



PO Box 1749
Halifax, Nova Scotia
B3J 3A5 Canada

MEMORANDUM

TO: Chair and Members of Regional Waters Advisory Board

FROM: Andrew Bone, Planner III

DATE: April 4, 2017

SUBJECT: **Case 21012: Application by WSP Canada Inc. on behalf of Hamton Holdings Limited to enter in to a development agreement to permit the reduction from 100' to 50' of the environmental setback from a wetland near the corner of Duke Street and Damascus Road, Bedford.**

Background: The applicant wishes to establish a gas bar and small retail development at the southwest corner of Damascus Road and Duke Street in Bedford. Access to the site is limited on Damascus Road by a median. Another access can be enabled on Duke Street, but restrictions related to setbacks from a wetland prohibit such an access. NS Environment has granted permission to the land owner to alter the wetland by installing storage cells which maintain the capacity of the wetland. Such storage cells enable commercial activities to be established on top of the cells such as parking areas and enable an access to Duke Street.

Site: The property is located opposite 91 Duke Street and is:

- Located on the southwest corner of Damascus Road and Duke Street (a Provincially controlled access highway);
- Approximately 9771.4 sq. m. (2.41 acres) in size – located on south east side of the interchange between Highway 101, Bedford Highway and Highway 102 in Bedford.

Location: Southwest corner of Damascus Drive and Duke Street, Bedford (opposite Civic 91 Duke Street).

Existing Use: The site is vacant and previously housed a temporary stormwater management pond.

Designation: Industrial under the Bedford Municipal Planning Strategies (MPS) (Map 1 of Attachment A).

Zoning: ILI (Light Industrial) Zone under the Bedford Land Use By-law) (Map 2 of Attachment A).

MPS Policy: MPS policy for Bedford enables the creation of the ILI Zone which permits a broad range of light industrial, commercial and service uses. Under separate MPS Amendment application is a request to permit gas stations in the ILI Zone.

MPS policies also establish a broad range of environmental policies which regulate activities around environmental features such as wetlands and watercourses. Environmental policies create a requirement for a 100 foot setback from identified wetlands. A reduction to 50 feet is enabled by development agreement

Policy E-8:

In areas where Industrial ILI or IHI Zones, Institutional Zones, or Commercial Zones abut a watercourse or water retention area identified on the map showing environmentally sensitive areas in the Town, Town Council shall prohibit the erection of any structure, or the excavation or filling in of land within 100 feet of the watercourse or water retention area. This 100 ft. area shall be maintained with existing vegetation or landscaped. A reduction in the buffer from 100' to 50' may be considered by Town Council by a development agreement, where it is demonstrated that a property cannot be reasonably developed by complying with the 100 foot setback and site disturbance provisions. A development agreement shall be subject to the provisions of Policy Z-3, and the undertaking of an environmental study which addresses the issues of runoff, erosion, siltation and any other impacts on the watercourse during and after construction. The development agreement shall outline the specific measures to be used to ensure a no net loss in the effectiveness of the natural 100' buffer in terms of protecting the watercourse. The setback and site disturbance provisions of this policy are applicable also to commercial uses in an RCDD zone and multiple unit dwellings in all zones. Single unit dwellings, two unit dwellings and townhouses in all zones are subject to the setback provisions of Policy E-4. Policy E-8 shall not apply to properties abutting the Bedford Basin.

Proposal: The proposal is to establish a gas bar and convenience store, car wash and an additional retail unit with associated parking and on site stacking lanes (for the car wash) while maintaining a 50 foot setback from the wetland. Currently a limited access (right in/right out) to Duke Street is enabled, the addition of a second access to Duke Street enables full access to the site. Infill and a reduced setback are required to gain full access to this site. Further details can be found in Attachments A through E.

