in Canada. The Rail Safety Program develops and enforces regulations, rules, standards and procedures governing safe railway operations. Additional information about the Rail Safety Program is available at: https://www.tc.gc.ca/eng/railsafety/menu.htm. Enquiries can be directed to RailSafety@tc.gc.ca or (613) 998-2985.

Transportation of Dangerous Goods Act (TDGA) – the transportation of dangerous goods by air, marine, rail and road is regulated under the TDGA. Transport Canada, based on risks, develops safety standards and regulations, provides oversight and gives expert advice on dangerous goods to promote public safety. Additional information about the transportation of dangerous goods is available at: https://www.tc.gc.ca/eng/tdg/safety-menu.htm. Enquiries can be directed to TDG-TMDOntario@tc.gc.ca or (416) 973-1868.

Aeronautics Act – Transport Canada has sole jurisdiction over aeronautics, which includes aerodromes and all related buildings or services used for aviation purposes. Aviation safety in Canada is regulated under this Act and the Canadian Aviation Regulations (CARs). Elevated Structures, such as wind turbines and communication towers, would be examples of projects that must be assessed for lighting and marking requirements in accordance with the CARs. Transport Canada also has an interest in projects that have the potential to cause interference between wildlife and aviation activities. One example would be waste facilities, which may attract birds into commercial and recreational flight paths. Enquires can be directed to CASO-SACO@tc.gc.ca or 1 (800) 305-2059 / (416) 952-0230.

If none of the aforementioned information applies to any of the projects under review, please ensure we are removed from the distribution list.

Thank you,

Environmental Assessment Coordinator | Coordinatrice d'évaluation environnementale
Transport Canada, Ontario Region | Transports Canada, Région de l'Ontario
4900 Yonge St., Toronto, ON M2N 6A5 | 4900, rue Yonge, Toronto, ON, M2N 6A5
Email | Courriel: EnviroOnt@tc.gc.ca
Facsimile | télécopieur: (416) 952-0514
Government of Canada | Gouvernement du Canada

To	Seen
GS	

FILE No 114137

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

Public Information Centre – July 22, 2015
7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT: [redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.): PROPERTY OWNER

ADDRESS (Including Postal Code, Telephone Number & Email Address): [redacted]

COMMENTS (Please use the back of this sheet if necessary)

See attached 1 page

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☒ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540
Fax: (705) 429-8226
m.latimer@wasagabeach.com

Mr. Gary Scott, M. Sc., P. Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, ON L9Y 4J5
Tel: (705) 445-3451
Fax: (705) 445-0968
scott@ainleygroup.com

RECEIVED
JUL 31 2015
AINLEY & ASSOC. LTD.

[redacted]

30th July 2015.

In regards to the open house offered to certain residence of Wasaga Beach relating to an environmental assessment with respect to the new water storage and maintenance depot that the city feels is required, please find my feedback.

In general: I would like to see the water storage ponds separated away from depots and have them placed in areas where they can be filtered in with walking trails either existing or planned. After all the city just keeps cutting down pristine forests for brick/ aluminum and mortar with little or no regard to walking trails, animal habitat etc.. One great area for a pond would be at site 6 and have it join up into the existing Carly Patterson trail. Yes it would take away a couple of light industry sites, however to date, I believe not one site has been purchased. As it is now, Ramblewood was part of one of the better all brick sub divisions at the West end of Wasaga, now it has become a race track and adjacent road for taking some of the Mosley traffic away [cities original intent]. There is a school on the street and the above mentioned light industry sites at the far West. There are homes facing Ramblewood and some backing onto Ramblewood with miserable fencing of all types – all very poor planning. So to try and at least attempt to pick up some "thinking ahead" attitudes – lets have a nice pond in this area with well planted trees, walking trails for families to use plus it would/ could show very well when driving into Wasaga from the South.

On a separate subject – lets have all dogs "chipped" so that all the dog stools can be matched to DNA by vets and come down hard on those owners who allow their animal to litter. Again, "thinking ahead" – revenue for the town.

Per the open house, it seems the city is moving for / preferring site 2 with site 4 a second. However it seems, based on feedback from both representatives of the city and the planner that the land is not currently owned by the city and that the property owner has to be convinced to sell.

In regards to site 2 [preferred] it would make more sense to have the road from the depot run from the far west side of the site so as to keep noise and traffic away from the homes on the East side of the site. This would also mean that the heavy equipment etc. would not have to drive between the water tower and pond.

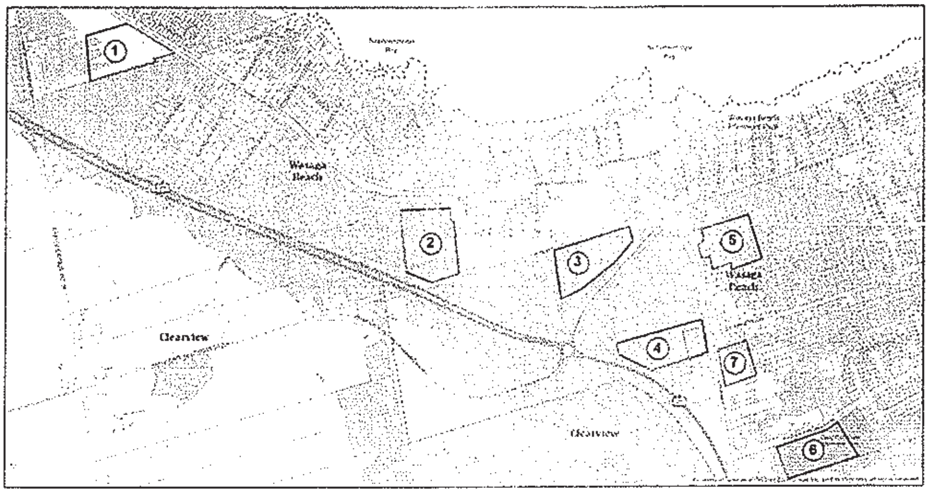
In conclusion, I believe the best sites for a depot and water tower only would be in the following order. Site 2, 1, 4, 3 and 5 only. However, the area where sites 4 and 3 are situated would be a prime area for a large park/ play/ bar-b-q, sports complex at the West end. If planned correctly we could entice people from Collingwood down – "additional potential revenue".

114137
~~WLS~~
~~JGS~~

TOWN OF WASAGA BEACH
CLASS ENVIRONMENTAL ASSESSMENT
WEST END WATER STORAGE FACILITY AND MAINTENANCE DEPOT
NOTICE OF PUBLIC INFORMATION CENTRE NO. 1

Further to the Notice of Study Commencement issued October 7, 2014, the Town of Wasaga Beach is continuing to undertake a Class Environmental Assessment (Schedule C) to consider alternative sites for a new water storage reservoir, and alternative sites for a new maintenance depot in the Town's west end.

The area west of 58th Street to the Town boundary was identified as suitable for a maintenance depot to serve the west end and to provide sufficient water storage to the west end. Based on the site requirements, seven (7) alternative sites were identified for the west end facility. The study area with the location of the seven (7) Alternative Sites is shown on the map.



Public Information Centre

A Public Information Centre is planned to provide further information to the public on the evaluation process and Recommended Preferred Solution and to receive input and comment from interested persons.

Time: Open House: 7:00 pm to 9:00 pm
Date: Wednesday, July 22, 2015
Location: Wasaga Rec Plex – 1724 Mosley Street

Public input and comment on the recommended solution will be incorporated into the planning process. Comments received before August 21, 2015 will be taken into consideration in Phase 3. A future Public Information Centre (Phase 3) will be held to present Design Alternatives for the recommended preferred solution. A Notice will be issued prior to the future PIC date.

If you have any comments or questions, or if you would like to be placed on the mailing list to receive project information, please contact either:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540
Fax: (705) 429-8226
m.latimer@wasagabeach.com

Mr. Gary Scott, M. Sc., P. Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, ON L9Y 4J5
Phone: (705) 445-3451
Fax: (705) 445-0968
scott@ainleygroup.com

This Notice issued July 9, 2015.

A MAP THAT IS IMPOSSIBLE TO READ DOESN'T HELP MUCH. PLEASE PUT US THE MAILING LIST [redacted]

[redacted]

[redacted]

7.31.2015

RECEIVED
AUG 07 2015
AINLEY & ASSOC. LTD.

TO | SEEN
WLS
FILE NO.
114137

Mr. Mike Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1

AND

Mr. Gary Scott, M. Sc., P.Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, ON L9Y 4J5

Subject: Wasaga Beach west end storage facility and Maintenance Depot

Gentlemen:

Thank you and the Municipality for hosting the Public Information Centre on July 22rd, 2015. I along with neighbours appreciated the volume and quality of your presentation. And Michael, I want to thank you again for our discussion and allowing me to take blank comment sheets to others that were not able to attend.

Please find ~~eight~~ 10 responses that have been brought to my home for your phase 3 consideration. I have found that either language, reading, and/or writing skills have reduced the numbers as we assisted somewhat in the understanding of the project. I can assure you that there is additional negative feelings towards a maintenance depot in the Ramblewood/Lyons area.

We look forward to attending the PIC in phase 3.

Respectfully submitted

[redacted]

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot Class Environmental Assessment

Public Information Centre – July 22, 2015
7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

MYSELF AS A PROPERTY OWNER RE: Notice Regarding PROSAL

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

SELECTION #2 SITE = SAFETY, GEOGRAPHIC, TOWN GROWTH, NOISE, LAND Use Applicable/appropriate

OPPOSED TO #6 SITE = SAFETY, children live and play in the area, families in region enter & exit "Carry trail". NOISE maintenance facility activities coming/going at all hours & moving of their equipment within, many other reasons. A road maintenance depot, in any format APPEARANCE would →

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☐ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540
Fax: (705) 429-8226
m.latimer@wasagabeach.com

Mr. Gary Scott, M. Sc., P. Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, ON L9Y 4J5
Tel: (705) 445-3451
Fax: (705) 445-0968
scott@ainleygroup.com

absolutely and most definitely be a negative impact to our beautiful community of "Trillium Forest" Residential community, and this proposed facility & location would have a negative impact on the value of our homes. Recently, increase traffic has caused several people to sell their homes. Unbeknown to us, we just bought on Ramblewood 1-month ago, & if we had known. We would most definitely not done so, and now there is a proposed site at the end of our for a road maint. depot.

Shadow = by mid day the sun is from the west. A tower would cause a shadow for several of the homes.

Traffic the maintenance depot would definitely cause an increase in traffic, which would be added already to a very busy residential street. During winter weather, the maintenance equipment will be disturbing 24x7.

Suggestion # A meeting with the municipal staff/government need to meet with property owners of site #6 (and across the road) for the purpose of amending the Zoning to permit RESEDNTIAL.

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

Public Information Centre – July 22, 2015
7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

MYSELF AS A PROPERTY OWNER AND 4 FAMILIES THAT ARE OUT-OF-TOWN BUT HAVE REVIEW THE 'NOTICE' REGARDING PROPOSAL.

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

SELECTION: #2 SITE – SAFETY, GEOGRAPHIC, TOWN GROWTH, NOISE, LAND USE APPROPRIATE
I/WE TOTALLY AGREED THAT THIS IS THE PREFERRED LOCATION.

OPPOSED TO #6 SITE – SAFETY – CHILDREN LIVE AND PLAY IN THIS AREA AND FAMILIES FROM REGION ENTER/EXIT 'CARLY TRAIL'. NOISE MAINTENANCE FACILITY ACTIVITIES COMING/GOING AND MOVEMENT WITHIN – AND MUCH MORE, NO MATTER HOW YOU PRESENT IT – APPEARANCE WOULD ABSOLUTELY BE A NEGATIVE, THIS IS AN ENTRANCE TO THE BEAUTIFUL 'TRILLIUM FOREST' RESIDENTIAL →
OVER

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
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COMMUNITY AND SUCH A FACILITY WOULD DEVALUE OUR PROPERTIES. RECENTLY 3 HOUSES ON RAMBLEWOOD HAVE BEEN SOLD BECAUSE OF INCREASED TRAFFIC AND I PERSONALLY WOULD MOVE AT THE VERY HINT OF A DEPOT BEING LOCATED NEARBY.

SHADOW BY MID-DAY THE SUN IS FROM THE WEST. A TOWER WOULD CAUSE A SHADOW FOR SEVERAL OF THE HOMES.

TRAFFIC IN ADDITION TO THE SAFETY CONCERN EXPRESSED WE FEEL THERE WOULD BE A TRAMENDOUS VOLUME OF TRAFFIC. PERHAPS NOT AS MUCH IN THE NITE BUT GIVEN WINTER WEATHER A PLOWING NEEDS IT HAS THE POTENTIAL TO BE A DISTURBANCE 24 X 7.

SUGGESTION: I THINK IT IS TIME FOR THE MUNICIPAL STAFF/GOVERNMENT TO MEET WITH THE PROPERTY OWNER OF SITE #6 (AND ACROSS THE ROAD) FOR THE PURPOSE OF AMENDING THE ZONING TO PERMIT RESIDENTIAL.

[redacted]

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

Public Information Centre – July 22, 2015
7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

PROPERTY OWNER

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

WE ARE IN SUPPORT OF SITE 2 AS THE LOCATION.
HAVING REVIEWED ALL PROPOSED SITES THIS IS THE
MOST LOGICAL LOCATION WITH MINIMAL IMPACT TO THE
RESIDENTS. THIS APPEARS TO BE 'AN ORPHANED" PIECE OF PROPERTY.'
ALL ~~LOCATION~~ CONSIDERED LOCATIONS NEAR RESIDENTIAL
AREAS ie SITE 6, 7 SHOULD BE ELIMINATED. - ESPECIALLY
SITE 7 WHERE THE AREA CAN BE FUTURE RESIDENTIAL AND/OR -

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

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COMMERCIAL PROPERTY. IT IS ILLOGICAL TO USE THIS PIECE OF PROPERTY FOR WATER STORAGE & MAINTENANCE PURPOSES.

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

Public Information Centre – July 22, 2015
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COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT: [redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

OWNER

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

I AGREE THAT SITE NO# 2 WOULD BEST SUIT THE NEEDS OF THE TOWN OF WASAGA BEACH. RATHER THAN IN OUR BACKYARD. AND NO# 6 WOULD BE A REAL BAD CHOICE IN MY MIND. FOR THESE REASONS SUCH AS, TRAFFIC, NOISE, HOUSE DEVALUATION.

[redacted]

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☐ Yes ☑ No

Please submit this comment sheet by August 21, 2015 to:

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m.latimer@wasagabeach.com

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The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

Public Information Centre – July 22, 2015
7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

Don't like anything other than houses in my area. No C to #6 #2 is best location

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
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COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT: [redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):
[redacted]

ADDRESS (Including Postal Code, Telephone Number & Email Address):

COMMENTS (Please use the back of this sheet if necessary)

NO TO MY ZONE
2 OK

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☐ Yes ☑ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
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COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

No 6   Yes #2

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☐ Yes ☑ No

Please submit this comment sheet by August 21, 2015 to:

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Please print all responses.

NAME OF RESPONDENT: [redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):
[redacted]

COMMENTS (Please use the back of this sheet if necessary)

I WOULD PREFER HOUSING AROUND MY BLOCK AND LIVING AREA. NO COMMERCIAL OR INDUSTRIAL. I DO NOT LIKE #6. #2 IS A GREAT LOCATION.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
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COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT: [redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):
OWNER

ADDRESS (Including Postal Code, Telephone Number & Email Address):
[redacted]

COMMENTS (Please use the back of this sheet if necessary)
DON'T LIKE ANYTHING OTHER THAN HOUSES IN MY AREA. NO TO #6

#2 IS BEST LOCATION

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☐ Yes ☑ No

Please submit this comment sheet by August 21, 2015 to:

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COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

This is RESIDENTIAL AREA IN NUMBER 6 WE PREFER AREA 2

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540
Fax: (705) 429-8226
m.latimer@wasagabeach.com

Mr. Gary Scott, M. Sc., P. Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, ON L9Y 4J5
Tel: (705) 445-3451
Fax: (705) 445-0968
scott@ainleygroup.com

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

Public Information Centre – July 22, 2015
7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

OWNER

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

HAVING ATTENDED THE OPEN HOUSE FOR INFORMATION I TOTALLY AGREE THAT THE NUMBER TWO SITE SHOULD DESIGNATED. THE LOCATION WILL BEST SUIT PRESENT AND FUTURE NEEDS. ON THE OTHER HAND I FEEL #6 TO BE A BAD CHOICE FOR NUMEROUS REASON. RESIDENTIAL PROPERTY DEVALUATION AND SAFETY TOPPING MY LIST. [redacted]

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☐ Yes ☑ No

Please submit this comment sheet by August 21, 2015 to:

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Project Coordinator
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COMMENT SHEET

[redacted]

Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner] Tenant, etc.):

[redacted]

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary) [redacted]

WE DO NOT WANT ANOTHER NOISY TRUCK TERMINAL IN OUR AREA. MOST PEOPLE THAT LIVE IN THIS AREA BOUGHT HOMES TO RETIRE & LIVE QUIETLY. A TRUCK TERMINAL IS NOISY AND POLLUTES.
WE AGREE WITH GARY SCOTT'S PROPOSAL ON SIGHT #2.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

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Project Coordinator
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Fax: (705) 445-0968
scott@ainleygroup.com

Victoria

From: Gary Scott <scott@ainleygroup.com>
Sent: August-19-15 11:27 AM
To: Tori Giangrande; Smeh, Wendy
Subject: FW: Maintenance depot & water reservoir

From: [redacted]
Sent: August-19-15 10:55 AM
To: m.latimer@wasagabeach.com; Gary Scott
Subject: Maintenance depot & water reservoir

Looking for more information regarding the maintenance depot and water reservoir location on Ramblewood rd. Why isn't this land demeaned residential and even up for debate?

[redacted]

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

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7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:
[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):
PROPERTY OWNERS

ADDRESS (Including Postal Code, Telephone Number & Email Address):
[redacted]

COMMENTS (Please use the back of this sheet if necessary)
WE THE UNDERSIGNED DO CONCUR WITH THE PROPOSITION OF THE ENGINEER, PROJECT MANAGER THAT THE PROPOSED WEST END WATER AND MAINTENANCE DEPOT SHOULD BE PLACED ON SITE TWO (2) AND NOT ALONG RAMBLEWOOD DRIVE TOWARDS LYONS COURT. – RAMBLEWOOD DRIVE SHOULD BE ZONED AND DESIGNATED STRICTLY RESIDENTIAL. [redacted]
AUGUST 19, 2015

Do you wish to be informed of additional PICs and the publication of the Notice of Stud

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

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Project Coordinator
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RECEIVED
AUG 21 2015

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

Public Information Centre – July 22, 2015
7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:

[redacted] FOURTEEN FAMILIES RESIDING ON WEST SHORELANE Wasaga Beach

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

PROPERTY OWNERS

ADDRESS (Including Postal Code, Telephone Number & Email Address): (REP)

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

PLEASE NOTE THE ENCLOSED PAGES:
2 PAGES ATTACHED TO THIS PAGE -

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☒ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

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Project Coordinator
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COMMENT SHEET

On behalf of fourteen families who are homeowners residing on the west end of the Shore Lane area, Wasaga Beach, we would like to express our vigorous opposition to the possible selection of "SITE 2" as the West End Storage Facility and Maintenance Depot.

Although we do not contest the proposed "water reservoir" in our neighborhood, we are vehemently opposed to the Storage Facility and Maintenance Depot being considered in SITE 2. We also take exception to your Page 24 comments and conclusions that this proposal "will have minimum impact to the surrounding area" without first having discussed this matter with the taxpayers who reside in this neighborhood. We would have a firsthand knowledge of the impact.

Although we do not dispute the need for such a facility, we object to the SITE 2 location which is situated amid a historic residential area. This maintenance/storage facility includes storage of sand, salt etc. and heavy industrial vehicles (loaders, large dump trucks, snow plows etc.), truck washing and heavy vehicle maintenance repairs. This industrial yard will also have a gas facility, material storage and a communications tower.

We are aware that this location is presently zoned as Commercial and it is zoned as such for valid reasons. This proposal that you described would require a zoning change to Industrial. As a result this site consideration should never have been an option, especially considering the amount of hectares that would be required to complete this project. We wish to make it clear that we will oppose any zoning change to enable this proposal to succeed.

Our main oppositions to this proposal in our community are the following:

- Residential impact as a result of excessive noise (especially during early morning hours) when heavy industrial machinery and trucks are operating 24 hours a day. Also, how can you justify the noise/light impact rating as "5" in your report?
- Increase in vehicular traffic and noise traffic on Beachwood during all hours of the day. We already have enough disturbing noises with the proximity of busy Hwy 26 and Beachwood traffic nearby.
- Serious water/drainage surface issues which continue to plague our road on Shore Lane which are well documented by the Town of Wasaga Beach.
- The effect on trees, habitat and other surrounding environmental factors.
- Air pollution from the use of heavy machinery, idling trucks and the many de-icing products being stored in the depot.
- Concerns regarding the storage and washing away of salt, sand and other melting products into our water system and habitat.
- The visibility of heavy industrial equipment, communications and water tower is an obvious "eyesore" and should not be erected in a residential neighborhood.

There are many more concerns that we have regarding our opposition to the selection of SITE 2; however I believe that we made our point heard. In conclusion, we firmly believe that this storage and maintenance depot will reflect negatively on the value of our homes and our quality of life. We appreciatively request that your committee seriously consider an alternative preferred site.

[redacted]

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

Public Information Centre – July 22, 2015
7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

WE AGREE WITH THE ENGINEER THAT IF YOU'RE GOING TO BUILD THIS FACILITY, PUT IT IN ZONE 2. WE SURE AS HELL DON'T WANT IT ANYWHERE NEAR HERE. WE ARE RETIREES + MOVED UP HERE FOR PEACE + QUIET + TRANQUILITY, NOT TO HAVE TO LISTEN TO TRUCK NOISE + ADDITIONAL TRAFFIC. THANK YOU FOR ASKING FOR PUBLIC INPUT ON THIS.

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by August 21, 2015 to:

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COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:
[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):
Property owner

ADDRESS (Including Postal Code, Telephone Number & Email Address):
[redacted]

COMMENTS (Please use the back of this sheet if necessary)

Ideal Site would be the *2 site for the following considerations :-
(1) a less populated area
(2) closer proximity to the higway and hence, more convinient and would allow easy traffic-flow to the town's vehicles which will be using the maintenance depot
Opposed to *6 site : Safety issue for children (Please dont forget that there is an elementary school on Ramblewood Drive) !!!

Do you wish to be informed of additional PICs and the publication of the Notice of Study Completion?

☑ Yes ☐ No

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E-mail: collingwood@ainleygroup.com

October 22, 2015 File No. 114137

[redacted]

Ref: **Town of Wasaga Beach**
Class Environmental Assessment
West End Water Storage & Maintenance Depot
Notice of Public Information Centre No. 1 Comments

Dear [redacted]:

We are responding on behalf of the Town of Wasaga Beach to your comment sheet received following the July 22, 2015 Public Information Centre on the West End Water Storage & Maintenance Depot Schedule ‘C’ Class Environmental Assessment currently being undertaken by the Town. We appreciate the information and we have updated our Communication Plan to include your contact name.

A copy of the July 22, 2015 Public Information Centre Slides is available on the Town’s website.

Your comments are noted and will be considered during the planning process.

We will be in contact with you at key milestones throughout this planning process. We look forward to your continued interest in the project.

Sincerely,

AINLEY & ASSOCIATES LIMITED

Gary Scott, M.Sc., P. Eng.
Project Manager

cc. Mike Latimer, CET Town of Wasaga Beach

S:\114137\Class EA\Notice of PIC No.1\Responces to PIC Comments[redacted]

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October 22, 2015 File No. 114137

[redacted]

Ref: **Town of Wasaga Beach**
Class Environmental Assessment
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Dear [redacted]

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Sincerely,

AINLEY & ASSOCIATES LIMITED

Gary Scott, M.Sc., P. Eng.
Project Manager

cc. Mike Latimer, CET Town of Wasaga Beach

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CONSULTING
ENGINEERS
PLANNERS

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Tel: (705) 445-3451 • Fax: (705) 445-0968
E-mail: collingwood@ainleygroup.com

October 22, 2015

File No. 114137

[redacted]

Ref: **Town of Wasaga Beach**
Class Environmental Assessment
West End Water Storage & Maintenance Depot
Notice of Public Information Centre No. 1 Comments

Dear [redacted]:

We are responding on behalf of the Town of Wasaga Beach to your email dated August 19, 2015 on the West End Water Storage and Maintenance Depot Schedule 'C' Class Environmental Assessment currently being undertaken by the Town. We appreciate your comments and we have updated our Communication Plan to include your contact information.

A copy of the Public Information Centre Slides as presented at the July 22, 2015 meeting is available on the Town's website.

Our response to your comments is as follows:

Phase 2 of the west end water storage facility and maintenance depot Class Environmental Assessment (Class EA) remains ongoing with studies on the preferred site.

All potential site options within the study area were considered and 7 were identified as feasible. A series of evaluation criteria were developed to evaluate the 7 sites to identify a preferred solution for the water storage facility and maintenance depot. From the evaluation site 2, located west of 75th Street between Beachwood Road and Ayling Crescent/HWY 26, was identified as the recommended preferred site. Site 2 was identified to provide the least impact on the surrounding area and development in Wasaga Beach based on the preliminary investigation. Additionally the site will provide increased water security and performance as well as increased maintenance and service to the residents located in the west end of Wasaga Beach.

Site 6 at this time has not been identified as the recommended solution. This site was identified as one of the 7 potential options as it is zoned Service Commercial. During the evaluation process this site identified social environmental impacts including noise, light, residential and traffic and had a more significant economic impact.

If you would like to be added to the mailing list please provide us with your contact information and we will be in contact with you at key milestones throughout this planning process. We look forward to your continued interest in the project.

Sincerely,

AINLEY & ASSOCIATES LIMITED

Gary Scott, M.Sc., P. Eng.
Project Manager
cc. Mike Latimer, CET Town of Wasaga Beach

S:\114137\Class EA\Notice of PIC No.1\Responces to PIC Comments\[redacted]

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October 22, 2015 File No. 114137

[redacted]

Ref: **Town of Wasaga Beach**
Class Environmental Assessment
West End Water Storage & Maintenance Depot
Notice of Public Information Centre No. 1 Comments

Dear [redacted]:

We are responding on behalf of the Town of Wasaga Beach to your comment sheet received following the July 22, 2015 Public Information Centre on the West End Water Storage & Maintenance Depot Schedule 'C' Class Environmental Assessment currently being undertaken by the Town. We appreciate the information and we have updated our Communication Plan to include your contact name.

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Your comments are noted and will be considered during the planning process.

We will be in contact with you at key milestones throughout this planning process. We look forward to your continued interest in the project.

Sincerely,

AINLEY & ASSOCIATES LIMITED

Gary Scott, M.Sc., P. Eng.
Project Manager

cc. Mike Latimer, CET Town of Wasaga Beach

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October 22, 2015 File No. 114137

[redacted]

Ref: **Town of Wasaga Beach**
Class Environmental Assessment
West End Water Storage & Maintenance Depot
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Dear [redacted]:

We are responding on behalf of the Town of Wasaga Beach to your letter dated July 23, 2015 on the West End Water Storage and Maintenance Depot Schedule 'C' Class Environmental Assessment currently being undertaken by the Town. We appreciate your comments and we have updated our Communication Plan to include your contact information.

A copy of the Public Information Centre Slides as presented at the July 22, 2015 meeting is available on the Town's website.

Phase 2 of the west end water storage facility and maintenance depot Class Environmental Assessment (Class EA) process remains ongoing with studies on the preferred site. Several different types of site assessments, including geotechnical, archaeological, noise and natural environment assessments are currently being completed to ensure that the recommended preferred location does not cause negative impacts on the environment prior to a final selection of the site.

We appreciated your involvement in the process so far and understand you have remained in communication with the Town since our last meeting with you. We will continue to be in contact with you at key milestones throughout this planning process. We look forward to your continued interest in the project.

Sincerely,

AINLEY & ASSOCIATES LIMITED

Gary Scott, M.Sc., P. Eng.
Project Manager

cc. Mike Latimer, CET Town of Wasaga Beach

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Project Manager

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Project Manager

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Project Manager

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October 22, 2015 File No. 114137

[redacted]

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Project Manager

cc. Mike Latimer, CET Town of Wasaga Beach

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Ainley & Associates Limited
280 Pretty River Parkway, Collingwood, Ontario L9Y 4J5
Tel: (705) 445-3451 • Fax: (705) 445-0968
E-mail: collingwood@ainleygroup.com

October 22, 2015 File No. 114137

[redacted]

Ref: **Town of Wasaga Beach**
Class Environmental Assessment
West End Water Storage & Maintenance Depot
Notice of Public Information Centre No. 1 Comments

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Our response to your comments is as follows:

During Phase 2 of the Class Environmental Assessment (Class EA) Site 2, located west of 75th Street between Beachwood Road and Ayling Reid Crescent/HWY 26, was identified as the preferred recommended solution. Phase 2 remains ongoing with studies being conducted on the preferred site. When we enter Phase 3 of the Class EA process we will begin to develop design concepts for the preferred solution. This will include a detailed account of site layout, fencing and drainage requirements. We anticipate minimal increase in traffic will result from the maintenance depot however this will allow for more timely repairs and services, and improved winter maintenance. No problems have been identified with the location of the site in terms of water. Several different types of site assessments, including geotechnical, archaeological and natural environment assessments are currently being completed to ensure that the recommended preferred location does not cause negative impacts on the environment prior to a final selection of the site.

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TOWN OF WASAGA BEACH
CLASS ENVIRONMENTAL ASSESSMENT
WEST END WATER STORAGE FACILITY AND MAINTENANCE DEPOT
NOTICE OF PUBLIC INFORMATION CENTRE NO. 2

The Study

Further to the Notice of Study Commencement (issued October 7, 2014) and Public Information Center No. 1 (July 22, 2015), the Town of Wasaga Beach is continuing to undertake a Class Environmental Assessment (Schedule C) to consider design alternatives for a new water storage reservoir, and new maintenance depot in the Town's west end.

Preferred Alternative Solutions

During Phase 2 of the study, alternative solutions were identified and analyzed for each component of the project to find the most appropriate solution for the Town of Wasaga Beach. The preferred alternative for a new water storage reservoir is a 4,500 m^3 elevated tank in the west end and a new 4,500 m^3 cell at the Powerline Road in-ground storage facility. The preferred site was identified as Site 2, located south of Beachwood Road and west of 75th Street South. Site assessments were completed to identify it as a viable site.

Design Alternatives

During Phase 3 of the study, design alternatives were identified for the elevated tank and the site layout. Two elevated tank design alternatives have been identified as preferred and will be presented at the Public Information Centre for public input. The required site components were determined and a preferred site layout has been developed to maximize functionality for the Town of Wasaga Beach.

Public Information Centre

A Public Information Centre is planned to provide further information to the public on the evaluation process and design alternatives, and to receive input and comment from interested persons.

Time:	Open House: 7:00 pm to 9:00 pm
Date:	Thursday, August 18, 2016
Location:	Wasaga Rec Plex – 1724 Mosley Street

Public input and comment on the design alternatives will be incorporated into the planning process. Comments received before September 19, 2016 will be taken into consideration in the final stage of Phase 3.

If you have any comments or questions, or if you would like to be placed on the mailing list to receive project information, please contact either:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540 ext. 2342
Fax: (705) 429-8226
m.latimer@wasagabeach.com

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Ainley Group
280 Pretty River Parkway
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Phone: (705) 445-3451
Fax: (705) 445-0968
scott@ainleygroup.com

This notice issued July 28, 2016.

West End Water Storage Facility and Maintenance Depot
Class Environmental Assessment
Phase 3 Public Information Centre No. 2
Thursday, August 18, 2016

WELCOME

- Please sign in
- Representatives are available to answer questions
- Please complete a comment sheet
  - Place it in the box or send it to the Consultant undertaking the study or to the Town of Wasaga Beach at the address provided on the comment sheet

West End Water Storage Facility and Maintenance Depot
Class Environmental Assessment
Phase 3 Public Information Centre No. 2
Thursday, August 18, 2016

This Project is being planned in accordance with the Municipal Engineers Association's (MEA) Municipal Class Environmental Assessment (October 2000, as amended in 2007 & 2011) document. The MEA Planning and Design Process Flow Chart is provided for public information. At the present time, the Wasaga Beach West End Water Storage Facility and Maintenance Depot Class Environmental Assessment is in Phase 3.

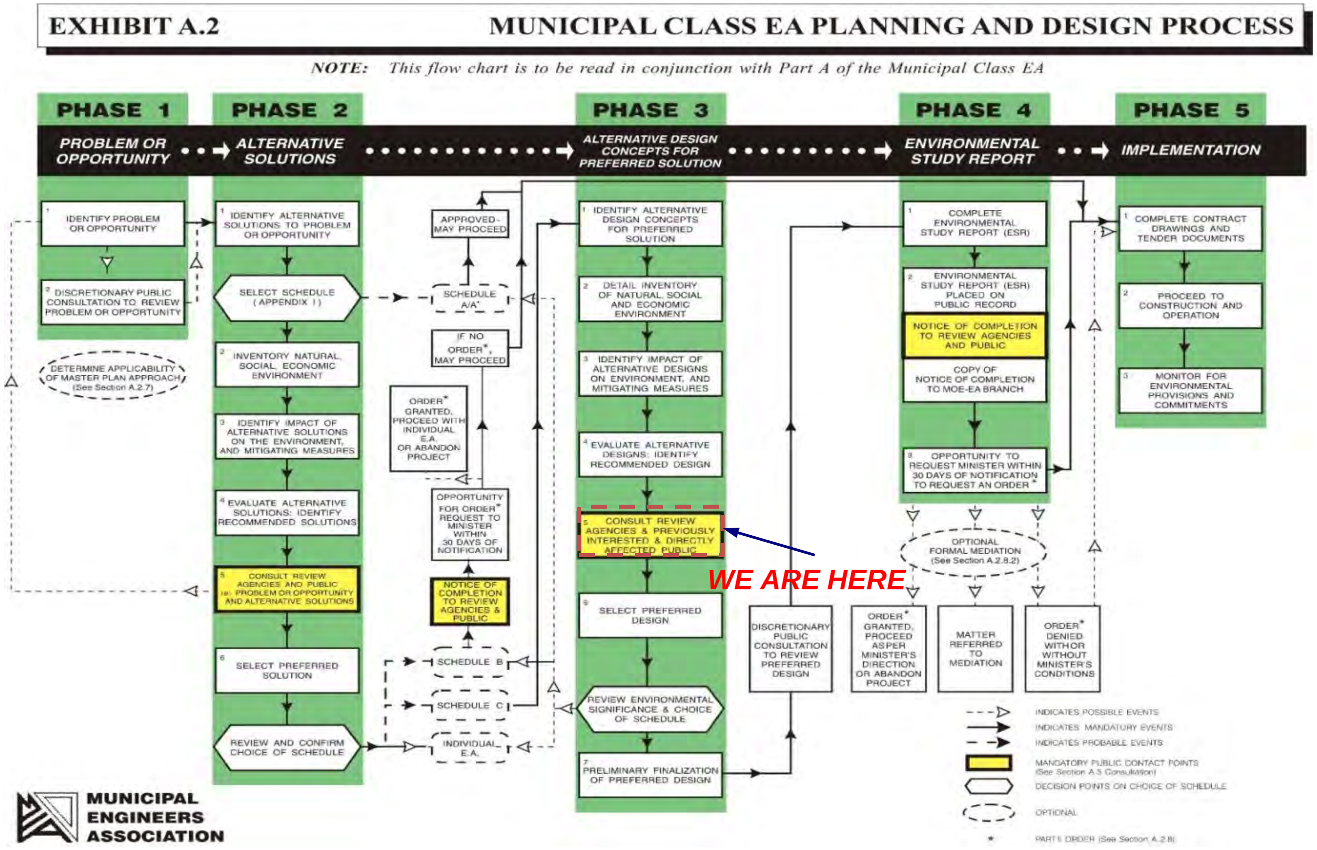


EXHIBIT A.2 **MUNICIPAL CLASS EA PLANNING AND DESIGN PROCESS**

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

Phase 1 - Problem Statement

In order to enhance potable water delivery in the west end of the community, the Town of Wasaga Beach is undertaking a Class Environmental Assessment planning process (Schedule C) to consider storage options and sites for a new water reservoir. The assessment will investigate all aspects of the water system including water pressure, fire flow volumes, adequate storage volume, existing servicing and future development. The Town intends to ensure that all areas within the current Town boundary limits are adequately serviced by the municipal water system.

In addition, the Town is also considering layout options and site locations for a new (satellite) maintenance depot in the west end of Town. Given the geographic layout of the Town, the current Public Works Maintenance Facility located in the east end, does not efficiently support present operations. Projected growth in demand for services will further overload the current facility and diminish current levels of service.

Phase 1 - Map of Study Area

The study area for the project is described as the Town limit west of 58th Street.

Phase 2 - Potential West End Sites Options

- All potential site options within the study area were considered.
- 7 sites were identified as feasible options and were short listed for additional consideration, shown on the map.

Phase 2 - Recommended Preferred Site

A comparison of site options was presented in the Public Information Centre held on July 22, 2015.

Comments received were taken into consideration to confirm the recommended preferred site.

Site 2 was established as the recommended preferred site

- Overall Site 2 presented the best alternative based on the evaluation criteria.
- This site is considered to have the least impact on development in Wasaga Beach with minimum impact to the surrounding area.
- This site is considered to provide increased water security and performance as well as increased maintenance and service to the residents located in the west end of Wasaga Beach.
- Studies were undertaken during Phase 3 to confirm the recommended preferred design solution.

Phase 2 - Maintenance Depot Requirements

A Needs Assessment was conducted which determined the need for a satellite maintenance depot in the west end of Wasaga Beach. The Assessment identified that the depot will allow for more timely repairs and services, improved winter maintenance and is necessary to service the proposed developments in the west end. The area necessary to provide these services was identified as 3.5 hectares.

To adequately serve the Wasaga Beach community, the new satellite maintenance depot requirements are as follows:

- Office Area
    - For office staff and dispatch
    - Will include meeting/training room and washrooms
- Utility Area
    - For building utilities, cleaning materials and storage
- Staff Facilities
    - Incudes kitchen, lunch room, locker rooms and washrooms
- Depot
    - Includes storage and vehicle bays for parking, truck washing and repair
- Sand and Salt Shed - Storage
- Yard
    - Fuel station, parking, material storage and a communication tower

Phase 2 - Water Storage Requirements

- The need for additional water storage was identified in a Report titled:

  “Ultimate Water Supply and Distribution System Model Update” prepared by Ainley & Associates Limited, March 2014.

- A total water storage requirement of 24,641 m^3 was identified for full build out of the Town (27,012 units)
- The additional storage requirement was derived as follows:

Location of Storage	Available Storage (m^3)
East End Elevated Tank	2,841
Veterans Way (formerly Powerline Road) In-Ground Reservoir	3,410
Sunnidale Elevated Tank	9,550
Total Existing Storage	15,801
Additional Storage Required	8,840

Phase 2 - Water Storage General Alternatives

Six water storage alternatives were considered for the additional required capacity as follows:

- Alternative 1
  - 9,000 m³ elevated tank in the west end
- Alternative 2
  - 9,000 m³ in-ground tank in the west end built in 2 stages
- Alternative 3
  - 4,500 m³ elevated tank in the west end and 4,500 m³ in-ground at Veterans Way (formerly Powerline Road) site
- Alternative 4
  - 4,500 m³ in-ground tank in the west end and 4,500 m³ in-ground at Veterans Way (formerly Powerline Road) site
- Alternative 5
  - Do Nothing
- Alternative 6
  - Limit Growth

Recommended Preferred Alternative

- Alternative # 3 is the recommended water storage solution (4,500m³ elevated tank in the west end and 4,500m³ in-ground reservoir on Veterans Way (formerly Powerline Road))

Phase 3 - Site Assessment Studies

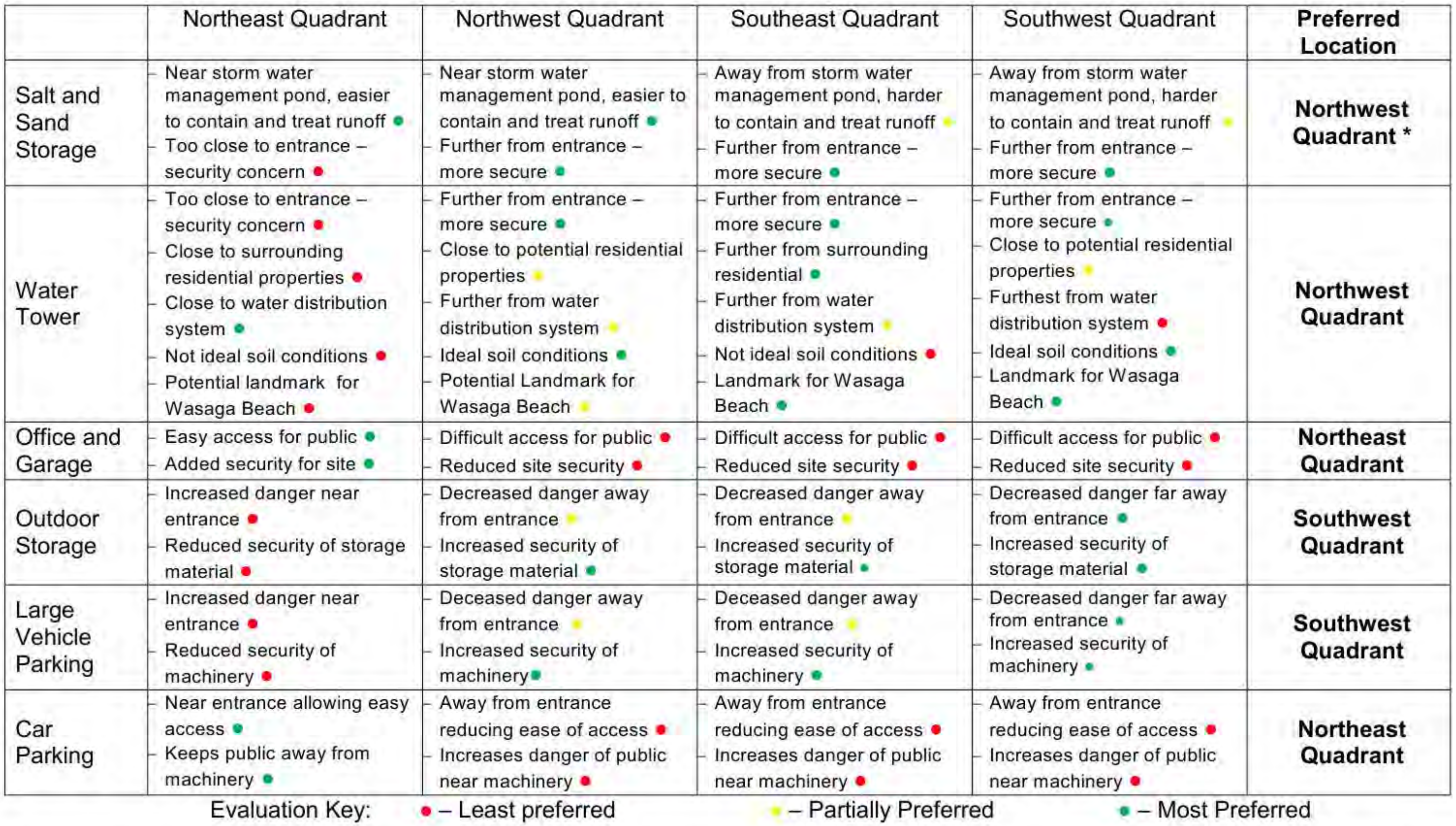
Desktop studies and field surveys were conducted by industry specialists for the proposed site. The following information and site studies were analyzed to confirm Site 2 as the preferred site for this project:

- Natural Environment
  - Natural heritage information, amphibian survey, bird survey, bat survey, vegetation and vascular flora surveys, wildlife survey and fish survey
- Archaeological
  - Stage 1 (review geomorphological conditions, government files, literature and historical maps and complete a field review), Stage 2 (field survey with test pits)
- Noise
  - Sound level testing at existing maintenance depot, sound level testing at preferred site and sound level modeling
- Geotechnical
  - Field work including 4 boreholes
- Drainage in the area of this site was examined to ensure that site development would have no negative impacts.
- Site Boundaries
  - The extent and boundaries of the site were examined to minimize impacts on neighbouring properties, to comply with Highway setbacks and to retain frontage on Joan Avenue for existing property owners.

Phase 3 - Site Assessment Recommendations

- Natural Environment
  - The preliminary Environmental Impact Study identified no concern of affecting Provincially Significant Wetlands, Areas of Natural and Scientific Interest, Significant Woodlands, Local Wildlife Habitat or Fish Habitat.
- Archaeological
  - Stage 1 identified the need for a Stage 2 assessment.
  - No archaeological resources were encountered during Stage 2 and no further investigation is required.
- Noise
  - To meet Ministry of the Environment and Climate Change's noise criteria, a 5.5m high acoustic barrier is likely required along the north limit of the preferred site.
- Geotechnical
  - The boreholes identified that the soil will be adequate for construction of the maintenance depot at any location on the site. The water tower will need to be constructed on the west side of the site to allow for sufficient geotechnical bearing resistance at serviceability limit state. Additional boreholes will be required before construction of the water tower.
- Drainage
  - Develop a storm water management plan that mitigates impacts on the site and eliminates impacts on adjacent properties and addresses existing drainage issues in the area.

Maintenance Depot Site Layout Evaluation



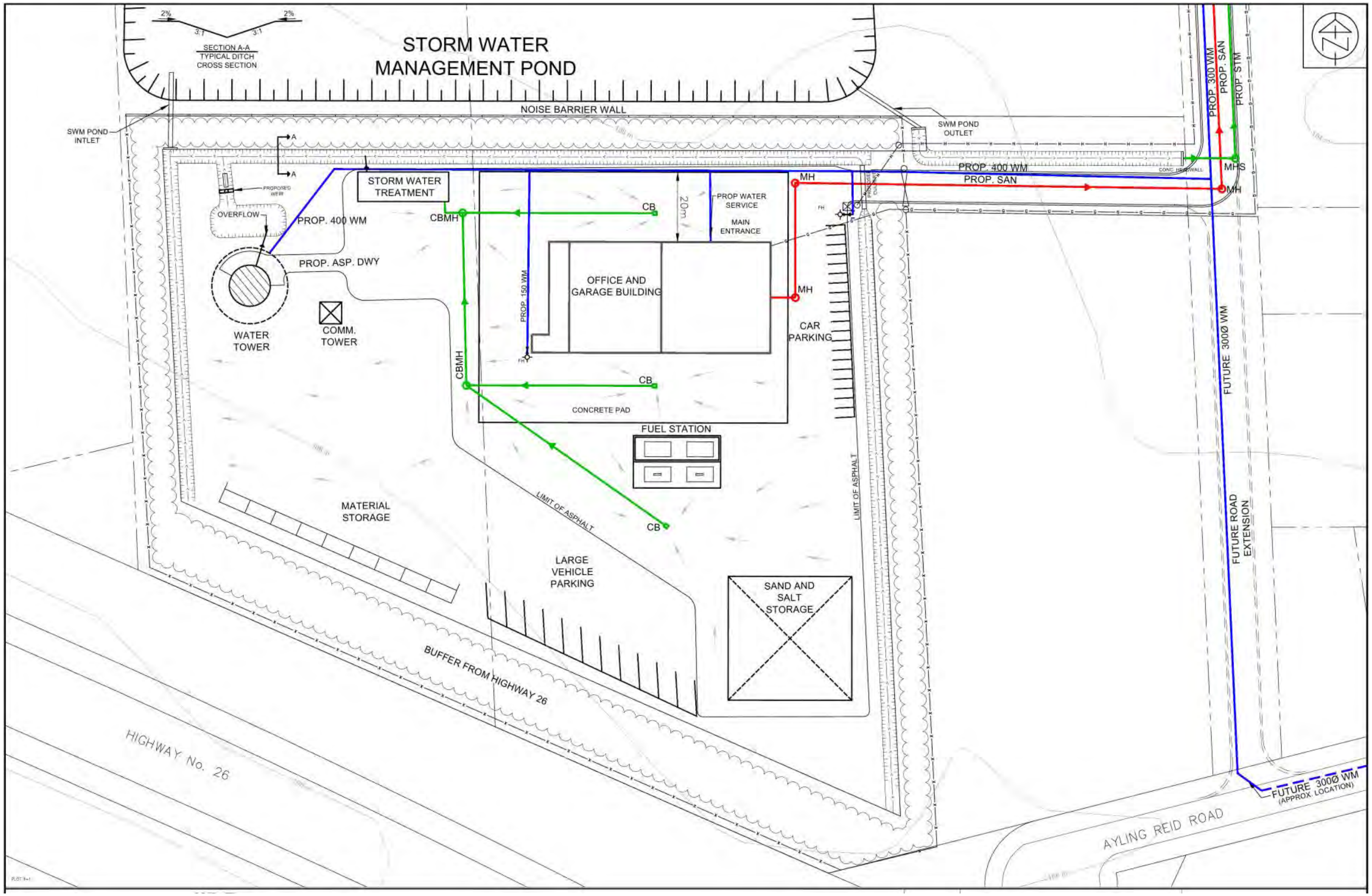
	Northeast Quadrant	Northwest Quadrant	Southeast Quadrant	Southwest Quadrant	Preferred Location
Salt and Sand Storage	- Near storm water management pond, easier to contain and treat runoff 🟢 - Too close to entrance – security concern 🔴	- Near storm water management pond, easier to contain and treat runoff 🟢 - Further from entrance – more secure 🟢	- Away from storm water management pond, harder to contain and treat runoff 🟡 - Further from entrance – more secure 🟢	- Away from storm water management pond, harder to contain and treat runoff 🟡 - Further from entrance – more secure 🟢	**Northwest Quadrant ***
Water Tower	- Too close to entrance – security concern 🔴 - Close to surrounding residential properties 🔴 - Close to water distribution system 🟢 - Not ideal soil conditions 🔴 - Potential landmark for Wasaga Beach 🔴	- Further from entrance – more secure 🟢 - Close to potential residential properties 🟡 - Further from water distribution system 🟡 - Ideal soil conditions 🟢 - Potential Landmark for Wasaga Beach 🟡	- Further from entrance – more secure 🟢 - Further from surrounding residential 🟢 - Further from water distribution system 🟡 - Not ideal soil conditions 🔴 - Landmark for Wasaga Beach 🟢	- Further from entrance – more secure 🟢 - Close to potential residential properties 🟡 - Furthest from water distribution system 🔴 - Ideal soil conditions 🟢 - Landmark for Wasaga Beach 🟢	**Northwest Quadrant**
Office and Garage	- Easy access for public 🟢 - Added security for site 🟢	- Difficult access for public 🔴 - Reduced site security 🔴	- Difficult access for public 🔴 - Reduced site security 🔴	- Difficult access for public 🔴 - Reduced site security 🔴	**Northeast Quadrant**
Outdoor Storage	- Increased danger near entrance 🔴 - Reduced security of storage material 🔴	- Decreased danger away from entrance 🟡 - Increased security of storage material 🟢	- Decreased danger away from entrance 🟡 - Increased security of storage material 🟢	- Decreased danger far away from entrance 🟢 - Increased security of storage material 🟢	**Southwest Quadrant**
Large Vehicle Parking	- Increased danger near entrance 🔴 - Reduced security of machinery 🔴	- Deceased danger away from entrance 🟡 - Increased security of machinery 🟢	- Deceased danger away from entrance 🟡 - Increased security of machinery 🟢	- Decreased danger far away from entrance 🟢 - Increased security of machinery 🟢	**Southwest Quadrant**
Car Parking	- Near entrance allowing easy access 🟢 - Keeps public away from machinery 🟢	- Away from entrance reducing ease of access 🔴 - Increases danger of public near machinery 🔴	- Away from entrance reducing ease of access 🔴 - Increases danger of public near machinery 🔴	- Away from entrance reducing ease of access 🔴 - Increases danger of public near machinery 🔴	**Northeast Quadrant**

Evaluation Key: 🔴 – Least preferred 🟡 – Partially Preferred 🟢 – Most Preferred

*No items were identified to have a preferred location in the southeast quadrant of the property. Both the water tower and the sand and salt storage preferred locations were in the northwest quadrant. This quadrant will not be able to accommodate both items and therefore the southeast quadrant of the site is considered to be an acceptable location for the sand and salt storage. The salt and sand storage received all partially preferred or most preferred rankings in the evaluation chart for the southeast quadrant making it a suitable location.

West End Water Storage Facility and Maintenance Depot
Class Environmental Assessment
Phase 3 Public Information Centre No. 2
Thursday, August 18, 2016

Recommended Preferred Site Layout



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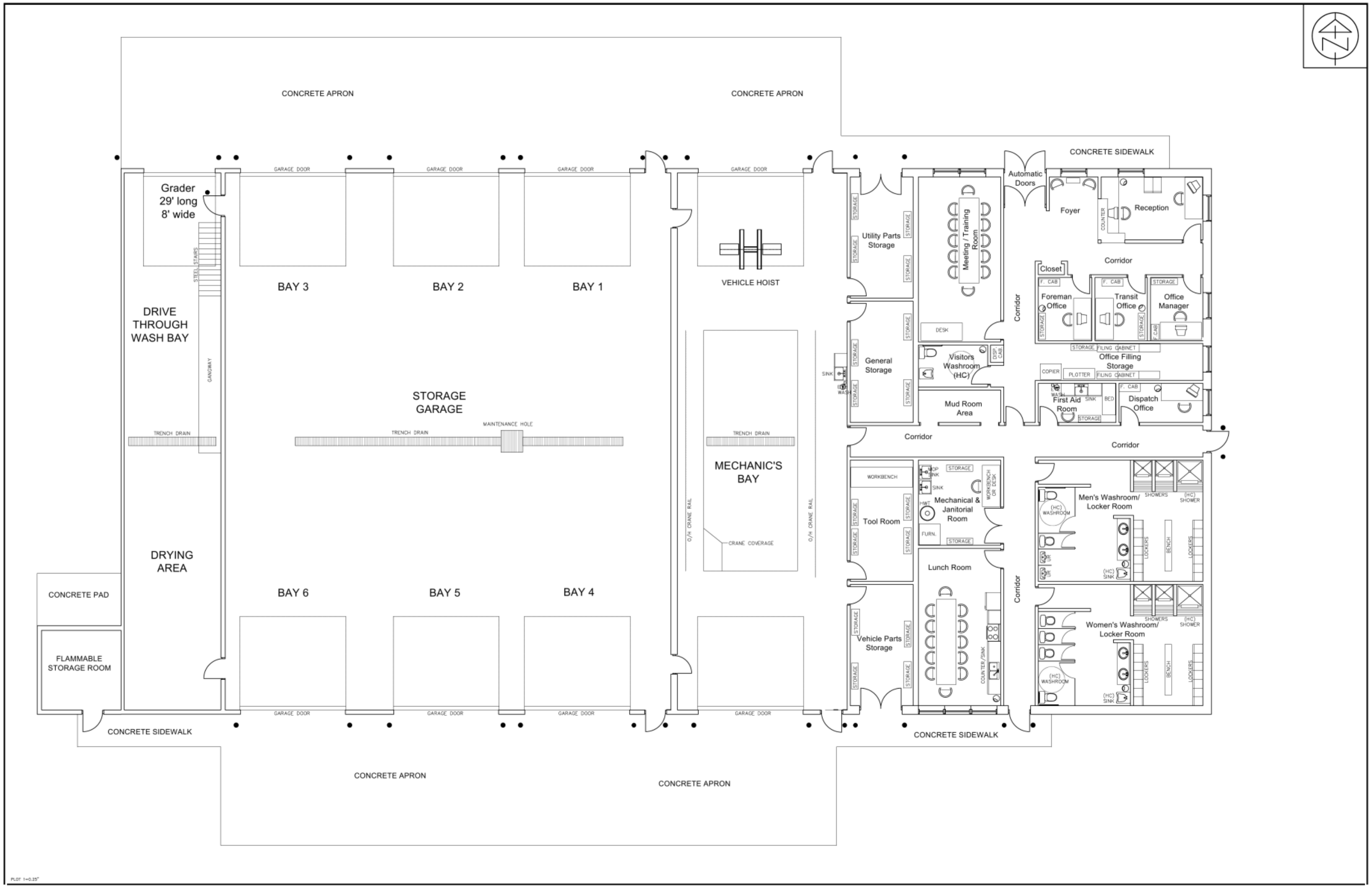
Class Environmental Assessment
Phase 3 Public Information Centre No. 2
Thursday, August 18, 2016

Proposed Maintenance Depot Office



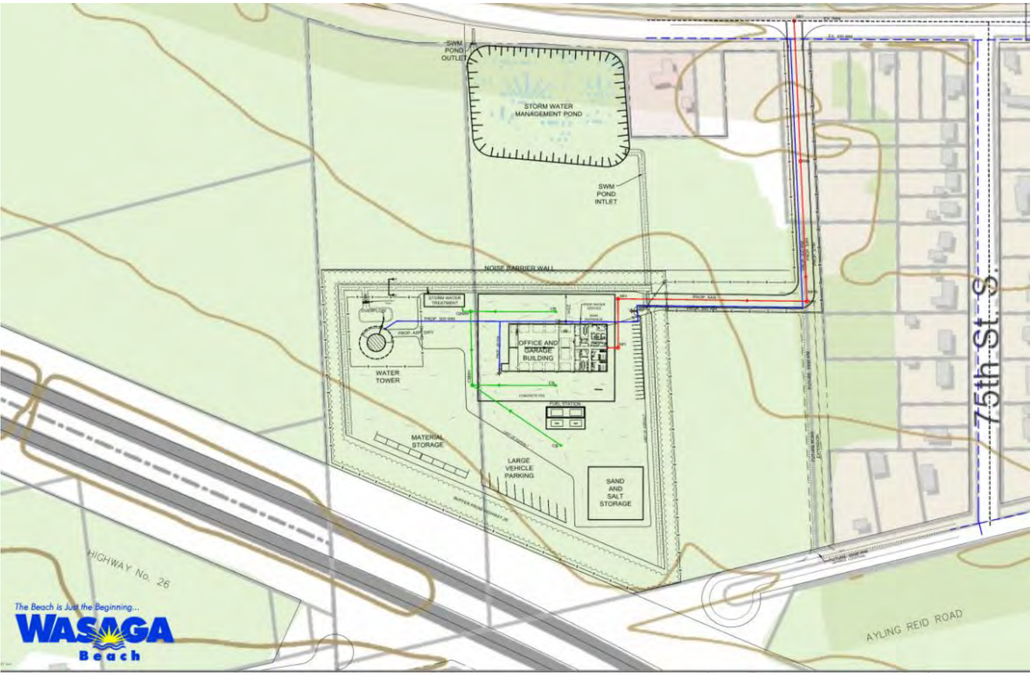
Storm Water Management

- A storm water management pond will be required on the site to properly attenuate stormwater flows.
- Site development will change the existing natural stormwater management. To ensure no negative effect on the downstream drainage area a stormwater management pond is needed.
- The storm water management pond will provide both water quality and water quantity control.
- Four alternative locations were considered for the stormwater management pond and evaluated to determine the preferred location.

Storm Water Management Pond Alternative Locations

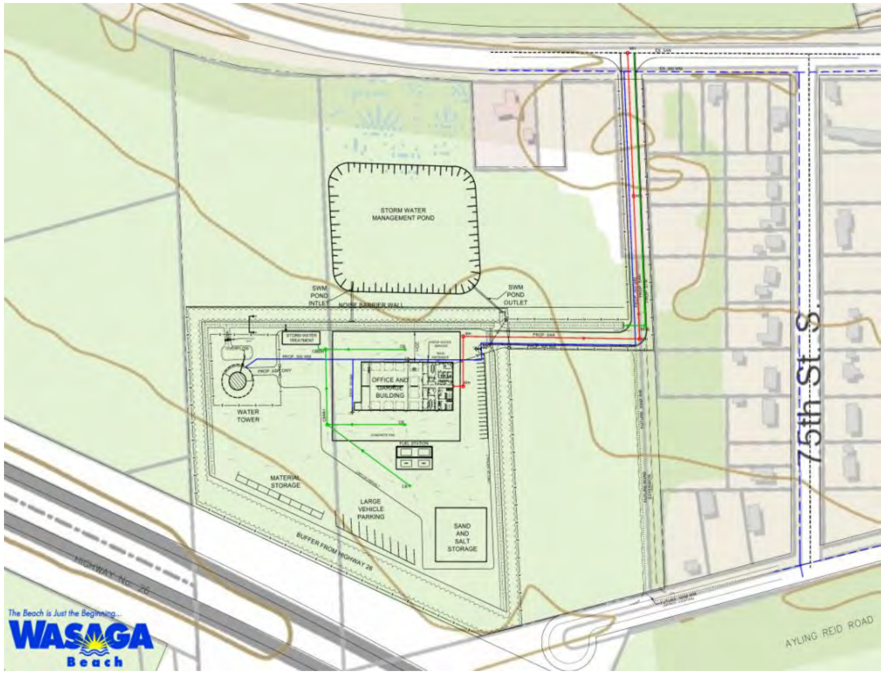
Alternative 1

Located in the existing unevaluated wetland



Alternative 2

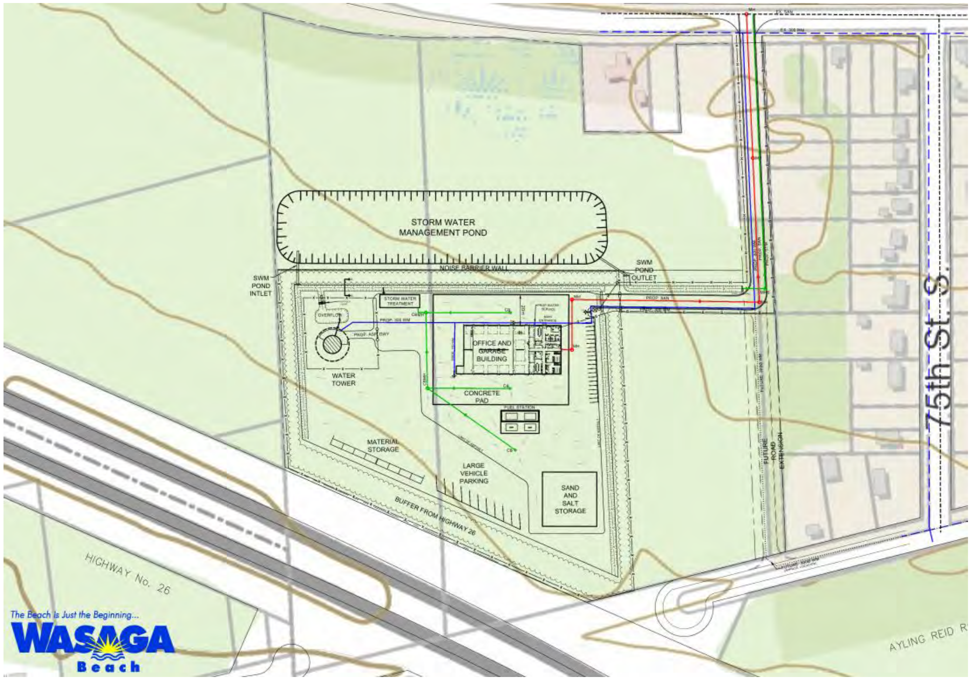
Located south of the existing unevaluated wetland



Storm Water Management Pond Alternative Locations

Alternative 3

Located along the north side of the maintenance depot



Alternative 4

Only services the maintenance depot and located on maintenance depot site

West End Water Storage Facility and Maintenance Depot
Class Environmental Assessment
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Thursday, August 18, 2016

Storm Water Management Pond Location Evaluation

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Ground water Influence Zone/ Impact to Surrounding Properties	Near properties with existing flooding problems. Could result in negative impact. 🔴	Near properties with existing flooding problems. Could result in negative impact. 🔴	Located away from properties with existing flooding problems, reducing potential impact. 🟢	Located away from properties with existing flooding problems, reducing potential impact. 🟢
Benefit to Entire Property	Intended to service maintenance depot site and surrounding property. 🟢	Intended to service maintenance depot site and surrounding property. 🟢	Intended to service maintenance depot site and surrounding property. 🟢	Intended to service only the maintenance depot site. 🔴
Drainage Path	Drainage to culvert 16 (west of the site) where drainage issues are currently experienced. 🔴	Drainage to culvert 16 and 17. 🟢	Drainage to culvert 16 and 17. 🟢	Drainage to culvert 17 (east of the site). 🟡
Best Use of Land	Incorporates the existing undefined wetland which may not be useful for development, allowing for the best use of the land. 🟢	Located on developable land. Remaining land left in sections making it less useful for development. 🟡	Located on developable land. Remaining land remains useful for development. 🟡	Only incorporates drainage for the maintenance depot site. Additional land would be required to build an additional SWMP when remaining land is developed. 🔴
Environmental Impact	Large negative impact on existing wetland environment. 🔴	Potential negative impact on existing wetland environment. 🟡	Further from wetland reducing potential impact. 🟢	Further from wetland reducing potential impact. 🟢
Elevation of SWMP	At lowest site elevation therefore best suited for draining entire site 🟢	1-2 m above lowest site elevation. 🟡	1-2 m above lowest site elevation. 🟡	3-4 m above lowest site elevation therefore least suited for draining entire site. 🔴
Adequate Size	Can be expanded to accommodate final design. 🟢	Can be expanded to accommodate final design. 🟢	Can be expanded to accommodate final design. 🟢	Only services maintenance depot site. Is not adequate to service entire site. 🔴
Future Considerations	Incorporates drainage of future development on the site. 🟡	Incorporates drainage of future development on the site. 🟡	Incorporates drainage of future development on the site. Could be incorporated into drainage plan for the property to the west. 🟢	Does not incorporate drainage of any future development. 🔴
Solves Existing Drainage Problem at Proposed Joan Avenue	May not be able to solve existing flood issue as drains to Culvert 16 (west of the site). 🔴	Drainage to culvert 17 (east of site) allows for a more direct drainage path to the lake helping solve existing flooding issue. 🟢	Drainage to culvert 17 (east of site) allows for a more direct drainage path to the lake helping solve existing flooding issue. 🟢	Drainage to culvert 17 (east of site) allows for a more direct drainage path to the lake helping solve existing flooding issue. 🟢
Rank	3	2	1	4

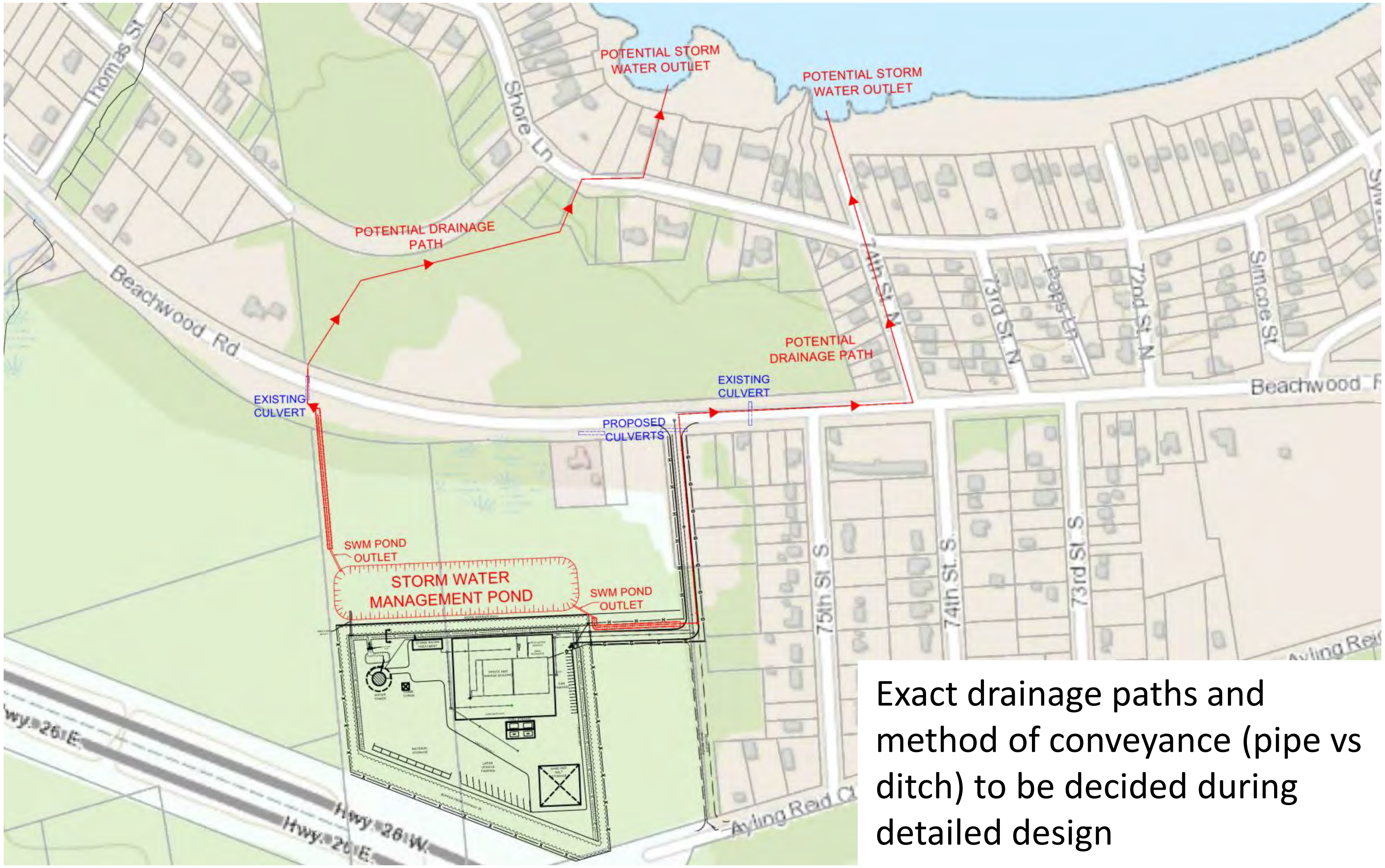
Evaluation Key: 🔴 – Least preferred 🟡 – Partially Preferred 🟢 – Most Preferred

Recommended Stormwater Management Pond Location

Alternative 3 is the recommended preferred location for the stormwater management pond.

- Takes into account future development in the surrounding area.
- Will help mitigate existing storm water management problems in the surrounding area.
- Provides a solution to the existing drainage problem.

Stormwater Management Pond Drainage Path



Exact drainage paths and method of conveyance (pipe vs ditch) to be decided during detailed design

Phase 3 - Elevated Water Storage Design Alternatives

Based on the water storage requirements for the Town of Wasaga Beach and the analysis completed during Stage 2 a 4,500 m^3 elevated storage tank is to be constructed in the west end. Three design alternatives for elevated water storage were considered for the additional required capacity as follows:

- Alternative 1
  - Composite Elevated Water Storage (Steel Tank with Concrete Pedestal)
- Alternative 2
  - Glass Lined Composite Elevated Water Storage
- Alternative 3
  - Glass Lined Composite Partially Elevated Water Storage

Alternative 1 – Composite Elevated Water Storage (Steel Tank with Concrete Pedestal)

Alternative 2 – Glass Lined Composite Elevated Water Storage

West End Water Storage Facility and Maintenance Depot
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Phase 3 Public Information Centre No. 2
Thursday, August 18, 2016

Alternative 3 – Glass Lined Composite Partially Elevated Water Storage

Comparison of Elevated Water Storage Alternatives

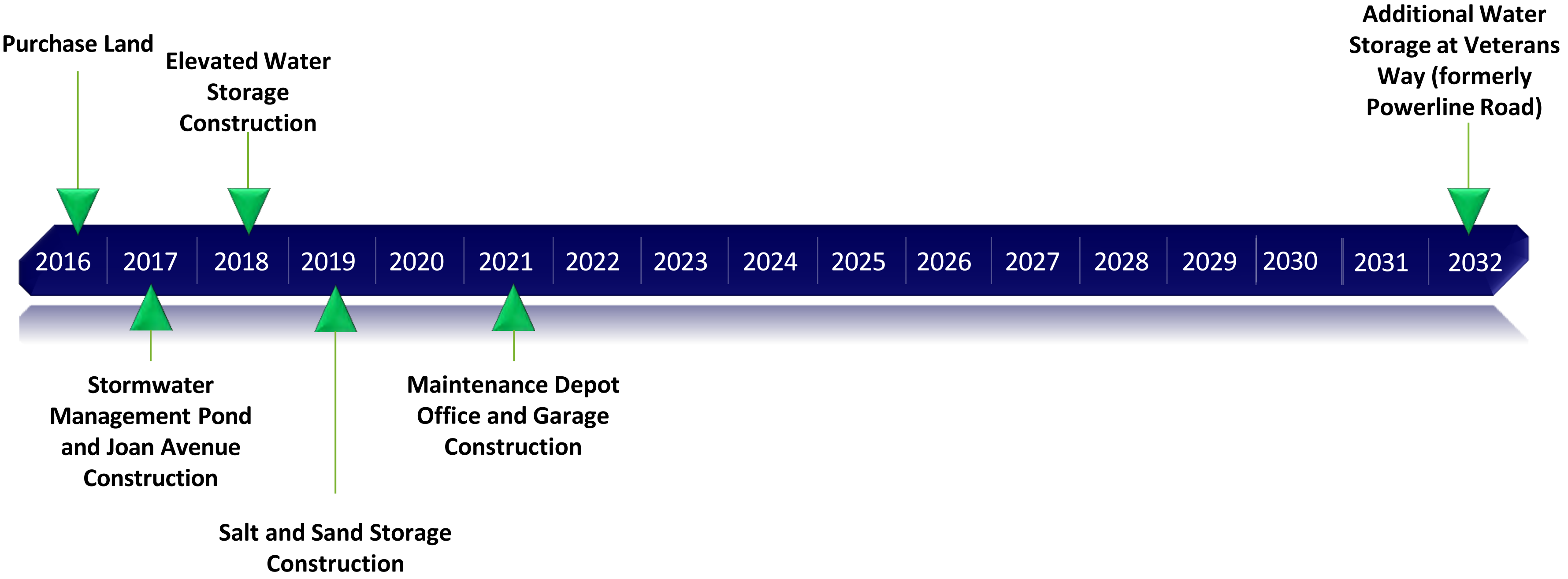
- A criteria assessment table was developed rating each of the options as best (3), moderate (2) or least preferred (1)
- Alternatives 1 and 2 are the recommended elevated water storage solutions

	Composite Elevated Water Storage	Glass Lined Composite Elevated Water Storage	Glass Lined Composite Partially Elevated Water Storage
Land Requirement	3	3	3
Construction Time	2	3	3
Maintenance	2	3	3
Aesthetics	3	1	2
Opportunity to Create Landmark	3	2	3
Security of Supply (Need for Standby Power)	3	3	1
Water Quality *	6	6	2
Access to Storage	2	1	1
Capital Cost *	6	6	4
Long Term Operation and Maintenance Cost	1	3	3
Normal Operation and Maintenance	2	2	2
Total	33	33	27

*A weighting of 2 has been applied because this criteria is of higher importance resulting in ratings of least preferred = 2, moderate = 4 and best = 6.

Timing and Phased Construction Plan

The water tower and maintenance depot project will be phased to allow for each aspect of the site to be constructed as needed. The following is the phased construction timing as indicated in the Development Charges report:



Purchase Land

Elevated Water Storage Construction

Additional Water Storage at Veterans Way (formerly Powerline Road)

2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032

Stormwater Management Pond and Joan Avenue Construction

Maintenance Depot Office and Garage Construction

Salt and Sand Storage Construction

West End Water Storage Facility and Maintenance Depot
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Phase 3 Public Information Centre No. 2
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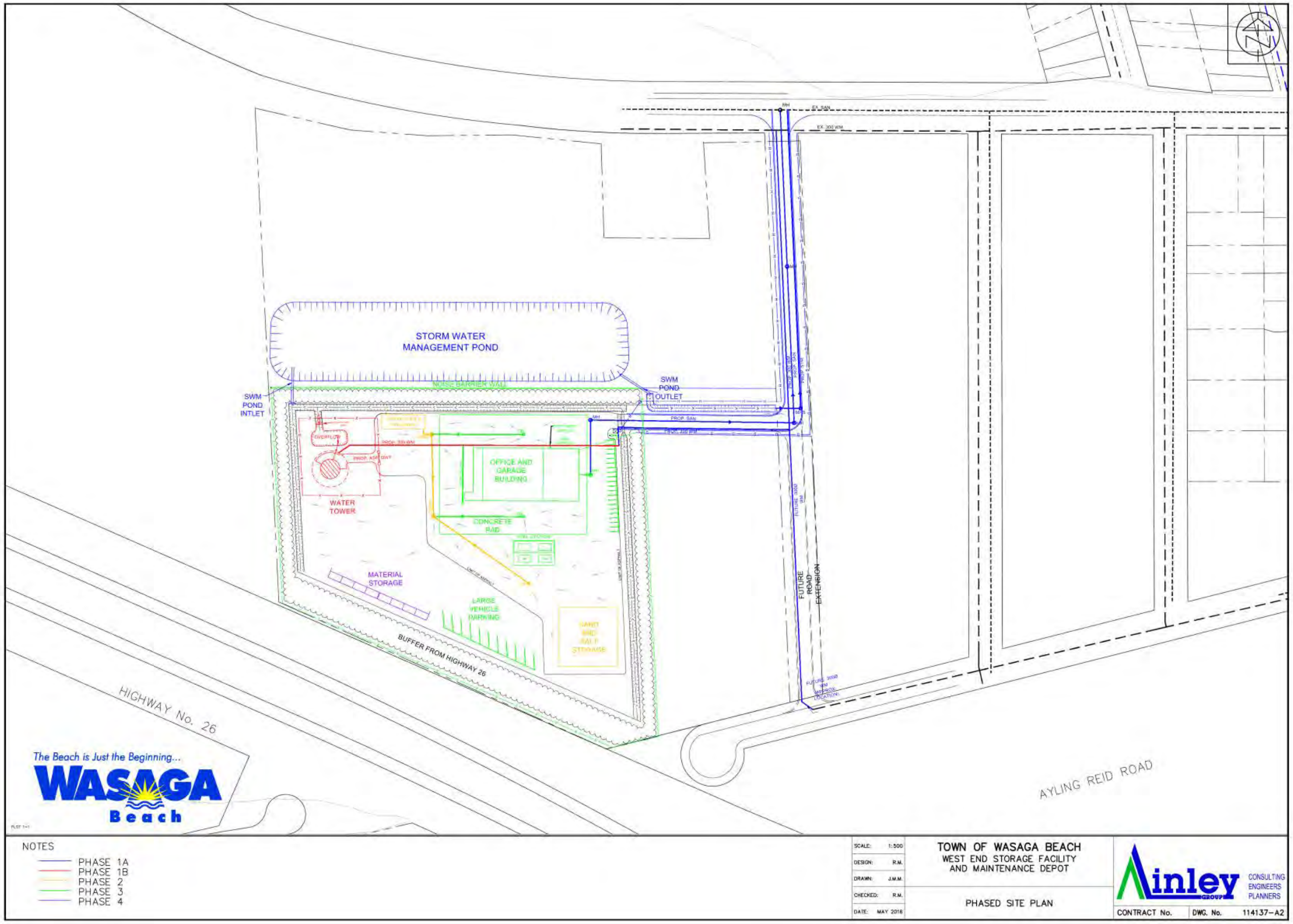
Phased Construction



Next Steps

Phase 3

1. Review PIC #2 comments
2. Confirm recommended preferred design option

Phase 4

3. Draft ESR
4. Publish Notice of Completion of Class EA
5. Public and Agency review of DRAFT Environmental Study Report
6. Finalize Environmental Study Report based on comments received
7. Memo to Ministry of Environment – Completion of Class EA

What Can you Do?

- Fill out a comment sheet
- Send your comments to:

Mike Latimer, C.E.T.
Project Coordinator
Town of Wasaga Beach
30 Lewis Street
Wasaga Beach
L9Z 1A1
Tel: (705) 429-2540
Fax: (705) 429-8226
Email: m.latimer@wasagabeach.com

Gary Scott, P.Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, Ontario
L9Y 4J5
Tel: (705) 445-3451
Fax: (705) 445-0968
Email: scott@ainleygroup.com

TOWN OF WASAGA BEACH
CLASS ENVIRONMENTAL ASSESSMENT
WEST END WATER STORAGE FACILITY AND MAINTENANCE DEPOT

INFORMATION SHEET

Phase 1 – The Study

The Town of Wasaga Beach is undertaking a Class Environmental Assessment (Schedule C) to consider design alternatives for a new water storage reservoir, and new maintenance depot in the Town's west end.

Background reports were examined along with existing and future conditions in the Town of Wasaga Beach. The review identified the need for an additional 9,000 m^3 of water storage to meet the needs of growth. The review also identified the need for a satellite maintenance depot in the west end to better service the Town's development plan.

Phase 2 – Alternative Solutions

A list of alternatives was formulated for each part of the project and an evaluation was completed to identify a preferred solution. Evaluation of alternatives assessed land use planning, natural environment, social environment, cultural environment, technical considerations and economic consideration to identify the preferred solution.

Water Storage

Based on the evaluation, a 4,500 m^3 elevated tank in the West End and 4,500 m^3 in-ground reservoir at the existing Veterans Way site was identified as the preferred solution.

Maintenance Depot

An assessment of the components required at the maintenance depot identified the need for: sand/salt storage, parking, outdoor material storage, main building (office, mechanical bay, storage garage, wash bay, storage rooms, flammable storage room), fuel station, stormwater treatment (site drainage) and a stormwater management pond.

Site

The following sites were identified based on a review of available lands in the study area:

- Area 1 - Northwest of George Avenue
- Area 2 - 75th Street South of Robert Street
- Area 3 – South of Ayling Reid Court
- Area 4 – West of Lyons Court
- Area 5 – 62nd Street to Lyons Court

- Area 6 – North and South of Ramblewood Drive and West of Cherry Sands Crescent and Green Pine Crescent
- Area 7 – East Side of Lyons Court, South of Bay Sand Drive

Site 2 was identified as the preferred solution as it has the least impact on development in Wasaga Beach and least impact to the surrounding area.

The preferred alternatives were presented to the public in the first Public Information Centre on July 22, 2015.

Subsequently, assessments were completed on site 2 for geotechnical, noise, natural environment, archaeological and water distribution system performance, confirming site 2 as the preferred site.

Phase 3 – Alternative Designs

During Phase 3 of the study, design alternatives were identified for the Elevated Tank and the Depot site layout.

Water Tower

Three elevated water tower design alternatives were examined and evaluated to determine the best option for the 4,500 m^3 storage in the west end:

- Alternative 1 - Composite elevated water storage
- Alternative 2 – Glass lined composite elevated water storage
- Alternative 3 – Glass lined composite partially elevated storage

Alternatives 1 and 2 were identified as the preferred elevated storage alternatives.

Site Layout

A final site layout was developed by analyzing the best location for each site component. The location of each site component as is follows:

- Salt and sand storage – southeast quadrant
- Water tower – northwest quadrant
- Office and garage – northeast quadrant
- Outdoor storage – southwest quadrant
- Large vehicle parking – southwest quadrant
- Car parking – northeast quadrant

Stormwater Management Pond Location

Alternatives were developed that allowed for a larger SWMP to deal with runoff from the maintenance depot site and surrounding land. The four SWMP locations alternatives are:

- Alternative 1 – SWMP located in the existing wetland area

- Alternative 2 – SWMP located south of existing wetland area
- Alternative 3 – SWMP located along north side of the maintenance depot
- Alternative 4 – SWMP only servicing the maintenance depot and located on the maintenance depot site

Alternative 3 was identified as the preferred location as it will provide the least environmental impact while providing treatment for future development in the area.

Phased Site Construction

To ensure optimal site construction it has been identified that phased construction will be implemented for this site. Each component of the site has different triggers resulting in the following phased construction schedule:

- 2016 – Complete Class EA and Purchase Land
- 2017 – Stormwater Management Pond and Joan Avenue Construction
- 2018 – Elevated Water Storage Construction
- 2019 – Salt and Sand Storage Construction
- 2021 – Maintenance Depot Office and Garage Construction
- 2032 – Additional Water Storage at Veterans Way Site

Next Steps

Phase 3

- Phase 3 Review PIC #2 Comments
- Confirm recommended preferred design alternatives

Phase 4

- Draft Environmental Study Report (ESR)
- Publish notice of completion of Class EA
- Public and Agency 30 day review of draft ESR
- Finalize ESR based on comments received
- Memo to MOECC – Completion of Class EA

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540 ext. 2342
Fax: (705) 429-8226
m.latimer@wasagabeach.com

Mr. Gary Scott, M. Sc., P. Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, ON L9Y 4J5
Phone: (705) 445-3451
Fax: (705) 445-0968
scott@ainleygroup.com

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

PUBLIC INFORMATION CENTRE
August 18, 2016

SIGN IN SHEET – PLEASE PRINT

NAME	ADDRESS	TELEPHONE NO.	E-MAIL ADDRESS
[redacted]	[redacted]	[redacted]	[redacted]
K LALONDE	WBPW	705 429 2540	

WASAUKSING

P.O. Box 250
Parry Sound, Ontario
P2A 2X4

Phone:
(705) 746-2531
Fax:
(705) 746-5984

Chief
Warren Tabobondung

CHIEF COUNCILLOR
Theresa McInnes

Councillors
Roberta Judge-Rice-Clements
Vera Pawis-Tabobondung
Walter Tabobondung

August 17, 2016

Mr. Gary Scott, M.Sc., P.Eng., Project Manager
Ainley and Associates Limited
280 Pretty River Parkway
Collingwood, ON
L9Y 4J5

Dear Mr. Scott,

RE: Town of Wasaga Beach - Class Environmental Assessment West End Water Storage and Maintenance Depot - Notice of Public Information Centre No. 2

Please accept this letter as confirmation that Wasauksing First Nation has received your notification dated August 8, 2016 in regards to the above.

Thank you for extending invitation for engagement with Wasauksing First Nation. Your correspondence will be reviewed and processed in a timely manner. Should there be any negative residual effects or any impacts to our Aboriginal and/or Treaty Rights and lands or resources within our Wasauksing-Anishinaabe Territory, Wasauksing First Nation reserves the right to initiate consultation with the Town of Wasaga Beach to seek accommodation and mitigation measures.

Should you have any questions or require any further information, please do not hesitate to contact me via email ccc@wasauksing.ca or telephone (705) 746-2531 ext. 2248.

Respectfully,

Daniella Baker

Daniella Baker
Community Consultation Coordinator

cc. Michael Latimer, Project Coordinator, Town of Wasaga Beach

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

Public Information Centre – August 18, 2016
7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, [✓ Property Owner], Tenant, etc.):

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

WE ALONG WITH NUMEROUS TRILLIUM FOREST (RAMBLEWOOD/GREENPINE AREA) RESIDENTS HAVE FOLLOWED THE VARIOUS PHASES OF THIS PROJECT. WE HAVE ALSO MADE OUR VIEWS KNOWN AT A PREVIOUS PUBLIC MEETING AND E-MAIL. WE ARE EXTREMELY PLEASED WITH YOUR SITE SELECTION WHICH ADDRESSES OUR WATER SERVICING NEEDS AND HAS THE MAINTENANCE/DEPOT IN AN AREA THAT DOES NOT EFFECT PROPERTY VALUES. TRUCK & EQUIPMENT TRAVEL AT ALL HOURS WOULD BE DISTURBING AND CAUSE A SAFETY HAZARD FOR CHILDREN & ADULTS. RESIDING NEARBY IN ADDITION TO THE SCHOOL. DESIGN AND SIZING APPEARS TO ADDRESS FUTURE GROWTH.

GOOD JOB!

Do you wish to be informed of the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by September 19, 2016 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540
Fax: (705) 429-8226
m.latimer@wasagabeach.com

Mr. Gary Scott, P. Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, ON L9Y 4J5
Tel: (705) 445-3451
Fax: (705) 445-0968
scott@ainleygroup.com

The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

Public Information Centre – August 18, 2016
7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:
[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):
Self

ADDRESS (Including Postal Code, Telephone Number & Email Address):
[redacted]

COMMENTS (Please use the back of this sheet if necessary)

- drainage
- loss of property value.
- return drainage to statis prior to MTO Highway construction

Do you wish to be informed of the publication of the Notice of Study Completion?

☑ Yes ☐ No

Please submit this comment sheet by September 19, 2016 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540
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m.latimer@wasagabeach.com

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The Town of Wasaga Beach
West End Storage Facility and Maintenance Depot
Class Environmental Assessment

Public Information Centre – August 18, 2016
7:00 p.m. to 9:00 p.m. – Wasaga Rec Plex, 1724 Mosley Street

COMMENT SHEET

Please print all responses.

NAME OF RESPONDENT:

[redacted]

REPRESENTING (Agency, Municipality, Property Owner, Tenant, etc.):

Residence of [redacted]

ADDRESS (Including Postal Code, Telephone Number & Email Address):

[redacted]

COMMENTS (Please use the back of this sheet if necessary)

Do you wish to be informed of the publication of the Notice of Study Completion?

☐ Yes ☐ No

Please submit this comment sheet by September 19, 2016 to:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540
Fax: (705) 429-8226
m.latimer@wasagabeach.com

Mr. Gary Scott, P. Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, ON L9Y 4J5
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scott@ainleygroup.com

COMMENT SHEET

On behalf of fourteen families who are homeowners residing on the west end of the Shore Lane area, Wasaga Beach, we would like to express our vigorous opposition to the possible selection of "SITE 2" as the West End Storage Facility and Maintenance Depot.

Although we do not contest the proposed "water reservoir" in our neighborhood, we are vehemently opposed to the Storage Facility and Maintenance Depot being considered in SITE 2. We also take exception to your Page 24 comments and conclusions that this proposal "will have minimum impact to the surrounding area" without first having discussed this matter with the taxpayers who reside in this neighborhood. We would have a firsthand knowledge of the impact.

Although we do not dispute the need for such a facility, we object to the SITE 2 location which is situated amid a historic residential area. This maintenance/storage facility includes storage of sand, salt etc. and heavy industrial vehicles (loaders, large dump trucks, snow plows etc.), truck washing and heavy vehicle maintenance repairs. This industrial yard will also have a gas facility, material storage and a communications tower.

We are aware that this location is presently zoned as Commercial and it is zoned as such for valid reasons. This proposal that you described would require a zoning change to Industrial. As a result this site consideration should never have been an option, especially considering the amount of hectares that would be required to complete this project. We wish to make it clear that we will oppose any zoning change to enable this proposal to succeed.

Our main oppositions to this proposal in our community are the following:

- Residential impact as a result of excessive noise (especially during early morning hours) when heavy industrial machinery and trucks are operating 24 hours a day. Also, how can you justify the noise/light impact rating as "5" in your report?
- Increase in vehicular traffic and noise traffic on Beachwood during all hours of the day. We already have enough disturbing noises with the proximity of busy Hwy 26 and Beachwood traffic nearby.
- Serious water/drainage surface issues which continue to plague our road on Shore Lane which are well documented by the Town of Wasaga Beach. – Storm Sewers
- The effect on trees, habitat and other surrounding environmental factors.
- Air pollution from the use of heavy machinery, idling trucks and the many de-icing products being stored in the depot.
- Concerns regarding the storage and washing away of salt, sand and other melting products into our water system and habitat.
- The visibility of heavy industrial equipment, communications and water tower is an obvious "eyesore" and should not be erected in a residential neighborhood.

There are many more concerns that we have regarding our opposition to the selection of SITE 2; however I believe that we made our point heard. In conclusion, we firmly believe that this storage and maintenance depot will reflect negatively on the value of our homes and our quality of life. We appreciatively request that your committee seriously consider an alternative preferred site.

Yours truly, [redacted]

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Parry Sound, Ontario
P2A 2X4

Phone:
(705) 746-2531
Fax:
(705) 746-5984

Chief
Warren Tabobondung

CHIEF COUNCILLOR
Theresa McInnes

Councillors
Roberta Judge-Rice-Clements
Vera Pawis-Tabobondung
Walter Tabobondung

October 4, 2016

Mr. Mike Latimer, C.E.T., Project Coordinator
Town of Wasaga Beach, Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON
L9Z 1A1

Dear Mr. Latimer,

RE: Town of Wasaga Beach Class Environmental Assessment - West End Water Storage and Maintenance Depot, Notice of Public Information Centre No. 2

Thank you for your notice issued on August 8, 2016 in regards to the above. Wasauksing First Nation does not currently have any concerns and/or comments to submit in response to the notification and we wish to receive a copy of the completed Class Environmental Assessment for consideration of storage options and sites for a new water reservoir.

This letter does not constitute Wasauksing First Nation's consent or agreement to the above and should there be any negative residual effects or any impacts to our Aboriginal and/or Treaty Rights and lands or resources within our Wasauksing-Anishinaabe Territory, Wasauksing reserves the right to initiate consultation with the Town of Wasaga Beach and to seek accommodation and mitigation measures.

Once again, thank you for engaging with Wasauksing First Nation and should you have any questions or require any further information, please do not hesitate to contact me via email ccc@wasauksing.ca or telephone (705) 746-2531 ext. 2248.

Respectfully,

Daniella Baker.

Daniella Baker
Community Consultation Coordinator

Ainley Group
CONSULTING
ENGINEERS
PLANNERS

Ainley & Associates Limited
280 Pretty River Parkway, Collingwood, Ontario L9Y 4J5
Tel: (705) 445-3451 • Fax: (705) 445-0968
E-mail: collingwood@ainleygroup.com

October 5, 2016 File No. 114137

VIA EMAIL

[redacted]

Ref: **Town of Wasaga Beach**
Class Environmental Assessment
West End Water Storage & Maintenance Depot

Dear [redacted]:

The Town recognizes your interest in this project and that you have identified several concerns with regards to selection of Site 2 as the recommended preferred site. Your input is valuable to the project team and the Town wishes to confirm that we have adequately addressed your concerns. We would be pleased to meet with you to further discuss any concerns.

Below is an update of the project showing specifically how your concerns have been addressed:

Property Zoning

The current zoning of the site is “Service Commercial”. A permitted use of “Service Commercial” land is public use, which includes Public Works’ Facilities. In addition, it is currently understood that the property owner intends to use the remaining lands for commercial uses. As such, it is anticipated that there will not be any need for re-zoning the lands.

Maintenance Depot Site

The hours of the maintenance depot will be regular working hours. The slight increase in traffic that may be experienced on Beachwood Road will only be during these hours. The exception to this will be when emergency work is required and during winter snow falls when night time snow plowing is necessary. In this regard, all of the roads in the area are already being plowed in winter and that will not change. In addition, this depot will reduce the overall travel time by trucks throughout the town and increase service levels to the west end of town.

We have conducted a noise assessment which has provided recommendations to mitigate noise coming from the site. The noise study took into account the noise of all equipment at a maintenance depot and identified the need for a noise barrier at the north end of the site once the site is fully constructed. Backup beepers are not included in MTO noise standards but were included in the analysis to prevent the surrounding residents to be affected by the maintenance depot. Additionally during preliminary design it was decided that a tree barrier will be left around the entire site to provide an additional noise barrier.

Drainage

It has been noted throughout this Municipal Class Environmental Assessment (Class EA) that this area of the west end is experiencing drainage issues. A proper drainage plan for the site will be conducted during detailed design to ensure that the site development has no negative effects on the drainage. Additional studies are planned to help address the existing issue in the area.

Water Storage

The purpose and function of water storage is to provide water security to the residents. Most water towers are located in residential areas as this provides the best performance of the water supply system and allows for optimal operation. The location of the water tower on the preferred site will also allow for a landmark for the community as people drive along HWY 26 will be able to recognise the Community. Water Tower design has evolved to allow for an aesthetically pleasing landmark in communities. Aesthetics have been taken into consideration in deciding on the type of water tower that will be used on the preferred site.

A communication tower will be located on the site for use of maintenance staff and water system operation.

Mitigation Measures

During Phase 2 of the Class EA site assessments were conducted including natural environment, noise, archaeological, geotechnical. These assessments were conducted to provide background information on the site to understand if the site was viable for a maintenance depot and water tower. Following the assessments it was concluded that the site was a viable location. Information from the assessments is being used to allow for mitigation measures to be put in place to reduce any negative effects on the natural, social and cultural environment in the area. Below is a list of mitigation measures that have been incorporated into the design.

Effect	Mitigation
Species Protection	- An expert on natural environment has been integral in the preliminary design and will continue to be used during detailed design to reduce or eliminate and negative effect on the natural environment - If a species is being effected by the project, off-site habitat compensation will occur - A significant tree barrier will remain around the site to allow some habitat to remain on the site
Surface Water Drainage	- A stormwater management pond (SWMP) will be constructed on the site to provide water quality and water quantity control for the maintenance depot site and surrounding land - Additional studies will be conducted during detailed design to help with existing drainage problems
Contamination of Surface Water	- There will be pre-treatment of all runoff from the site before it goes to the SWMP to ensure no water contamination occurs - The SWMP will provide additional water quality control
Residential/ Social Impacts	- The maintenance depot will be located on the south west corner of the property to provide a buffer to residential properties while still providing the residents in the west end with better water service - A tree boundary will be located around the entire site to create an

	additional boundary for residents. - A new entrance road will be constructed to reduce / eliminate any disruption to existing residential roads
Recreational	- Site 2 is not located near any recreational land in Wasaga Beach
Noise	- A noise barrier will be placed along the north side of the site to ensure no elevation in existing noise levels - A tree barrier will be placed around the entire site to further reduce any noise created on the site - The preliminary site was designed to keep heavier machinery further away from residential areas when on the site
Air Quality	- No additional trucks will be added to the works department fleet until it is required by population growth - With a second maintenance depot there will be a reduction in travel time for machinery and vehicles needed in the west end

We appreciate your involvement in the process so far. We will continue to be in contact with you at key milestones throughout this planning process. We look forward to your continued interest in the project.

Sincerely,

AINLEY & ASSOCIATES LIMITED

Gary Scott, M.Sc., P. Eng.
Project Manager

Encls.

cc. Mike Latimer, CET, Town of Wasaga Beach
Mike Pincivero, P.Eng., Town of Wasaga Beach

S:\114137\Class EA\Notice of PIC No. 2\Correspondance\Responce to [redacted]

CONSULTING
ENGINEERS
PLANNERS

Ainley & Associates Limited
280 Pretty River Parkway, Collingwood, Ontario L9Y 4J5
Tel: (705) 445-3451 • Fax: (705) 445-0968
E-mail: collingwood@ainleygroup.com

January 19, 2017

File No. 114137

Ref: **Town of Wasaga Beach**
Class Environmental Assessment
West End Water Storage & Maintenance Depot
Notice of Completion

Dear Sir and/or Madam:

The Town of Wasaga Beach has retained the service of the Ainley Group to document a Class EA planning process to consider storage options and sites for a new water reservoir, and layout options and site locations for a new maintenance depot in the west end of the Town.

The purpose of the project is to ensure that all areas within the Town are adequately serviced by the municipal water system. In addition, the study will ensure efficient maintenance of Public Works operations and current levels of service by supplementing the existing Public Works Maintenance facility located in the Town’s east end. The Class EA is being prepared in accordance with the Municipal Class Environmental Assessment October 2000, as amended in 2007, 2011 & 2015 as a Schedule ‘C’.

This notice is to advise you of completion of the project and that the Environmental Study Report (ESR) is being placed on the public record for review and comment for 30 calendar days. The evaluation and recommendations for the alternative solutions of this project are presented in the ESR. For additional details please refer to the attached notice, which will appear in the local newspaper on January 26th and February 2nd, 2017.

Should you have any further questions or concerns, please contact the undersigned or Mr. Michael Latimer, Project Coordinator, Town of Wasaga Beach at 705-429-2540 or via email at m.latimer@wasagabeach.com

Yours truly,

AINLEY & ASSOCIATES LIMITED

Gary Scott, M.Sc., P. Eng.
Project Manager
Phone: 905-595-6859
scott@ainleygroup.com

cc. Michael Latimer, Project Coordinator, Town of Wasaga Beach

TOWN OF WASAGA BEACH
CLASS ENVIRONMENTAL ASSESSMENT
WEST END WATER STORAGE FACILITY AND MAINTENANCE DEPOT

NOTICE OF COMPLETION

Further to the Phase 3 Public Information Centre (PIC) held on August 18, 2016, the Town of Wasaga Beach has prepared an Environmental Study Report (ESR) following Phases 1, 2 and 3 of the Municipal Class Environmental Assessment to review options for the installation of a new water storage facility and maintenance depot in the west end of Wasaga Beach. The Preferred Solution is to provide a new elevated water tower and maintenance depot between Beachwood Road and Ayling Reid Court, west of 75th Street South.

The Project has been planned as a Schedule ‘C’ of the Municipal Class Environmental Assessment document as issued by the Municipal Engineers Association (October 2000, amended 2007, 2011 & 2015). Subject to comments received as a result of this Notice and the receipt of necessary approvals, the Town intends to proceed with the design and construction of the new elevated water tower and maintenance depot.

The ESR is being placed on the public record for review and comment in accordance with the requirements of the Municipal Class Environmental Assessment. The Report is available for review at the following locations:

Town Office
30 Lewis Street
Wasaga Beach, Ontario

Mon-Fri: 9:00am – 4:30pm
Tel: 705-429-3844

Municipal Library
120 Glenwood Drive
Wasaga Beach, Ontario

Tues – Fri: 10:00am – 8:00pm
Sat: 10:00am – 4:00pm
Sun: noon – 4:00pm

Town of Wasaga Beach Web Site
www.wasagabeach.com

Interested persons should provide written comment to the Town on the proposal within 30 calendar days from the date of this Notice. Comment should be directed to either the Town or the Consultant undertaking the study at the addresses below.

During this 30-day review period, anyone who has any outstanding concerns with the Schedule C project listed above that cannot be resolved through discussions with the Town of Wasaga Beach may request that the Minister of the Environment and Climate Change make an order for the project to fall under Part II of the Environmental Assessment Act (referred to as a Part II Order), which addresses individual environmental assessments. Requests must be submitted to the Minister of the Environment at the Address below. Copies of the Part II Order requests should also be sent to the Study Contacts as listed below. If no request for a Part II Order is received by February 24th, 2017, the Town of Wasaga Beach may proceed to design and construction of the project as set out in the ESR.

The Honourable Glen Murray
Minister of the Environment and Climate Change
11th Floor, Ferguson Block
77 Wellesley Street West
Toronto ON M7A 2T5

If you have any comments or questions, please contact either:

Mr. Michael Latimer, C.E.T.
Project Coordinator
Wasaga Beach Public Works
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Tel: (705) 429-2540 ext. 2342
Fax: (705) 429-8226
m.latimer@wasagabeach.com

Mr. Gary Scott, M. Sc., P. Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, ON L9Y 4J5
Phone: (705) 445-3451
Fax: (705) 445-0968
scott@ainleygroup.com

This Notice issued January 26th, 2017.

Appendix – C

Sub Consultant Reports

Peto MacCallum Ltd.
CONSULTING ENGINEERS

PRELIMINARY GEOTECHNICAL INVESTIGATION WASAGA BEACH WEST END WATER STORAGE FACILITY AND MAINTENANCE DEPOT WASAGA BEACH, ONTARIO

for

AINLEY GROUP

PETO MacCALLUM LTD.
19 CHURCHILL DRIVE
BARRIE, ONTARIO
L4N 8Z5
PHONE: (705) 734-3900
FAX: (705) 734-9911
EMAIL: barrie@petomaccallum.com

Distribution:
2 cc: Ainley Group (+email)
1 cc: PML Barrie

PML Ref.: 14BF073
Report: 1 Revised
December 2015

Peto MacCallum Ltd.
CONSULTING ENGINEERS

December 17, 2015

PML Ref.: 14BF073
Report: 1 Revised

Mr. John Mabira
Ainley Group
280 Pretty River Parkway
Collingwood, Ontario
L9Y 4J5

Dear Mr. Mabira

Preliminary Geotechnical Investigation
Wasaga Beach West End Water Storage Facility and Maintenance Depot
Wasaga Beach, Ontario

Peto MacCallum Ltd. (PML) is pleased to present the results of the preliminary geotechnical investigation recently completed at the above noted project site. Authorization for the work was provided by Mr. J. Mabira, in email dated October 17, 2014.

The Town of Wasaga Beach is proposing to construct a new 4,500 m^3 elevated water storage tank and public works maintenance depot at the Town's west end. A Class EA is currently being completed for this facility. Initially, three sites were being considered for the proposed development and the preferred site has been selected for completion of a preliminary geotechnical investigation. The chosen site comprises the south portion of 8813 and 8835 Beachwood Road, with the lots to be severed to accommodate the development. The lots are currently vacant and heavily wooded with a few all-terrain vehicle trails throughout the site. Based on visual examination, the ground surface across the site is fairly flat with an estimated 1 to 2 m of relief. Topographical mapping shows a surface elevation of 188 across the site.

The purpose of this investigation was to explore the subsurface conditions at the site, and based on this information, provide a preliminary geotechnical engineering assessment of the subsurface conditions that would impact earthworks, foundations for buildings and elevated water tower, site servicing and pavement design. Geoenvironmental assessment of the site was not within the terms of reference, and no work has been carried out in this regard.

The comments and recommendations provided in this report are based on the subsurface conditions as revealed in a limited number of boreholes. Currently the development plans for the site are general in nature and have not been finalized. Accordingly, the comments and recommendations provided in this report are general in nature, and suitable only for preliminary planning purposes. When final design details are available, supplementary investigation and analysis will be required to finalize the geotechnical recommendations.

INVESTIGATION PROCEDURES

The field work for this investigation was carried out on September 16, 2015, and comprised Boreholes 1 to 4 advanced to 6.2 to 6.6 m depth below existing grade. Borehole locations are shown on Drawing 1, appended.

Co-ordination of clearances of underground utilities was provided by PML with the aid of a subcontracted private locating company.

The boreholes were advanced using continuous flight solid stem augers, powered by a track mounted CME-75 drill rig, supplied and operated by a specialist drilling contractor working under the full time supervision of a member of our engineering staff.

Representative samples of the overburden were recovered at frequent depth intervals using a conventional split spoon sampler. Standard penetration tests were carried out simultaneously with the sampling operation to assess the strength characteristics of the stratigraphy. Ground water conditions in the boreholes were closely monitored during the course of the field work.

Boreholes were backfilled in accordance with O.Reg. 903.

The locations of the boreholes were established in the field during a site meeting with the Client. The surface elevations of the boreholes have been interpolated based on topographic maps of the area.

All recovered samples were returned to our laboratory for detailed examination and moisture content determinations.

SUMMARIZED SUBSURFACE CONDITIONS

Reference is made to the appended Log of Borehole sheets for details of the subsurface conditions, including soil classifications, inferred stratigraphy, Standard Penetration test N values, ground water observations and the results of laboratory moisture content determinations.

Due to the soil sampling procedures and limited sample size, the depth demarcations on the borehole logs must be viewed as "transitional" zones between layers, and cannot be construed as exact geologic boundaries between layers.

The boreholes revealed topsoil over local fill over a native till deposit. Silt was encountered below the till in one borehole.

Topsoil

A thin topsoil layer ranging from 60 to 110 mm was encountered at the surface of all boreholes.

Fill

Fill was encountered locally below the topsoil in Borehole 4 extending to 0.7 m depth (elevation 187.30). The fill comprised sand with some gravel and trace silt. The fill was moist with a moisture content of 6%.

Sand/Silt Till

Below the topsoil and/or local fill, a granular till deposit was encountered in all boreholes extending to the 6.2 and 6.6 m depth of exploration in Boreholes 1 and 3, and penetrated at 1.6 m depth (elevation 186.4) in Borehole 2, and 3.1 m depth (elevation 184.9) in Borehole 4. The unit comprised a compact to very dense silty sand/sandy silt matrix, with trace gravel and cobbles and boulders noted. Moisture contents were generally in the 5 to 10% range, being moist.

Clay Till

The above described granular till unit was underlain by a cohesive till deposit at 1.6 and 3.1 m depth, elevation 186.4 and 184.9, respectively, in Boreholes 2 and 4. The unit was penetrated near 5.5 m depth, elevation 182.5 in Borehole 2, and extended to the full 6.6 m depth of Borehole 4. The unit was firm to stiff, becoming hard at depth in Borehole 4. Moisture contents were in the 10 to 30% range, being about plastic limit to wetter than plastic limit.

Silt

Beneath the till in Borehole 3 a very dense sandy silt unit was encountered to the 6.4 m depth of exploration. The layer was moist with a water content of 13%.

Ground Water

Upon completion of augering, no water or wet cave was observed in any of the boreholes.

Ground water levels will fluctuate seasonally and in response to variations in precipitation.

GEOTECHNICAL ENGINEERING CONSIDERATIONS

General

The Town of Wasaga Beach is proposing to construct a new 4,500 m^3 elevated water storage tank and public works maintenance depot at the Town's west end. A Class EA is currently being completed for this facility. Initially, three sites were being considered for the proposed development and the preferred site has been selected for completion of a preliminary geotechnical investigation. The chosen site comprises the south portion of 8813 and 8835 Beachwood Road, with the lots to be severed to accommodate the development. The lots are currently vacant and heavily wooded with a few all-terrain vehicle trails throughout the site. Based on visual examination, the ground surface across the site is fairly flat with an estimated 1 to 2 m of relief. Topographical mapping shows the ground surface to be around elevation 188 across the site.

The boreholes revealed topsoil over local fill over native deposits of granular till and local cohesive till. Silt was encountered below the till in one borehole. No water or wet cave was observed in any of the boreholes. Conditions are generally favourable for construction of the facility.

The comments and recommendations provided in this report are based on the subsurface conditions as revealed in a limited number of boreholes. Currently the development plans for the site are general in nature and have not been finalized. Accordingly, the comments and recommendations provided in this report are general in nature, and suitable only for preliminary planning purposes. When final design details are available, supplementary investigation and analysis will be required to finalize the geotechnical recommendations.

Site Grading and Engineered Fill

The site is relatively flat and as such it is anticipated that only minor regarding will be needed to accommodate the proposed site features.

Where grades are to be raised under structures (sand building, wash bay/garage/office, fuel station and elevated water storage tank) the fill must be constructed as engineered fill. Engineered fill construction will involve removal of all existing topsoil and fill down to native inorganic soil, followed by replacement with select soil that is well compacted. Excavated site inorganic soil should be suitable for reuse, provided it is not too wet and is free of topsoil and/or other deleterious material.

Building Foundations

Compact silty sandy/sandy silt till is anticipated at shallow depth, where it is anticipated that the buildings will typically be slab-on-grade with footings at frost depth. A bearing resistance at Serviceability Limit State (SLS) in the range of 100 to 150 kPa should be available for spread and strip footings.

Existing fill at the site is not suitable for supporting buildings or services. Existing fill under buildings will need to be removed and replaced with engineered fill (well compacted select fill). Any up fill needed to raise the site grades should also be constructed as engineered fill.

Floor slabs-on-grade can be supported on engineered fill or native soil.

Elevated Water Storage Tank

It is understood that an elevated water storage tank with 4,500 m^3 capacity is currently proposed. Landmark is a leading designer and constructor of elevated water storage tanks. General information available on Landmark's website was reviewed to gather general design information. In this regard, a 4,500 m^3 tank will have an estimated pedestal diameter of about 12 to 15 m and a mat foundation with a diameter on the order of 30 m.

Based on the boreholes, compact to very dense silty sand/sandy silt till occurs in the west part of the site. In the east part of the site Borehole 2 and 4, there is an underlying silty clay till deposit that is only firm to stiff. As such the western part of the site appears better suited for the elevated water storage tank where a geotechnical bearing resistance at SLS of at least 300 kPa appears to be available for design of a large mat foundation. In the east part of the site, the SLS bearing resistance is reduced substantially to around 100 kPa, due to the underlying firm cohesive till. It is recommended, as suggested on the Landmark website, that a detailed geotechnical investigation be carried out, comprising 3 boreholes around the perimeter of the mat foundation and one borehole in the centre of the foundation.

The MOECC well record database was reviewed. The well records in an approximate 250 m radius of the site show Limestone bedrock to typically between 15 to 20 m depth (55 and 65 ft.). It is recommended that boreholes be advanced with rotary diamond coring to confirm sound bedrock.

Site Servicing

Excavation for installation of site services are discussed in the following section of the report.

Site servicing will be installed within the till and no bearing capacity or settlement issues are anticipated.

Trench back fill should be free of organic, wet, frozen, oversized (greater than 200 mm), or otherwise deleterious materials and at a moisture content suitable to achieve the specified compaction. In this regard, it is anticipated that excavated site soil should be generally suitable for reuse as trench backfill, subject to geotechnical review and approved during construction. Trench back fill should be placed and compacted similar to engineered fill (placed in thin lifts and compacted thoroughly prior to placing next lift).

Excavation and Ground Water Control

Overall excavation depths are not known at this time but estimated to be 1.5 m depth for buildings, locally deeper for the mat foundation for the water tank, and up to 3.0 m for servicing. In this regard, mainly granular and cohesive till soils are expected. The presence of boulders should be anticipated. Type 3 soil conditions may be assumed for excavation in accordance with Occupational Health and Safety Act (OHSA).

Upon of completion of augering, no water or wet cave was noted in any of the boreholes. It is anticipated seepage, if any, would be of a nuisance nature and readily handled by sump pumping techniques.

Pavement Design

The pavement design depends on traffic loading for the proposed development (heavy loaded trucks/fire route or light duty car parking) and the nature of the subgrade material. The anticipated till material is moderate to highly frost susceptible. Preliminary pavement designs are provided below.

Material	Light Duty (Car Traffic)	Heavy Duty (Truck Traffic)
Asphalt (mm)	90	120
Granular A Base Course (mm)	150	150
Granular B Subbase Course (mm)	300	600
Total Thickness (mm)	540	870

CLOSURE

We trust this report is complete within our terms of reference, and the information provided is sufficient for your present purposes. If you have any questions, or when we may be of further assistance, please do not hesitate to call our office.

Sincerely

Peto MacCallum Ltd.

LICENSED PROFESSIONAL ENGINEER
G. R. WHITE
Dec. 17/2015
PROVINCE OF ONTARIO

Geoffrey R. White, P.Eng.
Associate
Manager, Geotechnical and Geoenvironmental Services

LICENSED PROFESSIONAL ENGINEER
T. LEE-BUN
26277509
Dec 17/15
PROVINCE OF ONTARIO

Turney Lee-Bun, P.Eng.
Vice President

GRW/TLB:jlb

Enclosure(s):
List of Abbreviations
Log of Boreholes No. 1 to 4
Drawing 1 – Borehole Location Plan

LIST OF ABBREVIATIONS

PENETRATION RESISTANCE

Standard Penetration Resistance N: - The number of blows required to advance a standard split spoon sampler 0.3 m into the subsoil. Driven by means of a 63.5 kg hammer falling freely a distance of 0.76 m.

Dynamic Penetration Resistance: - The number of blows required to advance a 51 mm, 60 degree cone, fitted to the end of drill rods, 0.3 m into the subsoil. The driving energy being 475 J per blow.