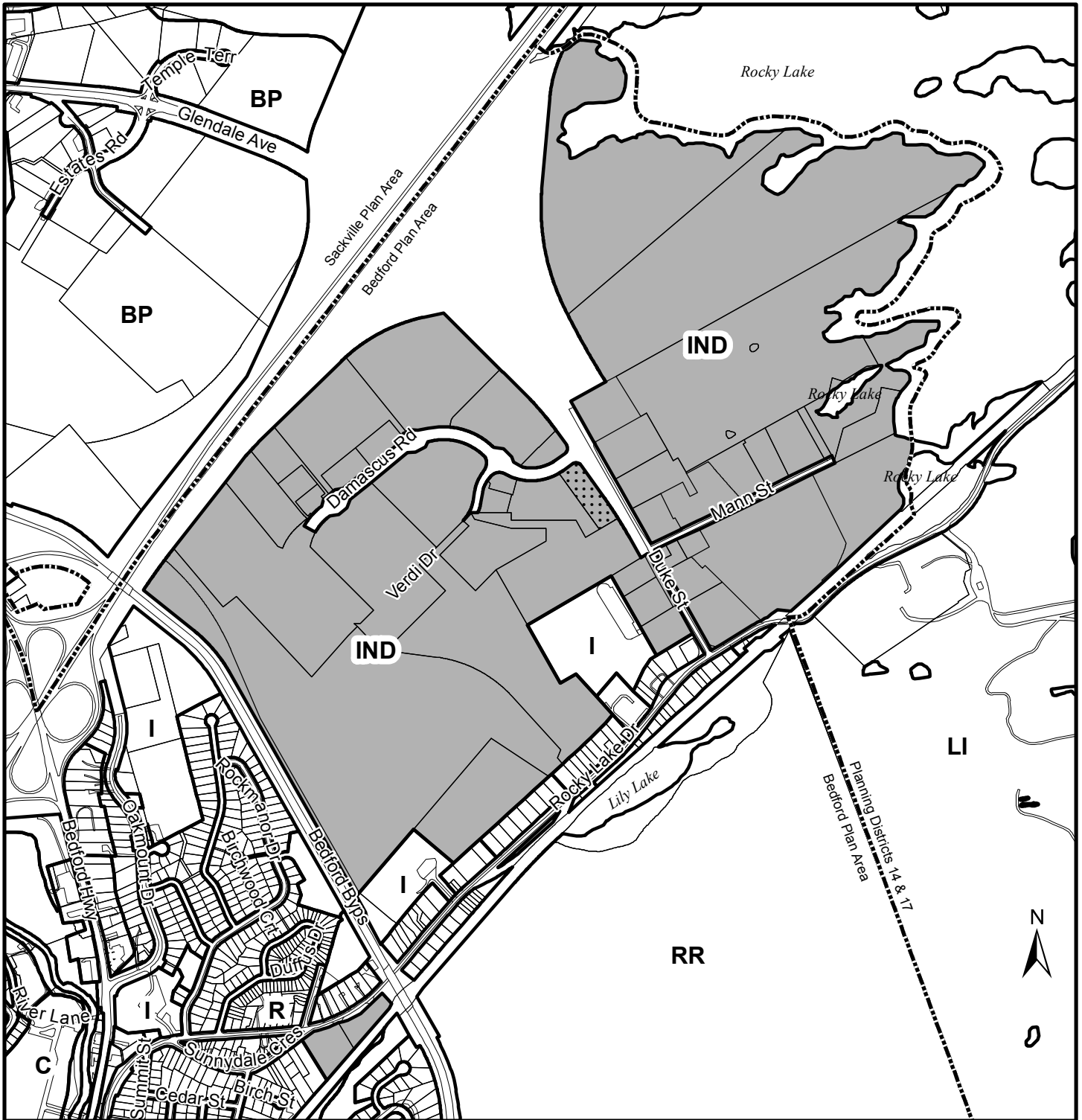
Public Engagement: The Community engagement process is consistent with the intent of the HRM Community Engagement Strategy. The level of community engagement is consultation, achieved through a public information meeting, to be held on April 3, 2017. Notices of the Public Information Meeting have been posted on the HRM website, in the newspaper and mailed to property owners within 500 feet of the site. Staff will provide a verbal summary of public comments received at the public information meeting as the meeting notes may not be complete in time for the April 12, 2017 RWAB meeting.

Input Sought from Regional Waters Advisory Board

Pursuant to the Committee's Terms of Reference, feedback is sought from the Committee relative to the proposed reduction in the environmental setback and the proposal to enter in to a development agreement. RWAB's recommendation will be forwarded to North West Community Council for consideration.




Attachments:

Map 1 Generalized Future Land Use (see Attachment A)
Map 2 Zoning (see Attachment A)
Attachment A: Application Letter
Attachment B: MPS Policy Review (Completed by Applicant)
Attachment C Site Plan
Attachment D Environmental Impact Study
Attachment E Concept Plan



**Map 1 - Generalized Future Land Use
Eastern Bedford Area**

HALIFAX

-  Industrial Designation
-  Subject Site
-  Plan Area Boundary
- Bedford Plan Area

- Bedford Designations**
- R Residential
 - RR Residential Reserve
 - C Commercial
 - IND Industrial
 - I Institutional

- Sackville Designations**
- BP Business Park

- Planning Districts 14 & 17 Designations**
- LI Light Industrial



This map is an unofficial reproduction of a portion of the Generalized Future Land Use Map for the plan area indicated.

The accuracy of any representation on this plan is not guaranteed.

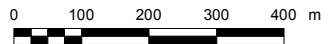


**Map 2 - Zoning
Eastern Bedford Area**

HALIFAX

-  Lands Zoned (ILI)
Light Industrial
-  Subject Site
-  Plan Area Boundary

Zone	
Bedford	RSU Single Unit Dwelling
	RTU Two Unit Dwelling
	RMU Multiple Dwelling Unit
	CGB General Business District
	CSC Shopping Centre
	CHWY Highway Oriented Commercial
	CCDD Commercial Comprehensive Development District
	LIL Light Industrial
	IHI Heavy Industrial
	SI Institutional
	P Park
	FW Floodway
	UR Urban Reserve
Sackville	BP Business Park



This map is an unofficial reproduction of a portion of the Zoning Map for the plan area indicated.

The accuracy of any representation on this plan is not guaranteed.



141-14425

January 24, 2017

HALIFAX – Planning & Development Office
40 Alderney Drive, Floor 2, Alderney Gate
Dartmouth, NS, B2Y 2N5

Attn: Mr. Andrew Bone, Planner III

Re: Application for Development Agreement to reduce the required water retention area setback distance 100 ft. to 50 ft. on PID 41376856

Dear Mr. Bone:

On behalf of our client, Hamton Holdings Limited (Hamton), WSP Canada Inc. (WSP) is pleased to provide you with an application for a Development Agreement (DA) to reduce the required water retention area setback distance 100 ft. to 50 ft. on PID 41376856.

The following report includes policy support and justification for the proposed DA. In addition, the following supporting materials are enclosed:

- Application Form
- Application Fee (\$2,600.00)
- Attachment A: MPS Policy Review (4 copies)
- Attachment B: Site Plan outlining Wetland Buffer and Developable Area (10 copies)
- Attachment C: Environmental Impact Study (4 copies)

WSP trusts that the above listed items are satisfactory to initiate the DA application process.

Background:

The subject property is zoned Industrial Light (ILI) under the LUB, which permits a variety of commercial uses. Hamton is currently undergoing a plan amendment process to enable a gas bar use within the ILI zone.

The subject property includes a portion of a water retention area that can be identified on the map showing environmentally sensitive areas in the Town of Bedford. The land owner has received approval from Nova Scotia Department of Environment to alter this water retention area (wetland) in accordance with the new boundary that is delineated on Attachment B of this application.