DESCRIPTION OF SOIL

The consistency of cohesive soils and the relative density or denseness of cohesionless soils are described in the following terms:

CONSISTENCY	N (blows/0.3 m)	c (kPa)	DENSENESS	N (blows/0.3 m)
Very Soft	0 - 2	0 - 12	Very Loose	0 - 4
Soft	2 - 4	12 - 25	Loose	4 - 10
Firm	4 - 8	25 - 50	Compact	10 - 30
Stiff	8 - 15	50 - 100	Dense	30 - 50
Very Stiff	15 - 30	100 - 200	Very Dense	> 50
Hard	> 30	> 200		

WTPL	Wetter Than Plastic Limit
APL	About Plastic Limit
DTPL	Drier Than Plastic Limit

TYPE OF SAMPLE

SS	Split Spoon	TW	Thinwall Open
WS	Washed Sample	TP	Thinwall Piston
SB	Scraper Bucket Sample	OS	Oesterberg Sample
AS	Auger Sample	FS	Foil Sample
CS	Chunk Sample	RC	Rock Core
ST	Slotted Tube Sample		

PH	Sample Advanced Hydraulically
PM	Sample Advanced Manually

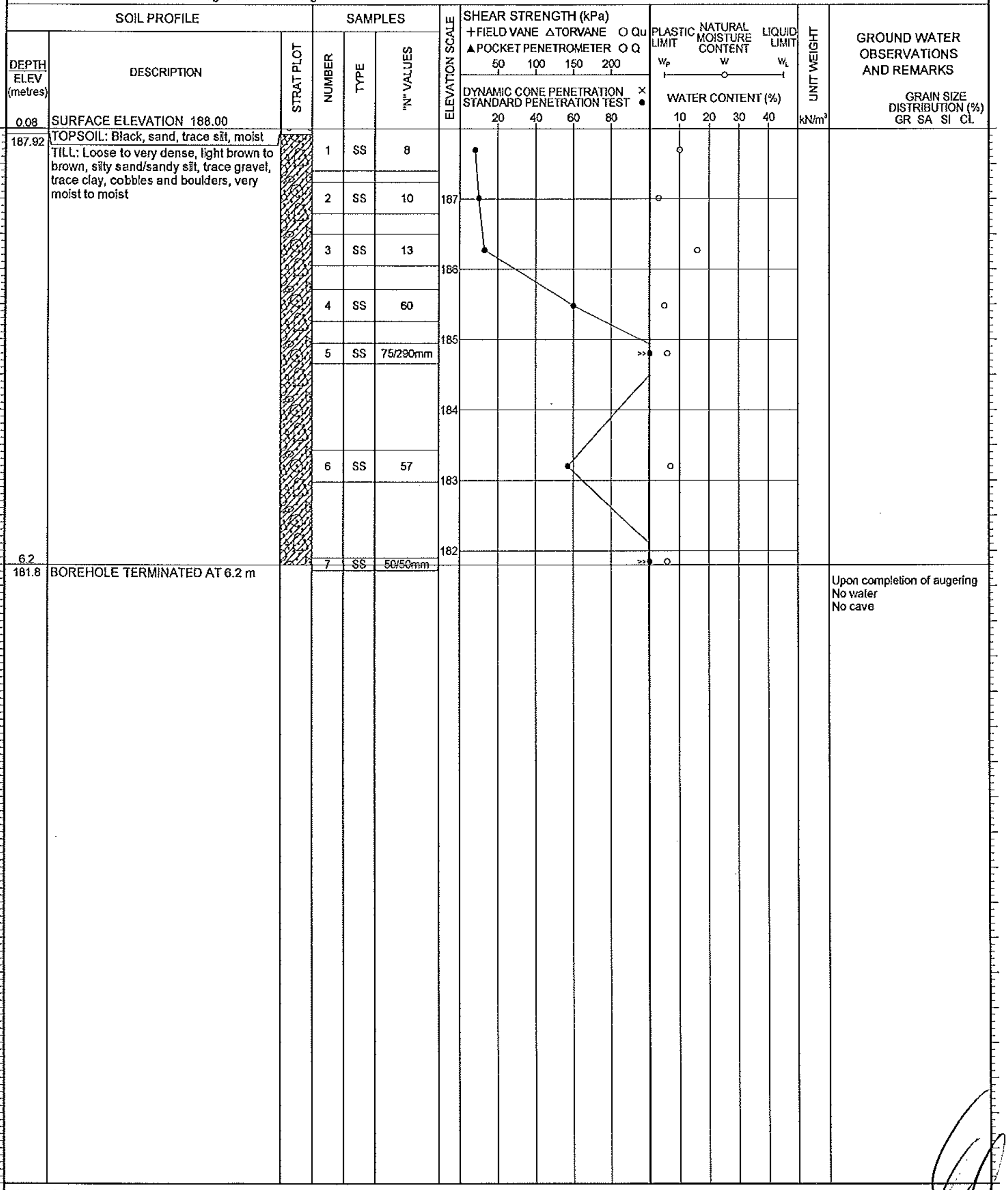
SOIL TESTS

Qu	Unconfined Compression	LV	Laboratory Vane
Q	Undrained Triaxial	FV	Field Vane
Qcu	Consolidated Undrained Triaxial	C	Consolidation
Qd	Drained Triaxial		

LOG OF BOREHOLE NO. 1

1 of 1

PROJECT Wasaga Beach West End Water Storage Facility and Maintenance Depot
17T 0569881E
4923942N
PML REF. 14BF073
LOCATION Town of Wasaga Beach, Ontario
BORING DATE September 16, 2015
ENGINEER GW
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN AT



DEPTH ELEV (metres)	DESCRIPTION	NUMBER	TYPE	"N" VALUES	UNIT WEIGHT kN/m³	GROUND WATER OBSERVATIONS AND REMARKS GRAIN SIZE DISTRIBUTION (%) GR SA SI CL
	SURFACE ELEVATION 188.00					
0.08 187.92	TOPSOIL: Black, sand, trace silt, moist					
	TILL: Loose to very dense, light brown to brown, silty sand/sandy silt, trace gravel, trace clay, cobbles and boulders, very moist to moist	1	SS	8		
		2	SS	10		
		3	SS	13		
		4	SS	60		
		5	SS	75/290mm		
		6	SS	57		
		7	SS	50/50mm		
6.2 181.8	BOREHOLE TERMINATED AT 6.2 m					Upon completion of augering No water No cave

NOTES

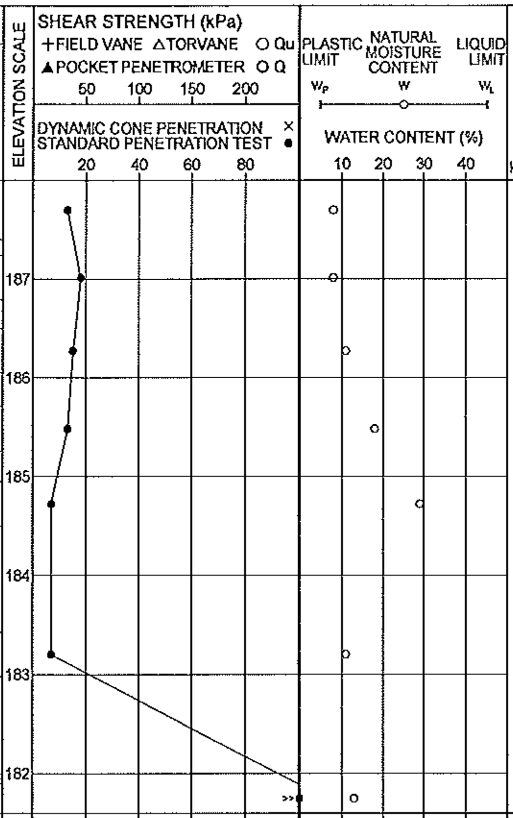
PML Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 2

1 of 1

PROJECT Wasaga Beach West End Water Storage Facility and Maintenance Depot
17T 0570041E
4923929N
PML REF. 14BF073
LOCATION Town of Wasaga Beach, Ontario
BORING DATE September 16, 2015
ENGINEER GW
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN AT

SOIL PROFILE		SAMPLES		
DEPTH ELEV (metres)	DESCRIPTION	NUMBER	TYPE	"N" VALUES
	SURFACE ELEVATION 188.00			
0.11 187.89	TOPSOIL: Black, sand, trace silt, moist			
	TILL: Compact, brown, silty sand/sandy silt, trace gravel, cobbles and boulders, moist	1	SS	13
		2	SS	18
1.6 186.4	TILL: Stiff to firm, grey, silty clay, trace gravel, cobbles and boulders, APL to WTPL	3	SS	15
		4	SS	13
		5	SS	7
		6	SS	7
5.5 182.5	SILT: Very dense, grey, sandy silt, moist			
6.4		7	SS	92/250mm
181.6	BOREHOLE TERMINATED AT 6.4 m			



UNIT WEIGHT kN/m³

GROUND WATER OBSERVATIONS AND REMARKS

GRAIN SIZE DISTRIBUTION (%)
GR SA SI CL

Upon completion of augering
No water
No cave

Depth scale (metres): 0.0, 1.0, 2.0, 3.0, 4.0, 5.0, 6.0, 7.0, 8.0, 9.0, 10.0, 11.0, 12.0, 13.0, 14.0, 15.0

NOTES

Peto MacCallum Ltd.
CONSULTING ENGINEERS

LOG OF BOREHOLE NO. 3

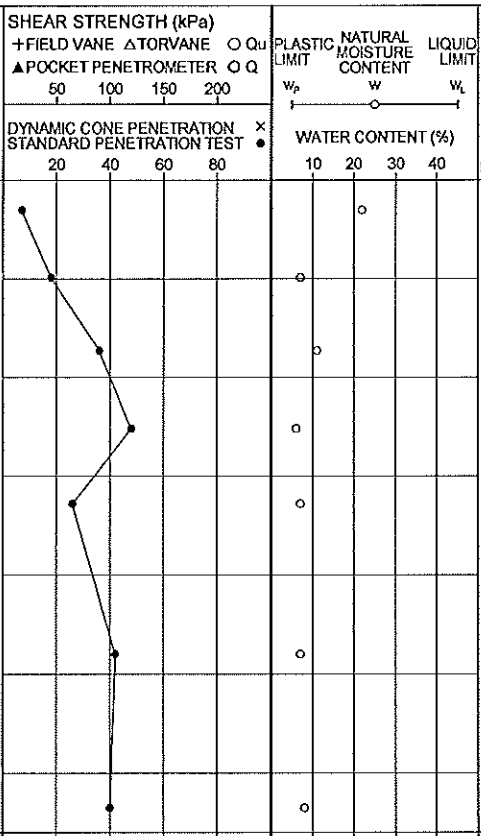
1 of 1

PROJECT Wasaga Beach West End Water Storage Facility and Maintenance Depot
17T 0569832E
4924002N
PML REF. 14BF073

LOCATION Town of Wasaga Beach, Ontario
BORING DATE September 16, 2015
ENGINEER GW

BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN AT

DEPTH / ELEV (metres)	DESCRIPTION	STRAT PLOT	NUMBER	TYPE	"N" VALUES	ELEVATION SCALE	GROUND WATER OBSERVATIONS AND REMARKS
0.06	SURFACE ELEVATION 188.00						
187.94	TOPSOIL: Black, sand, trace silt, moist						
	TILL: Loose to dense, light brown to grey, silty sand/sandy silt, trace gravel, cobbles and boulders, moist		1	SS	7		
			2	SS	18	187	
			3	SS	36	186	
			4	SS	48	185	
			5	SS	26	184	
			6	SS	42	183	
			7	SS	40	182	
6.6 181.4	BOREHOLE TERMINATED AT 6.6 m						Upon completion of augering No water No cave



UNIT WEIGHT kN/m³

GRAIN SIZE DISTRIBUTION (%) GR SA SI CL

Depth scale: 0.0 1.0 2.0 3.0 4.0 5.0 6.0 7.0 8.0 9.0 10.0 11.0 12.0 13.0 14.0 15.0

NOTES

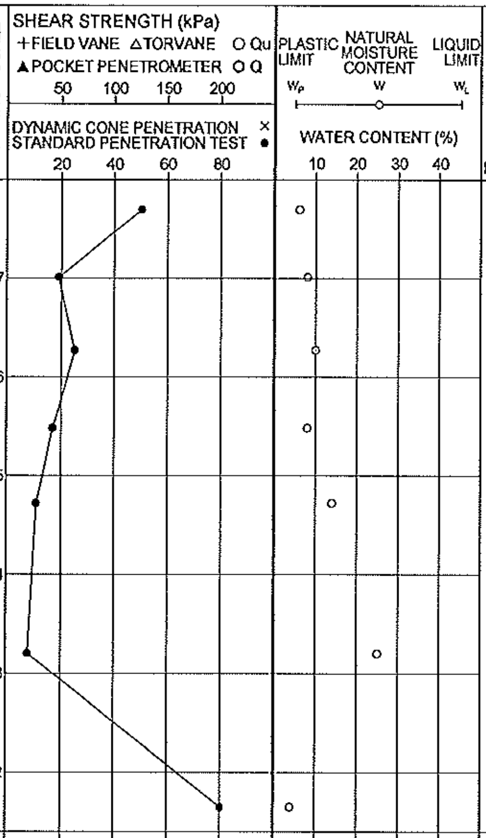
PML - BH LOG GEO/ENV WITH MWS 14BF073 2015-10-02 BH LOGS.GPJ ON_MOT.GDT 02/10/2015 10:38:17 AM

Peto MacCallum Ltd.
CONSULTING ENGINEERS

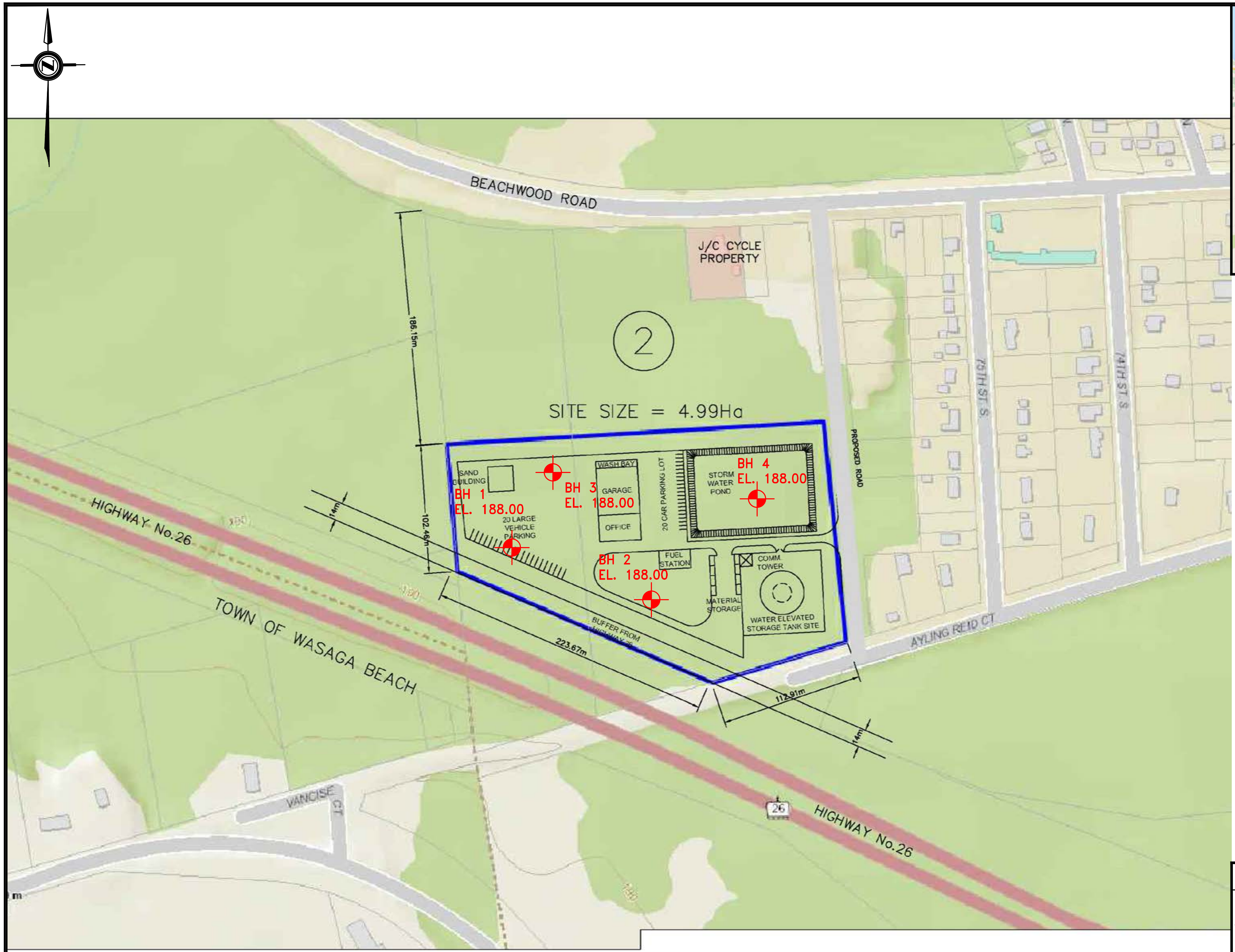
LOG OF BOREHOLE NO. 4

PROJECT Wasaga Beach West End Water Storage Facility and Maintenance Depot
17T 0570028E
4924020N
PML REF. 14BF073
LOCATION Town of Wasaga Beach, Ontario
BORING DATE September 16, 2015
ENGINEER GW
BORING METHOD Continuous Flight Solid Stem Augers
TECHNICIAN AT

DEPTH / ELEV (metres)	DESCRIPTION	NUMBER	TYPE	"N" VALUES	GROUND WATER OBSERVATIONS AND REMARKS
0.08	SURFACE ELEVATION 188.00				
187.92	TOPSOIL: Brown, sand, trace silt, moist				
	FILL: Brown, sand, trace silt, some gravel, moist	1	SS	50	
0.70 187.30	TILL: Compact, brown, silty sand/sandy silt, trace to some gravel, cobbles and boulders, moist	2	SS	19	
		3	SS	25	
		4	SS	17	
3.1 184.9	TILL: Firm to hard, grey, silty clay, trace gravel, cobbles and boulders, APL to WTPL	5	SS	11	
		6	SS	8	
		7	SS	80	
6.6 181.4	BOREHOLE TERMINATED AT 6.6 m				Upon completion of augering No water No cave



NOTES



KEY PLAN
WASAGA BEACH, ONTARIO

LEGEND:

BH 1 EL. 188.00	BOREHOLE 1 SURFACE ELEVATION

REFERENCE:

PLAN PRODUCED FROM A SITE PLAN PROVIDED BY THE CLIENT. BOREHOLE ELEVATIONS ARE APPROXIMATED BASED ON OVERHEAD CONTOUR MAPPING OF THE SITE.

NOTE:

THE INFERRED STRATIGRAPHY REFERRED TO IN THE REPORT IS BASED ON THE DATA FROM THESE BOREHOLES SUPPLEMENTED BY GEOLOGICAL EVIDENCE. THE ACTUAL STRATIGRAPHY BETWEEN THE BOREHOLES MAY VARY.

0m 50 100 150 200 250

SCALE

BOREHOLE LOCATION PLAN

WASAGA BEACH WEST END
WATER STORAGE FACILITY AND MAINTENANCE DEPOT
WASAGA BEACH, ONTARIO

Peto MacCallum Ltd.
CONSULTING ENGINEERS

DRAWN	AT	DATE	SCALE	PML REF.	DRAWING NO.
CHECKED	GRW	DEC. 2015	AS SHOWN	14BF073	1
APPROVED	GRW				

NOISE FEASIBILITY IMPACT STUDY
WASAGA BEACH WEST END WATER STORAGE RESERVOIR AND MAINTENANCE DEPOT
WASAGA BEACH, ONTARIO

FOR

TOWN OF WASAGA BEACH

PREPARED BY

HOWARD R. PATLIK, C.E.T.

HOWARD PATLIK
Nº 45573

CHECKED BY

JOHN E. COULTER, B.A.Sc., P.ENG.

2016/11/17
J. E. COULTER

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NOVEMBER 17, 2016

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INTRODUCTION

At the request of Ainley & Associates, J.E. COULTER ASSOCIATES LIMITED has prepared a noise feasibility impact study for the proposed Wasaga Beach West Maintenance facility in Wasaga Beach, Ontario (Appendix A, Figure 1). This study has been requested by the Town of Wasaga Beach as part of a Class EA application.

The scope of the study is to determine the potential noise impact from the anticipated facility at the most sensitive receiver locations and to recommend noise attenuation measures to comply with the noise objectives, as necessary. This study also includes the potential noise impact from vehicles accessing the new north-south road between Beachwood Road and Ayling Reid Court for the maintenance facility.

DESCRIPTION OF THE SITE AND SURROUNDING AREAS

The proposed maintenance facility is to be located north of Highway 26 and approximately 150m west of 75th Street in Wasaga Beach, Ontario (see Appendix A, Figure 2).

The proposed maintenance facility may include the following equipment:

Water Tower
- Backup generator (will be enclosed)
- Pumps (will be enclosed)

Maintenance Depot
- Dump trucks
- Loader
- Snow plows
- Trucks
- Grader
- Forklift
- Transport trucks (for fuel and sand drop off)
- Grass cutting

For the purposes of noise impact assessment, the neighbouring residential areas are classified as Class 1 under MOECC's *NPC-300* criteria. This report will also reference the requirements of MOECC's *D-6* guideline.

NOISE CRITERIA

MOECC recommends the guidelines found in *NPC-300* as the current noise criteria for non-transportation sources (service equipment and service activity noise). The MOECC noise guideline basically states that the average sound level of the stationary source (mechanically generated noise or impulse noise such as banging) should not exceed the average sound level of the roadway traffic during the same hourly period. The sound level limit at a point of reception is set as the higher of either the applicable exclusion limit, or the minimum background sound level that occurs or is likely to occur during the time period corresponding to the operation of the stationary source under impact assessment.

MOECC's *D-6* guideline requests a setback of 20, 70, and 300m for light (Class I), medium (Class II) and heavy (Class III) industrial uses. This site would fall into Class I or Class II.

EXISTING AMBIENT SOUND LEVELS

For the stationary noise sources, the criteria have been developed in accordance with MOECC's noise guidelines. The guideline states the sound levels due to a stationary source, including Quasi-Steady Impulsive Sound, but not including other impulsive sound, if the sound level is expressed in terms of the One-Hour Equivalent Sound Level (L_{eq}), should not, in any hour of the day, exceed the one-hour equivalent sound level (L_{eq}) of the existing road traffic or MOECC's minimum limits, noted in Table 1.

The assessment identified noise sensitive receivers to the east and north of the proposed development. Table 1, below, provides the quietest daytime hourly sound level considered by MOECC.

The closest and most prominent transportation sources are Highway 26 to the south and Beachwood Road to the north. The sound levels generated by the highway were modelled using CadnaA 4.6, using 3-D information. The ground cover is essentially flat between the roadways and receptors. There is a significant amount of dense wood in the area and this has been taken into account in the sound level calculations. The dense woods help to reduce the noise, depending on the depth of woods between the source and receivers.

Short-term sound level monitoring and vehicles counts were undertaken at Highway 26 and Beachwood Road.

The most current traffic data available from MTO indicates Highway 26 carried 20,600 vehicles AADT (year 2010) with 5.4% commercial vehicles and a posted speed limit of 70 kph.

Beachwood Road in 2013 carried 5,190 vehicles AADT at a posted speed limit of 80 kph, west of Joan Avenue and 60 kph east of Joan Avenue. The Town may be considering lowering the speed limit on Beachwood Road. The lowering of the speed limit will not impact the noise analysis because the minimum MOECC exclusion limits were used in any case. The current traffic generates sound levels that are less than the MOECC exclusion limits at all points of reception.

The closest points of reception were considered: the dwellings along the west side of 75th Street (R1-R6) and the residence along the south side of Beachwood Road (R7-R8). The sound level limit at a point of reception is anywhere within 30m of a dwelling.

Based on site noise monitoring of Highway 26 and Beachwood Road, and projecting the sound to the points of reception, it was found that the road traffic sound levels are less than MOECC's minimum exclusion limits and therefore the exclusion limits apply at all times of the day, evening, or night.

TABLE 1: LOWEST AMBIENT SOUND LEVELS AT POINT OF RECEPTION (MOECC CRITERIA, dB L_{eq}, 1 HOUR)

TIME PERIOD	RECEPTORS
	R1 – R7
DAYTIME (0700 to 1900 hours) (dB L_{eq}, 1 Hour)	50
EVENING (1900 to 2300 hours) (dB L_{eq}, 1 Hour)	50
NIGHT TIME (2300 to 0700 hours) (dB L_{eq}, 1 Hour)	45

SOURCE SOUND LEVELS

Table 2, below, summarizes the sound power levels of the main sources of equipment noise.

TABLE 2: NOISE SOURCE SUMMARY TABLE

Source ID[1]	Source Description	Sound Power Level (dB PWLA)	Source Location[2]	Sound Characteristics[3]	Noise Control Measures[4]
S1	Pneumatic Wrenches	110 dBA	O	Q	U
S2	Backup Beepers	110 dBA	O	T	U
S3	Power Wash	104 dBA	O	S	U
S4	Garage Exhaust Fan	98 dBA	O	S	U
S5	Forklift	100 dBA	O	S	U
S6	Snow Plows	112 dBA	O	S	U
S7	Case 741 Wheel Loader	103 dBA	O	S	U
S8	Trucks	100 dBA	O	S	U
S9	Emergency Generator (Generac QT070)	99 dBA	O	S	U

Notes:

1. Wherever possible, Source ID must be identical with that used in the ESDM report.
2. Source Location:
   O: located/installed outside the building, including roof
   I: located/installed inside building
3. Sound Characteristics:
   S: Steady
   Q: Quasi-Steady Impulsive
   I: Impulsive
   A: Buzzing
   T: Tonal (+5 dB included in PWL value)
   C: Cyclic
4. Noise Control Measures
   S: Silencer, acoustic louvre, muffler
   A: Acoustic lining, plenum
   A: Barrier, berm, screening
   L: Lagging
   E: Acoustic Enclosure
   O: Other
   U: Uncontrolled

ANTICIPATED EQUIPMENT AND OPERATION

A concept plan has been prepared for the development (see Appendix A, Figures 3 and 4). This report will outline, in general, the anticipated sound levels based on the equipment expected to be used on site as follows:

S1 Pneumatic Wrenches

Sound level measurements of the pneumatic wrenches were taken at the existing maintenance yard at 150 Westbury Road in Wasaga Beach. This is expected to be representative of what will take place at the proposed maintenance facility. It has been assumed that four pneumatic wrenches (2 bays on each side of the building) are each operated for an equivalent time period of 2 minutes per hour (8 minutes total). This assumes all garage doors (4 on each side of the building) are fully open. Each door is approximately 5m wide by 4m high. The pneumatic wrenches have a distinct sound characteristic (quasi-steady impulsive) that requires that the base sound level be adjusted by +10 dB as per MOECC's guidelines. This correction is included in the calculations.

S2 Backup Beepers

Backup beepers are excluded from MOECC's definition of a stationary noise because they are considered a safety device, as per the Environmental Protection Act. However, for this report, the sound of the backup beeper has been included in the calculations. The backup beeper on the loader was assumed to be operated 50% of the time (i.e., 30 minutes per hour). For other equipment, the backup beeper was assumed to be operated equivalent to 5 minutes per hour. The calculations here are based on a sound power level of 110 dB PWLA (79 dBA at 15m).

S3 Power Wash

There are two wash bays (east and west access) at the north end of the maintenance building. Sound level measurements of the power washing were recorded to model at the new site. Power washing in each bay was assumed to occur over a 20-minute period per hour.

S4 Garage Exhaust Fan

The maintenance garage includes a single wall-mounted exhaust fan. The existing fan at the Westbury Road site was used as a basis for this site. The fan was measured at a distance of 6m.

S5 Wheel Loader

A loader (CASE 741 or equivalent) was assumed to be operating by the sand building, covering the area west of the garage/office building. It was assumed that the loader operated 45 minutes per hour. Assumed travel speed is 10 kph.

S6 Forklift

A forklift was assumed to be operating in the material storage area, south of the SWMP. The forklift operating time is assumed to be 45 minutes per hour, moving at 10 kph.

S7 Snow Plows

For this study, it was assumed that 5 snowplows would enter or exit the site within a one-hour period.

S8 Truck Movements

For this proposed site, it was assumed that 10 truck movements (5 in and 5 out) per hour occur at a speed of 10 kph. The main truck movements are assumed to be between 0700 and 2300 hours. The truck movements assume trucks travelling south of the SWMP and approaching the maintenance building.

S9 Emergency Generator (Generac QT070)

The emergency generator is typically tested once per month. MOECC permits the sound level from the periodic testing to be +5 dB above the minimum noise criteria. In this case, the generator can produce 55 dBA (50 +5) at the noise sensitive receptors, without the need for additional noise control measures.

The generator was modelled on the Generac QT070 unit located at 150 Westbury Road. It has a sound power level rating of 99 dB PWLA. It was assumed that it is tested for a period of one hour (continuous).

PROJECTED SOUND LEVELS

The sound levels generated by the above noted equipment were calculated in order to determine the required noise control measures to meet MOECC's *NPC-300* noise criteria. The sound data were projected back to the residences, with appropriate adjustments for shielding, ground effect, building reflections, and atmospheric conditions. All sound level predictions were calculated using CadnaA v.4.5 based on the formulae in *ISO-9613-2.* Detailed calculations of each source were calculated for each receptor and are summarized in Appendix B.

The projected sound levels were calculated for the day, evening, and night time. The modelling assumes a predictable worst-case scenario, assuming all equipment is operated at the same time during the day and evening. During the night-time period, the operation of the snow plows is assumed to be the main source of potential noise.

The following tables summarize the unmitigated calculated sound level, the criteria and, where applicable, confirmation the sound levels meet the noise criteria.

TABLE 3: POINT-OF-RECEPTION NOISE IMPACT TABLE
DAY & EVENING (0700-2300 HOURS)

Source	**R1 75th St**	**R2 75th St**	**R3 75th St**	**R4 75th St**	**R5 75th St**	**R6 75th St**	**R7 – JC Cycle – @2nd Storey**	**R8 – JC Cycle – @Grade**
Garage	39.3	37.4	37.7	37.5	36.2	34.5	40.0	34.9
Snow Plows	42.0	39.7	39.0	38.2	36.6	35.7	39.1	36.1
Forklift	40.2	38.4	36.5	35.8	34.6	33.9	41.0	34.5
Loader	30.4	27.1	24.0	23.7	22.5	22.1	39.6	29.8
Wash Bays	41.5	39.5	40.0	39.9	36.3	35.0	38.1	36.8
Trucks	32.9	30.8	30.1	29.4	28.1	27.2	29.9	27.5
Emergency Gen Set	36.2	34.2	34.3	34.1	33.6	31.5	35.5	31.4
Backup Beeper	28.5	26.0	26.1	26.1	24.5	24.8	45.2	38.9
Total	48	46	46	45	43	42	50	45
Noise Criteria (dB L_{eq})	50	50	50	50	50	50	50	50
Noise Impact (dB)	-2	-4	-4	-5	-7	-8	0	-5

TABLE 4: POINT-OF-RECEPTION NOISE IMPACT TABLE
NIGHT TIME (2300-0700 HOURS)

Source	R1 75th St	R2 75th St	R3 75th St	R4 75th St	R5 75th St	R6 75th St	R7 – JC Cycle – @2nd Storey	R8 – JC Cycle – @Grade
Snow Plows	42	40	39	38	37	36	39	37
Backup Beeper	38	30	28	28	27	26	44	36
Total	42	40	39	38	37	36	45	39
Noise Criteria (dB L_{eq})	45	45	45	45	45	45	45	45
Noise Impact (dB)	-3	-5	-6	-7	-8	-9	0	-6

Note: Sound level less than 0 indicate no noise impact.

As summarized in Tables 3 to 5, the sound levels generated by the proposed operation do not create a noise impact at any point of reception, meeting MOECC's *NPC-300* noise criteria at all times of the day, evening, or night. The sound levels generated by the facility during the day and evening are expected to range from 1 to 8 dB below the minimum MOECC noise exclusion limit. At night, the snow plows entering and exiting the site will not impact the residences, as the sound levels will be up to 9 dB below the limit of the noise criterion. Additional noise control measures such as acoustic barriers, walls or enclosures are not required.

ACCESS ROAD

A new north-south access road to the maintenance facility has been reviewed for potential noise impact on the residences to the north and east (see Appendix A, Figure 5). An analysis was conducted to calculate the sound level of the snow plows and trucks that would use the north-south access road. The analysis looked at the sound levels generated by 10 snow plow (5 in/5 out) and 10 truck movements (5 in/5 out) in a one-hour period. The assumed movements are considered to be the same at any time of the day, evening, or night. This would be a worst-case scenario.

There is also the MTO noise criterion (Environmental Guide for Noise, October 2006) that requires consideration for noise control where the sound-level increase due to the undertaking is greater than or equal to 5 dBA. The significance of a noise impact is quantified by using this objective in addition to the change in sound level above the future ambient (i.e., the future sound level without the proposed access road in place is compared to the future sound level with the proposed access in place).

When a comparison is made with the existing ambient sound levels at the residences and those that include the new access road, the following results are generated:

TABLE 5: POINT-OF-RECEPTION NOISE IMPACT TABLE COMPARISON WITH EXISTING + NEW ACCESS ROAD

Source	R1	R2	R3	R4	R5	R6	R7 – JC Cycle – @2nd Storey	R8 – JC Cycle – @Grade
Existing Ambient	49.1	48.2	47.3	47.6	47.9	48.2	50.6	54.3
Existing Ambient + New Access Road	50.0	49.0	48.2	48.4	48.7	49.0	52.2	54.7
Noise Impact (dB)	0.9	0.8	0.9	0.8	0.8	0.8	1.6	0.4

When comparing the existing ambient and the sound levels with the access road in place, the sound level increase is less than 2 dB, insufficient to require consideration of noise mitigation measures.

The MOECC's noise criteria for transportation sources on public road is 55 dB L_{eq} daytime (0700 to 2300 hours) and 50 dB L_{eq} night time (2300 to 0700 hours). Vehicles were assumed to be operating at 40 kph.

Based on the above assumptions, the following sound levels are expected.

TABLE 6: ACCESS ROAD - POINT-OF-RECEPTION NOISE IMPACT TABLE
DAY & EVENING (0700-2300 HOURS)

Source	R1 75th St	R2 75th St	R3 75th St	R4 75th St	R5 75th St	R6 75th St	R7 – JC Cycle – @2nd Storey	R8 – JC Cycle – @Grade
Snow Plows	39.9	38.4	37.7	37.5	37.6	38.5	44.1	41.3
Trucks	39.6	37.9	37.3	37.1	37.3	38.4	43.6	40.6
Total	43	41	41	40	41	41	47	44
Noise Criteria (dB L_{eq})	55	55	55	55	55	55	55	55
Noise Impact (dB)	-12	-13	-14	-15	-14	-14	-8	-11

TABLE 7: ACCESS ROAD - POINT-OF-RECEPTION NOISE IMPACT TABLE
NIGHT TIME (2300-0700 HOURS)

Source	R1 75th St	R2 75th St	R3 75th St	R4 75th St	R5 75th St	R6 75th St	R7 – JC Cycle – @2nd Storey	R8 – JC Cycle – @Grade
Snow Plows	39.9	38.4	37.7	37.5	37.6	38.5	44.1	41.3
Trucks	39.6	37.9	37.3	37.1	37.3	38.4	43.6	40.6
Total	43	41	41	40	41	41	47	44
Noise Criteria (dB L_{eq})	50	50	50	50	50	50	50	50
Noise Impact (dB)	-7	-9	-9	-10	-9	-9	-3	-6

When comparing the projected sound levels to the daytime (55 dB L_{eq}, and nighttime (50 dB L_{eq}), the sound levels are increase is less than 3 to 15 dB less than the noise criteria, sufficient not to require consideration of noise mitigation measures.

The snow plow and trucks movements are not expected to generate any noise impact for the residents at any time of the day, evening, or night. MOECC's noise criteria are met without the need for any noise control measures.

FUTURE DEVELOPMENTS

A scenario was also considered where the entire property (the lands west of the new access road) is redeveloped. In this case, the existing dense woods would be removed. The potential noise impact of the trees removed on the existing residents was considered. A dense woods, where the depth is greater than 30m, provides additional noise attenuation compared to the condition with no dense woods present.

With the dense woods removed, the sound level change would be as follows:

TABLE 8: POINT-OF-RECEPTION NOISE IMPACT TABLE (WITH AND WITHOUT DENSE WOODS)
DAY & EVENING (0700-2300 HOURS)

Source	**R1 75th St**	**R2 75th St**	**R3 75th St**	**R4 75th St**	**R5 75th St**	**R6 75th St**	**R7 – JC Cycle – @2nd Storey**	**R8 – JC Cycle – @Grade**
Dense Woods Remain	48	46	46	45	43	42	50	45
Dense Woods Removed	48	46	46	45	44	44	56	54
Change	0	0	0	0	+1	+2	**+6**	**+9**
Noise Criteria (dB L_{eq})	50	50	50	50	50	50	50	50
Noise Impact, Trees Removed (dB)	-2	-4	-4	-5	-6	-6	**+6**	**+4**

TABLE 9: POINT-OF-RECEPTION NOISE IMPACT TABLE (WITH AND WITHOUT DENSE WOODS)
NIGHT TIME (2300-0700 HOURS)

Source	**R1 75th St**	**R2 75th St**	**R3 75th St**	**R4 75th St**	**R5 75th St**	**R6 75th St**	**R7 – JC Cycle – @2nd Storey**	**R8 – JC Cycle – @Grade**
Dense Woods Remain	42	40	39	38	37	36	45	39
Dense Woods Removed	42	40	39	38	37	36	47	43
Change	0	0	0	0	0	0	**+2**	**+4**
Noise Criteria (dB L_{eq})	45	45	45	45	45	45	45	45
Noise Impact (dB)	-3	-5	-6	-7	-8	-9	**+2**	-2

R1 through R6 are not impacted as a result of the removal of the dense woods during anytime of the day, evening or night. During the daytime and evening, the sound levels would increase by 6 to 9 dB at R7 and R8 resulting in a 4 to 6 dB noise impact. At night, the sound levels increase by 2 to 4 dB resulting in a 2 dB noise impact at R7 (2nd storey).

With the dense woods removed, additional noise control measures are required to protect R7 and R8 unless intervening buildings provide equivalent noise control. To meet MOECC's noise criteria, a 5.5m high acoustic barrier is required along the north limit of the maintenance yard. The length of the barrier is approximately 130m commencing at the west end of the SWMP and extending to the sand building at the northwest part of the site (see Appendix A, Figures 6 and 7).

CONCLUSIONS

Based on the anticipated operation of the maintenance facility, no noise impact is expected at any sensitive point of reception based on the dense woods remaining. In this scenario, additional noise control measures are not required to meet MOECC's noise criteria.

Redevelopment of the lands that includes removing the dense woods between the new maintenance yard and R7 and R8 would result in noise impacts for the resident at R7 and R8. Noise control measures in the form of an acoustic barrier (5.5m high or its equivalent) would be required.

While not a requirement, including the sound of the backup beepers with all other site generate sounds will result in the levels exceeding the minimum MOECC criteria. Replacing the truck mounted backup beepers with a version that creates a "rushing" sound, rather than a high-pitched beep is preferred.

The new access road was found not to create a noise impact at any resident and thus no noise mitigation measures are required.

RECOMMENDATIONS

The following measures are recommended:

1. The acoustic consultant should reconfirm that MOECC's *NPC-300* noise criteria are satisfied once the final equipment selection and site layout are made available.

2. Where the dense woods are entirely removed from the property, additional noise control measures or equivalent buildings will be required to protect R7 and R8. To meet MOECC's noise criteria, a 5.5m high acoustic barrier is required along the north limit of the maintenance yard. The length of the barrier is approximately 130m commencing at the west end of the SWMP and extending to the sand building at the northwest part of the site (se Appendix A, Figures 6 and 7).

3. It is recommend that the truck mounted backup beepers use a version that creates a "rushing" sound, rather than a high-pitched beep.

/pt:hp

APPENDIX A: FIGURES

County of Simcoe

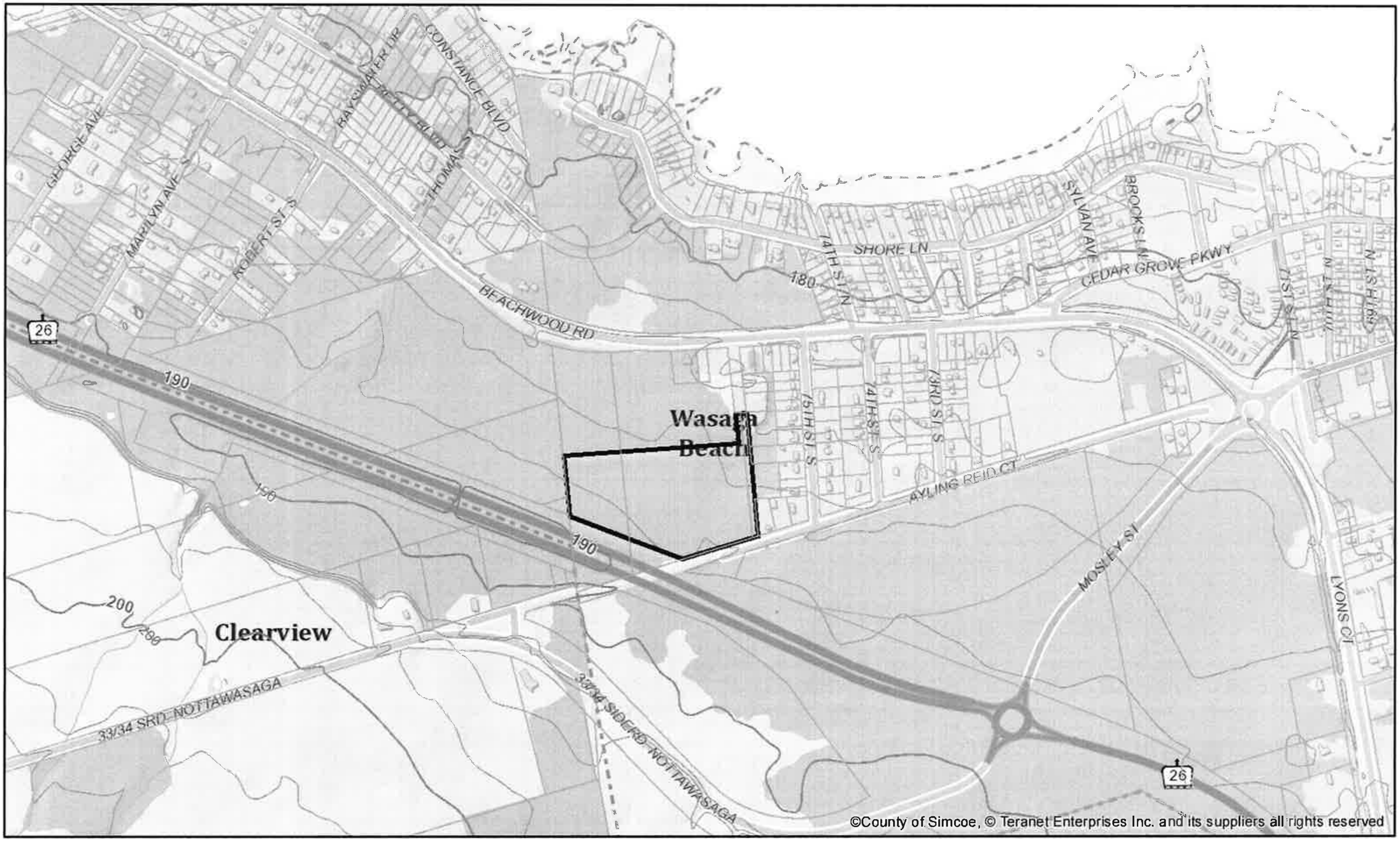

FIGURE 1

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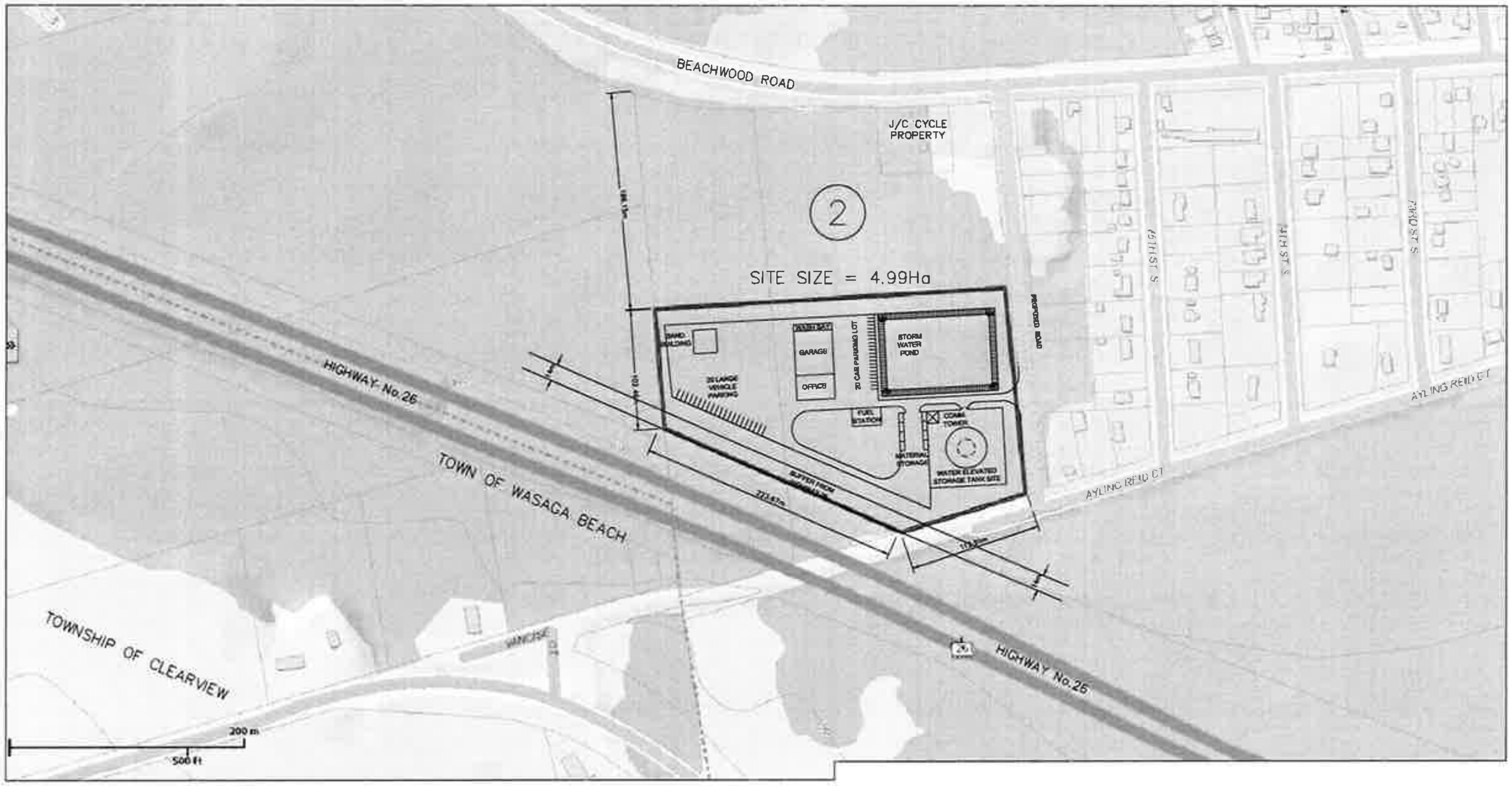
October 23, 2015



The Beach is Just the Beginning...

WASAGA Beach

PLOT

NOTES

- TOWN BOUNDARY
- LIMIT OF IDENTIFIED AREA

CONTRACT DRAWINGS

Contractor must verify all dimensions and be responsible for same. Any discrepancies must be reported to the Engineer before commencing work. Drawings are not to be scaled. Drawings may not be used for any purpose other than that stipulated in the contract agreement between the owner/client and the Engineer without the express written consent of Ainley & Associates Limited. Use of these drawings by any party for any other purpose is subject to the following caution.

CAUTION: [illegible]

NO.	REVISIONS	DATE	INITIAL

Not Valid Unless Signed And Dated

PRELIMINARY

SCALE: 1:200
DESIGN: R.M.
DRAWN: P.C.S.
CHECKED: R.M.
DATE: FEB. 2015

TOWN OF WASAGA BEACH
WEST END STORAGE FACILITY
AND MAINTENANCE DEPOT

IDENTIFIED AREA NO. 2

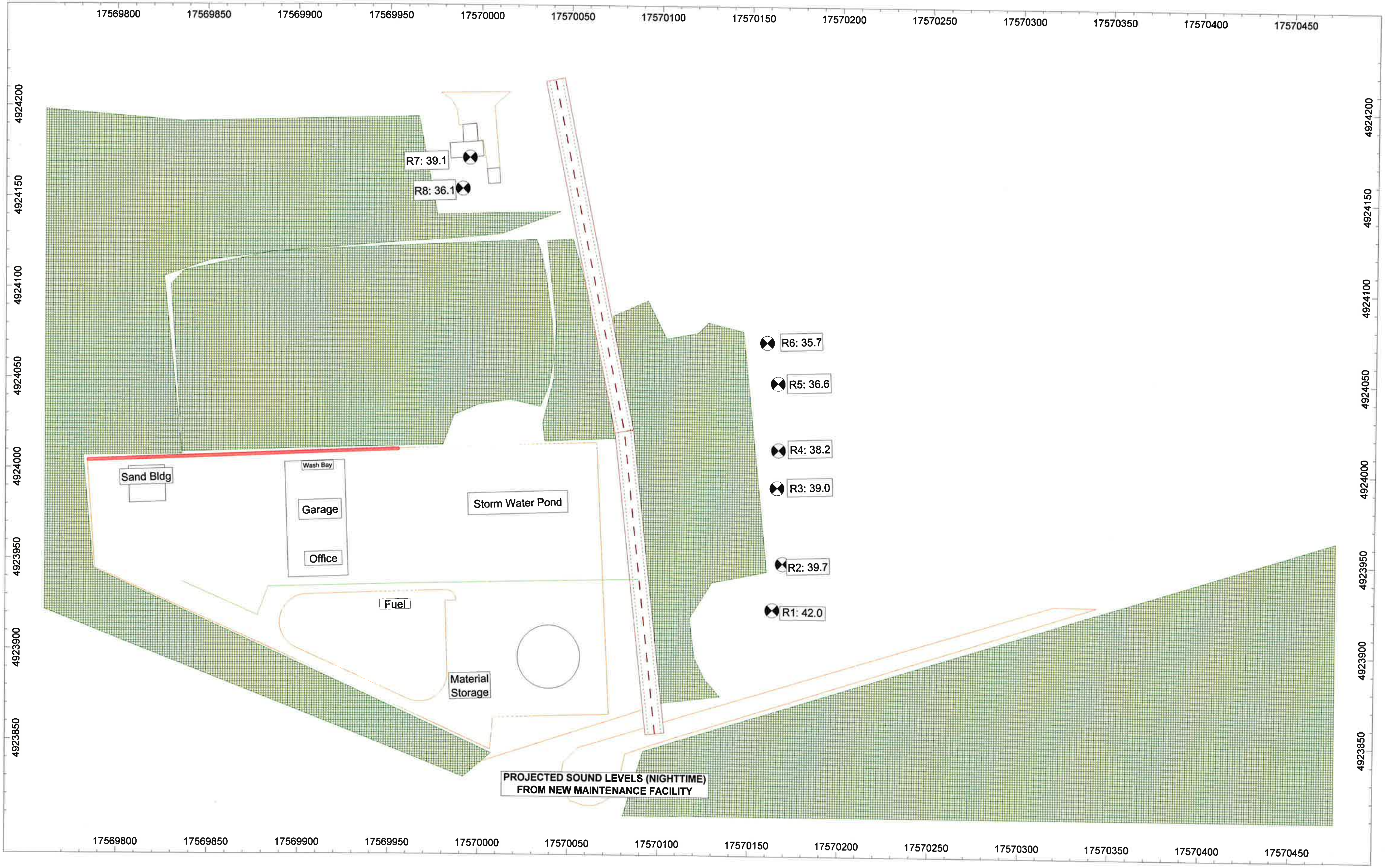
Ainley
CONSULTING
ENGINEERS
PLANNERS

CONTRACT No.
DWG. No. 114137-A2

FIGURE 2

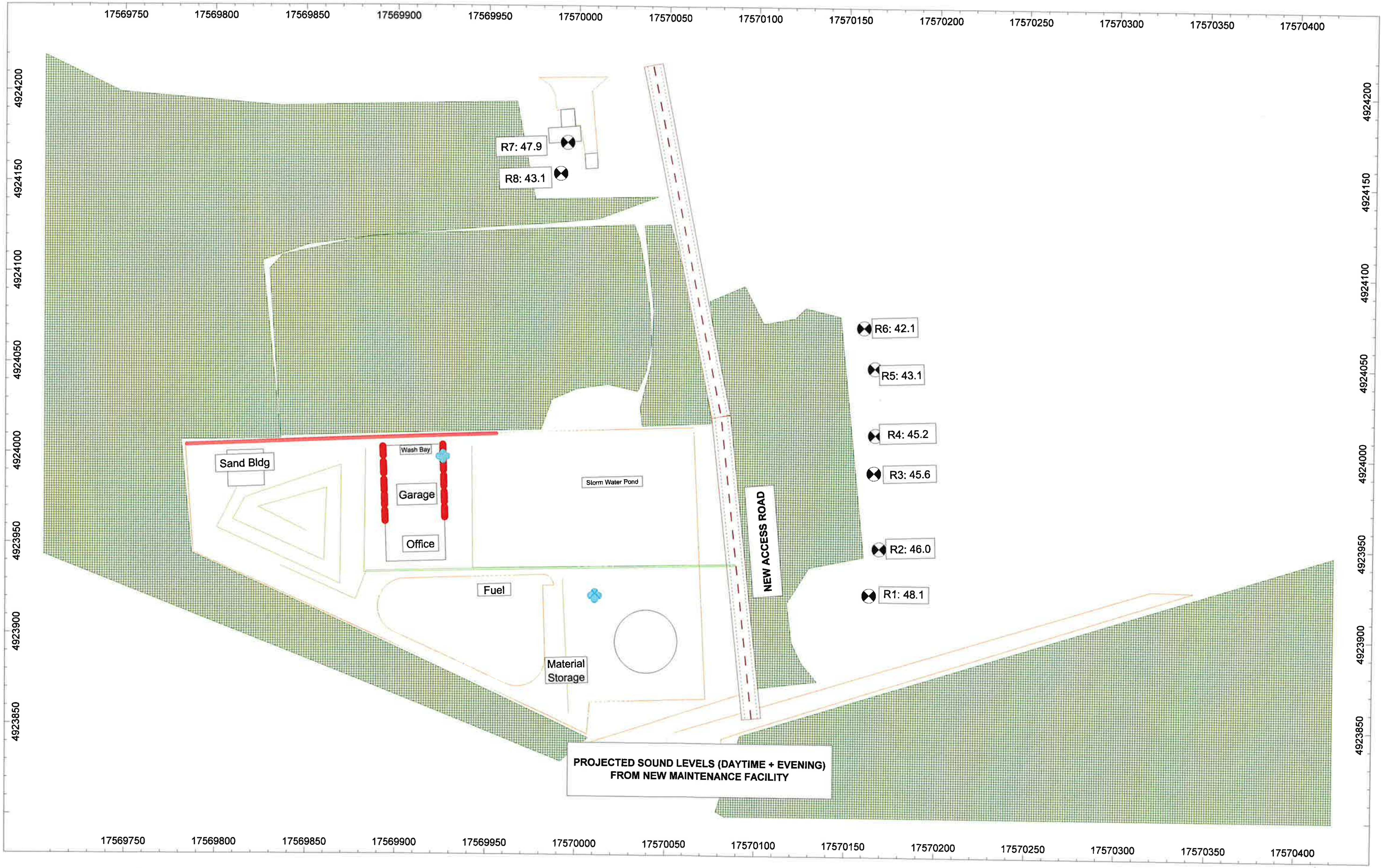
17569750
17569800
17569850
17569900
17569950
17570000
17570050
17570100
17570150
17570200
17570250
17570300
17570350
17570400
4924200
4924150
4924100
4924050
4924000
4923950
4923900
4923850
BEACHWOOD ROAD
R7: 52.2
R8: 54.7
R6: 49.0
R5: 48.7
75th St.
R4: 48.4
R3: 48.2
R2: 49.0
R1: 50.0
Sand Bldg
Wash Bay
Garage
Office
Storm Water Pond
Fuel
Material Storage
NEW ACCESS ROAD
HIGHWAY 26
PROJECTED SOUND LEVELS FROM NEW ACCESS ROAD

FIGURE 3



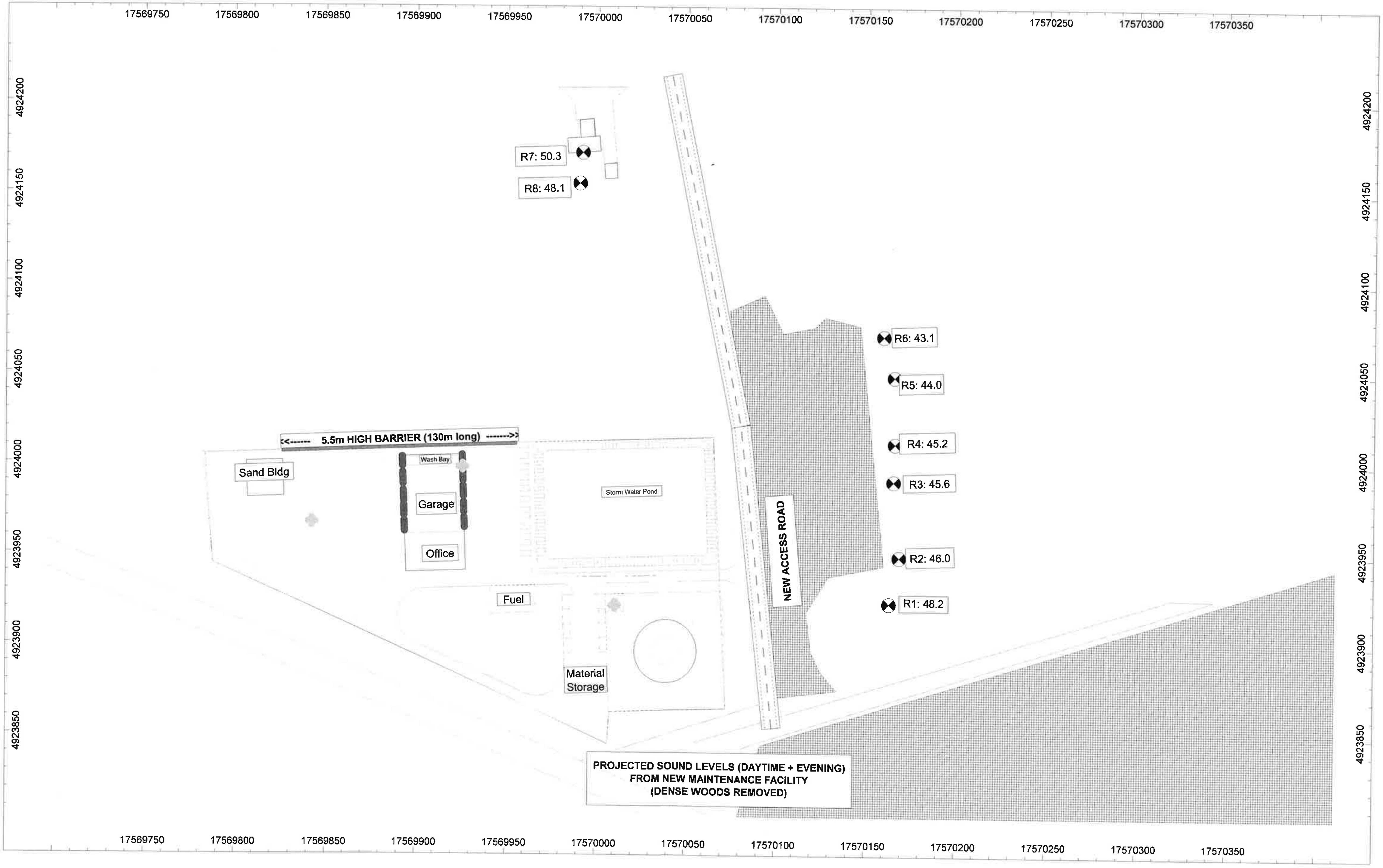
**PROJECTED SOUND LEVELS (NIGHTTIME)
FROM NEW MAINTENANCE FACILITY**

FIGURE 4



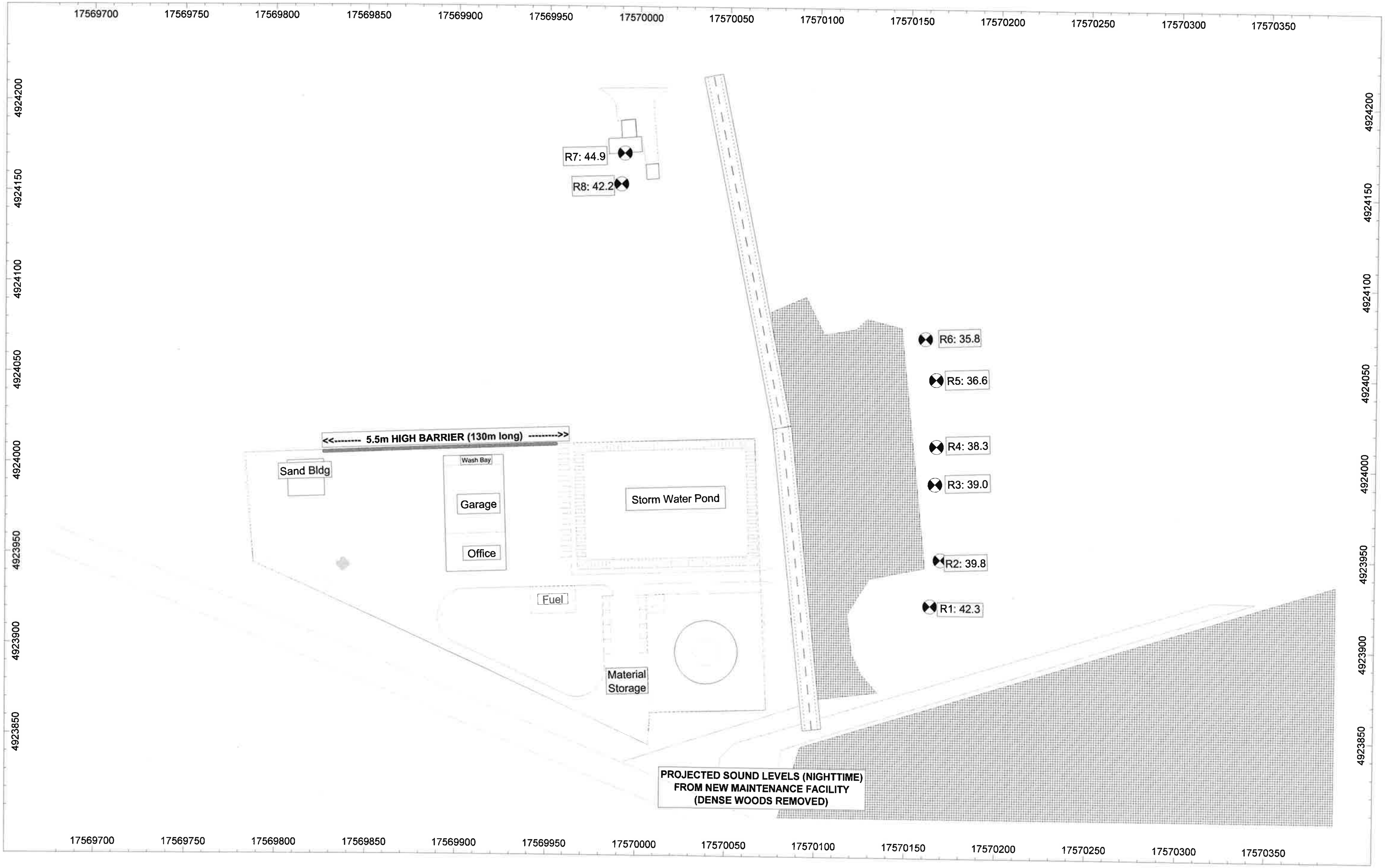
PROJECTED SOUND LEVELS (DAYTIME + EVENING)
FROM NEW MAINTENANCE FACILITY

FIGURE 5



PROJECTED SOUND LEVELS (DAYTIME + EVENING)
FROM NEW MAINTENANCE FACILITY
(DENSE WOODS REMOVED)

FIGURE 6



PROJECTED SOUND LEVELS (NIGHTTIME)
FROM NEW MAINTENANCE FACILITY
(DENSE WOODS REMOVED)

FIGURE 7

APPENDIX B: TRAFFIC DATA

Traffic
Engineering
Software

Weekly Volume Summary

Tue, Dec 03, 2013

Location: New Hwy 26 - 0.95km West of Start of New Hwy 26 (0.3km East of Mosley St./Roundabout)

LHRS/Offset: 25652 / 0.95 **Region:** Central

Pattern Type: Com. Tourist Recreation **PCS#:** 2 **Hwy. TVIS#:** 26125

Count Direction: EB **Report Dates:** Sep 30, 2013 **to** Oct 6, 2013

Hour Interval	Mon 13/09/30	Tue 1	Wed 2	Thu 3	Fri 4	Sat 5	Sun 6	Mon 7
0:00- 1:00		19	19	21	21	31	56	20
1:00- 2:00		7	9	19	18	26	38	13
2:00- 3:00		13	9	13	16	25	33	12
3:00- 4:00		11	25	14	15	23	17	21
4:00- 5:00		59	68	58	52	24	14	79
5:00- 6:00		113	123	137	121	59	42	148
6:00- 7:00		260	234	215	220	68	55	237
7:00- 8:00		347	389	405	312	148	90	398
8:00- 9:00		355	387	366	353	226	168	386
9:00-10:00		423	347	386	419	375	329	393
10:00-11:00		343	379	386	431	453	498	376
11:00-12:00		415	339	370	417	441	798	393
AM Total	0	2,365	2,328	2,390	2,395	1,899	2,138	2,476
12:00-13:00	398	391	393	423	420	457	726	
13:00-14:00	424	384	412	424	565	434	652	
14:00-15:00	432	408	431	410	526	471	646	
15:00-16:00	515	540	548	538	505	452	556	
16:00-17:00	521	494	582	566	528	465	615	
17:00-18:00	523	523	564	530	549	393	407	
18:00-19:00	266	318	325	320	328	365	357	
19:00-20:00	181	233	221	265	202	251	278	
20:00-21:00	157	155	153	159	178	181	229	
21:00-22:00	122	135	131	132	136	174	117	
22:00-23:00	48	60	75	59	106	127	53	
23:00-24:00	24	45	43	44	57	101	32	
PM Total	3,611	3,686	3,878	3,870	4,100	3,871	4,668	0
24 Hr. Total	3,611	6,051	6,206	6,260	6,495	5,770	6,806	2,476
Noon - Noon	5,976	6,014	6,268	6,265	5,999	6,009	7,144	

Traffic
Engineering
Software

Weekly Volume Summary

Tue, Dec 03, 2013

Location: New Hwy 26 - 0.95km West of Start of New Hwy 26 (0.3km East of Mosley St./Roundabout)

LHRS/Offset: 25652 / 0.95 **Region:** Central

Pattern Type: Com. Tourist Recreation **PCS#:** 2 **Hwy. TVIS#:** 26125

Count Direction: WB **Report Dates:** Sep 30, 2013 **to** Oct 6, 2013

Hour Interval	Mon 13/09/30	Tue 1	Wed 2	Thu 3	Fri 4	Sat 5	Sun 6	Mon 7
0:00- 1:00		25	32	29	25	67	53	19
1:00- 2:00		25	23	29	24	45	30	12
2:00- 3:00		24	16	18	18	20	16	2
3:00- 4:00		8	15	6	10	14	15	6
4:00- 5:00		6	7	11	8	16	9	7
5:00- 6:00		24	29	35	29	31	20	27
6:00- 7:00		149	147	145	129	63	30	131
7:00- 8:00		281	249	288	222	111	46	258
8:00- 9:00		385	414	376	331	168	87	365
9:00-10:00		243	266	241	236	274	133	231
10:00-11:00		220	246	209	230	293	152	209
11:00-12:00		239	271	242	246	361	179	226
AM Total	0	1,629	1,715	1,629	1,508	1,463	770	1,493
12:00-13:00	250	228	248	274	262	404	241	
13:00-14:00	233	217	211	242	292	347	243	
14:00-15:00	268	276	285	276	379	324	244	
15:00-16:00	287	300	322	310	424	347	232	
16:00-17:00	319	332	352	373	464	312	237	
17:00-18:00	339	366	351	330	443	219	214	
18:00-19:00	234	220	225	241	351	210	172	
19:00-20:00	142	160	170	198	297	157	170	
20:00-21:00	134	99	122	138	242	126	120	
21:00-22:00	88	104	102	113	228	98	89	
22:00-23:00	76	82	76	91	143	68	70	
23:00-24:00	17	31	44	52	76	63	19	
PM Total	2,387	2,415	2,508	2,638	3,601	2,675	2,051	0
24 Hr. Total	2,387	4,044	4,223	4,267	5,109	4,138	2,821	1,493
Noon - Noon	4,016	4,130	4,137	4,146	5,064	3,445	3,544	

Traffic
Engineering
Software

Weekly Volume Summary

Tue, Dec 03, 2013

Location: New Hwy 26 - 0.95km West of Start of New Hwy 26 (0.3km East of Mosley St./Roundabout)

LHRS/Offset: 25652 / 0.95 **Region:** Central

Pattern Type: Com. Tourist Recreation **PCS#:** 2 **Hwy. TVIS#:** 26125

Count Direction: EB/WB **Report Dates:** Sep 30, 2013 **to** Oct 6, 2013

Hour Interval	Mon 13/09/30	Tue 1	Wed 2	Thu 3	Fri 4	Sat 5	Sun 6	Mon 7
0:00- 1:00		44	51	50	46	98	109	39
1:00- 2:00		32	32	48	42	71	68	25
2:00- 3:00		37	25	31	34	45	49	14
3:00- 4:00		19	40	20	25	37	32	27
4:00- 5:00		65	75	69	60	40	23	86
5:00- 6:00		137	152	172	150	90	62	175
6:00- 7:00		409	381	360	349	131	85	368
7:00- 8:00		628	638	693	534	259	136	656
8:00- 9:00		740	801	742	684	394	255	751
9:00-10:00		666	613	627	655	649	462	624
10:00-11:00		563	625	595	661	746	650	585
11:00-12:00		654	610	612	663	802	977	619
AM Total	0	3,994	4,043	4,019	3,903	3,362	2,908	3,969
12:00-13:00	648	619	641	697	682	861	967	
13:00-14:00	657	601	623	666	857	781	895	
14:00-15:00	700	684	716	686	905	795	890	
15:00-16:00	802	840	870	848	929	799	788	
16:00-17:00	840	826	934	939	992	777	852	
17:00-18:00	862	889	915	860	992	612	621	
18:00-19:00	500	538	550	561	679	575	529	
19:00-20:00	323	393	391	463	499	408	448	
20:00-21:00	291	254	275	297	420	307	349	
21:00-22:00	210	239	233	245	364	272	206	
22:00-23:00	124	142	151	150	249	195	123	
23:00-24:00	41	76	87	96	133	164	51	
PM Total	5,998	6,101	6,386	6,508	7,701	6,546	6,719	0
24 Hr. Total	5,998	10,095	10,429	10,527	11,604	9,908	9,627	3,969
Noon - Noon	9,992	10,144	10,405	10,411	11,063	9,454	10,688	
	ADT	AWD	AADT	AAWD	SADT	SAWDT	WADT	DHV
	10,308	10,238	10,500	10,495	12,810	12,279	8,925	1,029

Traffic
Engineering
Software

Weekly Volume Summary

Tue, Dec 03, 2013

Location: New Hwy 26 - 0.5km W of Wasaga Beach/Mosley St (W of Roundabout)

LHRS/Offset: 25653 / 0.50 **Region:** Central

Pattern Type: Com. Tourist Recreation **PCS#:** 2 **Hwy. TVIS#:** 26127

Count Direction: EB **Report Dates:** Sep 30, 2013 **to** Oct 6, 2013

Hour Interval	Mon 13/09/30	Tue 1	Wed 2	Thu 3	Fri 4	Sat 5	Sun 6	Mon 7
0:00- 1:00		26	29	25	35	56	83	26
1:00- 2:00		19	17	27	19	22	53	17
2:00- 3:00		12	8	9	13	24	37	12
3:00- 4:00		12	19	18	16	23	24	21
4:00- 5:00		48	52	52	44	26	21	61
5:00- 6:00		103	106	114	100	50	34	119
6:00- 7:00		245	241	212	203	75	48	211
7:00- 8:00		378	398	387	307	133	94	384
8:00- 9:00		413	446	417	402	203	170	418
9:00-10:00		455	409	463	468	371	314	431
10:00-11:00		395	396	430	485	482	514	407
11:00-12:00		457	384	422	479	461	826	471
AM Total	0	2,563	2,505	2,576	2,571	1,926	2,218	2,578
12:00-13:00	450	464	466	481	538	498	763	
13:00-14:00	470	467	455	509	645	509	665	
14:00-15:00	538	527	534	509	621	522	659	
15:00-16:00	696	683	715	698	732	564	598	
16:00-17:00	682	705	772	738	654	556	638	
17:00-18:00	682	721	760	738	729	490	445	
18:00-19:00	358	393	437	415	419	419	379	
19:00-20:00	234	292	300	341	281	301	282	
20:00-21:00	188	210	201	202	245	216	246	
21:00-22:00	166	188	184	183	168	222	127	
22:00-23:00	82	98	101	104	135	147	72	
23:00-24:00	45	55	64	68	91	128	40	
PM Total	4,591	4,803	4,989	4,986	5,258	4,572	4,914	0
24 Hr. Total	4,591	7,366	7,494	7,562	7,829	6,498	7,132	2,578
Noon - Noon	7,154	7,308	7,565	7,557	7,184	6,790	7,492	

Weekly Volume Summary

Tue, Dec 03, 2013

Location: New Hwy 26 - 0.5km W of Wasaga Beach/Mosley St (W of Roundabout)

LHRS/Offset: 25653 / 0.50 **Region:** Central

Pattern Type: Com. Tourist Recreation **PCS#:** 2 **Hwy. TVIS#:** 26127

Count Direction: WB **Report Dates:** Sep 30, 2013 **to** Oct 6, 2013

Hour Interval	Mon 13/09/30	Tue 1	Wed 2	Thu 3	Fri 4	Sat 5	Sun 6	Mon 7
0:00- 1:00		27	41	31	37	80	60	28
1:00- 2:00		26	21	34	27	45	39	16
2:00- 3:00		31	18	20	22	20	23	5
3:00- 4:00		11	15	12	14	17	17	11
4:00- 5:00		12	13	16	15	22	11	9
5:00- 6:00		51	51	63	51	47	26	53
6:00- 7:00		251	249	235	224	119	56	218
7:00- 8:00		499	498	494	433	191	78	472
8:00- 9:00		724	713	708	658	314	178	694
9:00-10:00		465	458	428	420	421	258	416
10:00-11:00		337	386	355	394	460	276	348
11:00-12:00		391	422	383	402	544	321	346
AM Total	0	2,825	2,885	2,779	2,697	2,280	1,343	2,616
12:00-13:00	403	366	384	414	445	609	379	
13:00-14:00	370	348	362	358	489	564	401	
14:00-15:00	438	443	435	410	545	500	417	
15:00-16:00	424	407	450	464	641	491	344	
16:00-17:00	411	478	501	496	650	438	356	
17:00-18:00	439	491	453	487	609	351	296	
18:00-19:00	341	356	373	350	480	335	272	
19:00-20:00	227	221	257	253	409	227	225	
20:00-21:00	169	145	161	187	336	149	175	
21:00-22:00	132	149	141	149	282	134	125	
22:00-23:00	92	104	96	113	179	113	88	
23:00-24:00	33	37	71	74	98	81	30	
PM Total	3,479	3,545	3,684	3,755	5,163	3,992	3,108	0
24 Hr. Total	3,479	6,370	6,569	6,534	7,860	6,272	4,451	2,616
Noon - Noon	6,304	6,430	6,463	6,452	7,443	5,335	5,724	

Traffic
Engineering
Software

Weekly Volume Summary

Tue, Dec 03, 2013

Location: New Hwy 26 - 0.5km W of Wasaga Beach/Mosley St (W of Roundabout)

LHRS/Offset: 25653 / 0.50 **Region:** Central

Pattern Type: Com. Tourist Recreation **PCS#:** 2 **Hwy. TVIS#:** 26127

Count Direction: EB/WB **Report Dates:** Sep 30, 2013 **to** Oct 6, 2013

Hour Interval	Mon 13/09/30	Tue 1	Wed 2	Thu 3	Fri 4	Sat 5	Sun 6	Mon 7
0:00- 1:00		53	70	56	72	136	143	54
1:00- 2:00		45	38	61	46	67	92	33
2:00- 3:00		43	26	29	35	44	60	17
3:00- 4:00		23	34	30	30	40	41	32
4:00- 5:00		60	65	68	59	48	32	70
5:00- 6:00		154	157	177	151	97	60	172
6:00- 7:00		496	490	447	427	194	104	429
7:00- 8:00		877	896	881	740	324	172	856
8:00- 9:00		1,137	1,159	1,125	1,060	517	348	1,112
9:00-10:00		920	867	891	888	792	572	847
10:00-11:00		732	782	785	879	942	790	755
11:00-12:00		848	806	805	881	1,005	1,147	817
AM Total	0	5,388	5,390	5,355	5,268	4,206	3,561	5,194
12:00-13:00	853	830	850	895	983	1,107	1,142	
13:00-14:00	840	815	817	867	1,134	1,073	1,066	
14:00-15:00	976	970	969	919	1,166	1,022	1,076	
15:00-16:00	1,120	1,090	1,165	1,162	1,373	1,055	942	
16:00-17:00	1,093	1,183	1,273	1,234	1,304	994	994	
17:00-18:00	1,121	1,212	1,213	1,225	1,338	841	741	
18:00-19:00	699	749	810	765	899	754	651	
19:00-20:00	461	513	557	594	690	528	507	
20:00-21:00	357	355	362	389	581	365	421	
21:00-22:00	298	337	325	332	450	356	252	
22:00-23:00	174	202	197	217	314	260	160	
23:00-24:00	78	92	135	142	189	209	70	
PM Total	8,070	8,348	8,673	8,741	10,421	8,564	8,022	0
24 Hr. Total	8,070	13,736	14,063	14,096	15,689	12,770	11,583	5,194
Noon - Noon	13,458	13,738	14,028	14,009	14,627	12,125	13,216	
	ADT	AWD	AADT	AAWD	SADT	SAWDT	WADT	DHV
	13,600	13,808	13,853	14,155	16,901	16,562	11,775	1,357

APPENDIX C: SOUND LEVEL CALCULATIONS

SOUND LEVELS FROM NEW ACCESS ROAD

Receiver
Name: R1 - 75th St
ID: R1
X: 17570162.95
Y: 4923923.12
Z: 1.50

Line Source, ISO 9613, Name: "Truck Movements", ID: "TRUCKS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
34	17570091.59	4923934.45	2.00	0	DEN	500	74.0	13.6	0.0	0.0	0.0	48.2	0.1	5.3	1.6	0.0	0.0	0.0	0.0	32.3
35	17570094.11	4923911.76	2.00	0	DEN	500	74.0	13.6	0.0	0.0	0.0	47.9	0.1	5.2	1.2	0.0	0.0	0.0	0.0	33.2
37	17570096.63	4923889.08	2.00	0	DEN	500	74.0	13.6	0.0	0.0	0.0	48.4	0.1	5.3	1.3	0.0	0.0	0.0	0.0	32.3
39	17570099.15	4923866.40	2.00	0	DEN	500	74.0	13.6	0.0	0.0	0.0	49.6	0.2	5.6	1.3	0.0	0.0	0.0	0.0	30.9
41	17570083.85	4924002.08	2.00	0	DEN	500	74.0	15.8	0.0	0.0	0.0	52.0	0.2	5.9	4.3	0.0	0.0	0.0	0.0	27.3
43	17570088.17	4923964.55	2.00	0	DEN	500	74.0	15.8	0.0	0.0	0.0	49.6	0.2	5.5	2.6	0.0	0.0	0.0	0.0	31.8
44	17570053.03	4924165.99	2.00	0	DEN	500	74.0	19.9	0.0	0.0	0.0	59.5	0.5	6.5	8.1	0.0	0.0	0.0	0.0	19.3
45	17570067.36	4924093.41	2.00	0	DEN	500	74.0	16.9	0.0	0.0	0.0	56.8	0.4	6.3	8.0	0.0	0.0	0.0	0.0	19.4
47	17570076.91	4924045.03	2.00	0	DEN	500	74.0	16.9	0.0	0.0	0.0	54.5	0.3	6.1	6.2	0.0	0.0	0.0	0.0	23.9

Line Source, ISO 9613, Name: "Snow Plow Movements", ID: "PLOWS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
5	17570084.49	4923971.75	1.50	0	DEN	500	76.0	15.3	0.0	0.0	0.0	50.3	0.2	7.2	2.9	0.0	0.0	0.0	0.0	30.7
23	17570087.63	4923937.96	1.50	0	DEN	500	76.0	15.3	0.0	0.0	0.0	48.7	0.1	6.8	1.7	0.0	0.0	0.0	0.0	33.9
25	17570090.76	4923904.18	1.50	0	DEN	500	76.0	15.3	0.0	0.0	0.0	48.5	0.1	6.5	1.2	0.0	0.0	0.0	0.0	35.0
27	17570093.90	4923870.39	1.50	0	DEN	500	76.0	15.3	0.0	0.0	0.0	49.8	0.2	7.0	1.5	0.0	0.0	0.0	0.0	32.9
29	17570048.69	4924165.55	1.50	0	DEN	500	76.0	20.0	0.0	0.0	0.0	59.6	0.5	5.0	8.1	0.0	0.0	0.0	0.0	22.8
31	17570063.57	4924092.92	1.50	0	DEN	500	76.0	16.9	0.0	0.0	0.0	56.9	0.4	6.5	7.6	0.0	0.0	0.0	0.0	21.6
33	17570073.49	4924044.50	1.50	0	DEN	500	76.0	16.9	0.0	0.0	0.0	54.6	0.3	7.1	5.9	0.0	0.0	0.0	0.0	25.1
48	17570080.69	4924004.47	1.50	0	DEN	500	76.0	15.0	0.0	0.0	0.0	52.3	0.2	7.1	4.3	0.0	0.0	0.0	0.0	27.1

Road, TNM, Name: "Hwy 26 EB", ID: ""

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Ad	Aair	Agr	Afol	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
118	17569082.43	4924124.07	0.10	0	D	A	56.1	-29.8	0.0	10.8	0.0	0.0	15.5
128	17569352.00	4924020.53	0.10	0	D	A	56.1	-26.2	0.0	10.8	0.0	0.0	19.2
130	17569599.78	4923925.36	0.10	0	D	A	56.1	-24.8	0.0	3.6	0.0	0.0	27.7
133	17569705.24	4923884.85	0.10	0	D	A	56.1	-34.3	0.0	2.6	0.0	0.0	19.3
144	17569059.18	4924123.36	0.10	0	D	A	56.1	-30.8	0.0	10.7	0.0	0.0	14.6
149	17569315.47	4924024.92	0.10	0	D	A	56.1	-26.3	0.0	10.6	0.0	0.0	19.2
150	17569574.42	4923925.46	0.10	0	D	A	56.1	-25.0	0.0	3.3	0.0	0.0	27.8
151	17569693.15	4923879.86	0.10	0	D	A	56.1	-31.1	0.0	2.4	0.0	0.0	22.6
154	17569793.42	4923849.38	0.10	0	D	A	56.1	-22.1	0.0	3.4	0.0	0.0	30.6
157	17569912.26	4923801.36	0.10	0	D	A	56.1	-22.8	0.0	1.7	0.0	0.0	31.6
158	17569785.45	4923842.89	0.10	0	D	A	56.1	-22.6	0.0	2.4	0.0	0.0	31.1
159	17569904.29	4923794.88	0.10	0	D	A	56.1	-22.7	0.0	2.6	0.0	0.0	30.8
164	17570080.26	4923726.43	0.10	0	D	A	56.1	-20.9	0.0	0.4	0.0	0.0	34.8
165	17570150.64	4923693.62	0.10	0	D	A	56.1	-21.5	0.0	0.5	0.0	0.0	34.1
167	17570076.46	4923718.27	0.10	0	D	A	56.1	-21.2	0.0	-1.2	0.0	0.0	36.1
168	17570146.84	4923685.46	0.10	0	D	A	56.1	-21.8	0.0	-1.4	0.0	0.0	35.7
189	17569082.43	4924124.07	1.52	0	D	A	54.9	-29.8	0.0	12.0	0.0	0.0	13.1
195	17569352.00	4924020.53	1.52	0	D	A	54.9	-26.2	0.0	11.6	0.0	0.0	17.1
197	17569599.78	4923925.36	1.52	0	D	A	54.9	-24.8	0.0	4.9	0.0	0.0	25.2
201	17569705.24	4923884.85	1.52	0	D	A	54.9	-34.3	0.0	5.6	0.0	0.0	15.1
221	17569059.18	4924123.36	1.52	0	D	A	54.9	-30.8	0.0	11.7	0.0	0.0	12.4
229	17569315.47	4924024.92	1.52	0	D	A	54.9	-26.3	0.0	11.3	0.0	0.0	17.3
230	17569574.42	4923925.46	1.52	0	D	A	54.9	-25.0	0.0	4.6	0.0	0.0	25.3
231	17569693.15	4923879.86	1.52	0	D	A	54.9	-31.1	0.0	5.1	0.0	0.0	18.7
232	17569793.42	4923849.38	1.52	0	D	A	54.9	-22.1	0.0	4.2	0.0	0.0	28.6

SOUND LEVELS FROM NEW ACCESS ROAD

Road, TNM, Name: "Hwy 26 EB", ID: ""

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Ad	Aair	Agr	Afol	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
234	17569912.26	4923801.36	1.52	0	D	A	54.9	-22.8	0.0	6.2	0.0	0.0	25.8
237	17569785.45	4923842.89	1.52	0	D	A	54.9	-22.6	0.0	3.6	0.0	0.0	28.7
239	17569904.29	4923794.88	1.52	0	D	A	54.9	-22.7	0.0	6.1	0.0	0.0	26.1
250	17570080.26	4923726.43	1.52	0	D	A	54.9	-20.9	0.0	7.9	0.0	0.0	26.2
252	17570150.64	4923693.62	1.52	0	D	A	54.9	-21.5	0.0	8.5	0.0	0.0	24.9
254	17570076.46	4923718.27	1.52	0	D	A	54.9	-21.2	0.0	7.6	0.0	0.0	26.0
256	17570146.84	4923685.46	1.52	0	D	A	54.9	-21.8	0.0	8.4	0.0	0.0	24.8
271	17569997.91	4923764.32	0.10	0	D	A	56.1	-20.2	0.0	1.1	0.0	0.0	34.8
273	17569994.18	4923756.13	0.10	0	D	A	56.1	-20.5	0.0	-0.4	0.0	0.0	36.0
275	17570238.32	4923652.76	0.10	0	D	A	56.1	-21.4	0.0	-0.1	0.0	0.0	34.8
276	17570234.52	4923644.61	0.10	0	D	A	56.1	-21.6	0.0	-2.1	0.0	0.0	36.6
280	17569997.91	4923764.32	1.52	0	D	A	54.9	-20.2	0.0	3.2	0.0	0.0	31.5
281	17569994.18	4923756.13	1.52	0	D	A	54.9	-20.5	0.0	3.2	0.0	0.0	31.2
295	17570238.32	4923652.76	1.52	0	D	A	54.9	-21.4	0.0	9.2	0.0	0.0	24.3
297	17570234.52	4923644.61	1.52	0	D	A	54.9	-21.6	0.0	8.8	0.0	0.0	24.4
717	17570332.11	4923614.17	0.10	0	D	A	56.1	-24.6	0.0	2.0	0.0	0.0	29.6
718	17570329.20	4923605.66	0.10	0	D	A	56.1	-24.7	0.0	-1.2	0.0	0.0	32.6
899	17570332.11	4923614.17	1.52	0	D	A	54.9	-24.6	0.0	10.3	0.0	0.0	20.0
902	17570329.20	4923605.66	1.52	0	D	A	54.9	-24.7	0.0	9.9	0.0	0.0	20.3
905	17570417.44	4923591.07	0.10	0	D	A	56.1	-26.0	0.0	4.3	0.0	0.0	25.9
907	17570415.65	4923582.24	0.10	0	D	A	56.1	-26.1	0.0	0.6	0.0	0.0	29.4
920	17570417.44	4923591.07	1.52	0	D	A	54.9	-26.0	0.0	11.0	0.0	0.0	17.9
922	17570415.65	4923582.24	1.52	0	D	A	54.9	-26.1	0.0	10.6	0.0	0.0	18.2
932	17570491.06	4923574.30	0.10	0	D	A	56.1	-28.9	0.0	3.5	0.0	0.0	23.7
934	17570488.75	4923565.60	0.10	0	D	A	56.1	-29.0	0.0	0.2	0.0	0.0	26.9
936	17570675.86	4923511.10	0.10	0	D	A	56.1	-29.2	0.0	6.6	0.0	0.0	20.4
939	17570673.75	4923502.36	0.10	0	D	A	56.1	-29.3	0.0	2.2	0.0	0.0	24.7
957	17570491.06	4923574.30	1.52	0	D	A	54.9	-28.9	0.0	11.3	0.0	0.0	14.7
959	17570488.75	4923565.60	1.52	0	D	A	54.9	-29.0	0.0	10.7	0.0	0.0	15.2
962	17570675.86	4923511.10	1.52	0	D	A	54.9	-29.2	0.0	12.0	0.0	0.0	13.7
965	17570673.75	4923502.36	1.52	0	D	A	54.9	-29.3	0.0	10.7	0.0	0.0	15.0
982	17570776.39	4923482.98	0.10	0	D	A	56.1	-30.6	0.0	5.3	0.0	0.0	20.3
984	17570773.64	4923474.41	0.10	0	D	A	56.1	-30.7	0.0	2.1	0.0	0.0	23.4
1022	17570776.39	4923482.98	1.52	0	D	A	54.9	-30.6	0.0	12.0	0.0	0.0	12.3
1024	17570773.64	4923474.41	1.52	0	D	A	54.9	-30.7	0.0	11.5	0.0	0.0	12.7
1034	17570531.33	4923550.82	0.10	0	D	A	56.1	-32.5	0.0	-0.0	0.0	0.0	23.7
1035	17570523.64	4923546.14	0.10	0	D	A	56.1	-32.4	0.0	-0.8	0.0	0.0	24.5
1039	17570604.17	4923527.83	0.10	0	D	A	56.1	-32.5	0.0	9.4	0.0	0.0	14.2
1041	17570602.30	4923519.03	0.10	0	D	A	56.1	-32.6	0.0	7.3	0.0	0.0	16.2
1043	17570857.60	4923450.48	0.10	0	D	A	56.1	-33.0	0.0	2.9	0.0	0.0	20.2
1045	17570853.46	4923442.49	0.10	0	D	A	56.1	-33.0	0.0	-0.1	0.0	0.0	23.2
1056	17570531.33	4923550.82	1.52	0	D	A	54.9	-32.5	0.0	10.7	0.0	0.0	11.8
1058	17570523.64	4923546.14	1.52	0	D	A	54.9	-32.4	0.0	10.5	0.0	0.0	12.0
1067	17570604.17	4923527.83	1.52	0	D	A	54.9	-32.5	0.0	11.8	0.0	0.0	10.5
1068	17570602.30	4923519.03	1.52	0	D	A	54.9	-32.6	0.0	11.7	0.0	0.0	10.6
1071	17570568.50	4923529.66	0.10	0	D	A	56.1	-33.6	0.0	9.0	0.0	0.0	13.6
1072	17570569.98	4923520.78	0.10	0	D	A	56.1	-33.7	0.0	9.1	0.0	0.0	13.3
1073	17570857.60	4923450.48	1.52	0	D	A	54.9	-33.0	0.0	11.8	0.0	0.0	10.1
1075	17570853.46	4923442.49	1.52	0	D	A	54.9	-33.0	0.0	11.0	0.0	0.0	10.9
1088	17570547.76	4923532.62	0.10	0	D	A	56.1	-34.4	0.0	-1.5	0.0	0.0	23.3
1091	17570542.99	4923524.98	0.10	0	D	A	56.1	-34.4	0.0	0.5	0.0	0.0	21.2
1096	17570568.50	4923529.66	1.52	0	D	A	54.9	-33.6	0.0	11.5	0.0	0.0	9.8
1097	17570569.98	4923520.78	1.52	0	D	A	54.9	-33.7	0.0	11.5	0.0	0.0	9.7
1112	17570547.76	4923532.62	1.52	0	D	A	54.9	-34.4	0.0	9.8	0.0	0.0	10.7
1113	17570542.99	4923524.98	1.52	0	D	A	54.9	-34.4	0.0	9.8	0.0	0.0	10.7

Road, TNM, Name: "Beachwood Rd", ID: ""

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Ad	Aair	Agr	Afol	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
293	17570211.27	4924221.94	0.10	0	D	A	56.1	-21.5	0.0	9.7	0.0	0.0	24.9

SOUND LEVELS FROM NEW ACCESS ROAD

Road, TNM, Name: "Beachwood Rd", ID: ""													
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Ad	Aair	Agr	Afol	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
294	17570210.65	4924230.91	0.10	0	D	A	56.1	-21.7	0.0	5.9	0.0	0.0	28.5
324	17570211.27	4924221.94	1.52	0	D	A	54.9	-21.5	0.0	10.5	0.0	0.0	22.9
325	17570210.65	4924230.91	1.52	0	D	A	54.9	-21.7	0.0	10.6	0.0	0.0	22.6
327	17570019.43	4924210.12	0.10	0	D	A	56.1	-25.0	0.0	10.3	0.0	0.0	20.8
332	17569984.48	4924208.68	0.10	0	D	A	56.1	-39.4	0.0	11.0	0.0	0.0	5.7
344	17569977.11	4924208.37	0.10	0	D	A	56.1	-33.0	0.0	10.1	0.0	0.0	13.0
349	17569963.95	4924207.83	0.10	0	D	A	56.1	-32.4	0.0	11.0	0.0	0.0	12.7
351	17569950.44	4924207.27	0.10	0	D	A	56.1	-33.1	0.0	9.8	0.0	0.0	13.2
366	17570016.11	4924209.99	0.10	1	D	A	56.1	-36.7	0.0	9.2	0.0	1.0	9.2
450	17570006.65	4924209.59	0.10	1	D	A	56.1	-39.5	0.0	9.4	0.0	1.0	6.2
453	17570016.52	4924219.01	0.10	0	D	A	56.1	-24.9	0.0	6.0	0.0	0.0	25.2
466	17569979.00	4924217.46	0.10	0	D	A	56.1	-39.5	0.0	11.1	0.0	0.0	5.5
481	17569971.40	4924217.14	0.10	0	D	A	56.1	-33.1	0.0	9.8	0.0	0.0	13.3
489	17569957.83	4924216.58	0.10	0	D	A	56.1	-32.5	0.0	11.1	0.0	0.0	12.5
491	17569947.08	4924216.14	0.10	0	D	A	56.1	-36.0	0.0	5.9	0.0	0.0	14.2
507	17570020.27	4924219.17	0.10	1	D	A	56.1	-36.8	0.0	5.0	0.0	1.0	13.3
530	17570010.58	4924218.77	0.10	1	D	A	56.1	-39.7	0.0	4.6	0.0	1.0	10.9
533	17570098.10	4924214.36	0.10	0	D	A	56.1	-23.1	0.0	10.1	0.0	0.0	22.9
534	17570097.53	4924223.34	0.10	0	D	A	56.1	-23.4	0.0	5.8	0.0	0.0	27.0
535	17570329.66	4924230.46	0.10	0	D	A	56.1	-24.0	0.0	10.4	0.0	0.0	21.7
536	17570328.98	4924239.43	0.10	0	D	A	56.1	-24.2	0.0	5.4	0.0	0.0	26.6
538	17570446.44	4924237.08	0.10	0	D	A	56.1	-24.4	0.0	10.2	0.0	0.0	21.5
539	17570446.06	4924246.07	0.10	0	D	A	56.1	-24.5	0.0	6.7	0.0	0.0	24.9
586	17570019.43	4924210.12	1.52	0	D	A	54.9	-25.0	0.0	8.9	0.0	0.0	21.0
590	17569984.48	4924208.68	1.52	0	D	A	54.9	-39.4	0.0	12.2	0.0	0.0	3.3
599	17569977.11	4924208.37	1.52	0	D	A	54.9	-33.0	0.0	12.0	0.0	0.0	9.9
602	17569963.95	4924207.83	1.52	0	D	A	54.9	-32.4	0.0	12.2	0.0	0.0	10.3
603	17569950.44	4924207.27	1.52	0	D	A	54.9	-33.1	0.0	10.5	0.0	0.0	11.3
613	17570016.11	4924209.99	1.52	1	D	A	54.9	-36.7	0.0	7.8	0.0	1.0	9.4
623	17570006.65	4924209.59	1.52	1	D	A	54.9	-39.5	0.0	10.0	0.0	1.0	4.3
625	17570016.52	4924219.01	1.52	0	D	A	54.9	-24.9	0.0	8.9	0.0	0.0	21.1
637	17569979.00	4924217.46	1.52	0	D	A	54.9	-39.5	0.0	12.2	0.0	0.0	3.2
648	17569971.40	4924217.14	1.52	0	D	A	54.9	-33.1	0.0	11.9	0.0	0.0	9.9
654	17569957.83	4924216.58	1.52	0	D	A	54.9	-32.5	0.0	12.2	0.0	0.0	10.2
655	17569947.08	4924216.14	1.52	0	D	A	54.9	-36.0	0.0	10.3	0.0	0.0	8.6
681	17570020.27	4924219.17	1.52	1	D	A	54.9	-36.8	0.0	2.4	0.0	1.0	14.7
708	17570010.58	4924218.77	1.52	1	D	A	54.9	-39.7	0.0	2.6	0.0	1.0	11.6
719	17570098.10	4924214.36	1.52	0	D	A	54.9	-23.1	0.0	10.5	0.0	0.0	21.3
721	17570097.53	4924223.34	1.52	0	D	A	54.9	-23.4	0.0	10.6	0.0	0.0	21.0
724	17570329.66	4924230.46	1.52	0	D	A	54.9	-24.0	0.0	11.0	0.0	0.0	19.9
727	17570328.98	4924239.43	1.52	0	D	A	54.9	-24.2	0.0	11.0	0.0	0.0	19.7
728	17570446.44	4924237.08	1.52	0	D	A	54.9	-24.4	0.0	11.5	0.0	0.0	19.0
729	17570446.06	4924246.07	1.52	0	D	A	54.9	-24.5	0.0	11.5	0.0	0.0	18.9
890	17570593.22	4924243.71	0.10	0	D	A	56.1	-25.6	0.0	10.3	0.0	0.0	20.2
892	17570592.80	4924252.70	0.10	0	D	A	56.1	-25.7	0.0	7.1	0.0	0.0	23.3
909	17570593.22	4924243.71	1.52	0	D	A	54.9	-25.6	0.0	12.0	0.0	0.0	17.3
911	17570592.80	4924252.70	1.52	0	D	A	54.9	-25.7	0.0	11.9	0.0	0.0	17.3
913	17569521.49	4924395.85	0.10	0	D	A	56.1	-27.1	0.0	-0.8	0.0	0.0	29.9
914	17569527.44	4924402.60	0.10	0	D	A	56.1	-27.1	0.0	7.4	0.0	0.0	21.7
916	17569911.35	4924209.84	0.10	0	D	A	56.1	-26.7	0.0	10.0	0.0	0.0	19.5
918	17569912.14	4924218.80	0.10	0	D	A	56.1	-26.8	0.0	6.0	0.0	0.0	23.3
923	17569521.49	4924395.85	1.52	0	D	A	54.9	-27.1	0.0	6.0	0.0	0.0	21.9
926	17569527.44	4924402.60	1.52	0	D	A	54.9	-27.1	0.0	9.9	0.0	0.0	18.0
928	17569911.35	4924209.84	1.52	0	D	A	54.9	-26.7	0.0	10.9	0.0	0.0	17.3
930	17569912.14	4924218.80	1.52	0	D	A	54.9	-26.8	0.0	10.6	0.0	0.0	17.5
942	17569855.71	4924215.87	0.10	0	D	A	56.1	-29.0	0.0	10.2	0.0	0.0	17.0
944	17569856.94	4924224.79	0.10	0	D	A	56.1	-29.1	0.0	5.1	0.0	0.0	21.9
946	17569675.73	4924277.85	0.10	0	D	A	56.1	-29.8	0.0	8.5	0.0	0.0	17.9
948	17569679.97	4924285.79	0.10	0	D	A	56.1	-29.8	0.0	0.4	0.0	0.0	26.0
968	17569855.71	4924215.87	1.52	0	D	A	54.9	-29.0	0.0	11.4	0.0	0.0	14.6

SOUND LEVELS FROM NEW ACCESS ROAD

Road, TNM, Name: "Beachwood Rd", ID: ""

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Ad	Aair	Agr	Afol	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
970	17569856.94	4924224.79	1.52	0	D	A	54.9	-29.1	0.0	11.0	0.0	0.0	14.8
978	17569735.45	4924248.69	0.10	0	D	A	56.1	-30.4	0.0	10.4	0.0	0.0	15.4
980	17569738.97	4924256.98	0.10	0	D	A	56.1	-30.5	0.0	2.4	0.0	0.0	23.3
987	17569675.73	4924277.85	1.52	0	D	A	54.9	-29.8	0.0	11.1	0.0	0.0	14.0
989	17569679.97	4924285.79	1.52	0	D	A	54.9	-29.8	0.0	9.6	0.0	0.0	15.5
1013	17569780.54	4924232.53	0.10	0	D	A	56.1	-30.9	0.0	10.9	0.0	0.0	14.4
1014	17569782.94	4924241.20	0.10	0	D	A	56.1	-30.9	0.0	4.1	0.0	0.0	21.1
1018	17569735.45	4924248.69	1.52	0	D	A	54.9	-30.4	0.0	11.2	0.0	0.0	13.3
1019	17569738.97	4924256.98	1.52	0	D	A	54.9	-30.5	0.0	10.2	0.0	0.0	14.2
1020	17569816.16	4924223.10	0.10	0	D	A	56.1	-31.2	0.0	10.5	0.0	0.0	14.4
1021	17569818.34	4924231.84	0.10	0	D	A	56.1	-31.3	0.0	4.9	0.0	0.0	20.0
1029	17569780.54	4924232.53	1.52	0	D	A	54.9	-30.9	0.0	11.3	0.0	0.0	12.8
1031	17569782.94	4924241.20	1.52	0	D	A	54.9	-30.9	0.0	10.8	0.0	0.0	13.2
1032	17569816.16	4924223.10	1.52	0	D	A	54.9	-31.2	0.0	11.3	0.0	0.0	12.4
1033	17569818.34	4924231.84	1.52	0	D	A	54.9	-31.3	0.0	11.0	0.0	0.0	12.6
1036	17570737.66	4924243.75	0.10	0	D	A	56.1	-32.5	0.0	11.1	0.0	0.0	12.5
1037	17570739.03	4924252.65	0.10	0	D	A	56.1	-32.6	0.0	8.4	0.0	0.0	15.1
1047	17570693.37	4924247.49	0.10	0	D	A	56.1	-32.9	0.0	10.7	0.0	0.0	12.5
1050	17570693.37	4924256.49	0.10	0	D	A	56.1	-33.0	0.0	7.8	0.0	0.0	15.3
1064	17570737.66	4924243.75	1.52	0	D	A	54.9	-32.5	0.0	12.2	0.0	0.0	10.2
1066	17570739.03	4924252.65	1.52	0	D	A	54.9	-32.6	0.0	12.2	0.0	0.0	10.1
1069	17570820.38	4924219.44	0.10	0	D	A	56.1	-33.5	0.0	11.2	0.0	0.0	11.5
1070	17570823.90	4924227.73	0.10	0	D	A	56.1	-33.5	0.0	9.4	0.0	0.0	13.2
1077	17570693.37	4924247.49	1.52	0	D	A	54.9	-32.9	0.0	12.2	0.0	0.0	9.8
1078	17570693.37	4924256.49	1.52	0	D	A	54.9	-33.0	0.0	12.1	0.0	0.0	9.8
1081	17570780.11	4924234.43	0.10	0	D	A	56.1	-34.1	0.0	11.2	0.0	0.0	10.9
1082	17570782.75	4924243.04	0.10	0	D	A	56.1	-34.1	0.0	9.6	0.0	0.0	12.4
1093	17570820.38	4924219.44	1.52	0	D	A	54.9	-33.5	0.0	12.3	0.0	0.0	9.2
1095	17570823.90	4924227.73	1.52	0	D	A	54.9	-33.5	0.0	12.3	0.0	0.0	9.1
1098	17570859.69	4924200.26	0.10	0	D	A	56.1	-34.6	0.0	11.2	0.0	0.0	10.3
1100	17570864.13	4924208.09	0.10	0	D	A	56.1	-34.7	0.0	10.0	0.0	0.0	11.4
1102	17569628.52	4924304.56	0.10	0	D	A	56.1	-34.8	0.0	8.0	0.0	0.0	13.3
1103	17569633.45	4924312.10	0.10	0	D	A	56.1	-34.8	0.0	-1.3	0.0	0.0	22.6
1107	17570780.11	4924234.43	1.52	0	D	A	54.9	-34.1	0.0	12.3	0.0	0.0	8.6
1108	17570782.75	4924243.04	1.52	0	D	A	54.9	-34.1	0.0	12.3	0.0	0.0	8.5
1114	17570859.69	4924200.26	1.52	0	D	A	54.9	-34.6	0.0	12.3	0.0	0.0	8.0
1115	17570864.13	4924208.09	1.52	0	D	A	54.9	-34.7	0.0	12.4	0.0	0.0	7.9
1117	17569628.52	4924304.56	1.52	0	D	A	54.9	-34.8	0.0	11.0	0.0	0.0	9.1
1118	17569633.45	4924312.10	1.52	0	D	A	54.9	-34.8	0.0	9.0	0.0	0.0	11.2

Road, TNM, Name: "Hwy 26 WB", ID: ""

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Ad	Aair	Agr	Afol	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
51	17569919.80	4923816.01	0.10	0	D	A	56.1	-24.7	0.0	2.1	0.0	0.0	29.4
54	17569815.86	4923857.94	0.10	0	D	A	56.1	-21.5	0.0	3.6	0.0	0.0	31.0
56	17569724.61	4923894.76	0.10	0	D	A	56.1	-32.5	0.0	3.3	0.0	0.0	20.3
59	17569927.78	4923822.50	0.10	0	D	A	56.1	-25.3	0.0	9.0	0.0	0.0	21.8
62	17569832.28	4923861.03	0.10	0	D	A	56.1	-21.3	0.0	10.0	0.0	0.0	24.8
64	17569736.42	4923899.70	0.10	0	D	A	56.1	-29.7	0.0	10.2	0.0	0.0	16.3
160	17570143.76	4923706.68	0.10	0	D	A	56.1	-21.8	0.0	2.2	0.0	0.0	32.2
161	17570085.90	4923735.31	0.10	0	D	A	56.1	-21.2	0.0	3.2	0.0	0.0	31.7
162	17570147.75	4923714.75	0.10	0	D	A	56.1	-21.5	0.0	8.0	0.0	0.0	26.7
163	17570089.90	4923743.38	0.10	0	D	A	56.1	-20.8	0.0	8.9	0.0	0.0	26.4
169	17569919.80	4923816.01	1.52	0	D	A	54.9	-24.7	0.0	4.6	0.0	0.0	25.7
170	17569815.86	4923857.94	1.52	0	D	A	54.9	-21.5	0.0	4.3	0.0	0.0	29.1
171	17569724.61	4923894.76	1.52	0	D	A	54.9	-32.5	0.0	5.6	0.0	0.0	16.8
173	17569927.78	4923822.50	1.52	0	D	A	54.9	-25.3	0.0	4.5	0.0	0.0	25.1
175	17569832.28	4923861.03	1.52	0	D	A	54.9	-21.3	0.0	4.6	0.0	0.0	29.0
177	17569736.42	4923899.70	1.52	0	D	A	54.9	-29.7	0.0	6.1	0.0	0.0	19.1
178	17570028.33	4923763.95	0.10	0	D	A	56.1	-21.5	0.0	2.1	0.0	0.0	32.5

SOUND LEVELS FROM NEW ACCESS ROAD

Road, TNM, Name: "Hwy 26 WB", ID: ""													
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Ad	Aair	Agr	Afol	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
179	17569971.07	4923792.58	0.10	0	D	A	56.1	-22.4	0.0	2.3	0.0	0.0	31.4
180	17570032.35	4923772.00	0.10	0	D	A	56.1	-21.1	0.0	8.6	0.0	0.0	26.4
181	17569975.09	4923800.63	0.10	0	D	A	56.1	-22.1	0.0	9.3	0.0	0.0	24.8
241	17570143.76	4923706.68	1.52	0	D	A	54.9	-21.8	0.0	8.6	0.0	0.0	24.6
243	17570085.90	4923735.31	1.52	0	D	A	54.9	-21.2	0.0	8.1	0.0	0.0	25.6
245	17570147.75	4923714.75	1.52	0	D	A	54.9	-21.5	0.0	8.7	0.0	0.0	24.7
247	17570089.90	4923743.38	1.52	0	D	A	54.9	-20.8	0.0	8.2	0.0	0.0	25.9
258	17570028.33	4923763.95	1.52	0	D	A	54.9	-21.5	0.0	7.7	0.0	0.0	25.7
260	17569971.07	4923792.58	1.52	0	D	A	54.9	-22.4	0.0	8.8	0.0	0.0	23.8
263	17570032.35	4923772.00	1.52	0	D	A	54.9	-21.1	0.0	7.3	0.0	0.0	26.5
265	17569975.09	4923800.63	1.52	0	D	A	54.9	-22.1	0.0	9.0	0.0	0.0	23.8
267	17570224.04	4923667.89	0.10	0	D	A	56.1	-20.9	0.0	3.4	0.0	0.0	31.8
269	17570227.91	4923676.01	0.10	0	D	A	56.1	-20.7	0.0	8.9	0.0	0.0	26.5
278	17570224.04	4923667.89	1.52	0	D	A	54.9	-20.9	0.0	9.5	0.0	0.0	24.4
279	17570227.91	4923676.01	1.52	0	D	A	54.9	-20.7	0.0	9.7	0.0	0.0	24.5
282	17569634.24	4923929.33	0.10	0	D	A	56.1	-25.2	0.0	3.9	0.0	0.0	27.1
286	17569488.26	4923984.80	0.10	0	D	A	56.1	-28.2	0.0	10.1	0.0	0.0	17.9
289	17569650.90	4923932.63	0.10	0	D	A	56.1	-25.7	0.0	9.6	0.0	0.0	20.8
292	17569504.91	4923988.10	0.10	0	D	A	56.1	-27.2	0.0	10.3	0.0	0.0	18.6
301	17569634.24	4923929.33	1.52	0	D	A	54.9	-25.2	0.0	4.6	0.0	0.0	25.1
312	17569488.26	4923984.80	1.52	0	D	A	54.9	-28.2	0.0	11.4	0.0	0.0	15.3
314	17569650.90	4923932.63	1.52	0	D	A	54.9	-25.7	0.0	4.9	0.0	0.0	24.3
322	17569504.91	4923988.10	1.52	0	D	A	54.9	-27.2	0.0	12.0	0.0	0.0	15.8
531	17570413.38	4923597.79	0.10	0	D	A	56.1	-23.9	0.0	5.8	0.0	0.0	26.5
532	17570415.53	4923606.53	0.10	0	D	A	56.1	-23.8	0.0	10.2	0.0	0.0	22.2
540	17569350.33	4924037.83	0.10	0	D	A	56.1	-29.5	0.0	10.4	0.0	0.0	16.2
554	17569145.40	4924117.44	0.10	0	D	A	56.1	-28.8	0.0	10.7	0.0	0.0	16.6
561	17568985.74	4924179.47	0.10	0	D	A	56.1	-37.2	0.0	10.7	0.0	0.0	8.2
564	17569373.21	4924038.59	0.10	0	D	A	56.1	-30.6	0.0	10.5	0.0	0.0	14.9
570	17569194.28	4924108.11	0.10	0	D	A	56.1	-28.6	0.0	11.0	0.0	0.0	16.5
585	17569015.00	4924177.76	0.10	0	D	A	56.1	-34.0	0.0	11.0	0.0	0.0	11.2
711	17570413.38	4923597.79	1.52	0	D	A	54.9	-23.9	0.0	11.2	0.0	0.0	19.8
713	17570415.53	4923606.53	1.52	0	D	A	54.9	-23.8	0.0	11.4	0.0	0.0	19.8
714	17570310.15	4923629.02	0.10	0	D	A	56.1	-24.7	0.0	4.8	0.0	0.0	26.7
715	17570313.59	4923637.34	0.10	0	D	A	56.1	-24.6	0.0	9.7	0.0	0.0	21.9
734	17569350.33	4924037.83	1.52	0	D	A	54.9	-29.5	0.0	11.8	0.0	0.0	13.6
761	17569145.40	4924117.44	1.52	0	D	A	54.9	-28.8	0.0	12.0	0.0	0.0	14.1
822	17568985.74	4924179.47	1.52	0	D	A	54.9	-37.2	0.0	12.1	0.0	0.0	5.6
824	17569373.21	4924038.59	1.52	0	D	A	54.9	-30.6	0.0	12.1	0.0	0.0	12.1
849	17569194.28	4924108.11	1.52	0	D	A	54.9	-28.6	0.0	12.2	0.0	0.0	14.1
888	17569015.00	4924177.76	1.52	0	D	A	54.9	-34.0	0.0	12.2	0.0	0.0	8.7
894	17570310.15	4923629.02	1.52	0	D	A	54.9	-24.7	0.0	10.4	0.0	0.0	19.8
897	17570313.59	4923637.34	1.52	0	D	A	54.9	-24.6	0.0	10.7	0.0	0.0	19.7
950	17570507.18	4923575.69	0.10	0	D	A	56.1	-29.7	0.0	6.6	0.0	0.0	19.9
951	17570509.02	4923584.50	0.10	0	D	A	56.1	-29.6	0.0	10.5	0.0	0.0	16.0
953	17570816.75	4923470.88	0.10	0	D	A	56.1	-30.1	0.0	5.2	0.0	0.0	20.8
955	17570819.75	4923479.36	0.10	0	D	A	56.1	-30.1	0.0	11.0	0.0	0.0	15.0
974	17570715.17	4923502.36	0.10	0	D	A	56.1	-30.5	0.0	6.7	0.0	0.0	18.9
976	17570717.35	4923511.10	0.10	0	D	A	56.1	-30.4	0.0	11.2	0.0	0.0	14.5
991	17570507.18	4923575.69	1.52	0	D	A	54.9	-29.7	0.0	11.6	0.0	0.0	13.6
992	17570509.02	4923584.50	1.52	0	D	A	54.9	-29.6	0.0	11.8	0.0	0.0	13.5
996	17570639.90	4923522.08	0.10	0	D	A	56.1	-30.8	0.0	0.4	0.0	0.0	25.0
1000	17570642.31	4923530.75	0.10	0	D	A	56.1	-30.7	0.0	9.1	0.0	0.0	16.3
1006	17570816.75	4923470.88	1.52	0	D	A	54.9	-30.1	0.0	12.1	0.0	0.0	12.7
1011	17570819.75	4923479.36	1.52	0	D	A	54.9	-30.1	0.0	12.4	0.0	0.0	12.4
1016	17570715.17	4923502.36	1.52	0	D	A	54.9	-30.5	0.0	12.1	0.0	0.0	12.3
1017	17570717.35	4923511.10	1.52	0	D	A	54.9	-30.4	0.0	12.3	0.0	0.0	12.2
1025	17570639.90	4923522.08	1.52	0	D	A	54.9	-30.8	0.0	10.5	0.0	0.0	13.6
1026	17570642.31	4923530.75	1.52	0	D	A	54.9	-30.7	0.0	11.9	0.0	0.0	12.3
1052	17570565.58	4923572.63	0.10	0	D	A	56.1	-33.1	0.0	6.7	0.0	0.0	16.4

SOUND LEVELS FROM NEW ACCESS ROAD

Road, TNM, Name: "Hwy 26 WB", ID: ""													
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	Ad	Aair	Agr	Afol	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1054	17570566.33	4923581.60	0.10	0	D	A	56.1	-33.0	0.0	11.0	0.0	0.0	12.1
1060	17570596.29	4923545.27	0.10	0	D	A	56.1	-33.4	0.0	4.7	0.0	0.0	18.0
1062	17570603.61	4923550.50	0.10	0	D	A	56.1	-33.5	0.0	1.1	0.0	0.0	21.6
1079	17570565.58	4923572.63	1.52	0	D	A	54.9	-33.1	0.0	11.8	0.0	0.0	10.1
1080	17570566.33	4923581.60	1.52	0	D	A	54.9	-33.0	0.0	11.9	0.0	0.0	10.0
1084	17570596.29	4923545.27	1.52	0	D	A	54.9	-33.4	0.0	11.6	0.0	0.0	9.8
1086	17570603.61	4923550.50	1.52	0	D	A	54.9	-33.5	0.0	11.1	0.0	0.0	10.3
1104	17570543.58	4923572.10	0.10	0	D	A	56.1	-34.8	0.0	8.7	0.0	0.0	12.6
1105	17570541.81	4923580.93	0.10	0	D	A	56.1	-34.7	0.0	10.7	0.0	0.0	10.8
1109	17570581.94	4923565.60	0.10	0	D	A	56.1	-35.2	0.0	4.4	0.0	0.0	16.6
1110	17570589.34	4923570.73	0.10	0	D	A	56.1	-35.2	0.0	7.2	0.0	0.0	13.7
1119	17570543.58	4923572.10	1.52	0	D	A	54.9	-34.8	0.0	11.8	0.0	0.0	8.3
1120	17570541.81	4923580.93	1.52	0	D	A	54.9	-34.7	0.0	11.8	0.0	0.0	8.4
1121	17570581.94	4923565.60	1.52	0	D	A	54.9	-35.2	0.0	11.6	0.0	0.0	8.1
1122	17570589.34	4923570.73	1.52	0	D	A	54.9	-35.2	0.0	11.8	0.0	0.0	7.9

PROJECTED SOUND LEVELS (DAYTIME + EVENING) FROM NEW MAINTENANCE FACILITY (DENSE WOODS REMAIN)

SOUND LEVELS (DAYTIME + EVENING)