Policy E-8 of the Bedford Municipal Planning Strategy speaks about areas of land zoned ILI that abut water retention areas:

Policy E-8: *In areas where Industrial I/LI or I/HI Zones, Institutional Zones (RC-Mar 18/03;E-May 10/03), or Commercial Zones abut a watercourse or water retention area identified on the map showing environmentally sensitive areas in the Town, Town Council shall prohibit the erection of any structure, or the excavation or filling in of land within 100 feet of the watercourse or water retention area. This 100 ft. area shall be maintained with existing vegetation or landscaped. A reduction in the buffer from 100' to 50' may be considered by Town Council by a development agreement, where it is demonstrated that a property can not be reasonably developed by complying with the 100 foot setback and site disturbance provisions. A development agreement shall be subject to the provisions of Policy Z-3, and the undertaking of an environmental study which addresses the issues of runoff, erosion, siltation and any other impacts on the watercourse during and after construction. The development agreement shall outline the specific measures to be used to ensure a no net loss in the effectiveness of the natural 100' buffer in terms of protecting the watercourse. The setback and site disturbance provisions of this policy are applicable also to commercial uses in an RCDD zone and multiple unit dwellings in all zones. Single unit dwellings, two unit dwellings and townhouses in all zones are subject to the setback provisions of Policy E-4. Policy E-8 shall not apply to properties abutting the Bedford Basin.*

Discussion:

The proximity of the subject properties frontage on Damascus Road to the intersection of Damascus Road and Duke Street, as well as the existing boulevard layout of Damascus Road adjacent to the site prohibits a principle access (right & left turn in and right & left turn out) to be provided to the site from Damascus Road. Therefore, in order to provide a principle access to the site, it must be located off Duke Street.

The Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) does not allow a principle access driveway to be located on Duke any closer to the intersection of Damascus Street and Duke Street than what is currently shown on Attachment B.

Attachment B also illustrates that the proposed principle driveway entrance off Duke Street directly aligns with a 50 ft. buffer distance taken from the edge of the approved wetland alteration boundary.

Policy E-8 states that “a reduction in the buffer from 100' to 50' may be considered by Town Council by a development agreement, where it is demonstrated that a property can not be reasonably developed by complying with the 100 foot setback and site disturbance provisions.”

Due to principle access limitations from both Damascus Road frontage (close proximity to intersection & boulevard street layout) and the Duke Street frontage (required intersection setback distance from NSTIR) the watercourse buffer must be reduced from 100 ft. to 50 ft. in order to enable sufficient principle access to the subject site.

Policy E-8 also states the following:

- A development agreement shall be subject to the provisions of Policy Z-3
 - Please refer to Attachment A which outlines how this DA application complies with Policy Z-3
- A development agreement shall also be subject to the undertaking of an environmental study which addresses the issues of runoff, erosion, siltation and any other impacts on the watercourse during and after construction.
 - Please refer to Attachment C, which is an Environmental Study that addresses the issues of runoff, erosion, siltation and any other impacts on the watercourse during and after construction. The study also outlines the specific measures to be used to ensure a no net loss in the effectiveness of the natural 100' buffer in terms of protecting the watercourse




Conclusion:

We would ask that you accept this application to consider the proposed DA to reduce the watercourse setback at the subject site from 100 ft. to 50 ft. for reason outlined in the above report and the attached. Thank you, and should you have any questions or comments, please do not hesitate to contact the undersigned.

Sincerely,

 ORIGINAL SIGNED

Connor Wallace, BCD
Urban Planner
WSP Canada Inc.
1 Spectacle Lake Drive, Dartmouth, NS
T: 902-835-9955


Attachment B - MPS Policy Review
(Completed by Applicant)



Policy Criteria	Comment
<p>Z-3 It shall be the policy of Town Council when considering zoning amendments and development agreements [excluding the WFCDD area] with the advice of the Planning Department, to have regard for all other relevant criteria as set out in various policies of this plan as well as the following matters:</p> <ol style="list-style-type: none"> 1. That the proposal is in conformance with the intent of this Plan and with the requirements of all other Town By-laws and regulations, and where applicable, Policy R-16 is specifically met; 2. That the proposal is compatible with adjacent uses and the existing development form in the neighbourhood in terms of the use, bulk, and scale of the proposal; 3. That provisions are made for buffers and/or separations to reduce the impact of the proposed development where incompatibilities with adjacent uses are anticipated; 4. That provisions are made for safe access to the project with minimal impact on the adjacent street network; 5. That a written analysis of the proposal is provided by staff which addresses whether the proposal is premature or inappropriate by reason: <ol style="list-style-type: none"> i) the financial capability of the Town to absorb any capital or operating costs relating to the development; 	<ol style="list-style-type: none"> 1. Proposal is in conformance with Industrial Objective of the MPS which is to promote industrial development which is appropriately located in relation to the physical environment and other land uses, consistent with the preservation, creation and maintenance of a well-balanced community. 2. Proposed development is compatible with its adjacent land uses, which are also commercial and industrial. 3. There are no incompatibilities with proposed development and adjacent uses, which are also commercial and industrial 4. Proposed primary access on Duke Street as is located beyond the minimum setback distance required from intersections by NSTIR 5. <ol style="list-style-type: none"> i). Town will not absorb any capital or operating costs relating to the proposed development.