Receiver
Name: R1 - 75th St
ID: R1
X: 17570162.95
Y: 4923923.12
Z: 1.50

Point Source, ISO 9613, Name: "Emergency Generator", ID: "BEEPER"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
14	17569845.85	4923968.45	0.50	0	D	500	107.0	0.0	0.0	0.0	0.0	61.1	0.6	2.2	1.7	0.0	13.0	0.0	0.0	28.5

Line Source, ISO 9613, Name: "Forklift Movements (45 min/hr)", ID: "FORKLIFT"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
22	17569993.17	4923920.43	1.50	0	DEN	500	81.5	13.1	0.0	0.0	0.0	55.6	0.3	2.7	1.4	0.0	0.0	0.0	0.0	34.6
24	17569995.03	4923886.06	1.50	0	DEN	500	81.5	16.9	0.0	0.0	0.0	55.7	0.3	2.8	1.2	0.0	0.0	0.0	0.0	38.3
27	17569996.49	4923859.05	1.50	0	DEN	500	81.5	7.5	0.0	0.0	0.0	56.0	0.3	2.5	1.3	0.0	0.0	0.0	0.0	28.8

Point Source, ISO 9613, Name: "Emergency Generator", ID: "GEN_SET"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
32	17570010.74	4923921.45	1.50	0	DEN	500	98.9	0.0	0.0	0.0	0.0	54.6	0.3	2.7	1.4	0.0	0.0	0.0	0.0	39.8

Point Source, ISO 9613, Name: "Garage Exh. Fan", ID: ""

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
65	17569925.83	4923997.74	5.00	0	DEN	A	97.8	0.0	0.0	0.0	0.0	58.9	1.7	-0.2	2.6	0.0	0.0	0.0	0.0	34.8

vert. Area Source, ISO 9613, Name: "Wash Bay East", ID: "WASH_BAY"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
67	17569925.69	4924001.63	0.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	59.0	0.9	-2.5	2.4	0.0	0.0	0.0	0.0	36.0
69	17569925.69	4924001.63	1.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	59.0	0.9	-2.2	2.4	0.0	0.0	0.0	0.0	35.6
71	17569925.69	4924001.63	2.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	59.0	0.9	-1.9	2.4	0.0	0.0	0.0	0.0	35.3
73	17569925.69	4924001.63	3.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	59.0	0.9	-1.5	2.4	0.0	0.0	0.0	0.0	35.0

vert. Area Source, ISO 9613, Name: "Wash Bay East", ID: "WASH_BAY"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
75	17569892.70	4924000.44	0.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	60.0	1.0	-2.8	2.3	0.0	23.4	0.0	0.0	11.7
77	17569892.70	4924000.44	1.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	60.0	1.0	-2.5	2.3	0.0	23.4	0.0	0.0	11.4
79	17569892.70	4924000.44	2.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	60.0	1.0	-2.1	2.3	0.0	23.4	0.0	0.0	11.1
80	17569892.70	4924000.44	3.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	60.0	1.0	-1.8	2.3	0.0	23.4	0.0	0.0	10.8

vert. Area Source, ISO 9613, Name: "Bay #4 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
123	17569925.98	4923993.15	-2.50	0	D	500	81.1	7.9	0.0	3.0	0.0	58.9	0.5	16.9	1.9	0.0	0.0	0.0	0.0	13.9
124	17569925.98	4923993.15	-1.50	0	D	500	81.1	7.9	0.0	3.0	0.0	58.9	0.5	16.9	1.9	0.0	0.0	0.0	0.0	13.9
129	17569925.98	4923993.15	-3.50	0	D	500	81.1	7.9	0.0	3.0	0.0	58.9	0.5	16.9	1.9	0.0	0.0	0.0	0.0	13.9
135	17569925.98	4923993.15	-0.50	0	D	500	81.1	7.9	0.0	3.0	0.0	58.9	0.5	16.9	1.9	0.0	0.0	0.0	0.0	13.9

Line Source, ISO 9613, Name: "Snow Plow Movements", ID: "PLOWS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
4	17569935.12	4923935.61	1.50	0	DEN	500	79.0	20.1	0.0	0.0	0.0	58.2	0.4	2.2	1.5	0.0	0.0	0.0	0.0	36.8
7	17570012.01	4923937.53	1.50	0	DEN	500	79.0	17.1	0.0	0.0	0.0	54.6	0.3	2.9	1.6	0.0	0.0	0.0	0.0	36.7
9	17570050.45	4923938.49	1.50	0	DEN	500	79.0	14.1	0.0	0.0	0.0	52.1	0.2	5.0	1.6	0.0	0.0	0.0	0.0	34.1
11	17570076.08	4923939.13	1.50	0	DEN	500	79.0	14.1	0.0	0.0	0.0	49.9	0.2	6.7	1.7	0.0	0.0	0.0	0.0	34.5
81	17569857.16	4923927.76	1.50	0	DEN	500	79.0	16.6	0.0	0.0	0.0	60.7	0.6	3.2	1.4	0.0	0.0	0.0	0.0	29.6

DENSE WOODS REMAIN

SOUND LEVELS (DAYTIME + EVENING)

Line Source, ISO 9613, Name: "Snow Plow Movements", ID: "PLOWS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
152	17569880.87	4923926.42	1.50	0	DEN	500	79.0	12.3	0.0	0.0	0.0	60.0	0.5	6.6	1.4	0.0	0.0	0.0	0.0	22.7

vert. Area Source, ISO 9613, Name: "Bay #3 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
157	17569926.29	4923984.16	2.50	0	D	500	81.1	7.6	0.0	3.0	0.0	58.8	0.5	2.4	1.9	0.0	0.0	0.0	0.0	28.3
159	17569926.29	4923984.16	1.50	0	D	500	81.1	7.6	0.0	3.0	0.0	58.8	0.5	2.0	1.9	0.0	0.0	0.0	0.0	28.6
160	17569926.29	4923984.16	0.50	0	D	500	81.1	7.6	0.0	3.0	0.0	58.8	0.5	2.2	1.9	0.0	0.0	0.0	0.0	28.5
162	17569926.29	4923984.16	3.50	0	D	500	81.1	7.6	0.0	3.0	0.0	58.8	0.5	2.8	1.9	0.0	0.0	0.0	0.0	27.9

vert. Area Source, ISO 9613, Name: "Bay #1 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
166	17569926.89	4923966.83	1.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.0	1.7	0.0	0.0	0.0	0.0	28.7
171	17569926.89	4923966.83	3.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.8	1.7	0.0	0.0	0.0	0.0	28.0
173	17569926.89	4923966.83	2.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.4	1.7	0.0	0.0	0.0	0.0	28.3
175	17569926.89	4923966.83	0.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	1.7	1.7	0.0	0.0	0.0	0.0	29.1

vert. Area Source, ISO 9613, Name: "Bay #2 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
177	17569926.68	4923973.06	2.50	0	D	500	81.1	0.6	0.0	3.0	0.0	58.7	0.5	2.4	1.8	0.0	0.0	0.0	0.0	21.4
179	17569926.58	4923975.79	2.50	0	D	500	81.1	6.4	0.0	3.0	0.0	58.7	0.5	2.4	1.8	0.0	0.0	0.0	0.0	27.1
181	17569926.68	4923973.06	1.50	0	D	500	81.1	0.6	0.0	3.0	0.0	58.7	0.5	2.0	1.8	0.0	0.0	0.0	0.0	21.8
212	17569926.58	4923975.79	1.50	0	D	500	81.1	6.4	0.0	3.0	0.0	58.7	0.5	2.0	1.8	0.0	0.0	0.0	0.0	27.5
214	17569926.68	4923973.06	3.50	0	D	500	81.1	0.6	0.0	3.0	0.0	58.7	0.5	2.8	1.8	0.0	0.0	0.0	0.0	21.0
216	17569926.58	4923975.79	3.50	0	D	500	81.1	6.4	0.0	3.0	0.0	58.7	0.5	2.8	1.8	0.0	0.0	0.0	0.0	26.7
222	17569926.68	4923973.06	0.50	0	D	500	81.1	0.6	0.0	3.0	0.0	58.7	0.5	1.7	1.8	0.0	0.0	0.0	0.0	22.1
224	17569926.58	4923975.79	0.50	0	D	500	81.1	6.4	0.0	3.0	0.0	58.7	0.5	1.7	1.8	0.0	0.0	0.0	0.0	27.9

vert. Area Source, ISO 9613, Name: "Bay #4 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
230	17569893.02	4923991.24	-1.50	0	D	500	81.1	8.0	0.0	3.0	0.0	59.9	0.5	16.8	1.9	0.0	8.1	0.0	0.0	4.9
232	17569893.02	4923991.24	-0.50	0	D	500	81.1	8.0	0.0	3.0	0.0	59.9	0.5	16.8	1.9	0.0	8.1	0.0	0.0	4.9
237	17569893.02	4923991.24	-3.50	0	D	500	81.1	8.0	0.0	3.0	0.0	59.9	0.5	16.8	1.9	0.0	8.1	0.0	0.0	4.9
239	17569893.02	4923991.24	-2.50	0	D	500	81.1	8.0	0.0	3.0	0.0	59.9	0.5	16.8	1.9	0.0	8.1	0.0	0.0	4.9

vert. Area Source, ISO 9613, Name: "Bay #3 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
273	17569893.42	4923979.66	1.50	0	D	500	81.1	3.4	0.0	3.0	0.0	59.8	0.5	1.9	1.8	0.0	22.1	0.0	0.0	1.5
305	17569893.32	4923982.64	1.50	0	D	500	81.1	5.8	0.0	3.0	0.0	59.8	0.5	1.9	1.8	0.0	22.1	0.0	0.0	3.8
308	17569893.42	4923979.66	0.50	0	D	500	81.1	3.4	0.0	3.0	0.0	59.8	0.5	2.2	1.8	0.0	21.8	0.0	0.0	1.4
314	17569893.32	4923982.64	0.50	0	D	500	81.1	5.8	0.0	3.0	0.0	59.8	0.5	2.1	1.8	0.0	21.8	0.0	0.0	3.8
315	17569893.42	4923979.66	2.50	0	D	500	81.1	3.4	0.0	3.0	0.0	59.8	0.5	2.2	1.8	0.0	21.8	0.0	0.0	1.4
321	17569893.32	4923982.64	2.50	0	D	500	81.1	5.8	0.0	3.0	0.0	59.8	0.5	2.2	1.8	0.0	21.8	0.0	0.0	3.8
323	17569893.42	4923979.66	3.50	0	D	500	81.1	3.4	0.0	3.0	0.0	59.8	0.5	2.5	1.8	0.0	21.5	0.0	0.0	1.3
325	17569893.32	4923982.64	3.50	0	D	500	81.1	5.8	0.0	3.0	0.0	59.8	0.5	2.5	1.8	0.0	21.6	0.0	0.0	3.7

vert. Area Source, ISO 9613, Name: "Bay #1 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
331	17569893.93	4923964.71	1.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	1.9	1.7	0.0	21.7	0.0	0.0	6.1
340	17569893.93	4923964.71	0.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.3	1.7	0.0	21.5	0.0	0.0	6.0
342	17569893.93	4923964.71	3.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.5	1.7	0.0	21.3	0.0	0.0	5.9
350	17569893.93	4923964.71	2.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.2	1.7	0.0	21.5	0.0	0.0	6.0

DENSE WOODS REMAIN

SOUND LEVELS (DAYTIME + EVENING)

vert. Area Source, ISO 9613, Name: "Bay #2 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
357	17569893.63	4923973.38	1.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.8	0.5	1.9	1.7	0.0	22.0	0.0	0.0	5.7
362	17569893.63	4923973.38	0.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.8	0.5	2.2	1.7	0.0	21.7	0.0	0.0	5.7
368	17569893.63	4923973.38	3.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.8	0.5	2.5	1.7	0.0	21.5	0.0	0.0	5.6
370	17569893.63	4923973.38	2.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.8	0.5	2.2	1.7	0.0	21.7	0.0	0.0	5.7

Line Source, ISO 9613, Name: "Truck Movements", ID: "TRUCKS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
59	17569979.22	4923936.91	2.00	0	DEN	500	67.0	18.6	0.0	0.0	0.0	56.3	0.4	2.7	1.5	0.0	0.0	0.0	0.0	24.7
61	17570034.14	4923937.92	2.00	0	DEN	500	67.0	15.6	0.0	0.0	0.0	53.3	0.2	4.0	1.6	0.0	0.0	0.0	0.0	23.5
63	17570070.76	4923938.59	2.00	0	DEN	500	67.0	15.6	0.0	0.0	0.0	50.4	0.2	5.4	1.7	0.0	0.0	0.0	0.0	24.9
379	17569941.92	4923986.99	2.00	0	DEN	500	67.0	15.2	0.0	0.0	0.0	58.2	0.4	2.3	1.9	0.0	0.0	0.0	0.0	19.3
381	17569942.37	4923953.28	2.00	0	DEN	500	67.0	15.3	0.0	0.0	0.0	58.0	0.4	2.4	1.6	0.0	0.0	0.0	0.0	19.9

Line Source, ISO 9613, Name: "LOADER (45min/hr)", ID: "LOADER"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
83	17569817.89	4923950.51	2.00	0	DEN	500	76.0	15.7	0.0	0.0	0.0	61.8	0.7	1.7	1.5	0.0	6.5	0.0	0.0	19.4
87	17569851.97	4923935.00	2.00	0	DEN	500	76.0	15.8	0.0	0.0	0.0	60.9	0.6	2.3	1.5	0.0	0.0	0.0	0.0	26.6
102	17569869.37	4923933.96	2.00	0	DEN	500	76.0	11.4	0.0	0.0	0.0	60.4	0.6	2.3	1.5	0.0	0.0	0.0	0.0	22.7
104	17569869.58	4923963.30	2.00	0	DEN	500	76.0	16.5	0.0	0.0	0.0	60.4	0.6	1.9	1.6	0.0	15.3	0.0	0.0	12.7
106	17569869.77	4923989.36	2.00	0	DEN	500	76.0	8.5	0.0	0.0	0.0	60.6	0.6	1.9	1.8	0.0	15.7	0.0	0.0	4.0
110	17569863.35	4923990.73	2.00	0	DEN	500	76.0	11.3	0.0	0.0	0.0	60.7	0.6	1.9	1.8	0.0	14.5	0.0	0.0	7.8
112	17569836.84	4923981.74	2.00	0	DEN	500	76.0	16.3	0.0	0.0	0.0	61.4	0.6	1.8	1.7	0.0	10.9	0.0	0.0	15.9
115	17569833.39	4923952.09	2.00	0	DEN	500	76.0	17.1	0.0	0.0	0.0	61.4	0.6	1.8	1.6	0.0	8.7	0.0	0.0	19.1
117	17569858.48	4923940.73	2.00	0	DEN	500	76.0	6.1	0.0	0.0	0.0	60.7	0.6	1.9	1.5	0.0	0.0	0.0	0.0	17.4
137	17569860.35	4923940.62	2.00	0	DEN	500	76.0	1.6	0.0	0.0	0.0	60.6	0.6	1.9	1.5	0.0	0.0	0.0	0.0	13.0
147	17569861.06	4923960.74	2.00	0	DEN	500	76.0	15.9	0.0	0.0	0.0	60.7	0.6	2.0	1.6	0.0	13.5	0.0	0.0	13.6
164	17569842.81	4923974.81	2.00	0	DEN	500	76.0	15.9	0.0	0.0	0.0	61.2	0.6	1.8	1.7	0.0	11.5	0.0	0.0	15.1
372	17569837.48	4923962.74	2.00	0	DEN	500	76.0	14.8	0.0	0.0	0.0	61.3	0.6	1.8	1.6	0.0	10.6	0.0	0.0	14.9
374	17569806.71	4923969.13	2.00	0	DEN	500	76.0	13.9	0.0	0.0	0.0	62.1	0.7	1.7	1.6	0.0	8.0	0.0	0.0	15.8
375	17569811.52	4923978.64	2.00	1	DEN	500	76.0	5.3	0.0	0.0	0.0	62.0	0.7	1.7	1.7	0.0	8.7	0.0	1.0	5.4
383	17569813.46	4923968.77	2.00	0	DEN	500	76.0	11.5	0.0	0.0	0.0	61.9	0.7	1.8	1.6	0.0	8.5	0.0	0.0	13.0

Line Source, ISO 9613, Name: "Truck Movements", ID: "TRUCKS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
34	17569934.24	4923934.78	2.00	0	DEN	500	67.0	20.1	0.0	0.0	0.0	58.2	0.4	3.5	1.5	0.0	0.0	0.0	0.0	23.5
38	17570011.65	4923936.63	2.00	0	DEN	500	67.0	17.1	0.0	0.0	0.0	54.6	0.3	3.2	1.6	0.0	0.0	0.0	0.0	24.5
40	17570050.36	4923937.56	2.00	0	DEN	500	67.0	14.1	0.0	0.0	0.0	52.1	0.2	4.7	1.6	0.0	0.0	0.0	0.0	22.5
42	17570076.17	4923938.17	2.00	0	DEN	500	67.0	14.1	0.0	0.0	0.0	49.9	0.2	5.3	1.7	0.0	0.0	0.0	0.0	24.0
394	17569882.87	4923961.48	2.00	0	DEN	500	67.0	16.3	0.0	0.0	0.0	60.0	0.5	2.0	1.6	0.0	18.5	0.0	0.0	0.6
501	17569882.66	4923936.78	2.00	0	DEN	500	67.0	8.1	0.0	0.0	0.0	60.0	0.5	2.2	1.5	0.0	0.0	0.0	0.0	10.9

DENSE WOODS REMAIN

SOUND LEVELS (DAYTIME + EVENING)

Receiver
Name: R3 - 75th St
ID: R3
X: 17570165.08
Y: 4923990.60
Z: 1.50

Point Source, ISO 9613, Name: "Emergency Generator", ID: "BEEPER"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
13	17569845.85	4923968.45	0.50	0	D	500	107.0	0.0	0.0	0.0	0.0	61.1	0.6	2.3	3.5	0.0	13.4	0.0	0.0	26.1

Line Source, ISO 9613, Name: "Forklift Movements (45 min/hr)", ID: "FORKLIFT"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
16	17569993.71	4923910.40	1.50	0	DEN	500	81.5	16.1	0.0	0.0	0.0	56.5	0.4	2.7	3.7	0.0	0.0	0.0	0.0	34.3
18	17569995.73	4923873.22	1.50	0	DEN	500	81.5	15.3	0.0	0.0	0.0	57.3	0.4	2.7	4.0	0.0	0.0	0.0	0.0	32.5

Point Source, ISO 9613, Name: "Emergency Generator", ID: "GEN_SET"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
20	17570010.74	4923921.45	1.50	0	DEN	500	98.9	0.0	0.0	0.0	0.0	55.6	0.3	2.7	3.7	0.0	0.0	0.0	0.0	36.6

Point Source, ISO 9613, Name: "Garage Exh. Fan", ID: ""

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
33	17569925.83	4923997.74	5.00	0	DEN	A	97.8	0.0	0.0	0.0	0.0	58.6	1.6	-0.1	4.6	0.0	0.0	0.0	0.0	33.1

vert. Area Source, ISO 9613, Name: "Wash Bay East", ID: "WASH_BAY"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
62	17569925.69	4924001.63	0.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	58.6	0.9	-2.2	4.3	0.0	0.0	0.0	0.0	34.2
64	17569925.69	4924001.63	2.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	58.6	0.9	-1.8	4.3	0.0	0.0	0.0	0.0	33.8
66	17569925.69	4924001.63	1.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	58.6	0.9	-2.2	4.3	0.0	0.0	0.0	0.0	34.2
68	17569925.69	4924001.63	3.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	58.6	0.9	-1.5	4.3	0.0	0.0	0.0	0.0	33.4

vert. Area Source, ISO 9613, Name: "Wash Bay East", ID: "WASH_BAY"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
70	17569892.66	4924001.61	1.50	0	DEN	1000	85.6	4.4	0.0	3.0	0.0	59.7	1.0	-2.4	4.3	0.0	22.0	0.0	0.0	8.5
72	17569892.75	4923999.05	1.50	0	DEN	1000	85.6	3.7	0.0	3.0	0.0	59.7	1.0	-2.4	4.2	0.0	23.5	0.0	0.0	6.3
74	17569892.66	4924001.61	0.50	0	DEN	1000	85.6	4.4	0.0	3.0	0.0	59.7	1.0	-2.7	4.3	0.0	22.0	0.0	0.0	8.9
76	17569892.75	4923999.05	0.50	0	DEN	1000	85.6	3.7	0.0	3.0	0.0	59.7	1.0	-2.7	4.2	0.0	23.5	0.0	0.0	6.6
78	17569892.66	4924001.61	3.50	0	DEN	1000	85.6	4.4	0.0	3.0	0.0	59.7	1.0	-1.7	4.3	0.0	22.0	0.0	0.0	7.8
84	17569892.75	4923999.05	3.50	0	DEN	1000	85.6	3.7	0.0	3.0	0.0	59.7	1.0	-1.7	4.2	0.0	23.5	0.0	0.0	5.6
88	17569892.66	4924001.61	2.50	0	DEN	1000	85.6	4.4	0.0	3.0	0.0	59.7	1.0	-2.1	4.3	0.0	22.0	0.0	0.0	8.2
90	17569892.75	4923999.05	2.50	0	DEN	1000	85.6	3.7	0.0	3.0	0.0	59.7	1.0	-2.1	4.2	0.0	23.5	0.0	0.0	6.0

vert. Area Source, ISO 9613, Name: "Bay #4 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
138	17569925.98	4923993.15	-1.50	0	D	500	81.1	7.9	0.0	3.0	0.0	58.6	0.5	16.9	3.5	0.0	0.0	0.0	0.0	12.6
140	17569925.98	4923993.15	-0.50	0	D	500	81.1	7.9	0.0	3.0	0.0	58.6	0.5	16.9	3.5	0.0	0.0	0.0	0.0	12.6
142	17569925.98	4923993.15	-3.50	0	D	500	81.1	7.9	0.0	3.0	0.0	58.6	0.5	16.9	3.5	0.0	0.0	0.0	0.0	12.6
144	17569925.98	4923993.15	-2.50	0	D	500	81.1	7.9	0.0	3.0	0.0	58.6	0.5	16.9	3.5	0.0	0.0	0.0	0.0	12.6

vert. Area Source, ISO 9613, Name: "Bay #3 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
148	17569926.29	4923984.16	2.50	0	D	500	81.1	7.6	0.0	3.0	0.0	58.6	0.5	2.5	3.5	0.0	0.0	0.0	0.0	26.7
149	17569926.29	4923984.16	3.50	0	D	500	81.1	7.6	0.0	3.0	0.0	58.6	0.5	2.9	3.5	0.0	0.0	0.0	0.0	26.4

DENSE WOODS REMAIN

SOUND LEVELS (DAYTIME + EVENING)

vert. Area Source, ISO 9613, Name: "Bay #3 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
158	17569926.29	4923984.16	0.50	0	D	500	81.1	7.6	0.0	3.0	0.0	58.6	0.5	1.7	3.5	0.0	0.0	0.0	0.0	27.5
163	17569926.29	4923984.16	1.50	0	D	500	81.1	7.6	0.0	3.0	0.0	58.6	0.5	2.1	3.5	0.0	0.0	0.0	0.0	27.1

vert. Area Source, ISO 9613, Name: "Bay #1 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
170	17569926.89	4923966.83	1.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.1	3.5	0.0	0.0	0.0	0.0	26.9
172	17569926.89	4923966.83	2.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.5	3.5	0.0	0.0	0.0	0.0	26.5
180	17569926.89	4923966.83	3.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.9	3.5	0.0	0.0	0.0	0.0	26.1
182	17569926.89	4923966.83	0.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	1.7	3.5	0.0	0.0	0.0	0.0	27.3

vert. Area Source, ISO 9613, Name: "Bay #2 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
184	17569926.60	4923975.22	0.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	1.7	3.5	0.0	0.0	0.0	0.0	27.2
186	17569926.60	4923975.22	1.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.1	3.5	0.0	0.0	0.0	0.0	26.9
188	17569926.60	4923975.22	3.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.9	3.5	0.0	0.0	0.0	0.0	26.1
190	17569926.60	4923975.22	2.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.5	3.5	0.0	0.0	0.0	0.0	26.5

Line Source, ISO 9613, Name: "Snow Plow Movements", ID: "PLOWS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
3	17569892.47	4923934.54	1.50	0	DEN	500	79.0	12.4	0.0	0.0	0.0	59.9	0.5	1.9	3.5	0.0	5.4	0.0	0.0	20.1
6	17569948.04	4923935.93	1.50	0	DEN	500	79.0	19.7	0.0	0.0	0.0	58.0	0.4	2.2	3.5	0.0	0.0	0.0	0.0	34.5
8	17570018.47	4923937.69	1.50	0	DEN	500	79.0	16.7	0.0	0.0	0.0	54.9	0.3	2.9	3.6	0.0	0.0	0.0	0.0	34.0
10	17570065.42	4923938.86	1.50	0	DEN	500	79.0	16.7	0.0	0.0	0.0	52.0	0.2	6.8	3.7	0.0	0.0	0.0	0.0	32.9
95	17569848.54	4923931.61	1.50	0	DEN	500	79.0	14.2	0.0	0.0	0.0	61.2	0.6	1.7	3.5	0.0	8.7	0.0	0.0	17.6
97	17569869.27	4923922.36	1.50	0	DEN	500	79.0	12.8	0.0	0.0	0.0	60.6	0.6	3.0	3.5	0.0	0.0	0.0	0.0	24.0
192	17569880.22	4923924.68	1.50	0	DEN	500	79.0	11.2	0.0	0.0	0.0	60.3	0.6	3.6	3.5	0.0	0.0	0.0	0.0	22.2
194	17569883.20	4923932.58	1.50	0	DEN	500	79.0	5.7	0.0	0.0	0.0	60.2	0.6	1.9	3.5	0.0	5.0	0.0	0.0	13.6

vert. Area Source, ISO 9613, Name: "Bay #4 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
196	17569893.02	4923991.24	-3.50	0	D	500	81.1	8.0	0.0	3.0	0.0	59.7	0.5	16.9	3.5	0.0	8.1	0.0	0.0	3.4
198	17569893.02	4923991.24	-1.50	0	D	500	81.1	8.0	0.0	3.0	0.0	59.7	0.5	16.9	3.5	0.0	8.1	0.0	0.0	3.4
200	17569893.02	4923991.24	-2.50	0	D	500	81.1	8.0	0.0	3.0	0.0	59.7	0.5	16.9	3.5	0.0	8.1	0.0	0.0	3.4
202	17569893.02	4923991.24	-0.50	0	D	500	81.1	8.0	0.0	3.0	0.0	59.7	0.5	16.9	3.5	0.0	8.1	0.0	0.0	3.4

vert. Area Source, ISO 9613, Name: "Bay #3 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
204	17569893.35	4923981.55	2.50	0	D	500	81.1	7.8	0.0	3.0	0.0	59.7	0.5	2.3	3.5	0.0	22.2	0.0	0.0	3.7
206	17569893.35	4923981.55	1.50	0	D	500	81.1	7.8	0.0	3.0	0.0	59.7	0.5	2.0	3.5	0.0	22.3	0.0	0.0	3.8
208	17569893.35	4923981.55	0.50	0	D	500	81.1	7.8	0.0	3.0	0.0	59.7	0.5	2.5	3.5	0.0	21.9	0.0	0.0	3.7
228	17569893.35	4923981.55	3.50	0	D	500	81.1	7.8	0.0	3.0	0.0	59.7	0.5	2.6	3.5	0.0	21.9	0.0	0.0	3.7

vert. Area Source, ISO 9613, Name: "Bay #1 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
231	17569893.93	4923964.71	2.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.3	3.5	0.0	22.2	0.0	0.0	3.4
233	17569893.93	4923964.71	3.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.6	3.5	0.0	21.9	0.0	0.0	3.4
235	17569893.93	4923964.71	0.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.4	3.5	0.0	22.0	0.0	0.0	3.4
240	17569893.93	4923964.71	1.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.0	3.5	0.0	22.4	0.0	0.0	3.5

vert. Area Source, ISO 9613, Name: "Bay #2 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
274	17569893.63	4923973.38	2.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.3	3.5	0.0	22.2	0.0	0.0	3.4
276	17569893.63	4923973.38	1.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.0	3.5	0.0	22.4	0.0	0.0	3.4
278	17569893.63	4923973.38	0.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.5	3.5	0.0	22.0	0.0	0.0	3.4

DENSE WOODS REMAIN

SOUND LEVELS (DAYTIME + EVENING)

vert. Area Source, ISO 9613, Name: "Bay #2 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
280	17569893.63	4923973.38	3.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.6	3.5	0.0	21.9	0.0	0.0	3.4

Line Source, ISO 9613, Name: "Truck Movements", ID: "TRUCKS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
36	17569979.22	4923936.91	2.00	0	DEN	500	67.0	18.6	0.0	0.0	0.0	56.7	0.4	2.8	3.6	0.0	0.0	0.0	0.0	22.2
43	17570034.14	4923937.92	2.00	0	DEN	500	67.0	15.6	0.0	0.0	0.0	54.0	0.3	3.9	3.6	0.0	0.0	0.0	0.0	20.9
60	17570070.76	4923938.59	2.00	0	DEN	500	67.0	15.6	0.0	0.0	0.0	51.6	0.2	5.7	3.8	0.0	0.0	0.0	0.0	21.3
310	17569941.74	4924001.08	2.00	0	DEN	500	67.0	7.1	0.0	0.0	0.0	58.0	0.4	2.4	3.5	0.0	0.0	0.0	0.0	9.8
312	17569942.18	4923967.36	2.00	0	DEN	500	67.0	17.9	0.0	0.0	0.0	58.0	0.4	2.4	3.5	0.0	0.0	0.0	0.0	20.6

Line Source, ISO 9613, Name: "LOADER (45min/hr)", ID: "LOADER"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
99	17569834.54	4923942.93	2.00	0	DEN	500	76.0	18.7	0.0	0.0	0.0	61.5	0.6	1.8	3.5	0.0	10.5	0.0	0.0	16.8
107	17569868.63	4923927.43	2.00	0	DEN	500	76.0	1.8	0.0	0.0	0.0	60.6	0.6	1.9	3.5	0.0	0.0	0.0	0.0	11.2
114	17569869.56	4923960.02	2.00	0	DEN	500	76.0	18.2	0.0	0.0	0.0	60.5	0.6	2.0	3.5	0.0	15.8	0.0	0.0	11.9
122	17569843.28	4923983.92	2.00	0	DEN	500	76.0	17.5	0.0	0.0	0.0	61.2	0.6	1.8	3.5	0.0	11.8	0.0	0.0	14.6
127	17569853.05	4923987.24	2.00	1	DEN	500	76.0	15.5	0.0	0.0	0.0	62.2	0.7	1.7	3.5	0.0	8.1	0.0	1.0	14.3
134	17569835.23	4923951.26	2.00	0	DEN	500	76.0	17.4	0.0	0.0	0.0	61.4	0.6	1.9	3.5	0.0	10.7	0.0	0.0	15.3
167	17569861.03	4923960.02	2.00	0	DEN	500	76.0	16.0	0.0	0.0	0.0	60.7	0.6	2.0	3.5	0.0	14.1	0.0	0.0	11.1
168	17569842.81	4923974.81	2.00	0	DEN	500	76.0	15.9	0.0	0.0	0.0	61.2	0.6	1.8	3.5	0.0	11.8	0.0	0.0	13.0
306	17569837.48	4923962.74	2.00	0	DEN	500	76.0	14.8	0.0	0.0	0.0	61.3	0.6	1.8	3.5	0.0	11.1	0.0	0.0	12.4
309	17569806.71	4923969.13	2.00	0	DEN	500	76.0	13.9	0.0	0.0	0.0	62.1	0.7	1.7	3.5	0.0	8.4	0.0	0.0	13.5
316	17569813.46	4923968.77	2.00	0	DEN	500	76.0	11.5	0.0	0.0	0.0	61.9	0.7	1.7	3.5	0.0	8.9	0.0	0.0	10.7

Line Source, ISO 9613, Name: "Truck Movements", ID: "TRUCKS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
23	17569889.82	4923933.72	2.00	0	DEN	500	67.0	11.6	0.0	0.0	0.0	60.0	0.5	2.1	3.5	0.0	4.9	0.0	0.0	7.6
25	17569945.02	4923935.04	2.00	0	DEN	500	67.0	19.8	0.0	0.0	0.0	58.1	0.4	2.4	3.5	0.0	0.0	0.0	0.0	22.3
28	17570017.05	4923936.76	2.00	0	DEN	500	67.0	16.8	0.0	0.0	0.0	54.9	0.3	3.5	3.6	0.0	0.0	0.0	0.0	21.5
30	17570065.06	4923937.91	2.00	0	DEN	500	67.0	16.8	0.0	0.0	0.0	52.1	0.2	5.5	3.8	0.0	0.0	0.0	0.0	22.2

DENSE WOODS REMAIN

SOUND LEVELS (DAYTIME + EVENING)

Receiver
Name: R7 - J C Cycle - @2nd Storey
ID: R7
X: 17569993.83
Y: 4924171.74
Z: 4.50

Point Source, ISO 9613, Name: "Emergency Generator", ID: "BEEPER"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
489	17569845.85	4923968.45	0.50	0	D	500	107.0	0.0	0.0	0.0	0.0	59.0	0.5	-1.8	8.2	0.0	0.0	0.0	0.0	41.0
491	17569845.85	4923968.45	0.50	1	D	500	107.0	0.0	0.0	0.0	0.0	59.4	0.5	-2.0	8.2	0.0	0.0	0.0	1.0	39.8
493	17569845.85	4923968.45	0.50	2	D	500	107.0	0.0	0.0	0.0	0.0	60.2	0.6	-2.0	9.0	0.0	0.0	0.0	2.0	37.2
495	17569845.85	4923968.45	0.50	1	D	500	107.0	0.0	0.0	0.0	0.0	59.8	0.5	-0.9	9.3	0.0	0.0	0.0	1.0	37.3

Line Source, ISO 9613, Name: "Forklift Movements (45 min/hr)", ID: "FORKLIFT"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
509	17569994.63	4923893.41	1.50	0	DEN	500	81.5	18.7	0.0	0.0	0.0	59.9	0.5	-2.2	1.0	0.0	0.0	0.0	0.0	41.0

Point Source, ISO 9613, Name: "Garage Exh. Fan", ID: ""

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
511	17569925.83	4923997.74	5.00	0	DEN	A	97.8	0.0	0.0	0.0	0.0	56.4	1.3	-0.0	0.0	0.0	0.0	0.0	0.0	40.0

Point Source, ISO 9613, Name: "Emergency Generator", ID: "GEN_SET"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
523	17570010.74	4923921.45	1.50	0	DEN	500	98.9	0.0	0.0	0.0	0.0	59.0	0.5	-1.9	5.1	0.0	0.0	0.0	0.0	36.3

vert. Area Source, ISO 9613, Name: "Wash Bay East", ID: "WASH_BAY"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
525	17569925.69	4924001.63	1.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	56.3	0.7	0.2	8.1	0.0	0.0	0.0	0.0	30.4
530	17569925.66	4924002.56	1.50	1	DEN	1000	85.6	5.1	0.0	3.0	0.0	56.6	0.7	0.2	8.5	0.0	0.0	0.0	1.0	26.8
532	17569925.69	4924001.63	2.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	56.3	0.7	-0.2	8.1	0.0	0.0	0.0	0.0	30.8
540	17569925.66	4924002.56	2.50	1	DEN	1000	85.6	5.1	0.0	3.0	0.0	56.6	0.7	-0.2	8.5	0.0	0.0	0.0	1.0	27.1
543	17569925.69	4924001.63	3.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	56.3	0.7	-0.1	8.1	0.0	0.0	0.0	0.0	30.8
545	17569925.66	4924002.56	3.50	1	DEN	1000	85.6	5.1	0.0	3.0	0.0	56.6	0.7	-0.2	8.5	0.0	0.0	0.0	1.0	27.1
547	17569925.69	4924001.63	0.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	56.3	0.7	0.8	8.1	0.0	0.0	0.0	0.0	29.8
550	17569925.66	4924002.56	0.50	1	DEN	1000	85.6	5.1	0.0	3.0	0.0	56.6	0.7	0.8	8.5	0.0	0.0	0.0	1.0	26.2

vert. Area Source, ISO 9613, Name: "Wash Bay East", ID: "WASH_BAY"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
552	17569892.70	4924000.44	3.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	57.0	0.7	-0.2	6.3	0.0	14.0	0.0	0.0	17.8
554	17569892.70	4924000.44	3.50	1	DEN	1000	85.6	7.1	0.0	3.0	0.0	57.4	0.8	-0.2	9.3	0.0	25.0	0.0	1.0	2.5
556	17569892.70	4924000.44	2.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	57.0	0.7	-0.2	8.9	0.0	14.0	0.0	0.0	15.3
558	17569892.70	4924000.44	2.50	1	DEN	1000	85.6	7.1	0.0	3.0	0.0	57.4	0.8	-0.3	9.3	0.0	25.0	0.0	1.0	2.5
560	17569892.70	4924000.44	0.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	57.0	0.7	0.0	8.9	0.0	14.0	0.0	0.0	15.0
570	17569892.70	4924000.44	0.50	1	DEN	1000	85.6	7.1	0.0	3.0	0.0	57.4	0.8	-0.5	9.3	0.0	25.0	0.0	1.0	2.7
573	17569892.70	4924000.44	1.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	57.0	0.7	0.1	8.9	0.0	14.0	0.0	0.0	15.0
581	17569892.70	4924000.44	1.50	1	DEN	1000	85.6	7.1	0.0	3.0	0.0	57.4	0.8	0.1	9.3	0.0	24.9	0.0	1.0	2.2

vert. Area Source, ISO 9613, Name: "Bay #4 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
627	17569926.06	4923990.89	-0.50	0	D	500	81.1	2.1	0.0	3.0	0.0	56.7	0.4	13.4	6.7	0.0	0.0	0.0	0.0	9.1
628	17569925.96	4923993.96	-0.50	0	D	500	81.1	6.6	0.0	3.0	0.0	56.6	0.4	13.4	6.7	0.0	0.0	0.0	0.0	13.6
629	17569925.98	4923993.15	-1.50	0	D	500	81.1	7.9	0.0	3.0	0.0	56.6	0.4	13.4	6.7	0.0	0.0	0.0	0.0	14.9

DENSE WOODS REMAIN

SOUND LEVELS (DAYTIME + EVENING)

vert. Area Source, ISO 9613, Name: "Bay #4 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
630	17569925.98	4923993.15	-2.50	0	D	500	81.1	7.9	0.0	3.0	0.0	56.6	0.4	13.4	6.7	0.0	0.0	0.0	0.0	14.9
631	17569925.98	4923993.15	-3.50	0	D	500	81.1	7.9	0.0	3.0	0.0	56.6	0.4	13.4	6.7	0.0	0.0	0.0	0.0	14.9

vert. Area Source, ISO 9613, Name: "Bay #4 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
641	17569892.98	4923992.42	-0.50	0	D	500	81.1	6.0	0.0	3.0	0.0	57.3	0.4	13.5	7.3	0.0	11.5	0.0	0.0	0.2
644	17569893.02	4923991.24	-1.50	0	D	500	81.1	8.0	0.0	3.0	0.0	57.3	0.4	13.5	7.3	0.0	11.5	0.0	0.0	2.2
645	17569893.02	4923991.24	-1.50	1	D	500	81.1	8.0	0.0	3.0	0.0	57.7	0.4	13.5	7.6	0.0	11.5	0.0	1.0	0.4
646	17569893.02	4923991.24	-3.50	0	D	500	81.1	8.0	0.0	3.0	0.0	57.3	0.4	13.5	7.3	0.0	11.5	0.0	0.0	2.2
647	17569893.02	4923991.24	-3.50	1	D	500	81.1	8.0	0.0	3.0	0.0	57.7	0.4	13.5	7.6	0.0	11.5	0.0	1.0	0.4
648	17569893.02	4923991.24	-2.50	0	D	500	81.1	8.0	0.0	3.0	0.0	57.3	0.4	13.5	7.3	0.0	11.5	0.0	0.0	2.2
649	17569893.02	4923991.24	-2.50	1	D	500	81.1	8.0	0.0	3.0	0.0	57.7	0.4	13.5	7.6	0.0	11.5	0.0	1.0	0.4

vert. Area Source, ISO 9613, Name: "Bay #3 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
650	17569926.29	4923984.16	2.50	0	D	500	81.1	7.6	0.0	3.0	0.0	57.0	0.4	-0.1	6.7	0.0	0.0	0.0	0.0	27.8
651	17569926.29	4923984.16	1.50	0	D	500	81.1	7.6	0.0	3.0	0.0	57.0	0.4	0.7	6.7	0.0	0.0	0.0	0.0	27.0
652	17569926.29	4923984.16	0.50	0	D	500	81.1	7.6	0.0	3.0	0.0	57.0	0.4	-1.6	6.7	0.0	0.0	0.0	0.0	29.3
653	17569926.29	4923984.16	3.50	0	D	500	81.1	7.6	0.0	3.0	0.0	57.0	0.4	-0.4	4.3	0.0	0.0	0.0	0.0	30.5

vert. Area Source, ISO 9613, Name: "Bay #3 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
654	17569893.35	4923981.55	2.50	0	D	500	81.1	7.8	0.0	3.0	0.0	57.7	0.4	-0.2	7.2	0.0	18.6	0.0	0.0	8.2
655	17569893.35	4923981.55	2.50	1	D	500	81.1	7.8	0.0	3.0	0.0	58.1	0.4	-0.2	7.4	0.0	25.0	0.0	1.0	0.2
656	17569893.35	4923981.55	3.50	0	D	500	81.1	7.8	0.0	3.0	0.0	57.7	0.4	-0.4	2.7	0.0	18.6	0.0	0.0	12.9
657	17569893.35	4923981.55	3.50	1	D	500	81.1	7.8	0.0	3.0	0.0	58.1	0.4	-0.5	4.0	0.0	25.0	0.0	1.0	3.8
658	17569893.35	4923981.55	1.50	0	D	500	81.1	7.8	0.0	3.0	0.0	57.7	0.4	0.4	7.2	0.0	18.5	0.0	0.0	7.7
660	17569893.35	4923981.55	0.50	0	D	500	81.1	7.8	0.0	3.0	0.0	57.7	0.4	-0.4	7.2	0.0	18.6	0.0	0.0	8.5
661	17569893.35	4923981.55	0.50	1	D	500	81.1	7.8	0.0	3.0	0.0	58.1	0.4	-1.0	7.4	0.0	25.0	0.0	1.0	0.9

vert. Area Source, ISO 9613, Name: "Bay #2 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
662	17569926.60	4923975.22	3.50	0	D	500	81.1	7.4	0.0	3.0	0.0	57.3	0.4	-0.5	3.1	0.0	0.0	0.0	0.0	31.1
663	17569926.60	4923975.22	1.50	0	D	500	81.1	7.4	0.0	3.0	0.0	57.3	0.4	-0.5	6.6	0.0	0.0	0.0	0.0	27.6
664	17569926.60	4923975.22	2.50	0	D	500	81.1	7.4	0.0	3.0	0.0	57.3	0.4	-0.4	6.6	0.0	0.0	0.0	0.0	27.5
665	17569926.60	4923975.22	0.50	0	D	500	81.1	7.4	0.0	3.0	0.0	57.4	0.4	-1.6	6.6	0.0	0.0	0.0	0.0	28.7

vert. Area Source, ISO 9613, Name: "Bay #1 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
666	17569926.89	4923966.83	0.50	0	D	500	81.1	7.4	0.0	3.0	0.0	57.7	0.4	-1.9	6.6	0.0	0.0	0.0	0.0	28.8
667	17569926.89	4923966.83	1.50	0	D	500	81.1	7.4	0.0	3.0	0.0	57.7	0.4	-1.5	6.6	0.0	0.0	0.0	0.0	28.3
668	17569926.89	4923966.83	2.50	0	D	500	81.1	7.4	0.0	3.0	0.0	57.7	0.4	-0.7	6.6	0.0	0.0	0.0	0.0	27.5
669	17569926.89	4923966.83	3.50	0	D	500	81.1	7.4	0.0	3.0	0.0	57.7	0.4	-0.7	2.1	0.0	0.0	0.0	0.0	32.0

vert. Area Source, ISO 9613, Name: "Bay #2 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
670	17569893.63	4923973.38	2.50	0	D	500	81.1	7.5	0.0	3.0	0.0	57.9	0.4	-0.4	7.1	0.0	19.5	0.0	0.0	7.1
671	17569893.63	4923973.38	2.50	1	D	500	81.1	7.5	0.0	3.0	0.0	58.3	0.4	-0.5	7.3	0.0	25.0	0.0	1.0	0.0
672	17569893.63	4923973.38	0.50	0	D	500	81.1	7.5	0.0	3.0	0.0	57.9	0.4	-0.4	7.1	0.0	19.5	0.0	0.0	7.1
673	17569893.63	4923973.38	0.50	1	D	500	81.1	7.5	0.0	3.0	0.0	58.3	0.4	-0.9	7.3	0.0	25.0	0.0	1.0	0.4
674	17569893.63	4923973.38	3.50	0	D	500	81.1	7.5	0.0	3.0	0.0	57.9	0.4	-0.5	1.9	0.0	19.5	0.0	0.0	12.4
675	17569893.63	4923973.38	3.50	1	D	500	81.1	7.5	0.0	3.0	0.0	58.3	0.4	-0.6	3.1	0.0	25.0	0.0	1.0	4.3
676	17569893.63	4923973.38	1.50	0	D	500	81.1	7.5	0.0	3.0	0.0	57.9	0.4	-0.8	7.1	0.0	19.5	0.0	0.0	7.5
677	17569893.63	4923973.38	1.50	1	D	500	81.1	7.5	0.0	3.0	0.0	58.3	0.4	-1.1	7.3	0.0	25.0	0.0	1.0	0.6

DENSE WOODS REMAIN

SOUND LEVELS (DAYTIME + EVENING)

Line Source, ISO 9613, Name: "Snow Plow Movements", ID: "PLOWS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
497	17569905.09	4923934.86	1.50	0	DEN	500	79.0	16.3	0.0	0.0	0.0	59.1	0.5	-1.9	6.7	0.0	21.6	0.0	0.0	9.3
499	17569931.69	4923935.52	1.50	0	DEN	500	79.0	10.3	0.0	0.0	0.0	58.8	0.5	-1.9	6.5	0.0	0.0	0.0	0.0	25.5
503	17569975.01	4923936.60	1.50	0	DEN	500	79.0	18.8	0.0	0.0	0.0	58.5	0.5	-1.9	6.0	0.0	0.0	0.0	0.0	34.8
506	17570050.93	4923938.50	1.50	0	DEN	500	79.0	18.8	0.0	0.0	0.0	58.6	0.5	-1.9	5.2	0.0	0.0	0.0	0.0	35.4
612	17569842.92	4923934.11	1.50	0	DEN	500	79.0	11.5	0.0	0.0	0.0	60.0	0.5	-2.0	2.7	0.0	0.0	0.0	0.0	29.3
614	17569863.66	4923924.86	1.50	0	DEN	500	79.0	14.9	0.0	0.0	0.0	59.9	0.5	-2.1	2.4	0.0	10.7	0.0	0.0	22.4
615	17569840.14	4923935.35	1.50	1	DEN	500	79.0	9.1	0.0	0.0	0.0	60.3	0.6	-1.9	4.1	0.0	0.0	0.0	1.0	24.0
616	17569860.88	4923926.10	1.50	1	DEN	500	79.0	15.7	0.0	0.0	0.0	60.2	0.6	-2.0	4.9	0.0	12.7	0.0	1.0	17.3
678	17569880.87	4923926.42	1.50	0	DEN	500	79.0	12.3	0.0	0.0	0.0	59.6	0.5	-2.0	3.5	0.0	15.4	0.0	0.0	14.3

vert. Area Source, ISO 9613, Name: "Bay #1 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
679	17569893.93	4923964.71	3.50	0	D	500	81.1	7.5	0.0	3.0	0.0	58.2	0.4	-0.7	1.2	0.0	20.1	0.0	0.0	12.3
680	17569893.93	4923964.71	3.50	1	D	500	81.1	7.5	0.0	3.0	0.0	58.6	0.5	-0.7	2.2	0.0	25.0	0.0	1.0	5.1
681	17569893.93	4923964.71	2.50	0	D	500	81.1	7.5	0.0	3.0	0.0	58.2	0.4	-0.8	6.0	0.0	20.1	0.0	0.0	7.6
682	17569893.93	4923964.71	2.50	1	D	500	81.1	7.5	0.0	3.0	0.0	58.6	0.5	-0.8	7.3	0.0	25.0	0.0	1.0	0.2
683	17569893.93	4923964.71	0.50	0	D	500	81.1	7.5	0.0	3.0	0.0	58.2	0.4	-2.0	7.0	0.0	20.1	0.0	0.0	7.8
684	17569893.93	4923964.71	0.50	1	D	500	81.1	7.5	0.0	3.0	0.0	58.6	0.5	-2.0	7.3	0.0	25.0	0.0	1.0	1.3
685	17569893.93	4923964.71	1.50	0	D	500	81.1	7.5	0.0	3.0	0.0	58.2	0.4	-1.6	7.0	0.0	20.1	0.0	0.0	7.4
686	17569893.93	4923964.71	1.50	1	D	500	81.1	7.5	0.0	3.0	0.0	58.6	0.5	-1.6	7.3	0.0	25.0	0.0	1.0	0.9

Line Source, ISO 9613, Name: "Truck Movements", ID: "TRUCKS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
695	17569979.22	4923936.91	2.00	0	DEN	500	67.0	18.6	0.0	0.0	0.0	58.4	0.5	-1.7	5.5	0.0	0.0	0.0	0.0	22.9
696	17570052.45	4923938.25	2.00	0	DEN	500	67.0	18.6	0.0	0.0	0.0	58.6	0.5	-1.7	5.2	0.0	0.0	0.0	0.0	23.0
697	17569942.01	4923980.60	2.00	0	DEN	500	67.0	16.6	0.0	0.0	0.0	56.9	0.4	0.2	6.5	0.0	0.0	0.0	0.0	19.7
698	17569942.45	4923946.89	2.00	0	DEN	500	67.0	13.3	0.0	0.0	0.0	58.3	0.4	-1.6	6.4	0.0	0.0	0.0	0.0	16.7

Line Source, ISO 9613, Name: "Truck Movements", ID: "TRUCKS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
687	17569904.36	4923934.07	2.00	0	DEN	500	67.0	16.4	0.0	0.0	0.0	59.1	0.5	-1.8	3.6	0.0	21.1	0.0	0.0	0.8
688	17569931.47	4923934.72	2.00	0	DEN	500	67.0	10.3	0.0	0.0	0.0	58.8	0.5	-1.7	5.4	0.0	0.0	0.0	0.0	14.4
689	17569974.91	4923935.76	2.00	0	DEN	500	67.0	18.8	0.0	0.0	0.0	58.5	0.5	-1.7	6.0	0.0	0.0	0.0	0.0	22.5
690	17570051.02	4923937.57	2.00	0	DEN	500	67.0	18.8	0.0	0.0	0.0	58.6	0.5	-1.7	5.2	0.0	0.0	0.0	0.0	23.2
699	17569883.16	4923994.59	2.00	0	DEN	500	67.0	11.6	0.0	0.0	0.0	57.4	0.4	1.1	7.6	0.0	0.0	0.0	0.0	12.1
700	17569882.86	4923960.43	2.00	0	DEN	500	67.0	17.3	0.0	0.0	0.0	58.6	0.5	-1.2	7.1	0.0	14.8	0.0	0.0	4.5
701	17569883.17	4923995.75	2.00	1	DEN	500	67.0	10.9	0.0	0.0	0.0	57.8	0.4	1.1	7.9	0.0	0.0	0.0	1.0	9.7

Line Source, ISO 9613, Name: "LOADER (45min/hr)", ID: "LOADER"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
583	17569869.45	4923945.96	2.00	0	DEN	500	76.0	15.8	0.0	0.0	0.0	59.2	0.5	-1.6	3.6	0.0	10.3	0.0	0.0	19.8
589	17569869.69	4923978.86	2.00	0	DEN	500	76.0	14.5	0.0	0.0	0.0	58.2	0.4	-0.1	7.7	0.0	0.0	0.0	0.0	24.2
591	17569869.47	4923948.76	2.00	1	DEN	500	76.0	16.4	0.0	0.0	0.0	59.5	0.5	-1.7	7.5	0.0	14.3	0.0	1.0	11.2
594	17569869.71	4923981.67	2.00	1	DEN	500	76.0	13.5	0.0	0.0	0.0	58.5	0.5	0.0	7.9	0.0	0.0	0.0	1.0	21.6
598	17569846.84	4923985.13	2.00	0	DEN	500	76.0	16.9	0.0	0.0	0.0	58.5	0.5	0.5	8.6	0.0	0.0	0.0	0.0	24.8
600	17569820.33	4923976.14	2.00	0	DEN	500	76.0	8.8	0.0	0.0	0.0	59.3	0.5	-0.4	5.0	0.0	8.7	0.0	0.0	11.6
602	17569846.59	4923985.05	2.00	1	DEN	500	76.0	16.9	0.0	0.0	0.0	59.0	0.5	0.4	8.5	0.0	0.0	0.0	1.0	23.6
604	17569820.08	4923976.05	2.00	1	DEN	500	76.0	8.4	0.0	0.0	0.0	59.8	0.5	-0.5	5.5	0.0	15.7	0.0	1.0	2.4
606	17569844.19	4923984.23	2.00	2	DEN	500	76.0	7.0	0.0	0.0	0.0	59.9	0.5	-0.0	9.4	0.0	0.0	0.0	2.0	11.2
608	17569835.62	4923981.32	2.00	2	DEN	500	76.0	11.2	0.0	0.0	0.0	59.7	0.5	-0.2	8.1	0.0	0.0	0.0	2.0	17.0
610	17569837.25	4923981.88	2.00	1	DEN	500	76.0	12.3	0.0	0.0	0.0	59.3	0.5	0.0	7.2	0.0	0.0	0.0	1.0	20.3
617	17569803.27	4923957.16	2.00	0	DEN	500	76.0	6.7	0.0	0.0	0.0	60.2	0.6	-1.5	2.3	0.0	4.5	0.0	0.0	16.6
618	17569828.58	4923945.65	2.00	0	DEN	500	76.0	17.1	0.0	0.0	0.0	59.9	0.5	-1.7	2.0	0.0	0.0	0.0	0.0	32.2
619	17569860.54	4923931.11	2.00	0	DEN	500	76.0	12.9	0.0	0.0	0.0	59.8	0.5	-1.8	1.6	0.0	8.7	0.0	0.0	20.0
620	17569802.51	4923957.50	2.00	1	DEN	500	76.0	4.8	0.0	0.0	0.0	60.6	0.6	-1.5	2.4	0.0	7.6	0.0	1.0	10.2
621	17569825.20	4923947.18	2.00	1	DEN	500	76.0	16.7	0.0	0.0	0.0	60.3	0.6	-1.7	2.7	0.0	0.0	0.0	1.0	29.8
622	17569857.92	4923932.30	2.00	1	DEN	500	76.0	14.0	0.0	0.0	0.0	60.1	0.6	-1.8	3.0	0.0	11.7	0.0	1.0	15.5

DENSE WOODS REMAIN

SOUND LEVELS (DAYTIME + EVENING)

Line Source, ISO 9613, Name: "LOADER (45min/hr)", ID: "LOADER"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
623	17569833.00	4923952.27	2.00	0	DEN	500	76.0	17.0	0.0	0.0	0.0	59.7	0.5	-1.6	2.8	0.0	0.0	0.0	0.0	31.5
624	17569858.09	4923940.91	2.00	0	DEN	500	76.0	6.9	0.0	0.0	0.0	59.6	0.5	-1.7	2.5	0.0	4.4	0.0	0.0	17.7
625	17569830.64	4923953.34	2.00	1	DEN	500	76.0	16.5	0.0	0.0	0.0	60.1	0.5	-1.6	3.6	0.0	0.0	0.0	1.0	28.9
626	17569855.73	4923941.98	2.00	1	DEN	500	76.0	10.0	0.0	0.0	0.0	59.9	0.5	-1.8	4.0	0.0	10.9	0.0	1.0	11.5
632	17569860.50	4923944.93	2.00	0	DEN	500	76.0	10.0	0.0	0.0	0.0	59.4	0.5	-1.7	3.0	0.0	4.6	0.0	0.0	20.2
633	17569861.21	4923965.05	2.00	0	DEN	500	76.0	14.8	0.0	0.0	0.0	58.8	0.5	-1.0	6.4	0.0	0.0	0.0	0.0	26.1
634	17569860.64	4923948.98	2.00	1	DEN	500	76.0	12.6	0.0	0.0	0.0	59.6	0.5	-1.7	5.9	0.0	11.8	0.0	1.0	11.4
635	17569861.36	4923969.10	2.00	1	DEN	500	76.0	13.4	0.0	0.0	0.0	59.1	0.5	-0.9	7.9	0.0	0.0	0.0	1.0	21.9
636	17569842.81	4923974.81	2.00	0	DEN	500	76.0	15.9	0.0	0.0	0.0	58.9	0.5	-0.4	6.5	0.0	0.0	0.0	0.0	26.5
637	17569842.81	4923974.81	2.00	1	DEN	500	76.0	15.9	0.0	0.0	0.0	59.3	0.5	-0.6	8.4	0.0	0.0	0.0	1.0	23.3
638	17569843.06	4923974.88	2.00	2	DEN	500	76.0	11.5	0.0	0.0	0.0	60.0	0.5	-0.8	7.1	0.0	0.0	0.0	2.0	18.6
639	17569844.33	4923975.24	2.00	1	DEN	500	76.0	12.6	0.0	0.0	0.0	59.6	0.5	-0.6	6.7	0.0	0.0	0.0	1.0	21.3
691	17569837.48	4923962.74	2.00	0	DEN	500	76.0	14.8	0.0	0.0	0.0	59.3	0.5	-1.3	4.2	0.0	0.0	0.0	0.0	28.1
692	17569837.48	4923962.74	2.00	1	DEN	500	76.0	14.8	0.0	0.0	0.0	59.7	0.5	-1.5	5.3	0.0	0.0	0.0	1.0	25.8
693	17569806.71	4923969.13	2.00	0	DEN	500	76.0	13.9	0.0	0.0	0.0	59.8	0.5	-1.0	3.6	0.0	11.5	0.0	0.0	15.4
694	17569806.71	4923969.13	2.00	1	DEN	500	76.0	13.9	0.0	0.0	0.0	60.2	0.6	-1.2	3.7	0.0	13.6	0.0	1.0	12.0
703	17569813.46	4923968.77	2.00	0	DEN	500	76.0	11.5	0.0	0.0	0.0	59.7	0.5	-1.0	3.9	0.0	6.7	0.0	0.0	17.7
704	17569813.94	4923969.67	2.00	1	DEN	500	76.0	10.8	0.0	0.0	0.0	60.1	0.5	-1.1	4.3	0.0	11.6	0.0	1.0	10.4
705	17569810.62	4923963.51	2.00	1	DEN	500	76.0	3.1	0.0	0.0	0.0	60.3	0.6	-1.4	3.4	0.0	0.0	0.0	1.0	15.3

DENSE WOODS REMAIN

PROJECTED SOUND LEVELS (DAYTIME + EVENING)
FROM NEW MAINTENANCE FACILITY
(DENSE WOODS REMOVED)

Receiver
Name: R1 - 75th St
ID: R1
X: 17570162.95
Y: 4923923.12
Z: 1.50

Point Source, ISO 9613, Name: "Backup Beeper", ID: "BEEPER"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
6	17569842.84	4923966.95	0.50	0	D	1250	107.0	0.0	0.0	0.0	0.0	61.2	1.2	-2.9	2.0	0.0	17.2	0.0	0.0	28.3

Line Source, ISO 9613, Name: "Forklift Movements (45 min/hr)", ID: "FORKLIFT"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
7	17569993.17	4923920.43	1.50	0	DEN	500	81.5	13.1	0.0	0.0	0.0	55.6	0.3	2.7	1.4	0.0	0.0	0.0	0.0	34.6
8	17569995.03	4923886.06	1.50	0	DEN	500	81.5	16.9	0.0	0.0	0.0	55.7	0.3	2.8	1.2	0.0	0.0	0.0	0.0	38.3
9	17569996.49	4923859.05	1.50	0	DEN	500	81.5	7.5	0.0	0.0	0.0	56.0	0.3	2.5	1.3	0.0	0.0	0.0	0.0	28.8

Point Source, ISO 9613, Name: "Emergency Generator", ID: "GEN_SET"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
10	17570010.74	4923921.45	1.50	0	DEN	500	98.9	0.0	0.0	0.0	0.0	54.6	0.3	2.7	1.4	0.0	0.0	0.0	0.0	39.8

Point Source, ISO 9613, Name: "Garage Exh. Fan", ID: ""

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
18	17569925.83	4923997.74	5.00	0	DEN	A	97.8	0.0	0.0	0.0	0.0	58.9	1.7	-0.2	2.6	0.0	0.0	0.0	0.0	34.8

vert. Area Source, ISO 9613, Name: "Wash Bay East", ID: "WASH_BAY"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
19	17569925.69	4924001.63	0.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	59.0	0.9	-2.5	2.4	0.0	0.0	0.0	0.0	36.0
20	17569925.69	4924001.63	1.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	59.0	0.9	-2.2	2.4	0.0	0.0	0.0	0.0	35.6
21	17569925.69	4924001.63	2.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	59.0	0.9	-1.9	2.4	0.0	0.0	0.0	0.0	35.3
22	17569925.69	4924001.63	3.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	59.0	0.9	-1.5	2.4	0.0	0.0	0.0	0.0	35.0

vert. Area Source, ISO 9613, Name: "Wash Bay East", ID: "WASH_BAY"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
23	17569892.70	4924000.44	0.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	60.0	1.0	-2.8	2.3	0.0	23.4	0.0	0.0	11.7
24	17569892.70	4924000.44	1.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	60.0	1.0	-2.5	2.3	0.0	23.4	0.0	0.0	11.4
25	17569892.70	4924000.44	2.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	60.0	1.0	-2.1	2.3	0.0	23.4	0.0	0.0	11.1
26	17569892.70	4924000.44	3.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	60.0	1.0	-1.8	2.3	0.0	23.4	0.0	0.0	10.8

vert. Area Source, ISO 9613, Name: "Bay #4 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
35	17569925.98	4923993.15	-2.50	0	D	500	81.1	7.9	0.0	3.0	0.0	58.9	0.5	16.9	1.9	0.0	0.0	0.0	0.0	13.9
36	17569925.98	4923993.15	-1.50	0	D	500	81.1	7.9	0.0	3.0	0.0	58.9	0.5	16.9	1.9	0.0	0.0	0.0	0.0	13.9
37	17569925.98	4923993.15	-3.50	0	D	500	81.1	7.9	0.0	3.0	0.0	58.9	0.5	16.9	1.9	0.0	0.0	0.0	0.0	13.9
38	17569925.98	4923993.15	-0.50	0	D	500	81.1	7.9	0.0	3.0	0.0	58.9	0.5	16.9	1.9	0.0	0.0	0.0	0.0	13.9

Line Source, ISO 9613, Name: "Snow Plow Movements", ID: "PLOWS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1	17569935.12	4923935.61	1.50	0	DEN	500	79.0	20.1	0.0	0.0	0.0	58.2	0.4	2.2	1.5	0.0	0.0	0.0	0.0	36.8
3	17570012.01	4923937.53	1.50	0	DEN	500	79.0	17.1	0.0	0.0	0.0	54.6	0.3	2.9	1.6	0.0	0.0	0.0	0.0	36.7
4	17570050.45	4923938.49	1.50	0	DEN	500	79.0	14.1	0.0	0.0	0.0	52.1	0.2	5.0	1.6	0.0	0.0	0.0	0.0	34.1
5	17570076.08	4923939.13	1.50	0	DEN	500	79.0	14.1	0.0	0.0	0.0	49.9	0.2	6.7	1.7	0.0	0.0	0.0	0.0	34.5
27	17569857.16	4923927.76	1.50	0	DEN	500	79.0	16.6	0.0	0.0	0.0	60.7	0.6	3.2	1.4	0.0	0.0	0.0	0.0	29.6

DENSE WOOD REMOVED

PROJECTED SOUND LEVELS (DAYTIME + EVENING)

Line Source, ISO 9613, Name: "Snow Plow Movements", ID: "PLOWS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
46	17569880.87	4923926.42	1.50	0	DEN	500	79.0	12.3	0.0	0.0	0.0	60.0	0.5	6.6	1.4	0.0	0.0	0.0	0.0	22.7

vert. Area Source, ISO 9613, Name: "Bay #3 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
58	17569926.29	4923984.16	2.50	0	D	500	81.1	7.6	0.0	3.0	0.0	58.8	0.5	2.4	1.9	0.0	0.0	0.0	0.0	28.3
60	17569926.29	4923984.16	1.50	0	D	500	81.1	7.6	0.0	3.0	0.0	58.8	0.5	2.0	1.9	0.0	0.0	0.0	0.0	28.6
67	17569926.29	4923984.16	0.50	0	D	500	81.1	7.6	0.0	3.0	0.0	58.8	0.5	2.2	1.9	0.0	0.0	0.0	0.0	28.5
69	17569926.29	4923984.16	3.50	0	D	500	81.1	7.6	0.0	3.0	0.0	58.8	0.5	2.8	1.9	0.0	0.0	0.0	0.0	27.9

vert. Area Source, ISO 9613, Name: "Bay #1 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
76	17569926.89	4923966.83	1.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.0	1.7	0.0	0.0	0.0	0.0	28.7
78	17569926.89	4923966.83	3.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.8	1.7	0.0	0.0	0.0	0.0	28.0
80	17569926.89	4923966.83	2.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.4	1.7	0.0	0.0	0.0	0.0	28.3
82	17569926.89	4923966.83	0.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	1.7	1.7	0.0	0.0	0.0	0.0	29.1

vert. Area Source, ISO 9613, Name: "Bay #2 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
84	17569926.60	4923975.22	2.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.7	0.5	2.4	1.8	0.0	0.0	0.0	0.0	28.1
86	17569926.60	4923975.22	1.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.7	0.5	2.0	1.8	0.0	0.0	0.0	0.0	28.5
88	17569926.60	4923975.22	3.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.7	0.5	2.8	1.8	0.0	0.0	0.0	0.0	27.8
90	17569926.60	4923975.22	0.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.7	0.5	1.7	1.8	0.0	0.0	0.0	0.0	28.9

vert. Area Source, ISO 9613, Name: "Bay #4 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
99	17569892.99	4923992.01	-1.50	0	D	500	81.1	6.8	0.0	3.0	0.0	59.9	0.5	16.8	1.9	0.0	8.2	0.0	0.0	3.7
105	17569892.99	4923992.01	-0.50	0	D	500	81.1	6.8	0.0	3.0	0.0	59.9	0.5	16.8	1.9	0.0	8.2	0.0	0.0	3.7
113	17569892.99	4923992.01	-3.50	0	D	500	81.1	6.8	0.0	3.0	0.0	59.9	0.5	16.8	1.9	0.0	8.2	0.0	0.0	3.7
119	17569892.99	4923992.01	-2.50	0	D	500	81.1	6.8	0.0	3.0	0.0	59.9	0.5	16.8	1.9	0.0	8.2	0.0	0.0	3.7

vert. Area Source, ISO 9613, Name: "Bay #3 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
123	17569893.35	4923981.55	1.50	0	D	500	81.1	7.8	0.0	3.0	0.0	59.8	0.5	1.9	1.8	0.0	22.1	0.0	0.0	5.8
125	17569893.35	4923981.55	0.50	0	D	500	81.1	7.8	0.0	3.0	0.0	59.8	0.5	2.1	1.8	0.0	21.8	0.0	0.0	5.8
129	17569893.35	4923981.55	2.50	0	D	500	81.1	7.8	0.0	3.0	0.0	59.8	0.5	2.2	1.8	0.0	21.8	0.0	0.0	5.7
133	17569893.35	4923981.55	3.50	0	D	500	81.1	7.8	0.0	3.0	0.0	59.8	0.5	2.5	1.8	0.0	21.6	0.0	0.0	5.7

vert. Area Source, ISO 9613, Name: "Bay #1 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
137	17569893.93	4923964.71	1.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	1.9	1.7	0.0	21.7	0.0	0.0	6.1
143	17569893.93	4923964.71	0.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.3	1.7	0.0	21.5	0.0	0.0	6.0
149	17569893.93	4923964.71	3.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.5	1.7	0.0	21.3	0.0	0.0	5.9
153	17569893.93	4923964.71	2.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.2	1.7	0.0	21.5	0.0	0.0	6.0

vert. Area Source, ISO 9613, Name: "Bay #2 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
160	17569893.63	4923973.38	1.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.8	0.5	1.9	1.7	0.0	22.0	0.0	0.0	5.7
164	17569893.63	4923973.38	0.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.8	0.5	2.2	1.7	0.0	21.7	0.0	0.0	5.7
168	17569893.63	4923973.38	3.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.8	0.5	2.5	1.7	0.0	21.5	0.0	0.0	5.6
172	17569893.63	4923973.38	2.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.8	0.5	2.2	1.7	0.0	21.7	0.0	0.0	5.7

DENSE WOOD REMOVED

PROJECTED SOUND LEVELS (DAYTIME + EVENING)

Line Source, ISO 9613, Name: "Truck Movements", ID: "TRUCKS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
15	17569979.22	4923936.91	2.00	0	DEN	500	67.0	18.6	0.0	0.0	0.0	56.3	0.4	2.7	1.5	0.0	0.0	0.0	0.0	24.7
16	17570034.14	4923937.92	2.00	0	DEN	500	67.0	15.6	0.0	0.0	0.0	53.3	0.2	4.0	1.6	0.0	0.0	0.0	0.0	23.5
17	17570070.76	4923938.59	2.00	0	DEN	500	67.0	15.6	0.0	0.0	0.0	50.4	0.2	5.4	1.7	0.0	0.0	0.0	0.0	24.9
187	17569941.87	4923990.61	2.00	0	DEN	500	67.0	14.2	0.0	0.0	0.0	58.3	0.4	2.3	2.0	0.0	0.0	0.0	0.0	18.2
189	17569942.32	4923956.89	2.00	0	DEN	500	67.0	16.2	0.0	0.0	0.0	58.0	0.4	2.3	1.7	0.0	0.0	0.0	0.0	20.7

Line Source, ISO 9613, Name: "LOADER (45min/hr)", ID: "LOADER"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
28	17569817.89	4923950.51	2.00	0	DEN	500	76.0	15.7	0.0	0.0	0.0	61.8	0.7	1.7	1.5	0.0	6.5	0.0	0.0	19.4
29	17569851.97	4923935.00	2.00	0	DEN	500	76.0	15.8	0.0	0.0	0.0	60.9	0.6	2.3	1.5	0.0	0.0	0.0	0.0	26.6
30	17569869.37	4923933.96	2.00	0	DEN	500	76.0	11.4	0.0	0.0	0.0	60.4	0.6	2.3	1.5	0.0	0.0	0.0	0.0	22.7
31	17569869.60	4923966.86	2.00	0	DEN	500	76.0	17.2	0.0	0.0	0.0	60.4	0.6	2.0	1.7	0.0	15.4	0.0	0.0	13.2
32	17569843.28	4923983.92	2.00	0	DEN	500	76.0	17.5	0.0	0.0	0.0	61.2	0.6	1.8	1.7	0.0	11.6	0.0	0.0	16.5
33	17569833.39	4923952.09	2.00	0	DEN	500	76.0	17.1	0.0	0.0	0.0	61.4	0.6	1.8	1.6	0.0	8.7	0.0	0.0	19.1
34	17569858.48	4923940.73	2.00	0	DEN	500	76.0	6.1	0.0	0.0	0.0	60.7	0.6	1.9	1.5	0.0	0.0	0.0	0.0	17.4
41	17569860.35	4923940.62	2.00	0	DEN	500	76.0	1.6	0.0	0.0	0.0	60.6	0.6	1.9	1.5	0.0	0.0	0.0	0.0	13.0
43	17569861.06	4923960.74	2.00	0	DEN	500	76.0	15.9	0.0	0.0	0.0	60.7	0.6	2.0	1.6	0.0	13.5	0.0	0.0	13.6
73	17569842.81	4923974.81	2.00	0	DEN	500	76.0	15.9	0.0	0.0	0.0	61.2	0.6	1.8	1.7	0.0	11.5	0.0	0.0	15.1
175	17569837.48	4923962.74	2.00	0	DEN	500	76.0	14.8	0.0	0.0	0.0	61.3	0.6	1.8	1.6	0.0	10.6	0.0	0.0	14.9
177	17569806.71	4923969.13	2.00	0	DEN	500	76.0	13.9	0.0	0.0	0.0	62.1	0.7	1.7	1.6	0.0	8.0	0.0	0.0	15.8
183	17569811.52	4923978.64	2.00	1	DEN	500	76.0	5.3	0.0	0.0	0.0	62.0	0.7	1.7	1.7	0.0	8.7	0.0	1.0	5.4
193	17569813.46	4923968.77	2.00	0	DEN	500	76.0	11.5	0.0	0.0	0.0	61.9	0.7	1.8	1.6	0.0	8.5	0.0	0.0	13.0

Line Source, ISO 9613, Name: "Truck Movements", ID: "TRUCKS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
11	17569934.24	4923934.78	2.00	0	DEN	500	67.0	20.1	0.0	0.0	0.0	58.2	0.4	3.5	1.5	0.0	0.0	0.0	0.0	23.5
12	17570011.65	4923936.63	2.00	0	DEN	500	67.0	17.1	0.0	0.0	0.0	54.6	0.3	3.2	1.6	0.0	0.0	0.0	0.0	24.5
13	17570050.36	4923937.56	2.00	0	DEN	500	67.0	14.1	0.0	0.0	0.0	52.1	0.2	4.7	1.6	0.0	0.0	0.0	0.0	22.5
14	17570076.17	4923938.17	2.00	0	DEN	500	67.0	14.1	0.0	0.0	0.0	49.9	0.2	5.3	1.7	0.0	0.0	0.0	0.0	24.0
204	17569882.91	4923966.03	2.00	0	DEN	500	67.0	17.2	0.0	0.0	0.0	60.0	0.5	2.0	1.7	0.0	18.8	0.0	0.0	1.1
207	17569882.66	4923936.78	2.00	0	DEN	500	67.0	8.1	0.0	0.0	0.0	60.0	0.5	2.2	1.5	0.0	0.0	0.0	0.0	10.9

DENSE WOOD REMOVED

PROJECTED SOUND LEVELS (DAYTIME + EVENING)

Receiver
Name: R3 - 75th St
ID: R3
X: 17570165.08
Y: 4923990.60
Z: 1.50

Point Source, ISO 9613, Name: "Backup Beeper", ID: "BEEPER"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
59	17569842.84	4923966.95	0.50	0	D	1250	107.0	0.0	0.0	0.0	0.0	61.2	1.2	-2.9	4.2	0.0	18.1	0.0	0.0	25.2

Line Source, ISO 9613, Name: "Forklift Movements (45 min/hr)", ID: "FORKLIFT"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
61	17569993.71	4923910.40	1.50	0	DEN	500	81.5	16.1	0.0	0.0	0.0	56.5	0.4	2.7	3.7	0.0	0.0	0.0	0.0	34.3
62	17569995.73	4923873.22	1.50	0	DEN	500	81.5	15.3	0.0	0.0	0.0	57.3	0.4	2.7	4.0	0.0	0.0	0.0	0.0	32.5

Point Source, ISO 9613, Name: "Emergency Generator", ID: "GEN_SET"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
63	17570010.74	4923921.45	1.50	0	DEN	500	98.9	0.0	0.0	0.0	0.0	55.6	0.3	2.7	3.7	0.0	0.0	0.0	0.0	36.6

Point Source, ISO 9613, Name: "Garage Exh. Fan", ID: ""

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
95	17569925.83	4923997.74	5.00	0	DEN	A	97.8	0.0	0.0	0.0	0.0	58.6	1.6	-0.1	4.6	0.0	0.0	0.0	0.0	33.1

vert. Area Source, ISO 9613, Name: "Wash Bay East", ID: "WASH_BAY"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
106	17569925.65	4924002.82	0.50	0	DEN	1000	85.6	4.4	0.0	3.0	0.0	58.6	0.9	-2.2	4.3	0.0	0.0	0.0	0.0	31.5
108	17569925.74	4924000.26	0.50	0	DEN	1000	85.6	3.8	0.0	3.0	0.0	58.6	0.9	-2.2	4.3	0.0	0.0	0.0	0.0	30.9
112	17569925.65	4924002.82	2.50	0	DEN	1000	85.6	4.4	0.0	3.0	0.0	58.6	0.9	-1.8	4.3	0.0	0.0	0.0	0.0	31.1
114	17569925.74	4924000.26	2.50	0	DEN	1000	85.6	3.8	0.0	3.0	0.0	58.6	0.9	-1.8	4.3	0.0	0.0	0.0	0.0	30.5
118	17569925.65	4924002.82	1.50	0	DEN	1000	85.6	4.4	0.0	3.0	0.0	58.6	0.9	-2.2	4.3	0.0	0.0	0.0	0.0	31.4
124	17569925.74	4924000.26	1.50	0	DEN	1000	85.6	3.8	0.0	3.0	0.0	58.6	0.9	-2.2	4.3	0.0	0.0	0.0	0.0	30.8
126	17569925.65	4924002.82	3.50	0	DEN	1000	85.6	4.4	0.0	3.0	0.0	58.6	0.9	-1.4	4.3	0.0	0.0	0.0	0.0	30.7
128	17569925.74	4924000.26	3.50	0	DEN	1000	85.6	3.8	0.0	3.0	0.0	58.6	0.9	-1.5	4.3	0.0	0.0	0.0	0.0	30.1

vert. Area Source, ISO 9613, Name: "Wash Bay East", ID: "WASH_BAY"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
132	17569892.70	4924000.44	1.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	59.7	1.0	-2.4	4.3	0.0	22.9	0.0	0.0	10.2
136	17569892.70	4924000.44	0.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	59.7	1.0	-2.7	4.3	0.0	22.9	0.0	0.0	10.6
140	17569892.70	4924000.44	3.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	59.7	1.0	-1.7	4.3	0.0	22.9	0.0	0.0	9.6
144	17569892.70	4924000.44	2.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	59.7	1.0	-2.1	4.3	0.0	22.9	0.0	0.0	9.9

vert. Area Source, ISO 9613, Name: "Bay #4 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
176	17569925.98	4923993.15	-1.50	0	D	500	81.1	7.9	0.0	3.0	0.0	58.6	0.5	16.9	3.5	0.0	0.0	0.0	0.0	12.6
182	17569925.98	4923993.15	-0.50	0	D	500	81.1	7.9	0.0	3.0	0.0	58.6	0.5	16.9	3.5	0.0	0.0	0.0	0.0	12.6
186	17569925.98	4923993.15	-3.50	0	D	500	81.1	7.9	0.0	3.0	0.0	58.6	0.5	16.9	3.5	0.0	0.0	0.0	0.0	12.6
190	17569925.98	4923993.15	-2.50	0	D	500	81.1	7.9	0.0	3.0	0.0	58.6	0.5	16.9	3.5	0.0	0.0	0.0	0.0	12.6

vert. Area Source, ISO 9613, Name: "Bay #3 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
194	17569926.29	4923984.16	2.50	0	D	500	81.1	7.6	0.0	3.0	0.0	58.6	0.5	2.5	3.5	0.0	0.0	0.0	0.0	26.7
197	17569926.29	4923984.16	3.50	0	D	500	81.1	7.6	0.0	3.0	0.0	58.6	0.5	2.9	3.5	0.0	0.0	0.0	0.0	26.4

DENSE WOOD REMOVED

PROJECTED SOUND LEVELS (DAYTIME + EVENING)

vert. Area Source, ISO 9613, Name: "Bay #3 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
200	17569926.29	4923984.16	0.50	0	D	500	81.1	7.6	0.0	3.0	0.0	58.6	0.5	1.7	3.5	0.0	0.0	0.0	0.0	27.5
203	17569926.29	4923984.16	1.50	0	D	500	81.1	7.6	0.0	3.0	0.0	58.6	0.5	2.1	3.5	0.0	0.0	0.0	0.0	27.1

vert. Area Source, ISO 9613, Name: "Bay #1 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
213	17569926.89	4923966.83	1.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.1	3.5	0.0	0.0	0.0	0.0	26.9
216	17569926.89	4923966.83	2.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.5	3.5	0.0	0.0	0.0	0.0	26.5
221	17569926.89	4923966.83	3.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.9	3.5	0.0	0.0	0.0	0.0	26.1
225	17569926.89	4923966.83	0.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	1.7	3.5	0.0	0.0	0.0	0.0	27.3

vert. Area Source, ISO 9613, Name: "Bay #2 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
227	17569926.60	4923975.22	0.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	1.7	3.5	0.0	0.0	0.0	0.0	27.2
229	17569926.60	4923975.22	1.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.1	3.5	0.0	0.0	0.0	0.0	26.9
231	17569926.60	4923975.22	3.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.9	3.5	0.0	0.0	0.0	0.0	26.1
238	17569926.60	4923975.22	2.50	0	D	500	81.1	7.4	0.0	3.0	0.0	58.6	0.5	2.5	3.5	0.0	0.0	0.0	0.0	26.5

Line Source, ISO 9613, Name: "Snow Plow Movements", ID: "PLOWS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
39	17569892.47	4923934.54	1.50	0	DEN	500	79.0	12.4	0.0	0.0	0.0	59.9	0.5	1.9	3.5	0.0	5.4	0.0	0.0	20.1
42	17569948.04	4923935.93	1.50	0	DEN	500	79.0	19.7	0.0	0.0	0.0	58.0	0.4	2.2	3.5	0.0	0.0	0.0	0.0	34.5
45	17570018.47	4923937.69	1.50	0	DEN	500	79.0	16.7	0.0	0.0	0.0	54.9	0.3	2.9	3.6	0.0	0.0	0.0	0.0	34.0
48	17570065.42	4923938.86	1.50	0	DEN	500	79.0	16.7	0.0	0.0	0.0	52.0	0.2	6.8	3.7	0.0	0.0	0.0	0.0	32.9
148	17569848.54	4923931.61	1.50	0	DEN	500	79.0	14.2	0.0	0.0	0.0	61.2	0.6	1.7	3.5	0.0	8.7	0.0	0.0	17.6
150	17569869.27	4923922.36	1.50	0	DEN	500	79.0	12.8	0.0	0.0	0.0	60.6	0.6	3.0	3.5	0.0	0.0	0.0	0.0	24.0
240	17569880.22	4923924.68	1.50	0	DEN	500	79.0	11.2	0.0	0.0	0.0	60.3	0.6	3.6	3.5	0.0	0.0	0.0	0.0	22.2
244	17569883.20	4923932.58	1.50	0	DEN	500	79.0	5.7	0.0	0.0	0.0	60.2	0.6	1.9	3.5	0.0	5.0	0.0	0.0	13.6

vert. Area Source, ISO 9613, Name: "Bay #4 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
254	17569893.02	4923991.24	-3.50	0	D	500	81.1	8.0	0.0	3.0	0.0	59.7	0.5	16.9	3.5	0.0	8.1	0.0	0.0	3.4
257	17569893.02	4923991.24	-1.50	0	D	500	81.1	8.0	0.0	3.0	0.0	59.7	0.5	16.9	3.5	0.0	8.1	0.0	0.0	3.4
261	17569893.02	4923991.24	-2.50	0	D	500	81.1	8.0	0.0	3.0	0.0	59.7	0.5	16.9	3.5	0.0	8.1	0.0	0.0	3.4
263	17569893.02	4923991.24	-0.50	0	D	500	81.1	8.0	0.0	3.0	0.0	59.7	0.5	16.9	3.5	0.0	8.1	0.0	0.0	3.4

vert. Area Source, ISO 9613, Name: "Bay #3 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
265	17569893.35	4923981.55	2.50	0	D	500	81.1	7.8	0.0	3.0	0.0	59.7	0.5	2.3	3.5	0.0	22.2	0.0	0.0	3.7
268	17569893.35	4923981.55	1.50	0	D	500	81.1	7.8	0.0	3.0	0.0	59.7	0.5	2.0	3.5	0.0	22.3	0.0	0.0	3.8
271	17569893.35	4923981.55	0.50	0	D	500	81.1	7.8	0.0	3.0	0.0	59.7	0.5	2.5	3.5	0.0	21.9	0.0	0.0	3.7
273	17569893.35	4923981.55	3.50	0	D	500	81.1	7.8	0.0	3.0	0.0	59.7	0.5	2.6	3.5	0.0	21.9	0.0	0.0	3.7

vert. Area Source, ISO 9613, Name: "Bay #1 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
275	17569893.93	4923964.71	2.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.3	3.5	0.0	22.2	0.0	0.0	3.4
277	17569893.93	4923964.71	3.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.6	3.5	0.0	21.9	0.0	0.0	3.4
279	17569893.93	4923964.71	0.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.4	3.5	0.0	22.0	0.0	0.0	3.4
281	17569893.93	4923964.71	1.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.0	3.5	0.0	22.4	0.0	0.0	3.5

vert. Area Source, ISO 9613, Name: "Bay #2 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
283	17569893.63	4923973.38	2.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.3	3.5	0.0	22.2	0.0	0.0	3.4
285	17569893.63	4923973.38	1.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.0	3.5	0.0	22.4	0.0	0.0	3.4
305	17569893.63	4923973.38	0.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.5	3.5	0.0	22.0	0.0	0.0	3.4

DENSE WOOD REMOVED

PROJECTED SOUND LEVELS (DAYTIME + EVENING)

vert. Area Source, ISO 9613, Name: "Bay #2 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
307	17569893.63	4923973.38	3.50	0	D	500	81.1	7.5	0.0	3.0	0.0	59.7	0.5	2.6	3.5	0.0	21.9	0.0	0.0	3.4

Line Source, ISO 9613, Name: "Truck Movements", ID: "TRUCKS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
98	17569979.22	4923936.91	2.00	0	DEN	500	67.0	18.6	0.0	0.0	0.0	56.7	0.4	2.8	3.6	0.0	0.0	0.0	0.0	22.2
100	17570034.14	4923937.92	2.00	0	DEN	500	67.0	15.6	0.0	0.0	0.0	54.0	0.3	3.9	3.6	0.0	0.0	0.0	0.0	20.9
102	17570070.76	4923938.59	2.00	0	DEN	500	67.0	15.6	0.0	0.0	0.0	51.6	0.2	5.7	3.8	0.0	0.0	0.0	0.0	21.3
316	17569941.72	4924002.19	2.00	0	DEN	500	67.0	4.7	0.0	0.0	0.0	58.0	0.4	2.4	3.6	0.0	0.0	0.0	0.0	7.3
318	17569942.17	4923968.48	2.00	0	DEN	500	67.0	18.1	0.0	0.0	0.0	58.0	0.4	2.4	3.5	0.0	0.0	0.0	0.0	20.8

Line Source, ISO 9613, Name: "LOADER (45min/hr)", ID: "LOADER"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
156	17569834.54	4923942.93	2.00	0	DEN	500	76.0	18.7	0.0	0.0	0.0	61.5	0.6	1.8	3.5	0.0	10.5	0.0	0.0	16.8
158	17569868.63	4923927.43	2.00	0	DEN	500	76.0	1.8	0.0	0.0	0.0	60.6	0.6	1.9	3.5	0.0	0.0	0.0	0.0	11.2
162	17569869.56	4923960.02	2.00	0	DEN	500	76.0	18.2	0.0	0.0	0.0	60.5	0.6	2.0	3.5	0.0	15.8	0.0	0.0	11.9
165	17569843.28	4923983.92	2.00	0	DEN	500	76.0	17.5	0.0	0.0	0.0	61.2	0.6	1.8	3.5	0.0	11.8	0.0	0.0	14.6
170	17569853.05	4923987.24	2.00	1	DEN	500	76.0	15.5	0.0	0.0	0.0	62.2	0.7	1.7	3.5	0.0	8.1	0.0	1.0	14.3
174	17569835.23	4923951.26	2.00	0	DEN	500	76.0	17.4	0.0	0.0	0.0	61.4	0.6	1.9	3.5	0.0	10.7	0.0	0.0	15.3
206	17569861.03	4923960.02	2.00	0	DEN	500	76.0	16.0	0.0	0.0	0.0	60.7	0.6	2.0	3.5	0.0	14.1	0.0	0.0	11.1
211	17569842.81	4923974.81	2.00	0	DEN	500	76.0	15.9	0.0	0.0	0.0	61.2	0.6	1.8	3.5	0.0	11.8	0.0	0.0	13.0
310	17569837.48	4923962.74	2.00	0	DEN	500	76.0	14.8	0.0	0.0	0.0	61.3	0.6	1.8	3.5	0.0	11.1	0.0	0.0	12.4
313	17569806.71	4923969.13	2.00	0	DEN	500	76.0	13.9	0.0	0.0	0.0	62.1	0.7	1.7	3.5	0.0	8.4	0.0	0.0	13.5
323	17569813.46	4923968.77	2.00	0	DEN	500	76.0	11.5	0.0	0.0	0.0	61.9	0.7	1.7	3.5	0.0	8.9	0.0	0.0	10.7

Line Source, ISO 9613, Name: "Truck Movements", ID: "TRUCKS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
65	17569889.82	4923933.72	2.00	0	DEN	500	67.0	11.6	0.0	0.0	0.0	60.0	0.5	2.1	3.5	0.0	4.9	0.0	0.0	7.6
81	17569945.02	4923935.04	2.00	0	DEN	500	67.0	19.8	0.0	0.0	0.0	58.1	0.4	2.4	3.5	0.0	0.0	0.0	0.0	22.3
89	17570017.05	4923936.76	2.00	0	DEN	500	67.0	16.8	0.0	0.0	0.0	54.9	0.3	3.5	3.6	0.0	0.0	0.0	0.0	21.5
91	17570065.06	4923937.91	2.00	0	DEN	500	67.0	16.8	0.0	0.0	0.0	52.1	0.2	5.5	3.8	0.0	0.0	0.0	0.0	22.2

DENSE WOOD REMOVED

PROJECTED SOUND LEVELS (DAYTIME + EVENING)

Receiver
Name: R7 - J C Cycle - @2nd Storey
ID: R7
X: 17569991.46
Y: 4924171.70
Z: 4.50

Point Source, ISO 9613, Name: "Backup Beeper", ID: "BEEPER"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
382	17569842.84	4923966.95	0.50	0	D	1250	107.0	0.0	0.0	0.0	0.0	59.1	0.9	-1.9	0.0	0.0	8.3	0.0	0.0	40.6
384	17569842.84	4923966.95	0.50	1	D	1250	107.0	0.0	0.0	0.0	0.0	59.6	1.0	-2.0	0.0	0.0	7.9	0.0	1.0	39.5
386	17569842.84	4923966.95	0.50	1	D	1250	107.0	0.0	0.0	0.0	0.0	59.7	1.0	-1.9	0.0	0.0	7.7	0.0	1.0	39.5

Line Source, ISO 9613, Name: "Forklift Movements (45 min/hr)", ID: "FORKLIFT"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
397	17569994.63	4923893.41	1.50	0	DEN	500	81.5	18.7	0.0	0.0	0.0	59.9	0.5	-2.2	0.0	0.0	0.0	0.0	0.0	42.0

Point Source, ISO 9613, Name: "Garage Exh. Fan", ID: ""

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
399	17569925.83	4923997.74	5.00	0	DEN	A	97.8	0.0	0.0	0.0	0.0	56.4	1.3	-0.0	0.0	0.0	4.8	0.0	0.0	35.2

Point Source, ISO 9613, Name: "Emergency Generator", ID: "GEN_SET"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
401	17570010.74	4923921.45	1.50	0	DEN	500	98.9	0.0	0.0	0.0	0.0	59.0	0.5	-1.9	0.0	0.0	0.0	0.0	0.0	41.3

vert. Area Source, ISO 9613, Name: "Wash Bay East", ID: "WASH_BAY"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
403	17569925.69	4924001.63	1.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	56.2	0.7	0.2	0.0	0.0	16.0	0.0	0.0	22.6
463	17569925.69	4924001.63	0.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	56.2	0.7	0.8	0.0	0.0	17.2	0.0	0.0	20.8
472	17569925.69	4924001.63	2.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	56.2	0.7	-0.2	0.0	0.0	14.1	0.0	0.0	24.9
475	17569925.69	4924001.63	3.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	56.2	0.7	-0.1	0.0	0.0	10.9	0.0	0.0	28.1

vert. Area Source, ISO 9613, Name: "Wash Bay East", ID: "WASH_BAY"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
477	17569892.70	4924000.44	0.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	56.9	0.7	0.0	0.0	0.0	24.7	0.0	0.0	13.3
495	17569892.70	4924000.44	0.50	1	DEN	1000	85.6	7.1	0.0	3.0	0.0	57.5	0.8	-0.5	0.0	0.0	25.0	0.0	1.0	12.0
499	17569892.70	4924000.44	2.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	56.9	0.7	-0.2	0.0	0.0	24.7	0.0	0.0	13.6
511	17569892.70	4924000.44	2.50	1	DEN	1000	85.6	7.1	0.0	3.0	0.0	57.5	0.8	-0.3	0.0	0.0	25.0	0.0	1.0	11.7
513	17569892.70	4924000.44	1.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	56.9	0.7	0.1	0.0	0.0	24.6	0.0	0.0	13.3
515	17569892.70	4924000.44	1.50	1	DEN	1000	85.6	7.1	0.0	3.0	0.0	57.5	0.8	0.1	0.0	0.0	24.9	0.0	1.0	11.4
518	17569892.70	4924000.44	3.50	0	DEN	1000	85.6	7.1	0.0	3.0	0.0	56.9	0.7	-0.2	0.0	0.0	24.7	0.0	0.0	13.5
520	17569892.70	4924000.44	3.50	1	DEN	1000	85.6	7.1	0.0	3.0	0.0	57.5	0.8	-0.2	0.0	0.0	25.0	0.0	1.0	11.6

vert. Area Source, ISO 9613, Name: "Bay #4 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
595	17569925.98	4923993.15	-0.50	0	D	500	81.1	7.9	0.0	3.0	0.0	56.6	0.4	13.4	0.0	0.0	0.3	0.0	0.0	21.4
597	17569925.98	4923993.15	-2.50	0	D	500	81.1	7.9	0.0	3.0	0.0	56.6	0.4	13.4	0.0	0.0	2.7	0.0	0.0	19.0
599	17569925.98	4923993.15	-3.50	0	D	500	81.1	7.9	0.0	3.0	0.0	56.6	0.4	13.4	0.0	0.0	3.7	0.0	0.0	18.0
601	17569925.98	4923993.15	-1.50	0	D	500	81.1	7.9	0.0	3.0	0.0	56.6	0.4	13.4	0.0	0.0	1.6	0.0	0.0	20.1

vert. Area Source, ISO 9613, Name: "Bay #4 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
621	17569893.02	4923991.24	-0.50	0	D	500	81.1	8.0	0.0	3.0	0.0	57.3	0.4	13.5	0.0	0.0	11.5	0.0	0.0	9.5

DENSE WOOD REMOVED

PROJECTED SOUND LEVELS (DAYTIME + EVENING)

vert. Area Source, ISO 9613, Name: "Bay #4 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
623	17569893.02	4923991.24	-0.50	1	D	500	81.1	8.0	0.0	3.0	0.0	57.8	0.4	13.5	0.0	0.0	11.5	0.0	1.0	7.9
624	17569893.02	4923991.24	-1.50	0	D	500	81.1	8.0	0.0	3.0	0.0	57.3	0.4	13.5	0.0	0.0	11.5	0.0	0.0	9.5
625	17569893.02	4923991.24	-1.50	1	D	500	81.1	8.0	0.0	3.0	0.0	57.8	0.4	13.5	0.0	0.0	11.5	0.0	1.0	7.9
626	17569893.02	4923991.24	-2.50	0	D	500	81.1	8.0	0.0	3.0	0.0	57.3	0.4	13.5	0.0	0.0	11.5	0.0	0.0	9.5
627	17569893.02	4923991.24	-2.50	1	D	500	81.1	8.0	0.0	3.0	0.0	57.8	0.4	13.5	0.0	0.0	11.5	0.0	1.0	7.9
628	17569893.02	4923991.24	-3.50	0	D	500	81.1	8.0	0.0	3.0	0.0	57.3	0.4	13.5	0.0	0.0	11.5	0.0	0.0	9.5
629	17569893.02	4923991.24	-3.50	1	D	500	81.1	8.0	0.0	3.0	0.0	57.8	0.4	13.5	0.0	0.0	11.5	0.0	1.0	7.9

vert. Area Source, ISO 9613, Name: "Bay #3 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
630	17569926.29	4923984.16	1.50	0	D	500	81.1	7.6	0.0	3.0	0.0	57.0	0.4	0.7	0.0	0.0	7.7	0.0	0.0	26.0
631	17569926.29	4923984.16	2.50	0	D	500	81.1	7.6	0.0	3.0	0.0	57.0	0.4	-0.1	0.0	0.0	6.8	0.0	0.0	27.7
632	17569926.29	4923984.16	3.50	0	D	500	81.1	7.6	0.0	3.0	0.0	57.0	0.4	-0.4	0.0	0.0	5.6	0.0	0.0	29.2
633	17569926.29	4923984.16	0.50	0	D	500	81.1	7.6	0.0	3.0	0.0	57.0	0.4	-1.6	0.0	0.0	9.9	0.0	0.0	26.1

vert. Area Source, ISO 9613, Name: "Bay #3 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
634	17569893.35	4923981.55	1.50	0	D	500	81.1	7.8	0.0	3.0	0.0	57.6	0.4	0.4	0.0	0.0	24.0	0.0	0.0	9.4
636	17569893.35	4923981.55	3.50	0	D	500	81.1	7.8	0.0	3.0	0.0	57.6	0.4	-0.4	0.0	0.0	24.8	0.0	0.0	9.4
638	17569893.35	4923981.55	2.50	0	D	500	81.1	7.8	0.0	3.0	0.0	57.6	0.4	-0.2	0.0	0.0	24.4	0.0	0.0	9.7
640	17569893.35	4923981.55	0.50	0	D	500	81.1	7.8	0.0	3.0	0.0	57.6	0.4	-0.4	0.0	0.0	24.4	0.0	0.0	9.8
641	17569893.27	4923984.10	0.50	1	D	500	81.1	-0.6	0.0	3.0	0.0	58.0	0.4	-1.0	0.0	0.0	25.0	0.0	1.0	0.1

vert. Area Source, ISO 9613, Name: "Bay #2 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
642	17569926.60	4923975.22	3.50	0	D	500	81.1	7.4	0.0	3.0	0.0	57.3	0.4	-0.5	0.0	0.0	5.2	0.0	0.0	29.1
643	17569926.60	4923975.22	1.50	0	D	500	81.1	7.4	0.0	3.0	0.0	57.3	0.4	-0.5	0.0	0.0	7.1	0.0	0.0	27.2
644	17569926.60	4923975.22	0.50	0	D	500	81.1	7.4	0.0	3.0	0.0	57.3	0.4	-1.6	0.0	0.0	8.4	0.0	0.0	27.0
645	17569926.60	4923975.22	2.50	0	D	500	81.1	7.4	0.0	3.0	0.0	57.3	0.4	-0.4	0.0	0.0	5.9	0.0	0.0	28.2

vert. Area Source, ISO 9613, Name: "Bay #1 - East", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
646	17569926.89	4923966.83	2.50	0	D	500	81.1	7.4	0.0	3.0	0.0	57.6	0.4	-0.7	0.0	0.0	5.4	0.0	0.0	28.8
647	17569926.89	4923966.83	1.50	0	D	500	81.1	7.4	0.0	3.0	0.0	57.6	0.4	-1.5	0.0	0.0	6.3	0.0	0.0	28.7
648	17569926.89	4923966.83	3.50	0	D	500	81.1	7.4	0.0	3.0	0.0	57.6	0.4	-0.7	0.0	0.0	4.8	0.0	0.0	29.3
649	17569926.89	4923966.83	0.50	0	D	500	81.1	7.4	0.0	3.0	0.0	57.6	0.4	-1.9	0.0	0.0	7.3	0.0	0.0	28.1

vert. Area Source, ISO 9613, Name: "Bay #2 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
650	17569893.63	4923973.38	0.50	0	D	500	81.1	7.5	0.0	3.0	0.0	57.9	0.4	-0.4	0.0	0.0	24.3	0.0	0.0	9.3
651	17569893.63	4923973.38	1.50	0	D	500	81.1	7.5	0.0	3.0	0.0	57.9	0.4	-0.8	0.0	0.0	24.3	0.0	0.0	9.7
652	17569893.63	4923973.38	2.50	0	D	500	81.1	7.5	0.0	3.0	0.0	57.9	0.4	-0.4	0.0	0.0	24.8	0.0	0.0	8.9
653	17569893.63	4923973.38	3.50	0	D	500	81.1	7.5	0.0	3.0	0.0	57.9	0.4	-0.5	0.0	0.0	24.9	0.0	0.0	8.9

Line Source, ISO 9613, Name: "Snow Plow Movements", ID: "PLOWS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
388	17569905.12	4923934.86	1.50	0	DEN	500	79.0	16.3	0.0	0.0	0.0	59.0	0.5	-1.9	0.0	0.0	23.8	0.0	0.0	13.9
390	17569932.26	4923935.54	1.50	0	DEN	500	79.0	10.7	0.0	0.0	0.0	58.7	0.5	-1.9	0.0	0.0	3.6	0.0	0.0	28.9
392	17569975.84	4923936.62	1.50	0	DEN	500	79.0	18.8	0.0	0.0	0.0	58.4	0.5	-1.9	0.0	0.0	0.0	0.0	0.0	40.7
394	17570051.21	4923938.51	1.50	0	DEN	500	79.0	18.8	0.0	0.0	0.0	58.6	0.5	-1.9	0.0	0.0	0.0	0.0	0.0	40.6
555	17569843.32	4923933.94	1.50	0	DEN	500	79.0	11.8	0.0	0.0	0.0	59.9	0.5	-1.9	0.0	0.0	5.0	0.0	0.0	27.3
558	17569864.05	4923924.69	1.50	0	DEN	500	79.0	14.8	0.0	0.0	0.0	59.9	0.5	-2.1	0.0	0.0	12.7	0.0	0.0	22.7
560	17569839.81	4923935.50	1.50	1	DEN	500	79.0	8.7	0.0	0.0	0.0	60.4	0.6	-2.0	0.0	0.0	4.9	0.0	1.0	22.8
562	17569850.37	4923930.79	1.50	1	DEN	500	79.0	12.0	0.0	0.0	0.0	60.3	0.6	-2.0	0.0	0.0	10.9	0.0	1.0	20.2
654	17569880.87	4923926.42	1.50	0	DEN	500	79.0	12.3	0.0	0.0	0.0	59.6	0.5	-2.0	0.0	0.0	17.0	0.0	0.0	16.2

DENSE WOOD REMOVED

PROJECTED SOUND LEVELS (DAYTIME + EVENING)

vert. Area Source, ISO 9613, Name: "Bay #1 - West", ID: "GARAGE"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
655	17569893.93	4923964.71	2.50	0	D	500	81.1	7.5	0.0	3.0	0.0	58.2	0.4	-0.8	0.0	0.0	24.8	0.0	0.0	9.0
656	17569893.93	4923964.71	1.50	0	D	500	81.1	7.5	0.0	3.0	0.0	58.2	0.4	-1.6	0.0	0.0	24.3	0.0	0.0	10.3
657	17569893.93	4923964.71	0.50	0	D	500	81.1	7.5	0.0	3.0	0.0	58.2	0.4	-2.0	0.0	0.0	24.3	0.0	0.0	10.7
658	17569893.93	4923964.71	3.50	0	D	500	81.1	7.5	0.0	3.0	0.0	58.2	0.4	-0.7	0.0	0.0	24.9	0.0	0.0	8.8

Line Source, ISO 9613, Name: "Truck Movements", ID: "TRUCKS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
667	17569979.22	4923936.91	2.00	0	DEN	500	67.0	18.6	0.0	0.0	0.0	58.4	0.5	-1.7	0.0	0.0	0.0	0.0	0.0	28.5
668	17570052.45	4923938.25	2.00	0	DEN	500	67.0	18.6	0.0	0.0	0.0	58.7	0.5	-1.7	0.0	0.0	0.0	0.0	0.0	28.2
669	17569942.03	4923978.98	2.00	0	DEN	500	67.0	16.9	0.0	0.0	0.0	57.0	0.4	0.1	0.0	0.0	5.8	0.0	0.0	20.7
670	17569942.48	4923945.26	2.00	0	DEN	500	67.0	12.6	0.0	0.0	0.0	58.3	0.4	-1.6	0.0	0.0	0.0	0.0	0.0	22.4

Line Source, ISO 9613, Name: "Truck Movements", ID: "TRUCKS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
659	17569904.39	4923934.07	2.00	0	DEN	500	67.0	16.4	0.0	0.0	0.0	59.1	0.5	-1.8	0.0	0.0	23.1	0.0	0.0	2.5
660	17569932.06	4923934.73	2.00	0	DEN	500	67.0	10.7	0.0	0.0	0.0	58.8	0.5	-1.7	0.0	0.0	3.4	0.0	0.0	16.8
661	17569975.75	4923935.78	2.00	0	DEN	500	67.0	18.8	0.0	0.0	0.0	58.5	0.5	-1.7	0.0	0.0	0.0	0.0	0.0	28.5
662	17570051.29	4923937.58	2.00	0	DEN	500	67.0	18.8	0.0	0.0	0.0	58.7	0.5	-1.7	0.0	0.0	0.0	0.0	0.0	28.4
671	17569883.16	4923994.40	2.00	0	DEN	500	67.0	11.7	0.0	0.0	0.0	57.4	0.4	1.1	0.0	0.0	8.8	0.0	0.0	11.2
672	17569882.86	4923960.24	2.00	0	DEN	500	67.0	17.3	0.0	0.0	0.0	58.5	0.5	-1.2	0.0	0.0	18.3	0.0	0.0	8.2
673	17569883.17	4923995.88	2.00	1	DEN	500	67.0	10.8	0.0	0.0	0.0	57.9	0.4	1.1	0.0	0.0	8.9	0.0	1.0	8.5
674	17569883.02	4923978.64	2.00	1	DEN	500	67.0	13.5	0.0	0.0	0.0	58.4	0.5	-0.2	0.0	0.0	19.1	0.0	1.0	1.7

Line Source, ISO 9613, Name: "LOADER (45min/hr)", ID: "LOADER"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
523	17569869.45	4923945.50	2.00	0	DEN	500	76.0	15.7	0.0	0.0	0.0	59.2	0.5	-1.6	0.0	0.0	13.6	0.0	0.0	19.9
525	17569869.69	4923978.40	2.00	0	DEN	500	76.0	14.6	0.0	0.0	0.0	58.2	0.4	-0.1	0.0	0.0	6.6	0.0	0.0	25.5
528	17569869.55	4923958.64	2.00	1	DEN	500	76.0	13.9	0.0	0.0	0.0	59.3	0.5	-1.6	0.0	0.0	14.3	0.0	1.0	16.4
532	17569869.71	4923981.96	2.00	1	DEN	500	76.0	13.4	0.0	0.0	0.0	58.6	0.5	0.0	0.0	0.0	6.8	0.0	1.0	22.6
536	17569846.87	4923985.14	2.00	0	DEN	500	76.0	16.8	0.0	0.0	0.0	58.5	0.5	0.5	0.0	0.0	6.9	0.0	0.0	26.6
538	17569820.36	4923976.15	2.00	0	DEN	500	76.0	8.8	0.0	0.0	0.0	59.3	0.5	-0.4	0.0	0.0	16.3	0.0	0.0	9.1
541	17569846.56	4923985.03	2.00	1	DEN	500	76.0	16.9	0.0	0.0	0.0	59.0	0.5	0.4	0.0	0.0	6.6	0.0	1.0	25.4
544	17569820.05	4923976.04	2.00	1	DEN	500	76.0	8.4	0.0	0.0	0.0	59.8	0.5	-0.6	0.0	0.0	15.6	0.0	1.0	8.0
547	17569844.11	4923984.20	2.00	2	DEN	500	76.0	7.4	0.0	0.0	0.0	59.9	0.5	-0.0	0.0	0.0	6.4	0.0	2.0	14.6
549	17569835.47	4923981.27	2.00	2	DEN	500	76.0	11.1	0.0	0.0	0.0	59.8	0.5	-0.4	0.0	0.0	6.2	0.0	2.0	18.9
553	17569837.14	4923981.84	2.00	1	DEN	500	76.0	12.2	0.0	0.0	0.0	59.2	0.5	0.0	0.0	0.0	6.5	0.0	1.0	21.0
565	17569803.38	4923957.11	2.00	0	DEN	500	76.0	6.9	0.0	0.0	0.0	60.1	0.6	-1.5	0.0	0.0	8.4	0.0	0.0	15.4
567	17569829.06	4923945.43	2.00	0	DEN	500	76.0	17.1	0.0	0.0	0.0	59.9	0.5	-1.6	0.0	0.0	5.0	0.0	0.0	29.4
572	17569860.91	4923930.94	2.00	0	DEN	500	76.0	12.7	0.0	0.0	0.0	59.8	0.5	-1.8	0.0	0.0	11.6	0.0	0.0	18.6
574	17569802.42	4923957.54	2.00	1	DEN	500	76.0	4.5	0.0	0.0	0.0	60.6	0.6	-1.6	0.0	0.0	7.5	0.0	1.0	12.3
577	17569824.79	4923947.37	2.00	1	DEN	500	76.0	16.7	0.0	0.0	0.0	60.4	0.6	-1.7	0.0	0.0	4.9	0.0	1.0	27.5
580	17569852.93	4923934.57	2.00	1	DEN	500	76.0	11.9	0.0	0.0	0.0	60.2	0.6	-1.9	0.0	0.0	10.7	0.0	1.0	17.3
584	17569833.33	4923952.12	2.00	0	DEN	500	76.0	17.1	0.0	0.0	0.0	59.6	0.5	-1.6	0.0	0.0	5.1	0.0	0.0	29.4
587	17569858.42	4923940.76	2.00	0	DEN	500	76.0	6.2	0.0	0.0	0.0	59.5	0.5	-1.7	0.0	0.0	9.5	0.0	0.0	14.4
590	17569830.36	4923953.47	2.00	1	DEN	500	76.0	16.5	0.0	0.0	0.0	60.1	0.6	-1.6	0.0	0.0	5.0	0.0	1.0	27.4
592	17569855.45	4923942.10	2.00	1	DEN	500	76.0	10.3	0.0	0.0	0.0	60.0	0.5	-1.8	0.0	0.0	10.9	0.0	1.0	15.6
603	17569860.48	4923944.26	2.00	0	DEN	500	76.0	9.4	0.0	0.0	0.0	59.4	0.5	-1.7	0.0	0.0	9.9	0.0	0.0	17.3
605	17569861.19	4923964.38	2.00	0	DEN	500	76.0	15.0	0.0	0.0	0.0	58.8	0.5	-1.1	0.0	0.0	5.6	0.0	0.0	27.3
607	17569860.66	4923949.40	2.00	1	DEN	500	76.0	12.8	0.0	0.0	0.0	59.7	0.5	-1.6	0.0	0.0	12.0	0.0	1.0	17.2
611	17569861.37	4923969.52	2.00	1	DEN	500	76.0	13.3	0.0	0.0	0.0	59.1	0.5	-0.9	0.0	0.0	5.6	0.0	1.0	23.9
613	17569842.81	4923974.81	2.00	0	DEN	500	76.0	15.9	0.0	0.0	0.0	58.8	0.5	-0.4	0.0	0.0	6.1	0.0	0.0	27.0
614	17569842.81	4923974.81	2.00	1	DEN	500	76.0	15.9	0.0	0.0	0.0	59.4	0.5	-0.6	0.0	0.0	5.8	0.0	1.0	25.8
617	17569842.96	4923974.85	2.00	2	DEN	500	76.0	11.4	0.0	0.0	0.0	60.1	0.5	-0.8	0.0	0.0	5.6	0.0	2.0	20.0
619	17569844.15	4923975.19	2.00	1	DEN	500	76.0	12.5	0.0	0.0	0.0	59.6	0.5	-0.6	0.0	0.0	5.8	0.0	1.0	22.3
663	17569837.48	4923962.74	2.00	0	DEN	500	76.0	14.8	0.0	0.0	0.0	59.3	0.5	-1.2	0.0	0.0	5.4	0.0	0.0	26.9
664	17569837.48	4923962.74	2.00	1	DEN	500	76.0	14.8	0.0	0.0	0.0	59.8	0.5	-1.5	0.0	0.0	5.2	0.0	1.0	25.8
665	17569806.71	4923969.13	2.00	0	DEN	500	76.0	13.9	0.0	0.0	0.0	59.8	0.5	-1.0	0.0	0.0	13.7	0.0	0.0	16.9

DENSE WOOD REMOVED

PROJECTED SOUND LEVELS (DAYTIME + EVENING)

Line Source, ISO 9613, Name: "LOADER (45min/hr)", ID: "LOADER"																				
Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
666	17569806.71	4923969.13	2.00	1	DEN	500	76.0	13.9	0.0	0.0	0.0	60.3	0.6	-1.2	0.0	0.0	13.5	0.0	1.0	15.7
675	17569813.46	4923968.77	2.00	0	DEN	500	76.0	11.5	0.0	0.0	0.0	59.6	0.5	-1.0	0.0	0.0	12.2	0.0	0.0	16.1
676	17569814.05	4923969.87	2.00	1	DEN	500	76.0	10.6	0.0	0.0	0.0	60.1	0.6	-1.1	0.0	0.0	11.6	0.0	1.0	14.4
677	17569810.74	4923963.72	2.00	1	DEN	500	76.0	4.0	0.0	0.0	0.0	60.3	0.6	-1.5	0.0	0.0	5.1	0.0	1.0	14.4

DENSE WOOD REMOVED

PROJECTED SOUND LEVELS (NIGHTTIME)

Receiver
Name: R1 - 75th St
ID: R1
X: 17570162.95
Y: 4923923.12
Z: 1.50

Point Source, ISO 9613, Name: "Backup Beeper", ID: "BEEPER"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
9	17569837.70	4923943.23	0.50	0	DEN	500	99.2	0.0	0.0	0.0	0.0	61.3	0.6	2.3	1.5	0.0	3.7	0.0	0.0	29.8

Line Source, ISO 9613, Name: "Snow Plow Movements", ID: "PLOWS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
1	17569935.12	4923935.61	1.50	0	DEN	500	79.0	20.1	0.0	0.0	0.0	58.2	0.4	2.2	1.5	0.0	0.0	0.0	0.0	36.8
2	17570012.01	4923937.53	1.50	0	DEN	500	79.0	17.1	0.0	0.0	0.0	54.6	0.3	2.9	1.6	0.0	0.0	0.0	0.0	36.7
3	17570050.45	4923938.49	1.50	0	DEN	500	79.0	14.1	0.0	0.0	0.0	52.1	0.2	5.0	1.6	0.0	0.0	0.0	0.0	34.1
6	17570076.08	4923939.13	1.50	0	DEN	500	79.0	14.1	0.0	0.0	0.0	49.9	0.2	6.7	1.7	0.0	0.0	0.0	0.0	34.5
14	17569857.16	4923927.76	1.50	0	DEN	500	79.0	16.6	0.0	0.0	0.0	60.7	0.6	3.2	1.4	0.0	0.0	0.0	0.0	29.6
16	17569880.87	4923926.42	1.50	0	DEN	500	79.0	12.3	0.0	0.0	0.0	60.0	0.5	6.6	1.4	0.0	0.0	0.0	0.0	22.7

DENSE WOOD REMOVED

PROJECTED SOUND LEVELS (NIGHTTIME)

Receiver
Name: R3 - 75th St
ID: R3
X: 17570165.08
Y: 4923990.60
Z: 1.50

Point Source, ISO 9613, Name: "Backup Beeper", ID: "BEEPER"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
15	17569837.70	4923943.23	0.50	0	DEN	500	99.2	0.0	0.0	0.0	0.0	61.4	0.6	2.2	3.5	0.0	12.1	0.0	0.0	19.4

Line Source, ISO 9613, Name: "Snow Plow Movements", ID: "PLOWS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	l/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
5	17569892.47	4923934.54	1.50	0	DEN	500	79.0	12.4	0.0	0.0	0.0	59.9	0.5	1.9	3.5	0.0	5.4	0.0	0.0	20.1
8	17569948.04	4923935.93	1.50	0	DEN	500	79.0	19.7	0.0	0.0	0.0	58.0	0.4	2.2	3.5	0.0	0.0	0.0	0.0	34.5
11	17570018.47	4923937.69	1.50	0	DEN	500	79.0	16.7	0.0	0.0	0.0	54.9	0.3	2.9	3.6	0.0	0.0	0.0	0.0	34.0
13	17570065.42	4923938.86	1.50	0	DEN	500	79.0	16.7	0.0	0.0	0.0	52.0	0.2	6.8	3.7	0.0	0.0	0.0	0.0	32.9
17	17569848.54	4923931.61	1.50	0	DEN	500	79.0	14.2	0.0	0.0	0.0	61.2	0.6	1.7	3.5	0.0	8.7	0.0	0.0	17.6
18	17569869.27	4923922.36	1.50	0	DEN	500	79.0	12.8	0.0	0.0	0.0	60.6	0.6	3.0	3.5	0.0	0.0	0.0	0.0	24.0
20	17569880.22	4923924.68	1.50	0	DEN	500	79.0	11.2	0.0	0.0	0.0	60.3	0.6	3.6	3.5	0.0	0.0	0.0	0.0	22.2
22	17569883.20	4923932.58	1.50	0	DEN	500	79.0	5.7	0.0	0.0	0.0	60.2	0.6	1.9	3.5	0.0	5.0	0.0	0.0	13.6

DENSE WOOD REMOVED

PROJECTED SOUND LEVELS (NIGHTTIME)

Receiver
Name: R7 - J C Cycle
ID: R7
X: 17569991.71
Y: 4924171.71
Z: 4.50

Point Source, ISO 9613, Name: "Backup Beeper", ID: "BEEPER"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
62	17569837.70	4923943.23	0.50	0	DEN	500	99.2	0.0	0.0	0.0	0.0	59.8	0.5	-1.7	0.0	0.0	5.5	0.0	0.0	35.1
63	17569837.70	4923943.23	0.50	1	DEN	500	99.2	0.0	0.0	0.0	0.0	60.2	0.6	-2.2	0.0	0.0	5.3	0.0	1.0	34.3

Line Source, ISO 9613, Name: "Snow Plow Movements", ID: "PLOWS"

Nr.	X	Y	Z	Refl.	DEN	Freq.	Lw	I/a	Optime	K0	Dc	Adiv	Aatm	Agr	Afol	Ahous	Abar	Cmet	RL	Lr
	(m)	(m)	(m)			(Hz)	dB(A)	dB	dB	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	(dB)	dB(A)
58	17569905.11	4923934.86	1.50	0	DEN	500	79.0	16.3	0.0	0.0	0.0	59.0	0.5	-1.9	0.0	0.0	23.8	0.0	0.0	13.9
59	17569932.20	4923935.53	1.50	0	DEN	500	79.0	10.7	0.0	0.0	0.0	58.7	0.5	-1.9	0.0	0.0	3.5	0.0	0.0	28.8
60	17569975.75	4923936.62	1.50	0	DEN	500	79.0	18.8	0.0	0.0	0.0	58.4	0.5	-1.9	0.0	0.0	0.0	0.0	0.0	40.7
61	17570051.18	4923938.51	1.50	0	DEN	500	79.0	18.8	0.0	0.0	0.0	58.6	0.5	-1.9	0.0	0.0	0.0	0.0	0.0	40.6
64	17569843.28	4923933.95	1.50	0	DEN	500	79.0	11.8	0.0	0.0	0.0	60.0	0.5	-1.9	0.0	0.0	5.0	0.0	0.0	27.2
65	17569864.01	4923924.71	1.50	0	DEN	500	79.0	14.8	0.0	0.0	0.0	59.9	0.5	-2.1	0.0	0.0	12.7	0.0	0.0	22.8
66	17569839.84	4923935.49	1.50	1	DEN	500	79.0	8.8	0.0	0.0	0.0	60.4	0.6	-2.0	0.0	0.0	4.9	0.0	1.0	22.8
67	17569851.71	4923930.19	1.50	1	DEN	500	79.0	12.7	0.0	0.0	0.0	60.3	0.6	-2.0	0.0	0.0	11.2	0.0	1.0	20.6
68	17569880.87	4923926.42	1.50	0	DEN	500	79.0	12.3	0.0	0.0	0.0	59.6	0.5	-2.0	0.0	0.0	17.0	0.0	0.0	16.2

DENSE WOOD REMOVED

APPENDIX D: REFERENCES

1. Ministry of Environment and Energy's *STAMSON* Computer Programme (Version 5.03) for the IBM PC.

2. Ministry of the Environment, "Publication NPC-300, Environmental Noise Guideline – Stationary and Transportation Sources – Approval and Planning", August 2013.