<p>ii) the adequacy of sewer services within the proposed development and the surrounding area, or if services are not provided, the adequacy of physical site conditions for private on-site sewer and water systems;</p> <p>iii) the adequacy of water services for domestic services and fire flows at Insurers Advisory Organization (I.A.O.) levels; the impact on water services of development on adjacent lands is to be considered;</p> <p>iv) precipitating or contributing to a pollution problem in the area relating to emissions to the air or discharge to the ground or water bodies of chemical pollutants;</p> <p>v) the adequacy of the storm water system with regard to erosion and sedimentation on adjacent and downstream areas (including parklands) and on watercourses;</p> <p>vi) the adequacy of school facilities within the Town of Bedford including, but not limited to, classrooms, gymnasiums, libraries, music rooms, etc.;</p> <p>vii) the adequacy of recreational land and/ or facilities;</p> <p>viii) the adequacy of street networks in, adjacent to, or leading toward the development regarding congestion and traffic hazards and the adequacy of existing and proposed access routes;</p> <p>ix) impact on public access to rivers, lakes, and Bedford Bay shorelines;</p> <p>x) the presence of significant natural features or historical buildings and \ sites;</p>	<p>ii). Adequate servicing infrastructure existing within and around the site to support the proposed development</p> <p>iii). Adequate servicing infrastructure existing within and around the site to support the proposed development</p> <p>iv). Provincial Regulation for Gasoline retails ensure that there will be no emissions to the air or discharges to the ground of chemical pollutants.</p> <p>v). Refer to Attachment C – Preliminary Servicing Schematic</p> <p>vi). N/A</p> <p>vii). N/A</p> <p>viii). Proposed primary access on Duke Street as is located beyond the minimum setback distance required from intersections by NSTIR</p> <p>ix). N/A</p> <p>x). Setback distances from wetland feature identified in Attachment B.</p>
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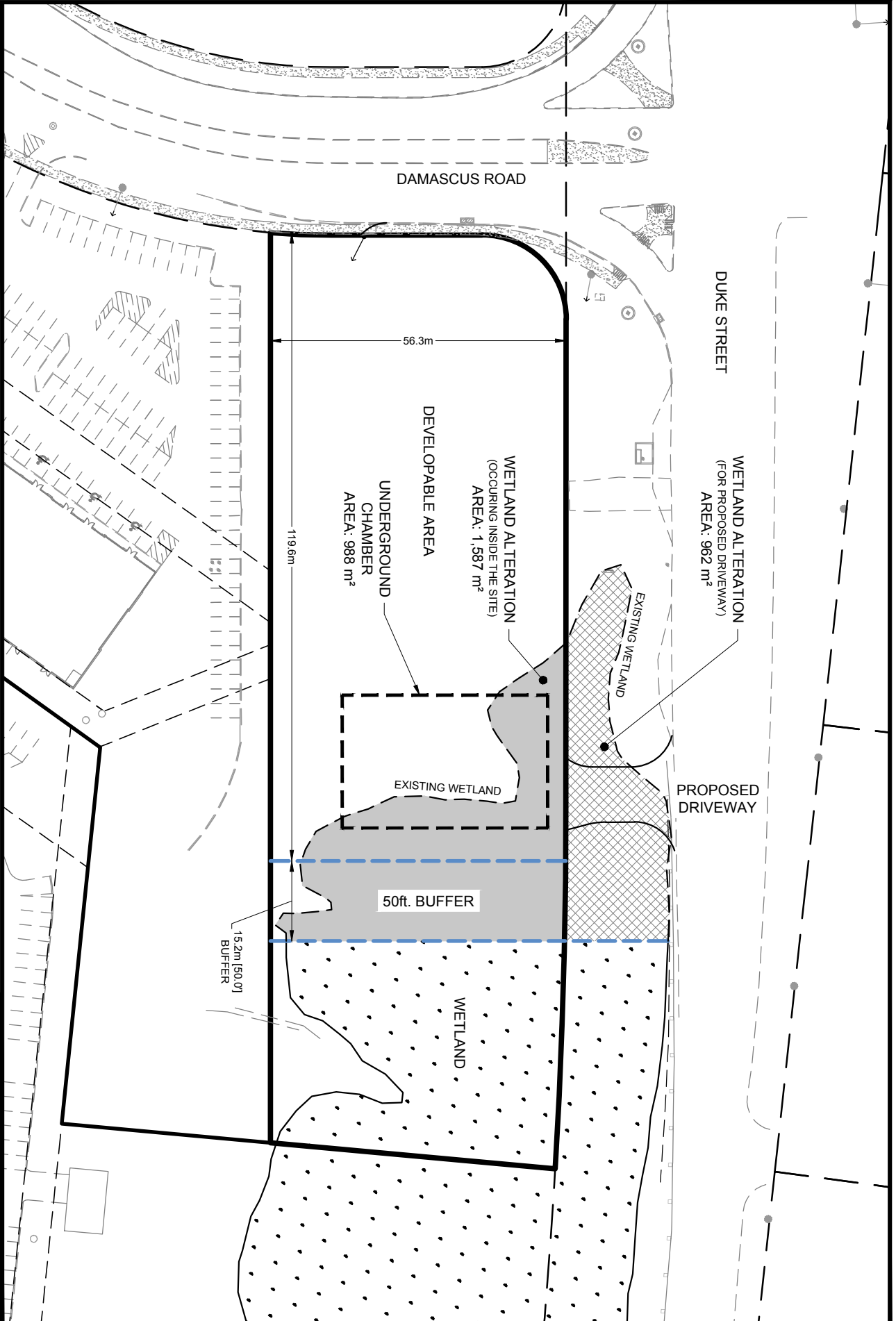
<p>xi) creating a scattered development pattern which requires extensions to trunk facilities and public services beyond the Primary Development Boundary;</p> <p>xii) impact on environmentally sensitive areas identified on the Environmentally Sensitive Areas Map; and,</p> <p>xiii) suitability of the proposed development's siting plan with regard to the physical characteristics of the site.</p> <p>6. Where this plan provides for development agreements to ensure compatibility or reduce potential conflicts with adjacent land uses, such agreements may relate to, but are not limited to, the following:</p> <p>i) type of use, density, and phasing;</p> <p>ii) traffic generation, access to and egress from the site, and parking;</p> <p>iii) open storage and landscaping;</p> <p>iv) provisions for pedestrian movement and safety;</p> <p>v) provision and development of open space, parks, and walkways;</p> <p>vi) drainage, both natural and subsurface;</p> <p>vii) the compatibility of the structure(s) in terms of external design and external appearance with adjacent uses; and,</p> <p>viii) the implementation of measures during construction to minimize and mitigate adverse impacts on watercourses.</p>	<p>xi). Proposed development is located within the Primary Development Boundary.</p> <p>xii). Setback distances from wetland feature identified in Attachment B.</p> <p>xiii). Developable area is sufficiently setback from wetland in accordance with a DA application</p> <p>6.</p> <p>i). Proposed use is compatible with adjacent commercial and industrial land uses.</p> <p>ii). N/A</p> <p>iii). N/A</p> <p>iv). N/A</p> <p>v). N/A</p> <p>vi). Developable area is sufficiently setback from wetland in accordance with a DA application. Setback distance will allow for sufficient drainage</p> <p>vii). Proposed structure is compatible with adjacent commercial and industrial land uses</p> <p>viii). Developable area is sufficiently setback from wetland in accordance with a DA application</p>