3. Cadna/A Computer Aided Noise Abatement, Version 4.5.

4. Ministry of Transportation, "Environmental Guide for Noise – October 2006". Part of the Environmental Standards and Practices. Version 1.1 – Updated July 2008.

Scoped Environmental Impact Study

West End Water Storage Facility & Maintenance Depot Environmental Assessment (RFP # PW 2014-07),

Town of Wasaga Beach, Simcoe County

Prepared for:
Ainley Group

Prepared by:
Azimuth Environmental
Consulting, Inc.

January 2017

AEC 14-307

AZIMUTH ENVIRONMENTAL CONSULTING, INC.
Environmental Assessments & Approvals

January 18, 2017 AEC 14-307

Ainley Group
280 Pretty River Parkway
Collingwood, Ontario
L4Y 2J5

Attention: Tori Giangrande, MASc. EIT, Engineering Assistant

Re: Scoped Environmental Impact Study for the Proposed West End Water Storage Facility and Maintenance Depot Environmental Assessment (RFP # PW 2014-07), Town of Wasaga Beach, Simcoe County.

Dear Ms. Giangrande:

Azimuth Environmental Consulting Inc. (Azimuth) has completed a Scoped Environmental Impact Study (EIS) for the proposed development of the property located between Beachwood Road and Hwy 26, east of 75 Street S in the Town of Wasaga Beach, County of Simcoe. It is understood that the need for an EIS is required due to the presence of woodland and wetland within the property limits.

The future development will not affect Provincially Significant Wetlands (PSW), Areas of Natural and Scientific Interest (ANSI), Significant Woodlands, Valley Lands, Wildlife Habitat or Fish Habitat on or adjacent (i.e. within 120m) to the property, provided that the recommended mitigation measures are implemented. The mitigation measures described herein should be sufficient to protect potential SAR during construction and operation of the development. Wildlife in the area will continue to utilize the naturalized communities of the property specifically within the retained woodlot and wetland communities.

If you have any questions or concerns regarding this matter, please do not hesitate to contact me.

Yours truly,

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Melissa Fuller

Melissa Fuller, (H) B.Sc.
Terrestrial Ecologist

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1.0 INTRODUCTION

Azimuth Environmental Consulting Inc. (Azimuth) has completed a Scoped Environmental Impact Study (EIS) for the proposed West End Water Storage Facility and Maintenance Depot Environmental Assessment, on a property located at Lot 34, Concession 3, Town of Wasaga Beach (Town), County of Simcoe. A scoped EIS is required to satisfy all the requirements of the Schedule ‘C’ Municipal Class Environmental Assessment (EA).

The following document represents the findings of our field investigation and presents an assessment of the potential environmental impacts associated with the proposed development.

2.0 STUDY APPROACH

The following outlines the activities undertaken to satisfy the informational requirements of the Town of Wasaga Beach (Town), Nottawasaga Conservation Authority (NVCA) and the Ontario Ministry of Natural Resources and Forestry (MNRF) in the production of the EIS.

- Reviewed proposed location provided by Ainley Group's Project Team;
- Collected and reviewed all available existing background natural heritage information for the study area and adjacent lands;
- Consulted with NVCA and MNRF to determine an appropriate scope of work for the project, and to identify potential environmental concerns with the proposed site location and development;
- Prepared a Species at Risk screening based on desktop records of species occurrences known in the area, with consideration to site-specific knowledge of the habitats present within the property and through consultation with MNRF;
- Mapped existing natural features on current aerial photographs;
- Conducted vegetation mapping and vascular plant survey during field visits on October 11th, 2015, May 27th and August 26th, 2016;
- Designated vegetation communities using protocols of the Ecological Land Classification for Southern Ontario (Lee *et al*. 1998.);
- Conducted two dawn breeding bird surveys on June 3rd and June 16th, 2016, according to protocol established by the Ontario Breeding Bird Atlas (OBBA, 2001);
- Conducted three Whip-poor-will nocturnal surveys on May 19th, June 15th and June 16th, 2016, according to a modified MNRF methodology; and

- Completed a bat snag survey on May 9, 2016 according to methodology described by MNRF's Bat and Bat Habitat: Guidelines for Wind Power Projects (MNRF, 2011).

3.0 PLANNING CONTEXT

3.1 Provincial Policy Statement

The Provincial Policy Statement (PPS; MMAH, 2014) outlines policies related to natural heritage features (Section 2.1). The *Planning Act* requires that planning decisions shall be consistent with the PPS.

Section 2.1.1 requires that natural features and areas shall be protected for the long term.

Section 2.1.2 requires that the diversity and connectivity of the natural features in an area and the long-term ecological function and biodiversity of natural heritage systems, should be maintained, restored or, where possible, improved, recognizing linkages between and among natural heritage features and areas, surface water features and ground water features.

Section 2.1.3 indicates that natural heritage systems shall be identified in Ecoregions 6E & 7E, recognizing that natural heritage systems will vary in size and form in settlement area, rural areas, and prime agricultural areas.

Section 2.1.4 states that development and site alteration shall not be permitted in:

- Significant wetlands (in coastal areas or in Ecoregions 5E, 6E and 7E), and
- Significant coastal wetlands.

Section 2.1.5 states that, unless it has been demonstrated that there will be no negative impacts on the natural features or their ecological functions, development and site alteration shall not be permitted in:

- Significant woodlands (south and east of the Canadian Shield),
- Significant valley lands (south and east of the Canadian Shield),
- Significant wildlife habitat (see below),
- Significant Areas of Natural and Scientific Interest (ANSI), and
- Coastal wetlands not considered to be significant.

According to the Natural Heritage Reference Manual for Natural Heritage Policies of the PPS (MNR, 2010) Significant Wildlife Habitat includes:

- habitats of seasonal concentrations of animals;

- rare vegetation communities or specialized habitat for wildlife;
- habitat of species of conservation concern; and
- animal movement corridors.

Section 2.1.7 determines that development and site alteration shall not be permitted in habitat of endangered species and threatened species, except in accordance with provincial and federal requirements.

Section 2.1.8 indicates that no development and site alteration will be permitted on lands adjacent to the areas defined above unless the ecological function of the adjacent lands has been evaluated and it has been demonstrated there will be no negative impacts on the natural features and ecological functions.

3.2 County of Simcoe

The property is located within the Town of Wasaga Beach, which has been identified as a Settlement by the County of Simcoe, and is therefore subject to the policies of the Town. Simcoe County Woodlands have been identified within the property limits (Appendix A).

3.3 Town of Wasaga Beach

The property has been identified as Residential as per Schedule A1 (Land Use Plan) of the Town's Official Plan (Town’s OP; Appendix A).

According to Policy 5.2.1.1 (Town’s OP), the “Residential” designation area shall be for residential purposes. Uses that are compatible with and serve the basic residential use (generally termed public and institutional uses) may be also permitted in residential areas subject to the zoning by-law. Public and institutional uses shall include churches, community centres, day care centres, libraries, schools and senior citizens housing.

According to Schedule D (Natural Heritage System; Appendix A), the proposed development is 200m south of a Natural Heritage System Category 1 and 2 land (unevaluated wetland). According to the Natural Heritage Reference Manual (MNRF, 2010) lands up to 120m from significant wetlands and significant coastal wetlands are considered to be 'Adjacent Lands' to a PPS Natural Heritage Feature. Therefore, the proposed development is not within 'Adjacent Lands' of identified wetland habitat. Furthermore, according to Schedule G (Wellhead Protection Areas and Vulnerable Aquifer Areas), the property is not part of Area of High Aquifer Vulnerability.

The Town’s Zoning By-law 2003-60 zones the property as Service Commercial. According to Section 11 of this by-law, the permitted uses in these areas include residential and non-residential uses, including but not restricted to service industrial use, warehouse and public use.

3.4 Endangered Species Act

Ontario’s *Endangered Species Act, 2007* (ESA) provides regulatory protection to endangered and threatened species prohibiting harassment, harm and/or killing of individuals and destruction of their habitats. Habitat is broadly characterized within the ESA as the area prescribed by a regulation as the habitat of the species, or, an area on which the species depends, directly or indirectly, to carry on its life processes including reproduction, rearing of young, hibernation, migration or feeding.

The various schedules of the ESA identify SAR in Ontario. These include species listed as extirpated, endangered, threatened and special concern. As noted above, only species listed as endangered and threatened receive protection from harm and destruction to habitat on which they depend.

3.5 Nottawasaga Valley Conservation Authority

The northern portion of the property is regulated according to Regulation 172/06 by the Conservation Authority (Appendix A). This area is regulated due to the presence of an unevaluated wetland. The development will occur entirely off NVCA-regulated area and thus NVCA authorization will not be required.

4.0 EXISTING CONDITIONS

The following description of existing conditions was compiled based on background data available for the area and adjacent land included in the Study Area (Figure 1) through the County of Simcoe’s on-line GIS mapping, communication from the NVCA and site specific flora and fauna surveys as described below.

4.1 Land Use

4.1.1 Subject Property

The property consists of approximately 10.4ha of undeveloped land, mostly upland Mixed Forests; it also contains, Deciduous Swamp and a Cultural Meadow. The area is subject to anthropogenic impact, with ATV trails present throughout the centre of the property and piles of fill and anthropogenic refuse present within the cultural meadow.

4.1.2 Adjacent Lands

Lands within the study area are mostly undeveloped, established with secondary forest cover. The property is bound by Beachwood Road to the north and Highway 26 to the south. To the west, the property is bound by undeveloped lands with forest cover. To the east, the site is bound by single family residential dwellings.

4.2 Vegetation

Vegetation community mapping and vascular plant survey were completed during site visits conducted on October 11, 2015, May 27th and August 26th, 2016. The Ecological Land Classification for Southern Ontario [ELC; (Lee *et al*., 1998)] was used as a general guide to the classification of the vegetation community types. Based on these site investigations, three vegetation communities were identified on site. These communities are generally described below and are depicted on Figure 2.

The majority of the subject property is vegetated by a combination of a Fresh-Moist White Cedar-Hardwood Mixed Forest Type (FOM7-2) and a Green Ash Deciduous Swamp (SWDM2-2).

The mixed forest is composed largely of Eastern White Cedar and Trembling Aspen with Paper Birch, White Spruce, Balsam Fir, Balsam Poplar, White Ash and Red Maple (Figure 2). The shrub and groundcover layers include species such as Red Osier Dogwood, Nannyberry, Poison Ivy, asters and rushes. A small white cedar stand is present within the mixed forest community. The understory is sparse in this area with occurrences of Red-osier Dogwood and Common Buckthorn, goldenrods, Poison Ivy and Dandelion.

The deciduous swamp community is composed of Green Ash and White Ash with occurrences of Narrow-leaf Willow herb, Coltsfoot, Willows and Rushes. A full species list for the community can be found in Table 1.

A small pocket of Cultural Meadow (CUM-1) is present within the central portion of the property (Figure 2). This community is predominantly dominated by forbs, such as Goldenrods, Asters, Queen Anne’s Lace; Red Oak and Sugar Maple were present along the edges of this community. A full species list for the community can be found in Table 1.

No plant species of federal or provincial rarity were documented as part of the field investigations. There were no Butternuts on site.

4.2.1 Feature Assessment - Wetlands

There is one MNRF identified unevaluated wetland documented within the subject property (Appendix A, Figure 2) and confirmed during the 2015 site visit (SWDM2-2). The proposed development will be located approximately 50m south of the wetland.

4.2.2 Feature Assessment – Woodlands

Town of Wasaga Beach

The subject property is not contained within mapped Significant Woodland according to Schedule D (Natural Heritage System) of the Town's OP. However, the Town states within their OP that woodlands greater than 2 hectares in size outside of the core areas of the natural heritage system shall be assessed for significance based on the following criteria: size, shape, habitat and habitat potential, diversity (species composition), slope, soils, social and recreational value, surface water and groundwater functions, and linkage (Policy 13.4.10.8 (f) (iv) of the Town's OP).

Table 2 presents a description of the woodland feature in relation to the significance criteria abovementioned. The woodland is considered to be significant according to the Town. The Town permits development in woodlands outside of core areas provided that environmental studies can demonstrate that there will be no impact to the feature or its function.

Provincial Policy Statement

Direction for establishment of woodland significance according to the PPS is also provided within the Natural Heritage Reference Manual for Natural Heritage Policies of the *Provincial Policy Statement*, 2005 (OMNR 2010). Table 3 presents a description of the woodland feature in relation to the significant criteria outlined by the PPS (MNRF, 2010). The woodland is not considered to be significant under the directive of the PPS.

4.3 Wildlife Habitat

4.3.1 Mammals

Wildlife species utilizing the property were identified from direct observation and through interpretation of sign (i.e. tracks, scats, vocalizations, etc.) while conducting the field surveys. White-tailed Deer (*Odocoileus virginianus*), Raccoon (*Procyon lotor*), Coyote (*Canis latrans*) and Red Squirrel (*Sciurus vulgaris*) were observed to be utilizing the property. These species are not of conservation concern.

Given the property location in proximity to both forested sites and well-travelled roads, it expected that the following species could be utilizing the property: Grey Squirrel (*Sciurus* *carolinensis*), Eastern Chipmunk (*Tamias striatus*), Eastern Cottontail (*Sylvilagus floridanus*), Striped Skunk (*Mephitis mephitis*), and several species of mice, voles and shrews. These species are not of conservation concern. Species of bats could potentially utilize the site as well, and is further discussed in the Species-at-Risk section.

4.3.2 Reptiles and Amphibians (Herpetofauna)

No specific amphibian breeding surveys have been conducted on the property though individuals were incidentally recorded during the May 2016 Whip-poor-will Survey. Spring Peeper, American Toad and Leopard Frog were noted immediately north of the property.

The Ontario Nature's Ontario Reptile and Amphibian Atlas (ORAA; Ontario Nature, 2015) was consulted to identify species that could be utilizing the area. Data for the atlas is presented in $100km^2$ squares, each with a unique identifier. The property is located within the 17NK62 and 17NK72 squares. Two species of turtles, four species of snakes and 10 species of amphibians have been recently (< 20 years ago) recorded in the general area.

Herpetofauna Species at Risk (SAR) identified by ORAA and MNRF as potentially occurring in the area are addressed below.

4.3.3 Birds

Two dawn breeding bird surveys were conducted on June 3 and June 16, 2016 and were based on a combined point count (5 minute duration) and roving survey methodology described within the Ontario Breeding Bird Atlas Guide for Participants (OBBA, 2001). Point counts were undertaken at set locations within the subject property (Figure 2) and all birds were identified through visual confirmation or bird calls at each point count survey station.

In addition to this, three Whip-poor-will nocturnal surveys were conducted on site, on May 19, June 15 and June 16, 2016. A modified version of Bird Studies Canada survey protocol for Eastern Whip-poor-will was used for the purpose of this assessment. The survey protocol typically requires the surveyor to attend the property on a single night. This was modified to three nights over two months to ensure compatibility with MNRF protocols currently in development. Surveys in 2016 were focused to a period within 5 days of the full moons. Surveys began 30 minutes after sunset and the observer was required to survey each location for a total of 10 minutes. This is based on experience carrying out surveys since 2009 and undocumented discussions with various MNRF District SAR/Management Biologists. As noted within the protocol, surveys are ideally undertaken on calm clear nights with:

- At least 50% of the visible moon surface illuminated;
- Little or no cloud cover;
- Calm to light winds;
- No precipitation; and,
- Temperatures above 10°C.

A total of 32 species of birds were identified on site, from which 4 are considered area-sensitive species, and one is a designated Special Concern species under ESA, 2007 (see Section 4.5). No Endangered or Threatened individuals were observed during the surveys.

A full species list can be found in Table 4.

Ontario Breeding Bird Atlas (OBBA; BSC, 2009) was also consulted to identify sensitive avian species that could be utilizing the area for breeding purposes. A full species list for the 100km^2 data squares (17NK62 and 17NK72 squares) that encompasses the property is appended (Appendix B). Thirteen Species at Risk (SAR) were identified as occurring within these squares. These species are addressed below.

4.4 Significant Wildlife Habitat

Candidate SWH was identified, where applicable, as outlined within the SWH Technical Guideline Ecoregion 6E Criterion Schedule (MNRF, 2015). The SWH habitat assessment is presented in Table 5. In summary, the following candidate SWH may occur within and adjacent to the property:

- Seasonal Concentration of Animals;
    - Deer Yarding Area
- Specialized Habitats of Wildlife considered SWH;
    - Amphibian Breeding Habitat (Woodland)
- Habitats for Species of Conservation Concern considered SWH;
    - Special Concern & Rare Wildlife Species

4.5 Species at Risk

The OBBA identifies Common Nighthawk, Whip-poor-will, Chimney Swift, Red-Headed Woodpecker, Olive-sided Flycatcher, Eastern Wood-Pewee, Barn Swallow, Bank Swallow, Wood Thrush, Golden-winged Warbler, Canada Warbler, Bobolink, and

Eastern Meadowlark as occurring in the area (Appendix B). Table 6 presents a habitat assessment for these species.

MNRF's Natural Heritage Information Center (NHIC) Database (MNRF, 2014) was consulted to determine if there are historic Species at Risk records within the vicinity of the subject properties. The query indicated that Northern Map Turtle (Special Concern) has been recorded in the general area.

Azimuth contacted the Midhurst MNRF Office on November 24th, 2014, requesting additional SAR information for the area (Appendix C). MNRF has responded mentioning a record for Northern Long-eared Bat (Endangered) in the area. Given the similar habitat utilized by other species of bats, two other Endangered species of bats (Tri-colored Bat and Little Brown bat) has also been considered as possibly occurring in the area.

A Bat Snag Density Survey was conducted on site on May 9, 2016 to determine if the property provided high quality maternity roosting habitat for the identified individuals. According to MNRF's Maternity Roost Surveys Guideline (MNRF, 2011) , a minimum of 10 plots should be surveyed for sites ≤10 hectares. A total of 10 plots were surveyed in a study area of approximately 4.5ha (area proposed to be developed). The Guideline states that "if the snag density is calculated to be ≥10 snags/hectare, then this ELC polygon should be considered high quality potential maternity roost habitat". The results of the survey indicate that the snag density of the vegetation communities within the property is <10snags/hectare. Therefore, the area surveyed should not be considered a high quality potential maternity roost habitat.

In communication with NVCA (Appendix C), Azimuth learned that there are records for Western Chorus Frog and Whip-poor-will for the greater area. The NVCA also mentioned the possible habitat for Eastern Wood-pewee and Wood Thrush within the forest blocks. Of these species, only Wood Thrush was recorded on site during surveys.

In addition to this, the impact to Eastern Hog-nose Snake and Butternut are considered within the report.

Table 6 presents a habitat assessment for all abovementioned SAR, as it relates to the property.

4.5.1 Species at Risk Summary

A habitat assessment of the property (Table 6) has shown that the following species have potential habitat present within the property limits:

- Eastern Hog-nose Snake;
- Eastern Wood-Pewee;
- Red-headed Woodpecker;
- Northern Myotis, Little Brown Myotis and Tri-Coloured Bat; and
- Wood Thrush.

5.0 NATURAL FEATURE IDENTIFICATION

The following natural features have either been confirmed or have potential to be associated with the property, based on an assessment of the existing conditions of the property:

Confirmed

- Woodland
- Unevaluated Wetland
- Candidate Significant Wildlife Habitat (Special Concern & Rare Wildlife Species Habitat –Wood Thrush)

Potential

- Candidate Significant Wildlife Habitat (Deer Yarding Area, Amphibian Breeding Habitat - Woodland; and Special Concern & Rare Wildlife Species Habitat – Eastern Wood-pewee, and Red-headed Woodpecker)
- Habitat of Endangered or Threatened Species (Bat Maternity Colony - Endangered Bats, Eastern Hog-nosed Snake)

6.0 PROPOSED DEVELOPMENT

The proposed development consists of a Storage Facility and Maintenance Depot, which includes a stormwater pond, water elevated storage tank site, communication tower, material storage site, fuel station, sand building, office, and parking lot. The proposed development is to be fully served with municipal water and sewage.

7.0 NATURAL HERITAGE FEATURE ASSESSMENT

7.1 Woodland

The proposed water storage facility will result in the removal of approximately 5.8ha of woodland designated for Residential land use in the OP. The woodlot is a candidate Significant Woodland in the context of the Town of Wasaga Beach Official Plan, according to size criteria: woodlands 20ha in size or larger. After removal of 5.8ha, the woodland will still fulfil the requirements to be a candidate Significant Woodland (approximately 20.2ha will be retained).

Table 2 presents the impact of the proposed conceptual development based on the criteria set out in the Town's Official Plan. In summary, the woodland, though reduced in size, will continue to maintain the ecological functions that are associated with the feature.

Table 3 presents a description of the woodland feature in relation to the significant criteria outlined by the PPS (MNRF, 2010). In summary, the woodlot is not considered Significant according to any criteria in the context of the PPS.

Previous studies conducted by Azimuth in the west end of Wasaga Beach (Azimuth, 2010) determined that forest patch cover accounts for approximately 9% of the west end study area. When considered in terms of representation and amount, none of the forest patches of the west end study area are candidates for identification as significant within the planning area, since forest cover within the municipality is relatively abundant and protected as public land or as part of the Town's NHS. Further, none of the forest patches identified within the west end have unique or uncommon features compelling their identification as provincially significant (Azimuth, 2010).

Therefore, the proposed development can occur and maintain the current ecological functions of the feature with the protected lands, provided that the suggested mitigations are implemented.

7.2 Non-Significant Wetland

The wetland habitat located on the northern portion of the property will remain post-development. However, the proposed stormwater pond will be located less than 50m of this wetland. Provided that water balance in the wetland is maintained, and that mitigation measures are adhered to, it is possible for the development to occur with no impact to the wetland feature and its functions. This wetland will continue to provide habitat for local flora and fauna, will continue to provide opportunity for water retention and filtration, and will provide aesthetic value to the area.

7.3 Significant Wildlife Habitat (SWH)

According to the Significant Wildlife Habitat Technical Guide (MNRF, 2000) a property can be considered candidate Significant Wildlife Habitat based on the presence of:

- seasonal concentration areas of animals;

- rare vegetation communities;
- specialized habitat for wildlife;
- habitat for species of Conservation Concern;
- animal movement corridors.

Table 5 presents a detailed evaluation of each one of these criteria for the property. Based on this evaluation, the woodlot (considering the natural feature irrespective of ownership) could possibly function as the following SWH:

- Seasonal Concentration of Animals;
  - Deer Yarding Area
- Specialized Habitats of Wildlife considered SWH;
  - Amphibian Breeding Habitat (Woodland)
- Habitats for Species of Conservation Concern considered SWH;
  - Special Concern & Rare Wildlife Species.

7.3.1 Seasonal Concentration Areas of Animals: Deer Yarding Area

According to the Midhurst District Deer Yard Survey (Allan et al. 2005), the property is mapped as a Deer Yard Stratum I. "Deer yards consist of a core area of primarily coniferous trees (cedar, hemlock, pines) that offer the deer herd shelter, ease of movement, and protection from predators […] during severe winters with heavy snow loads, deer are confined in these core areas for extended periods of time." (Allan et al. 2005).

This area was mapped as Deer Yard in 2005. Since then, the Highway 26 was built crossing through the Deer Yard area, isolating the natural feature, which is now bound by Highway 26, Beachwood Road and residential areas. It is very unlikely that this natural feature still functions as a Deer Yard, given that there are no longer corridors that could lead deer to migrate to/from this area. Therefore, it is unlikely that the development will impact a functioning deer yard, and therefore Significant Wildlife Habitat.

7.3.2 Specialized Habitat for Wildlife: Amphibian Breeding Habitat

The variation in wetland and non-wetland forest cover indicates variable ground water levels which may promote the formation of vernal pools in early spring. No evidence of vernal pool presence was noted within the mixed forest community. The deciduous swamp wetland unit would likely provide suitable breeding habitat for amphibian species; this habitat will be retained post-development. The proposed development is 50m north of the wetland, therefore, direct impact to the wetland will be avoided during construction and operation of the development. Indirect impact to the feature can be avoided, provided that the groundwater table and surface flow to the feature is maintained at pre-development conditions.

7.3.3 Special Concern & Rare Wildlife Species Habitat

Eastern Wood-pewee

The Eastern Wood-pewee lives in the mid-canopy layer of forest clearings and edges of deciduous and mixed forests. It is most abundant in intermediate-age mature forest stands with little understory vegetation (MNRF 2014b). This habitat type is not rare within the municipality of Wasaga Beach. Therefore, the woodland habitat to be removed is not considered to be significant for long term maintenance of the species, and is therefore not considered to be Significant Wildlife Habitat. Indirect impact to the species as a result of vegetation removal can be mitigated through the implementation of appropriate timing windows for vegetation removal, as described within the Mitigation section below.

Red-headed Woodpecker

The Red-headed Woodpecker lives in open woodland and woodland edges, and is often found in parks, golf courses and cemeteries. These areas typically have many dead trees, which the bird uses for nesting and perching (MNRF, 2015b). Few standing snags were observed on site and the woodland does not likely represent significant habitat for continuation of the species in the area. Therefore, removal of the existing woodland habitat will not negatively impact the local species population. Indirect impact to the species that may occur as a result of vegetation removal can be mitigated through the implementation of appropriate timing windows for vegetation removal, as described within the Mitigation section below.

Wood Thrush

The Wood Thrush lives in mature deciduous and mixed forests. It is most abundant in moist stands of trees with well-developed undergrowth and tall trees for singing perches (MNRF, 2015c). This habitat type is not rare within the municipality of Wasaga Beach. Therefore, the woodland habitat to be removed is not considered to be significant for long term maintenance of the species, and is not considered to be Significant Wildlife Habitat. Indirect impact to the species as a result of vegetation removal can be mitigated through the implementation of appropriate timing windows for vegetation removal, as described within the Mitigation section below.

7.4 Species at Risk (SAR)

7.4.1 SAR Bats (Endangered)

Little Brown Bat, Tricoloured, Bat and Northern Long-eared Bat are designated Endangered species under the ESA and could potentially be present on site. Ontario's ESA affords these species individual and habitat protection as Endangered species.

Snag density survey conducted on site indicates the site does not meet the MNRF density threshold (10 snags/ha), therefore, the habitat is not considered to be high quality for potential maternity roosting. However, Endangered Bats could still use the location for roosting. The breeding season for bats coincides with the breeding seasons for birds, therefore, if vegetation removal activities occur in accordance with the timing window for migratory breeding birds (no clearing between early April to late August), bats will not be killed, harmed or harassed during vegetation removal, in accordance with Section 9 of the ESA.

7.4.2 Eastern Hog-nose Snake (Endangered)

Eastern Hog-nosed Snakes are known to occur within Wasaga Beach and the Wasaga Beach Provincial Park (WBPP) provides core habitat for this species (Featherstone *et. al,* 2005). The Eastern Hog-nosed Snake specializes in hunting and eating toads, and usually only occurs where toads can be found. Eastern Hog-nosed Snakes prefer sandy, well-drained habitats such as beaches and dry forests where they can lay their eggs and hibernate. The site lacks sandy south facing slopes, which are preferred as egg laying sites. The forest unit is a relatively isolated unit that is bound by roads and residential development. Although potential suitable habitat may exist within this forested area, it likely is not capable of supporting a viable population for the long term. Furthermore, site records and telemetry studies indicate that the snakes are utilizing areas within the vicinity of WBPP and this forested unit has not been identified as Significant Habitat for the species according to Featherstone *et al*. (2005).

7.4.3 Non-detected Species of Concern

It should be noted that the absence of a protected species within the Study Area does not indicate that they will never occur within the area. Given the dynamic character of the natural environment, there is a constant variation in habitat use. Care should be taken in the interpretation of presence of species of concern including those listed under the ESA and SARA. Changes to policy, or the natural environment, could result in shifts, removal, or addition of new areas to the list of areas currently considered being Key Natural Heritage features. This report is intended as a point in time assessment of the potential to impact SAR; not to provide long term 'clearance' for Species at Risk. While there is no expectation that the assessment should change significantly, it is the responsibility of the proponent to ensure that they are not in contravention of the ESA at the time that site works are undertaken. A review of the assessment provided in this report by a qualified person should be sufficient to provide appropriate advice at the time of the onset of future site works.

8.0 RECOMMENDATIONS

The following recommendations are provided as mitigation for the potential for negative environmental impacts arising during and following the proposed development.

8.1 Timing Restrictions

Construction activities involving removal of vegetation should be restricted from occurring during the breeding season. Migratory birds, nests, and eggs are protected by the *Migratory Birds Convention Act*, and the *Fish and Wildlife Conservation Act*. Environment Canada outlines dates when activities in any region have potential to impact nests at the Environment Canada Website (http://www.ec.gc.ca/paom-itmb/default.asp?lang=En&n=4F39A78F-1#_03).

In Zones C2 and C3 vegetation clearing should be avoided between April 1st through August 31st of any given year. If vegetation clearing is required between these dates, screening by an ecologist with knowledge of bird species present in the area should be undertaken to ensure that the vegetation has been confirmed to be free of nests prior to clearing.

8.2 Species at Risk

Vegetation clearing of the property should proceed in accordance with the timing window outlined above for migratory breeding birds. This will ensure that the Endangered Bats are not killed, harmed or harassed during those activities in accordance with Section 9 of the ESA.

8.2.1 Non-detected Species of Concern

It should be noted that the absence of a protected species within the study area does not indicate that they will never occur within the area. Given the dynamic character of the natural environment, there is a constant variation in habitat use. Care should be taken in the interpretation of presence of species of concern including those listed under the ESA and the SARA. Changes to policy, or the natural environment, could result in shifts, removal, or addition of new areas to the list of areas currently considered being Key Natural Heritage features. This report is intended as a point in time assessment of the potential to impact SAR; not to provide long term 'clearance' for SAR. While there is no expectation that the assessment should change significantly, it is the responsibility of the proponent to ensure that they are not in contravention of the ESA at the time that works are undertaken. A review of the assessment provided in this report by a qualified person should be sufficient to provide appropriate advice at the time of the onset of future work.

8.2.2 Site Workers Training

All on-site construction workers should be informed of SAR that could potentially be in the area (i.e. Little Brown Bat and Northern Long-eared Bat; Eastern Hog-nose Snake; Eastern Wood-pewee; Red-headed Woodpecker; Wood Thrush). This information would be best conveyed during a pre-construction meeting on-site by someone knowledgeable of the SAR issues. Workers should be instructed to stop work immediately, allow the species to move away from the work area and contact the local MNRF office to report any SAR encountered. Individuals working on site should ensure that SAR are not harmed during construction or killed by heavy machinery, vehicles or other equipment. The local MNRF office for this project is the Midhurst District Office (705-725-7500).

8.3 Isolation of Work Area

8.3.1 Sediment and Erosion Controls

Sediment and erosion controls should be installed along the limit of the development footprint to alleviate the risk of sediment migration or erosion into adjacent natural features, particularly the wetland situated north of the proposed development area. All disturbed areas should be stabilized with vegetation prior to removal of the sediment fence.

8.3.2 Tree Protection

Tree protection measures should be implemented prior to site alteration and adjacent to the retained forested area to protect tree resources outside of the development footprint. All proposed tree removals should be overseen by a certified arborist.

8.4 Site Restoration

The perimeter of the development should be fenced and densely planted with native trees and shrubs to prevent future encroachment into the feature and to alleviate indirect impact of the proposed development. Additionally, Azimuth recommends that all undeveloped disturbed areas should be revegetated with native trees and shrubs combined with a native seed mix.

8.5 Other Considerations

The development should incorporate directional lighting to reduce light pollution within the retained woodland feature.

Efforts to remove invasive species within the retained woodlot and prevention of invasive species establishment should be a consideration throughout construction and operation of the proposed development.

9.0 CONCLUSIONS

The future development will <u>not</u> affect Provincially Significant Wetlands (PSW), Areas of Natural and Scientific Interest (ANSI), Significant Woodlands, Valley Lands, Wildlife Habitat or Fish Habitat on or adjacent (i.e. within 120m) to the property, provided that the recommended mitigation measures are implemented. The mitigation measures described herein should be sufficient to protect potential SAR during construction and operation of the development. Wildlife in the area will continue to utilize the naturalized communities of the property specifically within the retained woodlot and wetland communities.

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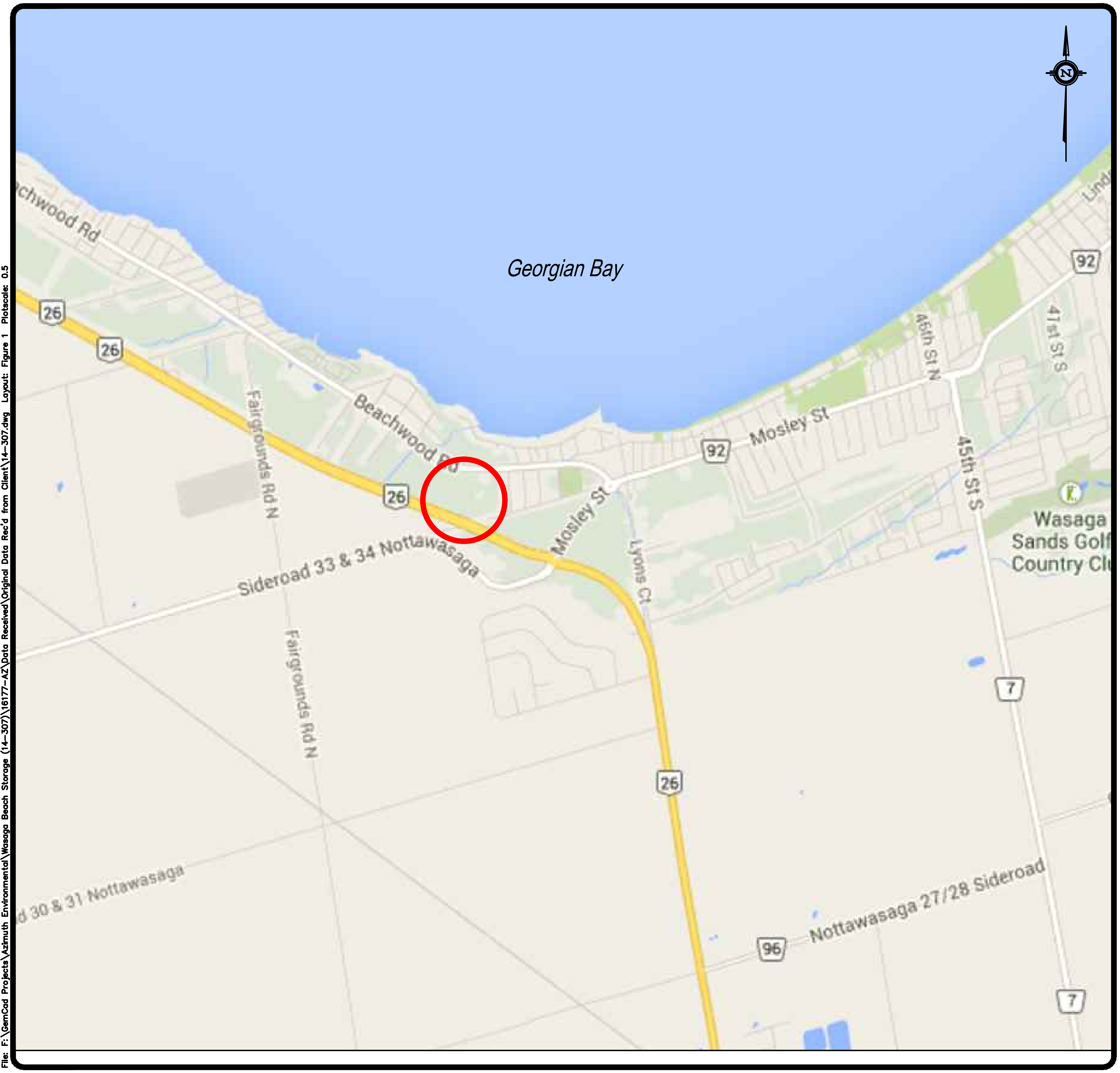

LEGEND:

🟥 *Approx. Study Area*

600m 0 1200m

HORIZONTAL SCALE 1: 40,000

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Study Area Location

Wasaga West End Water Storage
Wasaga Beach, ON

DATE ISSUED:	*November 2016*	Figure No.
CREATED BY:	*JLM/ Gemcad Inc.*	1
PROJECT NO.:	*14-307*	
REFERENCE:	*Google Maps*	

Plotted by: ANNE on November 21, 2016 at 10:33am
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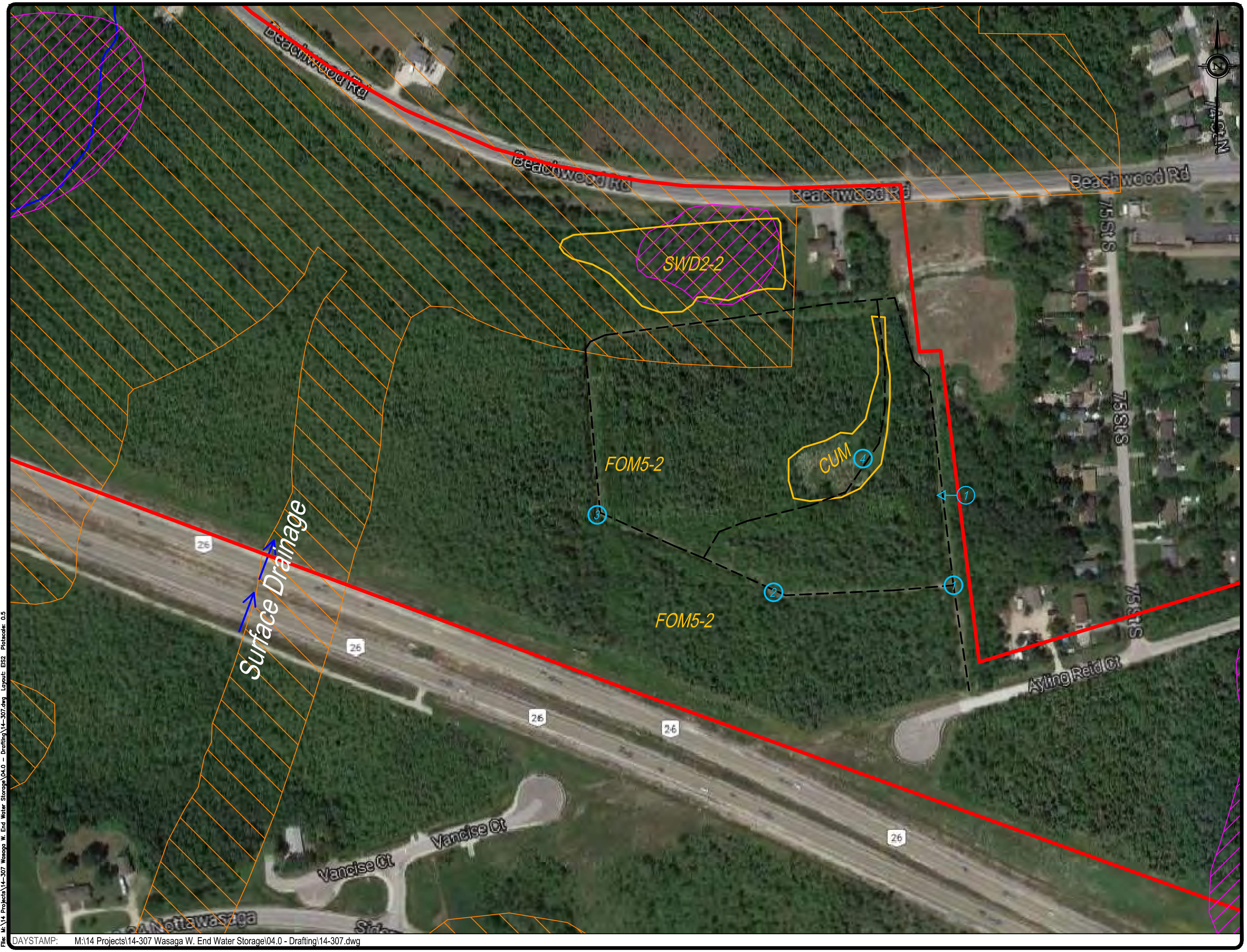


LEGEND:

🟥	Study Area
▨	NVCA Regulated Area
▨	Unevaluated Wetland
—	Watercourse
- -	ATV Trail
⓪	Bird Point Count Station
◁-⓪	Whip-poor-will Station
—	Vegetation Communities
CUM	Cultural Meadow
FOM5-2	Dry-Fresh Poplar Mixed Forest Type
SWD2-2	Green Ash Deciduous Swamp Type

25m 0 75m

HORIZONTAL SCALE 1:2,500

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Environmental Features

Wasaga West End Water Storage
Wasaga Beach, ON

DATE ISSUED:	November 2016	Figure No.
CREATED BY:	JLM	2
PROJECT NO.:	14-307	
REFERENCE:	First Base Solutions	

DAYSTAMP: M:\14 Projects\14-307 Wasaga W. End Water Storage\04.0 - Drafting\14-307.dwg

Plotted by: JMCCARTNEY on November 25, 2016 at 11:19am Layout: EIS2 Plotscale: 0.5
File: M:\14 Projects\14-307 Wasaga W. End Water Storage\04.0 - Drafting\14-307.dwg

LEGEND:

— Study Area
— Watercourse
- - ATV Trail
— Vegetation Communities

CUM	Cultural Meadow
FOM5-2	Dry-Fresh Poplar Mixed Forest Type
SWD2-2	Green Ash Deciduous Swamp Type

25m 0 75m

HORIZONTAL SCALE 1:2,500

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Proposed Development Plan

Wasaga West End Water Storage
Wasaga Beach, ON

DATE ISSUED:	November 2016	Figure No.
CREATED BY:	JLM / Gemcad Inc.	3
PROJECT NO.:	14-307	
REFERENCE:	First Base Solutions	

Plotted by: ANNE on November 22, 2016 at 9:48am
File: F:\GemCad Projects\Azimuth Environmental\Wasaga Beach Storage (14-307)\16177-AZ\Data Received\Original Data Rec'd from Client\14-307.dwg Layout: EIS3 Plotscale: 0.5

Table 1. Vascular Plant List, Wasaga West End Water Storage, Wasaga Beach, ON.

			Vegetation Communities[1]			Conservation Status[2]		
Family	**Scientific Name**	**Common Name**	**FOM5-2**	**SWD2-2**	**CUM**	**G-Rank**	**S-Rank**	**SARO**
Aceraceae	*Acer rubrum*	Red Maple	X			G5	S5	
Aceraceae	*Acer saccharum*	Sugar Maple	X	X		G5	S5	
Anacardiaceae	*Toxicodendron radicans*	Climbing Poison Ivy	X	X	X	G5	S5	
Apiaceae	*Daucus carota*	Wild Carrot	X		X	GNR	SE5	
Apocynaceae	*Apocynum androsaemifolium*	Spreading Dogbane	X		X	G5	S5	
Apocynaceae	*Vinca minor*	Periwinkle			X	GNR	SE5	
Araliaceae	*Aralia nudicaulis*	Wild Sarsaparilla	X	X		G5	S5	
Asteraceae	*Achillea millefolium*	Common Yarrow	X	X	X	G5	SE	
Asteraceae	*Ambrosia artemisiifolia*	Annual Ragweed			X	G5	S5	
Asteraceae	*Erigeron canadensis*	Canada Horseweed	X			G5	S5	
Asteraceae	*Eurybia macrophylla*	Large-leaved Aster		X		G5	S5	
Asteraceae	*Euthamia graminifolia*	Grass-leaved Goldenrod	X		X	G5	S5	
Asteraceae	*Lactuca biennis*	Tall Blue Lettuce	X			G5	S5	
Asteraceae	*Leucanthemum vulgare*	Oxeye Daisy	X			GNR	SE5	
Asteraceae	*Nabalus altissimus*	Tall Rattlesnake-root		X	X	G5?	S5	
Asteraceae	*Pilosella aurantiaca*	Orange Hawkweed	X			GNR	SE5	
Asteraceae	*Solidago altissima*	Eastern Late Goldenrod	X		X	GNR	S5	
Asteraceae	*Solidago caesia*	Blue-stemmed Goldenrod		X		G5	S5	
Asteraceae	*Solidago canadensis*	Canada Goldenrod		X	X	G5T5	S5	
Asteraceae	*Solidago gigantea*	Smooth Goldenrod	X			G5	S5	
Asteraceae	*Symphyotrichum boreale*	Rush Aster	X			G5	S5	
Asteraceae	*Symphyotrichum cordifolium*	Heart-leaved Aster	X	X		G5	S5	
Asteraceae	*Symphyotrichum ericoides*	White Heath Aster	X			G5T5	S5	
Asteraceae	*Symphyotrichum lanceolatum*	Panicled Aster	X			G5T5	S5	
Asteraceae	*Symphyotrichum lateriflorum*	Starved Aster		X		G5	S5	
Asteraceae	*Symphyotrichum novae-angliae*	New England Aster	X		X	G5	S5	
Asteraceae	*Symphyotrichum puniceum*	Swamp Aster	X	X	X	G5	S5	
Asteraceae	*Taraxacum officinale*	Common Dandelion	X		X	G5	SE5	
Asteraceae	*Tussilago farfara*	Colt's-foot	X	X		GNR	SE5	
Berberidaceae	*Podophyllum peltatum*	May-apple	X			G5	S5	
Betulaceae	*Betula papyrifera*	Paper Birch	X	X		G5	S5	
Brassicaceae	*Alliaria petiolata*	Garlic Mustard		X		GNR	SE5	
Caprifoliaceae	*Lonicera canadensis*	Canada Fly Honeysuckle	X			G5	S5	
Caprifoliaceae	*Viburnum lentago*	Nannyberry	X			G5	S5	
Celastraceae	*Celastrus orbiculatus*	Oriental Bittersweet	X			GNR	SE2	
Clusiaceae	*Hypericum perforatum*	Common St. John's-wort	X		X	GNR	SE5	
Cornaceae	*Cornus drummondii*	Rough-leaved Dogwood	X			G5	S4	
Cornaceae	*Cornus stolonifera*	Red-osier Dogwood	X	X	X	G5	S5	
Cupressaceae	*Thuja occidentalis*	Eastern White Cedar	X	X	X	G5	S5	
Cyperaceae	*Carex eburnea*	Ebony Sedge			X	G5	S5	
Cyperaceae	*Carex limosa*	Mud Sedge			X	G5	S5	
Dennstaedtiaceae	*Pteridium aquilinum*	Bracken Fern	X		X	G5	S5	
Elaeagnaceae	*Shepherdia canadensis*	Canada Buffalo-berry	X		X	G5	S5	
Equisetaceae	*Equisitum sp.*	Horsetail	X					

Table 1. Vascular Plant List, Wasaga West End Water Storage, Wasaga Beach, ON.

			Vegetation Communities[1]			Conservation Status[2]		
Family	**Scientific Name**	**Common Name**	**FOM5-2**	**SWD2-2**	**CUM**	**G-Rank**	**S-Rank**	**SARO**
Equisetaceae	*Equisetum arvense*	Field Horsetail	X			G5	S5	
Equisetaceae	*Equisetum pratense*	Meadow Horsetail	X		X	G5	S5	
Fabaceae	*Desmodium paniculatum*	Narrow-leaved Tick-trefoil		X		G5	S4	
Fabaceae	*Lathyrus latifolius*	Everlasting Pea	X			GNR	SE4	
Fabaceae	*Lotus corniculatus*	Garden Bird's-foot Trefoil	X		X	GNR	SE5	
Fabaceae	*Medicago lupulina*	Black Medic	X		X	GNR	SE5	
Fabaceae	*Melilotus albus*	White Sweet-clover	X			G5	SE5	
Fabaceae	*Melilotus officinalis*	Yellow Sweet-clover	X		X	GNR	SE5	
Fabaceae	*Securigera varia*	Common Crown-vetch	X			GNR	SE5	
Fabaceae	*Trifolium pratense*	Red Clover	X		X	GNR	SE5	
Fabaceae	*Vicia cracca*	Tufted Vetch	X		X	GNR	SE5	
Fagaceae	*Quercus rubra*	Northern Red Oak	X	X		G5	S5	
Grossulariaceae	*Ribes sp.*	Currant	X					
Juncaceae	*Juncus sp.*	Rush			X			
Lamiaceae	*Clinopodium vulgare*	Field Basil	X			G5	S5	
Lamiaceae	*Prunella vulgaris*	Self-heal	X			G5T5	S5	
Liliaceae	*Convallaria majalis*	European Lily-of-the-valley	X			G5	SE5	
Liliaceae	*Maianthemum canadense*	Wild Lily-of-the-valley	X	X		G5	S5	
Liliaceae	*Maianthemum racemosum*	False Solomon's-seal	X	X		G5	S5	
Liliaceae	*Maianthemum stellatum*	Star-flowered False Solomon's-seal	X			G5	S5	
Liliaceae	*Polygonatum pubescens*	Hairy Solomon's Seal	X		1	G5	S5	
Liliaceae	*Streptopus lanceolatus*	Eastern Rose Twisted-stalk		X		G5T5	S5?	
Lythraceae	*Lythrum hyssopifolia*	Hyssop-leaved Loosestrife			X	G5	SE1	
Oleaceae	*Fraxinus americana*	White Ash	X	X		G5	S4	
Oleaceae	*Fraxinus pennsylvanica*	Green Ash	X			G5	S4	
Onagraceae	*Epilobium strictum*	Downy Willowherb	X			G5?	S5	
Orchidaceae	*Epipactis helleborine*	Eastern Helleborine		X		GNR	SE5	
Pinaceae	*Abies balsamea*	Balsam Fir	X			G5	S5	
Pinaceae	*Picea glauca*	White Spruce	X		X	G5	S5	
Pinaceae	*Picea mariana*	Black Spruce		X	X	G5	S5	
Pinaceae	*Picea rubens*	Red Spruce	X	X		G5	S3	
Pinaceae	*Pinus strobus*	Eastern White Pine	X		X	G5	S5	
Plantaginaceae	*Plantago lanceolata*	English Plantain	X			G5	SE5	
Plantaginaceae	*Plantago major*	Common Plantain	X			G5	S5	
Poacaeae	*Dichanthelium acuminatum*	Hairy Panic Grass	X			G5	S5	
Poaceae	*Phalaris arundinacea*	Reed Canary Grass	X			G5	S5	
Poaceae	*Phleum pratense*	Common Timothy	X			GNR	SE5	
Poaceae	*Phragmites australis ssp. australis*	European Reed			X	G5T5	SE5	
Poaceae	*Poa sp.*	Grass	X					
Primulaceae	*Lysimachia ciliata*	Fringed Loosestrife	X			G5	S5	
Primulaceae	*Lysimachia quadriflora*	Four-flowered Loosestrife			X	G5?	S4	
Pyrolaceae	*Pyrola americana*	Round-leaved Pyrola	X	X	X	G5	S4?	
Ranunculaceae	*Actaea rubra*	Red Baneberry	X	X		G5	S5	
Ranunculaceae	*Anemone canadensis*	Canada Anemone	X			G5	S5	

Table 1. Vascular Plant List, Wasaga West End Water Storage, Wasaga Beach, ON.

			Vegetation Communities[1]			Conservation Status[2]		
Family	**Scientific Name**	**Common Name**	**FOM5-2**	**SWD2-2**	**CUM**	**G-Rank**	**S-Rank**	**SARO**
Ranunculaceae	*Anemone cylindrica*	Long-fruited Anemone	X			G5	S4	
Ranunculaceae	*Anemone quinquefolia*	Wood Anemone	X			G5	S5	
Ranunculaceae	*Ranunculus abortivus*	Kidney-leaved Buttercup	X			G5	S5	
Ranunculaceae	*Ranunculus repens*	Creeping Buttercup	X			GNR	SE5	
Rhamnaceae	*Rhamnus alnifolia*	Alderleaf Buckthorn	X			G5	S5	
Rhamnaceae	*Rhamnus cathartica*	Common Buckthorn	X			GNR	SE5	
Rosaceae	*Agrimonia eupatoria*	European Agrimony	X			GNR	SE1	
Rosaceae	*Crataegus flabellata*	Fan-leaved Hawthorn	X			G4	S4	
Rosaceae	*Fragaria virginiana*	Wild Strawberry	X		X	G5	S5	
Rosaceae	*Geum aleppicum*	Yellow Avens	X	X	X	G5	S5	
Rosaceae	*Malus pumila*	Common Apple	X			G5	SE4	
Rosaceae	*Physocarpus opulifolius*	Eastern Ninebark	X			GNR	S5	
Rosaceae	*Potentilla simplex*	Old-field Cinquefoil	X			G5	S5	
Rosaceae	*Prunus pensylvanica*	Pin Cherry		X		G5	S5	
Rosaceae	*Prunus virginiana*	Choke Cherry		X		G5	S5	
Rosaceae	*Rubus flagellaris*	Northern Dewberry	X			G5	S4	
Rosaceae	*Rubus idaeus*	Wild Red Raspberry	X			G5T5	S5	
Rosaceae	*Spiraea alba*	White Meadowsweet	X			G5	S5	
Rubiaceae	*Galium asprellum*	Rough Bedstraw	X	X		G5	S5	
Salicaceae	*Populus tremuloides*	Trembling Aspen	X	X	X	G5	S5	
Salicaceae	*Salix alba*	White Willow	X			G5	SE4	
Salicaceae	*Salix eriocephala*	Heart-leaved Willow	X			G5	S5	
Salicaceae	*Salix nigra*	Black Willow			X	G5	S4?	
Tiliaceae	*Tilia americana*	American Basswood		X		G5	S5	
Ulmaceae	*Ulmus americana*	American Elm	X			G5?	S5	
Vitaceae	*Vitis riparia*	Riverbank Grape	X		X	G5	S5	
Violaceae	*Viola labradorica*	Labrador Violet	X			G5	S5	

[1] See Figure 1 for vegetation community location

[2] S Rank - "Sub-national Rank/provincial rank" (S Rank 1, 2 & 3 considered provincially rare); G RANK - "Global Rank" (G Rank 1, 2 & 3 considered globally rare), "SNA" - sub-national rank not assigned (general indicates non-native species); SARO - designation as Species at Risk in Ontario (Endangered, Threatened or Special Concern); Oak Ridges Moraine Rarity as per ORMCP Technical Paper 6 - Appendix A.1 listing.

Table 2. Significant Woodland Assessment (Town of Wasaga Beach criteria), Wasaga West End Water Storage, Wasaga Beach, ON.

CRITERIA	Site Conditions	Function Impact Assessment
Size	Tree cover of the subject lands and adjacent lands is continuous with tree cover that extends onto adjacent properties. Accounting for linear canopy gaps narrower than 20m, the woodlot in the subject property forms part of a woodland patch of approximately 44ha.This sizemeets the Town's size criteria of 20ha for significance.	The retained woodland area (post-development) will be approximately 20ha, therefore, it will still be considered significant by the City's OP.
Shape	The shape of the woodland provides approximately 4haof interior woodland habitat.	Approximately 1.5ha of interior habitat will be removed with 2.5ha of interior habitat remaining on site. Area sensitive species will continue to utilize the remaining habitat within and adjacent to the property.
Habitat Potential	There is potential for the woodland to provide wildlife habitat in the form of vernal pools.	A woodland area will be removed with the development. Potential amphibian breeding habitat will remain in the retained forested and wetland areas.
Diversity of Species	One hundred and fifteen individual vegetation species were observed within the property, likely given the diversity of vegetation communities present (i.e. woodland, wetland and meadow communities).	The majority of the features of the property that contribute to the species diversity, i.e. forest and wetland, will be retained post-development. Therefore, species diversity on the property would be retained.
Slope	No significant slopes were observed on the property.	NA
Soils	The parent soils have been identified as Sargent Gravelly Sandy Loamin the soil classifications of Simcoe County (Soil Report #29 of the Ontario Soil Survey). This soil type is common in Simcoe County (3%) and is not considered to be significant.	No change to the soil types is anticipated as a result of the proposed development.
Social and Recreational Value	Minimal social and recreational value is associated with this property. No formal trails are present and minimal recreational opportunity is afforded by the property.In designating the land predominately Residential, the Town eliminated its use for social/recreational uses	The retained portion of the woodland will continue to provide aesthetic value to the area.
Surface and Groundwater Functions	The presence of wetland communities to the north and west of the property would indicate ground water in proximity to surface.	This surface /groundwatercontribution would be maintained in the retained portion of the property. Run-off from the developed portion will be captured

Table 2. Significant Woodland Assessment (Town of Wasaga Beach criteria), Wasaga West End Water Storage, Wasaga Beach, ON.

		and released at rates comparable to those present pre-development.
Linkage	The woodland present in the subject property is enclosed by adjacent woodlots, excluding the east where a low-density residential development is present. The southeast portion of the property connects with a smaller woodland patch located south of the property, beyond Ayling Reid Ct.	Minimal linkage function is offered by the property given the orientation of the property to adjacent roads and residential developments.

Table 3. Significant Woodland Assessment (PPS criteria), Wasaga West End Water Storage, Wasaga Beach, ON.

CRITERIA	STANDARDS	ASSESSMENT
Woodland Size Criteria		
• Size refers to the aerial (spatial) extent of the woodland (irrespective of ownership) • Woodland areas are considered to be generally continuous even if intersected by narrow gaps 20m or less in width between crown edges. • Size value is related to the scarcity of woodland in the landscape derived on a municipal basis with consideration of the differences in woodland coverage among physical sub-units (e.g., watersheds, biophysical regions). • Size criteria should also account for differences in landscape-level physiography (e.g., moraines, clay planes) and community vegetation types.	Where woodlands cover: • Is less than about 5% of land cover, woodlands 2ha in size or larger should be considered significant • Is about 5-15% of land cover, woodlands 4ha in size or larger should be considered significant • Is about 15-30% of land cover, woodlands 20ha in size or larger should be considered significant • **Is about 30-60% of land cover, woodlands 50ha in size or larger should be considered significant** • Occupies more than 60% of the land, a minimum size is not suggested, and other factors should be considered	• According to the Nottawasaga Valley Conservation Authority (NVCA), the Town of Wasaga Beach contains approximately 43% of forest cover (NVCA, 2005. Town of Wasaga Beach Natural Heritage System, Background Review and Landscape Model). Therefore, the Natural Heritage Reference Manual (NHRM; MNR 2010) recommends that continuous patches of woodland cover in Wasaga Beach larger than 50ha should be considered significant. • Tree cover of the subject lands is isolated from the ones on adjacent properties by gaps wider than 20m. The woodlot in the subject property forms part of a woodland patch of approximately 26ha. • *Therefore, based on size criteria, forest cover of the property would not be considered part of a significant woodland in the context of the PPS.*
Ecological Function Criteria		
Woodland Interior		
• Interior Habitat more than 100m from the edge (as measured from the limits of a continuous woodland as defined above) is important for some species. • For purposes of this criterion, a maintained public road would create an edge even if the opening was not wider than 20m and did not create a separate woodland. •	Woodlands should be considered significant if they have: • Any interior habitat where woodlands cover less than about 15% of the land cover • 2 ha or more of interior habitat where woodlands cover about 15-30% of the land cover • **8 ha or more of interior habitat where woodlands cover about 30-60% of the land cover** • 20 ha or more of interior habitat where woodlands cover about 60% of the land cover	• Woodland present in the subject area contains less than 8ha of forest interior. Since landscape contains between 30 and 60% woodland cover, only 8ha or more of interior habitat would compel identification of the woodland as significant. • *Therefore, based on woodland interior criteria, forest cover of the property would not be considered part of a significant woodland in the context of the PPS.*
Proximity to Other Woodlands or Other Habitats		
• Woodlands that overlap, abut or are close to other significant natural heritage features or areas could be considered more valuable or significant than those that are not. • Patches close to each other are of greater mutual benefit and value to wildlife.	Woodlands should be considered significant if: • A portion of the woodland is located within a specific distance (e.g., 30m) of a significant natural feature or fish habitat likely receiving ecological benefit from the woodland and the entire woodland meets the minimum area threshold (e.g., 0.5-20ha, depending on circumstance)	• Woodland present in the subject property does not overlap or abut other significant natural heritage features (i.e., fish habitat, evaluated wetland, ANSI, etc.). • *Therefore, based on the proximity to other woodlands or habitats criteria, forest cover of the property would not be considered part of a significant woodland in the context of the PPS.*
Linkages		
• Linkages are important connections providing for movement between habitats. • Woodlands that are located between other significant features or areas can be considered to perform an important linkage function as “stepping stones” for movement between habitats.	Woodlands should be considered significant if they: • Are located within a defined natural heritage system or provide a connecting link between two other significant features, each of which is within a specified distance (e.g., 120m) and meets minimum area thresholds (e.g., 1-20ha, depending on circumstance)	• Woodland present in the subject property is not identified as part of mapped habitat linkage area. • The woodland is located within 120m of an unevaluated wetland, and according to the Midhurst District Deer Yard Survey (Allan et al., 2005), the property is adjacent to a mapped Deer yard Stratum I (Core area). Therefore, the property might be used as yarding area. • However, according to the criteria established by the Significant Wildlife Habitat Criteria

Table 3. Significant Woodland Assessment (PPS criteria), Wasaga West End Water Storage, Wasaga Beach, ON.

		Schedules for Ecoregion 6E (MNRF, 2015), the woodland existent in the property does not provide wildlife habitat linkage/wildlife movement corridor function because it does not comply with the following: "Forest habitat associated with watercourses and ridges that are >200m wide and having gaps <20m wide. If following a riparian area corridor should include vegetation 15m of either side of watercourse. Corridors leading to deer wintering yards should be unbroken by roads or residential areas." • *Therefore, based on the linkages criteria, forest cover of the property would not be considered part of a significant woodland in the context of the PPS.*
Water Protection		
• Source water protection is important. • Natural hydrological processes should be maintained.	Woodlands should be considered significant if they: • Are located within a sensitive or threatened watershed or a specific distance (e.g., 50m or top of valley bank if greater) or a sensitive groundwater discharge, sensitive recharge, sensitive headwater area, watercourse or fish habitat and meet minimum area thresholds (e.g., 0.5-10ha, depending on circumstance)	• Woodland present in the subject property is not located within a sensitive or threatened watershed, or a sensitive groundwater discharge, sensitive recharge, sensitive headwater area, watercourse or fish habitat. • *Therefore, based on the water protection criteria, forest cover of the property would not be considered part of a significant woodland in the context of the PPS.*
Woodland Diversity		
• Certain woodland species have had major reductions in representation on the landscape and may need special consideration. • More native diversity is more valuable than less diversity.	Woodlands should be considered significant if they have: • A naturally occurring composition of native forest species that have declined significantly south and east of the Canadian Shield and meet minimum area thresholds (e.g., 1-20ha, depending on circumstance) • A high native diversity through a combination of composition and terrain (e.g., a woodland extending from a hilltop to a valley bottom or to opposite slopes) and meet minimum area thresholds (e.g., 2-20ha, depending on circumstance)	• Woodland present in the subject property is not composed by a declining native forest species or has a high diversity through a combination of composition and terrain. • *Therefore, based on the woodland diversity criteria, forest cover of the property would not be considered part of a significant woodland in the context of the PPS.*
	Uncommon Characteristics Criteria	
• Woodlands that are uncommon in terms of species composition, cover type, age or structure should be protected. • Older woodlands (i.e., woodlands greater than 100 years old) are particularly valuable for several reasons, including their contributions to genetic, species and ecosystem diversity.	Woodlands should be considered significant if they have: • A unique species composition or the site is represented by less than 5% overall in woodland area and meets minimum area thresholds (e.g., 0.5ha, depending on circumstance) • A vegetation community with a provincial ranking of S1, S2 or S3 (as ranked by the NHIC and meet minimum area thresholds (e.g., 0.5ha, depending on circumstance) • Habitat (e.g., with 10 individual stems or 100m^2 of leaf coverage) of a rare, uncommon or restricted woodland plant species and meet minimum area thresholds (e.g., 0.5ha, depending on circumstance): vascular plant species for which the NHIC's Southern Ontario	• Woodland present in the subject property does not have rare or unique species composition, cover types (i.e., composition of ELC vegetation types), structure or age. • *Therefore, based on the uncommon characteristics criteria, forest cover of the property would not be considered part of a significant woodland in the context of the PPS.*

Table 3. Significant Woodland Assessment (PPS criteria), Wasaga West End Water Storage, Wasaga Beach, ON.

	Coefficient of Conservatism is 8, 9 or 10; tree species of restricted distribution such as sassafras or rock elm; species existing only in a limited number of sites within the planning area • Characteristics of older woodlands or woodlands with larger tree size structure in native species meet minimum area thresholds (e.g., 1-10ha, depending on circumstance): older woodlands could be defined as having 10 or more trees/ha greater than 100 years old; larger tree size structure could be defined as 10 or more trees/ha at least 50cm in diameter, or a basal area of 8 or more m^2/ha in trees that are at least 40cm in diameter	
	Economic and Social Function Values Criteria	
• Woodlands that have high economic or social values through particular site characteristics or deliberate management should be protected.	Woodlands should be considered significant if they have: • High productivity in terms of economically viable products together with continuous native natural attributes and meet minimum area thresholds (e.g., 2-20ha, depending on circumstance) • A high value in special services such as air-quality improvement or recreation at a sustainable level that is compatible with long-term retention and meet minimum area thresholds (e.g., 0.2-10ha, depending on circumstance) • Important identified appreciation, education, cultural or historical value and meet minimum area thresholds (e.g., 0.2-10ha, depending on circumstance)	• Forest communities of property do not generate economically viable forest products. • No formal recreational use of license area and adjacent lands. • Forests not identified as providing education, cultural or historical value. • Economic and social values do not warrant identification as significant. • *Therefore, based on the economic and social function values criteria, forest cover of the property would not be considered part of a significant woodland in the context of the PPS.*

Table 4 - Bird Species List, Wasaga West End Water Storage, Wasaga Beach, ON.

			Point Count Stations [A,B]							Conservation Ranks[F]		
Family	**Scientific Name**	**English Common Name**	**1**	**2**	**3**	**4**	**Incidental[C,D]**	**Breeding Evidence[E]**	**Area-sensitive?***	**S-Rank**	**G-Rank**	**SARO Status**
Anatidae	*Anas platyrhynchos*	Mallard			S,			Possible		S5	G5	
Anatidae	*Branta canadensis*	Canada Goose			FO,			Observed		S5	G5	
Bombycillidae	*Bombycilla cedrorum*	Cedar Waxwing	,S	S,	,S		X	Possible		S5B	G5	
Cardinalidae	*Cardinalis cardinalis*	Northern Cardinal	S,				X	Possible		S5	G5	
Corvidae	*Corvus brachyrhynchos*	American Crow				,S	X	Possible		S5B	G5	
Corvidae	*Cyanocitta cristata*	Blue Jay				,S	X	Possible		S5	G5	
Emberizidae	*Melospiza melodia*	Song Sparrow	S,S			S,S	X	Probable		S5B	G5	
Emberizidae	*Zonotrichia albicollis*	White-throated Sparrow	,S		,S	S,S	X	Probable		S5B	G5	
Fringillidae	*Carduelis tristis*	American Goldfinch				,S	X	Possible		S5B	G5	
Fringillidae	*Carpodacus purpureus*	Purple Finch		S,	S,			Possible		S4B	G5	
Icteridae	*Agelaius phoeniceus*	Red-winged Blackbird		S,				Possible		S4	G5	
Icteridae	*Molothrus ater*	Brown-headed Cowbird					X	Possible		S4B	G5	
Icteridae	*Quiscalus quiscula*	Common Grackle	S,			,S		Possible		S5B	G5	
Laridae	*Larus delawarensis*	Ring-billed Gull		,S				Possible		S5B,S4N	G5	
Mimidae	*Dumetella carolinensis*	Gray Catbird				S,S	X	Probable		S4B	G5	
Paridae	*Poecile atricapillus*	Black-capped Chickadee	S,		S,		X	Possible		S5	G5	
Parulidae	*Geothlypis trichas*	Common Yellowthroat	S,		S,	S,	X	Possible		S5B	G5	
Parulidae	*Mniotilta varia*	Black-and-white Warbler	S,S	,S	S,S	S,	X	Probable	Yes	S5B	G5	
Parulidae	*Oreothlypis ruficapilla*	Nashville Warbler			S,	S,	X	Possible		S5B	G5	
Parulidae	*Setophaga ruticilla*	American Redstart		S,S	S,	S,	X	Probable	Yes	S5B	G5	
Phasianidae	*Meleagris gallopavo*	Wild Turkey					X	Possible		S5	G5	
Picidae	*Colaptes auratus*	Northern Flicker			,S			Possible		S4B	G5	
Regulidae	*Regulus satrapa*	Golden-crowned Kinglet					X	Possible		S5B	G5	
Scolopacidae	*Scolopax minor*	American Woodcock					X	Probable		S4B	G5	
Sittidae	*Sitta canadensis*	Red-breasted Nuthatch					X	Possible	Yes	S5	G5	
Troglodytidae	*Troglodytes aedon*	House Wren	S,S				X	Probable		S5B	G5	
Turdidae	*Catharus fuscescens*	Veery					X	Possible	Yes	S4B	G5	
Turdidae	*Hylocichla mustelina*	Wood Thrush			,S	S,	X	Possible		S4B	G5	SC
Turdidae	*Turdus migratorius*	American Robin	S,	FO,S		S,		Possible		S5B	G5	
Tyrannidae	*Empidonax alnorum*	Alder Flycatcher				,S		Possible		S5B	G5	
Tyrannidae	*Myiarchus crinitus*	Great Crested Flycatcher	S,S	S,	,S	,S		Probable		S4B	G5	
Vireonidae	*Vireo olivaceus*	Red-eyed Vireo	,S	S,S	S,	S,S	X	Probable		S5B	G5	

* According to Appendix C of the Significant Wildlife Habitat Technical Guide (MNRF, 2000)

Surveys Conditions:

[A] June 03, 2016; Start Time 0632hr/ End Time 0714hr; Temperature +16°C; Wind B0; Cloud Cover <5%; Precipitation Nil; Observer M. Fuller

[B] June 16, 2016; Start Time 0554hr/ End Time 0637hr; Temperature +15°C; Wind B0; Cloud Cover 100%; Precipitation Nil, high humidity post rain; Observer M. Fuller

[C] May 27, 2016; Vegetation Survey; Observer M. Fuller

[D] May 09, 2016; Bat Snag Density Survey; Observers B. Peloso, S. Casutt

Table 4 - Bird Species List, Wasaga West End Water Storage, Wasaga Beach, ON.

[E]OBBA Breeding Evidence Codes:
OBSERVED
FO - Fly Over
X - Species observed in its breeding season (no breeding evidence)
POSSIBLE
H - Species observed in its breeding season in suitable nesting habitat
S - Singing male present, or breeding calls heard, in suitable nesting habitat in nesting season.
PROBABLE
A - Agitated behaviour or anxiety calls of an adult.
N - Nest building or excavation of nest hole.
P -Pair observed in suitable nesting habitat in nesting season.
T - Permanent territory presumed trhough registration of territorial behaviour (e.g. song) on at least two days, a week or more apart, at the same place.

[F]Conservation Rank - from OMNRF, NHIC and SARO Lists 2014
S-rank - S1 - Extremely Rare, S2 - Very Rare, S3 - Rare to Uncommon, S4 - Common, S5 - Very Common
G-Rank - G1 - Critically Imperiled, G2 - Imperiled, G3 - Vulnerable, G4 - Apparently Secure, G5 - Secure
SARO - EXP (Extirpated), END (Endangered), THR (Threatened), SC (Special Concern)

Table 5. Significant Wildlife Habitat Ecoregion 6E Assessment, Wasaga West End Water Storage, Wasaga Beach, ON.

1.2.2 Specialized Habitat for Wildlife

Wildlife Habitat	Wildlife Species	Candidate SHW		Confirmed SWH	Assessment
		ELC Ecosite Codes	**Habitat Criteria and Information Sources**	**Defining Criteria**	
Waterfowl Nesting Area **Rationale;** Important to local waterfowl populations, sites with greatest number of species and highest number of individuals are significant.	American Black Duck Northern Pintail Northern Shoveler Gadwall Blue-winged Teal Green-winged Teal Wood Duck Hooded Merganser Mallard	All upland habitats located adjacent to these wetland ELC Ecosites are Candidate SWH: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SWT1 SWT2 SWD1 SWD2 SWD3 SWD4 **Note: includes adjacency to Provincially Significant Wetlands**	A waterfowl nesting area extends 120 m from a wetland (> 0.5 ha) or a wetland (>0.5ha) and any small wetlands (0.5ha) within 120m or a cluster of 3 or more small (<0.5 ha) wetlands within 120 m of each individual wetland where waterfowl nesting is known to occur. • Upland areas should be at least 120 m wide so that predators such as racoons, skunks, and foxes have difficulty finding nests. • Wood Ducks and Hooded Mergansers utilize large diameter trees (>40cm dbh) in woodlands for cavity nest sites. Information Sources • Ducks Unlimited staff may know the locations of particularly productive nesting sites. • OMNRF Wetland Evaluations for indication of significant waterfowl nesting habitat. • Reports and other information available from Conservation Authorities.	Studies confirmed: • Presence of 3 or more nesting pairs for listed species excluding Mallards, or; • Presence of 10 or more nesting pairs for listed species including Mallards. • Any active nesting site of an American Black Duck is considered significant. • Nesting studies should be completed during the spring breeding season (April - June). Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • A field study confirming waterfowl nesting habitat will determine the boundary of the waterfowl nesting habitat for the SWH, this may be greater or less than 120 m from the wetland and will provide enough habitat for waterfowl to successfully nest. • SWHMiST Index #25 provides development effects and mitigation measures.	Property not adjacent to wetlands over 0.5ha in size or clusters of 3 or more small (<0.5) wetlands.
Bald Eagle and Osprey Nesting, Foraging and Perching Habitat **Rationale;** Nest sites are fairly uncommon in Eco-region 6E and are used annually by these species. Many suitable nesting locations may be lost due to increasing shoreline development pressures and scarcity of habitat.	Osprey **Special Concern** Bald Eagle	ELC Forest Community Series: FOD, FOM, FOC, SWD, SWM and SWC directly adjacent to riparian areas – rivers, lakes, ponds and wetlands	Nests are associated with lakes, ponds, rivers or wetlands along forested shorelines, islands, or on structures over water. • Osprey nests are usually at the top a tree whereas Bald Eagle nests are typically in super canopy trees in a notch within the tree's canopy. • Nests located on man-made objects are not to be included as SWH (e.g. telephone poles and constructed nesting platforms). Information Sources • Natural Heritage Information Center (NHIC) compiles all known nesting sites for Bald Eagles in Ontario. • MNRF values information (LIO/NRVIS) will list known nesting locations. Note: data from NRVIS is provided as a point and does not represent all the habitat. • Nature Counts, Ontario Nest Records Scheme data. • OMNRF Districts. • Check the Ontario Breeding Bird Atlas or Rare Breeding Birds in Ontario for species documented • Reports and other information available from Conservation Authorities. • Field Naturalists clubs	Studies confirm the use of these nests by: • One or more active Osprey or Bald Eagle nests in an area. • Some species have more than one nest in a given area and priority is given to the primary nest with alternate nests included within the area of the SWH. • For an Osprey, the active nest and a 300 m radius around the nest or the contiguous woodland stand is the SWH , maintaining undisturbed shorelines with large trees within this area is important . • For a Bald Eagle the active nest and a 400-800 m radius around the nest is the SWH. , Area of the habitat from 400-800m is dependent on site lines from the nest to the development and inclusion of perching and foraging habitat • To be significant a site must be used annually. When found inactive, the site must be known to be inactive for > 3 years or suspected of not being used for >5 years before being considered not significant. • Observational studies to determine nest site use, perching sites and foraging areas need to be done from mid March to mid August. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWHMiST Index #26 provides development effects and mitigation measures	No records of Osprey or Bald Eagle within or adjacent to subject property.
Woodland Raptor Nesting Habitat	Northern Goshawk Cooper's Hawk	May be found in all forested ELC Ecosites. May also be found in SWC, SWM, SWD	All natural or conifer plantation woodland/forest stands >30ha with >10ha of interior habitat. Interior habitat	Studies confirm: • Presence of 1 or more active nests from species list	The subject and adjacent lands do not provide >10ha of "200m interior forest habitat". Not Significant

Table 5. Significant Wildlife Habitat Ecoregion 6E Assessment, Wasaga West End Water Storage, Wasaga Beach, ON.

Wildlife Habitat	Wildlife Species	Candidate SHW		Confirmed SWH	Assessment
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
Rationale: Nests sites for these species are rarely identified; these area sensitive habitats and are often used annually by these species.	Sharp-shinned Hawk Red-shouldered Hawk Barred Owl Broad-winged Hawk	and CUP3	determined with a 200m buffer • Stick nests found in a variety of intermediate-aged to mature conifer, deciduous or mixed forests within tops or crotches of trees. Species such as Coopers hawk nest along forest edges sometimes on peninsulas or small off-shore islands. • In disturbed sites, nests may be used again, or a new nest will be in close proximity to old nest. Information Sources • OMNRF Districts. • Check the Ontario Breeding Bird Atlas or Rare Breeding Birds in Ontario for species documented. • Check data from Bird Studies Canada. • Reports and other information available from Conservation Authorities.	is considered significant. • Red-shouldered Hawk and Northern Goshawk – A 400m radius around the nest or 28 ha area of habitat is the SWH . (the 28 ha habitat area would be applied where optimal habitat is irregularly shaped around the nest) • Barred Owl – A 200m radius around the nest is the SWH. • Broad-winged Hawk and Coopers Hawk– A 100m radius around the nest is the SWH. • Sharp-Shinned Hawk – A 50m radius around the nest is the SWH. • Conduct field investigations from mid-March to end of May. The use of call broadcasts can help in locating territorial (courting/nesting) raptors and facilitate the discovery of nests by narrowing down the search area. • SWHMiST Index #27 provides development effects and mitigation measures.	Woodland Raptor Nesting Habitat.
Turtle Nesting Areas **Rationale;** These habitats are rare and when identified will often be the only breeding site for local populations of turtles.	Midland Painted Turtle Special Concern Species Northern Map Turtle Snapping Turtle	Exposed mineral soil (sand or gravel) areas adjacent (<100m) or within the following ELC Ecosites: MAS1 MAS2 MAS3 SAS1 SAM1 SAF1 BOO1 FEO1	• Best nesting habitat for turtles are close to water and away from roads and sites less prone to loss of eggs by predation from skunks, raccoons or other animals. • For an area to function as a turtle-nesting area, it must provide sand and gravel that turtles are able to dig in and are located in open, sunny areas. Nesting areas on the sides of municipal or provincial road embankments and shoulders are not SWH. • Sand and gravel beaches adjacent to undisturbed shallow weedy areas of marshes, lakes, and rivers are most frequently used. Information Sources • Use Ontario Soil Survey reports and maps to help find suitable substrate for nesting turtles (well-drained sands and fine gravels). • Check the Ontario Herpetofaunal Summary Atlas records or other similar atlases for uncommon turtles; location information may help to find potential nesting habitat for them. • Natural Heritage Information Center (NHIC) • Field Naturalist clubs	Studies confirm: • Presence of 5 or more nesting Midland Painted Turtles • One or more Northern Map Turtle or Snapping Turtle nesting is a SWH. • The area or collection of sites within an area of exposed mineral soils where the turtles nest, plus a radius of 30-100m around the nesting area dependant on slope, riparian vegetation and adjacent land use is the SWH. • Travel routes from wetland to nesting area are to be considered within the SWH as part of the 30-100m area of habitat. • Field investigations should be conducted in prime nesting season typically late spring to early summer. Observational studies observing the turtles nesting is a recommended method. • SWHMiST Index #28 provides development effects and mitigation measures for turtle nesting habitat.	No suitable habitat.
Seeps and Springs **Rationale;** Seeps/Springs are typical of headwater areas and are often at the source of coldwater streams.	Wild Turkey Ruffed Grouse Spruce Grouse White-tailed Deer Salamander spp.	Seeps/Springs are areas where ground water comes to the surface. Often they are found within headwater areas within forested habitats. Any forested Ecosite within the headwater areas of a stream could have seeps/springs.	Any forested area (with <25% meadow/field/pasture) within the headwaters of a stream or river system. • Seeps and springs are important feeding and drinking areas especially in the winter will typically support a variety of plant and animal species Information Sources • Topographical Map. • Thermography. • Hydrological surveys conducted by Conservation Authorities and MOE. • Field Naturalists clubs and landowners. • Municipalities and Conservation Authorities may	Field Studies confirm: • Presence of a site with 2 or more seeps/springs should be considered SWH. • The area of a ELC forest ecosite or an ecoelement within ecosite containing the seeps/springs is the SWH. The protection of the recharge area considering the slope, vegetation, height of trees and groundwater condition need to be considered in delineation the habitat. • SWHMiST Index #30 provides development effects and mitigation measures	No seeps or springs evident in forests of subject lands.

Table 5. Significant Wildlife Habitat Ecoregion 6E Assessment, Wasaga West End Water Storage, Wasaga Beach, ON.

Wildlife Habitat	Wildlife Species	Candidate SHW		Confirmed SWH	Assessment
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
			have drainage maps and headwater areas mapped.		
Amphibian Breeding Habitat (Woodland). **Rationale:** These habitats are extremely important to amphibian biodiversity within a landscape and often represent the only breeding habitat for local amphibian populations	Eastern Newt Blue-spotted Salamander Spotted Salamander Gray Treefrog Spring Peeper Western Chorus Frog Wood Frog	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD Breeding pools within the woodland or the shortest distance from forest habitat are more significant because they are more likely to be used due to reduced risk to migrating amphibians	• Presence of a wetland, pond or woodland pool (including vernal pools) >500m2 (about 25m diameter) within or adjacent (within 120m) to a woodland (no minimum size). Some small wetlands may not be mapped and may be important breeding pools for amphibians. • Woodlands with permanent ponds or those containing water in most years until mid-July are more likely to be used as breeding habitat Information Sources • Ontario Herpetofaunal Summary Atlas (or other similar atlases) for records • Local landowners may also provide assistance as they may hear spring-time choruses of amphibians on their property. • OMNRF District. • OMNRF wetland evaluations • Field Naturalist clubs • Canadian Wildlife Service • Amphibian Road Call Survey • Ontario Vernal Pool Association: http://www.ontariovernalpools.org	Studies confirm; • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog species with at least 20 individuals (adults or eggs masses) or 2 or more of the listed frog species with Call Level Codes of 3. • A combination of observational study and call count surveys will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the woodland/wetlands. • The habitat is the wetland area plus a 230m radius of woodland area. If a wetland area is adjacent to a woodland, a travel corridor connecting the wetland to the woodland is to be included in the habitat. • SWHMiST Index #14 provides development effects and mitigation measures.	**Not assessed, but possibly present on lands adjacent to the property. No specific amphibian breeding surveys have been conducted within the property limits.**
Amphibian Breeding Habitat (Wetlands) **Rationale;** Wetlands supporting breeding for these amphibian species are extremely important and fairly rare within Central Ontario landscapes.	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	ELC Community Classes SW, MA, FE, BO, OA and SA. Typically these wetland ecosites will be isolated (>120m) from woodland ecosites, however larger wetlands containing predominantly aquatic species (e.g. Bull Frog) may be adjacent to woodlands.	• Wetlands>500m2 (about 25m diameter), supporting high species diversity are significant; some small or ephemeral habitats may not be identified on MNRF mapping and could be important amphibian breeding habitats. • Presence of shrubs and logs increase significance of pond for some amphibian species because of available structure for calling, foraging, escape and concealment from predators. • Bullfrogs require permanent water bodies with abundant emergent vegetation. Information Sources • Ontario Herpetofaunal Summary Atlas (or other similar atlases) • Canadian Wildlife Service Amphibian Road Surveys and Backyard Amphibian Call Count. • OMNRF Districts and wetland evaluations • Reports and other information available from Conservation Authorities.	Studies confirm: • Presence of breeding population of 1 or more of the listed newt/salamander species or 2 or more of the listed frog/toad species with at least 20 individuals (adults or eggs masses) or 2 or more of the listed frog/toad species with Call Level Codes of 3. **or;** Wetland with confirmed breeding Bullfrogs are significant. • The ELC ecosite wetland area and the shoreline are the SWH. • A combination of observational study and call count surveys will be required during the spring (March-June) when amphibians are concentrated around suitable breeding habitat within or near the wetlands. • If a SWH is determined for Amphibian Breeding Habitat (Wetlands) then Movement Corridors are to be considered as outlined in Table 1.4.1 of this Schedule. • SWHMiST Index #15 provides development effects and mitigation measures.	No suitable habitat.
Woodland Area-Sensitive Bird Breeding Habitat **Rationale:** Large, natural blocks of mature woodland habitat within the settled areas of Southern Ontario are	Yellow-bellied Sapsucker Red-breasted Nuthatch Veery Blue-headed Vireo Northern Parula Black-throated Green Warbler Blackburnian Warbler Black-throated Blue Warbler Ovenbird	All Ecosites associated with these ELC Community Series; FOC FOM FOD SWC SWM SWD	Habitats where interior forest breeding birds are breeding, typically large mature (>60 yrs old) forest stands or woodlots >30 ha, • Interior forest habitat is at least 200 m from forest edge habitat. Information Sources • Local bird clubs. • Canadian Wildlife Service (CWS) for the location of	Studies confirm: • Presence of nesting or breeding pairs of 3 or more of the listed wildlife species. • Note: any site with breeding Cerulean Warblers or Canada Warblers is to be considered SWH. • Conduct field investigations in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird	The property and adjacent lands do not offer 200m of interior habitat. Also, from the listed species only Red-breasted Nuthatch was recorded in the area.

Table 5. Significant Wildlife Habitat Ecoregion 6E Assessment, Wasaga West End Water Storage, Wasaga Beach, ON.

Wildlife Habitat	Wildlife Species	Candidate SHW		Confirmed SWH	Assessment
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
important habitats for area sensitive interior forest song birds.	Scarlet Tanager Winter Wren **Special Concern:** Cerulean Warbler Canada Warbler		forest bird monitoring. • Bird Studies Canada conducted a 3-year study of 287 woodlands to determine the effects of forest fragmentation on forest birds and to determine what forests were of greatest value to interior species • Reports and other information available from Conservation Authorities.	Habitats: Guidelines for Wind Power Projects” • SWHMiST Index #34 provides development effects and mitigation measures.	

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

Wildlife Habitat	Wildlife Species	Candidate SHW		Confirmed SWH	Assessment
		ELC Ecosite Codes	Habitat Criteria and Information Sources	Defining Criteria	
Marsh Breeding Bird Habitat **Rationale;** Wetlands for these bird species are typically productive and fairly rare in Southern Ontario landscapes.	American Bittern Virginia Rail Sora Common Moorhen American Coot Pied-billed Grebe Marsh Wren Sedge Wren Common Loon Sandhill Crane Green Heron Trumpeter Swan **Special Concern:** Black Tern Yellow Rail	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 SAS1 SAM1 SAF1 FEO1 BOO1 For Green Heron: All SW, MA and CUM1 sites.	• Nesting occurs in wetlands. • All wetland habitat is to be considered as long as there is shallow water with emergent aquatic vegetation present. • For Green Heron, habitat is at the edge of water such as sluggish streams, ponds and marshes sheltered by shrubs and trees. Less frequently, it may be found in upland shrubs or forest a considerable distance from water. Information Sources • OMNRF District and wetland evaluations. • Field Naturalist clubs • Natural Heritage Information Center (NHIC) Records. • Reports and other information available from Conservation Authorities. • Ontario Breeding Bird Atlas.	Studies confirm: • Presence of 5 or more nesting pairs of Sedge Wren or Marsh Wren or **or** 1 pair of Sandhill Cranes; **or** breeding by any combination of 5 or more of the listed species. • Note: any wetland with breeding of 1 or more Black Terns, Trumpeter Swan, Green Heron or Yellow Rail is SWH. • Area of the ELC ecosite is the SWH. • Breeding surveys should be done in May/June when these species are actively nesting in wetland habitats. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWHMiST Index #35 provides development effects and mitigation measures	No suitable habitat.
Open Country Bird Breeding Habitat Sources Defining Criteria **Rationale;** This wildlife habitat is declining throughout Ontario and North America. Species such as the Upland Sandpiper have declined significantly the past 40 years based on CWS (2004) trend records.	Upland Sandpiper Grasshopper Sparrow Vesper Sparrow Northern Harrier Savannah Sparrow **Special Concern** Short-eared Owl	CUM1 CUM2	Large grassland areas (includes natural and cultural fields and meadows) >30 ha • Grasslands not Class 1 or 2 agricultural lands, and not being actively used for farming (i.e. no row cropping or intensive hay or livestock pasturing in the last 5 years). • Grassland sites considered significant should have a history of longevity, either abandoned fields, mature hayfields and pasturelands that are at least 5 years or older. • The Indicator bird species are area sensitive requiring larger grassland areas than the common grassland species. Information Sources • Agricultural land classification maps, Ministry of Agriculture. • Local bird clubs. • Ontario Breeding Bird Atlas • Reports and other information available from Conservation Authorities.	Field Studies confirm: • Presence of nesting or breeding of 2 or more of the listed species. • A field with 1 or more breeding Short-eared Owls is to be considered SWH. • The area of SWH is the contiguous ELC ecosite field areas. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories. • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWHMiST Index #32 provides development effects and mitigation measures	No suitable habitat.
Shrub/Early Successional Bird Breeding Habitat **Rationale;** This wildlife habitat is declining throughout Ontario and North America. The Brown Thrasher has declined significantly over the past 40 years based on CWS (2004) trend records.	Indicator Spp: Brown Thrasher Clay-coloured Sparrow Common Spp. Field Sparrow Black-billed Cuckoo Eastern Towhee Willow Flycatcher **Special Concern:** Yellow-breasted Chat Golden-winged Warbler	CUT1 CUT2 CUS1 CUS2 CUW1 CUW2 Patches of shrub ecosites can be complexed into a larger habitat for some bird species	Large field areas succeeding to shrub and thicket habitats>10haclxiv in size. • Shrub land or early successional fields, not class 1 or 2 agricultural lands, not being actively used for farming (i.e. no row-cropping, haying or live-stock pasturing in the last 5 years). • Shrub thicket habitats (>10 ha) are most likely to support and sustain a diversity of these species. • Shrub and thicket habitat sites considered significant should have a history of longevity, either abandoned fields or pasturelands. Information Sources • Agricultural land classification maps, Ministry of Agriculture. • Local bird clubs. • Ontario Breeding Bird Atlas • Reports and other information available from Conservation	Field Studies confirm: • Presence of nesting or breeding of 1 of the indicator species and at least 2 of the common species. • A habitat with breeding Yellow-breasted Chat or Golden-winged Warbler is to be considered as Significant Wildlife Habitat. • The area of the SWH is the contiguous ELC ecosite field/thicket area. • Conduct field investigations of the most likely areas in spring and early summer when birds are singing and defending their territories • Evaluation methods to follow "Bird and Bird Habitats: Guidelines for Wind Power Projects" • SWHMiST Index #33 provides development effects	No suitable habitat.

Table 5. Significant Wildlife Habitat Ecoregion 6E Assessment, Wasaga West End Water Storage, Wasaga Beach, ON.

Wildlife Habitat	**Wildlife Species**	**Candidate SHW**		**Confirmed SWH**	**Assessment**
		ELC Ecosite Codes	**Habitat Criteria and Information Sources**	**Defining Criteria**	
			Authorities.	and mitigation measures.	
Terrestrial Crayfish **<u>Rationale:</u>** Terrestrial Crayfish are only found within SW Ontario in Canada and their habitats are very rare.	Chimney or Digger Crayfish; (Fallicambarus fodiens) Devil Crayfish or Meadow Crayfish; (Cambarus Diogenes)	MAM1 MAM2 MAM3 MAM4 MAM5 MAM6 MAS1 MAS2 MAS3 SWD SWT SWM CUM1 with inclusions of above meadow marsh or swamp ecosites can be used by terrestrial crayfish.	Wet meadow and edges of shallow marshes (no minimum size) should be surveyed for terrestrial crayfish. • Constructs burrows in marshes, mudflats, meadows, the ground can't be too moist. Can often be found far from water. • Both species are a semi-terrestrial burrower which spends most of its life within burrows consisting of a network of tunnels. Usually the soil is not too moist so that the tunnel is well formed. <u>Information Sources</u> • Information sources from "Conservation Status of Freshwater Crayfishes" by Dr. Premek Hamr for the WWF and CNF March 1998	Studies Confirm: • Presence of 1 or more individuals of species listed or their chimneys (burrows) in suitable meadow marsh, swamp or moist terrestrial sites • Area of ELC ecosite or an ecoelement area of meadow marsh or swamp within the larger ecosite area is the SWH. • Surveys should be done April to August in temporary or permanent water. Note the presence of burrows or chimneys are often the only indicator of presence, observance or collection of individuals is very difficult • SWHMiST Index #36 provides development effects and mitigation measures.	One crayfish chimney was recorded along the dirt road. Crayfish species hasn't been determined.
Special Concern and Rare Wildlife Species **<u>Rationale:</u>** These species are quite rare or have experienced significant population declines in Ontario.	All Special Concern and Provincially Rare (S1-S3, SH) plant and animal species. Lists of these species are tracked by the Natural Heritage Information Centre.	All plant and animal element occurrences (EO) within a 1 or 10km grid. Older element occurrences were recorded prior to GPS being available, therefore location information may lack accuracy	When an element occurrence is identified within a 1 or 10 km grid for a Special Concern or provincially Rare species; linking candidate habitat on the site needs to be completed to ELC Ecosites <u>Information Sources</u> • Natural Heritage Information Centre (NHIC) will have Special Concern and Provincially Rare (S1-S3, SH) species lists with element occurrences data. • NHIC Website "Get Information" : http://nhic.mnr.gov.on.ca • Ontario Breeding Bird Atlas • Expert advice should be sought as many of the rare spp. have little information available about their requirements.	Studies Confirm: • Assessment/inventory of the site for the identified special concern or rare species needs to be completed during the time of year when the species is present or easily identifiable. • The area of the habitat to the finest ELC scale that protects the habitat form and function is the SWH, this must be delineated through detailed field studies. The habitat needs be easily mapped and cover an important life stage component for a species e.g. specific nesting habitat or foraging habitat. • SWHMiST Index #37 provides development effects and mitigation measures.	**Wood Thrush (Special Concern) was recorded in the area.**

Table 5. Significant Wildlife Habitat Ecoregion 6E Assessment, Wasaga West End Water Storage, Wasaga Beach, ON.

1.4 Animal Movement Corridors

Wildlife Habitat	Wildlife Species	Candidate SHW		Confirmed SWH	Assessment
		ELC Ecosite	**Habitat Criteria and Information Sources**	**Defining Criteria**	
Amphibian Movement Corridors **Rationale;** Movement corridors for amphibians moving from their terrestrial habitat to breeding habitat can be extremely important for local populations.	Eastern Newt American Toad Spotted Salamander Four-toed Salamander Blue-spotted Salamander Gray Treefrog Western Chorus Frog Northern Leopard Frog Pickerel Frog Green Frog Mink Frog Bullfrog	Corridors may be found in all ecosites associated with water. • Corridors will be determined based on identifying the significant breeding habitat for these species in Table 1.1	Movement corridors between breeding habitat and summer habitat. • Movement corridors must be determined when Amphibian breeding habitat is confirmed as SWH from Table 1.2.2 (**Amphibian Breeding Habitat –Wetland)** of this Schedule. Information Sources • MNRF District Office. • Natural Heritage Information Center (NHIC). • Reports and other information available from Conservation Authorities. • Field Naturalist Clubs.	• Field Studies must be conducted at the time of year when species are expected to be migrating or entering breeding sites. • Corridors should consist of native vegetation, with several layers of vegetation. • Corridors unbroken by roads, waterways or bodies, and undeveloped areas are most significant • Corridors should have at least 15m of vegetation on both sides of waterway or be up to 200m wide of woodland habitat and with gaps <20mcxlix . • Shorter corridors are more significant than longer corridors, however amphibians must be able to get to and from their summer and breeding habitat. • SWHMiST Index #40 provides development effects and mitigation measures	No suitable habitat.
Deer Movement Corridors **Rationale:** Corridors important for all species to be able to access seasonally important life-cycle habitats or to access new habitat for dispersing individuals by minimizing their vulnerability while travelling.	White-tailed Deer	Corridors may be found in all forested ecosites. A Project Proposal in Stratum II Deer Wintering Area has potential to contain corridors.	Movement corridor must be determined when **Deer Wintering Habitat** is confirmed as SWH from Table 1.1 of this schedule. • A deer wintering habitat identified by the OMNRF as SWH in Table 1.1 of this Schedule will have corridors that the deer use during fall migration and spring dispersion. • Corridors typically follow riparian areas, woodlots, areas of physical geography (ravines, or ridges). Information Sources • MNRF District Office. • Natural Heritage Information Center (NHIC). • Reports and other information available from Conservation Authorities. • Field Naturalist Clubs.	• Studies must be conducted at the time of year when deer are migrating or moving to and from winter concentration areas. • Corridors that lead to a deer wintering habitat should be unbroken by roads and residential areas. • Corridors should be at least 200m wide with gaps <20mcxlix and if following riparian area with at least 15m of vegetation on both sides of waterway. • Shorter corridors are more significant than longer corridors. • SWHMiST Index #39 provides development effects and mitigation measures	Subject property is bound by road and residential areas, and there are no watercourses in the study area or within 120m of it. Not deer movement corridor.

Table 5. Significant Wildlife Habitat Ecoregion 6E Assessment, Wasaga West End Water Storage, Wasaga Beach, ON.

1.5 Exceptions for EcoRegion 6E

EcoDistrict	Wildlife Habitat and Species	Candidate			Confirmed SWH	Assessment
		Ecosites	**Habitat Description**	**Habitat Criteria and Information**	**Defining Criteria**	
6E-14 **Rationale:** The Bruce Peninsula has an isolated and distinct population of black bears. Maintenance of large woodland tracts with mast-producing tree species is important for bears.	**Mast Producing Areas** Black Bear	All Forested habitat represented by ELC Community Series: FOM FOD	• Black bears require forested habitat that provides cover, winter hibernation sites, and mast-producing tree species. • Forested habitats need to be large enough to provide cover and protection for black bears	Woodland ecosites >30ha with mast-producing tree species, either soft (cherry) or hard (oak and beech), Information Sources Important forest habitat for black bears may be identified by OMNRF.	All woodlands > 30ha with a 50%composition of these ELC Vegetation Types are considered significant: FOM1-1 FOM2-1 FOM3-1 FOD1-1 FOD1-2 FOD2-1 FOD2-2 FOD2-3 FOD2-4 FOD4-1 FOD5-2 FOD5-3 FOD5-7 FOD6-5 SWHMiST Index #3 provides development effects and mitigation measures.	Not applicable.
6E- 17 **Rationale:** Sharp-tailed grouse only occur on Manitoulin Island in Eco-region 6E, Leks are an important habitat to maintain their population	**Lek** **Sharp-tailed Grouse**	CUM CUS CUT	• The lek or dancing ground consists of bare, grassy or sparse shrubland. There is often a hill or rise in topography. • Leks are typically a grassy field/meadow >15ha with adjacent shrublands and >30ha with adjacent deciduous woodland. Conifer trees within 500m are not tolerated.	Grasslands (field/meadow) are to be >15ha when adjacent to shrubland and >30ha when adjacent to deciduous woodland. • Grasslands are to be undisturbed with low intensities of agriculture (light grazing or late haying) • Leks will be used annually if not destroyed by cultivation or invasion by woody plants or tree planting Information Sources • OMNRF district office • Bird watching clubs • Local landowners • Ontario Breeding Bird Atlas	Studies confirming lek habitat are to be completed from late March to June. • Any site confirmed with sharp-tailed grouse courtship activities is considered significant • The field/meadow ELC ecosites plus a 200 m radius area with shrub or deciduous woodland is the lek habitat • SWHMiST Index #32 provides development effects and mitigation measures	Not applicable.

Table 6: Species at Risk Habitat Summary AEC14-307

Common Name	Species Name	MNR	SARA	Key Habitats Used By Species[1]	Initial Assessment
Bank Swallow	*Riparia riparia*	THR	THR	Nests in burrows excavated in natural and human-made settings with vertical sand and silt faces. Colonies commonly found in sand or gravel pits, lakeshores, and along river banks ESA Protection: Species and general habitat protection	No suitable habitat is available for the species.
Barn Swallow	*Hirundo rustica*	THR	THR	Ledges and walls of man-made structures such as buildings, barns, boathouses Cliffs or caves ESA Protection: Species and general habitat protection	No foraging or nesting habitat observed within the property limits.
Bobolink	*Dolichonyx oryzivorus*	THR	Not Listed	Large, open expansive grasslands with dense ground cover; hayfields, meadows or fallow fields; marshes; requires tracts of grassland >4ha (MNRF, 2000) ESA Protection: Species and general habitat protection	No suitable grassed meadows were observed.
Butternut	*Juglans cinerea*	END	END	Occurs on a variety of sites, inc luding dry rocker soils (particularly those of limestone origin); grows best on well-drained fertile soils in shallow valleys and on gradual slopes; singly or in small groups mixed with other species. Intolerant of shade (Farrar 1995) ESA Protection: Species and general habitat protection	No Butternut was observed within or adjacent (25m) to the property limits.
Canada Warbler	*Wilsonia canadensis*	SC	THR	Wet, mixed deciduous-coniferous forests with a well developed shrub layer. Shrub marshes, red-maple stands, cedar stands, black spruce swamps, larch and riparian woodlands along rivers and lakes. (COSEWIC, 2008) ESA Protection: N/A	This species nests across the southern boreal region. The property doesn't offer this habitat.
Chimney Swift	*Chaetura pelagica*	THR	THR	Nests primarily in chimneys though some populations (i.e. in rural areas) may nest in cavity trees (Cadman 2007). Recent changes in chimney design and covering of openings to prevent wildlife access may be a significant factor in recent declines in numbers (Adams and Lindsey 2010). ESA Protection: Species and general habitat protection	No suitable habitat is available for the species.
Common Nighthawk	*Chordeiles minor*	SC	THR	Open habitats including sand dunes, beaches recently logged/burned over areas, forest clearings, short grass prairies, pastures, open forests, bogs, marshes, lakeshores, gravel roads, mine tailings, quarries, and other open relatively clear areas. (COSEWIC, 2007) ESA Protection: N/A	No suitable habitat is available for the species.
Eastern Hog-nosed Snake	*Heterodon platirhinos*	THR	THR	Open areas of sand or fine gravel Rock-barren ESA Protection: Species and general habitat protection	**Potential suitable habitat for the species is present (forest). Availability of prey (mainly toads) unknown.**
Eastern Meadowlark	*Sturnella magna*	THR	Not Listed	Open, grassy meadows, farmland, pastures, hayfields or grasslands with elevated singing perches; cultivated land and weedy areas with trees. Old orchards with adjacent, open grassy areas >4 ha in size (MNRF, 2000) ESA Protection: Species and general habitat protection	No suitable grassed meadows were observed.
Eastern Small-footed Bat	*Myotis Lleibii*	END	END	Generally occurrs in mountainous or rocky regions where it has been noted to roost in large boulders and beneath slabs of rock and stones. Hibernation is typically confined to caves and abandoned mine adits. (Best and Jennings, 1997 and MNRF, 2014) ESA Protection: Species and general habitat protection	**Potential spring/summer habitat for species is present (maternity colony). No potential hibernacula.**
Eastern Wood-pewee	*Contopus virens*	SC	SC	Typically associated with deciduous and mixed forests with little understory vegetation; Often found in clearings or on edges of deciduous and mixed forests (MNRF, 2015). ESA Protection: N/A	**Potential habitat for the species is present.**
Golden-winged Warbler	*Vermivora chrysoptera*	SC	THR	Areas of early successional scrub surrounded by Mature Forests including dry uplands, swamp forests, and marshes (COSEWIC, 2006#). ESA Protection: N/A	No suitable habitat is available for the species.

Table 6: Species at Risk Habitat Summary

AEC14-307

Common Name	Species Name	MNR	SARA	Key Habitats Used By Species[1]	Initial Assessment
Little Brown Myotis	*Myotis lucifugus*	END	END	Forests and regularly aging human structures as maternity roost sites. Regularly associated with attics of older buildings and barns for summer maternity roost colonies. Overwintering sites are characteristically mines or caves, but can often include buildings (MNRF 2014, COSEWIC 2013a). ESA Protection: Species and general habitat protection	**Potential spring/summer habitat for species is present (maternity colony). No potential hibernacula.**
Northern Long-eared Bat	*Myotis septentrionalis*	END	END	Maternity roost sites are generally located within deciduous and mixed forests and focused in snags including loose bark and cavities of trees. Overwintering sites are characteristically mines or caves. ESA Protection: Species and general habitat protection	**Potential spring/summer habitat for species is present (maternity colony). No potential hibernacula.**
Northern Map Turtle	*Grapetemys geographica*	SC	SC	Northern Map Turtles prefer rivers and lakeshores with available emergent rocks and fallen trees for basking. Deep, slow-moving sections of rivers are utilized for hibernation (COSEWIC, 2002a). ESA Protection: N/A	No suitable habitat is available for the species.
Olive-sided Flycatcher	*Contopus cooperi*	SC	THR	Natural forest openings, forest edges near natural openings (such as wetlands) or open to semi-open forest stands. Occasionally human made openings (such as clear cuts). Presence of tall snags and residual live trees is essential. (COSEWIC, 2007 and MNRF, 2015)) ESA Protection: N/A	No suitable habitat is available for the species.
Red-Headed Woodpecker	*Melanerpes erythrocephalus*	SC	THR	Oak and Beech Forests, graasslands, forest edges, orchards, pastures, riparian forests, roadsides, urban parks, golf courses, cemetaries, beaver ponds and burns (COSEWIC, 2007#). ESA Protection: N/A	**Potential habitat for the species is present within and adjacent to the property limits.**
Tri-colored Bat	*Perimyotis subflavus*	END	END	Maternity roost sites are generally located within deciduous and mixed forests and focused in snags including loose bark and cavities of trees. Might roost on attics and other structures. Overwintering sites are characteristically mines or caves. ESA Protection: Species and general habitat protection	**Potential spring/summer habitat for species is present (maternity colony). No potential hibernacula.**
Western Chorus Frog	*Pseudacristris eriata*	THR (Great Lakes-St. Lawrence population)	Not at Risk	Habitats include damp meadows, marshes, forest edges, bottomland swamps, and temporary ponds. Breeding sites include quiet, shallow, usually temporary water with submerged and low emergent vegetation, especially rain-flooded meadows and ditches and temporary ponds in floodplains. ESA Protection: N/A	Western Chorus Frog is not considered to be at risk in Ontario, according to ESA. It is considered Threatened under the Species at Risk Act (federal), however, the federal act does not apply to private property.
Whip-Poor-Will	*Caprimulgus vociferus*	THR	THR	Whip-poor-will prefer areas with a mix of open and forested habitat, open woodlands, or openings in mature forests (MNRF, 2015). ESA Protection: Species and general habitat protection	Woodland understory is quite dense with minimal canopy openings. Individuals were not documented during species specific surveys.
Wood Thrush	*Hylocichla mustelina*	SC	THR	Typically associated with moist mature deciduous and mixed forests with a well developed understory. ESA Protection: N/A	**Species was recorded on site.**

1. Habitat as outlined within the Species at Risk in MNR's Parry Sound District Excel file version 3, updated as of May 10, 2012, MNRF's Species at Risk in Ontario website files (https://www.ontario.ca/environment-and-energy/species-risk-ontario-list), or Species Specific COSEWIC Reports referenced in this document.

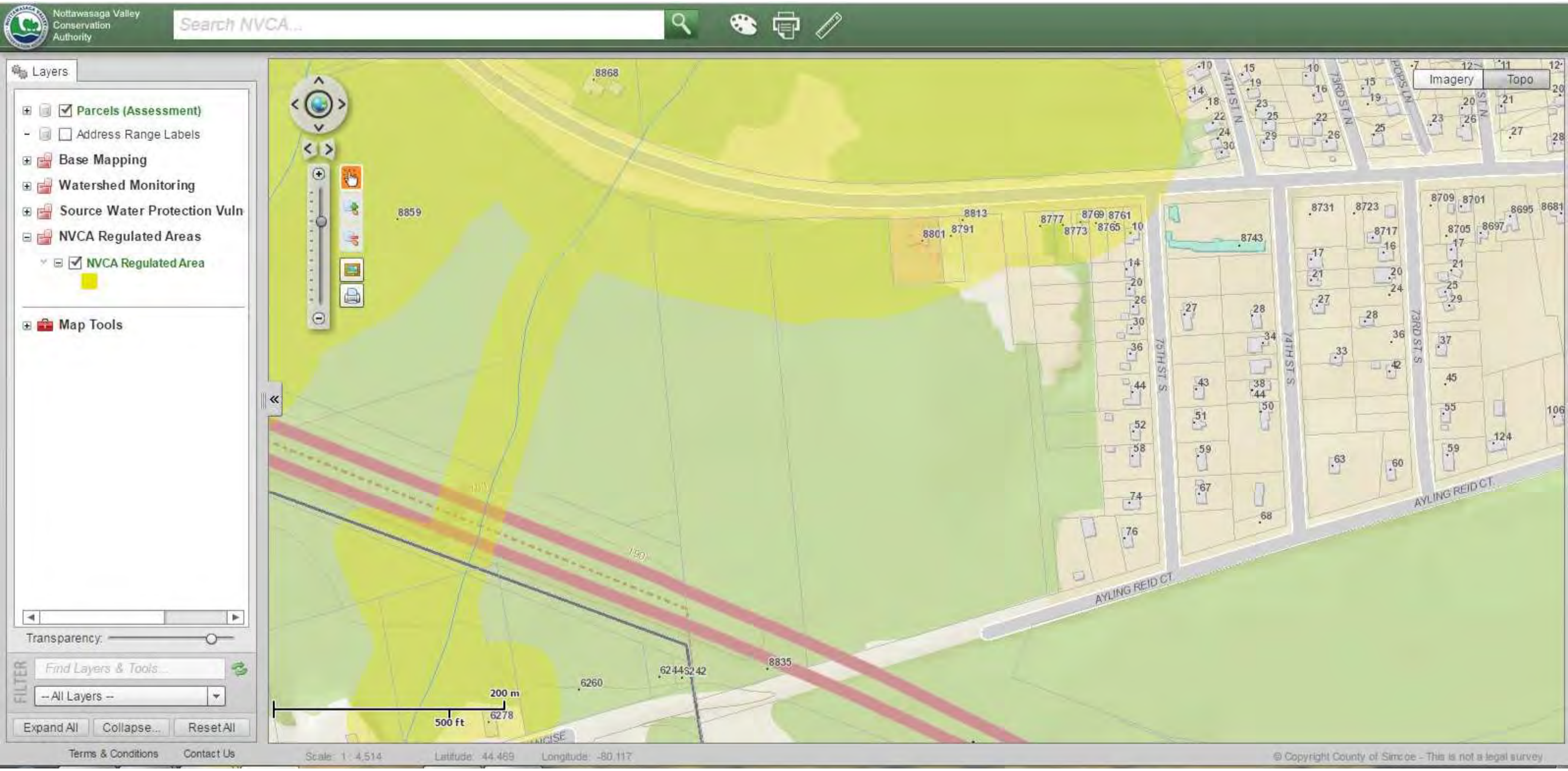
Species at Risk in Ontario List (November 2, 2015)
Adams, C.E., and K.J. Lindsey. 2010. Urban wildlife management: second edition. CRC Press, Taylor & Francis Group. New York, NY, USA.
Cadman, M.E., D.A. Sutherland, G.G. Beck, D. Lepage, and A.R. Couturier. 2007. The atlas of the breeding birds of Ontario, 2001-2005. Bird Studies Canada, Environment
COSEWIC. 2002b. COSEWIC assessment and update status report on the Northern Map Turtle in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 34 pp. + vi.
COSEWIC. 2013b. COSEWIC assessment and update status report on the Bank Swallow. Committee on the Status of Endangered Wildlife in Canada. Ottawa. 48 pp. + ix.
Farrar, J.L. 1995. Trees in Canada. Fitzhenry and Whiteside Limited Markham, ON, CAN
Ministry of Natural Resources – Fish and Wildlife Branch (MNR). 2000. Significant Wildlife Habitat Technical Guide.
Ministry of Natural Resources and Forestry (MNRF). 2014. Eastern Small-footed Bat. Queen's Printer for Ontario. https://www.ontario.ca/environment-and-energy/eastern-small-footed-bat
Ministry of Natural Resources and Forestry (MNRF). 2015 http://www.ontario.ca/environment-and-energy/species-risk
COSEWIC. 2008. COSEWIC assessment and status report on the Canada Warbler Wilsonia Canadensis in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. vi + 35 pp.
COSEWIC 2006. COSEWIC assessment and status report on the Golden-winged Warbler Vermivora chrysoptera in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa.vii + 30 pp
COSEWIC. 2007. COSEWIC assessment and status report on the Olive-sided Flycatcher Contopus cooperi in Canada. Committee on the Status of Endangered Wildlife in Canada. Ottawa. Vii + 25pp.

APPENDICES

Appendix A: Official Plan Schedules & Maps
Appendix B: Ontario Breeding Bird Atlas (OBBA) Data
Appendix C: Agency Consultation

APPENDIX A

Official plan Schedules and Maps



Scale: 1 : 4,514 Latitude: 44.469 Longitude: -80.117

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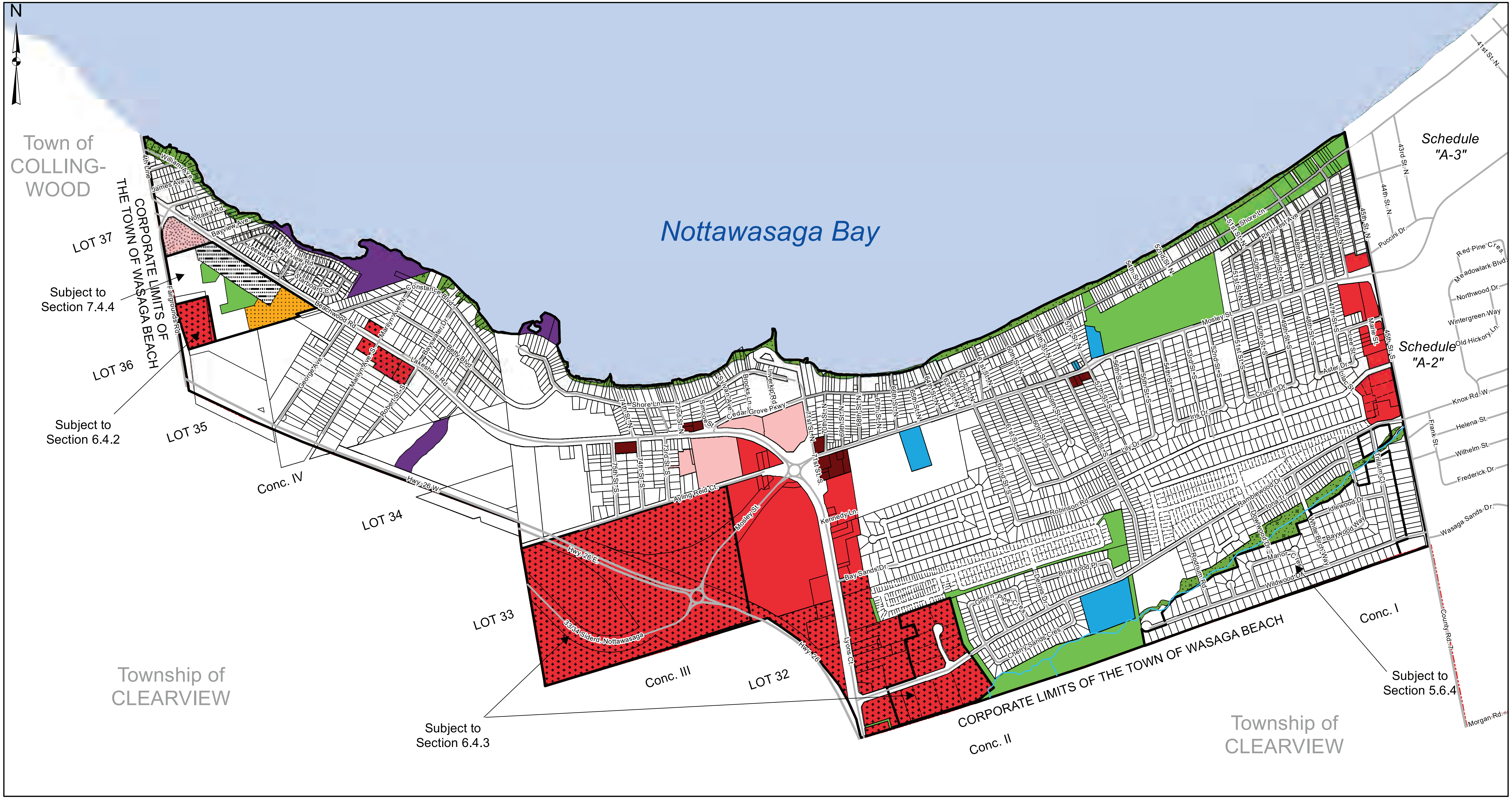
Wasaga Beach

Natural Heritage System: Existing Woodlands

LEGEND

- ▤ **Simcoe County Greenlands**
- 🟩 **Simcoe County Woodlands**
- 🟥 **Town of Wasaga Beach Boundary**
- ▢ **Study Area**



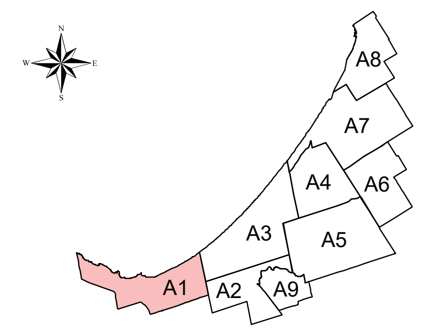
Adopted by Council: Sept 9, 2003

Approved by the County of Simcoe: June 22, 2004

Consolidated: September 6, 2013

NOTE: The lot lines depicted on this map are for reference only and may not reflect accurately property boundaries in all instances.

0 100 200 400 600 800 1,000
Metres



Legend

⬜	Residential	🟧	Tourism Accommodation
▤	High Density Residential	▨	Tourism Commercial
░	Country Club Community	🟦	Institutional
▭	Campground Commercial	🟩	Open Space
▒	Recreational Commercial	▩	Natural Hazards
▦	Service Commercial	🟪	Natural Heritage System Category 1
🟥	District Commercial	▭	Rural
🟫	Local Commercial	▬	Waste Disposal

Schedule 'A-1'

Land Use Plan

Official Plan of theTown of Wasaga Beach

Adopted by Council: September 9, 2003

Approved by the County of Simcoe: June 22, 2004

Consolidated: September 6, 2013

NOTE: The lot lines depicted on this map are for reference only and may not reflect accurately property boundaries in all instances.

0 300 600 1,200 1,800 2,400 3,000
Metres

☐ ANSI (Area of Natural and Scientific Interest)

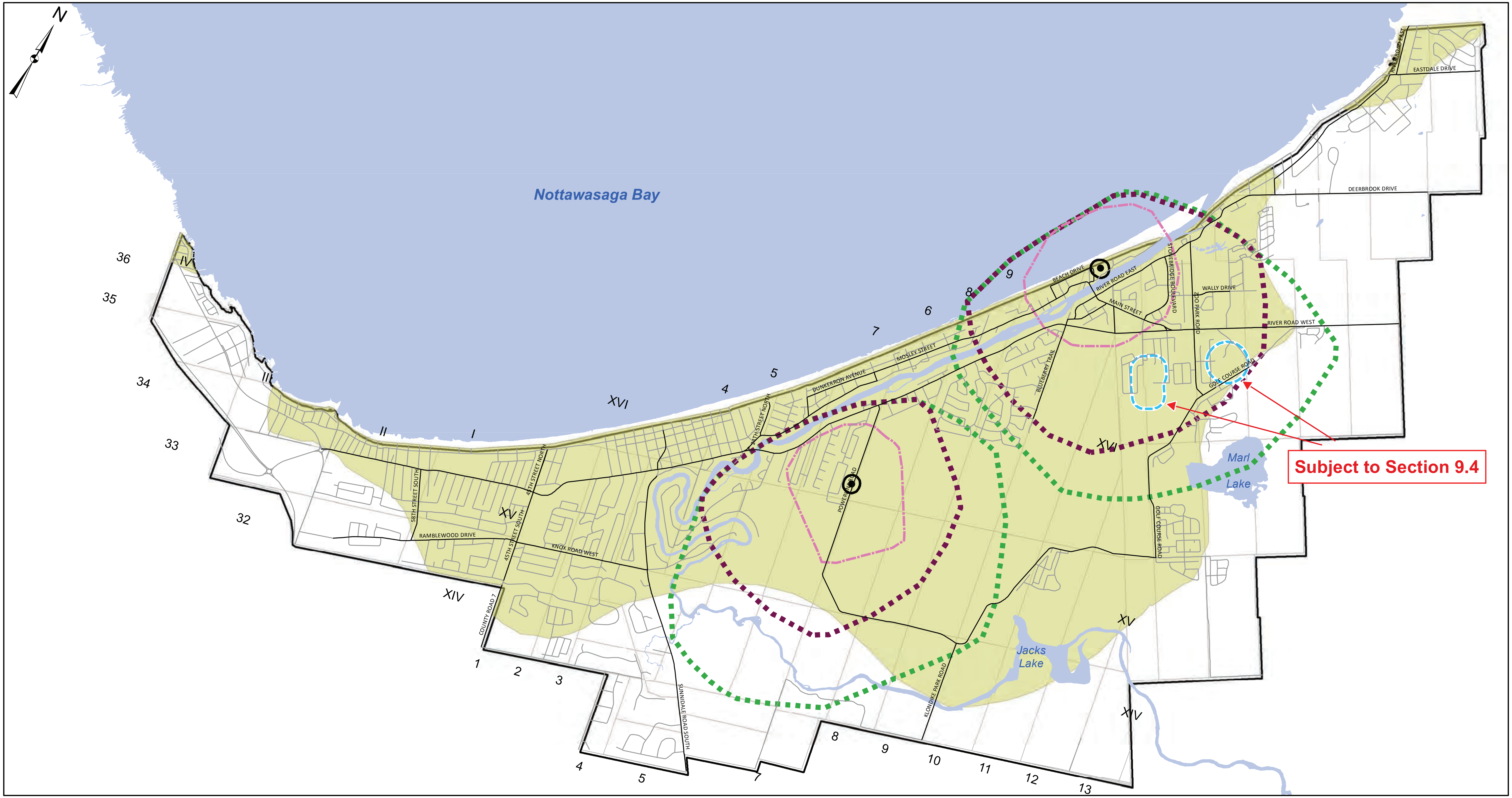
🟦 Provincially Significant Wetland Complex

▨ Natural Heritage System Category 1 and 2 Lands

Schedule 'D'

Natural Heritage System

Official Plan of theTown of Wasaga Beach



Adopted by Council: September 9, 2003

Approved by the County of Simcoe: June 22, 2004

Consolidated: September 6, 2013

NOTE: The lot lines depicted on this map are for reference only and may not reflect accurate property boundaries in all instances.

0 300 600 1,200 1,800 2,400 3,000

Metres

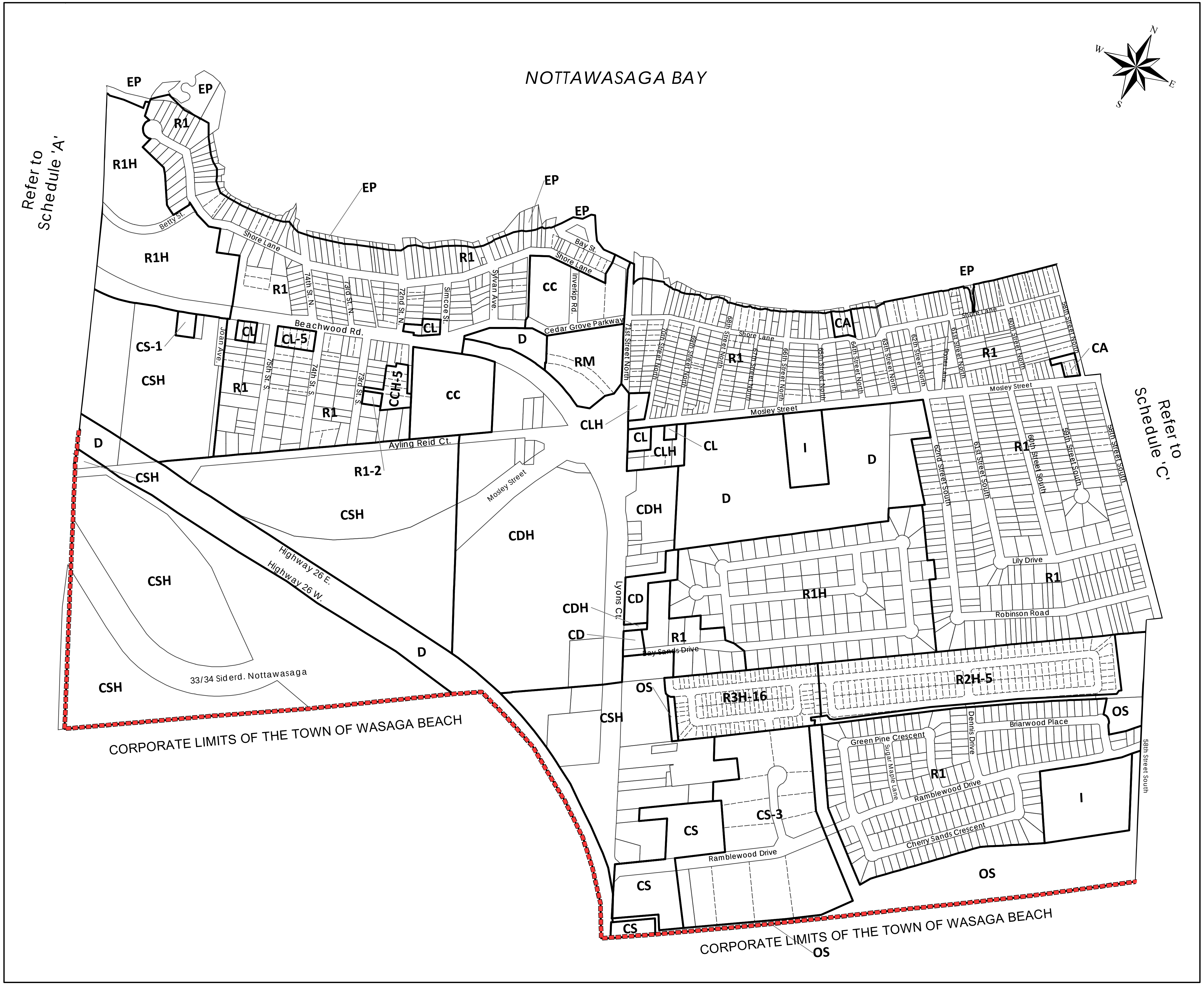
- ● Municipal Wells
- ☐ Well Head Protection Area-A: 100 Metre Fixed Radius Area Capture Zone
- ☐ Well Head Protection Area-B: 2 Year Capture Zone
- ☐ Well Head Protection Area-C: 2-10 Year Capture Zone
- ☐ Well Head Protection Area-D: 10-25 Year Capture Zone
- ▨ Area of High Aquifer Vulnerability
- ☐ Special Hydrogeological Study Area

TOWN OF WASAGA BEACH • INCORPORATED 1974 •

Schedule 'G'

Wellhead Protection Areas and Vulnerable Aquifer Areas

Official Plan for theTown of Wasaga Beach



SCHEDULE 'B'

TOWN OF WASAGA BEACH

The Beach is Just the Beginning...
WASAGA
Beach

THIS IS SCHEDULE 'B' TO BY-LAW
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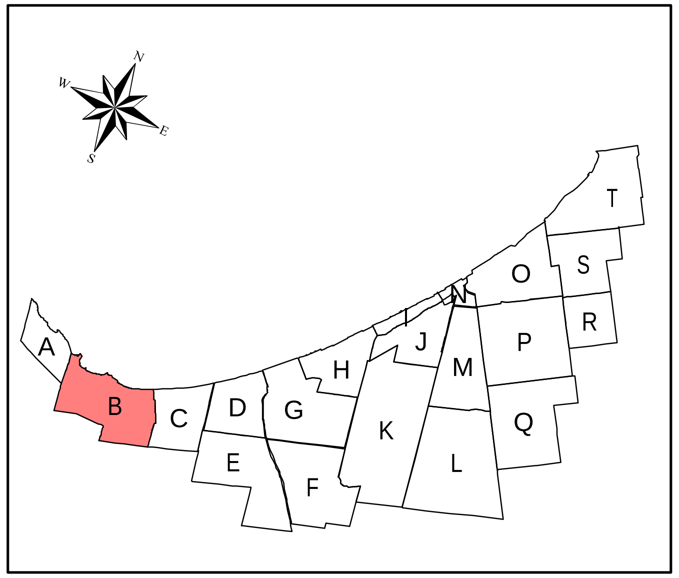
SIGNATURES OF SIGNING OFFICERS

MAYOR ____________________

CLERK ____________________



OFFICE CONSOLIDATION
AUGUST 2014

NOTE: The lot lines depicted on this map are for reference purposes only and may not reflect accurately property boundaries in all instances

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APPENDIX B

Ontario Breeding Bird Atlas (OBBA) Data

Atlas of the BREEDING BIRDS OF ONTARIO

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Atlas of the
BREEDING BIRDS
OF ONTARIO

About the Atlas Data and Maps Resources for Atlassers Fra

Atlas Data Summary

Select what type of data summary you would like to display and click the appropriate view button. You can use those pages to find out where the atlas regions and atlas squares are located.

What years do you want to display : : all years combined ▼ Which version of the atlas Second (2001-2005) ▼

How do you want to view the results: Tabular results ▼

Show me statistics on the number of species reported, the effort, etc.

1. View summary statistics:: Province ▼ View
2. View summary statistics: By Square ▼ within region 1. Essex ▼ View
3. View list of completed Point Counts in square :: View

Show me the list of species, the highest breeding evidence and abundance

4. View species list for : : Province ▼ View
5. View species list for square or block no. : : 17NK62 View

Show me the list of regions or squares reporting a species

6. View list of Regions ▼ reporting ▼ View

Species list for square 17NK62 (number of entries returned: 116)

Region	Square	Species		Breeding Evidence			Point Counts			
			Max BE	Categ	#Sq	Atlasser Name	#PC	%PC	Abun	#Sq
13	17NK62	Canada Goose	AE	CONF	1	Glenn Coady	1	1.92	0.0192	1
13	17NK62	Trumpeter Swan	FY	CONF	1					
13	17NK62	American Wigeon	P	PROB	1					
13	17NK62	Mallard	FY	CONF	1	Glenn Coady	2	3.85	0.0385	1
13	17NK62	Blue-winged Teal	P	PROB	1					
13	17NK62	Northern Shoveler	P	PROB	1					
13	17NK62	Ring-necked Duck	H	POSS	1					
13	17NK62	Hooded Merganser	P	PROB	1					
13	17NK62	Common Merganser	FY	CONF	1					
13	17NK62	Red-breasted Merganser	D	PROB	1					
13	17NK62	Ruffed Grouse	T	PROB	1					
13	17NK62	Wild Turkey	FY	CONF	1	Geoff Carpentier				
13	17NK62	Common Loon	H	POSS	1					
13	17NK62	Pied-billed Grebe	P	PROB	1					
13	17NK62	Great Blue Heron	NY	CONF	1					
13	17NK62	Green Heron	A	PROB	1					
13	17NK62	Black-crowned Night-Heron	H	POSS	1					
13	17NK62	Turkey Vulture	D	PROB	1		1	1.92	0.0192	1
13	17NK62	Northern Harrier	H	POSS	1	2 atlassers				
13	17NK62	Sharp-shinned Hawk	A	PROB	1	Geoff Carpentier	1	1.92	0.0192	1
13	17NK62	Cooper's Hawk	H	POSS	1					
13	17NK62	Northern Goshawk	H	POSS	1	Geoff Carpentier				
13	17NK62	Red-shouldered Hawk	H	POSS	1	Geoff Carpentier				
13	17NK62	Red-tailed Hawk	P	PROB	1		4	7.69	0.0769	1
13	17NK62	American Kestrel	T	PROB	1		3	5.77	0.0577	1
13	17NK62	Killdeer	DD	CONF	1	Glenn Coady	9	17.31	0.1923	1
13	17NK62	Rock Pigeon	NY	CONF	1	Glenn Coady	8	15.38	0.3462	1
13	17NK62	Spotted Sandpiper	A	PROB	1	Glenn Coady	2	3.85	0.0385	1
13	17NK62	Upland Sandpiper	D	PROB	1					
13	17NK62	Common Snipe	S	POSS	1	Glenn Coady				
13	17NK62	American Woodcock	D	PROB	1					
13	17NK62	Ring-billed Gull	NY	CONF	1		10	19.23	0.5385	1
13	17NK62	Herring Gull	NY	CONF	1		3	5.77	0.0962	1
13	17NK62	Common Tern	P	PROB	1		1	1.92	0.0192	1
13	17NK62	Mourning Dove	NE	CONF	1	Glenn Coady	37	71.15	1.0192	1
13	17NK62	Black-billed Cuckoo	S	POSS	1	Glenn Coady	1	1.92	0.0192	1
13	17NK62	Eastern Screech-Owl	H	POSS	1	Geoff Carpentier				

13	17NK62	Great Horned Owl	D	PROB	1	Christa L. Rigney				
13	17NK62	Barred Owl	H	POSS	1					
13	17NK62	Common Nighthawk	S	POSS	1	Glenn Coady				
13	17NK62	Whip-poor-will	T	PROB	1					
13	17NK62	Chimney Swift	T	PROB	1	Glenn Coady	1	1.92	0.0192	1
13	17NK62	Ruby-throated Hummingbird	D	PROB	1					
13	17NK62	Belted Kingfisher	AE	CONF	1		1	1.92	0.0192	1
13	17NK62	Red-headed Woodpecker	N	PROB	1					
13	17NK62	Yellow-bellied Sapsucker	S	POSS	1					
13	17NK62	Downy Woodpecker	AE	CONF	1	Glenn Coady	7	13.46	0.1923	1
13	17NK62	Hairy Woodpecker	H	POSS	1	Glenn Coady	1	1.92	0.0192	1
13	17NK62	Northern Flicker	N	PROB	1		19	36.54	0.3654	1
13	17NK62	Pileated Woodpecker	FY	CONF	1					
13	17NK62	Eastern Wood-Pewee	T	PROB	1		1	1.92	0.0192	1
13	17NK62	Alder Flycatcher	H	POSS	1					
13	17NK62	Least Flycatcher	T	PROB	1		3	5.77	0.0577	1
13	17NK62	Eastern Phoebe	CF	CONF	1	Glenn Coady	2	3.85	0.0385	1
13	17NK62	Great Crested Flycatcher	AE	CONF	1		5	9.62	0.0962	1
13	17NK62	Eastern Kingbird	AE	CONF	1		10	19.23	0.2308	1
13	17NK62	Warbling Vireo	AE	CONF	1		7	13.46	0.1346	1
13	17NK62	Red-eyed Vireo	NU	CONF	1	Geoff Carpentier	8	15.38	0.1538	1
13	17NK62	Blue Jay	CF	CONF	1	Glenn Coady	12	23.08	0.2885	1
13	17NK62	American Crow	AE	CONF	1	Glenn Coady	23	44.23	0.5962	1
13	17NK62	Purple Martin	NY	CONF	1	Glenn Coady	1	1.92	0.0577	1
13	17NK62	Tree Swallow	NY	CONF	1		5	9.62	0.1731	1
13	17NK62	Northern Rough-winged Swallow	H	POSS	1	Glenn Coady	1	1.92	0.0192	1
13	17NK62	Bank Swallow	AE	CONF	1	Glenn Coady	1	1.92	0.0192	1
13	17NK62	Cliff Swallow	NY	CONF	1	Glenn Coady	1	1.92	0.2308	1
13	17NK62	Barn Swallow	AE	CONF	1		6	11.54	0.1346	1
13	17NK62	Black-capped Chickadee	CF	CONF	1		11	21.15	0.2692	1
13	17NK62	Red-breasted Nuthatch	P	PROB	1		2	3.85	0.0769	1
13	17NK62	White-breasted Nuthatch	NY	CONF	1		12	23.08	0.3269	1
13	17NK62	House Wren	NY	CONF	1	Geoff Carpentier	16	30.77	0.3077	1
13	17NK62	Winter Wren	S	POSS	1	Glenn Coady	2	3.85	0.0385	1
13	17NK62	Eastern Bluebird	FY	CONF	1	Glenn Coady				
13	17NK62	Veery	T	PROB	1	Glenn Coady	2	3.85	0.0385	1
13	17NK62	Hermit Thrush	H	POSS	1					
13	17NK62	Wood Thrush	S	POSS	1	Glenn Coady	3	5.77	0.0577	1
13	17NK62	American Robin	NY	CONF	1	Geoff Carpentier	49	94.23	2.2885	1
13	17NK62	Gray Catbird	CF	CONF	1	Glenn Coady	4	7.69	0.0769	1
13	17NK62	Brown Thrasher	A	PROB	1	Glenn Coady	1	1.92	0.0192	1
13	17NK62	European Starling	AE	CONF	1	Glenn Coady	36	69.23	2.7885	1
13	17NK62	Cedar Waxwing	NB	CONF	1	Glenn Coady	1	1.92	0.0192	1
13	17NK62	Nashville Warbler	S	POSS	1	Glenn Coady				
13	17NK62	Yellow Warbler	AE	CONF	1		4	7.69	0.0962	1
13	17NK62	Chestnut-sided Warbler	S	POSS	1	Glenn Coady	1	1.92	0.0192	1
13	17NK62	Magnolia Warbler	H	POSS	1					
13	17NK62	Yellow-rumped Warbler	D	PROB	1					
13	17NK62	Blackburnian Warbler	H	POSS	1					
13	17NK62	Black-and-white Warbler	S	POSS	1	Glenn Coady				
13	17NK62	American Redstart	T	PROB	1	Glenn Coady	2	3.85	0.0385	1
13	17NK62	Ovenbird	T	PROB	1	Glenn Coady				
13	17NK62	Northern Waterthrush	S	POSS	1	Glenn Coady				
13	17NK62	Mourning Warbler	T	PROB	1	Glenn Coady	1	1.92	0.0192	1
13	17NK62	Common Yellowthroat	T	PROB	1	Glenn Coady				
13	17NK62	Eastern Towhee	S	POSS	1	Joel Kits				
13	17NK62	Chipping Sparrow	NY	CONF	1	Geoff Carpentier	20	38.46	0.4038	1
13	17NK62	Field Sparrow	S	POSS	1	Glenn Coady				
13	17NK62	Vesper Sparrow	P	PROB	1		2	3.85	0.0385	1
13	17NK62	Savannah Sparrow	D	PROB	1		5	9.62	0.1346	1
13	17NK62	Song Sparrow	NY	CONF	1		33	63.46	0.8077	1
13	17NK62	Swamp Sparrow	T	PROB	1	Glenn Coady				
13	17NK62	White-throated Sparrow	T	PROB	1	Glenn Coady	6	11.54	0.1154	1
13	17NK62	Scarlet Tanager	S	POSS	1	Glenn Coady				
13	17NK62	Northern Cardinal	NE	CONF	1	Glenn Coady	6	11.54	0.1346	1
13	17NK62	Rose-breasted Grosbeak	T	PROB	1	Glenn Coady	5	9.62	0.1154	1
13	17NK62	Indigo Bunting	T	PROB	1	Glenn Coady	1	1.92	0.0192	1
13	17NK62	Bobolink	P	PROB	1	Glenn Coady	1	1.92	0.0192	1
13	17NK62	Red-winged Blackbird	NE	CONF	1		5	9.62	0.0962	1
13	17NK62	Eastern Meadowlark	T	PROB	1	Glenn Coady				
13	17NK62	Common Grackle	NY	CONF	1	Geoff Carpentier	45	86.54	1.5192	1
13	17NK62	Brown-headed Cowbird	FY	CONF	1	Glenn Coady	15	28.85	0.5962	1
13	17NK62	Baltimore Oriole	NU	CONF	1	Geoff Carpentier	8	15.38	0.1538	1

13	17NK62	Purple Finch	NB	CONF	1					
13	17NK62	House Finch	NE	CONF	1	Glenn Coady	6	11.54	0.1538	1
13	17NK62	Pine Siskin	P	PROB	1					
13	17NK62	American Goldfinch	CF	CONF	1		11	21.15	0.2692	1
13	17NK62	Evening Grosbeak	H	POSS	1					
13	17NK62	House Sparrow	AE	CONF	1	Glenn Coady	21	40.38	0.9423	1

New data summary Download results

Disclaimer: If you wish to use the data in a publication, research or for any purpose, or would like information concerning the accuracy and appropriate uses of these data, read the data use policy and request form. These data are current as of 29 Oct 2015 .

LEGEND	
Breeding Evidence Max BE: Highest Breeding Evidence recorded Categ: Highest Breeding Category recorded (OBS=observed, POSS=possible, PROB=probable, CONF=confirmed) #Sq: Number of squares with species (Breeding Evidence) Atlasser name: Name of atlasser who reported the highest breeding evidence (if they accepted that their name be displayed). If more than one person provided the same breeding evidence code, then only the number of atlassers is listed.	Point Counts #PC: Number of Point Counts with species %PC: Percent of Point Counts with species Abun: Average number of birds per Point Count #Sq: Number of squares with species (Point Counts)

Site hosted by Bird Studies Canada

APPENDIX C

Agency Consultation

AZIMUTH ENVIRONMENTAL
CONSULTING, INC.
Environmental Assessments & Approvals

October 29, 2015 AEC 14-307

Nottawasaga Valley Conservation Authority (NVCA)
8195 8th Line
Utopia, ON
L0M 1T0

Attention: David Featherstone, B.Sc.

Re: **Scoped Environmental Impact Study for the Proposed West End Water Storage Facility and Maintenance Depot Environmental Assessment (RFP # PW 2014-07), Town of Wasaga Beach, Simcoe County.**

Dear Mr. Featherstone:

Azimuth Environmental Consulting Inc. (Azimuth) has been retained by Ainley Group to complete a Scoped Environmental Impact Study (EIS) for the proposed West End Water Storage Facility and Maintenance Depot Environmental Assessment on property located at Lot 34, Concession 3, Town of Wasaga Beach (Town), County of Simcoe. A scoped . IS is required to satisf. all the requirements of the Schedule C' Municipal Class Environmental Assessment (EA).

We have contacted NVCA regarding this project in the past (November 24th, 2014 Email from Taco Den Haas, Azimuth to David Featherstone, NVCA) inquiring about records of Species at Risk (SAR) existent in the general area. The purpose of this letter is to confirm the Scope of Work we have delineated to complete the abovementioned EIS.

SCOPE OF WORK

Azimuth has scoped and completed the following activities in order to satisfy the informational requirements for the production of the EIS:

- Reviewed proposed location provided by Ainley Group's Project Team
- Collected and reviewed all available existing background natural heritage information for the study area and adjacent lands.

- Consulted with NVCA (this letter) and MNRF to inquire in regards to their concerns with the proposed development and site location;
- Prepared a Species at Risk screening based on desktop records of species occurrences known to occur in the area in relation to site knowledge of the habitats present within the property and through consultation with MNRF and NVCA;
- Mapped existing natural features on maps with current aerial photographs;
- Conducted a single field survey to confirm background information and to identify the presence of any fish habitat and wetlands not documented in background information.
- Prepared a EIS report that:
    - characterizes existing natural heritage features and functions;
    - summarizes relevant environmental policy;
    - identifies additional field surveys that may be required and potential constraints related to the existing natural features and functions, as well as opportunities for development,
    - assesses potential direct and indirect impacts based on details of the development (i.e. design plan, etc.) on existing environmental features and functions; and
    - provides recommendations for appropriate voidance/mitigation/restoration strategy to address the potential environmental impacts.

Yours truly,
AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Bruna D.A. Peloso

Bruna Peloso, M.Sc.
Terrestrial Ecologist

Attach: Study Area map

Bruna Dias Peloso

From:	Melissa Fuller
Sent:	October-28-15 3:32 PM
To:	Bruna Dias Peloso
Subject:	FW: Wasaga West Water Storage EA - SAR Information Request

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From: Dave Featherstone [mailto:dfeatherstone@nvca.on.ca]
Sent: December-11-14 8:33 AM
To: Taco Den Haas
Subject: RE: Wasaga West Water Storage EA - SAR Information Request

You're welcome, Taco. I'm off for a long holiday rest – it's been a pleasure working with you and lots of fun seeing you at the non-NVCA events – have a great holiday season!

Dave

From: Taco Den Haas [mailto:TDenHaas@Azimuthenvironmental.Com]
Sent: Wednesday, December 10, 2014 1:18 PM
To: Dave Featherstone
Cc: Robinson, Suzanne (MNR) (suzanne.robinson@ontario.ca); John Mabira; Melissa Fuller
Subject: RE: Wasaga West Water Storage EA - SAR Information Request

Thanks David,
We'll take these comments and those from Suzanne into account as we proceed with the planning of the field studies.
Regards,
Taco
office (705) 721-8451 x 220
cell (705) 331-6677

From: Dave Featherstone [mailto:dfeatherstone@nvca.on.ca]
Sent: December-10-14 1:15 PM
To: Taco Den Haas
Cc: Robinson, Suzanne (MNR) (suzanne.robinson@ontario.ca)
Subject: RE: Wasaga West Water Storage EA - SAR Information Request

Hi Taco. Apologies for the delay. I have a couple of milksnake records from 62nd St south of Mosley. Though not on the provincial list, I have several records of western chorus frog within the broader area – they seem to be fairly common in Wasaga/Collingwood/northern Clearview. I heard a whip-poor-will in spring 2014 in close proximity to the block second from the west (between new 26 and Beachwood) – not an exact location or date, unfortunately, but heard it from the servicing corridor/trail between Beachwood and Shorelane (it was definitely on the south side of Beachwood. There is a wetland with Great Lakes coastal marsh affinities (possible rare species) in the westernmost parcel (as identified by Gartner Lee several years back). Possible habitat for eastern wood-pewee and wood thrush in the forested blocks.

Best regards,

David Featherstone, B.Sc.
Manager, Watershed Monitoring Program
Nottawasaga Valley Conservation Authority

8195 Concession Line 8
Utopia, Ontario
L0M 1T0
(705) 424-1479 Ext. 242
dfeatherstone@nvca.on.ca

From: Taco Den Haas [mailto:TDenHaas@Azimuthenvironmental.Com]
Sent: Monday, November 24, 2014 2:53 PM
To: Dave Featherstone
Subject: FW: Wasaga West Water Storage EA - SAR Information Request
Importance: High

Hello Dave:
Please find the attached request for background information that I send to MNR Midhurst District.
Thanks,
Taco
office (705) 721-8451 x 220
cell (705) 331-6677

From: Taco Den Haas
Sent: November-24-14 2:25 PM
To: Robinson, Suzanne (MNR)
Cc: Dave Featherstone; 'John Mabira'; Melissa Fuller
Subject: Wasaga West Water Storage EA - SAR Information Request
Importance: High

Dear Suzanne:

The of Town Wasaga beach intends to construct a water storage facility including a maintenance depot in the West end of the settlement of Wasaga Beach. Azimuth was retained by Ainley Group to conduct an Environmental Impact Study for the project. Please find our request for SAR information attached to this email. We look forward to receiving your response. Don't hesitate to contact myself if you have any questions about this request.

Regards,
Taco den Haas
Aquatic Ecologist

Azimuth Environmental Consulting, Inc.
85 Bayfield Street, Suite 400
Barrie, ON L4M 3A7
office (705) 721-8451 x 220
cell (705) 331-6677

Providing services in ecology, environmental engineering & hydrogeology

Bruna Dias Peloso

From: Melissa Fuller
Sent: October-28-15 3:32 PM
To: Bruna Dias Peloso
Subject: FW: Wasaga West Water Storage EA - SAR Information Request

---

From: Robinson, Suzanne (MNRF) [mailto:suzanne.robinson@ontario.ca]
Sent: December-09-14 4:14 PM
To: Taco Den Haas
Cc: Dave Featherstone; John Mabira; Melissa Fuller
Subject: RE: Wasaga West Water Storage EA - SAR Information Request

Good afternoon Taco

Further to your email below, we have reviewed the species at risk information that we have available at this time. Your information request included most of the species that are likely to be located in this area.

There is a record for Northern Long-eared Bat in this area. A number of species of bats have been listed recently, including Northern Long-eared Bats, Little Brown Bats and Eastern Small-footed Myotis. Bats can be found in a number of natural and anthropogenic habitat and features. If there is suitable habitat for any of these species, there is the possibility that they could be present. The forested component of the subject lands could provide roosting and summer maternity habitat for these species.

At this time, there are no other known reports of species at risk that are relevant to this location. The species at risk information is based on the best available information to date, please keep in mind that other species may be present on the landscape.

For a complete list of species at risk in Ontario please review the information at the following link:

http://www.ontario.ca/environment-and-energy/species-risk

Should an observation of a species at risk or rare species occur, please report the information to the Natural Heritage Information Centre (NHIC) http://nhic.mnr.gov.on.ca/nhic_.cfm and to the Midhurst District MNRF office.

Regards,

Suzanne Robinson
Management Biologist
Midhurst District

From: Taco Den Haas [mailto:TDenHaas@Azimuthenvironmental.Com]
Sent: November-24-14 2:25 PM
To: Robinson, Suzanne (MNRF)
Cc: Dave Featherstone; John Mabira; Melissa Fuller
Subject: Wasaga West Water Storage EA - SAR Information Request
Importance: High

Dear Suzanne:

The of Town Wasaga beach intends to construct a water storage facility including a maintenance depot in the West end of the settlement of Wasaga Beach. Azimuth was retained by Ainley Group to conduct an Environmental Impact Study for the project. Please find our request for SAR information attached to this email. We look forward to receiving your response. Don't hesitate to contact myself if you have any questions about this request.

Regards,
Taco den Haas
Aquatic Ecologist

Azimuth Environmental Consulting, Inc.
85 Bayfield Street, Suite 400
Barrie, ON L4M 3A7
office (705) 721-8451 x 220
cell (705) 331-6677

Providing services in ecology, environmental engineering & hydrogeology

AZIMUTH ENVIRONMENTAL
CONSULTING, INC.
Environmental Assessments & Approvals

November 24, 2014 AEC 14-307

Ministry of Natural Resources
Midhurst District
2284 Nursery Road
Midhurst, Ontario
L0L 1X0

Attention: Suzanne Robinson, Species at Risk Biologist

RE: West End Water Storage Facility and Maintenance Depot Background Information Request, Town of Wasaga Beach, Simcoe County

Dear Ms. Robinson,

The of Town Wasaga beach intends to construct a water storage facility including a maintenance depot in the West end of the settlement of Wasaga Beach. Azimuth was retained by Ainley Group (Ainley) to conduct an Environmental Impact Study for the project.

Ainley has identified seven (7) locations for consideration during the environmental assessment process (Figure 1). Azimuth defined a study area for the natural heritage component that encompasses all seven sites. The study area is within the settlement of Wasaga Beach and is designated 'rural and agricultural' by the County of Simcoe Official Plan. The Town of Wasaga Beach official plan identifies this area as residential. Parts of the study area are regulated by NVCA. There are no PSW/ANSI's within or adjacent to study area but the study area contains unevaluated wetlands. Parts of the study area are treed. Other land use includes residential lots institutional land, and municipal roads.

The Ontario Breeding Bird Atlas was consulted to determine the potential for avian Species at Risk to be utilizing the property. Information derived from the Ontario Breeding Bird Atlas indicates that Common Nighthawk, Red-headed Woodpecker, Barn Swallow, Golden-winged Warbler, Eastern Meadowlark, Bobolink, Whip-poor-will, Chimney Swift, Eastern Wood Pewee, Loggerhead Shrike, Bank Swallow, and, Wood Thrush within the general area (OBBA squares 17NK62 & 17NK72).

General background information from Midhurst MNR indicates that SAR within the Town of Wasaga Beach include Piping Plover, Eastern Hog-nosed Snake, Cerulean Warbler, Spotted Wintergreen, Least Bittern. Within the County of Simcoe American Ginseng and Spotted Turtle are known to occur. Other SAR to be considered during SAR assessment includes Butternut.

The purpose of this letter is to request additional information regarding Species at Risk and sensitive areas associated with the study area, aside from those identified above and to request any background information from you that may be relevant to our study.

Thank you very much for your assistance in this matter. If you have any questions regarding this project please do not hesitate to contact us.

AZIMUTH ENVIRONMENTAL CONSULTING, INC.

Tc den Haas

Taco den Haas, M.Sc,
Aquatic Ecologist

c.c.: Dave Featherstone, NVCA.

Attached:

- Figure 2 Environmental Features; and,
- Ontario Breeding Bird Atlas Data Summaries (17NK62 & 17NK72).

ARCHEOWORKS INC.

Stage 1 Archaeological Assessment for the:
Proposed New Wasaga Beach West End Water Storage Facility And Maintenance Depot

Within Part of Lots 32-33, Concession 2, Lots 33-34, Concession 3,
And Lots 34 and 36, Concession 4
Geographic Township of Nottawasaga
Historical County of Simcoe
Now the Town of Wasaga Beach
County of Simcoe
Ontario

Project #: 235-WA1311-14
Licensee (#): Alvina Tam (P1016)
PIF#: P1016-0050-2014

Original Report

November 25th, 2015

Presented to:
Ainley Group
550 Welham Road
Barrie, Ontario
L4N 9H3
T: 705.445.3451

Prepared by:
Archeoworks Inc.
16715-12 Yonge Street, Suite 1029
Newmarket, Ontario
L3X 1X4
T: 416.676.5597
F: 647.436.1938

EXECUTIVE SUMMARY

The Town of Wasaga Beach (the 'Town') identified the need for a new Water Storage Facility and Public Works maintenance depot, in order to meet projected growth and servicing needs to ensure that all areas within the Town will be efficiently supplied by the municipal water system. *Archeoworks Inc*. was retained by *Ainley Group,* to conduct a Stage 1 Archaeological Assessment (AA) of seven proposed site locations within the Town's west end, herein collectively referred to as the 'study area'. The study area is composed of seven properties, which encompasses parts of several lots within the Geographic Township of Nottawasaga, historical County of Simcoe, now the Town of Wasaga Beach, Simcoe County, Ontario.

The Stage 1 background research identified elevated potential for the recovery of archaeologically significant materials within undisturbed portions of the study area. Archaeological potential was determined based on close proximity to historic transportation routes and a primary water source (Nottawasaga Bay). The entirety of Properties #5, #6 and #7, and a large portion of Property #1, however, were previously assessed by other consulting firms. Furthermore, disturbances were identified within the remaining balance of Property #1, and small portions of Property #2. These disturbances are associated with an existing self-storage facility, a commercial business, and some graded roadside areas. Nevertheless, outstanding archaeological concerns exist for the remaining balance of the study area which does not exhibit deep and extensive disturbance, consisting of manicured grass lawn, open meadow, and woodlot, and have not been previously tested.

In light of these results, the following recommendations are presented:

1. With previous assessments by *Archaeological Assessments Ltd.* (2014), *Mayer Heritage Consultants* (1996), AMICK Consultants Ltd. (2007), and *Archaeological Research Associates Ltd.* (2005) having fulfilled the Stage 1 and/or 2 AA requirements within their respective portions of the current study area, as illustrated in **Maps 13, 15 and 16,** it is recommended that these areas be exempt from further assessment within the scope of this project.

2. As per *Section 1.4, Standard 1.f* of the *2011 S&G,* areas that exhibit disturbed conditions, marked in **Maps 13-14**, need to be confirmed through an on-site property inspection during a Stage 2 AA.

3. All identified areas which retain archaeological potential must be subjected to a Stage 2 AA, illustrated in **Maps 14-16**. Ploughing in advance of Stage 2 pedestrian survey will not be possible due to the high tree content within these areas. As such, these areas must be subjected to a Stage 2 shovel test pit archaeological survey at five-metre intervals in accordance with *Section 2.1.2* of the *2011 S&G*.

TABLE OF CONTENTS

LIST OF TABLES

PROJECT PERSONNEL

Project Director	Alvina Tam - MTCS licence P1016
Report Preparation	Alvina Tam - MTCS licence P1016
Report Review	Nimal Nithiyanantham – MTCS licence P390 Kim Slocki – MTCS licence P029
Historical Research	Lee Templeton – MTCS licence R454
Graphics	Alvina Tam - MTCS licence P1016 Lee Templeton – MTCS licence R454

1.0 PROJECT CONTEXT

1.1 Objective

The objectives of a Stage 1 Archaeological Assessment (AA), as outlined in the 2011 *Standards and Guidelines for Consultant Archaeologists* (‘*2011 S&G*’) (2011), are as follows:

- To provide information about the property’s geography, history, previous archaeological fieldwork and current land condition;
- To evaluate in detail the property’s archaeological potential, which will support recommendations for Stage 2 survey for all or parts of the property; and
- To recommend appropriate strategies for Stage 2 survey.

1.2 Development Context

The Town of Wasaga Beach (the ‘Town’) has identified the need for a new Water Storage Facility and Public Works maintenance depot, in order to meet projected growth and servicing needs to ensure that all areas within the Town will be efficiently supplied by the municipal water system. In support of this new water system, *Archeoworks Inc*. was retained by *Ainley Group,* to conduct a Stage 1 AA of seven proposed site locations within the Town’s west end, herein collectively referred to as the ‘study area’ (***see Appendix A – Map 1***). The study area is composed of seven properties, which encompass parts of several lots within the Geographic Township of Nottawasaga, historical County of Simcoe, now the Town of Wasaga Beach, Simcoe County, Ontario:

- Property #1 falls within part of Lot 36, Concession 4,
- Property #2 falls within part of Lot 34, Concessions 3 and 4,
- Properties #3 and #4 fall within part of Lot 33, Concession 3,
- Property #5 falls within part of Lot 33, Concession 2,
- Properties #6 and #7 fall within part of Lot 32, Concession 2.

This project was triggered the *Environmental Assessment (EA) Act*under Schedule C. This Stage 1 AA was conducted under the project direction of Ms. Alvina Tam; under the archaeological consultant licence number P1016, in accordance with the *Ontario Heritage Act* (2009). Permission to investigate the study area was granted by *Ainley Group* on October 17th, 2014.

1.3 Historical Context

The *2011 S&G*, published by the *Ministry of Tourism, Culture and Sport* (*MTCS*) considers areas of early Euro-Canadian settlement, including places of early military pioneer or pioneer settlement (e.g., pioneer homesteads, isolated cabins, and farmstead complexes), early wharf or dock complexes, and pioneer churches and early cemeteries, as having archaeological potential. There may be commemorative markers of their history, such as local, provincial, or federal monuments or heritage parks. Early historical transportation routes (trails, passes, roads, railways, portage routes), properties listed in a municipal register or designated under the *Ontario Heritage Act* or a federal, provincial, or municipal historic landmark or site, and properties that local histories or informants have identified with possible archaeological sites, historical events, activities, or occupations are also considered to have archaeological potential.

To establish the archaeological and historical significance of the study area, *Archeoworks Inc*. conducted a comprehensive review of the Aboriginal and Euro-Canadian settlement history, the designated and listed heritage properties, commemorative markers as well as consulted with available historical mapping. Furthermore, an examination of the registered archaeological sites and previous archaeological assessments within close proximity to its limits, and review of the physiography of the overall area and its correlation to locating archaeological remains was performed.

The results of this background research are documented below and summarized in **Appendix B – Summary of Background Research.**

1.3.1 Pre-Contact Period

1.3.1.1 The Paleo-Indian Period (ca. 11500 to 7500 B.C.)

The region in which the study area is situated was first inhabited after the final retreat of the North American Laurentide ice sheet approximately 15,000 years ago (or 13,000 B.C.) (Stewart, 2013, p.24). Massive amounts of glacial meltwater expanded against the retreating ice boundary in the north, flooding the Huron and Georgian Bay and occupying much of the Simcoe lowlands (Stewart, 2013, p.25). Eventually, the water within these basins coalesced to form glacial Lake Algonquin, which “covered parts or all of Lake Huron, Lake Superior, and Erie basins, which included Lake Simcoe and Lake Couchiching” (Frim, 2002, p.xi; Karrow and Warner, 1990, p.15). The lessening ice load created isostatic rebound and caused abandoned shorelines to tilt northward towards the ice centre. Water began to accumulate along the southern shorelines, forming the main glacial strandline of Lake Algonquin which extended around the southern shore of Lake Simcoe (Karrow and Warner, 1990, p.15). This strandline is marked by a number of erosional and depositional features including high bluffs, off-shore bars, and limestone scarps where wave erosion cut into the bedrock (Storck, 1982, p.9). At this time, the study area was under Lake Algonquin.

The continuing retreat of the glaciers between 10,500 and 10,000 B.P. (ca. 8500-8000 B.C.) and glacial uplift uncovered a series of lower outlets near North Bay, Ontario and water flooded the Ottawa River. The level of Lake Algonquin rapidly fell to form a series of short-lived post-Algonquin lakes located in the Georgian Bay and Lake Huron Basins which “exposed about half the present lake floor areas as dry land” (Karrow and Warner, 1990, p.17; Larson and Schaetzl, 2001, p.532; Jackson et al, 2000, p.419). These low-water lakes exposed as much as 12,000 to 14,000 kilometres of lake plain along the Ontario side of modern Lake Huron (Jackson, 2004, p.38). Streams and stream valleys extended throughout the flat, newly-exposed lake plain which opened large tracts of land available for flora and fauna to colonize (Karrow, 2004, p. 8; Karrow and Warner, 1990, p. 17). Along this shoreline and the beaches of Lake Algonquin, there is definite evidence of human occupations corresponding to the Late Paleoindian period of Southern Ontario (Karrow and Warner, 1990, p.15).

Generally, Paleoindians are thought to have been small groups of nomadic hunter-gathers who depended on naturally available foodstuff such as game or wild plants (Ellis and Deller, 1990, p.38). For much of the year, Paleoindians "hunted in small family groups; these would periodically gather into a larger grouping or bands during a favourable period in their hunting cycle, such as the annual caribou migration" (Wright, 1994, p.25).

Paleoindian sites are extraordinarily rare and consist of "stone tools clustered in an area of less than 200-300 metres" (Ellis, 2013, p.35). These sites appear to have been campsites used during travel episodes and can be found on well-drained soils in elevated situations, which would have provided a more comfortable location in which to camp and view the surrounding territory (Ellis and Deller, 1990, p.50). Traditionally, Paleoindian sites have been located primarily along abandoned glacial lake strandlines or beaches. However, this view is biased as these are the only areas in which archaeologists have searched for sites, due to the current understanding of the region's geological history (Ellis and Deller, 1990, p.50; Ellis, 2013, p.37). In areas where attention has been paid to non-strandline areas and to older strandlines, sites are much less concentrated and more ephemeral (Ellis and Deller, 1990, p.51).

The artifact assemblage from this period is characterized by fluted and lanceolate stone points, scrapers, and small projectile points produced from specific chert types (Ellis and Deller, 1990). Distinctive dart heads were used to kill game, and knives for butchering and other tasks (Wright, 1994, p.24). These items were created and transported over great distances while following migratory animals within a massive territory.

1.3.1.2 The Archaic Period (ca. 7800 to 500 B.C.)

As the climate steadily warmed, deciduous trees slowly began to permeate throughout Southern Ontario, creating mixed deciduous and coniferous forests (Karrow and Warner, 1990, p.30). The "Archaic peoples are the direct descendants of Paleoindian ancestors" having adapted to meet new environmental and social conditions (Ellis, 2013, p.41; Wright, 1994, p.25). The Archaic period is divided chronologically and cultural groups are divided geographically and sequentially. Archaic Aboriginals lived in "hunter-gatherer bands whose social and economic organization was probably characterized by openness and flexibility" (Ellis et al, 1990, p.123). This fluidity creates 'traditions' and 'phases' which encompass large groups of Archaic Aboriginals (Ellis et al, 1990, p.123).

Few Archaic sites have faunal and floral preservation and lithic scatters are often the most common Archaic Aboriginal site type (Ellis et al, 1990, p. 123). House structures have "left no trace" due to the high acidic content of Ontario soils (Wright, 1994, p.27). Burial/grave goods and ritual items appear, although very rarely. By the Late Archaic, multiple individuals were buried together suggesting semi-permanent communities were in existence (Ellis, 2013, p.46).

Ceremonial and decorative items also appear on Archaic Aboriginal sites through widespread trade networks, such as conch shells from the Atlantic coast and galena from New York (Ellis, 2013, p.41). Through trade with the northern Archaic Aboriginals situated around Lake Superior, native copper was initially utilized to make hooks and knives, but gradually became used for decorative and ritual items (Ellis, 2013, p.42).

During the Archaic period, stone points were reformed from fluted and lanceolate points to stone points with notched bases to be attached to a wooden shaft (Ellis, 2013, p.41). The artifact assemblages from this period are characterized by a reliance on a wide range of raw lithic materials in order to make stone artifacts, the presence of stone tools shaped by grinding and polishing, and an increase in the use of polished stone axes and adzes as wood-working tools (Ellis et al, 1990, p. 65; Wright, 1994, p.26). Ground-stone tools were also produced from hard stones and reformed into tools and throwing weapons (Ellis, 2013, p.41). The bow and arrow was first used during the Archaic period (Ellis, 2013, p.42).

As isostatic uplift continued, drainage through the North Bay outlet was closed off and elevated water in the Huron Basin to higher than modern levels (Jackson et al, 2000, p.419). This high water phase is known as the "Nipissing Phase, occurring approximately 5000 B.P. (3000 B.C.), which inundated large areas probably previously occupied by humans" (Karrow and Warner, 1990, p. 21). It is generally believed that during the Nipissing Phase, water levels achieved the same height as those of Lake Algonquin, thus creating one contiguous lake in the Lake Superior, Lake Michigan, and Lake Huron basins (Jackson et al, 2000, p.419). At their highest peak, water levels of Lake Huron reached "approximately one-kilometre inland from the present-day shoreline and extending upstream along the Nottawasaga River as a large, shallow lagoon immediately south of the present-day parabolic dune system" (Featherstone et al, 2005, p.5). Gradually, the Nipissing Phase water levels retreated to their present heights by approximately 2000-2,500 B.P. (500-0 B.C.) and due to the recession of Lake Algonquin and transgression of the Nipissing Phase water levels, evidence of Paleoindian and Archaic groups in the Town of Wasaga Beach have been lost (Featherstone et al, 2005, p.5).

1.3.1.3. The Woodland Period (ca. 800 B.C. to A.D. 1600)

Due to the receding water levels during the Nipissing Phase, the earliest evidence of human occupation in the Town of Wasaga Beach dates to the Middle Woodland period (ca. 200B.C. – A.D. 900). Middle Woodland sites are clustered near Jack's Lake, east of the study area (Featherstone et al, 2005, p.5).

During the Middle Woodland period, three primary cultural complexes developed in Southern Ontario. The Couture complex was located in the southwestern-most part of Ontario (Spence et al, 1990, p.143). The Point Peninsula complex was "distributed throughout south-central and eastern Southern Ontario, the southern margins of the Canadian Shield, the St. Lawrence River down river to Quebec City, most of southeastern Quebec, along the Richelieu River into Lake Champlain" (Spence et al., 1990, p.157; Wright, 1999, p.633). The Saugeen complex occupied "southwestern Southern Ontario from the Bruce Peninsula on Georgian Bay to the north shore of Lake Erie to the west of Toronto" (Wright, 1999, p.629; Wright, 1994, p.30). The Saugeen complex was also present along the Nottawasaga, Thames and Grand Rivers, however “sites along the Grand River have been variously assigned to Saugeen, Point Peninsula and independent complexes” (Spence et al, 1990, p.148). The Saugeen and Point Peninsula cultures appear to have shared Southern Ontario but the borders between these three cultural complexes are not well defined, and many academics believe that the Niagara Escarpment formed a frontier between the Saugeen complex and the Point Peninsula complex (Spence et al., 1990, p.143; Wright, 1999, p.629; Ferris and Spence, 1995, p.98). Consequently, the dynamics of hunter-gatherer societies shifted territorial boundaries resulting in regional clusters throughout southwestern Southern Ontario that have been variously assigned to Saugeen, Point Peninsula, or independent complexes (Spence et al., 1990, p.148; Wright, 1999, p.649).

Middle Woodland pottery share a preference for stamped, scallop-edged or tooth-like decoration, but each cultural complex had distinct pottery forms, such as globular pots, finishes, and zones of decoration (Williamson, 2014, p.49; Ferris and Spence, 1995, p. 97; Spence et al, 1990, p.143). Major changes in settlement-subsistence systems occurred during the Middle Woodland period, particularly the introduction of large ‘house’ structures and substantial middens associated with these structures (Spence et al., 1990, p.167; Ferris and Spence, 1995, p. 99). The larger sites likely indicate a prolonged period of macroband settlement and a more consistent return to the same site, rather than an increase in band size (Spence et al., 1990, p. 168). Environmental constraints in different parts of Southern Ontario all produce a common implication of increased sedentism caused by the intensified exploitation of local resources (Ferris and Spence, 1995, p. 100). Burial offerings became more ornate and encompassed many material mediums, including antler, whetstones, copper, and pan pipes (Ferris and Spence, 1995, p. 99). Burial sites during this time were set away from occupation sites and remains were buried at time of death; secondary burials were not common (Ferris and Spence, 1995, p. 101). Small numbers of burial mounds are present, particularly around Rice Lake, and both exotic and utilitarian items were left as grave goods (Williamson, 2014, p.51; Ferris and Spence, 1995, p.102).

During the Late Woodland Period (A.D. 900-1600), multiple sub-stages and complexes have been assigned, which are divided spatially and chronologically, and eventually progress into the historic Contact period groups of the Late Ontario Iroquois Stage (Fox, 1990; Williamson, 1990; Dodd et al., 1990; Warrick, 2000). Although several migration theories have been suggested explaining the Iroquoian origins, “available date from southern Ontario strongly suggests continuity (*in situ*) from the Middle-Late Woodland Transitional Princess Point complex and Late Woodland cultural groups” (Ferris and Spence, 1995, p. 105; Smith, 1990, p.283).

During the Late Ontario Iroquoian stage, the Iroquoian-speaking linguistic groups developed. Prior to European Contact, neighbouring Iroquois-speaking communities united to form several confederacies known as the Huron (Huron-Wendat), Neutral (called Attiewandaron by the Wendat), Petun (Tionnontaté or Khionontateronon) in Ontario, and the Five Nations of the Iroquois (Haudenosaunee) of upper New York State (Birch, 2010, p.31; Warrick, 2013, p.71). These groups are located primarily in south and central Ontario. Each group was distinct but shared a similar pattern of life already established by the 16th century (Trigger, 1994, p.42). Village size began to gradually enlarge as horticulture began to take on a more central importance in subsistence patterns, particularly the farming of maize, squash, and beans, supplemented by fishing, hunting, and gathering. House structures were initially oval and gradually became longhouses. Villages were later fortified (Williamson, 1990; Dodd et al., 1990).

The geographic distribution of pre-contact Ontario Iroquoian sites describes two major groups east and west of the Niagara Escarpment: the ancestral Huron-Wendat in the east and the ancestral Attiewandaron to the west (Warrick, 2000, p. 446). Recently, it has been determined that ancestral Tionnontaté groups had arrived in the area between the Nottawasaga River, the Niagara Escarpment and Georgian Bay via the Grand, Pine and Nottawasaga Rivers from ancestral Attiewandaron country and are derived from the pre-contact Attiewandaron community (Garrad, 2014, pp. 1, 147-148). However, their origins are still questioned due to a lack of comparative studies between Tionnontaté and Attiewandaron material culture (Garrad, 2014, p.153).

1.3.2 European Contact Period (ca. A.D 1600 to 1650)

The Tionnontaté or Khionontateronon were called the ‘Petun,’ a term of Brazillian origin meaning tobacco, by the French after Samuel de Champlain observed the Tionnontaté cultivating and trading tobacco. In 1615-1616, Samuel de Champlain, along with Father Joseph Le Caron a Recollet priest, had arrived in Tionnontaté territory and found eight occupied villages and two villages under construction. Limited ethno-historical information is available regarding the size of the Tionnontaté population, but inferred pre-epidemic Huron-Wendat data suggests the Tionnontaté population may have exceeded 8,000 individuals. Jesuit missionaries who attempted to establish the Mission of the Apostles to the Petun recognized the existence of two different groups within the Tionnontaté territory: the Nation of the Wolves and the Nation of the Deer (Garrad and Heidenreich, 1978, pp. 394-396).

Prior to the Jesuit missionaries, several Recollet priests traveled through Tionnontaté territory en route to Attiewandaron territory, following the Nottawasaga River, to the Pine River to the source of the Irvine River into the Grand River, and into the banks of Lake Erie (Bricker, 1934, p.58; Garrad, 2014, p.148). Scant reference of the Tionnontaté were made by French fur-traders suggesting they believed the Tionnontaté were similar in language, dress, and religious beliefs to tribes within the Huron-Wendat Confederacy (Garrad and Heidenreich, 1978, p.395; Garrad, 2014, pp.167-177, 490). However, it is now believed that the Tionnontaté were “mainly or entirely Attiewandaron who had moved to a new location to enhance their trading position” (Garrad, 2014, p.490). Additionally, the Tionnontaté acted as middle-men for trade of European goods between the Ottawa, an Algonquin linguistic and cultural group, and the Attiewandaron along the Niagara River (Garrad and Heidenreich, 1978, p.396).

During the 1630s, Jesuit missionaries attempted to convert the entire Huron-Wendat Confederacy to Christianity as the initial phase of a missionary endeavour to convert all native people in Southern Ontario (Trigger, 1994, p.51). The Jesuits attempted to set up missionaries amongst the Tionnontaté, but were unsuccessful due to fears of the spread of disease (Garrad, 2014, p.215). By 1640, post-epidemic population numbers of the Tionnontaté population dropped to 3,375 individuals, a reduction of 60% of their entire population (Garrad, 2014, p.473). That same year, a village of the Tionnontaté was destroyed by the Haudenosaunee, renewing the Huron- Tionnontaté military and defence alliance (Garrad and Heidenreich, 1978, p.396).

By 1645, having grown dependent on European goods and with their territory no longer yielding enough animal pelts, the Haudenosaunee became increasingly aggressive towards the Huron-Wendat Confederacy (Trigger, 1994, p.53). Armed with Dutch guns and ammunition, the Haudenosaunee engaged in warfare with the Huron-Wendat Confederacy and brutally attacked and destroyed several Huron-Wendat villages (Trigger, 1994, p.53). To prevent the revival of Huron-Wendat settlements, the Haudenosaunee attacked and destroyed the villages of the Huron-Wendat's allies, the Tionnontaté (Trigger, 1994, p.56). In 1650, what remained of the Tionnontaté migrated through Attiewandaron territory prior to resettlement in America (Garrad, 2014, pp.501-505). The former territory occupied by the Tionnontaté likely remained largely unoccupied for several decades.

1.3.3 Post Contact Period (ca. A.D 1650 to 1800)

Although their homeland was located south of the lower Great Lakes, the Haudenosaunee controlled most of Southern Ontario after the 1660s, occupying at "least half a dozen villages along the north shore of Lake Ontario and into the interior" (Schmalz, 1991, p.17; Williamson, 2013, p.60). The Haudenosaunee established "settlements at strategic locations along the trade routes inland from the north shore of Lake Ontario. Their settlements were on canoe-and-portage routes that linked Lake Ontario to Georgian Bay and the upper Great Lakes" (Williamson, 2013, p.60). The Haudenosaunee used this territory within Southern Ontario to hunt game and obtain furs for exclusive trade with the Dutch and English (Coyne, 1895, p.20).

As early as 1653, the Anishinaabeg, an Algonquin-speaking linguistic and cultural group, wanted control of the land between Lake Huron and Lake Ontario in order to further their role in the fur trade. At this time, several Anishinaabeg Nations began to challenge the Haudenosaunee dominance in the Lake Huron and Georgian Bay region (Johnston, 2004, pp.9-10; Gibson, 2006, p.36). Before contact with the Europeans, the Ojibwa territorial homeland was situated inland from the north shore of Lake Huron (MNCFN, ND, p.3). The English referred to the Algonquin-speaking linguistic and cultural groups that settled in the area bounded by Lakes Ontario, Erie and Huron as Chippewas or Ojibwas (Smith, 2002, p.107). In 1640, the Jesuit fathers had recorded the name "*oumisagai*, or Mississaugas, as the name of an Algonquin band near the Mississagi River on the northwestern shore of Lake Huron. The French, and later English, applied this same designation to all Algonquians settling on the north shore of Lake Ontario" (Smith, 2002, p. 107; Smith, 1987, pp.19-20).

After a major smallpox epidemic in 1662, the capture of New Netherland by the English in 1664, and a series of successful attacks against the Haudenosaunee by the Ojibwa from 1653 to 1662, the Haudenosaunee dominance in Southern Ontario began to fail (Warrick, 2008, p.242;

Schmalz, 1991, p.20). Prior to 1680, the Ojibwa had begun to settle just north of the evacuated Huron-Wendat territory and with the English entering the fur-trading market, the Ojibwa began to expand further into Southern Ontario (Gibson, 2006, p. 36; Schmalz, 1991, p.18). By the 1690s, Haudenosaunee settlements along the northern shores of Lake Ontario were abandoned (Williamson, 2013, p.60). In 1701, after a series of successful battles on the Bruce Peninsula and Burlington Bay, the Haudenosaunee were defeated and expelled from Ontario (Gibson, 2006, p. 37; Schmalz, 1991, p.27; Coyne, 1895, p.28). Following these battles, the Ojibwa replaced the Haudenosaunee in Southern Ontario (Schmalz, 1991, p.29).

In 1701, representatives of several bands within the Ojibwa Nation and the Haudenosaunee assembled in Montreal to participate in Great Peace negotiations, sponsored by the French (Johnston, 2004, p.10; Trigger, 2004, p.58). The Mississaugas were granted sole possession of the territory to the north of Lake Ontario and Lake Erie, while the Haudenosaunee, or Six Nations as the British referred them with the inclusion of the Tuscarora group, retained territory along the Grand River (Hathaway, 1930, p.433; Tooker, 1978, p.428)

From 1701 to the fall of New France in 1759, the Ojibwa experienced a “golden age” of trade, holding no conclusive alliance with either the British or the French while maintaining their middle-man position between native groups to the north and in southwestern Ontario (Schmalz, 1991, p. 35). As the Seven Years War between the French and British continued in North America, both the Ojibwa bands and the French were weakened by famine, lack of supplies, and disease (Schmalz, 1991, p.53). In 1763, the Royal Proclamation declared the Seven Years War over, giving the British control of New France and created a western boundary for British colonization.

The British did not earn the respect of the Ojibwa bands, as the British did not honour fair trade nor recognize the Ojibwa occupancy of the land as the French had. The Pontiac Uprising, also known as the Beaver Wars, began that same year (Schmalz, 1991, p.70; Johnston, 2004, pp.13-14). After numerous attacks on the British, the Pontiac Uprising was over in 1766, when a peace agreement was concluded with Sir William Johnson, the Superintendent of Indian Affairs, which depended mostly on the integrity of the British (Schmalz, 1991, p.81). The fur-trade continued throughout Southern Ontario until the beginning of British colonization.

1.3.4 Euro-Canadian Settlement Period

By 1793, Lieutenant-Governor John Graves Simcoe had arrived at the entrance of Penetanguishene Bay and sought to establish a fort in the easily defensible natural harbour should the Americans provoke an attack from the south (Pencen Museum, 2013). This site would also act as a depot of inter-lake commerce (Belden, 1881, p.4). In 1798, William Claus, Superintendent of Indian Affairs, bargained on behalf of the British Government for a tract of land adjacent to the harbour of Penetanguishene, and purchased the tip of the peninsula for cloth, blankets and kettles valued at £101 of Quebec currency (Surtees, 1994, p. 109; Hunter, 1909a, p.12). Settlement around Fort Penetanguishene continued slowly until the War of 1812.

After the War of 1812, a second wave of settlers arrived in Upper Canada. Between 1815 and 1824, the non-Aboriginal population doubled as a result of heavy immigration from Britain (Surtees, 1994, p. 112). In 1818, William Claus assembled an Ojibwa council and "asked for over a million hectares to the west and south of Lake Simcoe" (Surtees, 1994, p. 115; Hunter, 1909a, p.14). At this council, William Claus advised settlement would take several years and the Aboriginals residing in the area would still be able to occupy the area while receiving annual clothing and the usual presents distributed by the King (Surtees, 1994, p. 116). The government agreed to pay an annuity of £1,200 currency in goods (Surtees, 1994, p.116; Hunter, 1909a, p. 15). This tract included 1,592,000 acres of land and the majority of the County of Simcoe; this transaction is known as the Lake Simcoe-Nottawasaga Treaty (Hunter, 1909a, p.15; Surtees, 1994, p.103).

It would be another 20 years before the Township of Nottawasaga was surveyed. Thomas Kelly, a government surveyor, began the official survey in 1832, and was completed by Charles Rankin in 1833 (Hunter, 1909a, p.41; Belden, 1881, p. 15). Shortly afterwards, a few settlers arrived in the Township after having purchased land. The Township contains several rivers and streams, which navigate a chain of hills, and drain into Georgian Bay, producing deep clefts or canyons (Belden, 1881, p.15). The earliest settlers to arrive in the Township of Nottawasaga were of considerably mixed nationalities, however they were "ready to sink considerations of race, and, with mutual dependence and help, to form a community of united interests in the new land" (Belden, 1881, p. 15). By 1842, a total of 420 individuals lived in Nottawasaga Township, and were principally of Scottish descent (Smith, 1846, p. 132). 18,850 acres were owned, but only 1,539 were under cultivation (Smith, 1846, p.132).

During the mid-19th century, there was a significant increase in immigrants from the British Isles into Upper Canada placing a great demand on all available land. By 1850, the number of individuals within the Township increased to 1,411 (Smith, 1851, p.63). In 1855, the Northern Railway was extended from Aurora to Collingwood, allowing the township to prosper economically through their rich cedar reserves (Historical Canada, 2014; Smith, 1846, p.132). The Township continued to develop with the construction of the Hamilton and North Western Railway (ca. 1881) which began in Hamilton and extended to Collingwood (Cooper, 2001). Better roadways were established throughout the remainder of the century as early settlers focused on the lumber trade, agriculture, and animal husbandry within rural Ontario (Hunter, 1909a, pp. 323-330).

1.3.5 Past Land Use

To further assess the study area's potential for the recovery of historic pre-1900 remains, several documents, namely the 1881 *Simcoe Supplement in the Illustrated Historical Atlas of the Dominion of Canada*, were reviewed in order to gain an understanding of the land use history. The study area encompasses part of several lots all within the Geographic Township of Nottawasaga, in the historical County of Simcoe, now in the Town of Wasaga Beach, Simcoe County (***see Map 1***):

- Property #1 falls within part of Lot 36, Concession 4,

- Property #2 falls within part of Lot 34, Concessions 3 and 4,
- Properties #3 and #4 fall within part of Lot 33, Concession 3,
- Property #5 falls within part of Lot 33, Concession 2,
- Properties #6 and #7 fall within part of Lot 32, Concession 2.

A review of the 1881 *Simcoe Supplement* (***see Map 2***) revealed that all seven properties were located in unassigned lots. It should be kept in mind, however, that not all historic features within the Township of Nottawasaga may have been depicted as the Simcoe Supplement in the Illustrated Atlas required a paid subscription from the residents in the County of Simcoe (Benson, N.D., p.4).

In addition, the study area abuts three historic settlement roads: present-day Fairgrounds Road, Ayling Reid Court, and Lyons Court, which were originally laid out during the survey of the Township of Nottawasaga. In Southern Ontario, the *2011 S&G, Section 1.3.1* considers undisturbed lands within 100 metres of early historic transportation routes (e.g., trails, passes, roads, railways, portage routes) to be of elevated archaeological potential. Therefore, based on the proximity to historic transportation routes, potential for the location of Euro-Canadian archaeological resources (pre-1900) within undisturbed portions of the study area can be established within 100 metres of their limits.

1.3.6 Present Land Use

The study area is presently zoned primarily as a municipal park, with some industrial, commercial and government land uses.

1.4 Archaeological Context

1.4.1 Designated and Listed Cultural Heritage Resources

Consultation of the Ontario Heritage Properties Database which records heritage resources that have been designated for their provincial cultural value or interest under the *Ontario Heritage Act* (*O.Reg. 10/06)*, confirmed the absence of a provincially designated heritage property within and near (within 300 metres of) the study area[1].

Additional consultation with the online inventory entitled, “Heritage Registry – Register of Cultural Heritage Properties” (Town of Wasaga Beach, 2014), which is an inventory of all cultural heritage properties within the Town of Wasaga Beach, confirmed the absence of any cultural heritage properties within and near (within 300 metres of) the study area. To determine if this resource is the most up-to-date inventory that lists both designated and listed heritage properties, the Planning Department at the Town of Wasaga Beach was contacted. The Planning Department at the Town of Wasaga Beach does not have any information regarding heritage properties (Kelso, 2015).

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[1] **Clarification:** As of 2005, the Ontario Heritage Properties Database is no longer being updated. The Ministry of Tourism, Culture and Sport is currently updating a new system which will provide much greater detail to users and will become publicly accessible in the future. (http://www.hpd.mcl.gov.on.ca)

According to *Section 1.3.1* in the *2011 S&G,* undisturbed lands within 300 metres of properties listed in a municipal register or designated under the *Ontario Heritage Act* or a federal, provincial, or municipal historic landmark or site are considered to have elevated archaeological potential. Therefore, based on the absence of cultural heritage resources within and near (within 300 metres of) the study area, this feature does not aid to further elevate potential for the location of Euro-Canadian archaeological resources (pre-1900) within undisturbed portions of its limits.

1.4.2 Heritage Conservation Districts

A Heritage Conservation District (HCD) includes areas that have been protected under Part V of the *Ontario Heritage Act*. An HCD can be found in both urban and rural environments and may include residential, commercial, and industrial areas, rural landscapes or entire villages or hamlets with features or land patterns that contribute to a cohesive sense of time or place and contribute to an understanding and appreciation of the cultural identity of a local community, region, province, or nation. An HCD may comprise an area with a group or complex of buildings, or large area with many buildings and properties and often extends beyond its built heritage, structures, streets, landscape and other physical and spatial elements, to include important vistas and views between and towards buildings and spaces within the district (MTCS, 2006, p.5). An HCD area contains valuable cultural heritage and must be taken into consideration during municipal planning to ensure that they are conserved.

To determine if the study area was located within an HCD, the Planning Department at the Town of Wasaga Beach was contacted; however the Planning Department does not have any information regarding heritage properties (Kelso, 2015).

1.4.3 Commemorative Plaques or Monuments

According to *Section 1.3.1* of the *2011 S&G,* undisturbed lands within 300 metres of Aboriginal and Euro-Canadian settlements where commemorative markers of their history, such as local, provincial, or federal monuments, cairns or plaques, or heritage parks, are considered to have elevated archaeological potential. To determine if any historical plaques are present, Ontario Historical Plaques inventory, which contains a catalogue of federal Historic Sites and Monuments Board of Canada plaques, the provincial Ontario Heritage Trust plaques, plaques from the various historical societies and other published plaques located in Ontario, confirmed the absence of commemoratives plaques within and near (within 300 metres of) the study area of all seven properties. Therefore, based on the absence of commemorative marker within and near (within 300 metres of) the study area, this feature does not aid to further elevate potential for the location of archaeological resources (pre-1900) within undisturbed portions of the study area.

1.4.4 Registered Archaeological Sites

In order provide a summary of registered or known archaeological sites within a minimum one kilometre distance from the project limits, as per *Section 7.5.8, Standard 1* of the *2011 S&G*, the *Ontario Archaeological Sites Database* (OASD) maintained by the *MTCS* was consulted (MTCS, 2014). Every archaeological site is registered according to the Borden System, which is a numbering system used throughout Canada to track archaeological sites and their artifacts. The study area is located within Borden block BcHa.

The *2011 S&G* considers undisturbed lands within 300 metres of a registered archaeological site to be of elevated archaeological potential. According to the *MTCS* (2014), two archaeological sites have been registered within a one kilometre radius of Property #1 (***see Table 1***), none of which fall within close (300 metres) proximity.

Table 1: Registered Archaeological Sites within One Kilometre of the Study Area

Borden #	Name	Cultural Affiliation	Type
BcHa-50	Chesnut	Prehistoric	Undetermined
BcHa-63	Derenzo	Pre-contact	Lithic scatter

Having noted the presence of these sites in relation to the study area, it is useful to place them in the proper context by reviewing the cultural history of occupation in Southern Ontario provided in **Table 2**. This data provides an understanding of the potential cultural activity that may have occurred within the study area (Ferris, 2013, p.13).

Table 2: History of Occupation in Southern Ontario

Period	Archaeological Culture	Date Range	Attributes
PALEO-INDIAN			
Early	Gainey, Barnes, Crowfield	>11500-8500 BC	Big game hunters. Fluted projectile points
Late	Holcombe, Hi-Lo, Lanceolate	8500-7500 BC	Small nomadic hunter-gatherer bands. Lanceolate projectile points
ARCHAIC			
Early	Side-notched, corner notched, bifurcate-base	7800-6000 BC	Small nomadic hunter-gatherer bands; first notched and stemmed points, and ground stone celts.
Middle	Otter Creek, Brewerton	6000-2000 BC	Transition to territorial settlements
Late	Narrow, Broad and Small Points Normanskill, Lamoka, Genesee, Adder Orchard etc.	2500-500 BC	More numerous territorial hunter-gatherer bands; increasing use of exotic materials and artistic items for grave offerings; regional trade networks
WOODLAND			
Early	Meadowood, Middlesex	800BC-0BC	Introduction of pottery, burial ceremonialism; panregional trade networks
Middle	Point Peninsula, Saugeen, Jack's Reef Corner Notched	200 BC-AD 900	Cultural and ideological influences from Ohio Valley complex societies; incipient horticulture
Late	Algonquian, Iroquoian, Western Basin	AD 900-1250	Transition to village life and agriculture
	Algonquian, Iroquoian, Western Basin	AD 1250-1400	Establishment of large palisaded villages
	Algonquian, Iroquoian	AD 1400-1600	Tribal differentiation and warfare

Period	Archaeological Culture	Date Range	Attributes
HISTORIC			
Early	Huron, Neutral, Petun, Odawa, Ojibwa, Five Nations Iroquois	AD 1600 – 1650	Tribal displacements
Late	Six Nations Iroquois, Ojibwa, Mississauga	AD 1650 – 1800s	Migrations and resettlement
	Euro-Canadian	AD 1780 - present	European immigrant settlements

1.4.5 Previous Archaeological Assessments

In order to further establish the archaeological context of the study area, reports documenting previous archaeological fieldwork carried out within the limits of, or immediately adjacent to (i.e., within 50 metres) the study area were consulted. Five reports were identified and are depicted within **Map 3**. All five reports were previous assessments associated with other development projects:

1. Archaeological Survey of the Hwy 26 Bypass, Wasaga Beach to Collingwood (W.P. 209-85-00) (Ministry of Transportation, 1989)

In 1988 and 1989, the *Ministry of Transportation* conducted a survey of 7.5 kilometres of new right-of-way (ROW) lands to accommodate the construction of the Highway 26 Bypass from Wasaga Beach to Collingwood. This subject corridor runs parallel to the southwestern shore of Nottawasaga Bay, 700 to 900 metres southwest of the shoreline, and measures approximately 90 metres in width. This assessment encompasses land within 50 metres of Properties #2 and #3.

The background research included a review of the subject corridor's glacial environment and its impact on human settlement history. During the field survey, a combination of test pits were excavated ranging in 10-metre intervals placed atop the Nipissing bluff, those areas below the bluff were visually examined at 10-metre intervals and at five-metre intervals near Batteaux Creek. During the field survey, a total of four pre-contact and two 19th century Euro-Canadian sites were identified, all found during test pit survey of the top of the Nipissing bluff. All six sites are located greater than 300 metres away from the current study area limits and therefore present no concerns to the present study. The remainder of the subject corridor was considered free of further archaeological concern. However, due to the significance of the pre-contact sites located around Batteaux Creek area, no construction related activity is allowed to take place off of the corridor and should it be necessary to extend construction activities beyond the ROW, additional archaeological investigations will be necessary.

2. Archaeological Assessment (Stages 1 & 2) Proposed Business Park Development, Town of Wasaga Beach, Nottawasaga Township, Simcoe County (Mayer Heritage Consultants Inc., 1996)

Mayer Heritage Consultants Inc. conducted a Stage 1 and Stage 2 AA on a 51.75 hectare parcel of land situated on part of Lot 32, Concession 2 for a proposed Business Park Development. This subject area encompasses the entirety of Property #6. The Stage 1 AA included a review of all available previous assessments, the natural environment, and historical mapping. The background research determined a Stage 2 AA was required consisting of both test pit survey and pedestrian survey. No Aboriginal cultural material was encountered, while a scatter of mid-to-late 20th century Euro-Canadian cultural material was encountered. No temporally diagnostic artifacts suggestive of an early to mid-19th century occupation/activity were noted, and as such, no material was collected for analysis. This material appears to have accumulated due to garbage dumping activities and has no archaeological significance. No further archaeological assessments are recommended for the subject area.

3. Stage 1 & 2 Archaeological Assessment: Proposed West Wasaga - Resort Lifestyle Community, Part Lot 36, Con. 4, Former Nottawasaga Twp., Now Town of Wasaga Beach, County of Simcoe (Archaeological Research Associates Ltd., 2005)

Archaeological Research Associates Ltd. (ARA) conducted a Stage 1 and Stage 2 AA on a 14.2 hectare parcel of land in advance of construction of the proposed West Wasaga – Resort Lifestyle Community situated on part of Lot 36, Concession 4 for a proposed Business Park Development. This subject area encompasses most of Property #1, excluding the self-storage facility severance. The Stage 1 AA included a review of the geography of the subject area, its physiography, a review of all registered sites within two-kilometres, and review of historical mapping. The background research determined a Stage 2 AA was required consisting of test pit survey at five-metre intervals. Much of the subject area was disturbed as the eastern and northern sides of the property had been previously used as a trailer park. No archaeological remains were encountered and no further archaeological study of the subject lands was recommended.

4. The Stage 1 Archaeological Assessment of the Bay Sands Development Area Proposed Stormwater Drainage and Outlet Improvements, Part of Lots 33 & 34, Concession 2, Geographic Township of Nottawasaga, Town of Wasaga Beach, Simcoe County (Archaeological Assessments Ltd, 2014).

Archaeological Assessments Ltd. conducted a Stage 1 AA of a 55 hectare parcel of land located within part of Lots 33 and 34, Concession 2. This assessment focused primarily on the proposed location of five ponds, an easement corridor, a road widening, and a watercourse channel upgrade. This assessment encompasses the entirety of Property #5. The background review included a brief review of the subject area physiography, present land use, historical mapping, and previous archaeological research. A field review was conducted and determined that due to the disturbed nature of the lands situated around four of the five ponds and easement corridor, these areas do not have any archaeological potential due to poor drainage conditions. The 62nd Street South road corridor has no archaeological potential due to previous disturbances associated with the existing road construction. The 62nd Street North road corridor, watercourse channel upgrades, and the pond in the northeast section have archaeological potential and should be subjected to a Stage 2 AA.

5. Report on the 2007 Stage 1-2 Archaeological Assessment, Proposed Zancor North Development, Part Lot 32, Concession 2 (Geographic Township of Nottawasaga), Town of Wasaga Beach, County of Simcoe (AMICK Consultants Ltd., 2007).

AMICK Consultants Ltd. (AMICK) conducted a Stage 1 and Stage 2 AA on an 18.29 hectare parcel of land situated on part of Lot 32, Concession 2, in the Geographic Township of Nottawasaga. This subject area encompasses the entirety of Property #7. The Stage 1 AA included a review of the physiography of the subject area, a review of all registered sites within two-kilometres, and a review of historical mapping. The background research determined a Stage 2 AA was required consisting of test pit survey at five-metre intervals. An early- to mid-20th century site was located surrounding former house foundations and was determined to be of no archaeological concern. Consequently, the lands included within this proposed development are considered free of archaeological concern.

1.4.6 Physical Features

An investigation of the study area's physical features was conducted to aid in the development of an argument for archaeological potential based on the environmental conditions of the study area. Environmental factors such as close proximity to water, soil type, and nature of the terrain, for example, can be used as predictors to determine where human occupation may have occurred in the past.

The study area is situated within the Simcoe Lowlands physiographic region of Southern Ontario. These lowlands were flooded by glacial Lake Algonquin and are bordered by shore cliffs, beaches and bouldery terraces, and are floored by sand, silt, and clay. East of the Holland marsh, the plains are level, underlain by deposits of sand and silt. Drumlinized till has also been observed in the region. The lands south of Lake Simcoe have substantial swamp or wet sand areas, making it a poorer farming district than the Nottawasaga basin to the west (Chapman & Putnam, 1984).

The study area encompasses several native soil types. Property #1 is located primarily within Wiarton loam – stony phase which is a Grey-Brown Podzolic, characterized as a pale yellow, calcareous loam and silt loam till with imperfect drainage. Its topography is smooth, gently sloping and is slightly to very stony. Properties #2, #3, and #4 are situated primarily within Sargent gravelly sandy loam, a Brown Forest soil which is characterized as pale brown, calcareous outwash gravel with good drainage. Its topography is smooth, gently sloping and is stonefree. Properties #5, #6, and #7 are situated within Sargent gravelly sandy loam and Alliston sandy loam. Alliston sandy loam is a Podzol, characterized as grey, calcareous outwash sand with imperfect drainage. It topography is smooth, very gently sloping and is stonefree to moderately stony (Soil Research Institute, 1959).

In terms of archaeological potential, potable water is a highly important resource necessary for any extended human occupation or settlement. As water sources have remained relatively stable in Southern Ontario since post-glacial times, proximity to water can be regarded as a useful index for the evaluation of archaeological site potential. Indeed, distance from water has been one of the most commonly used variables for predictive modeling of site location. In Southern Ontario, the *2011 S&G* considers undisturbed lands in proximity to a water source to be of elevated archaeological potential. Hydrological features such as lakes, rivers, creeks, swamps, and marshes would have helped supply plant and food resources to the surrounding area, and consequently support high potential for locating archaeological resources within 300 metres of their limits. The study area is located within 300 metres of Nottawasaga Bay. This primary water source would have helped supply plant and food resources to the surrounding area, and consequently supports elevated potential for locating archaeological resources within undisturbed portions of the study area that fall within 300 metres of its limits.

1.4.7 Current Land Conditions

The study area is situated within a rural landscape at the west end of the Town of Wasaga Beach. Property #1 currently encompasses a self-storage facility, drainage pond, and berm. Properties #2 to #5 are heavily treed with some meadow areas. Property #2 houses a small commercial business within its northern extent. Properties #6 and #7 encompass treed and meadow areas. Portions of Property #6 were also previously graded and present-day Ramblewood Drive traverses the property. The topography within the study area is generally level, with the elevation averaging around 186 metres above sea level.

1.4. Date(s) of Review

Given the presence of snow cover, a desktop review of field conditions was undertaken using historical aerial photography and current satellite imagery obtained through the Google Earth application on January 22nd, 2015.

1.5 Confirmation of Archaeological Potential

Based on the information gathered from background research documented in the preceding sections, potential for the recovery of archaeological resources within any undisturbed portions of the study area limits has been established. Features contributing to archaeological potential are summarized in **Appendix B**.

2.0 ANALYSIS AND CONCLUSIONS

In combination with data gathered from background research (***see Sections 1.3 and 1.4***), an evaluation of archaeological potential was performed.

A comparison between 1954 and 1978 aerial photographs (***see Maps 4-8***) and recent satellite imagery (***see Maps 9-12***), reveals that the landscape within and immediately around the study area has undergone some changes. In 1954, the study area was undeveloped and exhibited a natural landscape, consisting of mainly of treed areas with some meadows interspersed.

In 1978, road construction and some grading activities occurred within Property #1 (***see Map 5***). Properties #2 and #3 remain unchanged, with the exception of a small square area cleared within the northern limit of Property #2 (***see Map 6***). The surrounding areas of Properties #4 and #5 became more developed, with some tracks visible within these two properties (***see Map 7***). Properties #6 and #7 appear unchanged (***see Map 8***).

By 2011, the existing self-storage building within Property #1 was established and the drainage pond behind the facility is visible. Within Property #2, the commercial building was also established within the cleared square area from 1978. Additionally, some road tracks are visible within the eastern half of the property and a very small graded area is visible within the southeastern extent. Property #3 has remained unchanged. Properties #4 and #5 have also remained relatively unchanged since 1978, although it may be said that the southwest corner of Property #5 has become more overgrown with vegetation and trees. Property #6 exhibits the greatest amount of change since 1978 as present-day Ramblewood Drive was constructed, almost the entirety of the property was cleared of trees, and portions of the land were subjected to grading. The greatest changes to Property #7 since 1978 is new tree growth.

2.1 Previously Surveyed Lands

Background research has revealed that portions of the study area had already been subjected to a Stage 1 and/or 2 AA (***see Maps 3, 13, 15 and 16***) (Section 1.4.5). A Stage 1 and 2 AA was previously conducted by *Mayer Heritage Consultants* (1996), which encompassed the entirety of Property #6. A Stage 1 and 2 AA was previously conducted by AMICK (2007), which encompassed the entirety of Property #7. A Stage 1 AA was previously conducted by *Archaeological Assessments Ltd.* (2014), which encompassed the entirety of Property #5. Finally, ARA (2005) previously conducted a Stage 1 AA that encompassed a large portion of Property #1. With previous AAs having fulfilled the Stage 1 and 2 AA requirements within their respective portion of the current study area, it is therefore recommended that these areas be exempt from further assessment within the scope of this project.

2.2 Deep and Extensive Disturbances

The study area was evaluated for extensive disturbances that have removed archaeological potential. Disturbances may include but are not limited to: grading below topsoil, quarrying, building footprints, or sewage and infrastructure development. *Section 1.3.2* of the *2011 S&G's* counts infrastructure development among those "features indicating that archaeological potential has been removed".

The remaining balance of Property #1 that had not been previously assessed appears entirely disturbed, consisting of an existing self-storage facility, gravel parking lot and driveway, drainage pond and berms. Within Property #2, a small commercial business, paved driveway and parking area, and small graded roadside areas also represent disturbed conditions. The construction of these features would have resulted in severe damage to the integrity of any archaeological resources which may have been present within their footprints. However, in accordance with *Section 1.4.1* of the *2011 S&G*, which requires that both an on-site visual inspection and background research be conducted in order to exempt any area from further Stage 2 survey, it is recommended that the aforementioned areas of low or uncertain archaeological potential due to disturbances only be considered as *likely* not requiring Stage 2 test pit or pedestrian survey (***Maps 13-14; Images 1-3, 5***). A Stage 2 visual survey is still required to provide on-site confirmation and documentation of the actual condition and exact extent of the disturbances.

2.3 Areas of Elevated Archaeological Potential

Portions of the study area that do not exhibit extensive disturbed conditions are considered to retain archaeological potential. These areas include, but are not limited to: all woodlots and open meadows, as well as a small portion of grassed lawn within Property #2 (***see Maps 14-16; Images 3-8***).

3.0 RECOMMENDATIONS

In light of the results of the Stage 1 AA, the following recommendations are presented:

1. With previous assessments by *Archaeological Assessments Ltd.* (2014), *Mayer Heritage Consultants* (1996), AMICK (2007) and ARA (2005) having fulfilled the Stage 1 and/or 2 AA requirements within their respective portions of the current study area, as illustrated in **Maps 3, 13, 15 and 16,** it is recommended that these areas be exempt from further assessment within the scope of this project.

2. As per *Section 1.4, Standard 1.f* of the *2011 S&G,* areas that exhibit disturbed conditions, marked in **Maps 13-14**, need to be confirmed through an on-site property inspection during a Stage 2 AA.

3. All identified areas which retain archaeological potential must be subjected to a Stage 2 AA prior to any development activities. Ploughing in advance of Stage 2 pedestrian survey will not be possible due to the high tree content and heavy vegetation within these areas. As such, these areas must be subjected to a Stage 2 shovel test pit archaeological survey at five-metre intervals in accordance with *Section 2.1.2* of the *2011 S&G*.

4.0 ADVICE ON COMPLIANCE WITH LEGISLATION

1. This report is submitted to the *MTCS* as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the *MTCS*, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

2. It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

3. Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.

4. The *Cemeteries Act*, R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the *Ministry of Consumer Services*.

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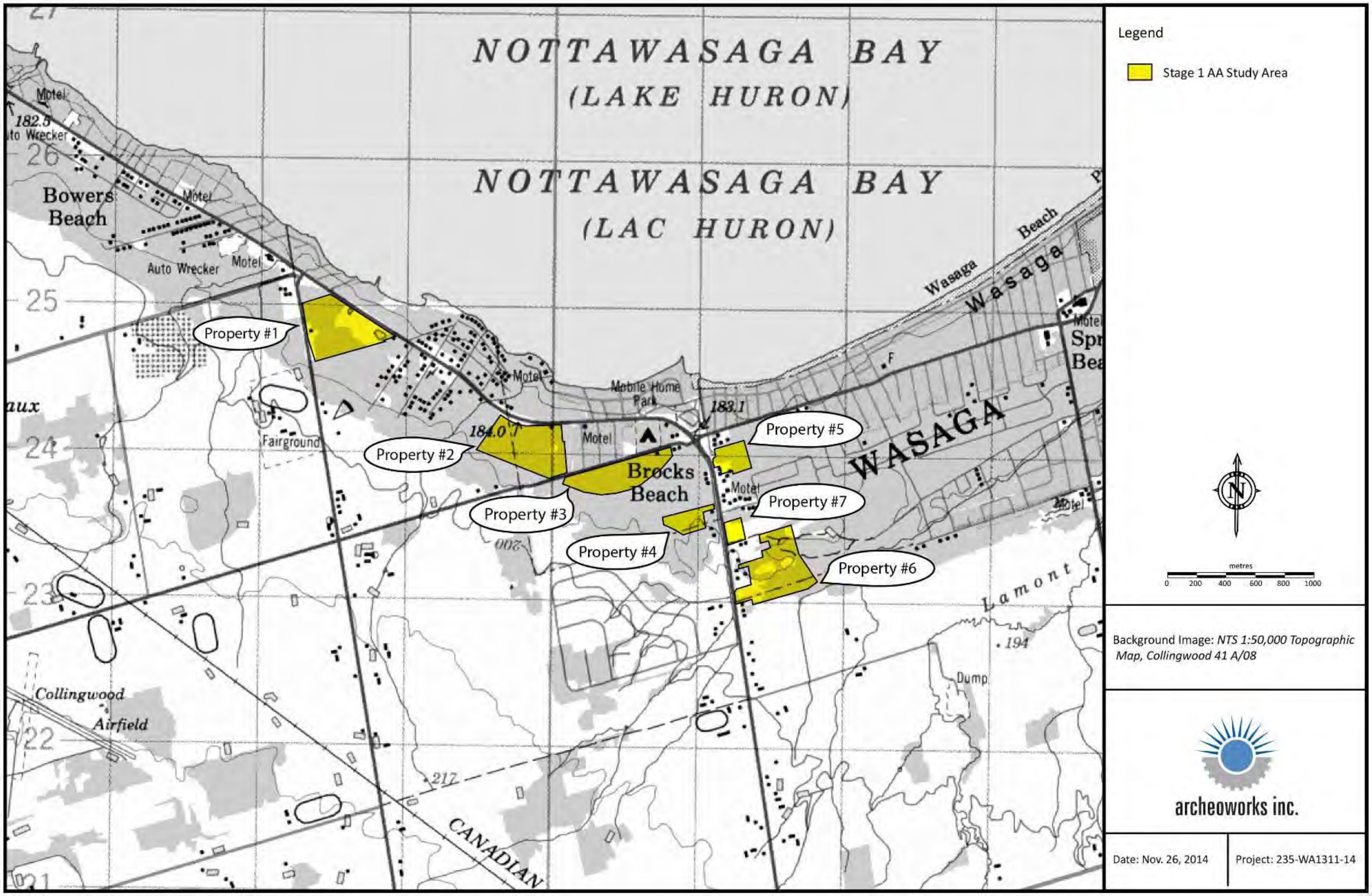
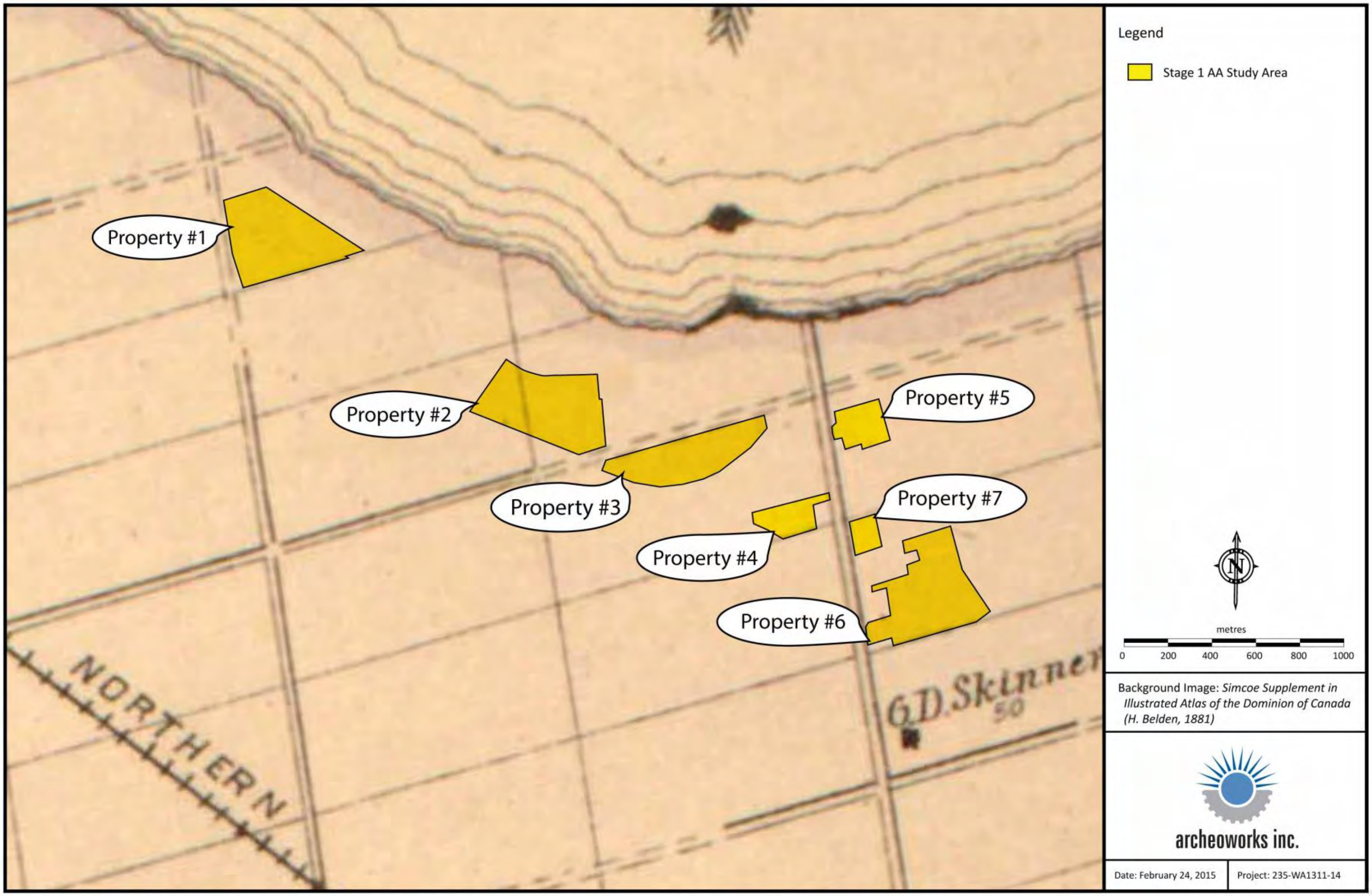
APPENDICES

APPENDIX A: MAPS



MAP 1 National Topographical System Map (Natural Resources Canada, 1998) identifying the Stage 1 AA Study Area.

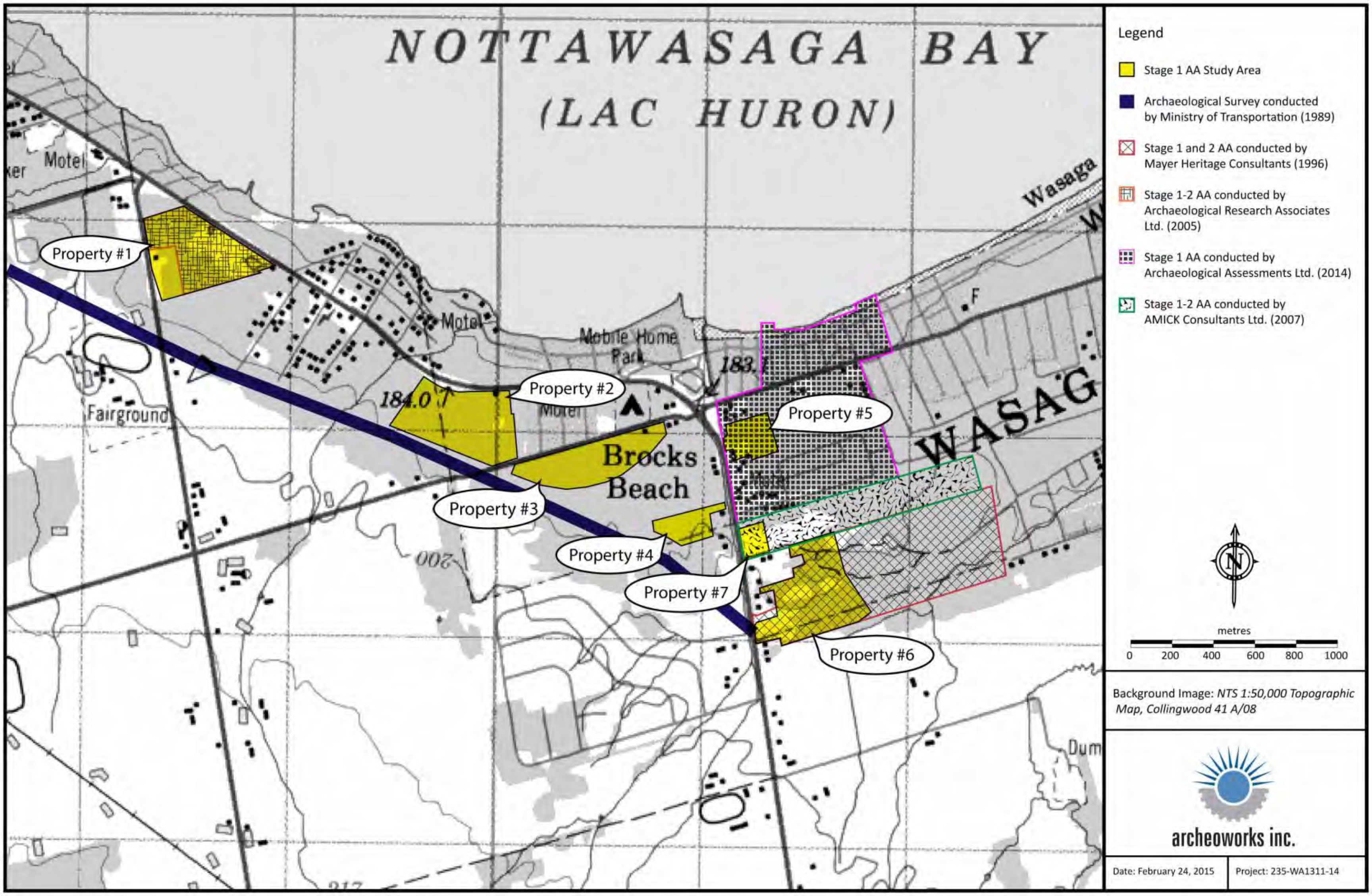


Background Image: *Simcoe Supplement in Illustrated Atlas of the Dominion of Canada (H. Belden, 1881)*

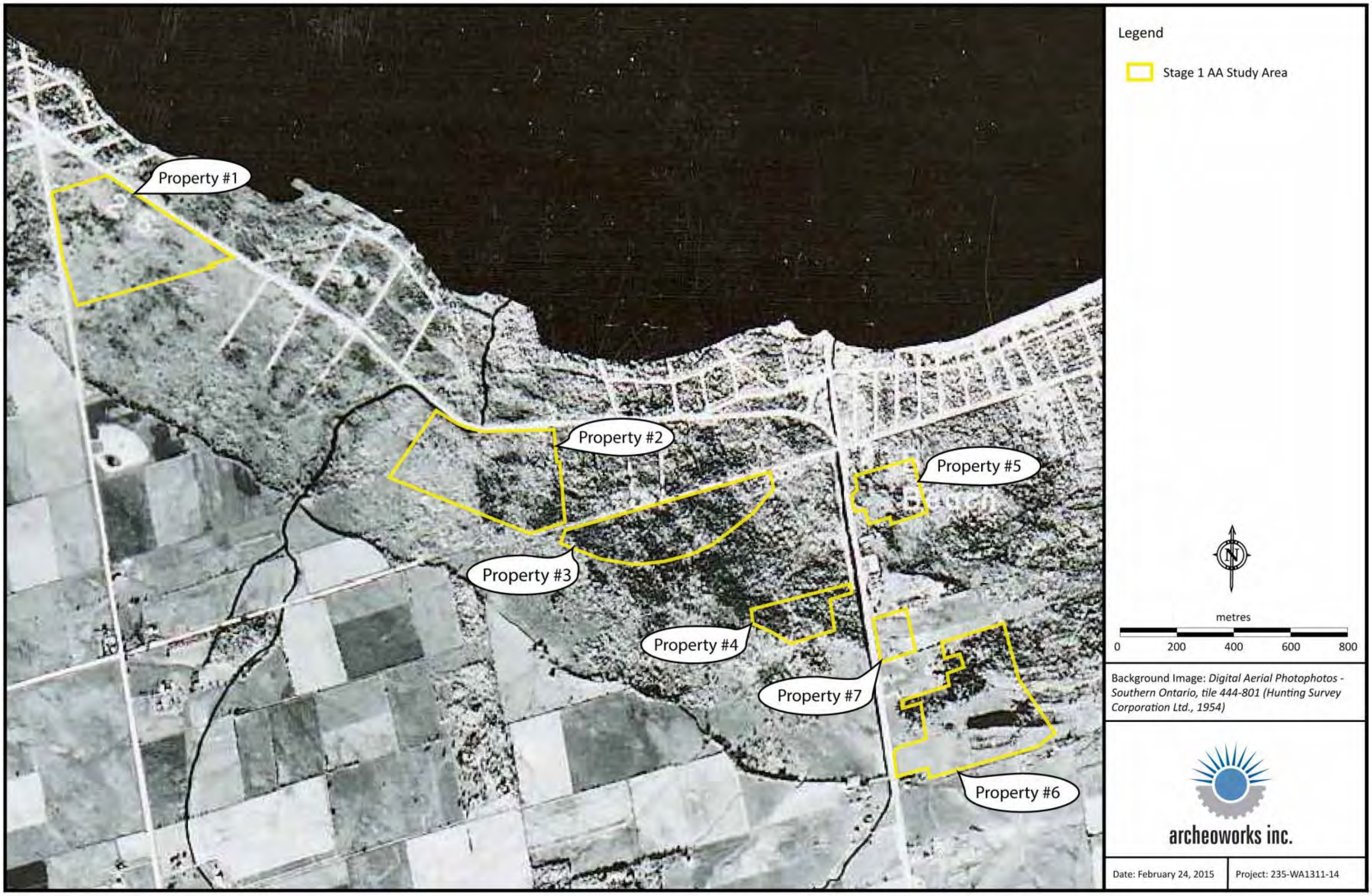
Date: February 24, 2015

Project: 235-WA1311-14

MAP 2: Stage 1 AA Study Area within the Simcoe Supplement in Illustrated Historical Atlas of the Dominion of Canada (H. Belden, 1881).



MAP 3 Previous archaeological assessments within 50 metres of the Stage 1 Study Area.



MAP 4 Stage 1 AA Study Area within a 1954 aerial photograph (Hunting Survey Corporation Ltd., 1954).

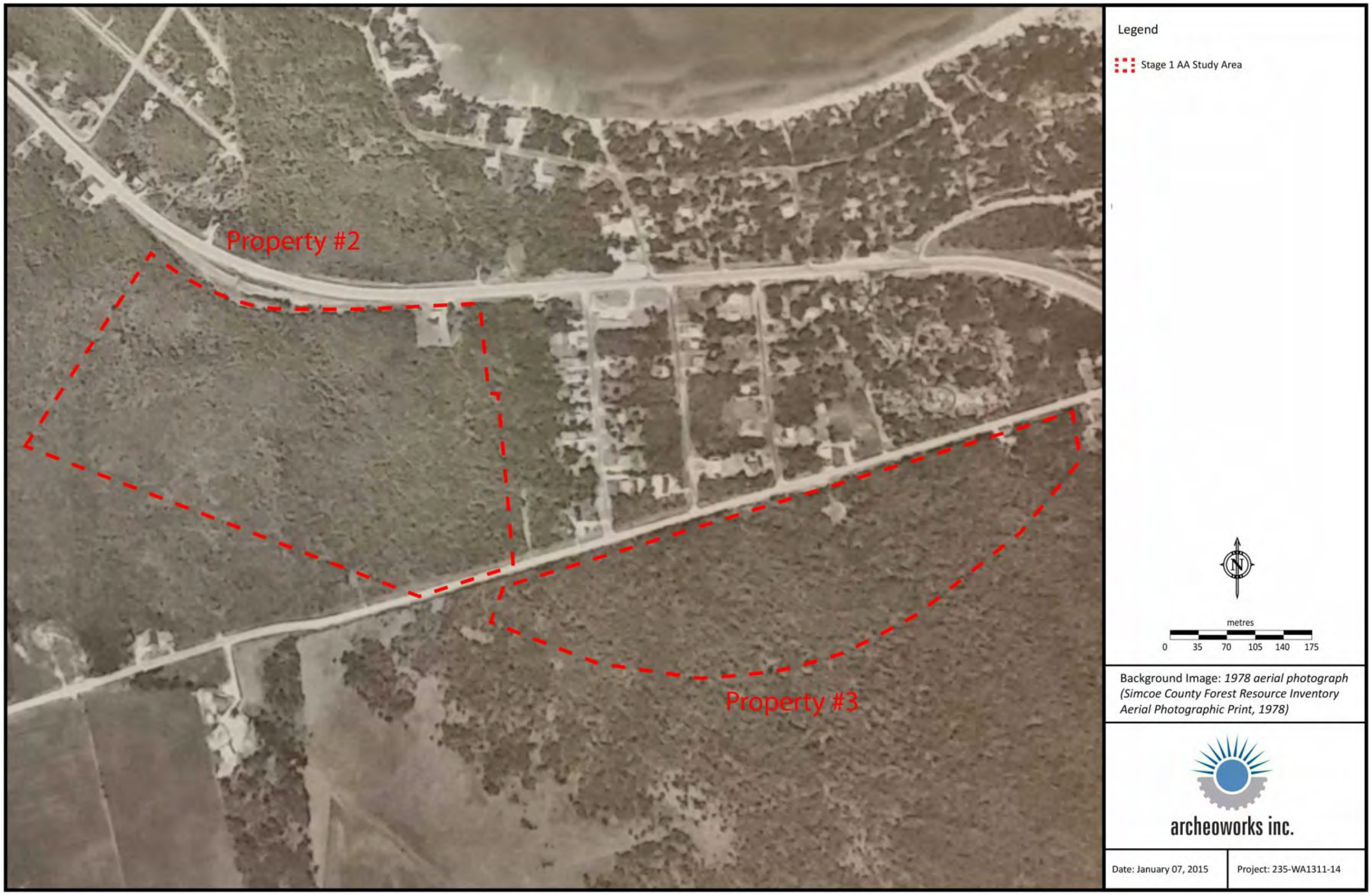
Background Image: *1978 aerial photograph (Simcoe County Forest Resource Inventory Aerial Photographic Print, 1978)*

archeoworks inc.

Date: January 07, 2015

Project: 235-WA1311-14

MAP 5 Property #1 within a 1978 aerial photograph (Simcoe County Forest Resource Inventory Aerial Photographic Print, 1978).



Background Image: *1978 aerial photograph (Simcoe County Forest Resource Inventory Aerial Photographic Print, 1978)*

Date: January 07, 2015

Project: 235-WA1311-14

MAP 6 Properties #2 and #3 within a 1978 aerial photograph (Simcoe County Forest Resource Inventory Aerial Photographic Print, 1978).

MAP 7 Properties #4 and #5 within a 1978 aerial photograph (Simcoe County Forest Resource Inventory Aerial Photographic Print, 1978).

MAP 8 Properties #6 and #7 within a 1978 aerial photograph (Simcoe County Forest Resource Inventory Aerial Photographic Print, 1978)[2].

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[2] Aerial photograph featuring the southern extent of Property #6 was unavailable.

Background Image: *2011 satellite image (Google Earth, 2015)*

Date: January 07, 2015

Project: 235-WA1311-14

MAP 9 Property #1 within a 2011 satellite image (Google Earth, 2015).

MAP 10 Properties #2 and #3 within a 2011 satellite image (Google Earth, 2015).

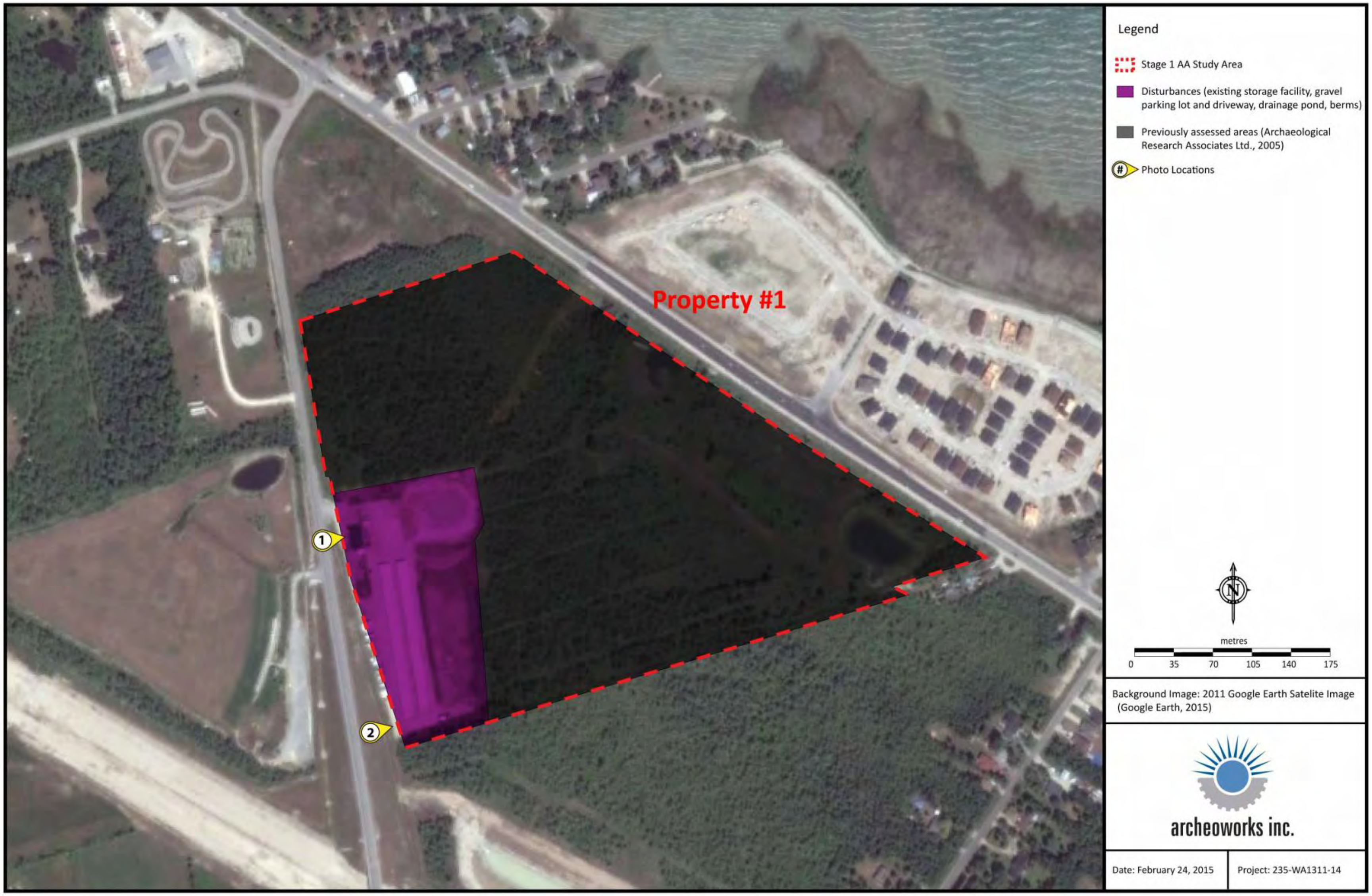
Background Image: *2011 satellite image (Google Earth, 2015)*

Date: January 07, 2015

Project: 235-WA1311-14

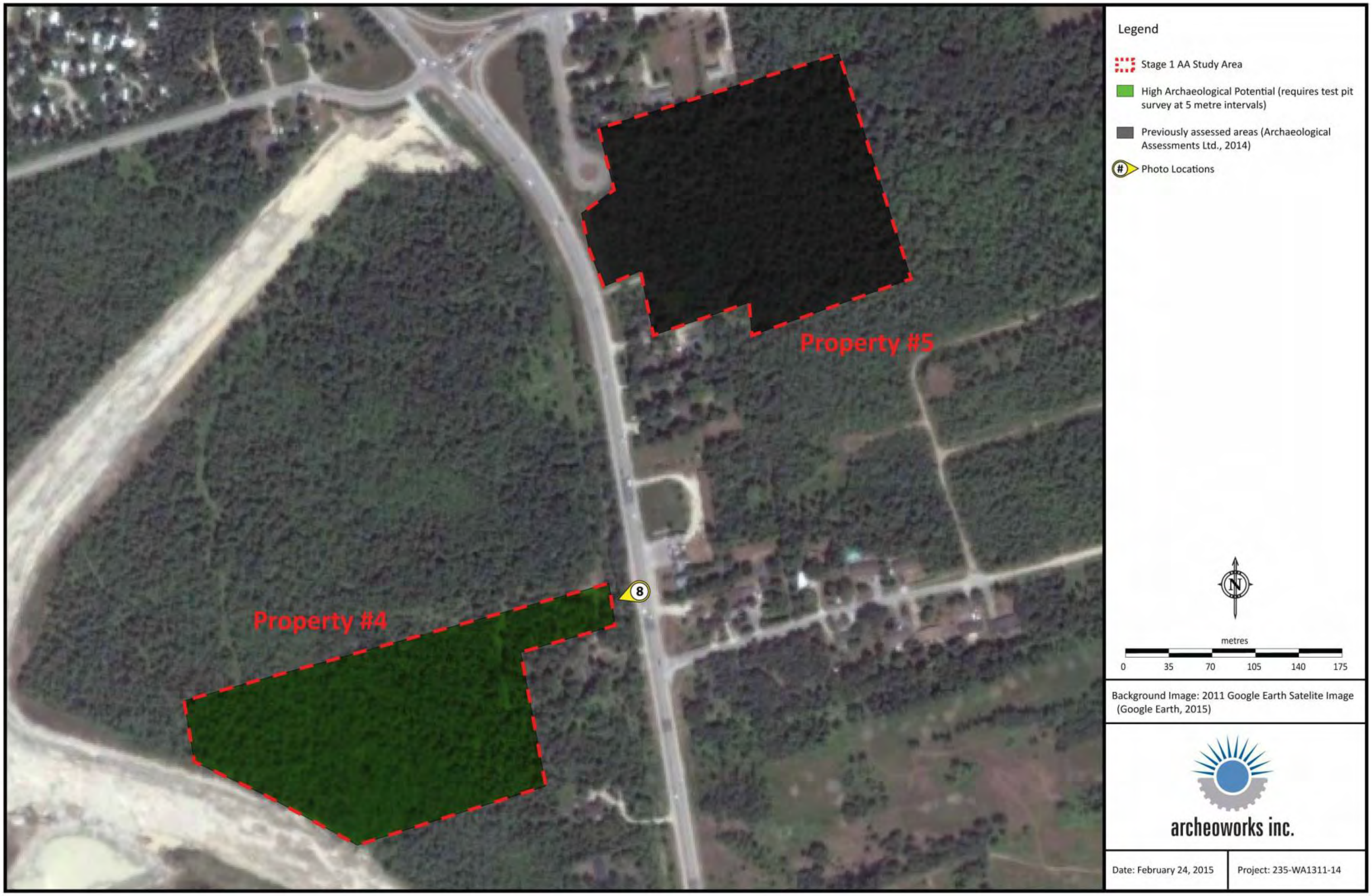
MAP 11 Properties #4 and #5 within a 2011 satellite image (Google Earth, 2015).