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<p>7. Any other matter enabled by Sections 73 and 74 of the Planning Act.</p> <p>8. In addition to the foregoing, all zoning amendments and development agreements shall be prepared in sufficient details to:</p> <ul style="list-style-type: none"> i) provide Council with a clear indication of the nature of the proposed development; and ii) permit staff to assess and determine the impact such development would have on the proposed site and the surrounding community. <p>9. To assist in the evaluation of applications to enter into development agreements, Council shall encourage proponents to provide the following information:</p> <ul style="list-style-type: none"> a) a plan to a scale of 1":100' or 1":40' showing such items as: <ul style="list-style-type: none"> i) an overall concept plan showing the location of all proposed land uses; ii) each residential area indicating the number of dwelling units of each type and an indication of the number of bedrooms; iii) description, area, and location of all proposed commercial, cultural, mixed-use projects proposed; iv) location, area, shape, landscaping and surface treatment of all public and private open spaces and/or park areas; v) plan(s) showing all proposed streets, walkways, sidewalks, bus bays and bike routes; vi) a description of any protected viewplanes; and, 	<p>7. N/A</p> <p>8.</p> <ul style="list-style-type: none"> i) Attached letter provides clear indication of the nature of the proposed DA. ii) Supporting Environmental Study permit staff to assess and determine the impact the proposed DA will have on the proposed site and the surrounding community. <p>9.</p> <ul style="list-style-type: none"> i). Refer to Attachment B ii). N/A iii). Refer to Attachment B iv). N/A v). Refer to Attachment B vi). N/A
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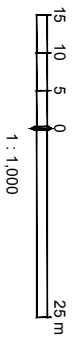
<p>vii) an indication of how the phasing and scheduling is to proceed.</p> <p>b) For individual phases of a development more detailed concept plans are to be provided indicating such items as maximum building heights, location and configuration of parking lots, landscaping plans, and any additional information required to be able to assess the proposal in terms of the provisions of the Municipal Planning Strategy.</p> <p>c) Plans to the scale of 1":100' showing schematics of the proposed sanitary and storm sewer systems and, water distribution system.</p> <p>10. Within any designation, where a holding zone has been established pursuant to Infrastructure Charges - Policy IC-6", Subdivision Approval shall be subject to the provisions of the Subdivision By-law respecting the maximum number of lots created per year, except in accordance with the development agreement provisions of the MGA and the Infrastructure Charges@ Policies of this MPS. (RC-Jul 2/02;E-Aug 17/02)</p>	<p>vii). N/A</p> <p>b). The site will be developed in a single phase.</p> <p>c). Preliminary Servicing Schematic provided with MPS amendment application to enable a Gas Bar use at the subject site (Case:</p> <p>10. N/A</p>
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SITE PLAN
DUKE STREET / DAMASCUS ROAD
 Bedford, Nova Scotia