MAP 12 Properties #6 and #7 within a 2011 satellite image (Google Earth, 2015).

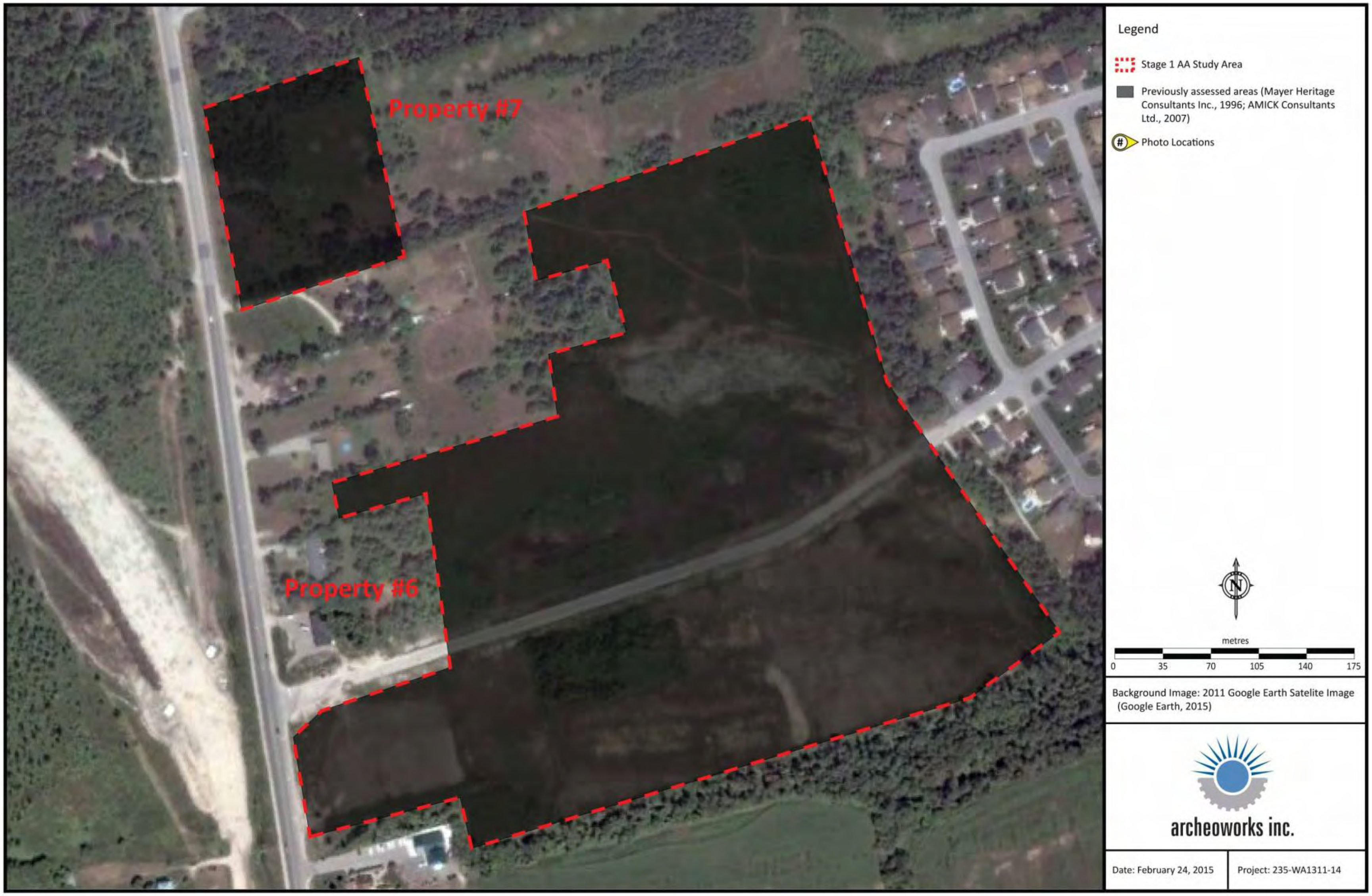


MAP 13 Stage 1 AA results of Property #1 with photo locations indicated, overlaid on a 2011 satellite image (Google Earth, 2015). Note: The extent of the disturbed area is to be considered provisional; only on-site inspection can confirm its disturbed nature and can exempt it from further assessment, per *Section 1.4.1* of the 2011 *S&G*.

MAP 14 Stage 1 AA results of Properties #2 and #3 with photo locations indicated, overlaid on a 2011 satellite image (Google Earth, 2015). Note: The extent of the disturbed area is to be considered provisional; only on-site inspection can confirm its disturbed nature and can exempt it from further assessment, per *Section 1.4.1* of the 2011 *S&G*.



MAP 15 Stage 1 AA results of Properties #4 and #5 with photo locations indicated, overlaid on a 2011 satellite image (Google Earth, 2015).



MAP 16 Stage 1 AA results of Properties #6 and #7, overlaid on a 2011 satellite image (Google Earth, 2015).

APPENDIX B: SUMMARY OF BACKGROUND RESEARCH

Feature of Archaeological Potential		Yes	No	Unknown	Comment
1	Known archaeological sites within 300 m?		X		If Yes, potential confirmed
Physical Features		**Yes**	**No**	**Unknown**	**Comment**
2	Is there water on or near the property?		X		If Yes, potential confirmed
2a	Presence of primary water source within 300 metres of the study area (lakes, rivers, streams, creeks)	X			If Yes, potential confirmed
2b	Presence of secondary water source within 300 metres of the study area (intermittent creeks and streams, springs, marshes, swamps)		X		If Yes, potential confirmed
2c	Features indicating past presence of water source within 300 metres (former shorelines, relic water channels, beach ridges)		X		If Yes, potential confirmed
2d	Accessible or inaccessible shoreline (high bluffs, swamp or marsh fields by the edge of a lake, sandbars stretching into marsh)		X		If Yes, potential confirmed
3	Elevated topography (knolls, drumlins, eskers, plateaus, etc.)		X		If Yes to two or more of 3-5 or 7-10, potential confirmed
4	Pockets of well-drained sandy soil, especially near areas of heavy soil or rocky ground		X		If Yes to two or more of 3-5 or 7-10, potential confirmed
5	Distinctive land formations (mounds, caverns, waterfalls, peninsulas, etc.)		X		If Yes to two or more of 3-5 or 7-10, potential confirmed
Cultural Features		**Yes**	**No**	**Unknown**	**Comment**
6	Is there a known burial site or cemetery that is registered with the Cemeteries Regulation Unit on or directly adjacent to the property?		X		If Yes, potential confirmed
7	Associated with food or scarce resource harvest areas (traditional fishing locations, food extraction areas, raw material outcrops, etc.)		X		If Yes to two or more of 3-5 or 7-10, potential confirmed
8	Indications of early Euro-Canadian settlement (monuments, cemeteries, structures, etc.) within 300 metres		X		If Yes to two or more of 3-5 or 7-10, potential confirmed
9	Associated with historic transportation route (historic road, trail, portage, rail corridor, etc.) within 100 metres of the property	X			If Yes to two or more of 3-5 or 7-10, potential confirmed
Property-specific Information		**Yes**	**No**	**Unknown**	**Comment**
10	Contains property designated under the Ontario Heritage Act		X		If Yes to two or more of 3-5 or 7-10, potential confirmed
11	Local knowledge (aboriginal communities, heritage organizations, municipal heritage committees, etc.)		X		If Yes, potential confirmed
12	Recent ground disturbance, not including agricultural cultivation (post-1960, extensive and deep land alterations)	Present in certain areas, but undisturbed areas also remain			If Yes, low archaeological potential is determined

APPENDIX C: IMAGES

Image 1: Looking at disturbances associated with self-storage facility within Property #1.

Image 2: Looking at disturbances associated with self-storage facility within Property #1.

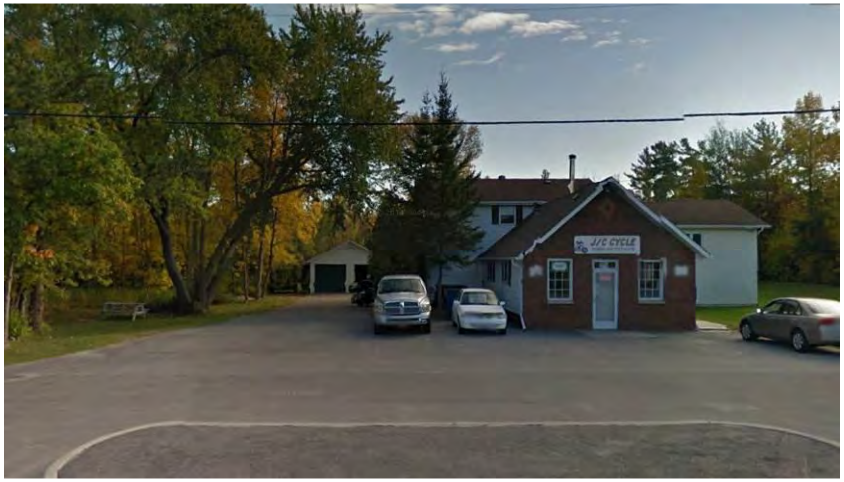


Image 3: Looking at disturbances associated with a commercial business and surrounding potentially undisturbed manicured grass lawn within Property #2.

Image 4: Looking at undisturbed meadow and treed area within Property #2.

Image 5: Looking at disturbances associated with grading and undisturbed woodlot with archaeological potential within Property #2.

Image 6: Looking at undisturbed meadow and woodlot with archaeological potential within Property # 2.

Image 7: Looking at undisturbed woodlot with archaeological potential within Property #3.

Image 8: Looking at undisturbed woodlot with archaeological potential within Property #4.

APPENDIX D: INVENTORY OF DOCUMENTARY AND MATERIAL RECORD

Project Information:				
Project Number:		215-WA1311-14		
Licensee:		Alvina Tam (P1016)		
MTCS PIF:		P1016-0050-2014		
Document/ Material			**Location**	**Comments**
1.	Research/ Analysis/ Reporting Material	Digital files stored in: /2014/235-WA1311-14 - Wasaga Beach West End Water Storage Facility and Maintenance Depot	Archeoworks Inc., 16715-12 Yonge Street, Suite 1029, Newmarket, ON, Canada, L3X 1X4	Stored on Archeoworks network servers
2.	Digital Images	Nine (9) digital images	Archeoworks Inc., 16715-12 Yonge Street, Suite 1029, Newmarket, ON, Canada, L3X 1X4	Stored on Archeoworks network servers

Under Section 6 of Regulation 881 of the *Ontario Heritage Act*, *Archeoworks Inc*. will, "keep in safekeeping all objects of archaeological significance that are found under the authority of the licence and all field records that are made in the course of the work authorized by the licence, except where the objects and records are donated to Her Majesty the Queen in right of Ontario or are directed to be deposited in a public institution under subsection 66 (1) of the Act."

ARCHEOWORKS INC.

Stage 2 Archaeological Assessment for the Environmental Assessment for the West End Water Storage Facility And Maintenance Depot

Within Part of Lot 34, Concession 3
In the Geographic Township of Nottawasaga
Historical County of Simcoe
Town of Wasaga Beach
Simcoe County
Ontario

Project #: 235-WA1311-14
Licensee (#): Nimal Nithiyanantham (P390)
PIF#: P390-0155-2015

Original Report

December 14th, 2015

Presented to:
Ainley Group
550 Welham Road
Barrie, Ontario
L4N 9H3
T: 705.445.3451

Prepared by:
Archeoworks Inc.
16715-12 Yonge Street, Suite 1029
Newmarket, Ontario
L3X 1X4
T: 416.676.5597
F: 647.436.1938

EXECUTIVE SUMMARY

Archeoworks Inc. was retained by the *Ainley Group* to conduct a Stage 2 Archaeological Assessment (AA), in support of the proposed development of a new water storage facility and Public Works maintenance depot for maintenance equipment and storage at the Town of Wasaga Beach's west end (the "study area"). The study area is located within part of Lot 34, Concession 3, in the Geographic Township of Nottawasaga, historical County of Simcoe, now in the Town of Wasaga Beach, Simcoe County, Ontario.

During the Stage 2 AA, disturbances were encountered consisting of gravel fill and grading, where the ground had been stripped to subsoil to form a trail. The remaining balance of the study area consisted of a heavily treed woodlot with dense brush and large boulders was subjected to a test pit form of survey at five-metre intervals. Despite careful scrutiny, no archaeological resources were encountered during the Stage 2 AA of the study area.

In light of the study area testing negative for archaeological resources, the following recommendation is presented:

1. No further archaeological investigation is required for the study area.

No construction activities shall take place within the study area prior to the *Ministry of Tourism, Culture, and Sport* (Archaeology Programs Unit) confirming in writing that all archaeological licensing and technical review requirements have been satisfied.

TABLE OF CONTENTS

PROJECT PERSONNEL

Project Director	Nimal Nithiyanantham - MTCS licence P390
Field Director	Sarah Henderson - MTCS licence P394
Field Archaeologists	Kara Adams
	Kassandra Aldridge - MTCS licence R439
	Micha Blackman
	Ian Boyce - MTCS licence R1059
	Jessica Budhoo
	Heather Kerr
	Sebastian LaForce - MTCS licence R416
	Jessica Marr - MTCS licence P334
	Alexander Rodriguez - MTCS licence R487
	Adrian Susac
Report Preparation	Alvina Tam - MTCS licence P1016
Report Review	Nimal Nithiyanantham - MTCS licence P390
	Kim Slocki – MTCS licence P029
Historical Research	Lee Templeton – MTCS licence R454
Graphics	Alvina Tam - MTCS licence P1016
	Lee Templeton – MTCS licence R454

PROJECT CONTEXT

1.1 Objective

The objectives of a Stage 2 Archaeological Assessment (AA), as outlined by the 2011 *Standards and Guidelines for Consultant Archaeologists* (‘*2011 S&G*’) published by the *Ministry of Tourism, Culture, and Sport* (*MTCS*) (2011), are as follows:

- To document all archaeological resources on the property;
- To determine whether the property contains archaeological resources requiring further assessment; and,
- To recommend appropriate Stage 3 assessment strategies for archaeological sites identified.

1.2 Development Context

Archeoworks Inc. was initially retained by the *Ainley Group* to conduct a Stage 1 AA, in support of a Schedule C Municipal Class Environmental Assessment (EA) for provision of a new water storage facility and Public Works maintenance depot for maintenance equipment and storage at the Town of Wasaga Beach’s west end. The Stage 1 AA identified elevated potential for the recovery of archaeologically significant materials within the project limits, therefore a Stage 2 AA was recommended for which *Archeoworks Inc*. was further retained.

This Stage 2 AA will focus on the potential site location within Property #2, located west of 58th Street to the western limit of the Town of Wasaga Beach, which will herein be referred to as the “study area”. The study area encompasses part of Lot 34, Concession 3, in the Geographic Township of Nottawasaga, historical County of Simcoe, now in the Town of Wasaga Beach, Simcoe County, Ontario (***see Appendix A – Map 1***).

This study was triggered by the Ontario Municipal Class Environmental Assessment (Class EA) process. This Stage 2 AA was conducted under the project direction of Mr. Nimal Nithiyanantham, under the archaeological consultant licence number P390, in accordance with the *Ontario Heritage Act* (2009). Permission to investigate the study area was granted by the *Ainley Group* on September 11, 2015.

1.3 Historical Context

To establish the archaeological and historical potential of the study area, *Archeoworks Inc.* conducted a Stage 1 AA (Archeoworks Inc., 2015). This report included an examination of the study area’s settlement history, a review of historical mapping, a review of designated and listed heritage resources, physiography, proximity to significant water sources, a review of previous AAs within proximity to the study area, and a summary of registered archaeological sites within proximity to the study area.

The results of this background research are summarized and documented below.

1.3.1 Pre-Contact Period

1.3.1.1 The Paleoindian Period (ca. 11,500 to 7,500 B.C.)

The region in which the study area is situated was first inhabited after the final retreat of the North American Laurentide ice sheet approximately 15,000 years ago (or 13,000 B.C.) (Stewart, 2013, p.24). Massive amounts of glacial meltwater expanded against the retreating ice boundary in the north, flooding the Huron and Georgian Bay and occupying much of the Simcoe lowlands (Stewart, 2013, p.25). Eventually, the water within these basins coalesced to form glacial Lake Algonquin, which "covered parts or all of Lake Huron, Lake Superior, and Erie basins, which included Lake Simcoe and Lake Couchiching" (Frim, 2002, p.xi; Karrow and Warner, 1990, p.15). The lessening ice load created isostatic rebound and caused abandoned shorelines to tilt northward towards the ice centre. Water began to accumulate along the southern shorelines, forming the main glacial strandline of Lake Algonquin which extended around the southern shore of Lake Simcoe (Karrow and Warner, 1990, p.15). This strandline is marked by a number of erosional and depositional features including high bluffs, off-shore bars, and limestone scarps where wave erosion cut into the bedrock (Storck, 1982, p.9). At this time, the study area was under Lake Algonquin.

The continuing retreat and glacial uplift uncovered a series of lower outlets near North Bay, Ontario and water flooded the Ottawa River. The level of Lake Algonquin rapidly fell to form a series of short-lived post-Algonquin lakes located in the Georgian Bay and Lake Huron Basins which "exposed about half the present lake floor areas as dry land" (Karrow and Warner, 1990, p.17; Larson and Schaetzl, 2001, p.532; Jackson et al, 2000, p.419). These low-water lakes exposed as much as 12,000 to 14,000 kilometres of lake plain along the Ontario side of modern Lake Huron (Jackson, 2004, p.38). Streams and stream valleys extended throughout the flat, newly-exposed lake plain which opened large tracts of land available for flora and fauna to colonize (Karrow, 2004, p.8; Karrow and Warner, 1990, p.17). Along this shoreline and the beaches of Lake Algonquin, there is definite evidence of human occupations corresponding to the Late Paleoindian period of Southern Ontario (Karrow and Warner, 1990, p.15).

Paleoindians are thought to have been small groups of nomadic hunter-gatherers who depended on naturally available foodstuff such as game or wild plants (Ellis and Deller, 1990, p.38). For much of the year, Paleoindians "hunted in small family groups; these would periodically gather into a larger grouping or bands during a favourable period in their hunting cycle, such as the annual caribou migration" (Wright, 1994, p.25). Paleoindian sites are extraordinarily rare and consist of "stone tools clustered in an area of less than 200-300 metres" (Ellis, 2013, p.35). Traditionally, Paleoindian sites have been located primarily along abandoned glacial lake strandlines or beaches. However, this view is biased as these are the only areas in which archaeologists have searched for sites, due to the current understanding of the region's geological history (Ellis and Deller, 1990, p.50; Ellis, 2013, p.37). Artifact assemblages from this period are characterized by fluted and lanceolate stone points, scrapers, and small projectile points produced from specific chert types (Ellis and Deller, 1990). Distinctive dart heads were used to kill game, and knives for butchering and other tasks (Wright, 1994, p.24).

1.3.1.2 The Archaic Period (ca. 7,800 to 500 B.C.)

As the climate steadily warmed, deciduous trees slowly began to permeate throughout Southern Ontario, creating mixed deciduous and coniferous forests (Karrow and Warner, 1990, p.30). The "Archaic peoples are the direct descendants of Paleoindian ancestors" having adapted to meet new environmental and social conditions (Ellis, 2013, p.41; Wright, 1994, p.25). Few Archaic sites have faunal and floral preservation, thus lithic scatters are often the most common Archaic Aboriginal site type (Ellis et al., 1990, p.123). Burial, grave goods and ritual items appear, although very rarely. Stone points were reformed from the fluted and lanceolate points to stone points with notched bases to be attached to a wooden shaft (Ellis, 2013, p.41). The artifact assemblages from this period are characterized by a reliance on a wide range of raw lithic materials to make stone artifacts, the presence of stone tools shaped by grinding and polishing, and an increase in the use of polished stone axes and adzes as wood-working tools (Ellis et al., 1990, p.65; Wright, 1994, p.26).

As isostatic uplift continued, drainage through the North Bay outlet was closed off and elevated water in the Huron Basin to higher than modern levels (Jackson et al, 2000, p.419). This high water phase is known as the "Nipissing Phase, occurring approximately 5000 B.P. (3000 B.C.), which inundated large areas probably previously occupied by humans" (Karrow and Warner, 1990, p. 21). It is generally believed that during the Nipissing Phase, water levels achieved the same height as those of Lake Algonquin, thus creating one contiguous lake in the Lake Superior, Lake Michigan, and Lake Huron basins (Jackson et al, 2000, p.419). At their highest peak, water levels of Lake Huron reached "approximately one-kilometre inland from the present-day shoreline and extending upstream along the Nottawasaga River as a large, shallow lagoon immediately south of the present-day parabolic dune system" (Featherstone et al, 2005, p.5). Gradually, the Nipissing Phase water levels retreated to their present heights by approximately 2000-2,500 B.P. (500-0 B.C.) and due to the recession of Lake Algonquin and transgression of the Nipissing Phase water levels, evidence of Paleoindian and Archaic groups in the Town of Wasaga Beach have been lost (Featherstone et al, 2005, p.5).

1.3.1.3. The Woodland Period (ca. 800 B.C. to A.D. 1600)

Due to the receding water levels during the Nipissing Phase, the earliest evidence of human occupation in the Town of Wasaga Beach dates to the Middle Woodland period (ca. 200B.C. – A.D. 900). During the Middle Woodland period, the Saugeen complex occupied "southwestern Southern Ontario from the Bruce Peninsula on Georgian Bay to the north shore of Lake Erie to the west of Toronto" (Wright, 1999, p.629; Wright, 1994, p.30). Middle Woodland sites are clustered near Jack's Lake, east of the study area (Featherstone et al, 2005, p.5). The distinguishing characteristic of the Woodland period is the introduction of pottery (ceramics).

The earliest forms were coil-formed, "thick, friable and often under fired, and must have been only limited to utility usage" (Ferris and Spence, 1995, p.89; Williamson, 2013, p.48).

The Woodland Period has been divided into multiple phases and stages of cultural development indicating increasing complexity. The material culture, particularly that of pottery decoration and manufacturing, became more ornate; burials gradually evolved into ossuaries and burial offerings became more significant; and settlement-subsistence systems included the construction of longhouses and the farming of maize, squash, and beans, which was supplemented by fishing, hunting, and gathering (Spence et al., 1990; Ferris and Spence, 1995; Williamson, 2013; Dodd et al., 1990). These phases and stages are divided chronologically and spatially (Fox, 1990; Williamson, 1990; Dodd et al., 1990). During the Late Woodland Period, the Ontario Iroquoian-speaking linguistic and cultural groups developed. Although several migration theories have been suggested explaining the Iroquoian origins, an "available date from southern Ontario strongly suggests continuity (*in situ*) from the Middle-Late Woodland Transitional Princess Point complex and Late Woodland cultural groups" (Ferris and Spence, 1995, p. 105; Smith, 1990, p. 283).

Gradually the Ontario Iroquois progressed into the Huron (Huron-Wendat), Neutral (called Attiewandaron by the Wendat), Petun (Tionnontaté or Khionontateronon) in Ontario, and the Five Nations of the Iroquois (Haudenosaunee) of upper New York State, which were distinct but shared a similar pattern of life already established by European contact in 16th century (Birch, 2010, p.31; Warrick, 2013, p.71; Trigger, 1994, p.42). The geographic distribution of ancestral Ontario Iroquoian sites describes two major groups east and west of the Niagara Escarpment: the ancestral Attiewandaron to the west, and the ancestral Huron-Wendat to the east (Warrick, 2000, p.446). Recently, it has been theorized that ancestral Tionnontaté groups had arrived in the area between the Nottawasaga River, the Niagara Escarpment and Georgian Bay via the Grand, Pine and Nottawasaga Rivers from ancestral Attiewandaron country and are derived from the pre-contact Attiewandaron community (Garrad, 2014, pp. 1, 147-148). However, their origins are still questioned due to a lack of comparative studies between Tionnontaté and Attiewandaron material culture (Garrad, 2014, p.153).

1.3.2 European Contact Period (ca. A.D 1600 to 1650)

The Tionnontaté or Khionontateronon were called the 'Petun,' a term of Brazilian origin meaning tobacco, by the French after Samuel de Champlain observed the Tionnontaté cultivating and trading tobacco. Limited ethno-historical information is available regarding the size of the Tionnontaté population, but inferred pre-epidemic Huron-Wendat data suggests the Tionnontaté population may have exceeded 8,000 individuals located within eight occupied villages and two villages under construction. Jesuit missionaries who attempted to establish the Mission of the Apostles with the Petun recognized the existence of two different groups within the Tionnontaté territory: the Nation of the Wolves and the Nation of the Deer (Garrad and Heidenreich, 1978, pp.394-396).

Prior to the Jesuit missionaries, several Récollet priests traveled through Tionnontaté territory en route to Attiewandaron territory, following the Nottawasaga River, to the Pine River to the source of the Irvine River into the Grand River, and into the banks of Lake Erie (Bricker, 1934, p.58; Garrad, 2014, p.148). Scant reference of the Tionnontaté were made by French fur-traders suggesting they believed the Tionnontaté were similar in language, dress, and religious beliefs to tribes within the Huron-Wendat Confederacy (Garrad and Heidenreich, 1978, p.395; Garrad, 2014, pp.167-177, 490). However, it is now believed that the Tionnontaté were "mainly or entirely Attiewandaron who had moved to a new location to enhance their trading position" (Garrad, 2014, p.490). Additionally, the Tionnontaté acted as middle-men for trade of European goods between the Ottawa, an Algonquin linguistic and cultural group, and the Attiewandaron along the Niagara River (Garrad and Heidenreich, 1978, p.396).

During the 1630s, the Jesuits attempted to establish missionaries amongst the Tionnontaté, but were unsuccessful due to fears of the spread of disease (Garrad, 2014, p.215). By 1640, post-epidemic population numbers of the Tionnontaté population dropped to 3,375 individuals, a reduction of 60% of their entire population (Garrad, 2014, p.473). That same year, a village of the Tionnontaté was destroyed by the Haudenosaunee, renewing the Huron-Tionnontaté military and defence alliance (Garrad and Heidenreich, 1978, p.396).

By 1645, having grown dependent on European goods and with their territory no longer yielding enough animal pelts, the Haudenosaunee became increasingly aggressive towards the Huron-Wendat Confederacy (Trigger, 1994, p.53). Armed with Dutch guns and ammunition, the Haudenosaunee engaged in warfare with the Huron-Wendat Confederacy and brutally attacked and destroyed several Huron-Wendat villages throughout Southern Ontario (Trigger, 1994, p.53). To prevent the revival of Huron-Wendat settlements, the Haudenosaunee attacked and destroyed the villages of the Huron-Wendat's allies, the Tionnontaté (Trigger, 1994, p.56). In 1650, what remained of the Tionnontaté migrated through Attiewandaron territory prior to resettlement in America (Garrad, 2014, pp.501-505). The former territory occupied by the Tionnontaté likely remained largely unoccupied for several decades.

1.3.3 Post Contact Period (ca. A.D 1650 to 1800)

Although their homeland was located south of the lower Great Lakes, the Haudenosaunee controlled most of Southern Ontario after the 1660s, occupying at "least half a dozen villages along the north shore of Lake Ontario and into the interior" (Schmalz, 1991, p.17; Williamson, 2013, p.60). The Haudenosaunee established "settlements at strategic locations along the trade routes inland from the north shore of Lake Ontario. Their settlements were on canoe-and-portage routes that linked Lake Ontario to Georgian Bay and the upper Great Lakes" (Williamson, 2013, p.60). The Haudenosaunee used this territory within Southern Ontario to hunt game and obtain furs for exclusive trade with the Dutch and English (Coyne, 1895, p.20).

At this time, several Algonquin-speaking linguistic and cultural groups within the Anishinaabeg (or Anishinaabe) began to challenge the Haudenosaunee dominance in the region (Johnston, 2004, pp.9-10; Gibson, 2006, p.36). The Anishinaabeg were originally located primarily in Northern Ontario. Before contact with the Europeans, the Ojibwa territorial homeland was situated inland from the north shore of Lake Huron (MNCFN, ND, p.3). The English referred to those Algonquin-speaking linguistic and cultural groups that settled in the area bounded by

Lakes Ontario, Erie, and Huron as Chippewas or Ojibwas (Smith, 2002, p.107). In 1640, the Jesuit fathers had recorded the name "*oumisagai*, or Mississaugas, as the name of an Algonquin group near the Mississagi River on the northwestern shore of Lake Huron. The French, and later English, applied this same designation to all Algonquian [-speaking groups] settling on the north shore of Lake Ontario" (Smith, 2002, p.107; Smith, 2013, pp.19-20).

A major smallpox epidemic combined with the capture of New Netherland by the English, access to guns and powder became increasingly restricted for the Haudenosaunee. The Anishinaabeg launched a series of successful attacks against the Haudenosaunee between 1653 and 1662, and the Haudenosaunee dominance in the region began to fail (Warrick, 2008, p.242; Schmalz, 1991, p.20). By the 1690s, Haudenosaunee settlements along the northern shores of Lake Ontario were abandoned (Williamson, 2013, p.60). After a series of successful battles throughout Ontario, the Haudenosaunee were defeated and expelled from Ontario (Gibson, 2006, p.37; Schmalz, 1991, p.27; Coyne, 1895, p.28). In 1701, representatives of several bands within the Anishinaabeg and the Haudenosaunee assembled in Montreal to participate in Great Peace negotiations, sponsored by the French (Johnston, 2004, p.10; Trigger, 2004, p.58).

From 1701 to the fall of New France in 1759, the fur trade continued in Ontario the Anishinaabeg trading with both the English and the French. As the Seven Years War between the French and British continued in North America, both the Ojibwa bands and the French were weakened by famine, lack of supplies, and disease (Schmalz, 1991, p.53). In 1763, the Royal Proclamation declared the Seven Years War over, giving the British control of New France and creating a western boundary for British colonization.

1.3.4 Euro-Canadian Settlement Period

By 1793, Lieutenant-Governor John Graves Simcoe had arrived at the entrance of Penetanguishene Bay and sought to establish a fort in the easily defensible natural harbour should the Americans provoke an attack from the south (Pencen Museum, 2013). This site would also act as a depot of inter-lake commerce (Belden, 1881, p.4). In 1798, William Claus, Superintendent of Indian Affairs, bargained on behalf of the British Government for a tract of land adjacent to the harbour of Penetanguishene, and purchased the tip of the peninsula for cloth, blankets and kettles valued at £101 of Quebec currency (Surtees, 1994, p.109; Hunter, 1909a, p.12). Settlement around Fort Penetanguishene continued slowly until the War of 1812.

After the War of 1812, a second wave of settlers arrived in Upper Canada. Between 1815 and 1824, the non-Aboriginal population doubled as a result of heavy immigration from Britain (Surtees, 1994, p.112). In 1818, William Claus assembled an Ojibwa council and "asked for over a million hectares to the west and south of Lake Simcoe" (Surtees, 1994, p.115; Hunter, 1909a, p.14). At this council, William Claus advised settlement would take several years and the Aboriginals residing in the area would still be able to occupy the area while receiving annual clothing and the usual presents distributed by the King (Surtees, 1994, p.116). The government agreed to pay an annuity of £1,200 currency in goods (Surtees, 1994, p.116; Hunter, 1909a, p.15). This tract included 1,592,000 acres of land and the majority of the County of Simcoe; this transaction is known as the Lake Simcoe-Nottawasaga Treaty (Hunter, 1909a, p.15; Surtees, 1994, p.103).

It would be another 20 years before the Township of Nottawasaga was surveyed. Thomas Kelly, a government surveyor, began the official survey in 1832, and was completed by Charles Rankin in 1833 (Hunter, 1909a, p.41; Belden, 1881, p. 15). Shortly afterwards, a few settlers arrived in the Township after having purchased land. The Township contains several rivers and streams, which navigate a chain of hills, and drain into Georgian Bay, producing deep clefts or canyons (Belden, 1881, p.15). The earliest settlers to arrive in the Township of Nottawasaga were of considerably mixed nationalities, however they were “ready to sink considerations of race, and, with mutual dependence and help, to form a community of united interests in the new land” (Belden, 1881, p. 15). By 1842, a total of 420 individuals lived in Nottawasaga Township, and were principally of Scottish descent (Smith, 1846, p. 132). 18,850 acres were owned, but only 1,539 were under cultivation (Smith, 1846, p.132).

During the mid-19th century, there was a significant increase in immigrants from the British Isles into Upper Canada placing a great demand on all available land. By 1850, the number of individuals within the Township increased to 1,411 (Smith, 1851, p.63). In 1855, the Northern Railway was extended from Aurora to Collingwood, allowing the township to prosper economically through their rich cedar reserves (Historical Canada, 2014; Smith, 1846, p.132). The Township continued to develop with the construction of the Hamilton and North Western Railway (ca. 1881) which began in Hamilton and extended to Collingwood (Cooper, 2001). Better roadways were established throughout the remainder of the century as early settlers focused on the lumber trade, agriculture, and animal husbandry within rural Ontario (Hunter, 1909a, pp.323-330).

1.3.5 Past Land Use

To further assess the study area’s potential for the recovery of historic pre-1900 remains, several documents, namely the 1881 *Simcoe Supplement in the Illustrated Historical Atlas of the Dominion of Canada*, were reviewed in order to gain an understanding of the land use history. The study area encompasses part of Lot 34, Concession 3, within the Geographic Township of Nottawasaga, in the historical County of Simcoe, now in the Town of Wasaga Beach, Simcoe County:

A review of the 1881 *Simcoe Supplement* (***see Map 2***) reveals that the study area was located in unassigned lots. It should be kept in mind, however, that not all historic features within the Township of Nottawasaga may have been depicted as the Simcoe Supplement in the Illustrated Atlas required a paid subscription from the residents in the County of Simcoe (Benson, N.D., p.4).

In addition, the study area abuts one historic settlement road: present-day Ayling Reid Court, which was originally laid out during the survey of the Township of Nottawasaga.

1.3.6 Present Land Use

The present land use of the study area can be classified as rural/open space.

1.4 Archaeological Context

1.4.1 Designated and Listed Cultural Heritage Resources

Consultation of the Ontario Heritage Properties Database which records heritage resources that have been designated for their provincial cultural value or interest under the *Ontario Heritage Act* (*O.Reg. 10/06)*, confirmed the absence of a provincially designated heritage property within and near (within 300 metres of) the study area[1].

Additional consultation with the online inventory entitled, “Heritage Registry – Register of Cultural Heritage Properties” (Town of Wasaga Beach, 2014), which is an inventory of all cultural heritage properties within the Town of Wasaga Beach, confirmed the absence of any cultural heritage properties within close proximity to (300 metres of) the study area. To determine if this resource is the most up-to-date inventory that lists both designated and listed heritage properties, the Planning Department at the Town of Wasaga Beach was contacted. The Planning Department at the Town of Wasaga Beach does not have any information regarding heritage properties (Templeton, 2015a).

1.4.2 Heritage Conservation Districts

A Heritage Conservation District (HCD) includes areas that have been protected under Part V of the *Ontario Heritage Act*. An HCD can be found in both urban and rural environments and may include residential, commercial, and industrial areas, rural landscapes or entire villages or hamlets with features or land patterns that contribute to a cohesive sense of time or place and contribute to an understanding and appreciation of the cultural identity of a local community, region, province, or nation. An HCD may comprise an area with a group or complex of buildings, or large area with many buildings and properties and often extends beyond its built heritage, structures, streets, landscape and other physical and spatial elements, to include important vistas and views between and towards buildings and spaces within the district (MTCS, 2006, p.5). An HCD area contains valuable cultural heritage and must be taken into consideration during municipal planning to ensure that they are conserved.

To determine if the study area was located within an HCD, the Planning Department at the Town of Wasaga Beach was contacted; however, the Planning Department does not have any information regarding heritage properties (Templeton, 2015a).

1.4.3 Commemorative Plaques or Monuments

According to *Section 1.3.1* of the *2011 S&G,* lands within 300 metres of Aboriginal and Euro-Canadian settlements where commemorative markers of their history, such as local, provincial,

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[1] **Clarification:** As of 2005, the Ontario Heritage Properties Database is no longer being updated. The Ministry of Tourism, Culture and Sport is currently updating a new system which will provide much greater detail to users and will become publicly accessible in the future. (http://www.hpd.mcl.gov.on.ca)

or federal monuments, cairns or plaques, or heritage parks, are considered to have elevated archaeological potential. To determine if any historical plaques are present, Ontario Historical Plaques inventory, which contains a catalogue of federal Historic Sites and Monuments Board of Canada plaques, the provincial Ontario Heritage Trust plaques, plaques from the various historical societies and other published plaques located in Ontario, confirmed the absence of commemoratives plaques within and in proximity to (within 300 metres) of the study area (Ontario Historical Plaques, 2015).

1.4.4 Registered Archaeological Sites

In order that an inventory of archaeological resources could be compiled for this study area, the *Ontario Archaeological Sites Database* (OASD) maintained by the *MTCS* was consulted. Every archaeological site is registered according to the Borden System, which is a numbering system used throughout Canada to track archaeological sites and their artifacts. The study area is located within Borden block BcHa.

According to the *MTCS* (2015), no archaeological sites have been registered within one kilometre of the study area. It must be noted, however, that the paucity of archaeological sites in proximity to the study area is not necessarily reflective of the scale of previous habitation, but more likely a lack of detailed archaeological surveys within the immediate area.

1.4.5 Previous Archaeological Assessments

In order to further establish the archaeological context of the study area, reports documenting previous archaeological fieldwork carried out within the limits of, or immediately adjacent to (i.e., within 50 metres) the study area were consulted. Five reports were identified:

Previous assessments associated with current development project:

1. Stage 1 Archaeological Assessment for the: Proposed New Wasaga Beach West End Water Storage Facility and Maintenance Depot, within Part of Lots 32-33, Concession 2; Lots 33-34, Concession 3, and Lots 34 and 36; Concession 4, Geographic Township of Nottawasaga, Historical County of Simcoe, Now in the Town of Wasaga Beach, Simcoe County, Ontario (Archeoworks Inc., 2015)

Archeoworks Inc. conducted a Stage 1 AA of seven properties (Property # 1 to 7) in the Town of Wasaga Beach in support of a new Water Storage Facility and Public Works maintenance depot. These properties were located throughout the Town of Wasaga Beach's west end. This assessment encompasses the entire study area. The Stage 1 AA included a review of both Aboriginal and Euro-Canadian settlement history; a review of historic mapping; a review of designated, listed, heritage conservation districts and historic plaques within proximity to the subject areas; and a review of registered archaeological sites within one-kilometre of the subject area, previous assessments and the subject area's physiography. Property #6 and #7 had been previously subjected to a Stage 1 and 2 AA and having fulfilled the Stage 1 and 2 requirements, both were not recommended for Stage 2 AA within the scope of this project. A Stage 1 AA had been previously conducted on Property # 5 and on a large portion of Property

#1. With these reports having fulfilled the Stage 1 AA requirements, no further Stage 2 AA was recommended within the scope of this project. For the Property #1, #2, #3 and #4, in areas where no deep and extensive disturbances were identified, Stage 2 AA was recommended (***see Map 3***).

Previous assessments associated with other development projects:

2. Archaeological Survey of the Hwy 26 Bypass, Wasaga Beach to Collingwood (W.P. 209-85-00) (Ministry of Transportation, 1989)

In 1988 and 1989, the *Ministry of Transportation* conducted a survey of 7.5 kilometres of new right-of-way (ROW) lands to accommodate the construction of the Highway 26 Bypass from Wasaga Beach to Collingwood. This subject corridor runs parallel to the southwestern shore of Nottawasaga Bay, 700 to 900 metres southwest of the shoreline, and measures approximately 90 metres in width. This assessment encompasses land within 50 metres of the study area.

The background research included a review of the subject corridor’s glacial environment and its impact on human settlement history. During the field survey, a combination of test pits was excavated ranging in 10-metre intervals placed atop the Nipissing bluff, those areas below the bluff were visually examined at 10-metre intervals and at five-metre intervals near Batteaux Creek. During the field survey, a total of four pre-contact and two 19th century Euro-Canadian sites were identified, all found during test pit survey of the top of the Nipissing bluff. All six sites are located greater than 300 metres away from the current study area limits and therefore present no concern to the current study. The remainder of the subject corridor was considered free of further archaeological concern. However, due to the significance of the pre-contact sites located around Batteaux Creek area, no construction related activity is allowed to take place off of the corridor and should it be necessary to extend construction activities beyond the ROW, additional archaeological investigations will be necessary.

3. Stage 1 Archaeological Assessment: Highway 26 New Alignment between Collingwood and Wasaga Beach, Town of Collingwood, Town of Wasaga Beach and Clearview Township, Ontario – Part A (Archaeological Services Inc., rev.2009)

Archaeological Services Inc. (ASI) conducted as Stage 1 AA of a corridor of land for the Highway 26 New Alignment consisting of eight kilometres of new highway extending between the existing Highway 26, west of the Sixth Line in the Town of Collingwood, to the existing alignment of the highway, south of Mosley Street, in the Town of Wasaga Beach. This assessment includes lands within 50 metres of the current study area. The Stage 1 AA included a review of registered archaeological sites within one-kilometre of the subject area, previous AAs, the physiography and proximity to water sources, historic mapping and settlement history. Part of the proposed Highway 26 new alignment was subjected to previous AAs and additional AA was not required within the proposed ROW; that portion of the subject corridor was cleared of further archaeological concern. If the project limits extend beyond the areas subjected to previous assessment, then additional Stage 2 AA is required.

4. Highway 26 Realignment Project – Phase 1, from the Town of Collingwood to the Town of Wasaga Beach (MTO GWP 629-91-00): Stage 1 Background and Stage 2 Assessment (Final Report) (Fisher Archaeological Consulting, 2001)

5. Highway 26 Realignment Project – Phase 2: Stage 2 Assessment of Storm Water Management Lands, Additional Lands including the Flat Rock Site Area, and the Collingwood Airport Road Interchange and Stage 3 Testing of the Mighton Site, and Stage 4 Additional Excavation of the Rentner Site (MTO GWP 629-91-00) (Fisher Archaeological Consulting, 2004)

In an attempt to adhere to *Section 7.5.8, Standard 4* of the *2011 S&G*, the *consulting firm* was contacted in order to obtain copies of the report #4 and #5 listed above (Templeton, 2015b). No response was received at the time of report completion

1.4.6 Physical Features

The study area is situated within the Simcoe Lowlands physiographic region of Southern Ontario. These lowlands were flooded by glacial Lake Algonquin and are bordered by shore cliffs, beaches and boulder terraces, and are floored by sand, silt, and clay. East of the Holland marsh, the plains are level, underlain by deposits of sand and silt. Drumlinized till has also been observed in the region. The lands south of Lake Simcoe have substantial swamp or wet sand areas, making it a poorer farming district than the Nottawasaga basin to the west (Chapman & Putnam, 1984).

The native soil within the study area is classified as Sargent gravelly sandy loam, a Brown Forest soil which is characterized as pale brown, calcareous outwash gravel with good drainage. Its topography is smooth, gently sloping and is stonefree (Ontario Agricultural College, 1959).

In terms of archaeological potential, potable water is a highly important resource necessary for any extended human occupation or settlement. As water sources have remained relatively stable in Southern Ontario since post-glacial times, proximity to water can be regarded as a useful index for the evaluation of archaeological site potential. Indeed, distance from water has been one of the most commonly used variables for predictive modeling of site location. A watershed is an area drained by a river and its tributaries. As surface water collects and joins a collective water body, it picks up nutrients, sediment and pollutants, which may altogether, affect ecological processes along the way. Hydrological features such as primary water sources (i.e. lakes, rivers, creeks, streams) and secondary water sources (i.e. intermittent streams and creeks, springs, marshes, swamps) would have helped supply plant and food resources to the surrounding area and are indicators of archaeological potential (per *Section 1.3.1* of the *2011 S&G*).

The study area is located approximately 450 metres south of Nottawasaga Bay. No primary or secondary water sources are located within 300 metres close proximity of the study area.

1.4.7 Current Land Conditions

The study area is situated within a rural landscape at the west end of the Town of Wasaga Beach and is heavily treed (***see Map 4***). The topography within the study area is generally level with an elevation of approximately 186 metres above sea level.

1.4.8 Dates of Fieldwork

The Stage 2 AA of the study area was undertaken in 2015 on November 2nd-6th and 9th. The weather during the Stage 2 investigation was sunny to slightly overcast with temperatures ranging from 11.9° Celsius to 24.2° Celsius. The weather and lighting conditions during the Stage 2 investigation permitted good visibility of all parts of the study area and were conducive to the identification and recovery of archaeological resources.

2.0 FIELD METHODS

This field assessment was conducted in compliance with the *2011 S&G*. Photographic images of the study area are presented within **Appendix B**. The results of the Stage 2 AA are provided within **Map 5**.

2.1 Identified Deep and Extensive Disturbances

The study area was evaluated for extensive disturbances that have removed archaeological potential. Disturbances may include but are not limited to: grading below topsoil, quarrying, building footprints, or sewage and infrastructure development. *Section 1.3.2* of the *2011 S&G* considers infrastructure development among those "features indicating that archaeological potential has been removed."

Disturbances were encountered within the study area, including gravel fill and grading, where the ground had been stripped to subsoil to form a trail (***see Map 5; Images 1-2***). Disturbances amounted to approximately 0.33 hectares or 6.6% of the study area.

2.2 Test Pit Survey

The remaining balance of the study area consisted of a heavily treed woodlot with dense brush and large boulders, where ploughing in advance of pedestrian survey was not viable. Therefore, this area was subjected to a test pit form of survey. A test pit form of survey involves the systematic walking of an area, excavating 30-centimetre diameter pits by hand, and examining their contents. The test pit survey was performed in a grid pattern at five-metre intervals and the topsoil was screened through six-millimetre wire mesh in order to facilitate the recovery of artifacts. All test pits were examined for stratigraphy, cultural features, evidence of fill and were excavated into the first five centimetres of subsoil (***see Map 5; Images 3-7***). All test pits were backfilled.

Approximately 4.7 hectares or 93.4% of the study area was subjected to test pit survey at five-metre intervals. A total of approximately 1,880 test pits were excavated to depths ranging from 10-25 centimetres within sandy loam soil. Despite careful scrutiny, no archaeological resources were encountered during test pit survey.

3.0 RECORD OF FINDS

No archaeological resources were encountered during the Stage 2 AA of the study area.

4.0 ANALYSIS AND CONCLUSIONS

No archaeological sites were identified during the Stage 2 AA. The study area may be considered free of further archaeological concern.

5.0 RECOMMENDATIONS

In light of the study area testing negative for archaeological resources, the following recommendation is presented:

1. No further archaeological investigation is required for the study area.

No construction activities shall take place within the study area prior to the *MTCS* (Archaeology Programs Unit) confirming in writing that all archaeological licensing and technical review requirements have been satisfied.

6.0 ADVICE ON COMPLIANCE WITH LEGISLATION

1. This report is submitted to the *MTCS* as a condition of licensing in accordance with Part VI of the *Ontario Heritage Act*, R.S.O. 1990, c 0.18. The report is reviewed to ensure that it complies with the standards and guidelines that are issued by the Minister, and that the archaeological fieldwork and report recommendations ensure the conservation, protection and preservation of the cultural heritage of Ontario. When all matters relating to archaeological sites within the project area of a development proposal have been addressed to the satisfaction of the *MTCS*, a letter will be issued by the ministry stating that there are no further concerns with regard to alterations to archaeological sites by the proposed development.

2. It is an offence under Sections 48 and 69 of the *Ontario Heritage Act* for any party other than a licensed archaeologist to make any alteration to a known archaeological site or to remove any artifact or other physical evidence of past human use or activity from the site, until such time as a licensed archaeologist has completed archaeological fieldwork on the site, submitted a report to the Minister stating that the site has no further cultural heritage value or interest, and the report has been filed in the Ontario Public Register of Archaeology Reports referred to in Section 65.1 of the *Ontario Heritage Act*.

3. Should previously undocumented archaeological resources be discovered, they may be a new archaeological site and therefore subject to Section 48 (1) of the *Ontario Heritage Act*. The proponent or person discovering the archaeological resources must cease alteration of the site immediately and engage a licensed consultant archaeologist to carry out archaeological fieldwork, in compliance with Section 48 (1) of the *Ontario Heritage Act*.

4. The *Cemeteries Act*, R.S.O. 1990 c. C.4 and the *Funeral, Burial and Cremation Services Act*, 2002, S.O. 2002, c.33 require that any person discovering human remains must notify the police or coroner and the Registrar of Cemeteries at the *Ministry of Consumer Services*.

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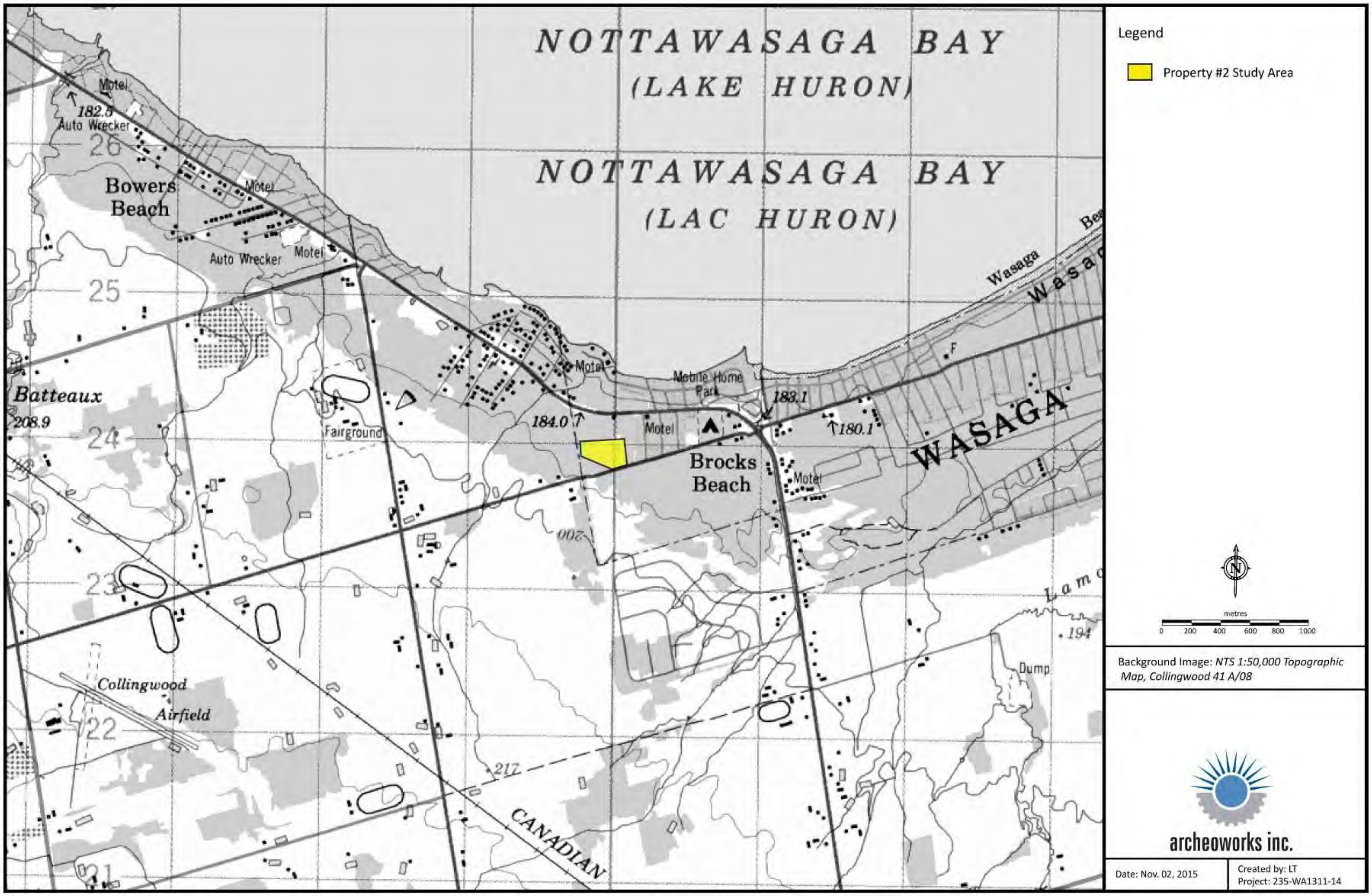
APPENDICES

APPENDIX A: MAPS

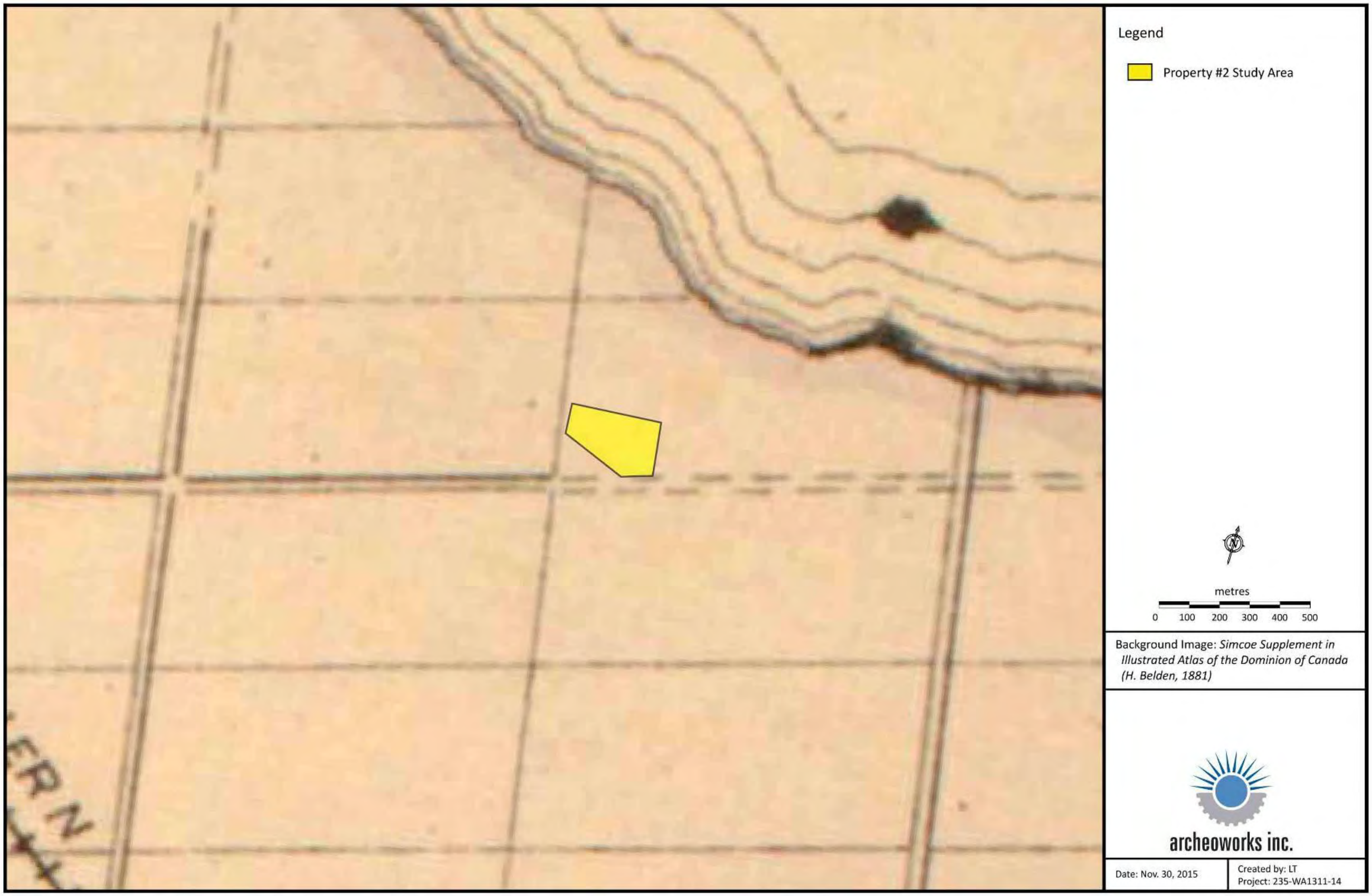


Background Image: *NTS 1:50,000 Topographic Map, Collingwood 41 A/08*

Date: Nov. 02, 2015

Created by: LT
Project: 235-WA1311-14

Map 1: National Topographical System Map (Natural Resources Canada, 1998) identifying the Stage 2 AA study area.



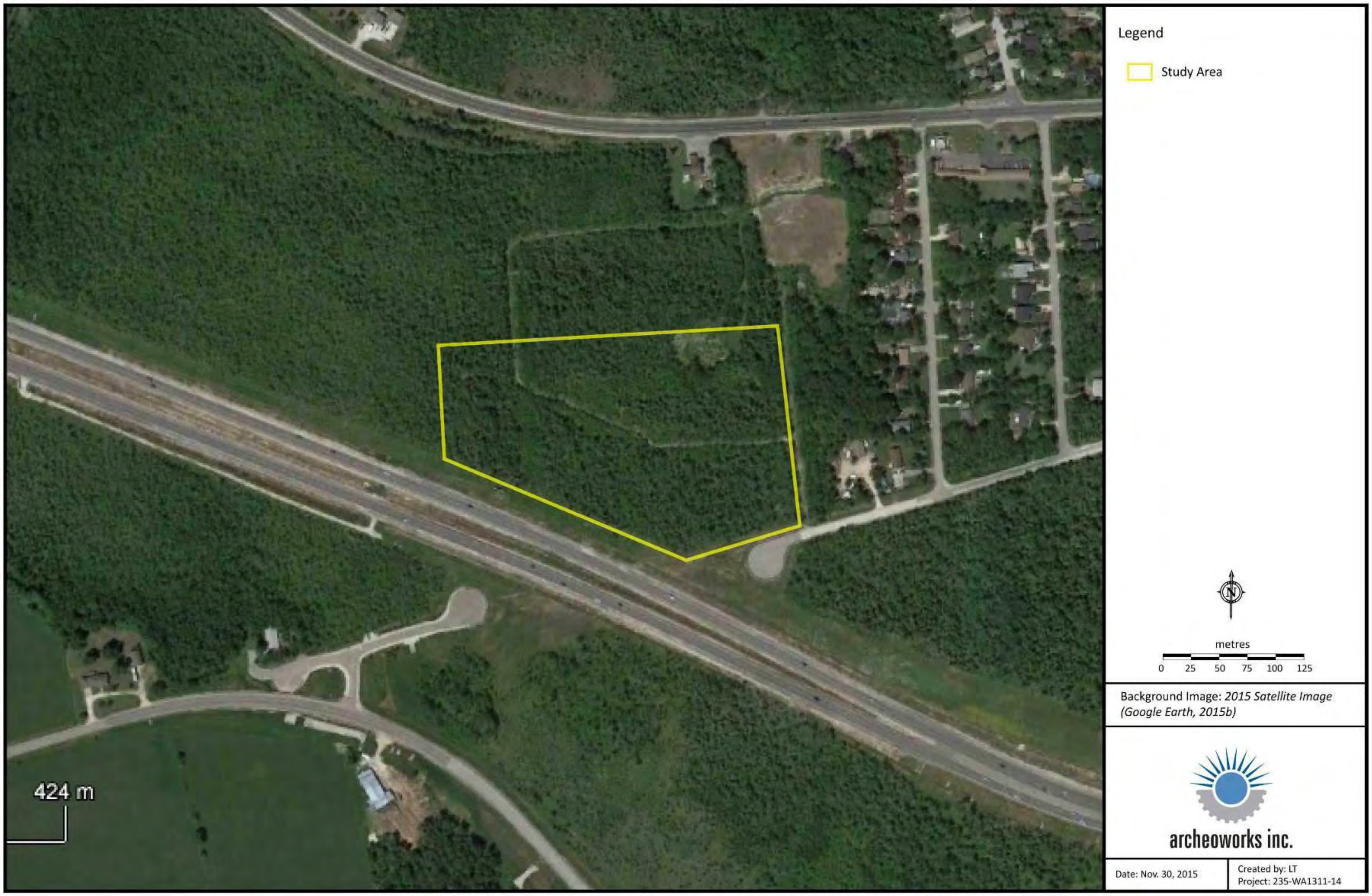
Background Image: *Simcoe Supplement in Illustrated Atlas of the Dominion of Canada (H. Belden, 1881)*

Date: Nov. 30, 2015

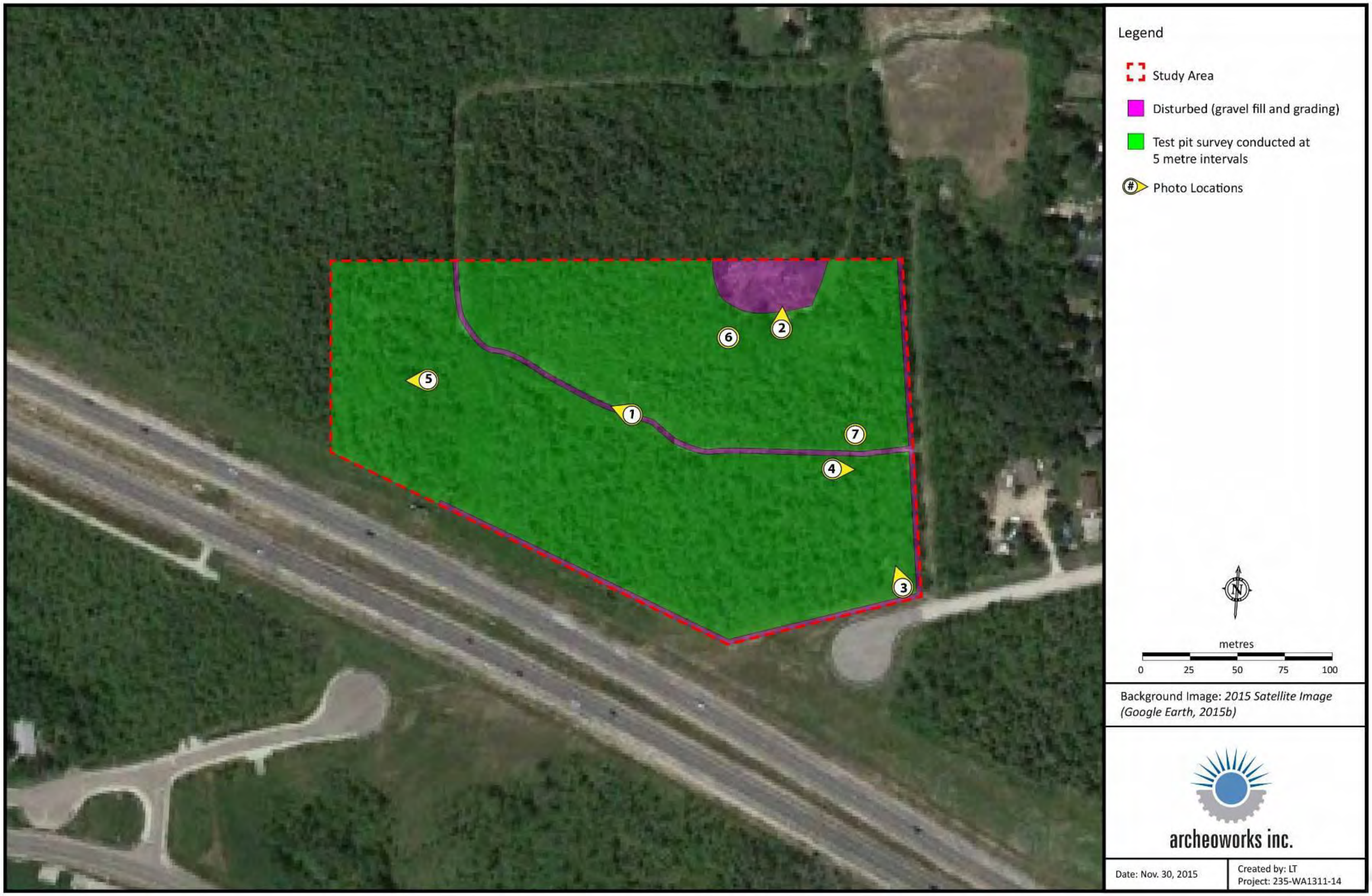
Created by: LT
Project: 235-WA1311-14

Map 2: Stage 2 AA study area within the Illustrated Historical Atlas of the Counties of Northumberland and Durham (H. Belden & Co., 1878).

Map 3: Stage 1 AA results of the Stage 2 AA study area.



Map 4: Stage 2 AA study area within a 2014 satellite image (Google Earth, 2015).



Map 5: Stage 2 AA results of the study area with photo locations indicated.

APPENDIX B: IMAGES

Image 1: View of disturbances associated with graded trail (stripped to subsoil).

Image 2: View of disturbances associated with gravel fill.

Image 3: View of test pit survey at five metre intervals.

Image 4: View of test pit survey at five metre intervals.


Image 5: View of test pit survey at five metre intervals.


Image 6: View of stratigraphy of a test pit.


Image 7: View of stratigraphy of a test pit.

APPENDIX C: INVENTORY OF DOCUMENTARY AND MATERIAL RECORD

Project Information:				
Project Number:		235-WA1311-14		
Licensee:		Nimal Nithiyanantham (P390)		
MTCS PIF:		P390-0155-2015		
Document/ Material			**Location**	**Comments**
1.	Research/ Analysis/ Reporting Material	Digital files stored in: /2014/235-WA1311-14 - Wasaga Beach West End Water Storage Facility and Maintenance Depot/Stage 2	Archeoworks Inc., 16715-12 Yonge Street, Suite 1029, Newmarket, ON, Canada, L3X 1X4	Stored on Archeoworks network servers
2.	Written Field Notes/Annotated Field Maps/Images	Field Notes: Eight (8) pages Field Maps: One (1) map Digital Images: 58 photos	Archeoworks Inc., 16715-12 Yonge Street, Suite 1029, Newmarket, ON, Canada, L3X 1X4	Stored on Archeoworks network servers

Under Section 6 of Regulation 881 of the *Ontario Heritage Act*, *Archeoworks Inc*. will, “keep in safekeeping all objects of archaeological significance that are found under the authority of the licence and all field records that are made in the course of the work authorized by the licence, except where the objects and records are donated to Her Majesty the Queen in right of Ontario or are directed to be deposited in a public institution under subsection 66 (1) of the Act.”

Appendix – D

Technical Memorandums and Memorandums

Town of Wasaga Beach

West End Water Storage Facility and Maintenance Depot Class EA

Technical Memorandum No.1A

Class EA Phase 1 Report and Water Storage Needs

November 2014

Ainley GROUP
CONSULTING ENGINEERS & PLANNERS

West End Water Storage Facility and Maintenance Depot Class EA

Project No. 114137

Prepared for:
Town of Wasaga Beach

Prepared By:

Gary Scott, M.Sc., P.Eng.

Checked By:

Mike Ainley, P.Eng., PMP

Ainley Group
280 Pretty River Parkway
Collingwood, ON L9Y 4J5

Phone: (705) 445 – 3451
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www.ainleygroup.com

1.0 Introduction

The Town of Wasaga Beach initiated the West End Water Storage Facility and Maintenance Depot Class Environmental Assessment (EA) planning process (Schedule C) to consider storage options and sites for a new water reservoir that will enhance potable water delivery in the west end of the community. The assessment will also consider layout options and site locations for a new (satellite) maintenance depot in the west end of Town.

The project involves the completion of a Municipal Class EA including all investigations, studies and analyses in accordance with the requirements of the Municipal Engineers Association (MEA) Municipal Class Environmental Assessment (October 2000, as amended). This project has been undertaken as a Schedule C Class EA, with the key deliverable being an Environmental Study Report (ESR) based on the completion of Phases 1 to 4 of the Class EA planning and design process.

This Technical Memorandum (TM No.1A) provides a summary of the Class EA Phase 1 consultation and identification of water storage need requirements. This includes preliminary assessment of existing water storage infrastructure, a review of proposed developments and timing for projected water storage facility requirements through to ultimate capacity.

The objectives of the TM include:

- Provide a summary of the Class EA process
- Provide a description of the Study Area and the Phase 1 Consultation process
- Provide a background for the Town's water storage infrastructure, including a review of previously completed studies and an overview of the existing conditions and design criteria used
- Identification and establishment of water storage needs including capacity limitation to meeting current and future servicing requirements (study problem/opportunity statement).

2.0 Class EA Process

Ontario municipalities are subject to the requirements of the Environmental Assessment Act (EAA) for public works projects. The Municipal Engineers Association's (MEA) "Municipal Class Environmental Assessment" document (October 2000, as amended in

2007 & 2011) provides municipalities with a phased procedure, approved under the EAA, to plan most municipal works projects. These are usually limited in scale with a predictable set of environmental impacts and mitigation measures.

Major capital works for municipal water supply systems and facilities, such as construction of water storage and maintenance depot, are subject to the requirements of the *Environmental Assessment Act* (EA Act). The EA Act identifies two types of environmental assessment planning and approval processes including Individual Environmental Assessments (Part II of the EA Act) and Class Environmental Assessments (Part II.1 of the EA Act). Generally, the Class EA process is applicable to municipal projects where either a new facility is to be established or where an existing facility requires modification beyond what would be considered to be maintenance or operational improvements. Under the Class EA, projects are subject to varying levels of environmental review depending on the extent of their potential impact.

Under the Class EA process, projects fall into one of four schedules of undertakings. There are Schedule A projects which are essentially pre-approved. The next level are Schedule A+ projects, which are also considered to be pre-approved, that require the public to be advised prior to their project implementation. Schedule B projects are those considered to potentially have some significant environmental effects. In the case of Schedule B projects, proponents are required to undertake a screening process, involving mandatory contact with directly affected public or relevant review agencies to ensure that they are aware of the project and that their concerns are addressed. If there are no outstanding concerns, then the proponent may file a Notice of Completion. Schedule B projects generally include improvements such as minor expansions or upgrades to existing facilities. Schedule C projects are those that have the potential for significant environmental effects and must proceed through the full planning and documentation procedures specified in the Class EA document. Schedule C projects require that an ESR be prepared and filed for review by the public and review agencies in conjunction with the filing of a Notice of Completion. Schedule C projects generally include the construction of new facilities and major expansions to existing facilities. Provided that the approved Class EA planning process is followed, a proponent has complied with Section 13 (3)(a) of the EA Act.

There are five phases of the Schedule C Class EA process as follows:

- Phase 1 – identify the problem (deficiency) or opportunity
- Phase 2 – identify alternative solutions to address the problem or opportunity
- Phase 3 – examine alternative methods of implementing the preferred solution

- Phase 4 – document, in an Environmental Study Report a summary of the rationale, and the planning, design and consultation process of the project
- Phase 5 – complete contract drawings and documents, and proceed to construction and operation

This assignment will not include Phase 5 of the Class EA activities, since that is expected to be undertaken as a future engineering and construction assignment.

The Class EA flow chart is included as Figure 1.

The Class EA process entitles members of the public, interest groups and review agencies to review the ESR during a 30-day review period. It is the intent of this 30-day review period to resolve any outstanding concerns regarding the project with Town of Wasaga Beach. If issues cannot be resolved with the Town, an individual may request that the Minister of the Environment make an order for the project to comply with Part II of the *Environmental Assessment Act*, which addresses the individual environment assessment, by submitting a written request to the Ministry of Environment.

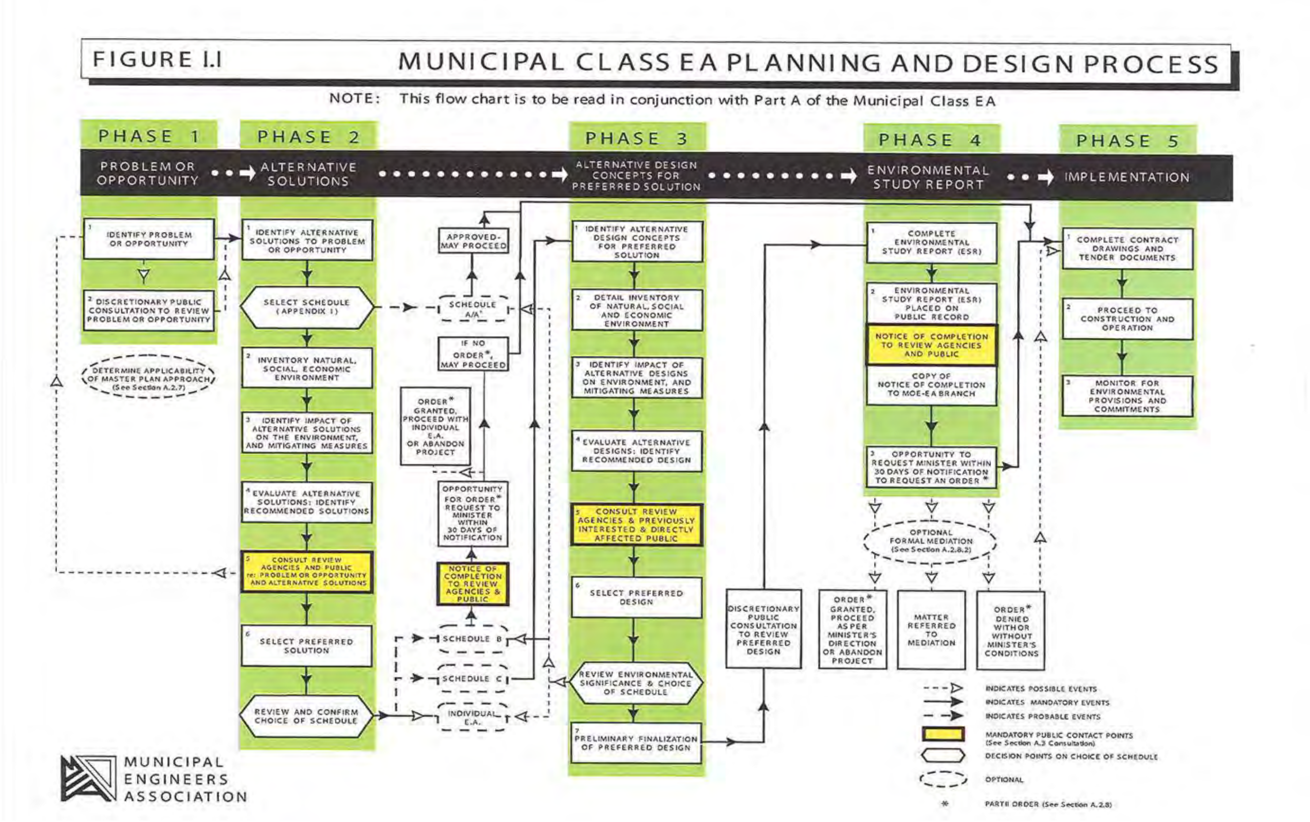


Figure 1 – Municipal Class EA Planning Process and Design Process

3.0 Study Area

The Study Area (as shown on the Figure 2) includes all areas to be considered in the Class EA and is described as the existing Town limit west of 58th Street.

Figure 2 – Study Area

4.0 Phase 1 Consultation

4.1 Notice of Study Commencement

The Notice of Study Commencement was mailed to the Class EA Contact List on October 9, 2014. The Notice was also published on the Town of Wasaga Beach website at that time. Copies of the Notice of Study Commencement and Class EA Contact List are included in Appendix ‘A’.

Responses to the Notice of Study Commencement will be compiled and the Contact List updated throughout the Class EA process.

4.2 First Nations Consultation

The Notice of Study Commencement was sent to First Nations contacts (see Contact List).

Correspondence from First Nations contacts will be compiled and follow up made as required throughout the Class EA process.

5.0 Existing Water Storage Infrastructure

5.1 Existing Water Supply System

The Town of Wasaga Beach's existing water supply system includes:

1. Two Water Plants and seven supply wells with a total capacity of 31.4ML/d (Veterans Way (formerly Powerline Road) WP and Jenetta Street WP)
2. Approximately 200km of watermain (150mm to 500mm in diameter)
3. Three storage facilities with a total volume of 15,800m^3

The water distribution system is maintained by the Town and the supply works and reservoirs are operated by Ontario Clean Water Agency (OCWA), under contract.

5.2 Types of Water Storage

Two of the water storage facilities are elevated tanks and include the East End Tower No.1 located at River Road W. with a capacity of 2,837m^3 and the Sunnidale Road Tower No.2 with a volume of 9,550m^3. The third storage facility is an in-ground reservoir located at the Veterans Way Water Plant with a volume of 3405m^3.

The system operation is based on high lift pumps pump turn on / off control based on water levels in the west end Sunnidale Road water tower. In the summer the tower is operated between 41% & 82% full and in the winter between 41% & 65% full.

6.0 Design Criteria

6.1 Ultimate Water Supply and Distribution System, 2013 Model Update report

The Design Criteria for this study will be based on findings and updates of previous studies including the 2013 Town of Wasaga Beach Ultimate Water Supply and Distribution System, Model Update done by the Ainley Group. The purpose of the hydraulic model update was to confirm the ultimate water infrastructure requirements to service the Town of Wasaga Beach to full build out.

Wasaga Beach's summer population is substantially higher because it is a tourist destination, with the population more on week-ends and greatly affected by weather. As a result of this, the Maximum Day Demand (MDD) in any one year may be relatively low and not indicative of the true potential MDD. Therefore, the analysis of the 2013 Model Update was based on the highest MDD (19,039 m^3/d) for the period 2010-2012.

The Peak Hour Factor (PHF) was based on 1.5 times the MDD, in accordance with the MOE Design Guidelines. The highest demand per unit was determined to be 1.478m^3/unit/day, based on the 2012 population and the 2011 MDD. The future MDD per unit was projected to be 30% higher than actual flows, giving an MDD per unit of 1.921m^3/day that was used in the analysis. The maximum day factor (MDF) used was 2.91 giving an Average Day Demand (ADD) per unit of 0.66m^3.

Required future amount of storage was based on MOE Design Guidelines:

Total Storage Requirement = Fire Storage + Equalization Storage (25% of MDD) + Emergency Storage (25% of A + B)

6.2 Proposed Development and Projected Water Storage Demand

The storage requirements for the proposed development and the timing for the water storage facilities are outline in Tables 1 and 2.

Table 1 - Proposed Developments Storage Requirements

Developments	**Number of Equivalent Residential Units**	**Cumulative Number of Equivalent Units**	**Storage Requirements - m^3**	**Remaining Storage Capacity - m^3**
Connected to the System (Dec. 2012) & Existing Available Connection	13,020	13,020	10,840	4,960
Existing Residences - Connection Not Yet Available	3,827	16,847	14,748	1,052
Committed Developments (Approved and/or Under Construction and Draft/Site Plan Approved) AND Development with Official Plan & Zoning Bylaw Status	5,595	22,442	19,429	-3,629
Uncommitted Development Proposals and Vacant Land Development Potential	4,570	27,012	24,265	-8,840

Table 2 - Storage Requirements Timing

Connections	**Number of Equivalent Residential Units**	**Cumulative Number of Equivalent Units**	**Storage Requirements - m^3**	**Remaining Storage Capacity - m^3**
Connected to the System (Dec. 2012)	*12,881*	*12,881*	*10,724*	5,076
2013 to 2017 new connections	*2,490*	*15,371*	*13,316*	2,484
2018 to 2022 new connections	*2,490*	*17,861*	*15,764*	36
2023 to 2027 new connections	*2,490*	*20,351*	*17,854*	-2,054
2028 to 2032 new connections	*2,490*	*22,841*	*19,753*	-3,953
2033 to 2041 new connections	*4,171*	*27,012*	*24,284*	-8,840

*Based on the historical rate of growth for the period of 2009 to 2012, which is estimated at approx. 498 New Connections per year

7.0 Storage Need / Study Problem

7.1 Storage Need

The results of the 2013 model update indicate that the existing water storage in the system, both in terms of volume and location, is adequate for the current demands.

The 2013 Model Update ultimate fire flow requirement was determined to be 378L/s for 6 hours (8,164.8m^3) based on a projected future population that is greater than 40,000 (for an ultimate equivalent number of units projected for full build out of 27,012). The MDD was established to be 46,192m^3/d (535 L/s), giving a total ultimate storage requirement of 24,641m^3.

Since the existing available storage is 15,801m^3, the required additional storage for full build out was determined to be 8,840m^3.

As depicted in Tables 1 and 2 and as determined by the 2013 Model Update analysis, there is enough storage for between approximately 7 – 8 years of growth. The model update study recommended that that a Class EA be initiated in 2014, given the length of time it takes to complete a Class EA and to build a storage facility.

7.2 Study Problem Statement

The Problem Statement is as follows:

In order to enhance potable water delivery in the west end of the community, the Town of Wasaga Beach is undertaking a Class Environmental Assessment planning process (Schedule C) to consider storage options and sites for a new water reservoir. The assessment will investigate all aspects of the water system including water pressure, fire flow volumes, adequate storage volume, existing servicing and future development. The Town intends to ensure that all areas within the current Town boundary limits are adequately serviced by the municipal water system.

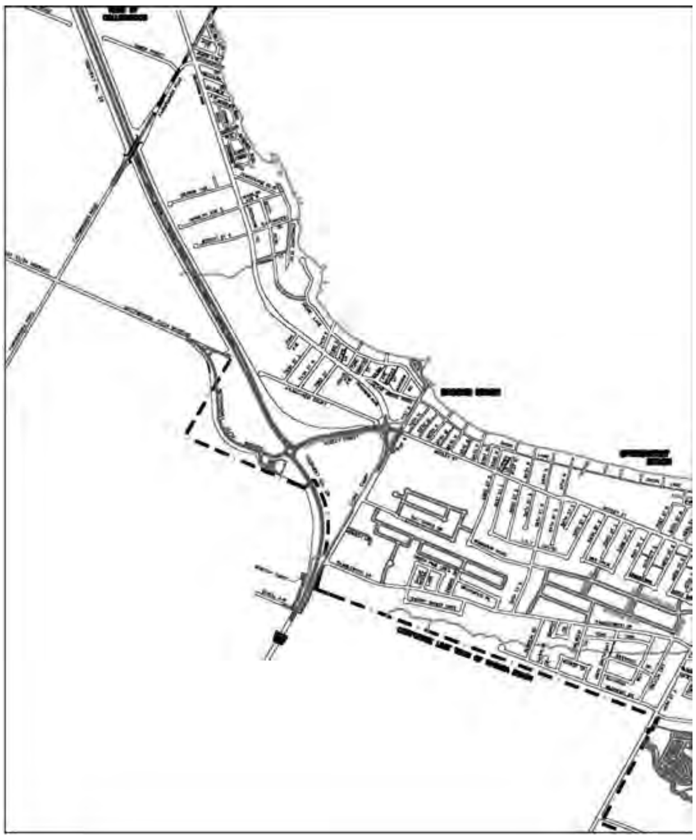
Appendix - A

Notice of Study Commencement and Class EA Contact List

Town of Wasaga Beach
West End Water Storage Facility and Maintenance Depot
Municipal Class Environmental Assessment
NOTICE OF STUDY COMMENCEMENT

In order to enhance potable water delivery in the west end of the community, the Town of Wasaga Beach is undertaking a Class Environmental Assessment planning process (Schedule C) to consider storage options and sites for a new water reservoir. The assessment will investigate all aspects of the water system including water pressure, fire flow volumes, adequate storage volume, existing servicing and future development. The Town intends to ensure that all areas within the current Town boundary limits are adequately serviced by the municipal water system.

In addition, the Town is also considering layout options and site locations for a new (satellite) maintenance depot in the west end of Town. Given the geographic layout of the Town, the current Public Works Maintenance facility located in the east end, does not efficiently support present operations. Projected growth in demand for services will further overload the current facility and diminish current levels of service.



As illustrated on the accompanying map, the study area for these two projects is described as the existing Town limit west of 58th Street. The study will examine all feasible site location options for both facilities including an overall site for both facilities. A comparison matrix proving the feasibility of the locations will be presented to the public for comment prior to the selection of the preferred location.

The Town has retained Ainley Group to complete and document the Schedule C Class EA planning process as outlined by the Municipal Class EA Document, October 2000, as amended in 2007 and 2011.

Public consultation is a key component of the Class EA process. The Town will hold informal drop-in style Public Information Centres (PICs) in Phases 2 and 3 of the planning process.

Advance notice will be provided to allow all interested parties an opportunity to attend the PICs and to comment. For further information regarding this project, or to provide input or comments or to be placed on the mailing list to receive further project information, please contact either of the following members of the study team:

Mr. John Mabira, P. Eng.
Project Manager
Ainley Group
280 Pretty River Parkway
Collingwood, Ontario, L9Y 4J5
Tel: (705) 445-3451
Fax: (705) 445-0968
mabira@ainleygroup.com

Mr. Gerald Reu, C.E.T
Project Manager
Town of Wasaga Beach
30 Lewis Street
Wasaga Beach, ON L9Z 1A1
Public Works Tel: (705) 429-2540
Public Works Fax: (705) 429-8226
g.reu@wasagabeach.com

This Notice issued October 7, 2014.

Any input received during this process will be maintained on file for use during the project and may be included in project documentation. Information collected will be used in accordance with the Freedom of Information and Protection of Privacy Act. With the exception of personal information, all comments will become part of the public record.

Town of Wasaga Beach
West End Maintenance Depot and Water Storage Class EA

Title	First Name	Last Name	Title	Agency	Department	Address 1	Address 2	City, Prov.	PC
Chief	James	R. Marsden		Alderville First Nations		11696 Second Line	Box 46	Roseneath, ON	K0K 2X0
Chief	Roland	Monague, Jr.		Beausoleil First Nations		1-O-Gema Street		Christian Island, ON	L0K 1C0
Mr.	Colin	Bonnell		Bell Canada		136 Bayfield Street	Floor 2	Barrie, ON	L4M 3B1
				Chiefs of Ontario	Administrative Office	111 Peter Street	Suite 804	Toronto, ON	M5V 2H1
Chief	Donna	Big Canoe		Chippewas of Georgina Island	dbigcanoe@geoginaisland.com	RR#2	Box 12	Sutton West, ON	L0E 1R0
Chief	Scott	Lee		Chippewas of Nawash First Nation		R.R. 5		Wiarton, ON	N0H2T0
Mr.	Marcus	Firman	Manager, Water Services	Collingwood Public Utilities		43 Stewart Road	P.O. Box 189	Collingwood, ON	
Mr.	Mark	Aitken	CAO	County of Simcoe	Administration Centre	1110 Highway #26		Midhurst, ON	L0L 1X0
Mr.	Allan	Greenwood	Manager, Corporate Communications	County of Simcoe	Administration Centre	1110 Highway #26		Midhurst, ON	L0L 1X0
Mr.	Bryan	Mackell	Director of Planning	County of Simcoe	Administration Centre	1110 Highway #26		Midhurst, ON	L0L 1X0
Ms.	Debbie	Korolnek	Gen. Man. Of Corp. Services	County of Simcoe	Administration Centre	1110 Highway #26		Midhurst, ON	L0L 1X0
Mr.	Nathan	Westendorp	Planner III	County of Simcoe	Planning Department	1110 Highway #26		Midhurst, ON	L0L 1X0
Chief	Keith	Knott		Curve Lake First Nation	dutytoconsult@curvelakefn.ca				
Mr.	Glenn	Gilbert	Manager, Environmental Unit	Department of Indian & Northern Affairs	Land and Trust Services	25 St. Clair Ave. East	8th Floor	Toronto, ON	M4T 1M2
				Department of Indian & Northern Affairs	EACoordination_ON@inac-ainc.gc.ca				
Mr.	Jonathan	Allen	Team Leader	Department of Indian & Northern Affairs Canada		1430-25 Eddy St.		Gatineau, QC	K1A 0H4
Mr.	Don	Boswell	Senior Claims Analyst	Department of Indian & Northern Affairs Canada	Specific Claims Branch, Ontario Research Team	10 Wellington St.	Rm 1310	Gatineau, QC	K1A 0H4
Mr.	Kevin	Clement	A/Director	Department of Indian & Northern Affairs Canada	Litigation Management & Resolution Branch	10 Wellington St.		Gatineau, QC	K1A 0H4
Mr.	Guy	Morin	Policy Analysis	Department of Indian & Northern Affairs Canada	Treaties and Aboriginal Government	10 Wellington St.	8th Floor	Gatineau, QC	K1A 0H4
			Consulation and Accommodation Unit	Aboriginal Affairs and Northern Development	CAU-UCA@aadnc-aandc.gc.ca	10 Wellington Street		Gatineau, QC	K1A 0H4
Ms.	Colleen	O'Meara	Bayfield Institute	Dept. of Fisheries & Oceans		867 Lakeshore Road, Box 5050		Burlington, ON	L7R 4A6
	Jennifer	Cooper	Field Rep., Customer Connections	Enbridge	municipalnotices@enbridge.com				
Ms.	Shelley	Van Sickle	Manager of Planning, Special Projects	Enbridge Gas		500 Consumers Rd.		North York, ON	M2J 1P8
Ms.	Sheila	Allan	A/Head Environ. Assess.	Environment Canada	Env. Protection Operations Division	867 Lakeshore Rd.	Box 5050	Burlington, ON	L7R 4A6
Ms.	Brenda	Laurin	President	Georgian Bay Metis Council		355 Cranston Cresent	Box 4	Midland, ON	L4R 4K6
Chief	Laurie	Carr		Hiawatha First Nations	lcarr@hiawathafn.ca	123 Paudash Street	R.R. #2	Keene, ON	K0L 2G0
Chief	Line	Gros-Lous	Family Chief	Conseil de la Nation huronne-wendat		255, Place Michel Laveau		Wendake, QC	G0A 4V0
Ms.	Tina	Durand	Secretaire executive jr., secteur politique	Conseil de la Nation huronne-wendat	tina.durand@cnhw.qc.ca				
Ms.	Melanie	Vincent	Consultant	Conseil de la Nation huronne-wendat	melanievincent21@yahoo.ca				
Mr.	Daniel	Johnson	Environmental Officer	Indian and Northern Affairs	Ontario Region	25 St. Clair Ave. East	8th Floor	Toronto, ON	M4T 1M2
Mr.	Sean	Darcy	Manager, Assessment & Historical Research	Indian and Northern Affairs Canada		10 Wellington St.		Gatineau, QC	K1A 0H4
Mr.	James W.	Wagar	Consultation Assesment Coordinator	Metis Nation of Ontario	Lands, Resources and Consultation	75 Sherbourne St.	Unit 222	Toronto, ON	M5A 2P9
			Metis Consultation Unit	Metis Nation of Ontario - Head Office		500 Old St. Patrick St.	Unit D	Ottawa, ON	K1N 9G4
Ms.	Wendy	Cornet	Manager, Consultation Unit	Ministry of Aboriginal Affairs	Aboriginal and Ministry Relationships Branch	160 Bloor St. E.	9th Floor	Toronto, ON	M7A 2E6
Mr.	Francois	Lachance	Senior Policy Advisor	Ministry of Aboriginal Affairs	Policy and Relations Branch	720 Bay Street	4th Floor	Toronto, ON	M5G 2K1
Mr.	Martin	Rukavina	Advisor	Ministry of Aboriginal Affairs	Aboriginal and Ministry Relationships Branch	160 Bloor St. E.	9th Floor	Toronto, ON	M7A 2E6
Ms.	Pam	Wheaton	Director	Ministry of Aboriginal Affairs	Aboriginal and Ministry Relationships Branch	160 Bloor St. E.	9th Floor	Toronto, ON	M7A 2E6
Mr.	Brian	Cardy	Director	Ministry of Agriculture Food & Rural Aff.	Economic Dev. Div., Rural Community Dev.Br.	1 Stone Rd. W.	4th Floor	Guelph, ON	N1G 4Y2
Mr.	Ray	Valaitis	Rural Planner	Ministry of Agriculture Food & Rural Aff.		R.R.#3, 95 Dundas St.		Brighton, ON	K0K 1H0
				Ministry of Econ. Dev. And Trade		2284 Nursery Road		Midhurst, ON	L0L 1X0
Ms.	Cindy	Hood	District Manager	Ministry of Environment	Barrie District Office	54 Cedar Pointe Drive	Unit 1203	Barrie, ON	L4N 5R7
Ms.	Chunmei	Lui	EA Coordinator	Ministry of Environment - Central Region		5775 Yonge St, 9th Fl.		Toronto, ON	M2M 4J1
				Ministry of Labour		400 University Ave.	14th Floor	Toronto, ON	M7A 1T7
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Mr.	Darryl	Lyons	Senior Planner (Acting)	Ministry of Municipal Affairs & Housing	Central Region Office	777 Bay Street		Toronto, ON	M5G 2E5
Mr.	Graham	Findlay	Area Biologist	Ministry of Natural Resources	District Office	2284 Nursery Road		Midhurst, ON	L0L 1X0
Ms.	Kathy	Woeller	District Planner	Ministry of Natural Resources		2284 Nursery Road		Midhurst, ON	L0L 1X0
				Ministry of Tourism & Recreation	Simcoe Regional Office	2284 Nursery Road		Midhurst, ON	L0L 1X0
Mr.	Rosi	Zirger	A/Heritage Planner	Ministry of Tourism, Culture and Sport	Culture Division, Programs and Services Branch, Cultu	401 Bay Street	17th Floor	Toronto, ON	M7A 0A7
Mr.	Greig	Stewart	Regional Advisor	Minsitry of Culture	Midhurst District Office	2284 Nursery Road		Midhurst, ON	L0L 1X0
Ms.	Shelley	Gray	Consultation Coordinator	Mississaugas of Alderville First Nation		P.O. Box 4		Roseneath, ON	K0K 2X0
Chief	Tracy	Gauthier		Mississaugas of Scugog Island	Tgauthier@scugogfirstnation.com	22521 Island Road	R.R.#5	Port Perry, ON	L9L 1B6
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				Moose Deer Point First Nation		P.O. Box 119		Mactier, ON	P0C 1H0
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Mr.	Glenn	Switzer	Director of Engineering	Nottawasaga Valley Conservation Authority		8195 Con. Line 8		Utopia, ON	L0M 1T0
	Lee	Bull		Nottawasaga Valley Conservation Authority		8195 Con. Line 8		Utopia, ON	L0M 1T0
Mr.	Jeffrey	Betker	Senior Policy Analyst Aboriginal Relations	Office of the Federal Interlocutor for Metis and non-status Indians		66 Slater Street	Rm 1225	Ottawa, ON	K1A 0H4
Ms.	Wanda	McGonigle		Ojibways of Hiawatha First Nation		RR#2		Keene, ON	K0L 2G0
Mr.	Wayne	White		Ontario Clean Water Agency		100 Woodland Drive		Wasaga Beach, ON	L9Z 2V4
Ms.	Karen	Lorente	Operations Manager - Georgian Bay Hum	Ontario Clean Water Agency		30 Woodland Drive		Wasaga Beach, ON	
Const.	Mark	Kinney	Community Policing Officer	Ontario Provincial Police		1000 River Road West		Wasaga Beach, ON	L9Z 2K6
Chief	Rodney	Noganosh		Rama First Nation	chief@ramafirstnation.ca				
Mr.	Carsten	Schnuelle	System Planner	Rogers		244 Newkirk Road		Richmond Hill, ON	L4C 3S5
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Ms.	Jennifer	Sharpe	Senior Planner (Acting)	Simcoe Muskoka Catholic District School Board		46 Alliance Blvd.		Barrie, ON	L4M 5K3

Town of Wasaga Beach
West End Maintenance Depot and Water Storage Class EA

Title	First Name	Last Name	Title	Agency	Department	Address 1	Address 2	City, Prov.	PC
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Mr.	Kevin	Lalonde	Director of Public Works	Town of Wasaga Beach		30 Lewis Street		Wasaga Beach, ON	L9Z 1A1
Mr.	Mike	McWilliam	Fire Chief	Town of Wasaga Beach		30 Lewis Street		Wasaga Beach, ON	L9Z 1A1
Mr.	Gerry	Reinders	Manager, Parks and Recreation	Town of Wasaga Beach		30 Lewis Street		Wasaga Beach, ON	L9Z 1A1
Mr.	George	Vadeboncoeur	CAO	Town of Wasaga Beach		30 Lewis Street		Wasaga Beach, ON	L9Z 1A1
				Wahta Mohawk		2664 Muskoka Rd. 38	Box 260	Bala, ON	P0C 1A0
Mr.	John	Fisher	Park Superintendent	Wasaga Beach Provincial Park (MNR)		11-22nd Street, North		Wasaga Beach, ON	L9Z 2V9
Mr.	Ron	Wheadon	President	Wasaga Beach Snowmobile Club		P.O. Box 67		Wasaga Beach, ON	L9Z 1A2
Mr.	Paul	Trace	Manager Planning & Technical Services	Wasaga Distribution		950 River Road West		Wasaga Beach, ON	L9Z 2K6
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Town of Wasaga Beach

West End Water Storage Facility and Maintenance Depot Class EA

Technical Memorandum No.1B

Maintenance Depot Needs

November 2014

Ainley GROUP
CONSULTING ENGINEERS & PLANNERS

West End Water Storage Facility and Maintenance Depot Class EA

Project No. 114137

Prepared for:
Town of Wasaga Beach

Prepared By:

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1.0 Introduction

The Town of Wasaga Beach initiated the West End Water Storage Facility and Maintenance Depot Class Environmental Assessment (EA) planning process (Schedule C) to consider storage options and sites for a new water reservoir that will enhance potable water delivery in the west end of the community. The assessment will also consider layout options and site locations for a new (satellite) maintenance depot in the west end of Town.

The project involves the completion of a Municipal Class EA including all investigations, studies and analyses in accordance with the requirements of the Municipal Engineers Association (MEA) Municipal Class Environmental Assessment (October 2000, as amended). This project has been undertaken as a Schedule C Class EA, with the key deliverable being an Environmental Study Report (ESR) based on the completion of Phases 1 to 4 of the Class EA planning and design process.

This Technical Memorandum (TM No.1B) identifies maintenance depot need requirements. This includes a preliminary assessment of existing infrastructure, a review of proposed developments and timing for infrastructure requirements.

The objectives of the TM include:

- Provide a background for the Town’s maintenance depot infrastructure
- Identify and establish capacity limitation to meeting current and future servicing requirements (study problem/opportunity statement)

2.0 Existing Maintenance Depot Infrastructure

The existing maintenance depot is located at 150 Westbury Road on the east end of Wasaga Beach. The current location covers 3.5 ha with 2 buildings, outdoor storage and parking.

The Existing Maintenance Depot Facilities and Infrastructure include:

- Stockpiling of construction supplies and material
- Salt storage dome with storm water runoff containment and treatment
- Construction equipment storage and parking
- Office space, reception area, meeting and training space, filing and storage
- Lunch room, locker room, mud room, dispatch area, washrooms and shower facilities and utility areas

- Fleet storage and parking including maintenance and wash bays, parts and tools storage, small equipment and machinery storage, indoor headed parking and external vehicle parking
- Above ground fuel tanks complete with spill containment system
- Transit vehicle storage and transit operations office

Existing Maintenance Depot capable of storing 8 snow plows with additional snow removal equipment and 6,000 tonnes of sand.

It is the responsibility the Town's public works department to provide winter maintenance services that include maintaining roads and sidewalks for public use in accordance with The Town of Wasaga Beach Public works Department – Winter Control Policy.

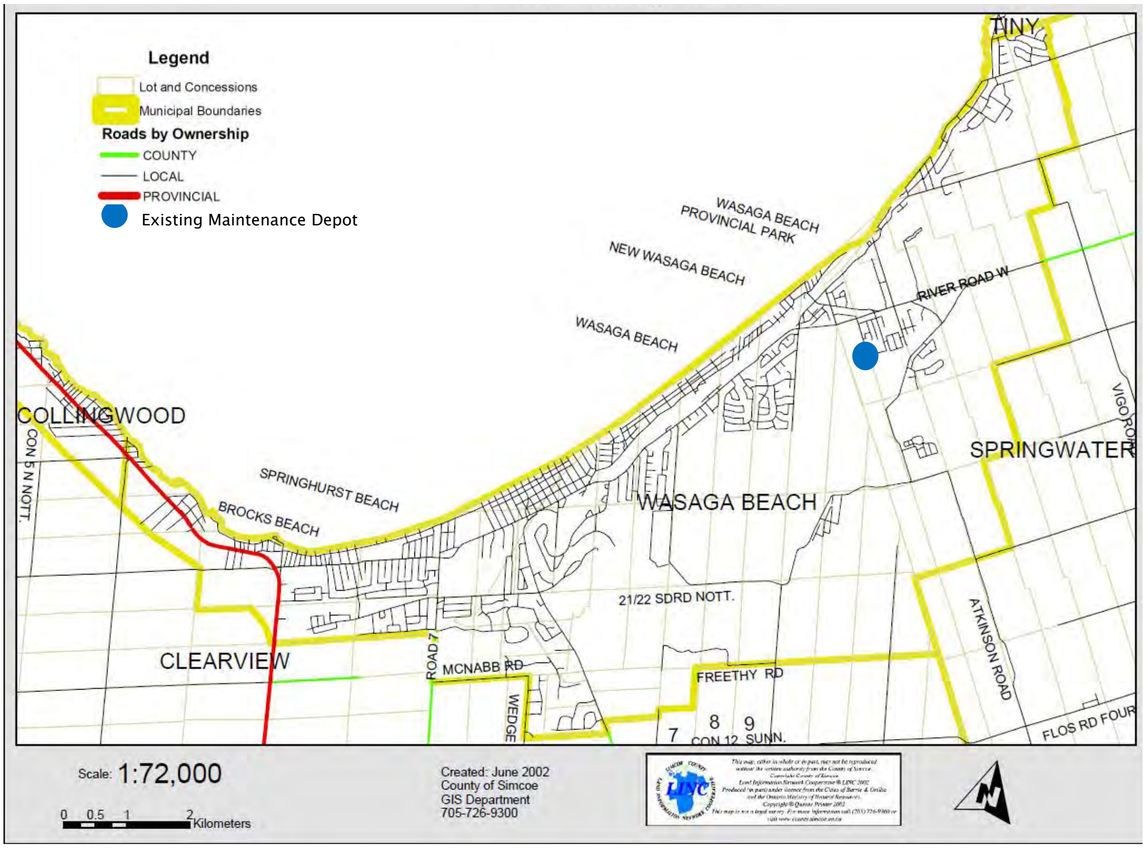

Figure 1 – Location of Existing Public Works Facility in the Town of Wasaga Beach.

3.0 Proposed Development and Maintenance Depot Requirements

Wasaga Beach has seen significant growth in recent years that will continue in the year to come. In 2011 the population of Wasaga beach was 17,537. The Statistics Canada webpage, 'Focus on Geography Series, 2011 Census – Census Subdivision of Wasaga Beach, Ontario, Population' indicates that Wasaga Beach had a 16.7% growth in population from 2006 to 2011 (Annual rate of 3.1%/year). At this rate the population is expected to increase to approximately 32,300 by the year 2031.

Schedule 7 (Distribution of Population and employment for the city of Barrie, City of Orillia and County of Simcoe to 2031) for Ontario Ministry of Infrastructure's Places to Grow Report titled, "Growth Plan for the Greater Golden Horseshoe, 2006" consolidated in June 2013, gives a 2031 projected population of 27,500, with projected employment of 3,500 for the Town Wasaga Beach.

The "Town of Wasaga Beach Housing Strategy" (2013) presents an expected increase of 4,500 households over the next 20 years. There are currently 7,330 proposed new dwellings in various planning stages showing even more expansion into the future (Figure 2). Over 4,000 of these units are expected to be located in the west end.

The Town's proposed development plan will lead to an increase in the amount of required maintenance resulting from construction of new roads, sidewalks, and reclassification of existing roads. More maintenance equipment and salt / sand will be required to ensure that the current levels of service are maintained and this will lead to an increase in the amount maintenance equipment / material storage requirements.

The Town's west end is currently serviced with one winter plow route out of a total of eight routes. More winter plow routes will be required to service planned expansion in the west end and since the existing depot is located in the Town's east end, service will be improved by providing another depot in the west end.

Enhanced Public Works Maintenance delivery will be required to service the proposed development and growth. The existing Public Works Maintenance depot will not be able to provide adequate levels of service to the proposed development, especially in the west end, because it has limited capacity and is located at east end of the Town. The addition of a satellite maintenance depot in the west end will enhance the current level of service and ensure that there is adequate capacity to services approved developments and growth.

The new facility will located between the 58th Street and the west limit of town. The depot needs to be easily accessible by Town vehicles while mitigating the nuisance of frequent passage of vehicles to and from the depot.

Figure 2 – Map Depicting Active and Proposed Developments for the Town of Wasaga Beach

4.0 Maintenance Depot Need / Study Problem

4.1 Maintenance Depot Need

Given the geographic layout and linear shape of the Town, the current Public Works Maintenance facility located in the east end, does not efficiently support present operations. Projected growth in demand for services will further overload the current facility and diminish current levels of service. The growth will cause increased road lengths and widening of existing road. This will greatly increase the duration of time to complete all maintenance tasks.

Therefore a new maintenance depot has been proposed on the same site as the new water storage facility. This site will allow for a second maintenance depot in the Town. The depot and water storage facility will be located in the west end to service the expected growth and development in the area.

4.2 Study Problem Statement

The Problem Statement is as follows:

In order to meet servicing requirements and enhance delivery of Public Works Maintenance services , the Town of Wasaga Beach is undertaking a Class Environmental Assessment planning process (Schedule C) to consider layout options and site locations for a new (satellite) maintenance depot in the west end of Town. Given the geographic layout of the Town, the current Public Works Maintenance facility located in the east end, does not efficiently support present operations. Projected growth in demand for services will further overload the current facility and diminish current levels of service.

Town of Wasaga Beach

West End Water Storage Facility and Maintenance Depot Class EA

Technical Memorandum No.2

Possible Site Identification and Screening

December 2014

Ainley GROUP
CONSULTING ENGINEERS & PLANNERS

West End Water Storage Facility and Maintenance Depot Class EA

Project No. 114137

Prepared for:
Town of Wasaga Beach

Prepared By:

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1.0 Introduction

The Study Area was defined in Phase 1 of this Class EA as the area within the Town limits, west of 58th Street. That Study Area was examined for the purpose of identifying general areas that might possibly accommodate the proposed satellite works yard and a new water storage reservoir. Depending on the analysis of the potential areas, the requirements of the works yard and the type of water storage facility that is selected, there may be a need to identify two sites rather than building both facilities on one large site. This will be considered.

The purpose of this Technical Memo is to document the process that was taken to identify potential areas and sites within the overall Study Area.

Drawing No. 114137-OP1 shows the overall Study Area as well as seven sites that are considered to be feasible for the intended purposes. The shoreline area north of Beachwood Road and north of Mosley Street was eliminated from further consideration due to the intensive residential nature of the area. The remaining study area was divided into a number of sub-areas that are discussed hereinafter.

2.0 Preliminary Site Size Considerations

Based on a previous Works Yard design, it is estimated that an area of 3 ha will be needed for the works yard itself. This needs to be confirmed with the Town. An additional 0.5 ha should be included for an elevated water storage tank. If the storage is to be in-ground or grade level, an additional 1 ha should be considered. Therefore, for analysis purposes, a combined total area for both facilities is 4.5 ha. as the largest site required. This does not allow for any setbacks that might be required from residential areas or highway corridor protection setback of 45 m from the property line.

3.0 Identification of Potential Areas

Commencing in the west end of the Town limits, a total of 13 areas were identified for consideration. The assessment of these 13 areas is provided in Table 1.

Table 1 – Assessment of 13 Potential Sites.

Area Description	Current Land Use Designation	Comments	Further Consideration
North west of George Ave. (Area 1)	Vacant – Zoned as residential, commercial	May be too far west for works yard South part of the site is too wet and should not be considered	Yes – north half only
Robert St South to George Ave.	Existing residential	No vacant land	No
75th South to Robert St. South (Area 2)	Mainly vacant – zoned residential – with natural heritage area (creek) in the west end	Sufficient land for both facilities in middle and east end only	Yes – middle and east only
North of Ayling Reid Ct to Beachwood Rd	Existing residential	No vacant land	No
South of Ayling Reid Ct (Area 3)	Vacant – zoned service commercial	Sufficient land for both facilities but poor road access – onto Mosley St. extension at future roundabout	Yes – east end only
West of Lyons Ct. (Area 4)	Vacant – zoned district commercial North two-thirds of site has Site Plan Approval (Phases 1 and 2)	Southern one-third of property may be large enough for both facilities	Yes – southern one-third only
62nd St to Lyons Ct (Area 5)	Existing abandoned school within vacant lands zoned residential. Middle and east portions are designated as a Provincially Significant Wetland	Sufficient lands for both facilities but a major portion of the undeveloped section of this area has been designated as Provincially Significant	Yes – west end only with protection of the remaining property
58th St to 62nd St.	Existing residential	No vacant land	No
East side of Lyons Ct, South of Bay Sands Dr. (Area 7)	Vacant but under development – zoned service commercial and residential	Insufficient lands for both facilities but could accommodate water storage facility	Yes – west end only
Green Pine Cres. To Dennis Dr.	Existing Residential	No vacant land	No
North of Briarwood Place	Vacant but under development – zoned open space and residential	Sufficient lands for both facilities but development is in progress	No
North and south of Ramblewood Dr., west of Cherry	Vacant – zoned service commercial	Sufficient lands for both facilities Town owns small section	Yes

Sands Cres. And Green Pine Cres. (Area 6)			
South of Cherry Sands Cres.	Vacant – zoned open space	Poor access – limited space	No

The long list of areas was reduced to a short list of seven feasible options as shown on Drawing 114137 – OP1. Each of these areas is further identified and assessed hereinafter.

4.0 Area 1 – Northwest of George Avenue

This area is bounded by Fairgrounds Rd. in the west, Beachwood Rd. in the north, George Avenue in the east and Hwy 26 in the south. There is an existing commercial property (storage lockers) along Fairgrounds Rd. and the remainder of the western lands are cleared. The eastern lands are designated as wet lands and are not suitable for the intended purposes. There is sufficient space within the west end of Area 1 to accommodate a 4.5 ha site for both facilities. Access to the site could be off of Beachwood Rd. See Drawing 114137 – Area 1 (Appendix A).

5.0 Area 2 – 75th Street South of Robert Street

This area is bounded by Beachwood Road in the north, 75th Street in the east, Highway 26 in the south and Robert Street in the west. There is one existing commercial property in the northeast corner – Motorcycle shop. In addition, there is a designated natural heritage area in the west end. The north - middle portion of the area is privately owned (Sabatini) and the south – middle portion is owned by the MTO. The east end of the area is also privately owned (Whitehead). There is a Highway Corridor restriction of 45 m along the south limit of this area. However there is sufficient space within this area to accommodate a 4.5 ha site for both facilities. The area is currently heavily treed. The eastern portion is better drained than the middle portion. See Drawing 114137 – Area 2 (Appendix A).

6.0 Area 3 – South of Ayling Reid Court

Bounded by Ayling Reid Court in the north, Mosley Street (access to Hwy 26) in the east and south and Hwy 26 in the west and south, this area is fully treed with no existing development. It is large enough to accommodate both proposed facilities. Access to the site is poor and would likely need to be off of Mosley Street (Hwy access). There is a Highway Corridor restriction of 45 m along the south west limit of this area. The area is privately owned (east end by DAS Developments) and the Town anticipates that a service commercial plaza may be considered. See Drawing 114137 – Area 3 (Appendix A).

7.0 Area 4 – West of Lyons Court

The area bounded by Lyons Court, Mosley Street and Highway 26 is currently cleared and is being considered for development purposes (DAS Developments - Phase 1 and 2 have Site Plan Approval – north and middle portions). The south end of the property (DAS Phase 3) is being considered for a casino. However that portion does provide excellent access for Town trucks (off of Lyons Ct.), is situated well away from most existing residential areas and does provide good visibility from the Highway should an elevated water storage tank be selected (Town advertisement). Access to the area will be off of Lyons Ct., across a major drainage course and therefore a bridge will be required. There is a Highway Corridor restriction of 45 m along the southwest edge of the property. It is considered that there is sufficient space to accommodate the required 4.5 ha. site. See Drawing 114137 – Area 4 (Appendix A).

8.0 Area 5 – 62nd Street to Lyons Court

There is some existing commercial development in the northwest corner of this area (Ice Cream Shop and residence) in addition to the abandoned school (currently for sale). The area surrounding the School is designated as a Provincially Significant Wet Land and should be properly protected. Drainage across this portion of the area is from west to east. The west end is drier than the middle and eastern portions of the site. The School site is privately owned and is currently for sale (about $1.9 million). The remainder of the area is also privately owned and is in an Estate. The owner may want to sell. The Town may be able to purchase the undeveloped lands and construct both intended facilities in the west end while protecting the significant wet lands. The west part of the area can be accessed off of Lyons St. Other than the School site, the area is heavily treed. See Drawing 114137 – Area 5 (Appendix A).

9.0 Area 6 – North and South of Ramblewood Drive and west of Cherry Sands Crescent and Green Pine Crescent

It is considered that this area could also accommodate the two facilities on a combined 4.5 ha site. Much of the area has been cleared and it is understood that the north-west end of the area is owned by the Town. The Town owned portion of the area is not of sufficient size for the intended, combined purposes but it could be used for the water storage facility. The remainder of the site is privately owned (Zancor) and is currently being considered for development. Access to the area would be off of Lyons Ct. and possibly along Ramblewood Dr. There may be a minor Highway Corridor restriction on the Lyons Ct. end of the property. See Drawing 114137 – Area 6 (Appendix A).

10.0 Area 7 – East side of Lyons Court, South of Bay Sand Drive

This area is privately owned (Zancor) and is fully treed. It is not considered to be large enough to accommodate the works yard but it is large enough for the water storage facility. There is good access to the site from Lyons Court. See Drawing 114137 – Area 7 (Appendix A).

11.0 Area Evaluation

An assessment of the 7, feasible areas based on selection criteria is provided in Table 2.

Table 2 – Assessment of Sites Based on Selection Criteria.

Potential Area See map	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Existing Land use	Service commercial, Recreational commercial, Residential, High density residential, Open Space and Tourism commercial	Residential but has Natural Heritage area included in the west	Service commercial	District Commercial – vacant but has Site Plan Approval for 2 of 3 Phases	Institutional (abandoned school) and wet lands	Service commercial	Service commercial
Ownership	Private	Private and MTO	Private	Private	Private owners – 2	Town but may need to take additional private lands	Private
Adequate size	Yes – west end only	Yes – middle and east	Yes	Yes	Yes – west end	Possible but may need to take additional lands	For water storage facility only
Residential impact	Medium	Low	Medium	Low	Medium	Low	Medium
Visibility of Elevated Water Storage Tank – Town advertisement	Poor – too far along the Highway	Excellent – if positioned in west end of property	Fair but past the Highway roundabout	Good – prior to Highway	Good – if positioned at extreme west end of property	Excellent – if positioned in west end of property	Excellent – if positioned in west end of property
Truck access	Good	Good	Poor	Good	Excellent	Good	Good
Distance from Town to Works Yard	Poor	Fair	Good	Excellent	Excellent	Good	N/A
Hydraulic performance – proximity to water distribution system	Fair – adjacent 300 mm trunk main on Beachwood Rd.	Good – adjacent 300 mm trunk main on Beachwood Rd.	Good but not adjacent to trunk watermain – need extension from Mosley St. on Ayling Reid Court	Good – but must extend existing 400 mm trunk main from Mosley St.	Excellent – must extend existing 400 mm trunk main from Mosley St.	Good - need to construct 400 mm dia. trunk main loop on Lyons Ct. from Ramblewood Dr.to Mosley St.	Good - need to construct 400 mm dia. trunk main loop on Lyons Ct. from Ramblewood Dr.to Mosley St.
Sanitary	250 mm dia.	May be	May be	Must	Must	Service to	Must extend

Service	On Beachwood Road	serviced to existing 250 mm dia. Sewer on Beachwood Rd.	serviced to existing 250 mm dia. sewer on Ayling Reid Ct.	extend existing 200 mm dia. sanitary service from Mosley St.	extend existing 200 mm dia. sewer service from Mosley St.	existing 250 mm dia. sewer on Ramblewood Dr.	existing 200 mm dia. sewer service from Mosley St.
Hydro Service	Existing on Beachwood Rd. – 3 Phase	Existing on Beachwood Rd. – 3 Phase	No 3 Phase power in the immediate area – could be extended from Mosley St.	Existing on Lyons Ct. – 3 Phase	Existing on Lyons Ct. – 3 Phase.	Existing on Ramblewood Dr.- 3 Phase	Existing on Lyons Ct. – 3 Phase.
Wellhead Protection Impact	No impact	No impact	No impact	No impact	No impact – west end	No impact	No impact
Natural Heritage System	Wet lands in east half of area	May impact but can be mitigated	No impact	No impact	Protect wet lands	No impact	No impact
Hwy Corridor Setback – 45 m	Not applicable in west half of property	45 m to gas tanks and elevated water tank	45 m to gas tanks and elevated water tank	45 m to gas tanks and elevated water tank	Not applicable	45 m to gas tanks and elevated water tank – extreme south-west corner only	N/A
Noise impact	Medium	Low	Medium	Low	Medium	Low	Medium
Light impact	Medium	Low	Medium	Low	Medium	Low	Medium
Overall Rating	Poor – west end	Good – south end	Good – east end	Excellent – south end	Excellent – west end with protection of remaining area	Good – west end on either side of Ramblewood Dr.	Good – for water storage only

Appendix - A

Site Locations

WASAGA BEACH

November 12, 2014

Town of Wasaga Beach

West End Water Storage Facility and Maintenance Depot Class EA

Technical Memorandum No.3

Site Screening Criteria

September 2015

Ainley Group
CONSULTING ENGINEERS & PLANNERS

West End Water Storage Facility and Maintenance Depot Class EA

Project No. 114137

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1.0 Introduction

The Study Area for the Wasaga Beach West End Water Storage and Maintenance Depot Class EA was defined as the area within the town limits, west of 58th Street. After examining the area for suitable locations 7 sites were selected. Site 1-6 are able to accommodate both the water storage and the maintenance depot. Site 7 can only accommodate the water storage and stormwater management pond so would have to be paired with site 4 if it is identified as a preferred solution.

2.0 Background Information

A desktop study was completed for the seven proposed sites. The following information was reviewed with respect to these sites:

- Geotechnical
- Land Use Plan
- National Heritage Plan
- Wellhead Protection Areas and Vulnerable Aquifer Areas
- Proposed Development
- Existing Sewers and Watermains

2.1 Geotechnical

Based on previously completed geotechnical investigations the general ground conditions at the seven sites were examined. Based on the investigations sites 1 and 2 have soils consisting of silt and clay with the possibility of silty sand present. Sites 3 and 4 consist of fine sand underlain by impervious soil. Site 5 is in an area of well graded, fine or gravely sand and sites 6 and 7 consist of fine sand that is possibly underlain by impervious soil. The geotechnical investigation also identified ground water levels that were present during the investigation for the area around the seven sites. Sites 1, 2, 3 and 4 are in areas with a deeper ground water table in comparison to sites 5, 6 and 7 where a shallower ground water table was found. Based on the previously completed geotechnical reports all of the sites are geotechnical suitable for the proposed use. Once a preferred site is chosen an additional geotechnical investigation will be performed to establish more detailed information about the site.

2.2 Land Use Plan

The Town of Wasaga Beach land use plan is identified in the Town Official Plan. Schedule ‘A-1’ identifies the land use plan for the seven sites. The land uses designated to each site are shown in Table 1.

Table 1 – Land Use Designation for the Seven Potential Sites

Site	Land Use Designation
1	Residential Open Space Tourism Commercial High Density Residential
2	Residential
3	Service Commercial
4	Service Commercial District Commercial
5	District Commercial Residential
6	Service Commercial
7	Service Commercial

For all of the sites land use designation will have to be changed to institutional to allow for the maintenance depot and water storage. A map of the land use in the west end is in Appendix A.

2.3 Natural Heritage Plan

The objective of the Town of Wasaga Beach Natural Heritage Plan is to conserve, maintain, and enhance the quality and integrity of the natural heritage features and ecological processes including air, water, land and living resources for the benefit of future generations. The natural heritage plan is identified in the Official Plan of the Town of Wasaga Beach. A map of the natural heritage system is provided in Appendix A. None of the 7 sites are affected by the 3 types of significant land identified on the map. Moving forward the natural heritage plan is not a concern for this project.

2.4 Wellhead Protection Areas and Vulnerable Aquifer Areas

The wellhead protection areas identify the surface and subsurface area surrounding a water well or well field that supplies a municipal drinking water system where land use must be planned in order to protect the quality and quantity of the water supply. The well fields in Wasaga Beach are located at the Jenetta Water Plant (17 Spruce Street) and Veterans Way (formerly Powerline Road) Water Plant (700 Veterans Way). A map of the wellhead protection areas and vulnerable aquifer areas is in Appendix A. This map indicates that none of the seven sites are located in an area of concern, therefore moving forward the wellhead protection and vulnerable aquifer areas are not a concern for this project.

2.5 Proposed Development

A map of the active and proposed development in Wasaga Beach, Appendix A, is provided by the Town of Wasaga Beach on their website. The map depicts the type of development and the number of proposed units for residential development. The map also identifies what stage of construction the each parcel of land is at. Table 2 provides a summary of the development that is proposed for the seven potential sites.

Table 2 – Type of Land Use at Each Site

Site	Land Use Designation
1	Proposed Condominium
2	N/A
3	Commercial
4	Commercial
5	N/A
6	Commercial
7	Commercial

To be able to acquire the land that is planned for development the Town will have to contact the land owner to better understand if this land could be used for a maintenance depot and water storage facility. This could potential cause some of the potential sites to no longer be an option for this project.

2.6 Existing Sewer and Watermain

The site will be connected to municipal water and sanitary sewers to services. By examining the existing sewer and watermain it allows an understanding of the amount of additional pipe that will be necessary to service the site. For the maintenance yard both sanitary sewer and watermain services will be necessary. The size of the pipe is not of concern for the maintenance depot. For the water tower only watermain servicing is required. A minimum of one 450 mm or two 300 mm watermains are required to properly service the water storage reservoir. Additionally this size of diameter will be necessary to provide adequate fire flow to west end of Wasaga Beach.

All of the sites require additional watermain and sanitary sewer to be lay to allow for adequate servicing. The maps of engineering records in Appendix A show the existing sanitary sewer and watermain.

3.0 Preliminary Site Layout

Preliminary site layouts were developed to identify the amount of land that would be required at each site, Figures 1 to 7. The layouts include:

- Elevated water storage tank, communication tower and fence surrounding water tower.
- Stormwater management pond.
- Maintenance building with office, garage and wash bay.

- Fuel Station, Vehicle parking, material storage and sand storage building.

Figure 1 – Preliminary Site Layout for Site 1

Figure 2 – Preliminary Site Layout for Site 2

Figure 3 – Preliminary Site Layout for Site 3

Figure 4 – Preliminary Site Layout for Site 4

Figure 5 – Preliminary Site Layout for Site 5

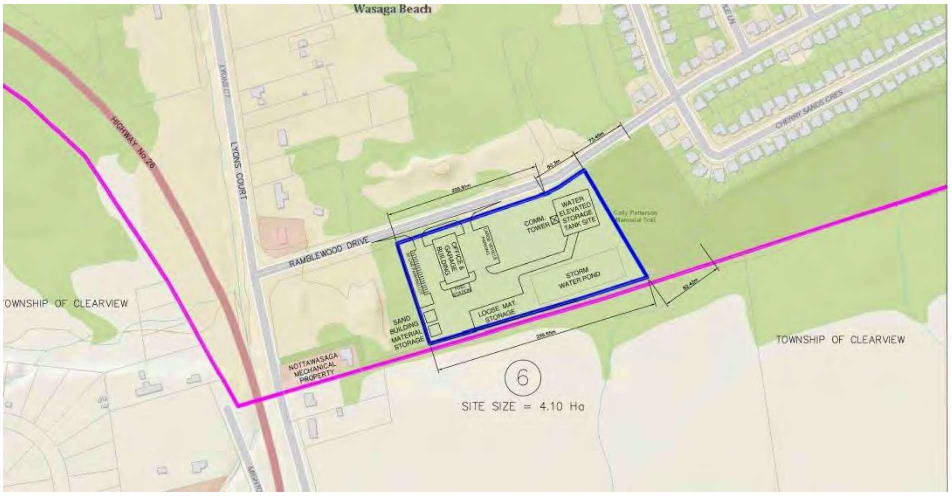


Figure 6 – Preliminary Site Layout for Site 6

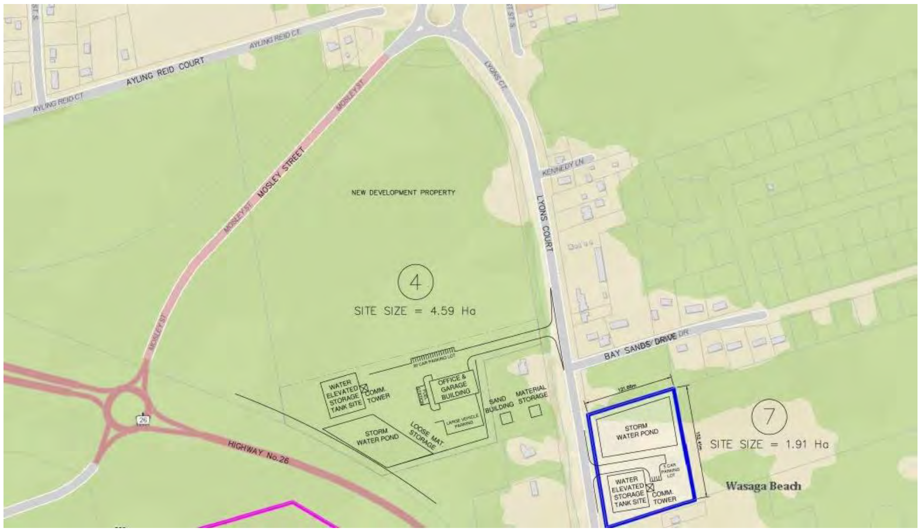


Figure 7 – Preliminary Site Layout for Site 7

Site assessments will be completed for the preferred site which will assist in developing a finalized site layout. Acoustic testing will be completed to obtain information about the type of attenuation barrier necessary to comply with Ministry guidelines.

4.0 Evaluations of Sites

4.1 Evaluation Criteria

To identify an alternative solution a set of rating criteria were developed based off of the criteria set out in the approved Class EA document. The criteria and weighting are presented in Table 3.

Table 3 - Evaluation Criteria and Weighting

Criteria	Sub-Criteria	Weighting (%)
Land Use Planning		**10**
	Existing Land Use	5
	Proposed/Potential Land Use	5
Natural Environment		**15**
	Well Head Protection	3
	Surface Water/Drainage	5
	Geotechnical	2

	Trees/Habitat	5
Social Environment		**30**
	Noise Impact	5
	Light Impact	5
	Residential Impact	10
	Traffic Impact	5
	Visibility of Water Reservoir	5
Cultural Environment		**5**
	Supporting Town Policies	5
Technical Considerations		**25**
	Site Servicing (Power, Sewer, Water)	5
	Adequate Size	5
	Tank Hydraulics Performance	5
	Depot Location	5
	Truck Access	5
Economic Considerations		**51**
	Cost	10
	Commercial/Industrial Impact	5
Total		100

The evaluation criteria were used to compare the seven viable alternative sites for the Wasaga Beach West End Water Storage and Maintenance Depot Class EA. Each alternative site was rated between 1 and 5 on its performance under each criterion, where 1 is poor performance and 5 is exceptional performance. The alternative site that scores the highest based on the ranking system will become the recommended site for this Class EA.

4.1.1 Land-Use Planning

Land use planning refers to the plans and policies that are identified in provincial plans and municipal Official Plans and Secondary Plans. For this Class EA the Wasaga Beach Official Plan, Provincial Policy Statement, Places to Grow Act (2005) and associated Growth Plans were used as references during the evaluation process.

4.1.2 Natural Heritage Features

Natural heritage features include land forms, groundwater, surface water and fisheries, terrestrial vegetation and wetlands, wildlife and habitat and connections provided by or between these resources. Significant natural heritage features in Wasaga Beach are identified at a local, regional, provincial and federal level reflecting municipal, Conservation Authority, provincial or federal policies. For this Class EA the Wasaga Beach Natural Heritage Plan and Official Plan were used as references during the evaluation process. Several site assessments will be completed for the recommended preferred site including geotechnical and natural heritage assessments.

4.1.3 Social Environment

Social environment examines the impact on both rural and urban communities, residential areas and recreational areas. To avoid negative social environmental impacts the Wasaga Beach Official Plan, Zoning By-Law, Provincial Policy Statement and MOECC Policies were used as references during the evaluation process. A noise assessment will be completed on the recommended preferred site to identify the type of noise barriers that will be necessary.

4.1.4 Cultural Environment

Cultural environment refers to cultural heritage and archeological resources in the environment. Cultural heritage features were identified early in the Class EA process to identify significant features and potential impacts. A Stage 1 Archeological Assessment was completed for the 7 sites. A more comprehensive Stage 2 Archeological Assessments will be completed for the recommended preferred site if necessary.

4.1.5 Technical Consideration

Technical considerations looked at technical sustainability throughout future growth in Wasaga Beach by taking into account engineering aspects which included constructability and operations of the water storage and maintenance depot. During the evaluation process MOECC guidelines for water and wastewater design were followed.

4.1.6 Economic Consideration

For each site capital costs were considered using information obtained from MPAC data. Additional consideration went into the economic impact on commercial and industrial properties for each potential site.

4.2 Site Evaluation of the Seven Sites

Using the evaluation criteria, explained above, the sites were assessed to determine the preferred solution. Site 7 was considered as a potential site however due to limited size, it was unable to meet the requirements needed for this project and there for was not evaluated any further. The evaluation of Phase 2 site options is shown in Table 4.

Table 4 - Evaluation of the seven Sites

Criteria	Sub-Criteria	Weighting (%)	Site 1	Site 2	Site 3	Site 4	Site 5	Site 6
Land Use Planning		**10**	**4**	**9**	**7**	**6**	**4**	**6**
	Existing Land use	5	2	4	4	4	3	5
	Proposed/Potential Land Use	5	2	5	3	2	1	1
Natural Environment		**15**	**9**	**10**	**13**	**15**	**8**	**12**
	Well Head Protection	3	3	3	3	3	3	3
	Surface Water/Drainage	5	1	2	5	5	1	2
	Geotechnical	2	1	1	2	2	2	2
	Trees/Habitat	5	4	4	3	5	2	5
Social Environment		**30**	**8**	**24**	**22**	**26**	**25**	**18**
	Noise Impact	5	1	5	4	4	4	3
	Light Impact	5	1	5	4	4	4	3
	Residential Impact	10	2	8	8	10	8	4
	Traffic Impact	5	3	4	2	3	5	3
	Visibility of Water Reservoir	5	1	2	4	5	4	5
Cultural Environment		**5**	**1**	**4**	**4**	**3**	**2**	**1**
	Supporting Town Policies	5	1	4	4	3	2	1
Technical Considerations		**25**	**17**	**21**	**21**	**20**	**22**	**22**
	Site Servicing (Power, Sewer, Water)	5	3	4	5	5	5	5
	Adequate Size	5	5	5	5	3	3	5
	Tank Hydraulic Performance	5	3	4	5	5	5	5
	Depot Location	5	1	3	4	4	4	4
	Truck Access	5	5	5	2	3	5	3
Economic Considerations		**15**	**11**	**13.5**	**11**	**10.5**	**8.5**	**9**
	Cost	8	6	6.5	7	7.5	7.5	8
	Commercial/Industrial Impact	7	5	7	4	3	1	1
Total		**100**	**50**	**81.5**	**78**	**80.5**	**69.5**	**68**

From the evaluation completed site 2 is the best alternative with the highest score of 81.5 out of a possible 100. Site 2 will have the least impact on development in Wasaga Beach with minimal impact to the surrounding area.

4.3 Recommendation – Preferred Site

Overall site 2 presents the best alternative based on the evaluation criteria used. This site will provide increased water security and performance as well as increased maintenance and service to the residents located in the west end of Wasaga Beach. Now that site 2 has been identified as the recommended preferred solution site assessments will be completed verify that it will be the best option of this Class EA. Included in these assessments are; a noise assessment, geotechnical assessment, natural environment assessment, archaeological assessment and survey.

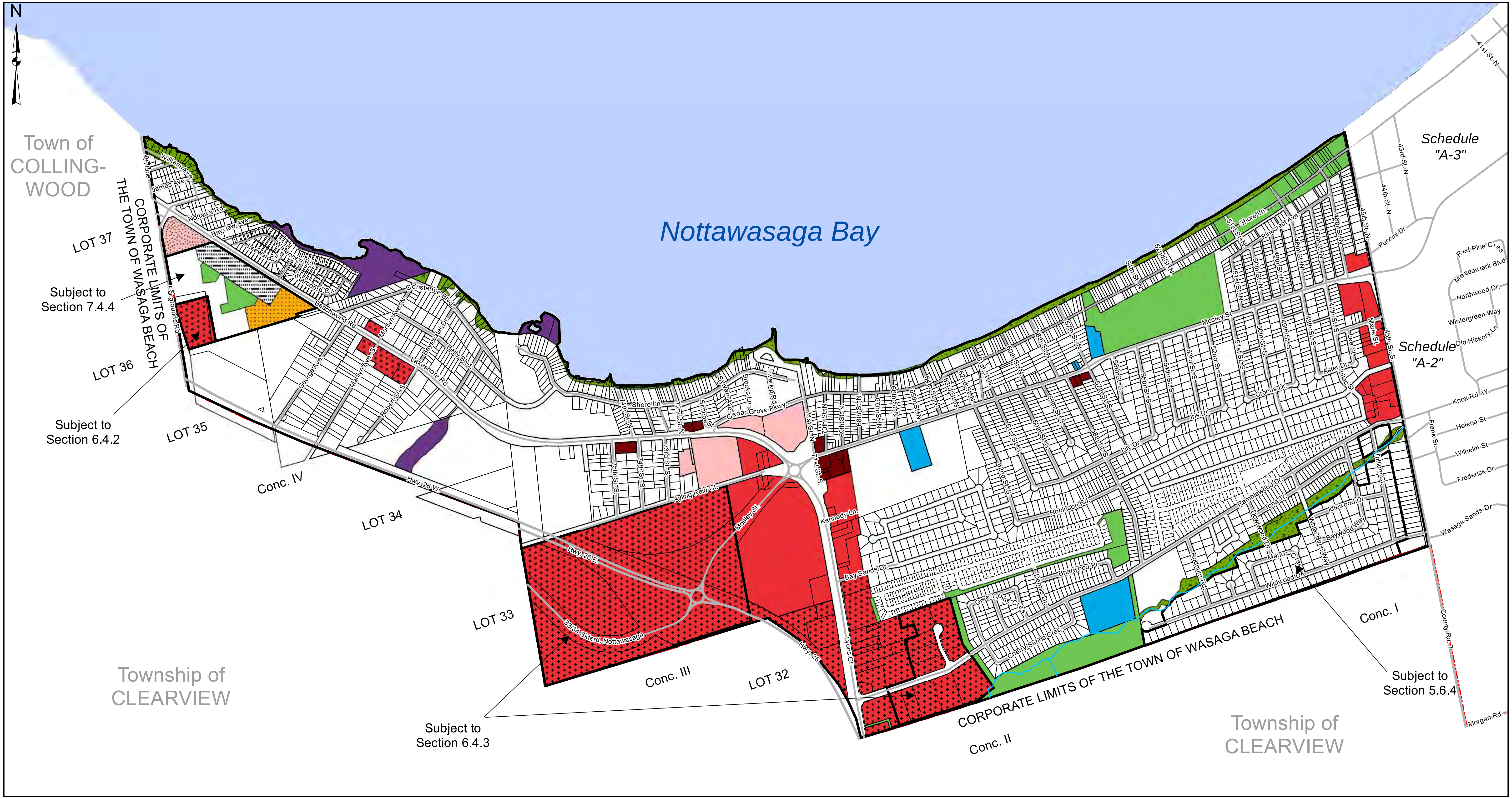
5.0 Conclusions and Recommendations

Seven sites were identified as potential locations for the Wasaga Beach West End Water Storage and Maintenance Depot Class EA. Background information was collected for each of the sites to allow for a preliminary assessment of the sites to be conducted. The information collected was used to evaluate the sites based on evaluation criteria that were developed based off of the criteria set out in the approved Class EA document.

Site 7 was eliminated as an option before the evaluation was completed due to its limited size. The remaining six sites received overall scores based on the evaluation criteria. Site 2 had the highest total score of 81.5. Site 2 has been identified as the recommended preferred solution. This scoring was presented at the PIC and comments were received based on the publics' opinion. Generally the public agreed with this site being preferred. Additional assessments are going to be competed on the site to verify that it is the best option for this Class EA.

Appendix - A

Wasaga Beach Maps



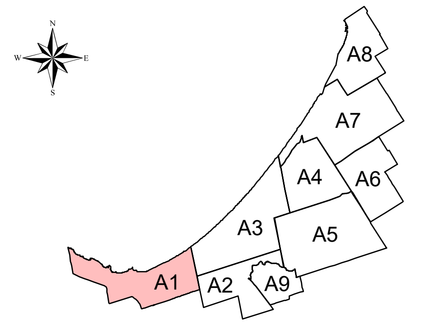
Adopted by Council: Sept 9, 2003

Approved by the County of Simcoe: June 22, 2004

Consolidated: September 6, 2013

NOTE: The lot lines depicted on this map are for reference only and may not reflect accurately property boundaries in all instances.

0 100 200 400 600 800 1,000
Metres



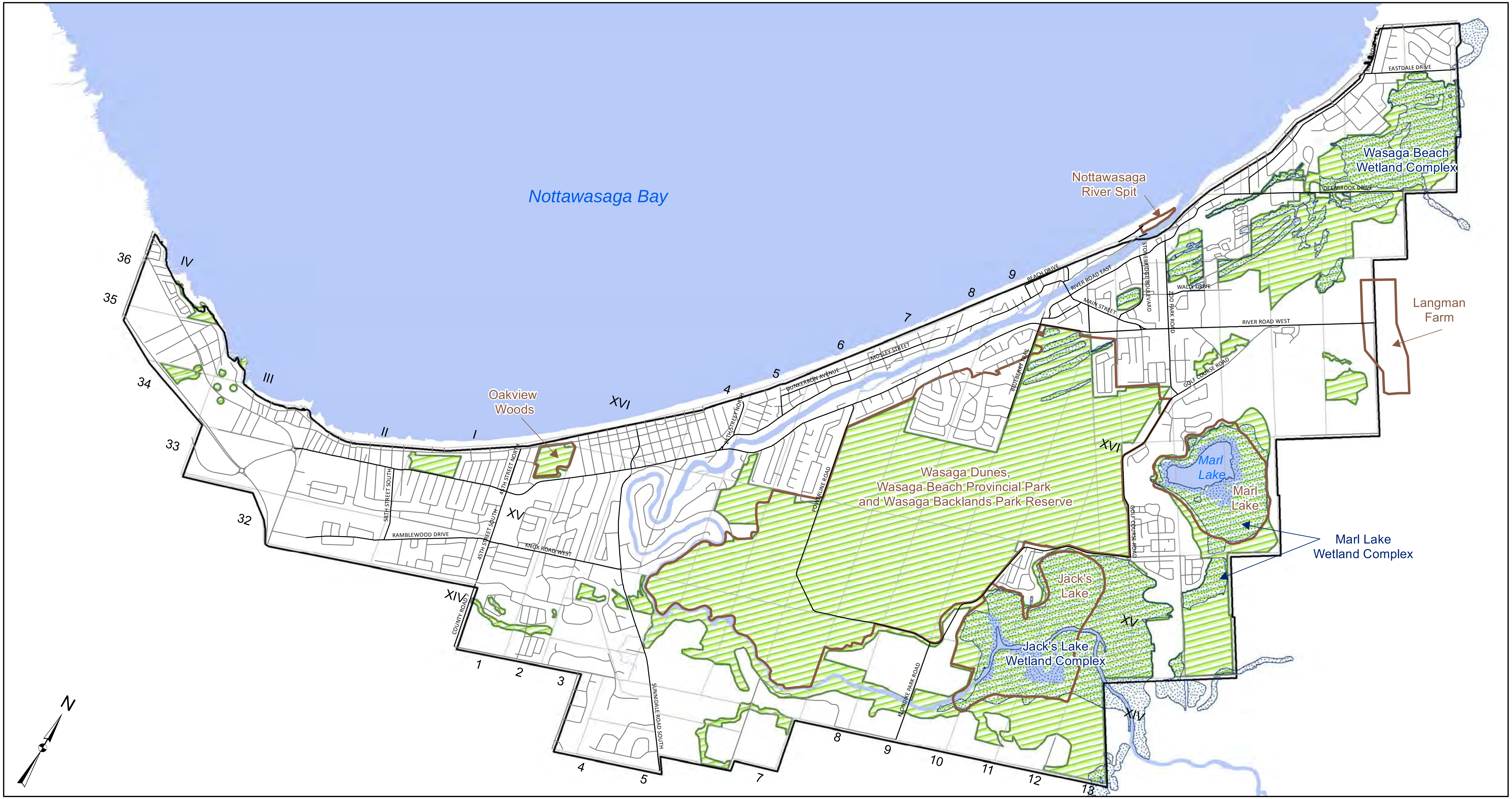
Legend

☐ Residential	🟧 Tourism Accommodation
▤ High Density Residential	▦ Tourism Commercial
⬚ Country Club Community	🟦 Institutional
▭ Campground Commercial	🟩 Open Space
▨ Recreational Commercial	▩ Natural Hazards
▦ Service Commercial	🟪 Natural Heritage System Category 1
🟥 District Commercial	▭ Rural
🟫 Local Commercial	▭ Waste Disposal

Schedule 'A-1'

Land Use Plan

Official Plan of theTown of Wasaga Beach



Adopted by Council: September 9, 2003

Approved by the County of Simcoe: June 22, 2004

Consolidated: September 6, 2013

NOTE: The lot lines depicted on this map are for reference only and may not reflect accurately property boundaries in all instances.

0 300 600 1,200 1,800 2,400 3,000
Metres

▭ ANSI (Area of Natural and Scientific Interest)

░ Provincially Significant Wetland Complex

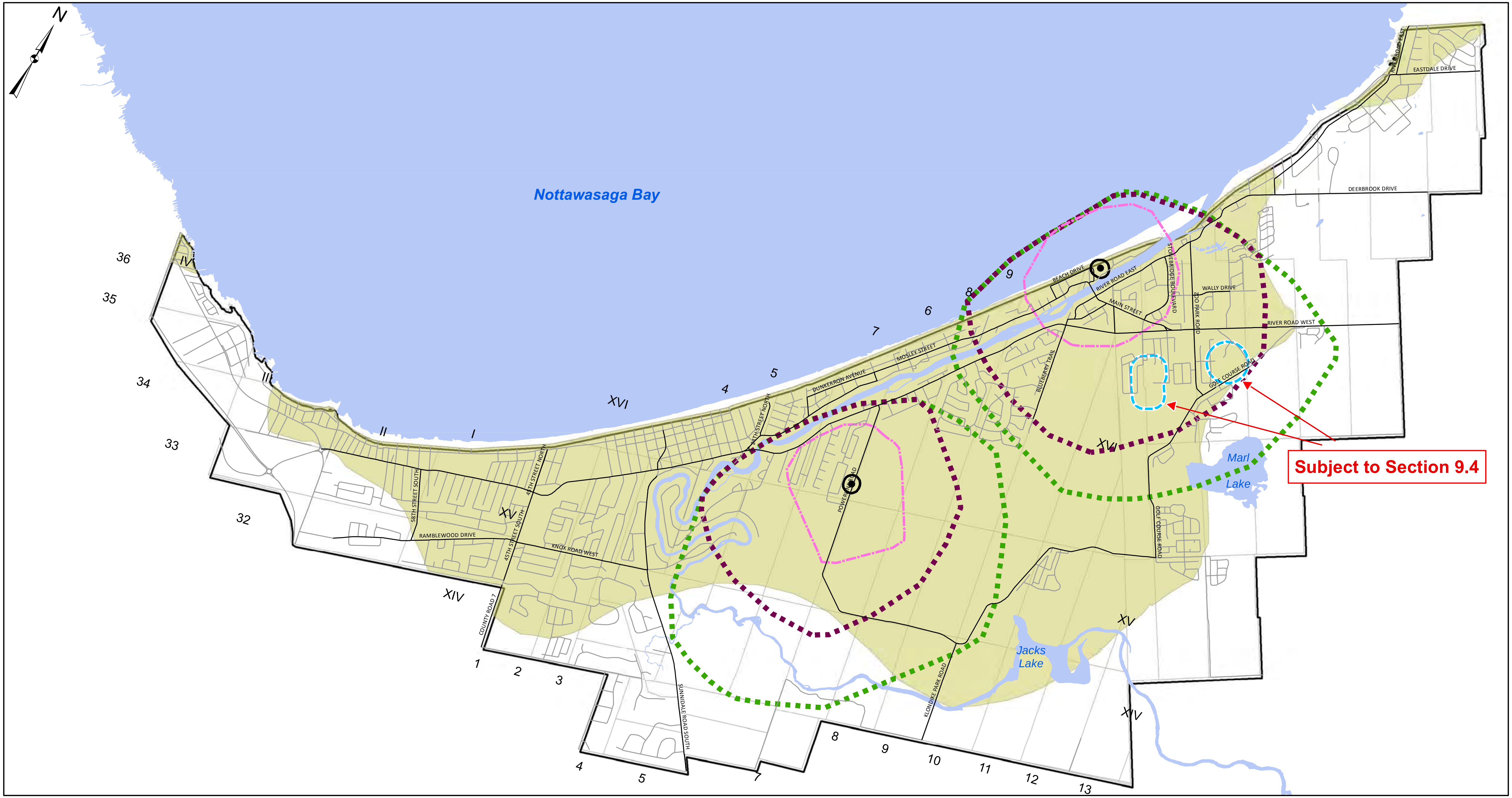
▨ Natural Heritage System Category 1 and 2 Lands

TOWN OF WASAGA BEACH INCORPORATED 1974

Schedule 'D'

Natural Heritage System

Official Plan of theTown of Wasaga Beach



Subject to Section 9.4

Adopted by Council: September 9, 2003

Approved by the County of Simcoe: June 22, 2004

Consolidated: September 6, 2013

NOTE: The lot lines depicted on this map are for reference only and may not reflect accurate property boundaries in all instances.

0 300 600 1,200 1,800 2,400 3,000
Metres

- ● Municipal Wells
- ☐ Well Head Protection Area-A: 100 Metre Fixed Radius Area Capture Zone
- ⬚ Well Head Protection Area-B: 2 Year Capture Zone
- ⬚ Well Head Protection Area-C: 2-10 Year Capture Zone
- ⬚ Well Head Protection Area-D: 10-25 Year Capture Zone
- ▨ Area of High Aquifer Vulnerability
- ⬚ Special Hydrogeological Study Area

Schedule 'G'

Wellhead Protection Areas and Vulnerable Aquifer Areas

Official Plan for theTown of Wasaga Beach

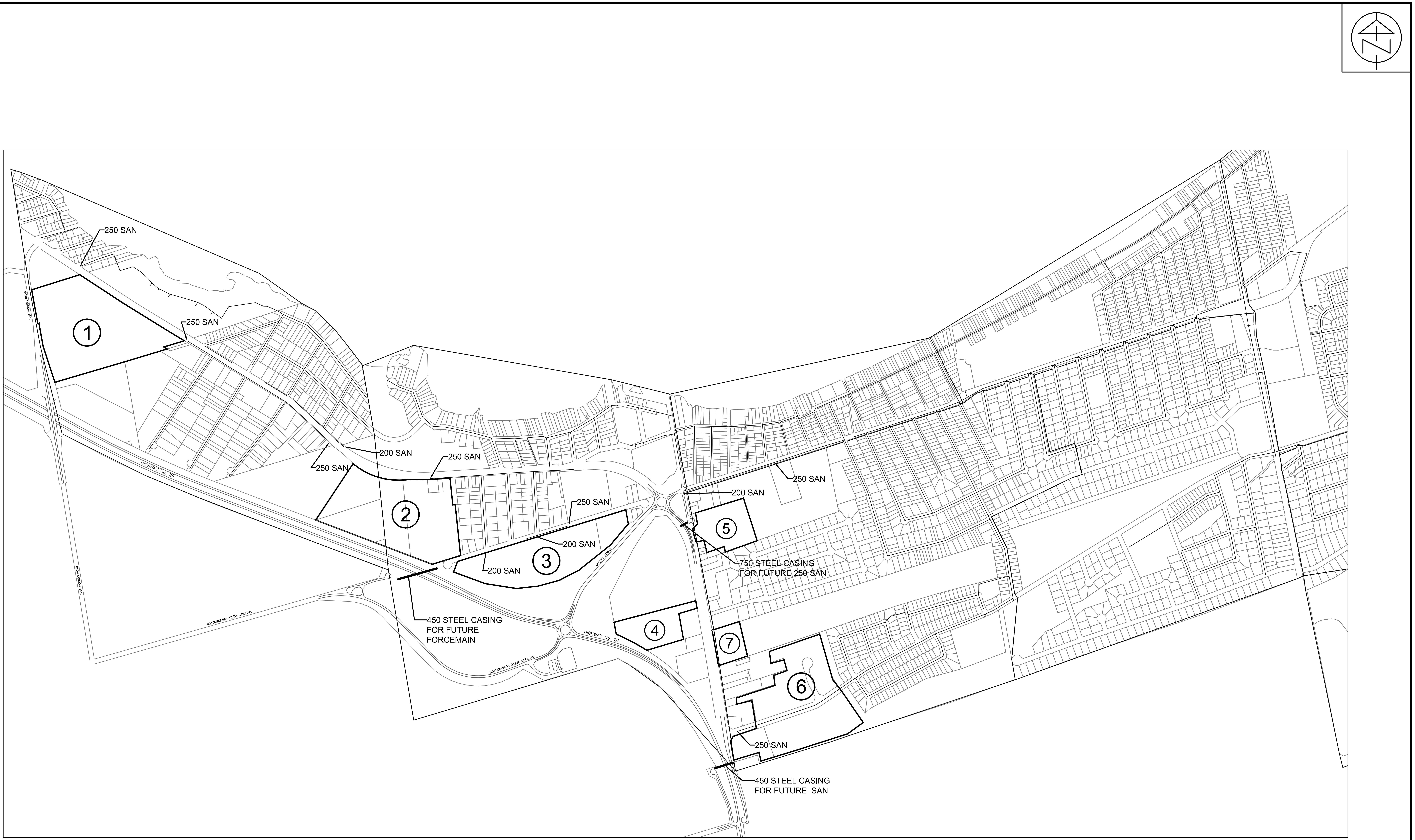
Active & Proposed Developments as of June 2016

Legend

- 🟨 Commercial
- 🟧 Commercial/Residential Mixed Use
- 🟫 Modular Home Community
- 🟦 Proposed Condominium
- 🟪 Proposed Severances
- 🟥 Proposed Subdivision
- 🟩 Draft Plan of Subdivision Approved
- 🟪 Subdivision/ Development Under Construction
- 26 Lots Proposed Number of Lots/Units

0 0.5 1 2 3
Kilometres

01. Maram Building Corp - Commercial Development (Maram)
02. Vandermeer Homes
03. West Wasaga (Stirling Cook Development Properties)
04. Bluewater Canoe Club (Phases I & II)
05. Wasaga Pines Retail Centre
06. DAS Developments
07. Jell-E-Bean Campground Expansion
08. Zancor Trillium Forest North - Commercial Zancor
09. Zancor Trillium Forest North - Zancor
10. Business Park (Zancor)
11. Robinson Road Area Servicing/Development
12. Marocco Residential Development (Ramblewood Drive)
13. Ramblewood Estates Subdivision (Phase II)
14. Marocco 45th Street Commercial Development
15. TY-Corp Lands
16. Baycliffe Homes - Morgan Road Development
17. Donato Puccini Townhouse Development
18. Pine Valley Estates Subdivision (Phase IV) Formerly J.Dick
19. Pacific Homes (Sunnidale Trails) Secondary Plan Ph.1
20. Pacific Homes (Sunnidale Trails) Secondary Plan Ph.2
21. Marocco / Spence (Sunnidale Trails)
22. Rivers Edge Phase 1 (Sunnidale Trails) Secondary Plan Area
23. Rivers Edge Phase 2 (Sunnidale Trails) Secondary Plan Area
24. Arnill Pitt - Marocco - Proposed Condominium Townhouses
25. Marocco Knox Road East High Density Development
26. RONA
27. Di Paola Commercial
28. Free Spirit Tours
29. Greenhill Homes
30. Riverdock Suites (Marcolini)
31. Blueberry Village Townhomes (Phase 1)
32. Blueberry Village Townhomes (Phase 2)
33. Acchione /Fisico Severances
34. Westbury Road Subdivision - Berkley Homes
35. Devlin Subdivision (Mollela)
36. Sergautis Townhouse Development
37. Wasaga Beach Village Ph 3 - Berkley Homes
38. Ansley Grove Subdivision - Pine Valley Developments
39. Scave Commercial Site Plan (Phases III & IV)
40. Esso Redevelopment - Petro Gold
41. Hamount Commercial (Phase 1, 2 & 3)
42. Hamount Residential
43. Parkbridge Wasaga Meadows East
44. Parkbridge Wasaga Country Life (Phase 5)
45. York Contracting - Royal Bank Plaza Ph.2
46. Bremont Homes - H2O Townhomes
47. Perciball - Townhomes
48. Golfview Estates (Peter Regina)
49. Iantorno Residential Development
50. Donato-Strite Subdivision
51. New England Village (Subdivision)
52. New England Village (Condominium)
53. Di Giovanni Hotel & Condominium Development
54. Wasaga Country Life Resort (Phases 4B & 4C)
55. Skydale Condos - Coastline Drive
56. Optima Homes
57. Beaver Run Estates Condos
58. Eastdale Redevelopment
59. Parkbridge - Phase 6 Park Place
60. Eastdale Drive - 2355573 Ont Inc.
61. Country Meadows (Parkbridge)
62. New England Village Phase 2 (Subdivision)
63. Mosley Street Professional Building-Commercial
64. Deerbrook Drive - 2355573 Ont Inc
65. Marlwood Inc Subdivision
66.Farsight Homes
67. Chrissies Cabins (Hamount)
68. Pine Valley Commercial
69. DiMichelle/Dipaola
70. Hamount Commercial (700m2)/Residential (64 Units)
71. Superstore Commercial Pad
72. A.B.B. Developments - 12 Unit Stacked Townhouse
73. Tru Star Developments -11 Units



PLOT 1=0.025

NOTES

Plotted by: VGIANGRANDE on July 18, 2016 at 10:28am
File: V:\113168\EX-SAN-WATER.dwg Layout: EX-SAN

NO.	REVISIONS	DATE	INITIAL

Not Valid Unless Signed And Dated

PRELIMINARY

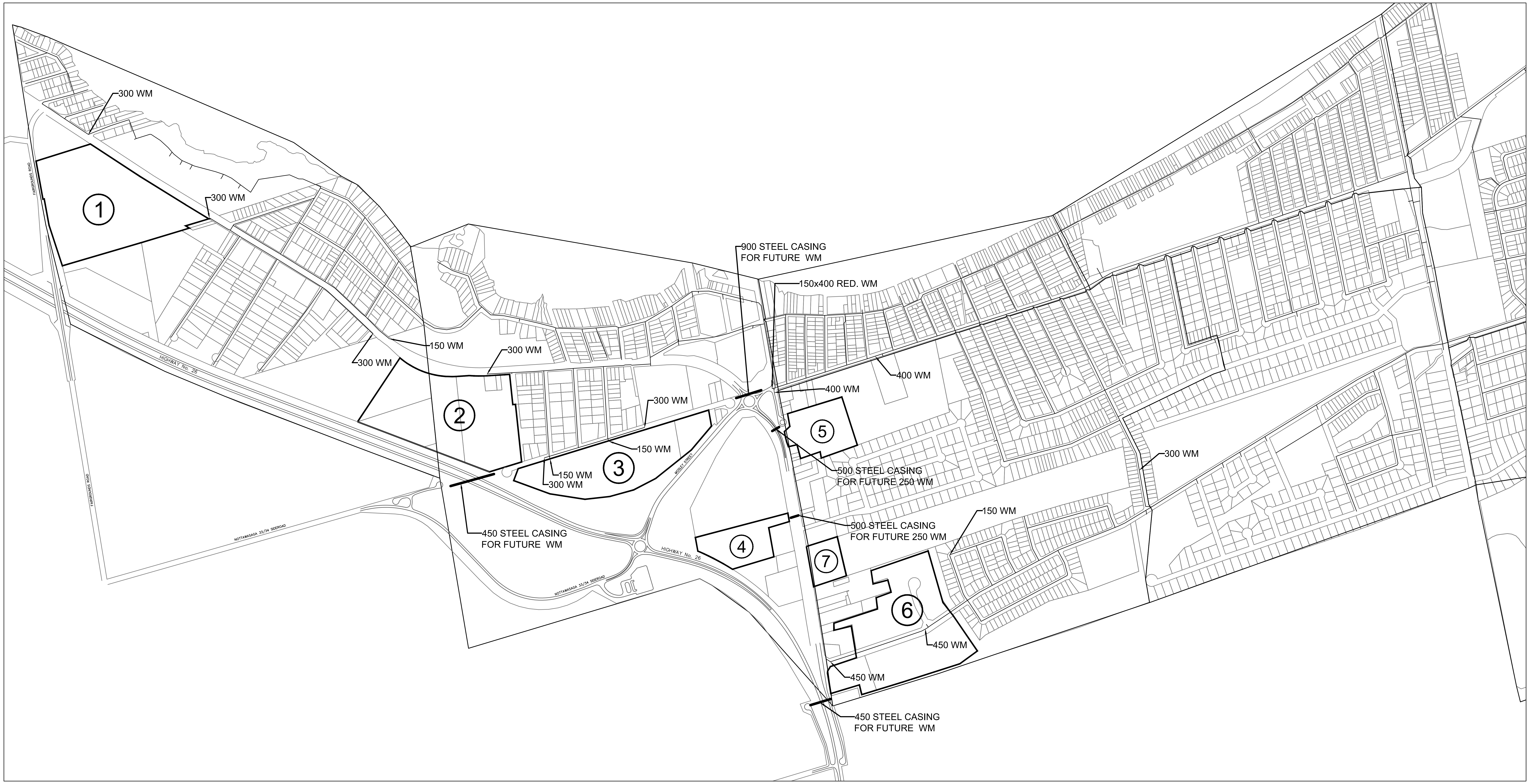
SCALE: N.T.S.
DESIGN: R.M.
DRAWN: S.V.T.
CHECKED: R.M.
DATE: OCT. 2014

TOWN OF WASAGA BEACH
WEST END STORAGE FACILITY
AND MAINTENANCE DEPOT

EXISTING SANITARY SERVICES

Ainley GROUP
CONSULTING
ENGINEERS
PLANNERS

CONTRACT No.
DWG. No. 114137–SAN



PLOT 1=0.025

NOTES

Plotted by: VGIANGRANDE on July 18, 2016 at 10:28am
File: V:\113168\EX-SAN-WATER.dwg Layout: EX-WATER

NO.	REVISIONS	DATE	INITIAL

Not Valid Unless Signed And Dated

PRELIMINARY

SCALE: N.T.S.
DESIGN: R.M.
DRAWN: S.V.T.
CHECKED: R.M.
DATE: OCT. 2014

TOWN OF WASAGA BEACH
WEST END STORAGE FACILITY
AND MAINTENANCE DEPOT

EXISTING WATER SERVICES

Ainley GROUP
CONSULTING
ENGINEERS
PLANNERS

CONTRACT No.
DWG. No. 114137-WATER

Town of Wasaga Beach

West End Water Storage Facility and Maintenance Depot Class EA

Technical Memorandum No. 4

Storage Alternatives

December 2014

Ainley GROUP
CONSULTING ENGINEERS & PLANNERS

West End Water Storage Facility and Maintenance Depot Class EA

Project No. 114137

Prepared for:
Town of Wasaga Beach

Prepared By:

Gary Scott, M.Sc., P.Eng.

Checked By:

Mike Ainley, P.Eng., PMP

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1.0 Introduction

The Town of Wasaga Beach initiated the West End Water Storage Facility and Maintenance Depot Class Environmental Assessment (EA) planning process (Schedule C) to consider storage options and sites for a new water reservoir that will support community growth in the west end of the Town. Based on previous planning and hydraulic modeling work, an additional 8,840 m^3 (approximated to 9,000 m^3) of storage will be necessary based on full build-out projected population growth in Wasaga Beach over the coming decades.

The need for additional water storage was identified in a Report titled "Ultimate Water Supply and Distribution System Model Update" prepared by Ainley & Associates Limited, March 2014. A total water storage requirement of 24,641 m^3 was identified. Recognizing that the Town's three existing water storage facilities have a combined useable volume of 15,801 m^3, in order to service the ultimate growth an additional 8,840 m^3 of storage is needed as shown in Table 1.

Table 1 – Additional Required Storage for Ultimate Growth Based on Current Available Water Storage in Wasaga Beach.

Location of Storage	**Available Storage (m^3)**
East End Elevated Tank	2,841
Veterans Way (formerly Powerline Road) In-Ground Reservoir	3,410
Sunnidale Elevated Tank	9,550
Total Existing Storage	15,801
Additional Storage Required	**8,840**

Assuming that the full water storage volume of 24,641 m^3 will be required within a 25 year growth span the storage demand can be shown as a straight line graph (Figure 1).

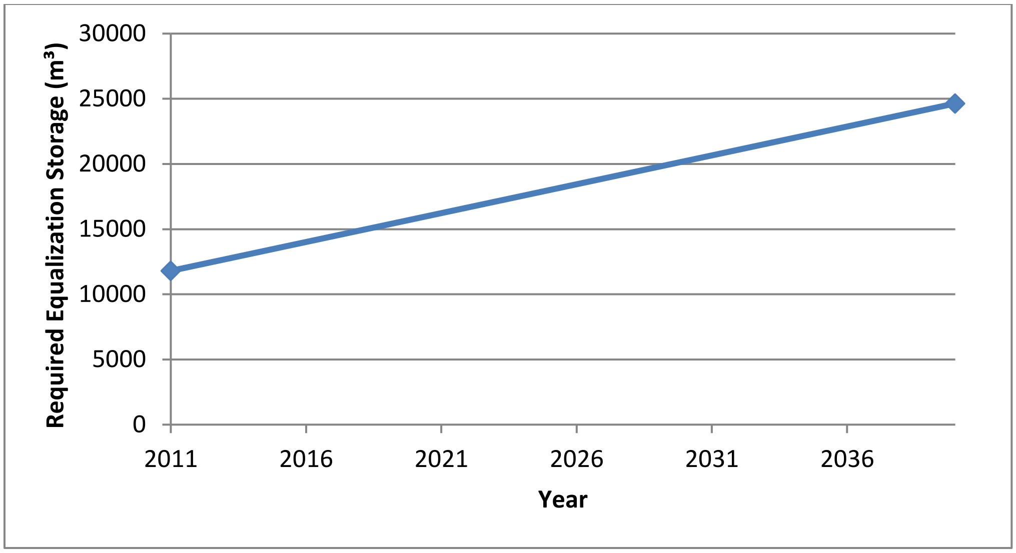

Figure 1 – Projection of Required Water Storage for The Town of Wasaga Beach until 2040.

This Class EA addresses all required water storage through to full build-out and specifically addresses the first phase of the storage, including size, location and type of storage, in the West End of the Town within the project area defined in the Notice of Study commencement. In addition, the study will also identify the preferred location for the balance of required storage.

1.1 Objectives of Technical Memorandum No. 4A

The objectives of this Technical Memo are to:

- Identify Alternative Solutions for storage tank types including both elevated and in-ground Alternatives. Identify General Alternative Solutions for provision of required additional storage through to full build-out of the Town including sizing, phasing and location of storage facilities
- Evaluate and compare Alternative Storage Types
- Evaluate and compare General Storage Alternatives
- Identify the preferred General Alternative for Storage through to full build-out of the Town
- Identify the preferred first phase of storage in the West end

1.2 Identification of Water Storage Types

The two main types of municipal water storage include floating and pumped storage. Pumped storage consists of a reservoir that can be located above ground, in-ground or partially in-ground and a pumping station. Common elevated tanks are elevated steel tanks and standpipes.

Pumped water storage consists of a concrete basin, which can be made up of multiple cells, and a pumping station. This type of storage allows for staged construction and is less visible to the public. Pumped storage results in high yearly hydro costs incurred due to necessary pumping. All three types of pumping options allow for similar function however, in-ground water storage allows for the land to be used for additional purposes making it the ideal type of pumped storage.

Elevated tanks provide water at or above the required system pressure. Recently the elevated tanks pedestal support has made this type of storage more aesthetically pleasing than pervious designs. This type of construction has large up front capital costs however no pumping is necessary reducing annual operation and maintenance costs.

The standpipe combines functions of both elevated and in-ground storage. The standpipe is a steel or concrete cylindrical storage option which is partially gravity feed. The water below the required system pressure is unusable without the addition of a pumping station. Since the use of concrete pedestals for elevated steel tanks few standpipe designs have been seen as cost effective. The disadvantages of this option combine those of both in-ground and elevated storage. Due to the vast disadvantages associated with this type of storage the standpipe was not considered as a viable option.

For the Wasaga Beach project both in-ground storage and elevated tank storage will be looked at as these types of storage have shown to be the best storage options available.

2.0 Identification of General Water Storage Alternatives

As noted in section 1 above, the Town of Wasaga Beach requires additional water storage capacity to support planned development. This Class EA will consider alternatives to provide an additional 9,000 m^3 of storage. A map with the location of the proposed developments can be seen in Figure2 along with the locations of the existing water storage facilities. This map shows the extensive development that is planned in the west end and the lack of storage in the far west end.

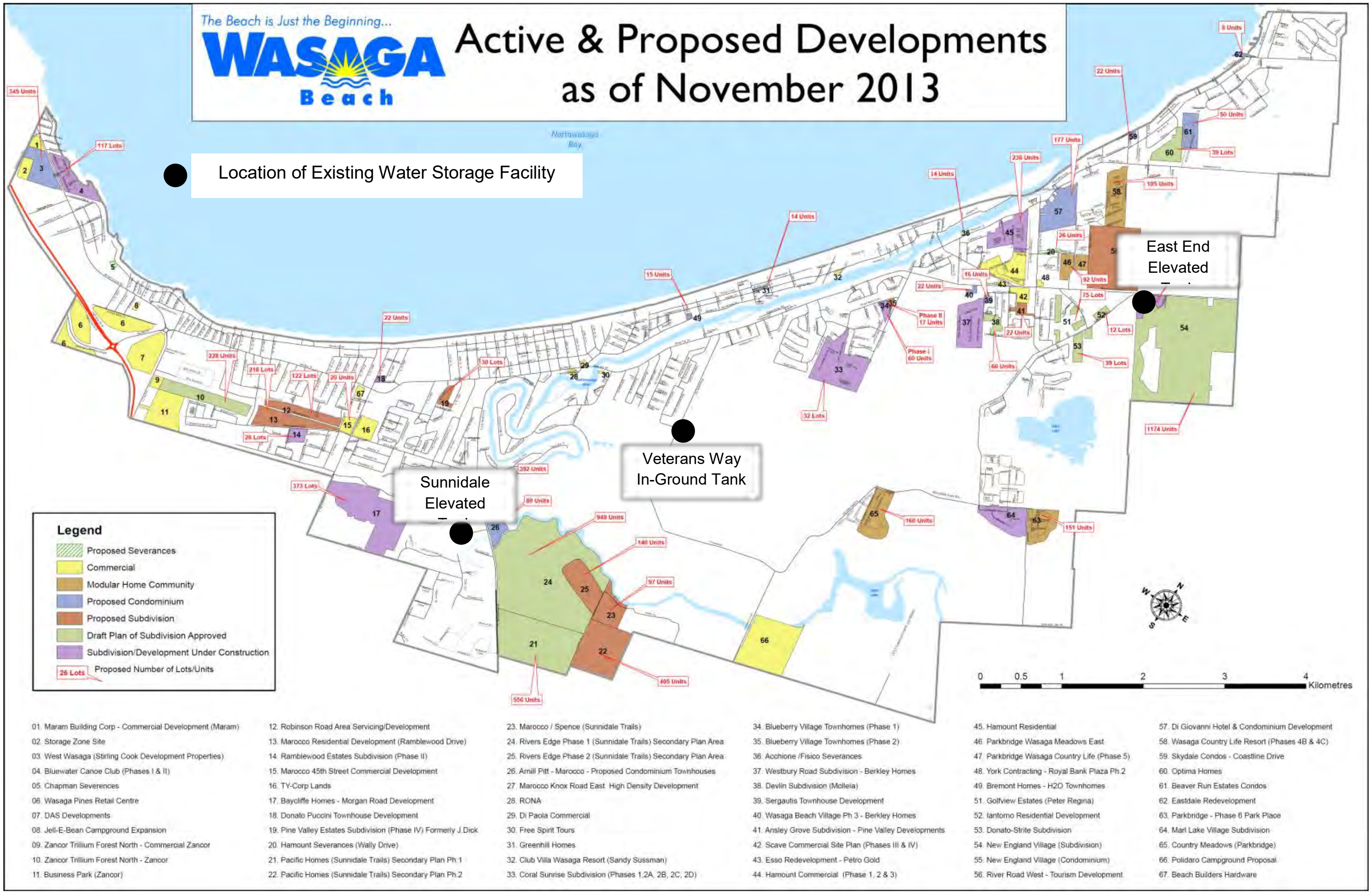

Figure 2 – Future Development in the Town of Wasaga Beach and the Location of the Existing Water Storage Facilities.

An extensive analysis of the Wasaga Beach water distribution system was completed in 2013. The analysis examined both present day network conditions and full build-out conditions. During existing condition analysis the system preforms to Ministry of Environment (MOE) Guidelines for Drinking Water Systems having system pressures above 275 kPa during normal operating conditions and pressures above 140 kPa during a minimum fire flow of 38 L/s. The McIntyre Creek area is the only exception to this where available fire flow ranges from 34 L/s to 47 L/s. In the past marginal available fire flow has been documented for this area.

Full build-out conditions were modelled with no pressure improvements to the system. A large section of the planned development in the west end would experience pressures below 275 kPa under peak hour flows. The theoretical pressures for the proposed Sunnidale Trails Secondary Plan area were as follows:

- ADD – approximately 300-370 kPa
- MDD - approximately 255-325 kPa
- PH - approximately 190 -255 kPa

These pressures are below the normal operating pressures of 350 kPa and during MDD and PH the pressures are below the minimum acceptable pressure of 275 kPa set out my MOE. This is also the case for the proposed Marocco – Sunnidale Knox High Density Development where theoretical pressures are as follows:

- ADD – approximately 265 kPa and below
- MDD - approximately 260 kPa and below
- PH - approximately 245 kPa and below

Pressure drops were also experienced in existing areas. For example McIntyre Creek area experienced pressures 25 kPa to 45 kPa lower than current pressures during full build-out conditions. During MDD and fire flow conditions the proposed developments experienced unacceptable pressures for a fire flow of 38 L/s. Additional modelling was completed to understand how a fire in the far west end would affect the system pressures. A fire flow of 283 L/s for 4 hours under MDD was modeled. It was found that the pressure in the far west end dropped significantly with 85 nodes experiencing a pressure below the minimum acceptable level of 140 kPa.

The current storage tank locations do not adequately service the west end especially due to the large amount of planned developments that are expected to be located in this area. To be able to handle full build-out of the network additional storage in the west end is necessary to maintain system pressures.

As a result of the above, the following general alternatives will be considered. The additional water storage volumes are as follows:

Alternative 1 9,000 m^3 - elevated tank in the west end
Alternative 2 9,000 m^3 - in-ground tank in the West end to be built in 2 stages (2 – 4,500 m^3 cells)
Alternative 3 4,500 m^3 - elevated tank in the West end and 4,500 m^3 in-ground at Veterans Way site
Alternative 4 4,500 m^3 - in-ground tank in the West end 4,500 m^3 in-ground at Veterans Way site

The 4 alternatives all offer different water storage alternatives to meet the necessary 9,000 m^3 of additional storage needed for the Wasaga Beach water distribution system. Alternative 1 would be built all at once increasing the network storage capacity to full build-out levels immediately. Alternatives 2, 3 and 4 can all be built in stages allowing for the second stage of storage to be constructed in the future when it becomes necessary. Both elevated and in-ground storage options are incorporated into the different alternatives. An extensive analysis on both types of storage is shown below. Additionally an evaluation of the 4 alternatives is also completed below concluding which alternative would best serve Wasaga Beach.

3.0 Evaluation of Water Storage Tank Types

3.1 In Ground Pumped Storage Alternative

An in-ground water storage tank solution would likely take the shape of a multi-celled, partially buried concrete tank under earth berms combined with a pump station at one end of the facility. These low level facilities have minimal visual/aesthetic impact on the community. A typical layout for this alternative is shown in Figure 3. In addition to the minimal visual impact, the main advantage of in-ground water storage reservoirs is that they can be built in stages with cells added as required to meet the needs of growth in the Town. The main disadvantage, especially in Wasaga Beach, is that water pressure is lost in filling the reservoir, requiring double pumping. A pump station with stand-by power would therefore be required, however, the station could also be staged with respect to pump capacity. This would result in lower initial capital costs. However, additional capital costs would be realized as new cells are constructed and as the pump station is expanded. The design of the reservoir/pump station facility can allow for future expansion(s) – stages. It should also be noted that staging of the ultimate reservoir volume will better help to maintain water quality (more turnover resulting in less chlorine loss) and will involve less maintenance (no painting). The design will need to include a pump control system (pumps would operate based on system pressure).

Hydro costs will be incurred as a result of the need to repump the water back to the system. A grade level or in-ground facility is more complex to operate, requiring variable pump rates to meet different demand conditions ranging from minimum day to maximum day plus fire. Finally, this type of reservoir requires more land (larger footprint) than the elevated tank alternative.

Figure 3 – Example of an In-Ground Water Reservoir (Located in Thornbury)

3.2 Elevated Tank as Floating Storage Alternative

Floating storage provides the most secure form of storage as it makes water available for all demand conditions without the need for power. While elevated tanks are available in a number of styles ranging from spheroidal shapes with steel shafts such as Wasaga East tank to composite cylindrical tanks with concrete shafts such as the Sunnidale Tank in Wasaga Beach. Elevated reservoirs are easier to operate (no pumps) and require less land than in-ground facilities. They can also be considered as an identifiable landmark for communities and as such are often located adjacent to highways. The main disadvantages of elevated storage tanks is that they must be repainted on a regular basis (every 20 years) and typically they cannot be staged, requiring all storage to be provided initially. In locations where large volumes of storage are constructed before required by developments, difficulty can be experienced with respect to maintaining a residual disinfection concentration in the water. Re-chlorination may be necessary. This is can apply in the winter months when the demand is greatly reduced or during the summer when the chlorine decay rate is much higher.

3.3 Water Storage Types Cost Comparison

Capital costs and operation and maintenance costs were estimated over a 50 year life span of the two different storage tank types. Estimated are based on similar, recently completed projects. The cost of a 4,500 m³ water storage facility was calculated for both elevated and in-ground tank alternatives. The calculation spreadsheets are provided in Appendix A. A Summary of the analysis is provided in Table 2 below.

Table 2 – Summary of Cost Comparison of a 4500 m³ Elevated Water Tank and a 4500 m³ In-Ground Water Tank. (Preliminary Estimates)

	Elevated Tank	**In-Ground Tank**
Estimated Capital Cost	$ 6,425,000[1]	$ 5,430,000
Estimated Operation and Maintenance Costs	$ 528,000	$ 2,477,000
Estimated Major Maintenance Costs	$ 1,000,000	$ 500,000
Estimated Total Cost	$ 7,887,000	$ 8,010,000
Estimated Net Present Value Cost	**$ 6,460,832**	**$ 6,000,055**

[1] All costs represent 2014 values except for the estimated net present value cost which takes into account a discount rate of 4% over the time period analyzed.

The capital costs represent the upfront costs including tank construction, land and engineering costs. The difference in capital cost is $995,000 (in favour of in-ground tank) which is considered to be significant. However the net present values must be considered.

The annual operation and maintenance costs represent the yearly costs over the next 50 years including hydro, diesel generator operation, site maintenance, equipment maintenance, labour and trucks. Although these costs are estimated, there is a major difference in operating the two types of facilities. Major maintenance cost represents maintenance that is not completed yearly and includes tank painting every 20 years for an elevated tank and pump replacement every 40 years for an in-ground tank. The total difference in overall estimated maintenance and operating costs is $1,949,000 (in favour of elevated tank) which is attributable primarily to the cost of running the pumps.

The total estimated net present value cost is a sum of all of the cost associated with the project. The net present value cost is the total cost taking into account a discount rate of 4% over the 50 year period analyzed. The elevated tank option is estimated to result in a larger up front capital cost. However with limited upkeep needed the annual operation and maintenance costs were low. Higher major maintenance costs are incurred because of the frequency of and high cost associated with painting the tank. The capital cost was estimated for an in-ground facility was lower. Operation and maintenance costs were significantly higher for this option because large pumping costs are experienced yearly. The major maintenance costs however were lower due the long life span (40 years) of the pumps.

3.4 Summary of Tank Type Comparison

Both of the two water storage alternatives have advantages and disadvantages which are important in the decision making process. Table 3 outlines the advantages and disadvantages of both elevated storage and in-ground storage.

Table 3 – Advantages vs. Disadvantages of Elevated and In-Ground Storage Options.

Storage Type	Advantages	Disadvantages
Elevated Storage	• Secure Floating Storage • Identifiable landmark to some (subjective) • Requires less land • No future capital costs • Low energy costs • Ease of operation	• Unpleasing aesthetics to some (subjective) • Access to storage cell is via a long ladder with climb assist equipment • Storage cell is a confined space • Painting cost • Initial capital cost • Volume cannot be staged • Initially, maintaining water quality (chlorine residual) is difficult due to large volume and low demand
In-Ground Storage	• Can be built in stages • No Painting cost • Low Initial Capital Cost • More aesthetically pleasing to some (subjective) • Access to storage cell is a shorter ladder • Easier to maintain water quality (chlorine residual) due to smaller volume	• Need standby power • Complex to operate • Storage cell is a confined space • Requires more land • Future capital costs • Energy costs • More complex operation and maintenance

4.0 Evaluation of Water Storage Alternatives

Four storage alternatives, as identified in section 3 above, have been evaluated.

The four storage alternatives are:

1. A new 9,000 m^3 elevated tank in the West end
2. A new 9,000 m^3 in-ground tank in the West end built in 2 stages (2 4,500 m^3 cells)
3. A new 4,500 m^3 elevated tank in the West end and the addition of a new 4,500m^3 cell at the Veterans Way in-ground storage facility.

4. A new 4,500 m^3 in-ground tank in the West end and the addition of a new 4,500 m^3 cell at the Veterans Way in-ground storage facility.

Storage can be phased for alternatives 2, 3 and 4 based on development triggers allowing for lower initial capital costs. Suggested phasing dates for each alternative are shown in Figure 2 (2020 and 2031), based on current storage availability and necessary total storage. Alternatives 2, 3 and 4 are the same with respect to staging and therefore, those three alternatives have been shown as one line in Figure 4.

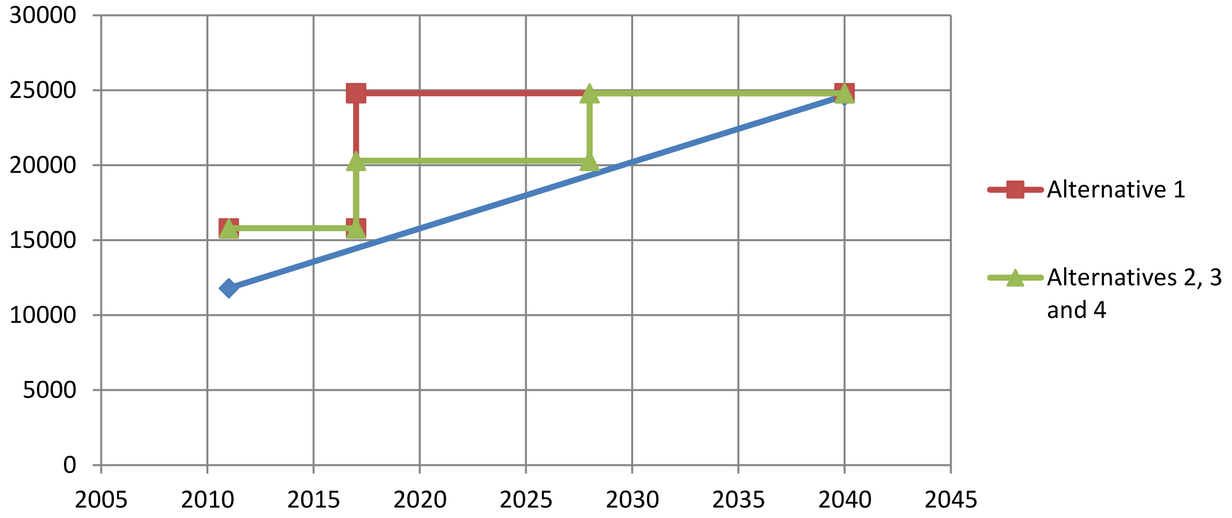

Figure 4 - Construction Phasing for the 4 Different Storage Alternatives

Figure 4 shows that the storage requirement in the Town will exceed the available 15,800 m^3 in 2020. Recent water modelling (fire flow of 283 L/s coupled with MDD under ultimate buildout scenario) indicate that a fire in the extreme west end will result in lower than acceptable pressures in the west end based on the existing system (no improvements). The system pressures ranged from below 0 kPa to 1,906 kPa during the modelled scenario. Therefore, additional water storage volume in the west end should be constructed by 2020 in order to provide suitable pressures and to support development. The second stage under alternatives 2, 3 and 4 should be completed by 2028 in order to meet the ultimate water storage requirements in the Town.

4.1 Water Storage Alternative Cost Comparison

A cost analysis has been completed for the estimated capital costs and operation and maintenance costs over a 50 year life span for each scenario. The calculation spreadsheets are included in Appendix A. A summary of the cost comparison of each alternative is presented in Table 4.

Table 4 – Estimated Cost Comparison of 4 Different Storage Alternatives.

	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**
Capital Cost	$ 11,675,000	$ 9,513,942	$ 10,455,836	$ 9,513,942
Operation and Maintenance Costs	$ 550,000	$ 4,540,800	$ 1,804,000	$ 3,834,000
Major Maintenance Costs	$ 1,800,000	$ 500,000	$ 1,000,000	$ 500,000
Total Cost	$ 14,300,000	$ 14,413,709	$ 13,259,835	$ 13,706,909
Present Value Cost	**$ 11,832,095**	**$ 8,956,188**	**$ 9,170,138**	**$ 8,756,159**

All costs represent 2014 values except for the net present value cost which takes into account a discount rate of 4% over the time period analyzed.

Alternative 1 results in the largest capital cost and does not involve phasing resulting in all capital expenses being paid up front. However due to minimal upkeep the annual operation and maintenance costs are very low for the 9,000 m^3 elevated tank. Large major maintenance costs reflect the frequency and high cost of painting the tank (every 20 years).

Alternatives 2 and 4 have similar estimated prices because these two projects result in the same storage volume but in different locations. These options have the lowest estimated capital and construction can be phased. Large operation and maintenance costs are as a result of expensive pumping (hydro) that is necessary for in-ground tanks. A low major maintenance cost reflects the longevity of the pumps.

Alternative 3 is estimated to be slightly more costly than alternatives 2 and 4 due to the elevated tank in the west end. However this option allows for phasing of construction which reduces the upfront cost. The operation and maintenance costs are low because of the low costs associated with the upkeep of an elevated tank. Tank painting results larger major maintenance costs.

4.2 Evaluation of Alternatives

To assess the four alternatives a criteria assessment table was developed rating each option as best, moderate or worst for the various criteria. No weighting was assigned to any of the criteria. Numbers were associated with each rating are: worst = 1, moderate = 2 and best = 3. The total value was obtained by summing all of the criteria ratings shown in Table 5. The criterion incorporates the advantages and disadvantages of elevated and in-ground storage as well as the costs associated with each of the for alternatives.

Table 5 – Rating Criteria

	Alternative 1	Alternative 2	Alternative 3	Alternative 4
Land Requirement	3	1	3	2
Aesthetics	3	1	2	1
Opportunity to Create Wasaga Beach Landmark	3	1	2	1
Security of Supply (Need for Standby Power)	3	1	2	1
Water Quality*	2	6	4	4
Storage Distribution Across Network*	2	2	6	4
Access to Storage (Health and Safety)	1	3	2	3
Initial Capital Cost*	2	6	4	6
Future Capital Cost	3	1	1	1
Long Term Operation and Maintenance Cost	3	1	3	2
Energy Costs	3	1	2	1
Total	**28**	**24**	**31**	**26**

From the assessment completed alternative 3 (4,500 m^3 elevated tank in the west end and a 4,500 m^3 in-ground tank at Veterans Way) is the best option with the highest total score of 31. Alternatives 1 and 4 had the next highest total of 28 and 26 respectively and alternative 2 is the worst option having a total of 24. It must be stressed that the assessment is subjective with all criteria having the same weighting. Should the Town determine that any of the criteria should be weighted more than other criteria, the result will change.

4.1 Recommendation – Option of Dividing Water Storage

The construction of a 4,500 m^3 elevated tank in the west end and a 4,500 m^3 in-ground tank at Veterans Way (alternative 3) is the recommended solution for the expansion of water storage in the Town of Wasaga Beach. Alternative 3 is cost effective and received the highest score from the assessment completed which incorporated the advantages and disadvantages of both storage alternatives.

5.0 Conclusion and Recommendation

The Town of Wasaga Beach requires an additional 9000 m^3 of water storage based on full build-out population projections. The required storage has been calculated to meet MOECC guidelines for storage.

Different storage options were considered and evaluated including elevated, in-ground and standpipe storage. For this project elevated and in-ground storage were identified as viable and considered when developing possible alternatives.

Four alternatives were identified and evaluated using rating criteria.

Alternative 1 9,000 m^3 - elevated tank in the west end
Alternative 2 9,000 m^3 - in-ground tank in the West end to be built in 2 stages (2 – 4,500 m^3 cells)
Alternative 3 4,500 m^3 - elevated tank in the West end and 4,500 m^3 in-ground at Veterans Way site
Alternative 4 4,500 m^3 - in-ground tank in the West end 4,500 m^3 in-ground at Veterans Way site

The rating criteria identified that alternative 3 is the best option and is the recommended solution for this project.

Appendix - A

“Present Value Cost Analysis”

Wasaga Beach Water Storage Class EA
4500 m^3 Elevated Tank West End
Present Value Cost Analysis

Discount Rate: **4.00 %**

Asset Description	**Annual Value** in Constant Year 2014 Dollars	**Total Value** in Constant Year 2014 Dollars	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027
1) Capital Cost															
West End															
Tank Construction		$ 6,000,000	$ 150,000	$1,000,000	$3,850,000	$1,000,000									
Land Cost		$ 125,000	$ 125,000												
Engineering		$ 300,000		$ 150,000	$ 150,000										
Sub-total		$ 6,425,000	$ 275,000	$1,150,000	$4,000,000	$1,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2) O&M Costs															
West End															
Hydro	$ 2,000	$ 96,000					$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
DG	$ -	$ -					$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Site Maintenance	$ 3,000	$ 144,000					$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
Equipment Maintenance	$ 500	$ 24,000					$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
Labour (Inspections)	$ 5,000	$ 240,000					$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
Trucks	$ 500	$ 24,000					$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
Sub-total	$ 11,000	$ 528,000					$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000
3) Major Maintenance															
Tank Painting or Pump Replacement	$ 500,000	$ 1,000,000													
Sub-total	$ 500,000	$ 1,000,000							$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs (Infrastructure and O&M Costs)		$ 7,887,000	$ 275,000	$1,150,000	$4,000,000	$1,000,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000
PV Costs (Infrastructure and O&M Costs)		**$ 6,460,832**	$ 275,000	$1,105,769	$3,698,225	$ 888,996	$ 9,403	$ 9,041	$ 8,693	$ 8,359	$ 8,038	$ 7,728	$ 7,431	$ 7,145	$ 6,871

2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500
$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$ 11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000
										$ 500,000												
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 500,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$ 511,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000
$ 6,606	$ 6,352	$ 6,108	$ 5,873	$ 5,647	$ 5,430	$ 5,221	$ 5,020	$ 4,827	$ 4,642	$ 207,326	$ 4,291	$ 4,126	$ 3,968	$ 3,815	$ 3,668	$ 3,527	$ 3,392	$ 3,261	$ 3,136	$ 3,015	$ 2,899	$ 2,788

2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$ 11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000
							500,000										
$ -	$ -	$ -	$ -	$ -	$ -	$ -	500,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$511,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000
$ 2,680	$ 2,577	$ 2,478	$ 2,383	$ 2,291	$ 2,203	$ 2,118	$ 94,621	$ 1,959	$ 1,883	$ 1,811	$ 1,741	$ 1,674	$ 1,610	$ 1,548	$ 1,488	$ 1,431	$ 1,376

Wasaga Beach Water Storage Class EA
4500 m^3 In-Ground West End
Present Value Cost Analysis

Discount Rate: **4.00** **%**

Asset Description	**Annual Value** in Constant Year 2014 Dollars	**Total Value** in Constant Year 2014 Dollars	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
1) Capital Cost															
West End															
Tank Construction		$ 4,504,527	$ 150,000	$1,000,000	$2,354,527	$1,000,000									
Land Cost		$ 250,000	$ 250,000												
Engineering		$ 675,679		$ 293,774	$ 293,774										
Sub-total		$ 5,430,206	$ 400,000	$1,293,774	$2,648,301	$1,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2) O&M Costs															
West End															
Hydro	$ 18,600	$ 892,800					$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600
DG	$ 1,000	$ 48,000					$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000
Site Maintenance	$ 3,000	$ 144,000					$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
Equipment Maintenance	$ 2,000	$ 96,000					$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
Labour (Inspections)	$ 25,000	$ 1,200,000					$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000
Trucks	$ 2,000	$ 96,000					$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
Sub-total	$ 51,600	$ 2,476,800					$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600
3) Major Maintenance															
Tank Painting or Pump Replacement	$ 500,000	$ 500,000													
Sub-total	$ 500,000	$ 500,000							$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs (Infrastructure and O&M Costs)		$ 8,009,274	$ 400,000	$1,293,774	$2,648,301	$1,000,000	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600
PV Costs (Infrastructure and O&M Costs)		**$ 6,000,055**	$ 400,000	$1,244,013	$2,448,503	$ 888,996	$44,108	$42,411	$40,780	$39,212	$37,704	$36,253	$34,859	$33,518	$32,229

2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600
$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000
$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600
$30,990	$29,798	$28,652	$27,550	$26,490	$25,471	$24,492	$23,550	$22,644	$21,773	$20,935	$20,130	$19,356	$18,612	$17,896	$17,207	$16,546	$15,909	$15,297	$14,709	$14,143	$13,599

2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600
$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000
$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$ 51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$500,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$551,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600
$13,076	$12,573	$12,090	$11,625	$11,178	$10,748	$10,334	$ 9,937	$102,139	$ 9,187	$ 8,834	$ 8,494	$ 8,167	$ 7,853	$ 7,551	$ 7,261	$ 6,982	$ 6,713	$ 6,455

Wasaga Beach Water Storage Class EA
Alternative 1 – 9000 m^3 Elevated Tank West End
Present Value Cost Analysis

Discount Rate: **4.00** **%**

Asset Description	**Annual Value** in Constant Year 2014 Dollars	**Total Value** in Constant Year 2014 Dollars	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
1) Capital Cost															
Tank Construction		$ 11,000,000	$ 275,000	$1,000,000	$ 9,000,000	$1,000,000									
Land Cost		$ 125,000	$ 125,000												
Engineering		$ 550,000		$ 275,000	$ 275,000										
Sub-total		**$ 11,675,000**	$ 400,000	$1,275,000	$ 9,275,000	$1,000,000									
2) O&M Costs															
Hydro	$ 2,000	$ 100,000					$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
DG	$ -	$ -					$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Site Maintenance	$ 3,000	$ 150,000					$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
Equipment Maintenance	$ 500	$ 25,000					$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
Labour (Inspections)	$ 5,000	$ 250,000					$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
Trucks	$ 500	$ 25,000					$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
Sub-total	$ 11,000	**$ 550,000**					$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000
3) Major Maintenance															
Tank Painting or Pump Replacement	$ 900,000	$ 1,800,000													
Sub-total	$ 900,000	$ 1,800,000					$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs (Infrastructure and O&M Costs)		**$ 14,300,000**	$ 400,000	$1,275,000	$ 9,275,000	$1,000,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000
PV Costs (Infrastructure and O&M Costs)		**$ 11,832,095**	$ 400,000	$1,225,962	$ 8,575,259	$ 888,996	$ 9,403	$ 9,041	$ 8,693	$ 8,359	$ 8,038	$ 7,728	$ 7,431	$ 7,145	$ 6,871

2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000
										$ 900,000										
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ 900,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$ 911,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000
$ 6,606	$ 6,352	$ 6,108	$ 5,873	$ 5,647	$ 5,430	$ 5,221	$ 5,020	$ 4,827	$ 4,642	$ 369,617	$ 4,291	$ 4,126	$ 3,968	$ 3,815	$ 3,668	$ 3,527	$ 3,392	$ 3,261	$ 3,136	$ 3,015

2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000
									$900,000										
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$900,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$911,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000
$ 2,899	$ 2,788	$ 2,680	$ 2,577	$ 2,478	$ 2,383	$ 2,291	$ 2,203	$ 2,118	$168,688	$ 1,959	$ 1,883	$ 1,811	$ 1,741	$ 1,674	$ 1,610	$ 1,548	$ 1,488	$ 1,431	$ 1,376

Wasaga Beach Water Storage Class EA
Alternative 2 – 4500 m^3 In-Ground West End and 4500 m^3 West End Phase 2
Present Value Cost Analysis

Discount Rate: 4.00 %

Asset Description	**Annual Value** in Constant Year 2014 Dollars	**Total Value** in Constant Year 2014 Dollars	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
1) Capital Cost														
West End														
Tank Construction		$ 4,550,527	$ 150,000	$1,000,000	$2,354,527	$1,000,000								
Land Cost		$ 250,000	$ 250,000											
Engineering		$ 682,579		$ 293,774	$ 293,774									
West End Phase 2														
Tank Construction		3,505,075.00												
Land Cost		$ -												
Engineering		$ 525,761												
Sub-total		**$ 9,513,942**	$ 400,000	$1,293,774	$2,648,301	$1,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2) O&M Costs														
West End														
Hydro	$ 18,600	$ 930,000					$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600
DG	$ 1,000	$ 50,000					$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
Site Maintenance	$ 3,000	$ 150,000					$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
Equipment Maintenance	$ 2,000	$ 100,000					$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
Labour (Inspections)	$ 25,000	$ 1,250,000					$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000
Trucks	$ 2,000	$ 100,000					$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
West End Phase 2														
Hydro	$ 18,600	$ 669,600												
DG	$ 1,000	$ 38,000												
Site Maintenance	$ 3,000	$ 114,000												
Equipment Maintenance	$ 2,000	$ 76,000												
Labour (Inspections)	$ 25,000	$ 950,000												
Trucks	$ 2,000	$ 76,000												
Sub-total	**$ 51,600**	**$ 4,540,800**					$ 51,600	$ 51,600	$ 51,600	$ 51,600	$ 51,600	$ 51,600	$ 51,600	$ 51,600
3) Major Maintenance														
Tank Painting or Pump Replacement	$ 500,000	$ 500,000												
Sub-total	**$ 500,000**	**$ 500,000**							$ -	$ -	$ -	$ -	$ -	$ -
Total Costs (Infrastructure and O&M Costs)		**$14,413,709**	$ 400,000	$1,293,774	$2,648,301	$1,000,000	$ 51,600	$ 51,600	$ 51,600	$ 51,600	$ 51,600	$ 51,600	$ 51,600	$ 51,600

PV Costs (Infrastructure and O&M Costs)	**$ 8,956,188**	$ 400,000	$1,244,013	$2,448,503	$ 888,996	$ 44,108	$ 42,411	$ 40,780	$ 39,212	$ 37,704	$ 36,253	$ 34,859	$ 33,518

2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045
$150,000	$ 1,000,000	$ 1,355,075	$ 1,000,000															
	$ 262,880	$ 262,880																
$150,000	$ 1,262,880	$ 1,617,955	$ 1,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600
$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000	$1,000
$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
				$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600
				$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000
				$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
				$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
				$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000
				$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$ 51,600	$ $ 51,600	$ 51,600	$ 51,600	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$201,600	$ 1,314,480	$ 1,669,555	$ 1,051,600	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200
$125,919	$ 789,443	$ 964,126	$ 583,916	$ 55,099	$ 52,980	$ 50,942	$ 48,983	$ 47,099	$ 45,288	$ 43,546	$ 41,871	$ 40,261	$ 38,712	$ 37,223	$ 35,791	$ 34,415	$ 33,091	$ 31,818

2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600
$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000
$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600	$ 18,600
$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000
$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000	$ 25,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200
												$500,000						
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$500,000	$ -	$ -	$ -	$ -	$ -	$ -
$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200	$603,200	$103,200	$103,200	$103,200	$103,200	$103,200	$103,200
$ 30,595	$ 29,418	$ 28,287	$ 27,199	$ 26,152	$ 25,147	$ 24,179	$ 23,249	$ 22,355	$ 21,495	$ 20,669	$ 19,874	$111,693	$ 18,374	$ 17,668	$ 16,988	$ 16,335	$ 15,706	$ 15,102

2065	2066	2067	2068
$ -	$ -	$ -	$ -
$ 18,600	$ 18,600	$ 18,600	$ 18,600
$ 1,000	$ 1,000	$ 1,000	$ 1,000
$ 3,000	$ 3,000	$ 3,000	$ 3,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000
$ 25,000	$ 25,000	$ 25,000	$ 25,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000
$ 18,600	$ 18,600	$ 18,600	$ 18,600
$ 1,000	$ 1,000	$ 1,000	$ 1,000
$ 3,000	$ 3,000	$ 3,000	$ 3,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000
$ 25,000	$ 25,000	$ 25,000	$ 25,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000
$103,200	$103,200	$103,200	$103,200
$ -	$ -	$ -	$ -
$103,200	$103,200	$103,200	$103,200
$ 14,522	$ 13,963	$ 13,426	$ 12,910

Wasaga Beach Water Storage Class EA
Alternative 3 – 4500 m^3 Elevated Tank West End and 4500 m^3 Expansion at Veterans Way
Present Value Cost Analysis

Discount Rate: **4.00 %**

Asset Description	**Annual Value** in Constant Year 2014 Dollars	**Total Value** in Constant Year 2014 Dollars	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**
1) Capital Cost															
West End															
Tank Construction		$ 6,000,000	$ 150,000	$1,000,000	$3,850,000	$1,000,000									
Land Cost		$ 125,000	$ 125,000												
Engineering		$ 300,000		$ 150,000	$ 150,000										
Veterans Way															
Tank Construction		$ 3,505,075.00													$150,000
Land Cost															
Engineering		$ 525,761													
Sub-total		**$ 10,455,836**	$ 275,000	$1,150,000	$4,000,000	$1,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$150,000
2) O&M Costs															
West End															
Hydro	$ 2,000	$ 100,000					$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
DG	$ -	$ -					$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
Site Maintenance	$ 3,000	$ 150,000					$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
Equipment Maintenance	$ 500	$ 25,000					$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
Labour (Inspections)	$ 5,000	$ 250,000					$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
Trucks	$ 500	$ 25,000					$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
Veterans Way															
Hydro	$ -	$ -													
DG	$ 1,000	$ 38,000													
Site Maintenance	$ 3,000	$ 114,000													
Equipment Maintenance	$ 2,000	$ 76,000													
Labour (Inspections)	$ 25,000	$ 950,000													
Trucks	$ 2,000	$ 76,000													
Sub-total	**$ 33,000**	**$ 1,804,000**					$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000
3) Major Maintenance															
Tank Painting or Pump Replacement	$ 500,000	$ 1,000,000													
Sub-total	**$ 500,000**	**$ 1,000,000**							$ -	$ -	$ -	$ -	$ -	$ -	$ -
Total Costs (Infrastructure and O&M Costs)		**$ 13,259,835**	$ 275,000	$1,150,000	$4,000,000	$1,000,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$11,000	$161,000

PV Costs (Infrastructure and O&M Costs)	**$ 9,170,138**	$ 275,000	$1,105,769	$3,698,225	$ 888,996	$ 9,403	$ 9,041	$ 8,693	$ 8,359	$ 8,038	$ 7,728	$ 7,431	$ 7,145	$100,560

2028	**2029**	**2030**	**2031**	**2032**	**2033**	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**
$1,000,000 $ 262,880	$1,355,075 $ 262,880	$1,000,000																	
$1,262,880	$1,617,955	$1,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500	$ 2,000 $ - $ 3,000 $ 500 $ 5,000 $ 500
			$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000
$ 11,000	$ 11,000	$ 11,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$ 44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000
										$500,000									
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$500,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$1,273,880	$1,628,955	$1,011,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$544,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000
$ 765,059	$ 940,681	$ 561,372	$23,492	$22,588	$21,720	$20,884	$20,081	$19,309	$18,566	$220,715	$17,165	$16,505	$15,870	$15,260	$14,673	$14,109	$13,566	$13,044	$12,543

2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000	$ 5,000
$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500	$ 500
$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000
$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$ 44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000
										$500,000									
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$500,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$544,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000	$44,000
$12,060	$11,596	$11,150	$10,721	$10,309	9,913	$ 9,531	$ 9,165	$ 8,812	$ 8,473	$100,732	$ 7,834	$ 7,533	$ 7,243	$ 6,964	$ 6,697	$ 6,439	$ 6,191	$ 5,953	$5,724

Wasaga Beach Water Storage Class EA
Alternative 4 – 4500 m^3 In-Ground Tank West End and 4500 m^3 Expansion at Veterans Way
Present Value Cost Analysis

Discount Rate: 4.00 %

Asset Description	**Annual Value** in Constant Year 2014 Dollars	**Total Value** in Constant Year 2014 Dollars	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**
1) Capital Cost														
West End														
Tank Construction		$4,550,527	$ 150,000	$1,000,000	$2,354,527	$1,000,000								
Land Cost		$ 250,000	$ 250,000											
Engineering		$ 682,579		$ 293,774	$ 293,774									
Veterans Way														
Tank Construction		$3,505,075.00												
Land Cost														
Engineering		$ 525,761												
Sub-total		**$ 9,513,942**	$ 400,000	$1,293,774	$2,648,301	$1,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
2) O&M Costs														
West End														
Hydro	$ 18,600	$ 930,000					$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600
DG	$ 1,000	$ 50,000					$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000
Site Maintenance	$ 3,000	$ 150,000					$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
Equipment Maintenance	$ 2,000	$ 100,000					$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
Labour (Inspections)	$ 25,000	$ 1,250,000					$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000
Trucks	$ 2,000	$ 100,000					$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
Veterans Way														
Hydro		$ -												
DG	$ 1,000	$ 38,000												
Site Maintenance	$ 3,000	$ 114,000												
Equipment Maintenance	$ 2,000	$ 76,000												
Labour (Inspections)	$ 25,000	$ 950,000												
Trucks	$ 2,000	$ 76,000												
Sub-total	**$ 33,000**	**$ 3,834,000**					$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600
3) Major Maintenance														
Tank Painting or Pump Replacement	$ 500,000	$ 500,000												
Sub-total	**$ 500,000**	**$ 500,000**							$ -	$ -	$ -	$ -	$ -	$ -

Total Costs (Infrastructure and O&M Costs)	**$ 13,706,909**	$ 400,000	$1,293,774	$2,648,301	$1,000,000	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600	$51,600
PV Costs (Infrastructure and O&M Costs)	**$ 8,756,159**	$ 400,000	$1,244,013	$2,448,503	$ 888,996	$44,108	$42,411	$40,780	$39,212	$37,704	$36,253	$34,859	$33,518

2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048
$1,000,000	$1,355,075	$1,000,000																		
$ 262,880	$ 262,880																			
$1,262,880	$1,617,955	$1,000,000	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$ 18,600	$ 18,600	$ 18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600	$18,600
$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000
$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$ 25,000	$ 25,000	$ 25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000
$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
			$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000	$ 1,000
			$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000	$ 3,000
			$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
			$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000	$25,000
			$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000	$ 2,000
$ 51,600	$ 51,600	$ 51,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$1,314,480	$1,669,555	$1,051,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600
$ 789,443	$ 964,126	$ 583,916	$45,169	$43,431	$41,761	$40,155	$38,610	$37,125	$35,697	$34,324	$33,004	$31,735	$30,514	$29,341	$28,212	$27,127	$26,084	$25,081	$24,116	$23,188

2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068
$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -	$ -
$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$18,600 $ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000
$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000	$ 1,000 $ 3,000 $ 2,000 $25,000 $ 2,000
$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$ 84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600
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$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$584,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600	$84,600
$21,439	$20,614	$19,822	$19,059	$18,326	$17,621	$16,944	$16,292	$108,249	$15,063	$14,483	$13,926	$13,391	$12,876	$12,380	$11,904	$11,446	$11,006	$10,583

Town of Wasaga Beach

West End Water Storage Facility and Maintenance Depot Class EA

Technical Memorandum No. 5A

Elevated Water Storage Alternatives

June 2016

Ainley GROUP
CONSULTING ENGINEERS & PLANNERS

West End Water Storage Facility and Maintenance Depot Class EA

Project No. 114137

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1.0 Introduction

The Town of Wasaga Beach initiated the West End Water Storage Facility and Maintenance Depot Class Environmental Assessment (EA) planning process (Schedule C) to consider storage options and sites for a new water reservoir that will support community growth in the west end of the Town. Based on analysis completed during Phase 2 of the Class EA the recommended solution for water storage consists of splitting the required 9,000 m^3 into two storage facilities; a 4,500 m^3 elevated tank in the west end and an addition of 4,500 m^3 to the Veterans Way (formerly Powerline Road) in-ground reservoir.

Different options are available for the elevated storage in the west end. An analysis of all the options will allow for an informed decision on which one will have the greatest benefits to the water distribution system in Wasaga Beach.

1.1 Objectives of Technical Memorandum No. 5A

The objectives of this Technical Memo are to:

- Identify elevated storage options and develop Alternative Solutions for the west end elevated storage tank.
- Evaluate and compare Alternative Elevated Storage Types
- Identify the preferred Alternative for Elevated Storage in the west end to allow for full build-out of the Town

2.0 Identification of Elevated Water Storage Types

Different types of elevated water storage have been developed and each has benefits with regards to different storage requirements. Common types of elevated water storage include spheroid, multi-column, composite and glass lined water storage.

Spheroid elevated storage consists of an elevated spherical water storage tank supported by a single circular support pedestal with a flared conical base (Figure 1). Spheroid elevated tanks are better suited for smaller volume requirements ranging between 750 to 2,000 m^3 but can be used for larger volumes as well. They have a relatively small base, therefore requiring less land than other elevated storage options. The small base also makes them preferential in specific soil and seismic conditions. The design also allows for a reduced surface area when compared to other elevated storage options of the same volume which reduces the overall surface maintenance that is required throughout its life span.

Figure 1 - Spheroid Elevated Tank located on the East End of Wasaga Beach

Multi-column elevated storage is a traditional design that has been used for over 100 years. It consists of an elevated water storage tank that is supported by a series of support columns and cross braces. This type of storage has no interior to the support braces allowing exterior access to the tower, which most new designs have eliminated. This design is still used as it provides an economical solution for small and medium capacity tanks (< 4,000 m^3). It provides a more efficient use of support material when compared to other elevated tower designs.

Figure 2 – Multi-Column Elevated Water Storage

Composite elevated water storage is a modern design, comprised of an elevated water storage tank supported by a large diameter steel-reinforced concrete support tower that extends vertically from a steel-reinforced concrete foundation. This style of elevated storage is the most common and typically the most economical for storage capacities greater than 4,000 m^3 because the design utilizes the valuable strength characteristics of each material. Maintenance costs are also reduced when compared to other traditional types of storage because only the tank portion of the tower requires coating. This style of tank has a life expectancy of 80 years.

Composite elevated tanks require repainting of both the inside and outside of the tank on a 20 year basis. At 20 years and 60 years no paint removal is necessary. The coating is placed on top of the existing coating of the tank. At 40 years a full removal and recoating of the tank is required. The costs of repainting are high however with new technologies and coating materials the cost of repainting has been reduced in recent years. Some cost reduction techniques include using newer coatings that are easier to remove and non-scafolding techniques during recoating.

This style of tank has been used in the construction of the Sunnidale Road elevated tank. The Town has had to remove and repaint the tank after 22 years.

Figure 3 – Composite Elevated Water Storage

The newest type of elevated storage that is being used for municipal potable water storage is a glass lined bolted tank. This type of tank is composed of a bolted steel tank with factory applied glass-fused-to-steel coating. This type of construction has the least maintenance because it never requires repainting and requires minimal upkeep over its service life (replacement of cathode protection bars). If the tank does become damaged individual panels can be replaced which additionally reduces maintenance costs. This type of tank has a reduced construction time because the tank is constructed of factory-coated panels that do not require on site welding. A top down construction approach of the tank allows for it to be constructed in remote and environmentally sensitive areas.

Glass lined elevated water tanks are a newer form of construction. There are currently no specific standards that have been developed for this style of elevated tank. A combination of standards is being used which may not properly represent the needs of the product. Since these tanks are a newer form of construction the life expectancy varies between different manufacturers and is not as well understood. In general research suggests that the bolted design reduces the life span of this type of elevated tank to approximately 40-60 years. At 40-60 years the glass lined panels can be replaced on the same pedestal which would result in a large cost to be incurred by the Town. This style of tank is also more susceptible to damage caused by seismic activity, wind and ice due to the bolted construction when compared to welded tanks. Glass lined bolted tanks are accessed from the outside which creates additional risks when compared to traditional composite tanks that are accessed through the interior of the pedestal. The structural design of a glass lined elevated tank does not allow for interior access.

For the West End Water Storage Class EA there are two different designs of glass lined tanks being considered.

The composite elevated glass lined tanks are similar to traditional composite elevated tanks with a steel-reinforced concrete support tower and foundation, however instead of a traditional steel water storage tank; a glass lined tank is used. Due to the materials used in this style of construction, glass lined elevated tank panels are less versatile than traditional welded panels, resulting in the need for a diameter larger pedestal.

Figure 4 – Composite Glass Lined Elevated Water Storage

The second type of glass lined storage being considered for the Wasaga Beach West End Storage Class EA is a partially elevated glass lined composite tank. This style of tank is similar to the traditional glass lined elevated tank however has a shorter pedestal and provides more emergency and fire storage versus equalization storage (Figure 5). The large fire/emergency volume can result in water quality issues as less water from the storage facility is used daily when compared with a traditional design. This is because only equalization storage can be used during normal system flow to maintain minimum system pressures. An adequate mixing system would be necessary to ensure higher water quality in the storage facility. If additional volume was needed for equalization storage of a partially elevated glass lined tank, pumps would be required to increase the water pressure above the minimum acceptable level. If pumps were installed at the storage facility, stand by power would also be required. The pedestal for this type of construction is the same diameter as the tank.

Figure 5 – Composite Glass Lined Partially Elevated Water Storage

Due to the size of the tank being constructed for the Wasaga Beach project the spheroid and multi-column tanks are not further considered for this project. Both of these types of elevated tanks are better suited to water storage less than 4,000 m^3 which does not satisfy the design parameters of this project. The composite elevated tank and both styles of glass lined tanks will be further examined as possible alternatives for the elevated tower to be constructed in the west end of Wasaga Beach.

3.0 Elevated Water Storage Alternatives

As a result of the project parameters and the above identification of elevated water storage types, the following alternatives will be considered:

- Alternative 1 - Composite elevated water storage
- Alternative 2 – Glass lined composite elevated water storage
- Alternative 3 – Glass lined composite partially elevated storage

Each of the alternatives offers unique design characteristics able to meet the necessary 4,500 m^3 of additional storage needed for the Wassaga Beach west end. Alternative 1 offers a more traditional design that has already been used in the construction of the Sunnidale Road elevated tank. Alternatives 2 and 3 provide a more innovative product but with varying designs that each have their benefits and disadvantages. An extensive analysis of each type of storage is shown below.

3.1 Design Parameters for Each Alternative

A hydraulic analysis was completed to develop the west end tank characteristics, including tank size, water elevations and tank elevation. The 2013 Wasaga Beach Water Distribution System Model Update was used to develop these characteristics based on projected full build out future system conditions. Additional preliminary design characteristics were provided by water tower design and construction companies (Landmark and Greatario).

The MOECC storage requirements were used to calculate the required future amount of storage needed, where the total storage equals the fire storage, emergency storage and equalization storage available in the system. The total volumes needed of each type of storage for full build out are as follows:

Fire storage = 8,164.8 m^3

Emergency storage = 4,928.2 m^3

Equalization storage = 11,548 m^3

The MOECC requirements indicate that the configuration of the water containing portion of the storage facility should be based on the water pressure that is necessary for equalization storage and emergency/fire storage. Equalization storage should be located between top water level of the storage facility and the elevation necessary to produce a minimum pressure of 275 kPa under peak hourly flow. Emergency and fire storage can be below 275 kPa however must be able to provide a minimum pressure of 140 kPa under maximum day plus fire flow conditions.

As identified in previous technical memorandums, the additional required storage needed for full build out is approximately 9,000 m^3, based on the above requirements. The water tower in the west end will have a capacity of 4,500 m^3 and the remaining 4,500 m^3 will be located at Veterans Way Reservoir. This information was used to calculate the storage design parameters of the composite elevated tower designs (Alternatives 1 and 2) and the partially elevated composite tank (Alternative 3). The design characteristics were calculated assuming that there is an equal amount of fire storage, equalization storage and emergency storage in each reservoir/ storage tank. Both the new elevated tower in the west end and expansion of Veterans Way reservoir were incorporated into the calculations.

To determine the design characteristics of the elevated composite water tower the design characteristics of the existing towers in Wasaga Beach were examined. The existing tanks have a high water level of 234.7 m and a low water level of 222.6 m. There is only one pressure zone in the Wasaga Beach water distribution system due to the relatively consistent ground elevations throughout the Town. With only one pressure zone the water levels in all the tanks need to match to allow for necessary pressures and evenly distributed fire/emergency storage and equalization storage.

Preliminary designs were provided by water tower manufacturers (Landmark and Greatario). The design characteristics provided by the water tower manufacturers are incorporated in the tank descriptions for each alternative found below.

3.1.1 Elevated Tank Characteristics (Alternatives 1 & 2)

3.1.1.1 Alternative 1 – Traditional Composite

The composite tank design has a tank diameter of 23.2 m and a pedestal diameter of 11.6 m. The division between equalization storage and fire and emergency storage is shown pictorially in Figure 6. The welded composite tank design has become the primary design for water towers over the last decade because each material used to construct it is used to its inherent advantages; steel in tension and concrete in compression. The design also offers an aesthetically pleasing design with an economical solution.

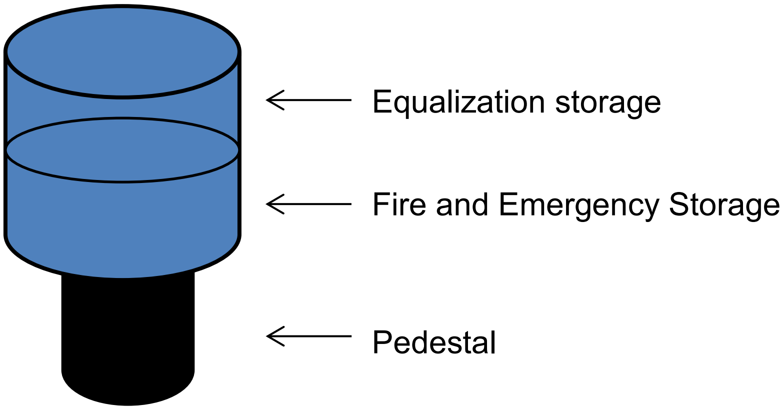

Figure 6 – Distribution of a Welded Composite Storage Tank in the West End

3.1.1.2 Alternative 2 – Glass Lined Composite

The glass lined bolted composite tank design has a tank diameter of 22.8 m and a pedestal diameter of 18.3 m. The division between equalization storage and fire and emergency storage is shown pictorially in Figure 7. The glass lined bolted panels are less versatile than the traditional welded panels causing the overall aesthetics of this style of tank to be compromised.

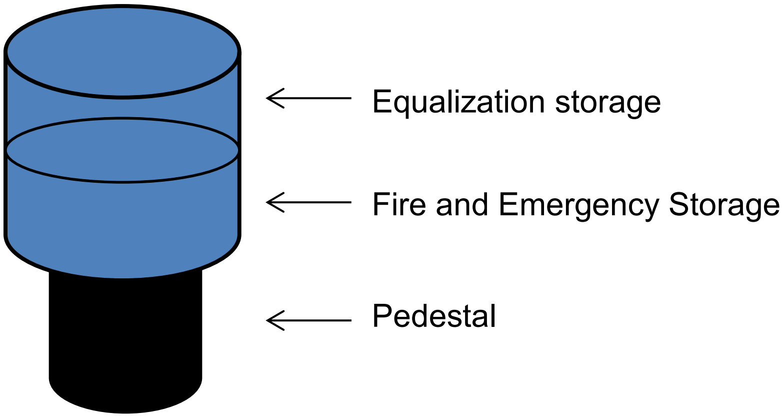

Figure 7 – Distribution of a Glass Lined Bolted Storage Tank in the West End

3.1.2 Partially Elevated Composite Tank Characteristics (Alternative 3)

A partially elevated design water storage facility in the west end would require different storage requirements when compared to an elevated tower. This type of design will result in there being a larger portion of the storage allocated for fire storage based on minimum pressures determined by the MOECC. The bottom tank elevation will be designed to allow for a minimum acceptable fire flow pressure of 140kPa to still be obtained. This style of tank would have a tank diameter of 15.25 m, and a pedestal with the same diameter. The division between equalization storage and fire and emergency storage is shown pictorially in Figure 8. Equalization storage provide with this alternative when combined with equalization storage already available in the system will provide the required 11,548 m^3 for full build-out.

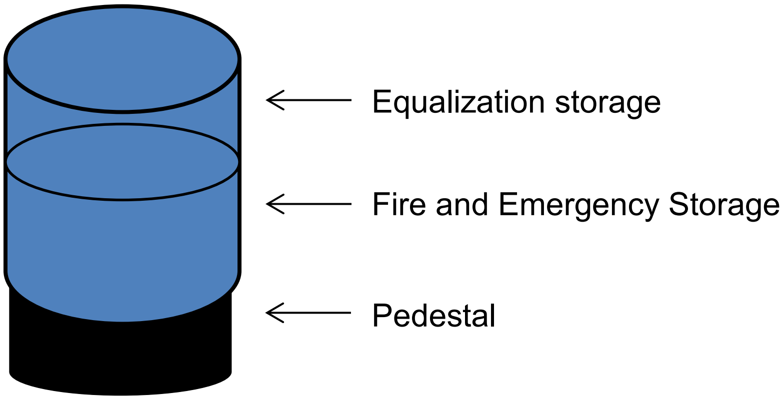

Figure 8 – Distribution of Glass Lined Bolted Partially Elevated Storage Tank in the West End

To provide additional innovation, this style of tank aesthetically has been designed to resemble a light house (Figure 9). This design would allow for this less versatile material to become an aesthetically pleasing addition to the waterfront community.

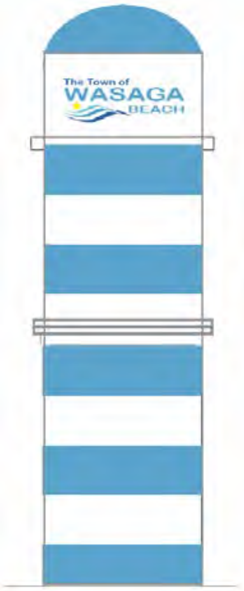

Figure 9 – Light House Design for Alternative 3

4.0 Evaluation of Elevated Storage Types

4.1 Cost Comparison

Capital costs and operation and maintenance costs were estimated over a 80 year life span of the three different elevated storage tank alternatives. An 80 year life span was used in the analysis as it represents the longest lifespan of the three alternatives. Estimates are based on quotes provided by industry manufacturers of composite welded and glass lined tanks. Additional operation and maintenance costs not included by the manufactures were calculated based on similar, recently completed projects. A summary of the analysis is provided in Table 1 below and a cost breakdown is provided in Appendix A.

Table 1 – Cost Comparison of 3 Different Elevated Storage Alternatives

	Alternative 1	**Alternative 2**	**Alternative 3**
Capital Cost *	$ 2,908,500	$ 2,992,500	$ 3,612,000
Operation and Maintenance Costs	$ 810,000	$ 848,000	$ 848,000
Major Maintenance Costs	$ 2,620,000	$ 1,680,500	$ 1,680,500
Total Cost	$ 6,338,500	$ 5,521,000	$ 6,140,500
Net Present Value	**$ 4,407,400**	**$ 3,944,800**	**$ 4,564,300**

*The capital cost includes just the cost of the water tower. Additional costs may result if additional features (not included in the price) are included with the water tower construction.

Costs were provided by Greatario Engineered Storage Systems and Landmark Structures. The quotes provided by each company are included in Appendix B.

The capital costs represent the upfront costs including tank construction and engineering costs. The annual operation and maintenance costs represent the yearly costs over the next 80 years including hydro, diesel generator operation, site maintenance, equipment maintenance, labour and trucks. Each of the elevated facilities will result in the same general maintenance costs as the designs of each tank result in the same upkeep requirements. Major maintenance cost represents maintenance that is not completed yearly and includes repainting every 20 years for the welded composite tank or replacement of the glass lined panels every 60 years for the glass lined tanks.

Alternative 1 results in the largest major maintenance costs as it requires recoating every 20 years which is an expensive procedure. The capital costs and operation and maintenance costs are similar to the other two tanks. The general operations and maintenance for all three styles of tank is similar resulting in comparable costs. For this exercise the painting costs were increased to include removal and recoating every 20 years to represent the actual timing Wasaga Beach has experienced with painting costs at Sunnidale Tank. This exceeds industry standard, therefore lower repainting costs may be experienced throughout the lifespan of Alternative 1.

Alternative 2 has the lowest estimated total cost due to the low capital cost and reduced major maintenance costs when compared to Alternative 1. The total difference in overall estimated maintenance and operating costs is approximately $900,000 (in favour of the glass lined tower alternatives) which is attributable primarily to the expensive painting costs that are associated with welded tanks.

Alternative 3 provides a unique design, resulting in an increased capital cost (as provided by Greatario Engineering Storage Systems). This increase capital cost causes the total cost to be the most expensive out of all three options. However all other costs associated with this alternative are low due to the reduced maintenance that is required with this style of tank.

The total estimated net present value cost is a sum of all of the cost associated with the project. The net present value cost is the total cost taking into account a discount rate of 4% with 2% inflation over the 80 year period analyzed.

4.2 Evaluation of Alternatives

To assess the 3 alternatives a criteria assessment table was developed rating each alternative as best, moderate or worst for the various criteria. Numbers associated with each rating are: worst = 1, moderate = 2 and best = 3. The total value was obtained by summing all of the criteria ratings shown in Table 2. The criteria incorporate the advantages and disadvantages of each type of elevated storage as well as the costs associated with each of the 3 alternatives.

Table 2 – Rating Criteria of 3 Elevated Storage Alternatives

	Alternative 1	Alternative 2	Alternative 3
Land Requirement	3	3	3
Construction Time	2	3	3
Maintenance	2	3	3
Aesthetics	3	1	2
Opportunity to Create Landmark	3	2	3
Security of Supply (Need for Standby Power)	3	3	1
Water Quality *	6	6	2
Access to Storage	2	1	1
Capital Cost *	6	6	4
Long Term Operation and Maintenance Cost	1	3	3
Normal Operation and Maintenance	2	2	2
Total	33	33	27

*A weighting of 2 has been applied because this criteria is of higher importance resulting in ratings of worst = 2, moderate = 4 and best = 6.

From the assessment completed Alternatives 1 and 2 are the highest ranked options with a score of 33. Alternative 3 also received a high rank of 27. This evaluation identifies that Alternatives 1 and 2 are the recommended alternatives for this project.

It must be stressed that the assessment is subjective. Should the Town determine that any additional criteria should be weighted, the result will change.

4.3 Evaluation Recommendation

Both the construction of a composite elevated water storage tank (Alterative 1) and glass lined composite elevated water storage tank (Alternative 2) are recommended solutions for the expansion of water storage in the west end of the Town of Wasaga Beach.

Alternative 1 provides an economical option with the lowest capital cost. This style of tank is a trusted design that provides the longest lifespan and is the most aesthetically pleasing.

Alternative 2 provides the most economical option with a low capital cost and the lowest major maintenance costs over 80 years. This style of tank does not require recoating throughout its lifespan which makes it a preferred asset when considering the Town's future.

5.0 Conclusion and Recommendation

Based on the water storage requirements for the Town of Wasaga Beach and the analysis completed during Stage 2 for the Town of Wasaga Beach Water Storage Class EA study a 4,500 m^3 elevated storage tank is to be constructed in the west end.

All types of elevated storage were considered and evaluated including spheroid, multi-column, composite and glass lined water storage. For this project composite and glass lined storage options were considered viable and considered when developing possible alternatives.

Three alternatives were identified and evaluated using rating criteria.

Alternative 1 – composite elevated water storage
Alternative 2 – glass lined composite elevated water storage
Alternative 3 – glass lined composite partially elevated water storage

The rating criteria identified that Alternatives 1 and 2 are preferred options and should both be identified as recommended solutions at the second public information centre.

Appendix A

“Present Value Cost Analysis”

Alternative 1 - CET x 4500m3

	Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Yr 1 Cost	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
1. Engineering and Design		Construct	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Repair-Minor	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Repair-Minor	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Repair-Minor
1.1 Recondition - design and specification - Landmark	$20,000																
2. Condition Assessment - Structural																	
2.1 Steel Inspection - corrosion	$1,500																
2.2 Steel Inspection - welding	$3,000																
2.3 Structural Adequacy Review	$5,000																
3. Condition Assessment - Coatings																	
3.1 Coating System (Visual) - Exterior	$500		1	1	1	1		1	1	1	1		1	1	1	1	
3.2 Coating System (Visual) - Interior	$500		1	1		1		1	1		1		1	1		1	
3.3 Coating System (Visual) - Interior (ROV)	$3,000				1					1					1		
3.4 Coating System (Test / Report) - Exterior	$250						1					1					1
3.5 Coating System (Test / Report) - Interior	$250						1					1					1
5. Quality Assurance / Quality Control																	
5.1 QA/QC - Coatings - Full Remove and Replace	$12,500																
5.2 QA/QC - Coatings - Overcoat	$5,000																
5.3 QA/QC - Coatings - Repair	$3,000						1					1					1
5.4 QA/QC - Welding Repair	$1,500																
6. Reports																	
6.1 Inspection Report - Maintenance	$1,000						1					1					1
6.2 Inspection Report - Rehabilitation	$2,500																
7. Cleaning and Disinfection																	
7.1 Interior - Drain and Washout	$4,000						1					1					1
7.2 Interior - Disinfection by Spray Method 2	$2,000						1					1					1
8. Coatings: Interior ICS-5 - zinc/epoxy/epoxy																	
8.1 Full Remove (Epoxy or equal) & Replace - SP10 / 3 coat system	$295,800																
8.2 Overcoat - SP7 / 1 coat epoxy	$153,000																
8.3 Repair - spot SP11 / 3 coat system	$5,100						1					1					1
9. Coatings: Exterior OCS-4 - zinc/polyurethane/fluorourethane																	
9.1 Full Remove (Non-Hazardous) & Replace - SP10 / 3 coat system	$255,750																
9.2 Overcoat - PW / Spot Repair / Int. Epoxy / Top Coat Urethane (OCS	$140,250																
9.3 Repair - spot SP11 / 3 coat system	$4,125						1					1					1
10. Coatings: Environmental Controls																	
10.2 Containment	$50,000																
11. Cathodic Protection																	
11.1 CP - Install	$4,500																
11.2 CP - Maintain	$1,000						1					1					1
12. Asset Acquisition / Replacement / Demolition																	
12.1 Asset Acquisition / Construction Costs	$2,770,000	1															
12.2 Engineering Costs	$138,500	1															
15. On Going Maintenance																	
Hydro	$2,000		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Site Maintenance	$3,000		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Equipment Maintenance	$500		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Trucks	$500		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Year Indicator:	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Current Year Cost of Services:	**$2,908,500**	**$7,000**	**$7,000**	**$9,500**	**$7,000**	**$26,725**	**$7,000**	**$7,000**	**$9,500**	**$7,000**	**$26,725**	**$7,000**	**$7,000**	**$9,500**	**$7,000**	**$26,725**
	Inflation Adjusted:	**$2,908,500**	**$7,140**	**$7,283**	**$10,081**	**$7,577**	**$29,507**	**$7,883**	**$8,041**	**$11,131**	**$8,366**	**$32,578**	**$8,704**	**$8,878**	**$12,289**	**$9,236**	**$35,968**
	NPV:	**$2,908,500**	**$6,865**	**$6,733**	**$8,962**	**$6,477**	**$24,252**	**$6,230**	**$6,110**	**$8,133**	**$5,878**	**$22,008**	**$5,654**	**$5,545**	**$7,381**	**$5,334**	**$19,972**

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
2033	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**	**2051**	**2052**	**2053**	**2054**	**2055**
Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Repair-Replace	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Repair-Minor	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Repair-Minor	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Repair-Minor	Inspect-Basic	Inspect-Basic	Inspect-ROV
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$7,000	**$7,000**	**$9,500**	**$7,000**	**$655,550**	**$7,000**	**$7,000**	**$9,500**	**$7,000**	**$26,725**	**$7,000**	**$7,000**	**$9,500**	**$7,000**	**$26,725**	**$7,000**	**$7,000**	**$9,500**	**$7,000**	**$26,725**	**$7,000**	**$7,000**	**$9,500**
$9,609	**$9,802**	**$13,568**	**$10,198**	**$974,113**	**$10,610**	**$10,822**	**$14,981**	**$11,259**	**$43,845**	**$11,714**	**$11,948**	**$16,540**	**$12,431**	**$48,409**	**$12,933**	**$13,192**	**$18,261**	**$13,725**	**$53,447**	**$14,279**	**$14,565**	**$20,162**
$5,131	**$5,032**	**$6,698**	**$4,840**	**$444,572**	**$4,656**	**$4,566**	**$6,078**	**$4,392**	**$16,447**	**$4,225**	**$4,144**	**$5,516**	**$3,986**	**$14,925**	**$3,834**	**$3,760**	**$5,005**	**$3,617**	**$13,544**	**$3,479**	**$3,412**	**$4,542**

39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61
2056	**2057**	**2058**	**2059**	**2060**	**2061**	**2062**	**2063**	**2064**	**2065**	**2066**	**2067**	**2068**	**2069**	**2070**	**2071**	**2072**	**2073**	**2074**	**2075**	**2076**	**2077**	**2078**
Inspect-Basic	Repair-Replace	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Repair-Minor	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Repair-Minor	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Repair-Minor	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Repair-Replace	Inspect-Basic
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1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
$7,000	$655,550	$7,000	$7,000	$9,500	$7,000	$26,725	$7,000	$7,000	$9,500	$7,000	$26,725	$7,000	$7,000	$9,500	$7,000	$26,725	$7,000	$7,000	$9,500	$7,000	$655,550	$7,000
$15,153	$1,447,480	$15,765	$16,081	$22,260	$16,730	$65,152	$17,406	$17,754	$24,577	$18,472	$71,933	$19,218	$19,602	$27,135	$20,394	$79,420	$21,218	$21,643	$29,959	$22,517	$2,150,880	$23,427
$3,282	$301,494	$3,157	$3,097	$4,122	$2,979	$11,154	$2,865	$2,810	$3,741	$2,703	$10,122	$2,600	$2,550	$3,394	$2,453	$9,185	$2,360	$2,314	$3,080	$2,226	$204,463	$2,141

62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	
2079	**2080**	**2081**	**2082**	**2083**	**2084**	**2085**	**2086**	**2087**	**2088**	**2089**	**2090**	**2091**	**2092**	**2093**	**2094**	**2095**	**2096**	**2097**	
Inspect-Basic	Inspect-ROV	Inspect-Basic	Repair-Minor	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Repair-Minor	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Repair-Minor	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Repair-Replace	
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1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
$7,000	$9,500	$7,000	$26,725	$7,000	$7,000	$9,500	$7,000	$26,725	$7,000	$7,000	$9,500	$7,000	$26,725	$7,000	$7,000	$9,500	$7,000	$655,550	$6,339,400
$23,895	$33,078	$24,860	$96,812	$25,865	$26,382	$36,520	$27,448	$106,888	$28,557	$29,128	$40,321	$30,305	$118,013	$31,529	$32,160	$44,518	$33,459	$3,196,094	$12,653,582
$2,100	$2,795	$2,020	$7,564	$1,943	$1,906	$2,537	$1,833	$6,864	$1,763	$1,729	$2,302	$1,664	$6,229	$1,600	$1,569	$2,089	$1,510	$138,660	$4,407,412

Alternative 2 - GFS-BET x 4500m3

	Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Yr 1 Cost	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**
		Construct	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_5/10	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Drain/Wash	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_5/10
1. Engineering and Design																	
1.1. Replacement - design and specification - 3rd party	$50,000																
2. Condition Assessment - Structural																	
2.1 Steel Inspection - corrosion (major)	$7,500																
2.2 Steel Inspection - corrosion (minor)	$2,500						1										1
2.3 Structural Adequacy Review	$10,000																
3. Condition Assessment - Coatings																	
3.1 Coating / Caulking System (Visual) - Exterior	$500		1	1	1	1		1	1	1	1		1	1	1	1	
3.2 Coating / Caulking System (Visual) - Interior	$500		1	1		1		1	1		1		1	1		1	
3.3 Coating / Caulking System (Visual) - Interior (ROV)	$3,000				1					1					1		
5. Quality Assurance / Quality Control																	
5.1 QA/QC -Tank - Full Remove and Replace	$25,000																
5.3 QA/QC - Caulking Ext. Repair	$3,000						1										1
5.4 QA/QC - Caulking Int. Repair	$1,500																
6. Reports																	
6.1 Inspection Report - Maintenance - Ext. Caulking Touch-up	$1,000						1										1
6.2 Inspection Report - Maintenance - Int. Caulking Touch-up	$2,500																
7. Cleaning and Disinfection																	
7.1 Interior - Drain and Washout	$4,000						1					1					1
7.2 Interior - Disinfection by Spray Method 2	$2,000						1					1					1
11. Cathodic Protection																	
11.1 CP - Install	$4,500																
11.2 CP - Maintain	$1,000						1					1					1
12. Asset Acquisition / Replacement / Demolition																	
12.1 Asset Acquisition / Construction Costs	$2,850,000	1															
12.2 Engineering Costs	$142,500	1															
12.2 Asset Demolition Costs	$100,000																
12.3 Asset Replacement (including starter plate)	$1,495,000																
13. GF-BT Services																	
13.1 Recaulking Ext. touch-up - every 5 to 10 years	$5,000						1										1
13.2 Recaulking Int. touch-up - every 25 years	$40,000																
15. On Going Maintenance																	
Hydro	$2,000		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Site Maintenance	$3,000		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Equipment Maintenance	$500		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Trucks	$500		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Year Indicator:	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Current Year Cost of Services:	**$2,992,500**	**$7,000**	**$7,000**	**$9,500**	**$7,000**	**$24,500**	**$7,000**	**$7,000**	**$9,500**	**$7,000**	**$13,000**	**$7,000**	**$7,000**	**$9,500**	**$7,000**	**$24,500**
	Inflation Adjusted:	**$2,992,500**	**$7,140**	**$7,283**	**$10,081**	**$7,577**	**$27,050**	**$7,883**	**$8,041**	**$11,131**	**$8,366**	**$15,847**	**$8,704**	**$8,878**	**$12,289**	**$9,236**	**$32,974**
	NPV:	**$2,992,500**	**$6,865**	**$6,733**	**$8,962**	**$6,477**	**$22,233**	**$6,230**	**$6,110**	**$8,133**	**$5,878**	**$10,706**	**$5,654**	**$5,545**	**$7,381**	**$5,334**	**$18,309**

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
2033	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**	**2051**	**2052**	**2053**	**2054**	**2055**
Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Drain/Wash	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_5/10	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_HalfLife	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_5/10	Inspect-Basic	Inspect-Basic	Inspect-ROV
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1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
$7,000	$7,000	$9,500	$7,000	$13,000	$7,000	$7,000	$9,500	$7,000	$24,500	$7,000	$7,000	$9,500	$7,000	$68,500	$7,000	$7,000	$9,500	$7,000	$24,500	$7,000	$7,000	$9,500
$9,609	$9,802	$13,568	$10,198	$19,317	$10,610	$10,822	$14,981	$11,259	$40,195	$11,714	$11,948	$16,540	$12,431	$124,078	$12,933	$13,192	$18,261	$13,725	$48,997	$14,279	$14,565	$20,162
$5,131	$5,032	$6,698	$4,840	$8,816	$4,656	$4,566	$6,078	$4,392	$15,078	$4,225	$4,144	$5,516	$3,986	$38,256	$3,834	$3,760	$5,005	$3,617	$12,417	$3,479	$3,412	$4,542

39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61
2056	**2057**	**2058**	**2059**	**2060**	**2061**	**2062**	**2063**	**2064**	**2065**	**2066**	**2067**	**2068**	**2069**	**2070**	**2071**	**2072**	**2073**	**2074**	**2075**	**2076**	**2077**	**2078**
Inspect-Basic	Drain/Wash	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_5/10	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Inspect Steel	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_5/10	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Demo/Replace	Inspect-Basic
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1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
$7,000	**$13,000**	**$7,000**	**$7,000**	**$9,500**	**$7,000**	**$24,500**	**$7,000**	**$7,000**	**$9,500**	**$7,000**	**$30,500**	**$7,000**	**$7,000**	**$9,500**	**$7,000**	**$24,500**	**$7,000**	**$7,000**	**$9,500**	**$7,000**	**$1,680,500**	**$7,000**
$15,153	**$28,705**	**$15,765**	**$16,081**	**$22,260**	**$16,730**	**$59,727**	**$17,406**	**$17,754**	**$24,577**	**$18,472**	**$82,093**	**$19,218**	**$19,602**	**$27,135**	**$20,394**	**$72,807**	**$21,218**	**$21,643**	**$29,959**	**$22,517**	**$5,513,772**	**$23,427**
$3,282	**$5,979**	**$3,157**	**$3,097**	**$4,122**	**$2,979**	**$10,225**	**$2,865**	**$2,810**	**$3,741**	**$2,703**	**$11,552**	**$2,600**	**$2,550**	**$3,394**	**$2,453**	**$8,421**	**$2,360**	**$2,314**	**$3,080**	**$2,226**	**$524,141**	**$2,141**

62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	
2079	**2080**	**2081**	**2082**	**2083**	**2084**	**2085**	**2086**	**2087**	**2088**	**2089**	**2090**	**2091**	**2092**	**2093**	**2094**	**2095**	**2096**	**2097**	
Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_5/10	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Drain/Wash	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_5/10	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Drain/Wash	
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1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
$7,000	$9,500	$7,000	$24,500	$7,000	$7,000	$9,500	$7,000	$13,000	$7,000	$7,000	$9,500	$7,000	$24,500	$7,000	$7,000	$9,500	$7,000	$13,000	$5,521,000
$23,895	$33,078	$24,860	$88,752	$25,865	$26,382	$36,520	$27,448	$51,994	$28,557	$29,128	$40,321	$30,305	$108,188	$31,529	$32,160	$44,518	$33,459	$63,381	$10,564,922
$2,100	$2,795	$2,020	$6,934	$1,943	$1,906	$2,537	$1,833	$3,339	$1,763	$1,729	$2,302	$1,664	$5,711	$1,600	$1,569	$2,089	$1,510	$2,750	$3,944,820

Alternative 3 - Partially Elevated GFS-BET x 4500m3

	Year	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
	Yr 1 Cost	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032
		Construct	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_5/10	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Drain/Wash	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_5/10
1. Engineering and Design																	
1.1. Replacement - design and specification - 3rd party	$50,000																
2. Condition Assessment - Structural																	
2.1 Steel Inspection - corrosion (major)	$7,500																
2.2 Steel Inspection - corrosion (minor)	$2,500						1										1
2.3 Structural Adequacy Review	$10,000																
3. Condition Assessment - Coatings																	
3.1 Coating / Caulking System (Visual) - Exterior	$500		1	1	1	1		1	1	1	1		1	1	1	1	
3.2 Coating / Caulking System (Visual) - Interior	$500		1	1		1		1	1		1		1	1		1	
3.3 Coating / Caulking System (Visual) - Interior (ROV)	$3,000				1					1					1		
5. Quality Assurance / Quality Control																	
5.1 QA/QC -Tank - Full Remove and Replace	$25,000																
5.3 QA/QC - Caulking Ext. Repair	$3,000						1										1
5.4 QA/QC - Caulking Int. Repair	$1,500																
6. Reports																	
6.1 Inspection Report - Maintenance - Ext. Caulking Touch-up	$1,000						1										1
6.2 Inspection Report - Maintenance - Int. Caulking Touch-up	$2,500																
7. Cleaning and Disinfection																	
7.1 Interior - Drain and Washout	$4,000						1					1					1
7.2 Interior - Disinfection by Spray Method 2	$2,000						1					1					1
11. Cathodic Protection																	
11.1 CP - Install	$4,500																
11.2 CP - Maintain	$1,000						1					1					1
12. Asset Acquisition / Replacement / Demolition																	
12.1 Asset Acquisition / Construction Costs	$3,440,000	1															
12.2 Engineering Costs	$172,000	1															
12.3 Asset Demolition Costs	$100,000																
12.4 Asset Replacement (including starter plate)	$1,495,000																
13. GF-BT Services																	
13.1 Recaulking Ext. touch-up - every 5 to 10 years	$5,000						1										1
13.2 Recaulking Int. touch-up - every 25 years	$40,000																
15. On Going Maintenance																	
Hydro	$2,000		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Site Maintenance	$3,000		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Equipment Maintenance	$500		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Trucks	$500		1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Year Indicator:	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
	Current Year Cost of Services:	$3,612,000	$7,000	$7,000	$9,500	$7,000	$24,500	$7,000	$7,000	$9,500	$7,000	$13,000	$7,000	$7,000	$9,500	$7,000	$24,500
	Inflation Adjusted:	$3,612,000	$7,140	$7,283	$10,081	$7,577	$27,050	$7,883	$8,041	$11,131	$8,366	$15,847	$8,704	$8,878	$12,289	$9,236	$32,974
	NPV:	$3,612,000	$6,865	$6,733	$8,962	$6,477	$22,233	$6,230	$6,110	$8,133	$5,878	$10,706	$5,654	$5,545	$7,381	$5,334	$18,309

16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
2033	**2034**	**2035**	**2036**	**2037**	**2038**	**2039**	**2040**	**2041**	**2042**	**2043**	**2044**	**2045**	**2046**	**2047**	**2048**	**2049**	**2050**	**2051**	**2052**	**2053**	**2054**	**2055**
Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Drain/Wash	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_5/10	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_HalfLife	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_5/10	Inspect-Basic	Inspect-Basic	Inspect-ROV
									1					1					1			
1	1	1	1		1	1	1	1		1	1	1	1		1	1	1	1		1	1	1
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$7,000	$7,000	$9,500	$7,000	$13,000	$7,000	$7,000	$9,500	$7,000	$24,500	$7,000	$7,000	$9,500	$7,000	$68,500	$7,000	$7,000	$9,500	$7,000	$24,500	$7,000	$7,000	$9,500
$9,609	$9,802	$13,568	$10,198	$19,317	$10,610	$10,822	$14,981	$11,259	$40,195	$11,714	$11,948	$16,540	$12,431	$124,078	$12,933	$13,192	$18,261	$13,725	$48,997	$14,279	$14,565	$20,162
$5,131	$5,032	$6,698	$4,840	$8,816	$4,656	$4,566	$6,078	$4,392	$15,078	$4,225	$4,144	$5,516	$3,986	$38,256	$3,834	$3,760	$5,005	$3,617	$12,417	$3,479	$3,412	$4,542

39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61
2056	**2057**	**2058**	**2059**	**2060**	**2061**	**2062**	**2063**	**2064**	**2065**	**2066**	**2067**	**2068**	**2069**	**2070**	**2071**	**2072**	**2073**	**2074**	**2075**	**2076**	**2077**	**2078**
Inspect-Basic	Drain/Wash	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_5/10	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Inspect Steel	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_5/10	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Demo/Replace	Inspect-Basic
																					1	
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$7,000	$13,000	$7,000	$7,000	$9,500	$7,000	$24,500	$7,000	$7,000	$9,500	$7,000	$30,500	$7,000	$7,000	$9,500	$7,000	$24,500	$7,000	$7,000	$9,500	$7,000	$1,680,500	$7,000
$15,153	$28,705	$15,765	$16,081	$22,260	$16,730	$59,727	$17,406	$17,754	$24,577	$18,472	$82,093	$19,218	$19,602	$27,135	$20,394	$72,807	$21,218	$21,643	$29,959	$22,517	$5,513,772	$23,427
$3,282	$5,979	$3,157	$3,097	$4,122	$2,979	$10,225	$2,865	$2,810	$3,741	$2,703	$11,552	$2,600	$2,550	$3,394	$2,453	$8,421	$2,360	$2,314	$3,080	$2,226	$524,141	$2,141

62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	
2079	**2080**	**2081**	**2082**	**2083**	**2084**	**2085**	**2086**	**2087**	**2088**	**2089**	**2090**	**2091**	**2092**	**2093**	**2094**	**2095**	**2096**	**2097**	
Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_5/10	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Drain/Wash	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Caulk_5/10	Inspect-Basic	Inspect-Basic	Inspect-ROV	Inspect-Basic	Drain/Wash	
			1										1						
1	1	1		1	1	1	1		1	1	1	1		1	1	1	1		
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1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
$7,000	$9,500	$7,000	$24,500	$7,000	$7,000	$9,500	$7,000	$13,000	$7,000	$7,000	$9,500	$7,000	$24,500	$7,000	$7,000	$9,500	$7,000	$13,000	$6,140,500
$23,895	$33,078	$24,860	$88,752	$25,865	$26,382	$36,520	$27,448	$51,994	$28,557	$29,128	$40,321	$30,305	$108,188	$31,529	$32,160	$44,518	$33,459	$63,381	$11,184,422
$2,100	$2,795	$2,020	$6,934	$1,943	$1,906	$2,537	$1,833	$3,339	$1,763	$1,729	$2,302	$1,664	$5,711	$1,600	$1,569	$2,089	$1,510	$2,750	$4,564,320

Appendix B

“Preliminary Quotes”

Budget Pricing

LANDMARK
Elevating Expectations

Project:

Town of Wasaga Beach, ON
Composite Elevated Tank (CET)

Budget Notes:
1. Budget refinements are required as additional project information and details become available.
2. Note the list of options and exclusions. Budget should be adjusted accordingly.
3. HST is not included

General Notes:
1. CET complies with AWWA D107 - Composite Elevated Tanks for Water Storage

Composite Elevated Tank

$ 2,770,000

Inclusions:

The following have been included in the above budget:

CET Configuration and Elevations			
Storage - Total Volume - normal operation (HWL - BCL)	4,500.00	m^3	included
Elevation - Grade	183.60	m	included
Elevation - Bottom Capacity Level (BCL)	222.60	m	included
Elevation - High Water Level - normal operation (HWL)	234.70	m	included
Elevation - Top Capacity Level / Overflow (TCL)	234.85	m	included
Operating Range (HWL - BCL)	12.10	m	included
Height to Top of Concrete Support	37.80	m	included
Height to TCL	51.25	m	included
Foundation (AWWA D107)			
Shallow raft or ring (300 MPa allowable soil bearing)	2.50	m (depth)	included
Support Structure (AWWA D107)			
Support Wall (reinforced concrete)	11.60	m (dia)	included
Architectural wall with exterior rustication pattern			included
Steel Tank			
AWWA D107 standard	23.16	m (dia)	included

Steel Tank Coatings (AWWA D102)

Interior - zinc-rich urethane + single coat 100% solids epoxy	included
Exterior - zinc-rich urethane + aliphatic urethane + fluorourethane	included
Disinfection	included

Piping and Mechanical

Inlet / Outlet (single) - Type 304 SS	400	mm	included
Inlet / Outlet isolation valve	400	mm	included
Inlet / Outlet control valve and bypass	300	mm	included
Inlet / Outlet - Heat Trace and Insulation	400	mm	included
Overflow with Flap Valve - Type 304L	250	mm	included
Tank Drain - inlet / outlet to overflow crossover	100	mm	included

Accessories

Standard accessories (per AWWA D107 Section 8)	included
Ladders - straight run with rest seats at 9 m	included
Ladders - climbing safety system with 3 pc. harness / lanyard	included
Landings - Interior and Exterior at top of concrete support wall	included
Support Wall - Access - double mandoor at grade	included
Support Wall - Vent at top of concrete support	included
Steel Tank - Cathodic Protection	included
Steel Tank - Vent	included
Steel Tank - Floor Manhole	included
Steel Tank - Roof Hatch (2 pc.)	included
Slab on grade within support wall	included

Electrical and Lighting

No allowance	$	-	included

Site Work

No allowance	$	-	included

Testing and Inspection - 3rd party

No allowance	$	-	included

Administrative

Bonds - Performance and Payment	included
Insurance - General / Professional Liability	included
Commissioning	included

Exclusions and Options:

The following have not been included in the above budget:

Probable requirements or recommended options for this project - are shown highlighted
Possible requirements for this project - are shown not highlighted
Scope that is probably not required for this project - are shown grayed

Budget cost range (typical) for the following items.	Low	High	
Foundation			
Shallow foundation - additional cost due to lower allowable bearing	$ 5,000	$ 60,000	not included
Deep foundations	$ 50,000	$ 175,000	not included
Support Structure			
Special Configuration / Design / Exterior Aesthetic Treatment	$ 10,000	$ 40,000	not included
Steel Tank			
Special Configuration / Design / Shape	$ 25,000	$ 100,000	not included
Corrosion Allowance (not recommended)	$ 10,000	$ 25,000	not included
Steel Tank Coatings			
Logo and special colors	$ 10,000	$ 50,000	not included
Interior - 100% solids aromatic urethane (not recommended)	$ 20,000	$ 25,000	not included
Exterior - zinc-rich urethane + epoxy + aliphatic urethane	$ (15,000)	$ (20,000)	not included
Environmental controls during coatings operations	$ 10,000	$ 75,000	not included
Piping and Mechanical			
Separate inlet and outlet plus associated pipe and valves	$ 20,000	$ 30,000	not included
Large diameter inlet, outlet, overflow or valve chamber	$ 5,000	$ 25,000	not included
High pressure pipe rating (exceed AWWA D107 requirement)	$ 5,000	$ 15,000	not included
Specialty pipe materials - Type 316 SS	$ 5,000	$ 15,000	not included
Specialty pipe coatings (fusion bonded epoxy)	$ 5,000	$ 20,000	not included
Accessories			
Tank Mixing System (enhance water quality and freeze protection)	$ 25,000	$ 75,000	not included
Vehicle Door in support wall at grade	$ 10,000	$ 20,000	not included
Landings - intermediate (in place of rest seats)	$ 5,000	$ 10,000	not included
Rescue equipment	$ 10,000	$ 20,000	not included
Specialty ladder and landing materials (stainless)	$ 10,000	$ 15,000	not included
Disinfection System (localized injection to manage water quality)	$ 25,000	$ 50,000	not included

Budget Pricing

Electrical and Lighting

Electrical service (typically Owner provided)	$	5,000	$	50,000	not included
Electrical and Lighting	$	25,000	$	125,000	not included
Obstruction lighting	$	10,000	$	20,000	not included
Site lighting	$	10,000	$	25,000	not included
Logo lighting	$	20,000	$	40,000	not included
Controls and Instrumentation	$	15,000	$	75,000	not included
Security and Surveillance	$	15,000	$	75,000	not included

Communications

Antenna provisions - roof mounted cellular / microwave	$	15,000	$	50,000	not included
Antenna provisions - pedestal mounted cellular	$	10,000	$	20,000	not included

Interior Finishes

Masonry room within pedestal - heated and insulated	$	25,000	$	50,000	not included
Structural intermediate floor, with stair access and lighting	$	40,000	$	60,000	not included
Coatings - floor, walls, masonry	$	2,500	$	15,000	not included

Site Work

Watermain, valves and valve chambers	$	20,000	$	75,000	not included
Overflow catch basin and associated yard piping	$	5,000	$	30,000	not included
Storm water piping and drainage structures	$	20,000	$	50,000	not included
Site grading, retainage ponds, etc.	$	10,000	$	100,000	not included
Sanitary piping	$	10,000	$	20,000	not included
Access road and parking - aggregate	$	20,000	$	50,000	not included
Access road and parking - concrete or asphalt	$	40,000	$	100,000	not included
Landscaping	$	10,000	$	50,000	not included
Fencing - chain link	$	15,000	$	40,000	not included
Fencing - ornamental	$	30,000	$	100,000	not included
Clearing	$	5,000	$	25,000	not included
Demolition	$	10,000	$	50,000	not included

Testing and Inspection - 3rd party

Soils / Foundation	$	10,000	$	20,000	not included
Concrete	$	7,500	$	10,000	not included
Welding	$	5,000	$	7,500	not included
Coatings	$	3,000	$	10,000	not included

Administrative

Permits and related fees	$	-	$	-	not included
Extended Warranty	$	-	$	-	not included
Prevailing wage rates		n/a		n/a	not included
Local labor agreements		n/a		n/a	not included

<u>Other</u>			
Schedule compression	$ -	$ -	not included
Site constraints and noise restrictions	$ -	$ -	not included
Contingencies	$ -	$ -	not included

Budget Pricing

LANDMARK
Elevating Expectations

Project:

Town of Wasaga Beach, ON

Glass-Fused-to-Steel Bolted Elevated Water Storage Tank (GFS-BET)

Budget Notes:

1. Budget refinements are required as additional project information and details become available.
2. Note the list of options and exclusions. Budget should be adjusted accordingly.
3. HST is <u>not</u> included

General Notes:

1. A nationally recognized consensus standard does not exist for the GFS-BET.
2. GFS-BET complies with applicable sections of AWWA D103, AWWA D107 and AWWA D108

Glass-Fused-to-Steel Bolted Elevated Water Storage Tank

$ 3,610,000

Inclusions:

The following have been included in the above budget:

<u>GFS-BET Configuration and Elevations</u>

Storage - Total Volume - normal operation (HWL - BCL)	4,500.00	m^3	included
Elevation - Site	183.60	m	included
Elevation - Bottom Capacity Level (BCL)	223.07	m	included
Elevation - High Water Level - normal operation (HWL)	234.70	m	included
Elevation - Top Capacity Level / Overflow (TCL)	234.85	m	included
Operating Range (HWL - BCL)	11.63	m	included
Height to Top of Concrete Support	39.27	m	included
Height to TCL	51.25	m	included

<u>Foundation (AWWA D107)</u>

Shallow raft or ring (300 MPa allowable soil bearing)	2.50	m (depth)	included

<u>Support Structure (AWWA D107)</u>

Support Wall (reinforced concrete)	18.30	m (dia)	included
Tank Structural Floor Support (reinforced concrete)	22.80	m (dia)	included
Architectural wall with exterior rustication pattern			included

Budget Pricing

LANDMARK
Elevating Expectations

Tank (AWWA D103 and AWWA D108)

Tank Shell - Bolted Steel	22.20	m (dia)	included
Tank Floor - Bolted Steel			included
Tank Roof - Aluminum Geodesic Dome			included

Tank Coatings (AWWA D103)

Glass-Fused-to-Steel			included
Interior / Exterior colour per manufacturer's standards			included

Piping and Mechanical

Inlet / Outlet (single) - Type 304 SS	400	mm	included
Inlet / Outlet isolation valve	400	mm	included
Inlet / Outlet control valve and bypass	300	mm	included
Inlet / Outlet - Heat Trace and Insulation	400	mm	included
Overflow with Flap Valve - Type 304L	250	mm	included
Tank Drain - inlet / outlet to overflow crossover	100	mm	included

Accessories

Standard accessories (per AWWA D107 Section 8 and AWWA D103 Section 7)	included
Ladders - straight run with rest seats at 9 m	included
Ladders - climbing safety system with 3 pc. harness / lanyard	included
Landings - Interior and Exterior at top of concrete support wall	included
Landings - Exterior at bottom of tank (circular)	included
Support Wall - Access - double mandoor at grade	included
Support Wall - Access - single mandoor at top for upper landings	included
Support Wall - Vent at top of concrete support	included
Steel Tank - Cathodic Protection	included
Steel Tank - Vent	included
Steel Tank - Shell Manhole	included
Steel Tank - Roof Hatch	included
Slab on grade within support wall	included

Electrical and Lighting

No allowance	$	-	included

Site Work

No allowance	$	-	included

Testing and Inspection - 3rd party

No allowance	$	-	included

Administrative

Bonds - Performance and Payment	included
Insurance - General / Professional Liability	included

Exclusions and Options:

The following have not been included in the above budget:

Probable requirements or recommended options for this project - are shown highlighted
Possible requirements for this project - are shown not highlighted
Scope that is probably not required for this project - are shown grayed

Budget cost range (typical) for the following items.	Low	High	
Foundation			
Shallow foundation - additional cost due to lower allowable bearing	$ 5,000	$ 75,000	not included
Deep foundations	$ 50,000	$ 200,000	not included
Support Structure			
Special Configuration / Design / Exterior Aesthetic Treatment	$ 10,000	$ 50,000	not included
Tank			
Min. plate thickness - shell 4.7mm / floor 3.2mm (recommended)	$ 80,000	$ 90,000	not included
Max. tensile stress (138 MPa) for shell calculation (recommended)	$ incl above	$ incl above	not included
Special Configuration / Design / Shape	$ 25,000	$ 100,000	not included
Tank Coatings			
Logo and special colors	$ 10,000	$ 50,000	not included
Piping and Mechanical			
Separate inlet and outlet plus associated pipe and valves	$ 20,000	$ 30,000	not included
Large diameter inlet, outlet, overflow or valve chamber	$ 5,000	$ 25,000	not included
High pressure pipe rating (exceed AWWA D107 requirement)	$ 5,000	$ 15,000	not included
Specialty pipe materials - Type 316 SS	$ 5,000	$ 15,000	not included
Specialty pipe coatings (fusion bonded epoxy)	$ 5,000	$ 20,000	not included
Accessories			
Tank Mixing System (enhance water quality and freeze protection)	$ 25,000	$ 75,000	not included
Vehicle Door in support wall at grade	$ 10,000	$ 20,000	not included
Landings - intermediate (in place of rest seats)	$ 5,000	$ 10,000	not included
Rescue equipment	$ 10,000	$ 20,000	not included
Specialty ladder and landing materials (stainless)	$ 10,000	$ 15,000	not included
Disinfection System (localized injection to manage water quality)	$ 25,000	$ 50,000	not included
Electrical and Lighting			
Electrical service (typically Owner provided)	$ 5,000	$ 50,000	not included
Electrical and Lighting	$ 25,000	$ 125,000	not included

Obstruction lighting	$	10,000	$	20,000	not included
Site lighting	$	10,000	$	25,000	not included
Logo lighting	$	20,000	$	40,000	not included
Controls and Instrumentation	$	15,000	$	75,000	not included
Security and Surveillance	$	15,000	$	75,000	not included
<u>Communications</u>					
Antenna provisions - roof mounted cellular / microwave	$	15,000	$	50,000	not included
Antenna provisions - pedestal mounted cellular	$	10,000	$	20,000	not included
<u>Interior Finishes</u>					
Masonry room within pedestal - heated and insulated	$	25,000	$	50,000	not included
Structural intermediate floor, with stair access and lighting	$	50,000	$	75,000	not included
Coatings - floor, walls, masonry	$	2,500	$	15,000	not included
<u>Site Work</u>					
Watermain, valves and valve chambers	$	20,000	$	75,000	not included
Overflow catch basin and associated yard piping	$	5,000	$	30,000	not included
Storm water piping and drainage structures	$	20,000	$	50,000	not included
Site grading, retainage ponds, etc.	$	10,000	$	100,000	not included
Sanitary piping	$	10,000	$	20,000	not included
Access road and parking - aggregate	$	20,000	$	50,000	not included
Access road and parking - concrete or asphalt	$	40,000	$	100,000	not included
Landscaping	$	10,000	$	50,000	not included
Fencing - chain link	$	15,000	$	40,000	not included
Fencing - ornamental	$	30,000	$	100,000	not included
Clearing	$	5,000	$	25,000	not included
Demolition	$	10,000	$	50,000	not included
<u>Testing and Inspection - 3rd party</u>					
Soils / Foundation	$	10,000	$	20,000	not included
Concrete	$	7,500	$	10,000	not included
Welding	$	3,000	$	5,000	not included
Coatings	$	2,500	$	5,000	not included
<u>Administrative</u>					
Permits and related fees	$	-	$	-	not included
Extended Warranty	$	-	$	-	not included
Prevailing wage rates		n/a		n/a	not included
Local labor agreements		n/a		n/a	not included
<u>Other</u>					
Schedule compression	$	-	$	-	not included
Site constraints and noise restrictions	$	-	$	-	not included

Contingencies	$ -	$ -	not included

Town of Wasaga Beach

BUDGET PROPOSAL

Jeff C. Rodger CET
Director of Sales
Greatario Engineered Storage Systems

jrodger@greatario.com
Office: 519-469-8169
Cell: 519-320-0278
www.greatario.com

The Greatario Engineered Storage Systems …

story dates back to 1966. Today, Greatario prides itself as the market leader for field erected liquid and dry storage tanks and covers in eastern Canada.

The Greatario reputation has been built on a foundation of building hundreds of successful tank installations over the last 25 years.

Greatario Storage solutions feature leading edge technology and advanced building methods. Our construction crews are factory trained and certified, and have been building tanks for as many as 35 years.

PROJECT INFORMATION Feb 22, 2016

Name:	Town of Wasaga Beach
Tank Type:	Aquastore Glass Fused to Steel Options
Product Stored:	Potable Water Storage

The intent of this proposal is that Greatario would act as the Design Build General Contractor. Greatario would solicit additional quotes for additional sub-contracted work for earthworks, concrete, electrical or mechanical work as required and would apply an agreed upon percentage for overhead and profit.

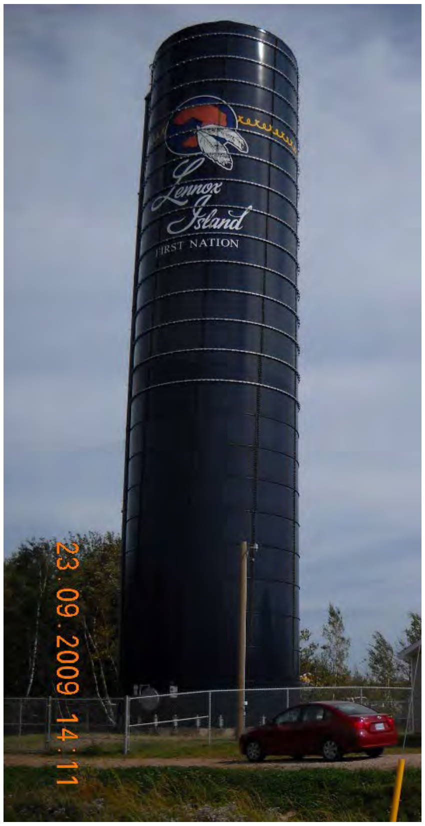
Greatario is the only experienced Supplier of Composite Elevated Glass Bolted Tanks. We are assuming at this time that the option of building an expandable tank, that could be easily increased in height in the future offers no benefit in a growth strategy.

<u>Option A – Traditional Greatario Standpipe</u>

This is perhaps the most cost effective option as an all-glass fused to steel standpipe and aluminum geodesic dome. Diameters and heights could vary however we are approaching the largest combination of diameter and height using an all glass fused to steel structure.

The current geometry requested cannot be met in a single glass tank however this may still be a preferred option to investigate further. For example the benefit of twin tank redundancy (same location or different), phased construction, pressure zones, cost effectiveness, reduced maintenance/operating costs or a hybrid composite tank. This option can also resemble a lighthouse which has not been shown at this time.

Aquastore Glass fused to steel tank size 33.57’ Dia. (10.23m) x 122.87’ (37.46m) tall providing a capacity of 800,200USG (3,029m3) ……………**$1,082,000.00 +HST**

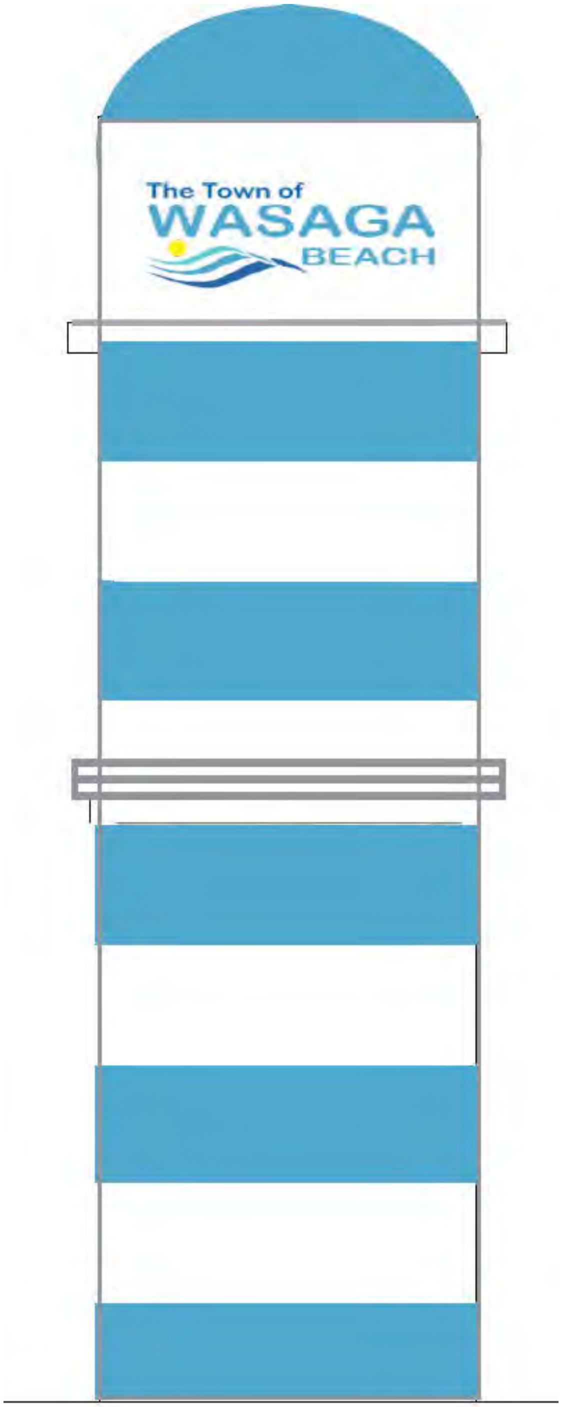


Option B - Typical Greatario Composite Elevated Glass Tank

For option B, a 21.3m (70') dia. x 13.11m (43') tall Aquastore Glass fused to steel tank will provide the 4500 m3 capacity. The concrete pedestal to support this tank would be approximately 15.24m (50') dia. and 37.49m (123') tall.
……………………………..………**$2,850,000 +HST**

Option C - Greatario Composite Elevated Glass Lighthouse Tank

For option C, a 15.24m (50') dia. x 27.13m (88') tall tank elevated onto a 23.4m (77') high pedestal and will resemble a lighthouse as shown and provide a capacity of over 4,700 m3. This 'first of its kind' innovative design would be sure to make a statement and become a prominent beacon in the community.
…………………………………………**$3,440,000 +HST**



Included All Options:

- Engineering- prelim. Drawings, shops and as-builts.
- Design, supply and construction of new Foundation, Aquastore glass fused to steel tank and aluminum geodesic dome.
- Standard colours
- Designed to the more stringent requirements of AWWA D103-09 and NBCC 2010
- Aluminum ladder and galv. cage from grade to roof and platform.
- 1 - 30" diameter tank manway with davit.
- 30" Sq. Roof hatch.
- Construction on site.
- Meals, lodging, travel expenses, project management and supervision.
- Truck unloading, temporary utilities
- Design, supply and install 10" overflow pipe
- Design, supply, install and testing of passive cathodic protection system
- 1 Dome Stainless Steel safety cable
- 1 Dome 24" (600mm) gravity vent
- 1 Year Greatario Workmanship Warranty
- 10-Year CST Manufacturer Tank Warranty
- Town Logo

Not included:

- Excavation, backfill, grading, seeding, mulching, fencing or other site restoration.
- Relocation\removal of existing utilities, equipment, or structures.

- Supply or installation of any electrical or mechanical work.
- Bonding (can be provided).
- H.S.T.
- Temporary facilities
- Power to site, 110V, 220V, 60AMP service
- Filling/draining/testing water.
- Building permits if required

Terms: Greatario Payment terms
5% with order
5% Upon Shop Drawing Approval
20% Upon Material release for fabrication
30% Materials Shipped to site
40% Monthly Progress Payments
NET30 (or approved line of credit)

Thank you again for allowing us the opportunity to provide this budgetary proposal. Please call my cell anytime at 519 320 0278.

Sincerely,

Jeff J. Rodger CET
Director of Sales
Greatario Engineered Storage Systems
Jrodger@Greatario.com
www.greatario.com
1-519-469 8169

Ainley GROUP CONSULTING ENGINEERS PLANNERS

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E-mail: collingwood@ainleygroup.com

May 4, 2016 File No. 114137

Town of Wasaga Beach
30 Lewis Street
Wasaga Beach, Ontario
L9Z 1A1

Attn: **Mike Pincivero, P. Eng.**
Manager of Engineering Services

Ref: **Town of Wasaga Beach**
West End Water Storage and Maintenance Depot

Dear Mr. Pincivero:

As part of the review for the proposed west end storage reservoir in Wasaga Beach we have completed a review in Wasaga Beach's WaterGEMS model updated to 2012 existing conditions. This review included an analysis of theoretical pressures and available fire flows under Maximum Day Demand (MDD) conditions, 5 hour MDD extended period scenarios with a single point large demand to represent an emergency flow added at various locations (including a demand of 283 L/s at the proposed DAS development, the required Phase 3 fire flow per C.F. Crozier's May 2012 Functional Servicing and Stormwater Management Report, a demand of 350 L/s on Lyons Court and various demands on Waterview Road) and a 72-hour MDD Extended Period Simulation (EPS) scenario. The following variables were reviewed:

Tank Connection Location

- Connection on Beachwood Road
- Connection on Ayling Reid Court
- Dual connection at both Beachwood Road and Ayling Reid Court

Diameter of Inlet/Outlet Watermain from Tank

- 300 mm
- 400 mm

Watermain Infrastructure Improvements

- Watermain loop on Ayling Reid Court /Lyons Court
- Watermain loop on Beachwood Road west of the site

Based on our review and analysis the following are our conclusions and recommendations:

Intermediate Scenario
Under a 5 hour MDD-EPS scenario with a large point demand the Ayling Reid Court/Lyons Court loop results in an increase in pressures of up to 50 kPa on Lyons Court when there is a fire flow in the same area, indicating a higher fire flow would be available. This loop causes insignificant changes when a fire flow is located in the far west end of the water distribution system.

Under a 5 hour MDD-EPS scenario with a large point demand the Beachwood Road loop results in a significant increase in pressure of up to 190 kPa in the far west end when a fire occurs in the far west end, indicating a higher fire flow would be available. This loop causes a slight increase in pressures to the Lyons Court area during a fire flow event in the same area.

The tower connection location causes an insignificant change in pressures and available fire flows for all intermediate scenarios examined.

A pipe inlet/outlet diameter of 300 mm versus 400 mm results in a slight decrease in flow from the west end tank. This decrease in flow with a smaller diameter inlet/outlet pipe has an insignificant effect on the system pressures and available fire flows. In most cases the Sunnidale Tank is able to make up for the slightly decreased flow.

Full Build-Out Scenario
A slight decrease in available fire flow is evident when compared to the intermediate scenario water modelling results. This is expected because of increased demands in the system during full build-out.

Under a 5 hour MDD-EPS scenario with a simulated fire at the proposed DAS development there is a slight increase in flow from the Sunnidale Tank when the proposed west end tower does not connect to Ayling Reid Court. The Alying Reid Court tank connection allows for water to more readily get to the DAS Development area requiring less water from the Sunnidale Tank.

The Beachwood Road loop causes a significant increase in available fire flow in the far west end. The Ayling Reid Court/ Lyons Court loop results in insignificant changes to available fire flows in the west end. Without this loop more water comes from the Sunnidale tank to provide water during a fire at DAS.

Pipe diameter of the inlet/outlet watermain for the proposed west end tank did not significantly affect the west end available fire flows and pressures. The exception to this is when the Beachwood Road loop is in place, a slight increase in available fire flows is experienced with a larger pipe, especially in the far west end.

The west end tank scenarios have no effect on the flow or filling and emptying characteristics at Powerline Road, the Jenetta wells and the East End Tank under the scenarios reviewed. Slight changes in the Sunnidale flow and filling characterises were evident.

Recommendations

It is suggested that both the Alying Reid Court/Lyons Court and Beachwood Road loops are constructed to allow for an increase in fire flows and system pressure in the west end. The proposed west end water tower can be constructed without these connections and system pressures and available fire flows will still meet MOECC guidelines. It is suggested that these looped connections are constructed before additional units are built in the west end. The looped watermain will increase system redundancy making the Wasaga Beach system safer.

A pipe diameter of 300 mm for the inlet/outlet pipe will be adequate for the west end water tower.

The location of the tank connection did not have a significant impact on the pressures and fire flows however it is suggested that both connections be constructed to allow for redundancy.

Supporting Documentation is attached.

Full build-out demands include demands for all lands within Wasaga Beach that are zoned as developable. The calculation and modeling completed do not account for any additional demands or related storage for Clearview.

Yours truly

AINLEY & ASSOCIATES LIMITED

Victoria Giangrande, M.A.Sc., E.I.T.

VEG\S:\114137\Working File\Water Modeling\Memo- Tower Water Modeling.docx

Intermediate Water Modeling Scenarios

Both Water Tower Connections with Both Looped Watermains

MDD+FF -Intermediate + plus Beach Area One Development				
Available Fire Flow (L/s)				
	300 mm		400 mm	
1				
2	177	275	183	290
3	158	248	162	265
4	54	72	55	73
5				

350 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		225	330	225	340	kPa
West End Tank	Flow -	75	135	85	160	L/s
	% Full -	45	85	40	85	emptying
Sunnidale Tank	Flow -	65	70	110	230	L/s
	% Full -	25	45	20	45	emptying

100 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		295	340	295	350	kPa
West End Tank	Flow -	20	80	15	100	L/s
	% Full -	70	75	70	85	emptying
Sunnidale Tank	Flow -	0	90	0	85	L/s
	% Full -	45	50	45	50	both

Both Water Tower Connections with Looped Watermain on Beachwood

MDD+FF -Intermediate + plus Beach Area One Development				
Available Fire Flow (L/s)				
	300 mm		400 mm	
1				
2	177	275	182	288
3	158	247	162	264
4	54	72	54	73
5				

350 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		220	305	220	310	kPa
West End Tank	Flow -	80	95	80	100	L/s
	% Full -	50	85	55	85	emptying
Sunnidale Tank	Flow -	140	230	130	230	L/s
	% Full -	15	45	15	45	emptying

100 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		280	340	280	350	kPa
West End Tank	Flow -	40	75	40	85	L/s
	% Full -	65	85	65	85	emptying
Sunnidale Tank	Flow -	0	80	0	80	L/s
	% Full -	45	50	45	50	both

Both Water Tower Connections with Looped Watermain on 71st St.

MDD+FF -Intermediate + plus Beach Area One Development				
Available Fire Flow (L/s)				
	300 mm		400 mm	
1				
2	90	123	91	124
3	96	110	97	110
4	48	60	48	60
5				

350 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		225	325	225	330	kPa
West End Tank	Flow -	85	130	80	140	L/s
	% Full -	45	85	40	85	emptying
Sunnidale Tank	Flow -	120	225	110	225	L/s
	% Full -	15	45	20	45	emptying

100 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		100	160	100	160	kPa
West End Tank	Flow -	10	60	10	70	L/s
	% Full -	70	85	70	85	emptying
Sunnidale Tank	Flow -	0	90	0	90	L/s
	% Full -	45	50	45	50	both

Both Water Tower Connections with No Looped Watermains

MDD+FF -Intermediate + plus Beach Area One Development				
Available Fire Flow (L/s)				
	300 mm		400 mm	
1				
2	85	120	89	120
3	94	108	94	108
4	47	59	47	59
5				

350 L/s can be maintained for 5 hours above 140 kPa

Note - 1 Node in west end goes to 135kPa after 4 hours

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		200	280	200	280	kPa
West End Tank	Flow -	55	70	60	70	L/s
	% Full -	60	85	60	85	emptying
Sunnidale Tank	Flow -	150	250	150	250	L/s
	% Full -	10	45	10	45	emptying

100 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		100	155	100	155	kPa
West End Tank	Flow -	30	35	30	35	L/s
	% Full -	70	85	70	85	emptying
Sunnidale Tank	Flow -	0	90	0	90	L/s
	% Full -	40	45	40	45	both

Beachwood Water Tower Connections with Both Looped Watermains

MDD+FF -Intermediate + plus Beach Area One Development				
Available Fire Flow (L/s)				
	300 mm		400 mm	
1				
2	175	272	182	287
3	157	245	162	262
4	54	72	54	73
5				

350 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		225	325	225	335	kPa
West End Tank	Flow -	85	130	85	150	L/s
	% Full -	40	85	40	85	emptying
Sunnidale Tank	Flow -	115	225	110	215	L/s
	% Full -	15	45	15	45	emptying

100 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		295	340	295	345	kPa
West End Tank	Flow -	25	70	20	90	L/s
	% Full -	70	85	70	85	emptying
Sunnidale Tank	Flow -	0	90	0	80	L/s
	% Full -	45	50	45	50	both

Beachwood Water Tower Connections with Looped Watermain on Beachwood

MDD+FF -Intermediate + plus Beach Area One Development				
Available Fire Flow (L/s)				
	300 mm		400 mm	
1				
2	175	271	182	286
3	157	241	162	263
4	54	72	55	73
5				

350 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		220	300	220	305	kPa
West End Tank	Flow -	80	95	80	100	L/s
	% Full -	50	85	50	85	emptying
Sunnidale Tank	Flow -	140	230	140	230	L/s
	% Full -	15	45	15	45	emptying

100 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		280	340	280	350	kPa
West End Tank	Flow -	40	75	40	85	L/s
	% Full -	65	85	65	85	emptying
Sunnidale Tank	Flow -	0	80	0	80	L/s
	% Full -	45	50	45	50	both

Beachwood Water Tower Connections with Looped Watermain on 71st St.

MDD+FF -Intermediate + plus Beach Area One Development				
Available Fire Flow (L/s)				
	300 mm		400 mm	
1				
2	90	121	90	123
3	95	110	96	110
4	47	59	48	60
5				

350 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		225	315	225	325	kPa
West End Tank	Flow -	80	115	85	130	L/s
	% Full -	45	85	50	85	emptying
Sunnidale Tank	Flow -	125	225	120	220	L/s
	% Full -	15	45	15	45	emptying

100 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		100	155	100	160	kPa
West End Tank	Flow -	15	55	10	60	L/s
	% Full -	70	85	70	85	emptying
Sunnidale Tank	Flow -	0	90	0	90	L/s
	% Full -	45	50	45	50	both

Beachwood Water Tower Connections with No Looped Watermain

MDD+FF -Intermediate + plus Beach Area One Development				
Available Fire Flow (L/s)				
	300 mm		400 mm	
1				
2	88	120	88	120
3	94	108	94	108
4	47	59	47	59
5				

350 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		200	280	200	280	kPa
West End Tank	Flow -	55	65	60	70	L/s
	% Full -	60	85	60	85	emptying
Sunnidale Tank	Flow -	150	250	150	250	L/s
	% Full -	10	45	10	45	emptying

100 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		100	155	100	155	kPa
West End Tank	Flow -	25	35	30	35	L/s
	% Full -	70	85	70	85	emptying
Sunnidale Tank	Flow -	0	90	0	90	L/s
	% Full -	40	45	45	50	both

Ayling Reid Water Tower Connections with Both Looped Watermains

MDD+FF -Intermediate + plus Beach Area One Development				
Available Fire Flow (L/s)				
	300 mm		400 mm	
1				
2	170	260	176	275
3	153	227	157	242
4	54	71	54	72
5				

350 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		225	325	225	340	kPa
West End Tank	Flow -	85	130	80	155	L/s
	% Full -	40	85	40	85	emptying
Sunnidale Tank	Flow -	115	225	110	220	L/s
	% Full -	15	45	20	45	emptying

100 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		290	335	290	340	kPa
West End Tank	Flow -	20	70	15	90	L/s
	% Full -	70	85	70	85	emptying
Sunnidale Tank	Flow -	0	90	0	90	L/s
	% Full -	45	50	45	50	both

Ayling Reid Water Tower Connections with Looped Watermain on Beachwood

MDD+FF -Intermediate + plus Beach Area One Development				
Available Fire Flow (L/s)				
	300 mm		400 mm	
1				
2	171	260	176	273
3	153	226	157	242
4	54	71	54	72
5				

350 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		215	300	220	305	kPa
West End Tank	Flow -	75	90	80	95	L/s
	% Full -	50	85	50	85	emptying
Sunnidale Tank	Flow -	140	230	130	230	L/s
	% Full -	15	45	15	45	emptying

100 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		375	335	275	340	kPa
West End Tank	Flow -	40	70	40	75	L/s
	% Full -	65	85	65	85	emptying
Sunnidale Tank	Flow -	0	80	0	80	L/s
	% Full -	45	50	45	50	both

Ayling Reid Water Tower Connections with Looped Watermain on 71st St.

MDD+FF -Intermediate + plus Beach Area One Development				
Available Fire Flow (L/s)				
	300 mm		400 mm	
1				
2	90	122	91	124
3	95	110	96	110
4	47	60	48	60
5				

350 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		225	320	225	330	kPa
West End Tank	Flow -	85	120	85	140	L/s
	% Full -	45	85	40	85	emptying
Sunnidale Tank	Flow -	120	230	115	225	L/s
	% Full -	15	45	15	45	emptying

100 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		100	155	100	160	kPa
West End Tank	Flow -	15	55	10	70	L/s
	% Full -	70	85	70	85	emptying
Sunnidale Tank	Flow -	0	90	0	90	L/s
	% Full -	40	45	45	50	both

Ayling Reid Water Tower Connections with No Looped Watermain

MDD+FF -Intermediate + plus Beach Area One Development				
Available Fire Flow (L/s)				
	300 mm		400 mm	
1				
2	88	120	88	120
3	94	108	94	108
4	47	59	47	59
5				

350 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		200	280	200	280	kPa
West End Tank	Flow -	55	65	60	70	L/s
	% Full -	60	85	60	85	emptying
Sunnidale Tank	Flow -	150	250	150	250	L/s
	% Full -	10	45	10	45	emptying

100 L/s can be maintained for 5 hours above 140 kPa

MDD EPS - Intermediate - includes a point demand fire						
		300 mm		400 mm		
Pressure @ Fire location		100	155	100	155	kPa
West End Tank	Flow -	30	35	30	35	L/s
	% Full -	70	85	70	85	emptying
Sunnidale Tank	Flow -	0	90	0	90	L/s
	% Full -	40	45	45	50	both

Full Build-Out Water Modeling Scenarios

Both Water Tower Connections with Both Looped Watermains

MDD+FF -Full Build Out - Includes updated demands for Beach Area 1 Development					
Available Fire Flow (L/s)					
	300 mm		400 mm		
1	197	340	201	355	Available FF in the vacinity of proposed DAS
2	170	265	177	280	Available FF in the vacinity of Constance Blvd
3	155	232	160	245	Available FF in the vacinity of Waterview Road
4	53	41	54	72	Available FF in the vacinity of James Ave
5	150	193	157	205	Available FF in the vacinity of proposed Stirling Cook

283 L/s for 5 hours is the required flow DAS Development fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west end at DAS Development (Hydraulic only 5 hours)						
		300 mm		400 mm		
Pressure @ Fire location		160	255	160	263	kPa
West End Tank	Flow -	63	120	60	135	L/s
	% Full -	50	85	50	85	emptying
Sunnidale Tank	Flow -	0	230	0	230	L/s
	% Full -	38	53	38	53	emptying
Powerline Road	Flow -	321	353	321	353	L/s
	% Full -	65	88	65	88	emptying
Jenetta	Flow -	242	285	242	285	L/s
East End Tank	% Full -	53	100	53	100	filling

200 L/s can be maintained for 5 hours above 140 kPa Waterview Road fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west end at DAS Development (Hydraulic only 5 hours)						
		300 mm		400 mm		
Pressure @ Fire location		105	220	105	235	kPa
West End Tank	Flow -	60	120	50	155	L/s
	% Full -	50	85	50	85	emptying
Sunnidale Tank	Flow -	0	180	0	180	L/s
	% Full -	50	60	50	60	both

Both Water Tower Connections with Looped Watermain on Beachwood

MDD+FF -Full Build Out - Includes updated demands for Beach Area 1 Development

Available Fire Flow (L/s)

	300 mm		400 mm		
1	190	312	191	316	Available FF in the vacinity of proposed DAS
2	170	265	177	278	Available FF in the vacinity of Constance Blvd
3	155	230	160	245	Available FF in the vacinity of Waterview Road
4	53	71	54	72	Available FF in the vacinity of James Ave
5	150	193	156	205	Available FF in the vacinity of proposed Stirling Cook

283 L/s for 5 hours is the required flow DAS Development fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west end at DAS Development (Hydraulic only 5 hours)

		300 mm		400 mm		
Pressure @ Fire location		160	237	160	240	kPa
West End Tank	Flow -	60	88	62	90	L/s
	% Full -	55	85	53	85	emptying
Sunnidale Tank	Flow -	0	235	0	235	L/s
	% Full -	38	53	36	53	emptying
Powerline Road	Flow -	322	354	322	354	L/s
	% Full -	62	88	65	88	emptying
Jenetta	Flow -	248	285	248	285	L/s
East End Tank	% Full -	53	100	53	100	filling

200 L/s can be maintained for 5 hours above 140 kPa Waterview Road fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west

		300 mm		400 mm		
Pressure @ Fire location		70	220	75	230	kPa
West End Tank	Flow -	95	140	95	115	L/s
	% Full -	40	85	35	85	emptying
Sunnidale Tank	Flow -	0	160	0	160	L/s
	% Full -	53	63	53	63	filling

Both Water Tower Connections with Looped Watermain on 71st St.

MDD+FF -Full Build Out - Includes updated demands for Beach Area 1 Development

Available Fire Flow (L/s)

	300 mm		400 mm		
1	194	329	196	338	Available FF in the vacinity of proposed DAS
2	75	105	76	106	Available FF in the vacinity of Constance Blvd
3	79	95	80	96	Available FF in the vacinity of Waterview Road
4	44	54	44	54	Available FF in the vacinity of James Ave
5	76	80	77	80	Available FF in the vacinity of proposed Stirling Cook

283 L/s for 5 hours is the required flow DAS Development fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west end at DAS Development (Hydraulic only 5 hours)

		300 mm		400 mm		
Pressure @ Fire location		160	250	160	255	kPa
West End Tank	Flow -	62	105	62	105	L/s
	% Full -	50	85	50	85	emptying
Sunnidale Tank	Flow -	0	240	0	240	L/s
	% Full -	37	53	37	53	emptying
Powerline Road	Flow -	320	353	320	353	L/s
	% Full -	65	88	65	88	emptying
Jenetta	Flow -	248	285	248	285	L/s
East End Tank	% Full -	53	100	53	100	filling

79 L/s can be maintained for 5 hours above 140 kPa Waterview Road fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west

		300 mm		400 mm		
Pressure @ Fire location		175	270	175	270	kPa
West End Tank	Flow -	0	45	0	50	L/s
	% Full -	76	85	76	85	emptying
Sunnidale Tank	Flow -	0	110	0	110	L/s
	% Full -	53	65	53	65	filling

Both Water Tower Connections with No Looped Watermains

MDD+FF -Full Build Out - Includes updated demands for Beach Area 1 Development					
Available Fire Flow (L/s)					
	300 mm		400 mm		
1	180	287	181	288	Available FF in the vacinity of proposed DAS
2	74	101	74	101	Available FF in the vacinity of Constance Blvd
3	77	93	77	93	Available FF in the vacinity of Waterview Road
4	43	53	43	53	Available FF in the vacinity of James Ave
5	75	77	75	77	Available FF in the vacinity of proposed Stirling Cook

283 L/s for 5 hours is the required flow   DAS Development fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west end at DAS Development (Hydraulic only 5 hours)						
		300 mm		400 mm		
Pressure @ Fire location		143	219	145	220	kPa
West End Tank	Flow -	45	63	46	64	L/s
	% Full -	63	85	63	85	emptying
Sunnidale Tank	Flow -	0	250	0	250	L/s
	% Full -	32	53	32	53	emptying
Powerline Road	Flow -	322	355	322	355	L/s
	% Full -	65	88	65	88	emptying
Jenetta	Flow -	249	286	249	286	L/s
East End Tank	% Full -	53	100	53	100	filling

77 L/s can be maintained for 5 hours above 140 kPa   Waterview Road fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west						
		300 mm		400 mm		
Pressure @ Fire location		180	280	180	280	kPa
West End Tank	Flow -	15	35	15	35	L/s
	% Full -	75	85	75	85	emptying
Sunnidale Tank	Flow -	0	125	0	125	L/s
	% Full -	53	67	53	67	filling

Beachwood Water Tower Connections with Both Looped Watermains

MDD+FF -Full Build Out - Includes updated demands for Beach Area 1 Development					
Available Fire Flow (L/s)					
	300 mm		400 mm		
1	195	330	200	345	Available FF in the vacinity of proposed DAS
2	170	260	175	275	Available FF in the vacinity of Constance Blvd
3	155	230	160	245	Available FF in the vacinity of Waterview Road
4	53	70	53	71	Available FF in the vacinity of James Ave
5	150	190	155	200	Available FF in the vacinity of proposed Stirling Cook

283 L/s for 5 hours is the required flow DAS Development fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west end at DAS Development (Hydraulic only 5 hours)						
		300 mm		400 mm		
Pressure @ Fire location		160	250	160	260	kPa
West End Tank	Flow -	63	107	63	125	L/s
	% Full -	50	85	48	85	emptying
Sunnidale Tank	Flow -	0	240	0	230	L/s
	% Full -	37	53	37	53	emptying
Powerline Road	Flow -	320	355	320	355	L/s
	% Full -	35	88	65	88	emptying
Jenetta	Flow -	248	285	248	285	L/s
East End Tank	% Full -	53	100	53	100	filling

200 L/s can be maintained for 5 hours above 140 kPa Waterview Road fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west						
		300 mm		400 mm		
Pressure @ Fire location		110	215	105	235	kPa
West End Tank	Flow -	60	115	60	145	L/s
	% Full -	50	85	50	85	emptying
Sunnidale Tank	Flow -	0	180	0	180	L/s
	% Full -	50	60	50	60	both

Beachwood Water Tower Connections with Looped Watermain on Beachwood

MDD+FF -Full Build Out - Includes updated demands for Beach Area 1 Development					
Available Fire Flow (L/s)					
	300 mm		400 mm		
1	189	310	189	310	Available FF in the vacinity of proposed DAS
2	168	257	168	257	Available FF in the vacinity of Constance Blvd
3	153	225	153	225	Available FF in the vacinity of Waterview Road
4	53	70	53	70	Available FF in the vacinity of James Ave
5	148	188	148	188	Available FF in the vacinity of proposed Stirling Cook

283 L/s for 5 hours is the required flow

DAS Development fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west end at DAS Development (Hydraulic only 5 hours)						
		300 mm		400 mm		
Pressure @ Fire location		158	235	160	240	kPa
West End Tank	Flow -	59	86	62	91	L/s
	% Full -	60	85	53	85	emptying
Sunnidale Tank	Flow -	0	240	0	230	L/s
	% Full -	35	53	36	53	emptying
Powerline Road	Flow -	322	355	322	355	L/s
	% Full -	65	88	65	88	emptying
Jenetta	Flow -	248	285	248	285	L/s
East End Tank	% Full -	53	100	53	100	filling

200 L/s can be maintained for 5 hours above 140 kPa

Waterview Road fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west						
		300 mm		400 mm		
Pressure @ Fire location		65	210	75	130	kPa
West End Tank	Flow -	95	135	100	155	L/s
	% Full -	40	85	35	85	emptying
Sunnidale Tank	Flow -	0	160	0	160	L/s
	% Full -	53	62	53	62	filling

Beachwood Water Tower Connections with Looped Watermain on 71st St.

MDD+FF -Full Build Out - Includes updated demands for Beach Area 1 Development					
Available Fire Flow (L/s)					
	300 mm		400 mm		
1	190	318	194	328	Available FF in the vacinity of proposed DAS
2	75	102	75	105	Available FF in the vacinity of Constance Blvd
3	78	94	80	95	Available FF in the vacinity of Waterview Road
4	43	53	44	54	Available FF in the vacinity of James Ave
5	75	78	76	79	Available FF in the vacinity of proposed Stirling Cook

283 L/s for 5 hours is the required flow DAS Development fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west end at DAS Development (Hydraulic only 5 hours)						
		300 mm		400 mm		
Pressure @ Fire location		157	241	159	249	kPa
West End Tank	Flow -	60	95	62	105	L/s
	% Full -	53	85	51	85	emptying
Sunnidale Tank	Flow -	0	240	0	240	L/s
	% Full -	36	53	37	53	emptying
Powerline Road	Flow -	322	353	320	354	L/s
	% Full -	65	98	65	98	emptying
Jenetta	Flow -	248	285	248	285	L/s
East End Tank	% Full -	53	100	53	100	filling

79 L/s can be maintained for 5 hours above 140 kPa Waterview Road fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west						
		300 mm		400 mm		
Pressure @ Fire location		175	270	175	270	kPa
West End Tank	Flow -	0	40	0	45	L/s
	% Full -	76	85	76	85	emptying
Sunnidale Tank	Flow -	0	110	0	110	L/s
	% Full -	53	65	53	65	filling

Beachwood Water Tower Connections with No Looped Watermain

MDD+FF -Full Build Out - Includes updated demands for Beach Area 1 Development					
Available Fire Flow (L/s)					
	300 mm		400 mm		
1	180	285	180	287	Available FF in the vacinity of proposed DAS
2	73	100	75	100	Available FF in the vacinity of Constance Blvd
3	77	93	77	93	Available FF in the vacinity of Waterview Road
4	43	53	43	53	Available FF in the vacinity of James Ave
5	75	77	75	77	Available FF in the vacinity of proposed Stirling Cook

283 L/s for 5 hours is the required flow DAS Development fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west end at DAS Development (Hydraulic only 5 hours)						
		300 mm		400 mm		
Pressure @ Fire location		142	218	144	220	kPa
West End Tank	Flow -	44	62	45	63	L/s
	% Full -	64	85	63	85	emptying
Sunnidale Tank	Flow -	0	255	0	250	L/s
	% Full -	32	53	32	53	emptying
Powerline Road	Flow -	322	355	322	355	L/s
	% Full -	65	88	65	88	emptying
Jenetta	Flow -	249	286	249	286	L/s
East End Tank	% Full -	53	100	53	100	filling

77 L/s can be maintained for 5 hours above 140 kPa Waterview Road fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west						
		300 mm		400 mm		
Pressure @ Fire location		180	280	180	280	kPa
West End Tank	Flow -	15	35	15	35	L/s
	% Full -	75	85	75	85	emptying
Sunnidale Tank	Flow -	0	125	0	125	L/s
	% Full -	53	67	53	67	filling

Ayling Reid Water Tower Connections with Both Looped Watermains

MDD+FF -Full Build Out - Includes updated demands for Beach Area 1 Development					
Available Fire Flow (L/s)					
	300 mm		400 mm		
1	200	345	200	355	Available FF in the vacinity of proposed DAS
2	170	260	170	270	Available FF in the vacinity of Constance Blvd
3	150	225	155	235	Available FF in the vacinity of Waterview Road
4	50	70	50	70	Available FF in the vacinity of James Ave
5	145	190	150	195	Available FF in the vacinity of proposed Stirling Cook

283 L/s for 5 hours is the required flow DAS Development fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west						
		300 mm		400 mm		
Pressure @ Fire location		160	260	160	262	kPa
West End Tank	Flow -	60	130	60	140	L/s
	% Full -	45	85	45	85	emptying
Sunnidale Tank	Flow -	0	230	0	230	L/s
	% Full -	35	52	35	52	emptying
Powerline Road	Flow -	320	355	320	355	L/s
	% Full -	63	88	63	88	emptying
Jenetta	Flow -	245	285	245	285	L/s
East End Tank	% Full -	55	100	55	100	filling

200 L/s can be maintained for 5 hours above 140 kPa Waterview Road fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west						
		300 mm		400 mm		
Pressure @ Fire location		90	190	90	210	kPa
West End Tank	Flow -	55	105	50	140	L/s
	% Full -	55	85	50	85	emptying
Sunnidale Tank	Flow -	0	180	0	180	L/s
	% Full -	50	58	50	58	both

Ayling Reid Water Tower Connections with Looped Watermain on Beachwood

MDD+FF -Full Build Out - Includes updated demands for Beach Area 1 Development					
Available Fire Flow (L/s)					
	300 mm		400 mm		
1	190	310	190	315	Available FF in the vacinity of proposed DAS
2	165	255	170	265	Available FF in the vacinity of Constance Blvd
3	150	220	155	230	Available FF in the vacinity of Waterview Road
4	53	70	53	70	Available FF in the vacinity of James Ave
5	145	185	150	192	Available FF in the vacinity of proposed Stirling Cook

283 L/s for 5 hours is the required flow DAS Development fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west						
		300 mm		400 mm		
Pressure @ Fire location		158	235	160	238	kPa
West End Tank	Flow -	60	85	60	90	L/s
	% Full -	55	85	55	85	emptying
Sunnidale Tank	Flow -	0	240	0	240	L/s
	% Full -	35	53	37	53	emptying
Powerline Road	Flow -	355	320	320	355	L/s
	% Full -	65	88	65	88	emptying
Jenetta	Flow -	248	285	248	285	L/s
East End Tank	% Full -	53	100	53	100	filling

200 L/s can be maintained for 5 hours above 140 kPa Waterview Road fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west						
		300 mm		400 mm		
Pressure @ Fire location		50	188	60	120	kPa
West End Tank	Flow -	95	125	95	140	L/s
	% Full -	40	85	40	85	emptying
Sunnidale Tank	Flow -	0	160	0	160	L/s
	% Full -	53	62	53	62	filling

Ayling Reid Water Tower Connections with Looped Watermain on 71st St.

MDD+FF -Full Build Out - Includes updated demands for Beach Area 1 Development					
Available Fire Flow (L/s)					
	300 mm		400 mm		
1	195	330	195	340	Available FF in the vacinity of proposed DAS
2	75	105	75	105	Available FF in the vacinity of Constance Blvd
3	80	95	80	95	Available FF in the vacinity of Waterview Road
4	45	55	45	55	Available FF in the vacinity of James Ave
5	75	80	75	80	Available FF in the vacinity of proposed Stirling Cook

283 L/s for 5 hours is the required flow DAS Development fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west						
		300 mm		400 mm		
Pressure @ Fire location		160	250	160	250	kPa
West End Tank	Flow -	60	110	60	120	L/s
	% Full -	50	85	50	85	emptying
Sunnidale Tank	Flow -	0	240	0	240	L/s
	% Full -	35	52	37	53	emptying
Powerline Road	Flow -	320	355	320	355	L/s
	% Full -	65	88	65	88	emptying
Jenetta	Flow -	245	285	245	285	L/s
East End Tank	% Full -	55	100	55	100	filling

79 L/s can be maintained for 5 hours above 140 kPa Waterview Road fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west						
		300 mm		400 mm		
Pressure @ Fire location		173	270	173	270	kPa
West End Tank	Flow -	0	43	0	50	L/s
	% Full -	76	85	76	85	emptying
Sunnidale Tank	Flow -	0	120	0	120	L/s
	% Full -	53	65	53	65	filling

Ayling Reid Water Tower Connections with No Looped Watermain

MDD+FF -Full Build Out - Includes updated demands for Beach Area 1 Development

Available Fire Flow (L/s)

	300 mm		400 mm		
1	180	285	180	288	Available FF in the vacinity of proposed DAS
2	75	100	75	100	Available FF in the vacinity of Constance Blvd
3	77	93	77	93	Available FF in the vacinity of Waterview Road
4	43	53	43	53	Available FF in the vacinity of James Ave
5	75	77	75	77	Available FF in the vacinity of proposed Stirling Cook

283 L/s for 5 hours is the required flow DAS Development fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west

		300 mm		400 mm		
Pressure @ Fire location		145	220	145	220	kPa
West End Tank	Flow -	45	63	45	63	L/s
	% Full -	63	85	63	85	emptying
Sunnidale Tank	Flow -	0	250	0	250	L/s
	% Full -	32	53	32	53	emptying
Powerline Road	Flow -	322	355	322	355	L/s
	% Full -	65	88	65	88	emptying
Jenetta	Flow -	249	286	249	286	L/s
East End Tank	% Full -	53	100	53	100	filling

77 L/s can be maintained for 5 hours above 140 kPa Waterview Road fire

MDD EPS Full Build Out - Updated Demand for Beach Area 1 - with fire in the west

		300 mm		400 mm		
Pressure @ Fire location		180	280	180	280	kPa
West End Tank	Flow -	15	35	15	35	L/s
	% Full -	75	85	75	85	emptying
Sunnidale Tank	Flow -	0	120	0	120	L/s
	% Full -	53	67	53	67	filling

Town of Wasaga Beach

West End Water Storage Facility and Maintenance Depot Class EA

Technical Memorandum No. 5B

Site Layout Alternatives

May 2016

Ainley GROUP
CONSULTING ENGINEERS & PLANNERS

West End Water Storage Facility and Maintenance Depot Class EA

Project No. 114137

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Town of Wasaga Beach

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1.0 Introduction

The Town of Wasaga Beach initiated the West End Water Storage Facility and Maintenance Depot Class Environmental Assessment (EA) planning process (Schedule C) to consider maintenance depot options, and sites for a maintenance depot that will support community growth in the west end of the Town. Based on analysis completed during Phase 2 of the Class EA the proposed maintenance depot will allow for more timely repairs and services, improved winter maintenance and is necessary to service the proposed developments in the west end. The area necessary to provide these services was identified as 3.5 hectares.

The required site components have been identified in Technical Memorandum 4B. These site components allow for numerous variations of site layouts. Development and analysis of the most viable options will allow for an informed decision about which site layout will provide the most benefit to the Town of Wasaga Beach.

1.1 Objectives of Technical Memorandum No. 5B

The objectives of this Technical Memorandum are to:

- Determine site requirements to assist in site layout development.
- Evaluate and compare component locations to determine a preferred alternative.
- Present the benefits of phased construction and the anticipated timeline of phased construction for this site.

2.0 Identification and Evaluation of General Site Layouts

The following site components have been identified as part of the proposed maintenance depot:

- Salt/sand storage
- Parking
- Outdoor material storage
- Main building and garage

Additional items that are being constructed on the same site as part of the Class EA are:

- Elevated water storage
- Storm water management pond
- Access road (Joan Avenue)

All of these site components are to be incorporated into the site layout. To develop a preferred site layout for the water storage and maintenance depot site a series of requirements were developed to assess layouts.

- Ease of access for public
- Least impact to neighbouring properties
- Property security
- Security of water tower
- Water tower as a landmark
- Ease of site phasing
- All parking in close proximity to the main building
- Adequate turning radii
- Adequate buffer between fuel storage and buildings

Each of these requirements affects the placement of specific site components. They assist in reducing the viable site layout options and provide guidance to determine a preferred alternative. An evaluation table was developed that identifies the preferred location of each site component (Table 1).

Table 1 – Evaluation for Preferred Location of Each Site Component

	Northeast Quadrant	Northwest Quadrant	Southeast Quadrant	Southwest Quadrant	**Preferred Location**
Salt and Sand Storage	– Near storm water management pond, easier to contain and treat runoff ● – Too close to entrance – security concern o	– Near storm water management pond, easier to contain and treat runoff ● – Further from entrance – more secure ●	– Away from storm water management pond, harder to contain and treat runoff ◑ – Further from entrance – more secure ●	– Away from storm water management pond, harder to contain and treat runoff ◑ – Further from entrance – more secure ●	**Northwest Quadrant** *
Water Tower	– Too close to entrance – security concern o – Close to surrounding residential properties o – Close to water distribution system ● – Not ideal soil conditions o – Potential landmark for Wasaga Beach o	– Further from entrance – more secure ● – Close to potential residential properties ◑ – Further from water distribution system ◑ – Ideal soil conditions ● – Potential Landmark for Wasaga Beach ◑	– Further from entrance – more secure ● – Further from surrounding residential ● – Further from water distribution system ◑ – Not ideal soil conditions o – Landmark for Wasaga Beach ●	– Further from entrance – more secure ● – Close to potential residential properties ◑ – Furthest from water distribution system o – Ideal soil conditions ● – Landmark for Wasaga Beach ●	**Northwest Quadrant**
Office and Garage	– Easy access for public ● – Added security for site ●	– Difficult access for public o – Reduced site security o	– Difficult access for public o – Reduced site security o	– Difficult access for public o – Reduced site security o	**Northeast Quadrant**
Outdoor Storage	– Increased danger near entrance o – Reduced security of storage material o	– Decreased danger away from entrance ◑ – Increased security of storage material ●	– Decreased danger away from entrance ◑ – Increased security of storage material ●	– Decreased danger far away from entrance ● – Increased security of storage material ●	**Southwest Quadrant**
Large Vehicle Parking	– Increased danger near entrance o – Reduced security of machinery o	– Deceased danger away from entrance ◑ – Increased security of machinery ●	– Deceased danger away from entrance ◑ – Increased security of machinery ●	– Decreased danger far away from entrance ● – Increased security of machinery ●	**Southwest Quadrant**
Car Parking	– Near entrance allowing easy access ● – Keeps public away from machinery ●	– Away from entrance reducing ease of access o – Increases danger of public near machinery o	– Away from entrance reducing ease of access o – Increases danger of public near machinery o	– Away from entrance reducing ease of access o – Increases danger of public near machinery o	**Northeast Quadrant**

Evaluation Key: o – Least preferred ◑ – Partially Preferred ● – Most Preferred

*No items were identified to have a preferred location in the southeast quadrant of the property. Both the water tower and the sand and salt storage preferred locations were in the northwest quadrant. This quadrant will not be able to accommodate both items and therefore the salt and sand storage will be located in the southeast quadrant of the site. The salt and sand storage received all partially preferred or most preferred rankings in the evaluation chart for the southeast quadrant making it a suitable location.

From the evaluation completed a preliminary site layout was developed. The preliminary site layout, Appendix A, allows for the best layout to address the needs of the Town.

2.0 Phased Construction

Phased construction is a construction approach where each phase or element of design has a defined work scope and can be considered a separate project allowing design and construction phases to overlap. It also allows for each element to be completed independently of the other components. By splitting the project into smaller elements more attention can be given to each component to ensure optimal design and construction.

The Class EA has identified preliminary designs for each component, allowing a general outline for the site layout. Phased construction will allow for additional background information to be collected to make the most informed decision throughout detailed design of components that are not required immediately. Phased construction will reduce the overlapping of construction/different contractors working on site. This will result in a smoother construction phase for each component. Additionally phased construction will reduce the initial capital costs, allowing the costs to be subsidized by development and the increasing population.

Each component of the site has different triggers resulting in its need for construction, outlined below.

Stormwater Management Pond – When the site is developed a stormwater management pond will be required to allow for proper site drainage.

Water Storage – A population increase and resulting increase in maximum day demand that causes the MOECC storage requirements to exceed the available storage.

Salt and Sand Storage – An increase in development in the west end resulting in an increase of salt and sand needed during winter months.

Maintenance Depot Office and Garage – An increase in the Town's population causing a significant increase in staff needed to complete Public Works Department responsibilities.

Additional Storage – Once the existing infrastructure and proposed maintenance depot storage is no longer adequate to serve the increasing population, additional storage will be required.

As outlined above each site component has a different trigger that will require it to be constructed. If the entire site was developed all together it would result in certain parts of the site remaining unused/underused. Phased construction allows for a more adaptive approach that meets the needs of the Town as it continues to grow and reach full build-out. The triggers allow for a general understanding of when each component will be necessary and in which order the site components will be developed. A timeline of when each component is expected to be required is shown in Figure 1. If the population does not increase as expected or other factors begin to play a role in the development of the site these dates may change.

Figure 1 – Timeline of Phased Construction of Maintenance Depot Site

Construction phasing was taken into account when developing the site layout to allow the site layout to be functional at each stage of the phased construction. A phased layout of the preferred site layout is attached as Appendix B.

3.0 Conclusion and Recommendation

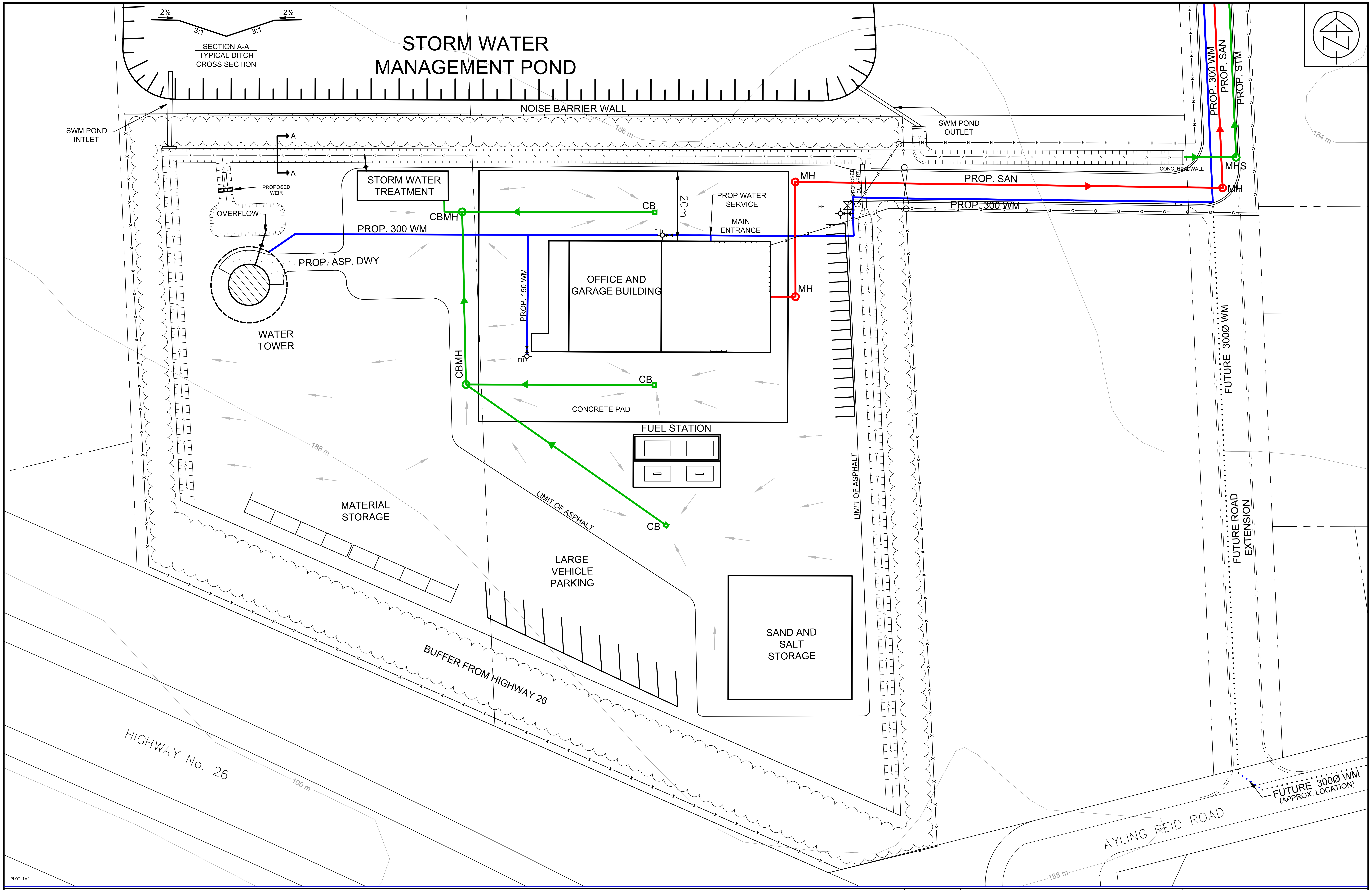
Based on the maintenance depot requirements of the Town of Wasaga Beach and the analysis completed during Stages 2 and 3 of the Town of Wasaga Beach Class EA Study, 3.5 hectares of land will be necessary to accommodate the required components of the maintenance depot.

An evaluation was completed to identify the preferred location for each site component. The evaluation was used to develop the preferred site layout.

To further assist in the site construction, phased construction was identified as an optimal solution. It will allow each component to be constructed when necessary, reduce construction conflicts and allow final designs to reflect changing requirements of the Town.

Appendix - A

Preferred Site Layout



NOTES

— — —	EXISTING WATERMAIN
- - - - - -	EXISTING SEWER
———	PROPOSED WATERMAIN
———	PROPOSED SANITARY SEWER
—H—	PROPOSED HYDRO
—X—	PROPOSED FENCE
—G—	PROPOSED GAS
○▷◁○	PROPOSED GATE
• • • • • • •	FUTURE WATERMAIN
🟩	PROPOSED STORM SEWER
→	PROPOSED DIRECTION OF SURFACE FLOW
—188 m—	EXISTING CONTOUR ELEVATION
○ MH	PROPOSED MAINTENANCE HOLE
○ CBMH	PROPOSED CATCH BASIN MAINTENANCE HOLE
▫ CB	PROPOSED CATCHBASIN
FH	PROPOSED FIRE HYDRANT

The Beach is Just the Beginning...

WASAGA Beach

EXACT LAYOUT TO BE CONFIRMED THROUGH FINAL DESIGN

SCALE:	1:500
DESIGN:	R.M.
DRAWN:	J.M.M.
CHECKED:	R.M.
DATE:	FEB. 2015

TOWN OF WASAGA BEACH
WEST END STORAGE FACILITY AND MAINTENANCE DEPOT

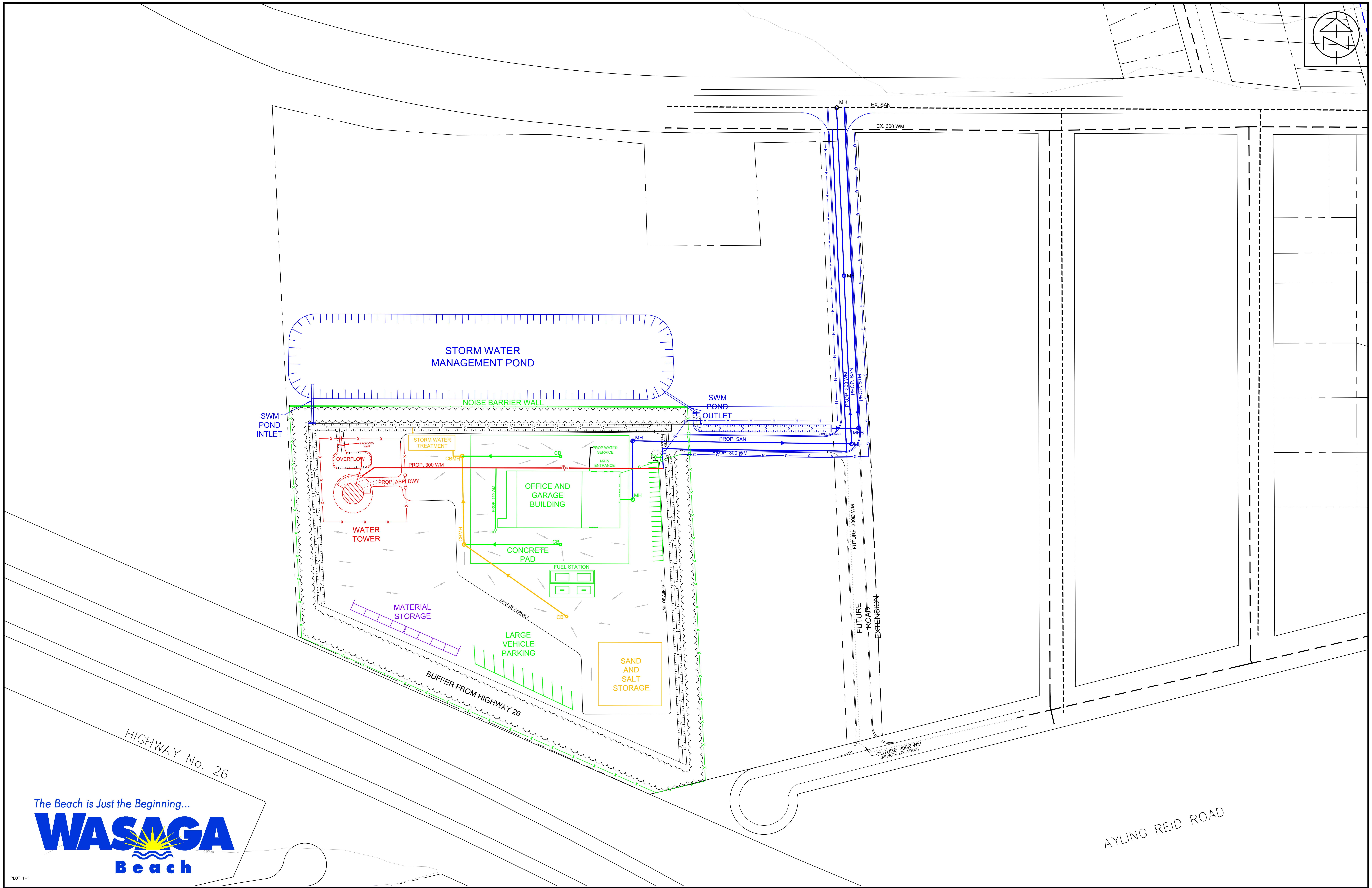
SITE PLAN

Ainley GROUP
CONSULTING
ENGINEERS
PLANNERS

CONTRACT No.
DWG. No. 114137–A2

Appendix - B

Phased Construction



NOTES

- PHASE 1A
- PHASE 1B
- PHASE 2
- PHASE 3
- PHASE 4

SCALE:	1:500
DESIGN:	R.M.
DRAWN:	J.M.M.
CHECKED:	R.M.
DATE:	MAY 2016

TOWN OF WASAGA BEACH
WEST END STORAGE FACILITY
AND MAINTENANCE DEPOT

PHASED SITE PLAN

Ainley GROUP
CONSULTING
ENGINEERS
PLANNERS

CONTRACT No.

DWG. No. 114137–A2

Town of Wasaga Beach

West End Water Storage Facility and Maintenance Depot Class EA

Technical Memorandum No. 5C

Storm Water Management Pond

May 2016

Ainley GROUP
CONSULTING ENGINEERS & PLANNERS

West End Water Storage Facility and Maintenance Depot Class EA

Project No. 114137

Prepared for:
Town of Wasaga Beach

Prepared By:

Gary Scott, M.Sc., P.Eng.

Checked By:

Mike Ainley, P.Eng., PMP

Ainley Group
280 Pretty River Parkway
Collingwood, ON L9Y 4J5

Phone: (705) 445 – 3451
Fax: (705) 445 – 0968
www.ainleygroup.com

1.0 Introduction

The Town of Wasaga Beach initiated the West End Water Storage Facility and Maintenance Depot Class Environmental Assessment (EA) planning process (Schedule C) to consider storage options and sites for a new water reservoir and maintenance depot that will enhance municipal services in the west end of the community.

Site 2, located south of Beachwood Road and west of 75th Street South, has been identified as the preferred location. A preliminary site layout has been developed to meet the needs of the Town of Wasaga Beach. In addition to the site components a stormwater management pond (SWMP) will be required on the site to properly attenuate stormwater flows.

The site is currently covered in trees and bush that allow for natural stormwater management. The development of the site will change the land from a permeable surface to a partially impermeable surface. The site will be cleared of most of the trees and portions of the property will be covered in asphalt, concrete and buildings which do not allow for natural stormwater management. To ensure no negative affect on the downstream drainage area a SWMP is needed on the site. The SWMP will provide both water quality and water quantity control.

1.1 Objective of Technical Memorandum No. 5C

The objectives of this Technical Memorandum are to:

- Identify alternative SWMP locations.
- Evaluate and compare SWMP alternatives to determine a preferred solution.

The design of the SWMP is outside the scope of the project and will be designed separately.

2.0 Identification of Alternative Storm Water Management Locations

Initially a SWMP was to be located on the maintenance depot site to allow for proper containment of stormwater on the site. After discussion with the land owner it was decided that a larger SWMP would be constructed to deal with runoff from the maintenance depot site and surrounding land. Several locations were discussed that would allow for different benefits to the land owner and the Town. Four SWMP locations were identified as possible alternatives. The four SWMP locations alternatives are identified in Figures 1-4, respectively.

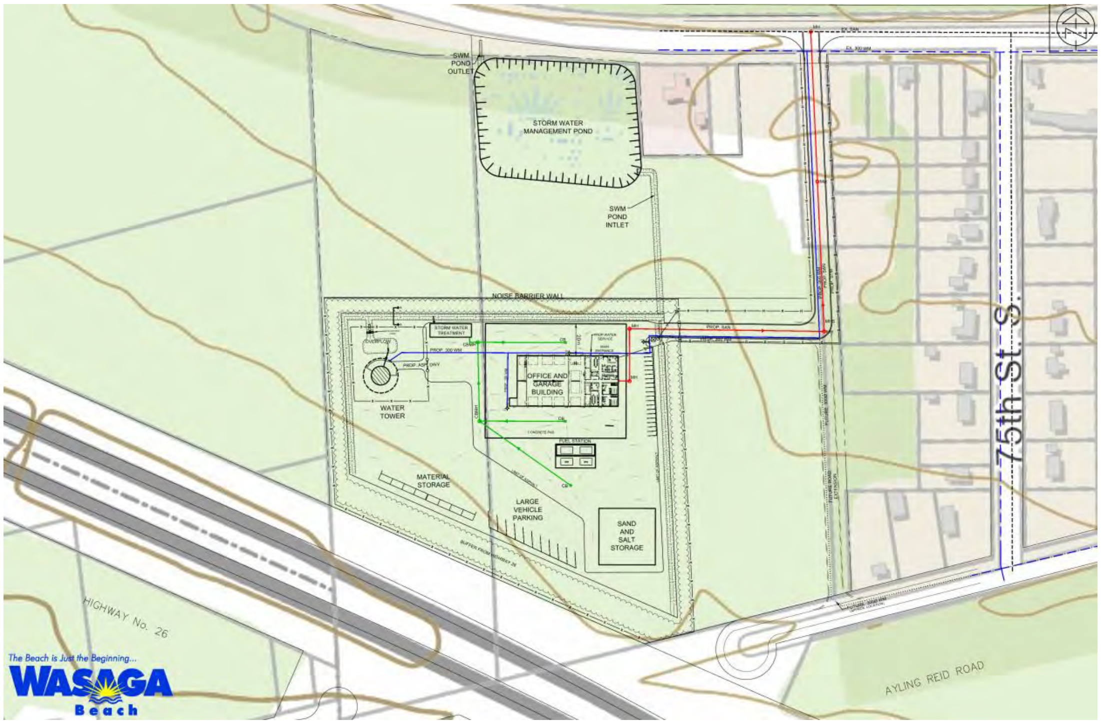


Figure 1 – Alternative 1: SWMP located in the existing wetland area.

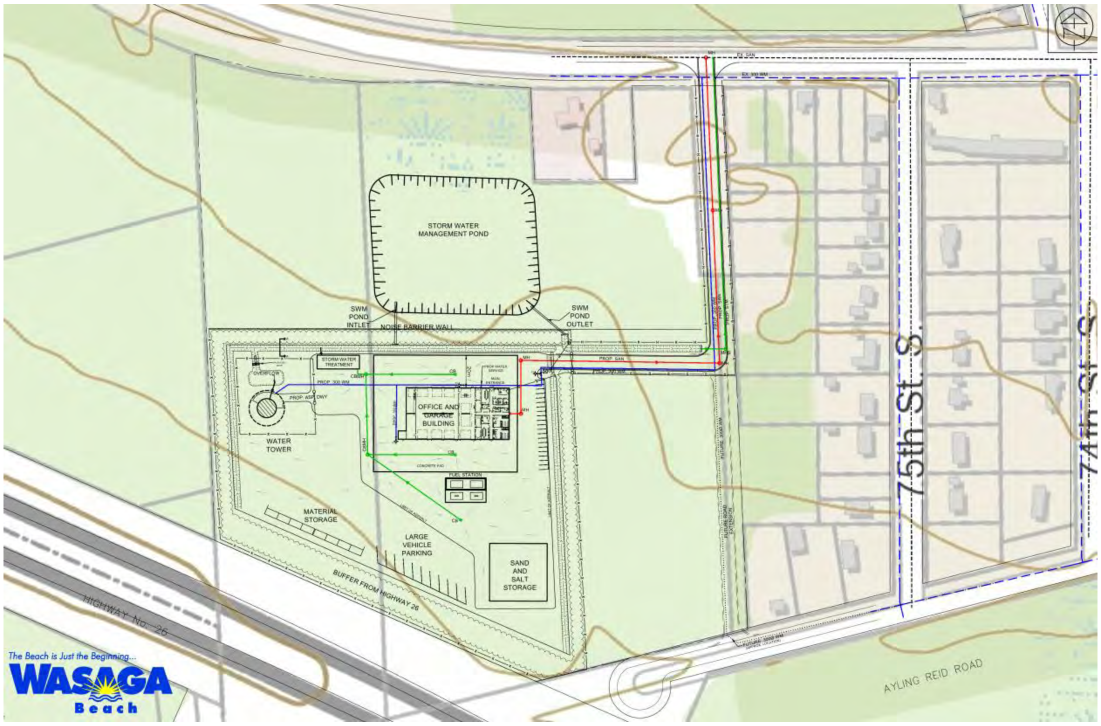


Figure 2 – Alternative 2 – SWMP located south of existing wetland area.

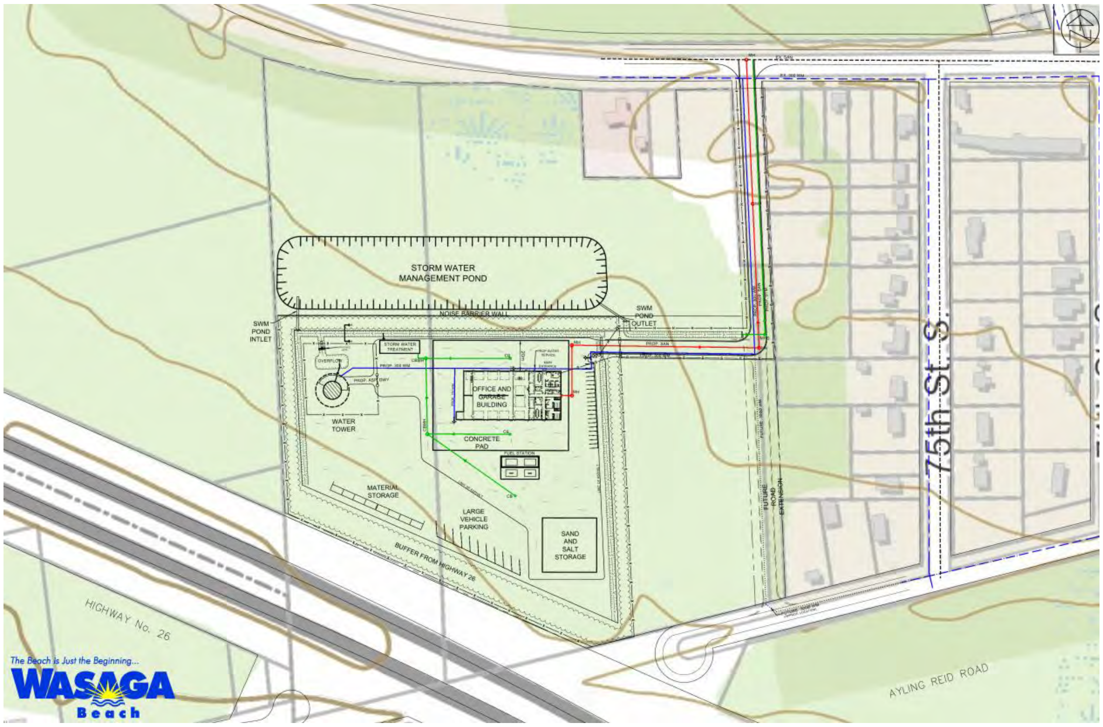


Figure 3 – Alternative 3: SWMP located along the north side of the maintenance depot site.

Figure 4 - Alternative 4: SWMP only servicing the maintenance depot and located on the maintenance depot site

Alternative 1 identifies the SWMP being located on an existing unevaluated wetland. To be able to construct the SWMP in this location additional natural environment studies would need to be conducted to identify any environmental concerns. To help mitigate the environmental impact the SWMP could be combined with the existing environment creating an integrated approach. If habitat is disrupted by this alternative, offsite habitat compensation would need to be completed to allow for minimal disruption to local habitat. This alternative is currently a natural drainage location as it is located at the lowest elevation on the site.

Alternative 2 identifies the SWMP being located directly south of the unidentified wetland. To reduce potential environmental impacts on the unidentified wetland area proper measures would need to be taken. Additionally this SWMP location is close to surrounding properties with existing flooding problems. The SWMP deign would have to try to mitigate these problems and ensure that the existing problem is not intensified.

Alternative 3 is located along the north side of the maintenance depot site. This location will allow for easier construction as the maintenance depot access road can be used during construction. It is also located further away from the unidentified wetland, reducing the chance of environmental impact. This SWMP location could allow for a joint SWMP with the neighbouring property to the west as it abuts the west border of the property.

Alternative 4 is located on the maintenance depot site. It is only large enough to contain and treat runoff from the maintenance depot site and will not benefit future development of the surrounding land. This design would allow the SWMP to not be over designed for the current development on the site however it would not take into consideration future planning.

3.0 Evaluation of Storm Water Management Pond Locations

Each alternative location was evaluated to determine the preferred location of the SWMP. An evaluation table (Table 1) was developed with a set of criteria to assess each alternative. Each alternative was rated as least preferred, partially preferred and most preferred.

Table 1 – Evaluation Table of SWMP Locations

	Alternative 1	**Alternative 2**	**Alternative 3**	**Alternative 4**
Ground water Influence Zone/ Impact to Surrounding Properties	Near properties with existing flooding problems. Could result in negative impact. ○	Near properties with existing flooding problems. Could result in negative impact. ○	Located away from properties with existing flooding problems, reducing potential impact. ●	Located away from properties with existing flooding problems, reducing potential impact. ●
Benefit to Entire Property	Intended to service maintenance depot site and surrounding property. ●	Intended to service maintenance depot site and surrounding property. ●	Intended to service maintenance depot site and surrounding property. ●	Intended to service only the maintenance depot site. ○
Drainage Path	Drainage to culvert 16 (west of the site) where drainage issues are currently experienced. ○	Drainage to culvert 17 (east of the site). ●	Drainage to culvert 17 (east of the site). ●	Drainage to culvert 17 (east of the site). ●
Best Use of Land	Incorporates the existing undefined wetland which may not be useful for development, allowing for the best use of the land. ●	Located on developable land. Remaining land left in sections making it less useful for development. ◑	Located on developable land. Remaining land remains useful for development. ◑	Only incorporates drainage for the maintenance depot site. Additional land would be required to build an additional SWMP when remaining land is developed. ○
Environmental Impact	Large negative impact on existing wetland environment. ○	Potential negative impact on existing wetland environment. ◑	Further from wetland reducing potential impact. ●	Further from wetland reducing potential impact. ●
Elevation of SWMP	At lowest site elevation therefore best suited for draining entire site ●	1-2 m above lowest site elevation ◑	1-2 m above lowest site elevation ◑	3-4 m above lowest site elevation therefore least suited for draining entire site ○
Adequate Size	Can be expanded to accommodate final design. ●	Can be expanded to accommodate final design. ●	Can be expanded to accommodate final design. ●	Only services maintenance depot site. Is not adequate to service entire site. ○
Future Considerations	Incorporates drainage of future development on the site. ◑	Incorporates drainage of future development on the site. ◑	Incorporates drainage of future development on the site. Could be incorporated into drainage plan for the property to the west. ●	Does not incorporate drainage of any future development. ○
Rank	**3**	**2**	**1**	**4**

Evaluation Key: ○ – Least preferred ◑ – Partially Preferred ● – Most Preferred

The preferred alternative is Alternative 3. Alternative 3 was assessed as partially preferred or most preferred for all of the criteria. This alternative will provide the least environmental impact while providing room for future development in the area.

4.0 Conclusions and Recommendations

A SWMP will be constructed for the proposed maintenance depot site to manage stormwater. The construction of the site will cause a change to the existing landscape, reducing natural stormwater management due to the increase of impermeable surfaces. The SWMP will provide both water quality and water quantity control to ensure no negative affect to the downstream drainage area.

Four alternative locations for the SWMP were identified:

Alternative 1 – located on the existing unidentified wetland;

Alternative 2 – located directly south of the unidentified wet land;

Alternative 3 – located along the north side of the maintenance depot site, and;

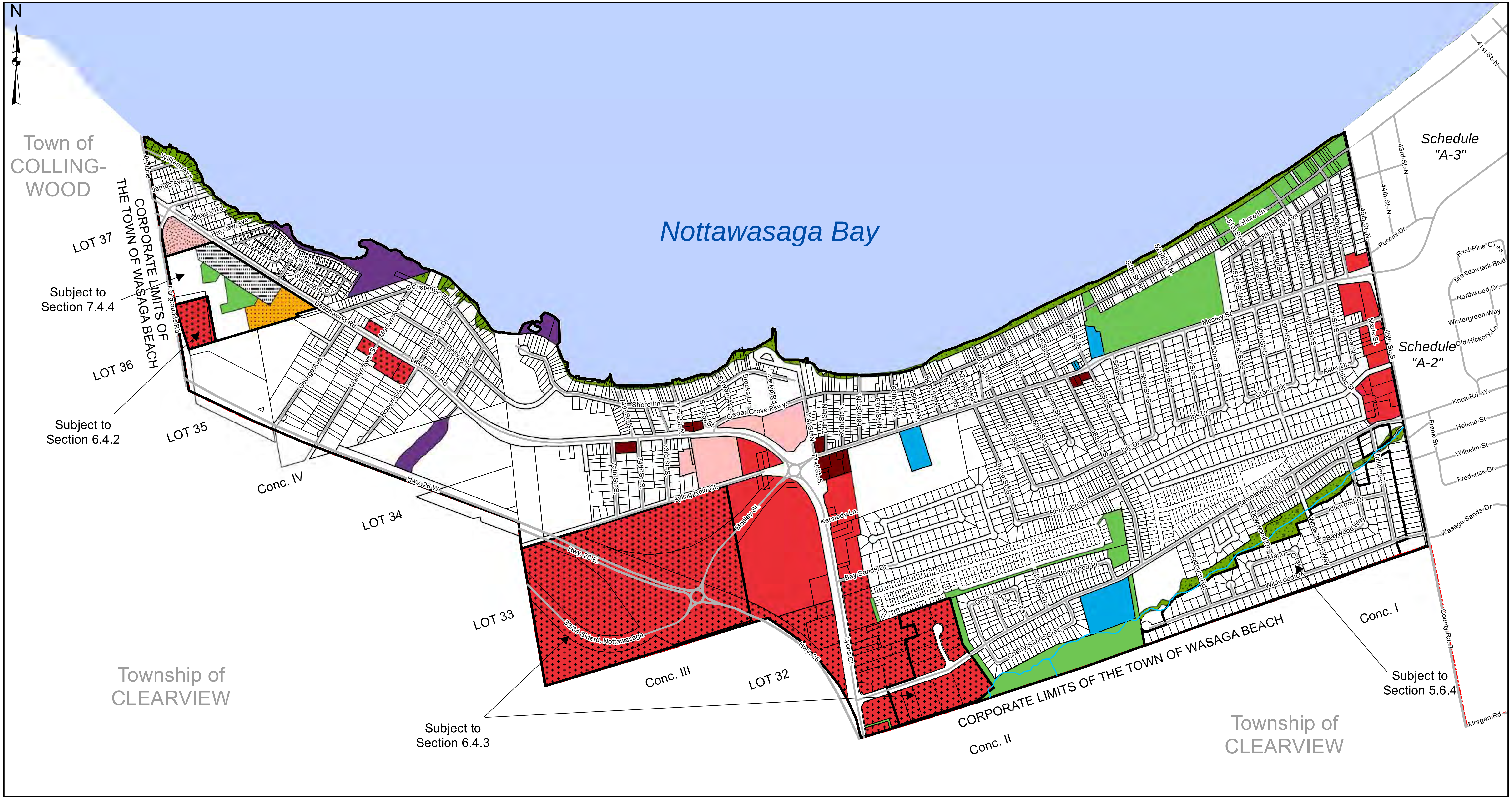
Alternative 4 – located on the maintenance depot site, only servicing the maintenance depot.

Alternative 3 was identified as the preferred location for the SWMP. This location results in the lowest environmental impact and can incorporate runoff from future development in the surrounding area.

In addition to this Class EA a SWMP design will need to be completed to determine the size and function of the SWMP. There may be additional site surveys that need to be conducted to assist with the design.

Appendix – E

Maps from Town of Wasaga Beach Official Plan



Subject to Section 7.4.4

Subject to Section 6.4.2

Subject to Section 6.4.3

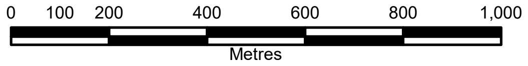
Subject to Section 5.6.4

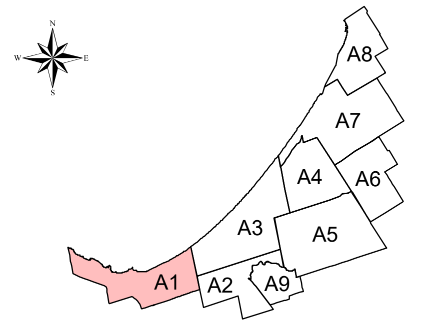
Adopted by Council: Sept 9, 2003

Approved by the County of Simcoe: June 22, 2004

Consolidated: September 6, 2013

NOTE: The lot lines depicted on this map are for reference only and may not reflect accurately property boundaries in all instances.





Legend

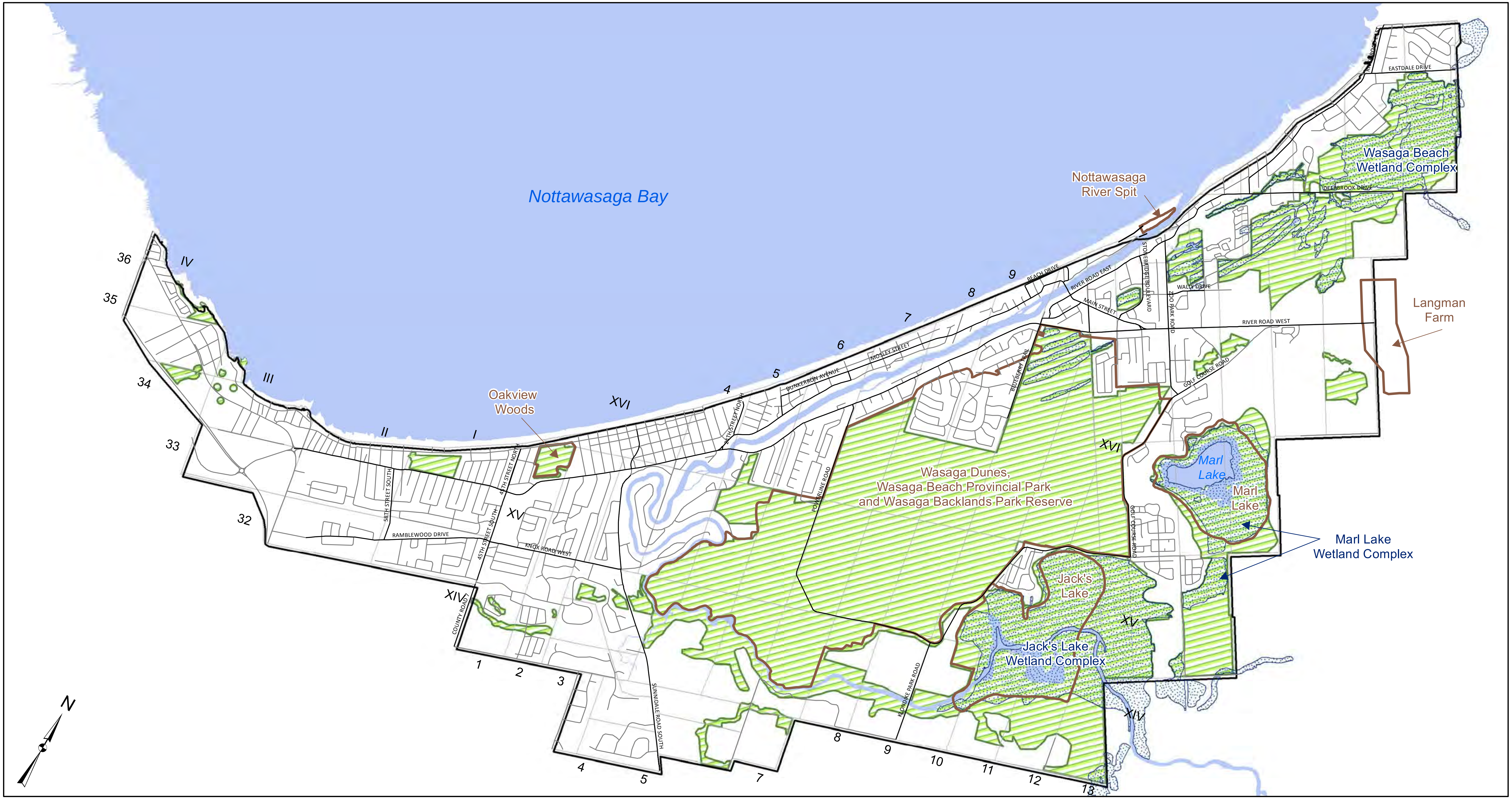
- ☐ Residential
- ▤ High Density Residential
- ⬚ Country Club Community
- 🟥 Campground Commercial
- ▨ Recreational Commercial
- ▩ Service Commercial
- 🟥 District Commercial
- 🟫 Local Commercial
- 🟧 Tourism Accommodation
- ▨ Tourism Commercial
- 🟦 Institutional
- 🟩 Open Space
- ▩ Natural Hazards
- 🟪 Natural Heritage System Category 1
- ▢ Rural
- 🟫 Waste Disposal

TOWN OF WASAGA BEACH INCORPORATED 1974

Schedule 'A-1'

Land Use Plan

Official Plan of theTown of Wasaga Beach



Adopted by Council: September 9, 2003

Approved by the County of Simcoe: June 22, 2004

Consolidated: September 6, 2013

NOTE: The lot lines depicted on this map are for reference only and may not reflect accurately property boundaries in all instances.

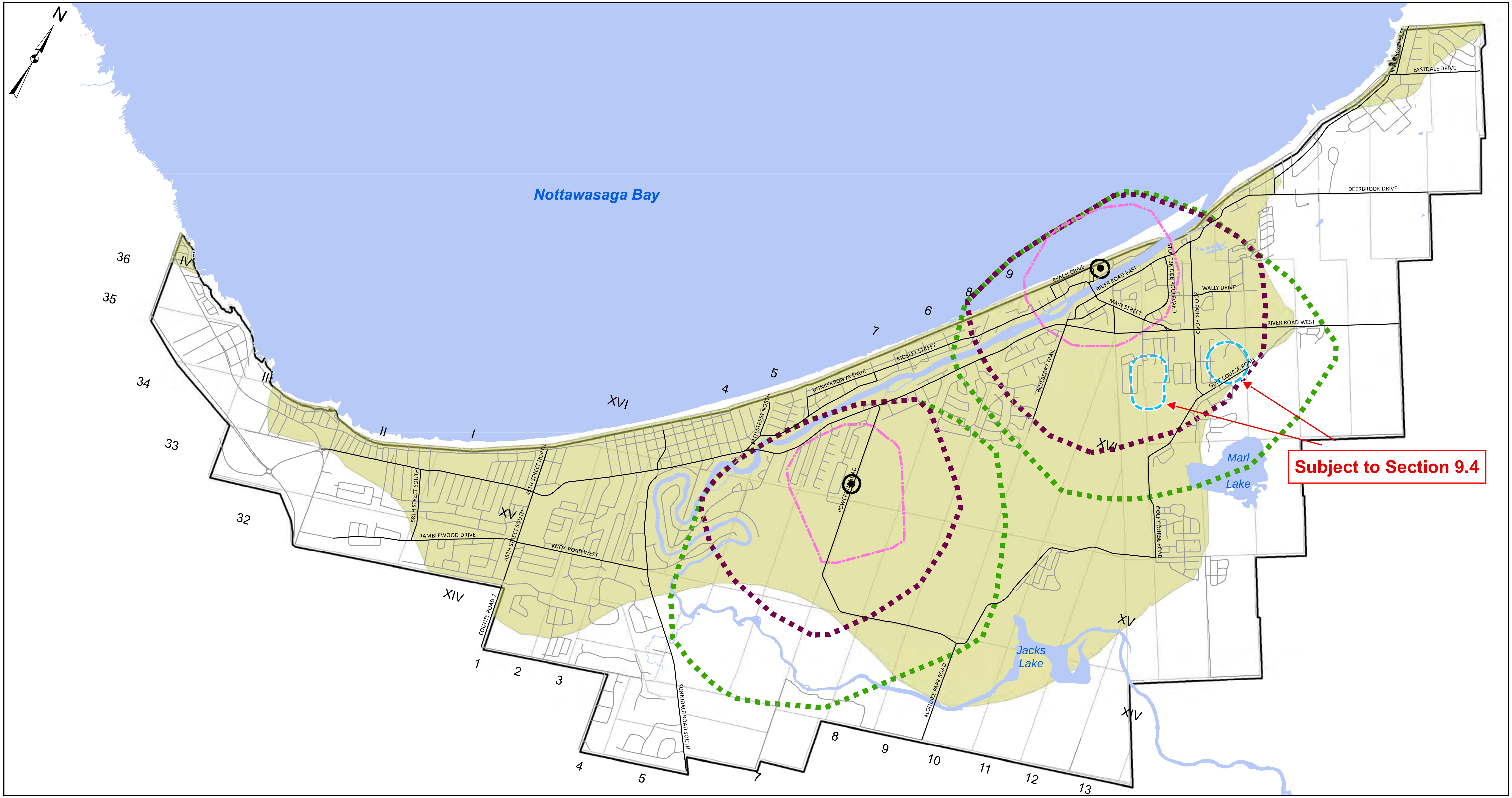
0 300 600 1,200 1,800 2,400 3,000
Metres

▭	ANSI (Area of Natural and Scientific Interest)
▦	Provincially Significant Wetland Complex
▨	Natural Heritage System Category 1 and 2 Lands

Schedule 'D'

Natural Heritage System

Official Plan of theTown of Wasaga Beach



Adopted by Council: September 9, 2003

Approved by the County of Simcoe: June 22, 2004

Consolidated: September 6, 2013

NOTE: The lot lines depicted on this map are for reference only and may not reflect accurate property boundaries in all instances.

0 300 600 1,200 1,800 2,400 3,000
Metres

- ● Municipal Wells
- ☐ Well Head Protection Area-A: 100 Metre Fixed Radius Area Capture Zone
- ☐ Well Head Protection Area-B: 2 Year Capture Zone
- ☐ Well Head Protection Area-C: 2-10 Year Capture Zone
- ☐ Well Head Protection Area-D: 10-25 Year Capture Zone
- ▨ Area of High Aquifer Vulnerability
- ☐ Special Hydrogeological Study Area

TOWN OF WASAGA BEACH • INCORPORATED 1974 •

Schedule 'G'

Wellhead Protection Areas and Vulnerable Aquifer Areas

Official Plan for theTown of Wasaga Beach