SCALE



DATE: 13-JANUARY-2017



Hampton Holdings

Impact Assessment – Lot 12A-2 Duke Street, Bedford, Nova Scotia

Report

Date: January 23, 2017
Ref. N°: B-0015573-1





Hampton Holdings

Impact Assessment, Lot 12A-2 Duke Street, Bedford, Nova Scotia

Report | B-0015573-1

Prepared by: Original Signed
Jenna Walker, B.Env.Sc., M.F., CET.
Environmental Professional, Environmental Engineering

Approved by : Original Signed
Aven Cole, M.Sc.E., P.Eng.
for Project Manager, Environmental Engineering



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Appendix 2	Test Pit Logs
Appendix 3	Details of Underground Storage System



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Test results mentioned herein are only valid for the sample(s) stated in this report.

Englobe's subcontractors who may have accomplished work either on site or in laboratory are duly qualified as stated in our Quality Manual's procurement procedure. Should you require any further information, please contact your Project Manager.*

REVISION AND PUBLICATION REGISTER		
Revision N°	Date	Modification And/Or Publication Details
00	2016-12-12	Report Issued
01	2017-01-23	Report Revised



EXECUTIVE SUMMARY

Hampton Holdings Limited currently plans to construct two commercial buildings and a gas bar on Lot 12A-2 Duke Street, in a commercial area of Bedford, Nova Scotia called "Bedford Common."

The subject property contains a single wetland (Wetland 1) which is considered an environmentally sensitive area according to the 2015 Bedford Municipal Planning Strategy (MPS). Policy E-8 of the MPS states that it is prohibited to erect any structure or excavate or fill any land within 100 ft of a water retention area. A reduction in the buffer from 100 ft to 50 ft may be considered by a development agreement, where it is demonstrated that a property cannot be reasonably developed by complying with the 100 ft setback and site disturbance provisions.

A development agreement is being requested to reduce the buffer due to the fact that the Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) will not allow for the driveway to be any closer to the intersection of Duke Street and Damascus Road than where it is shown on the site development plan in Appendix 1. As such, if the buffer is more than 50 ft, the site cannot be reasonably developed as there won't be full access to the site.

An impact assessment regarding a reduction in the buffer is presented in this report, and contains those items as indicated in Appendix A of the MPS. Topics include soils, surficial geology, and groundwater conditions, and respective limitations for development.

Where organic materials are encountered in the proposed building areas at the subject property, all fill and organic deposits should be removed and replaced with structural fill. Temporary stockpiles should not be placed near the wetland on the subject or adjacent properties, in order to prevent runoff, erosion and siltation. To further minimize the effects of the proposed development on the wetland and to assist in required earthworks, a geotechnical barrier will be constructed between the developable area and the buffer. Environmental controls will be introduced prior to site works, including an anchored silt boom, silt fencing, etc.

A Nova Scotia Environment wetland alteration *Approval* has been issued to alter the wetland. In the parking areas that overly the wetland, subsurface water retention will be incorporated into the parking structure design allowing for storm water to infiltrate the ground instead of running off and therefore reducing the siltation potential of the wetland. Ideally the buffer zone will be vegetated with shrubs and trees to further prevent erosion and subsequent siltation, or promote infiltration.

Shallow perched water will be controlled by the stormwater management plan that has been designed by Designpoint Engineering and Surveying Ltd. (2015) to replace the lost storage area offered by the wetland within the boundaries of the subject property. The proposed plan involved the construction of an underground stormwater management system. Preliminary design has shown that this system can be constructed to manage all stormwater that is currently being held by



the on-site portion of the wetland. The underground system will feed into the wetland and therefore will ensure that the water level in the wetland remains generally the same.

Provided the developer follow applicable guidelines and suggested best practices, no negative impacts from this project are expected to result if the setback requirement is reduced from 100ft to 50ft.

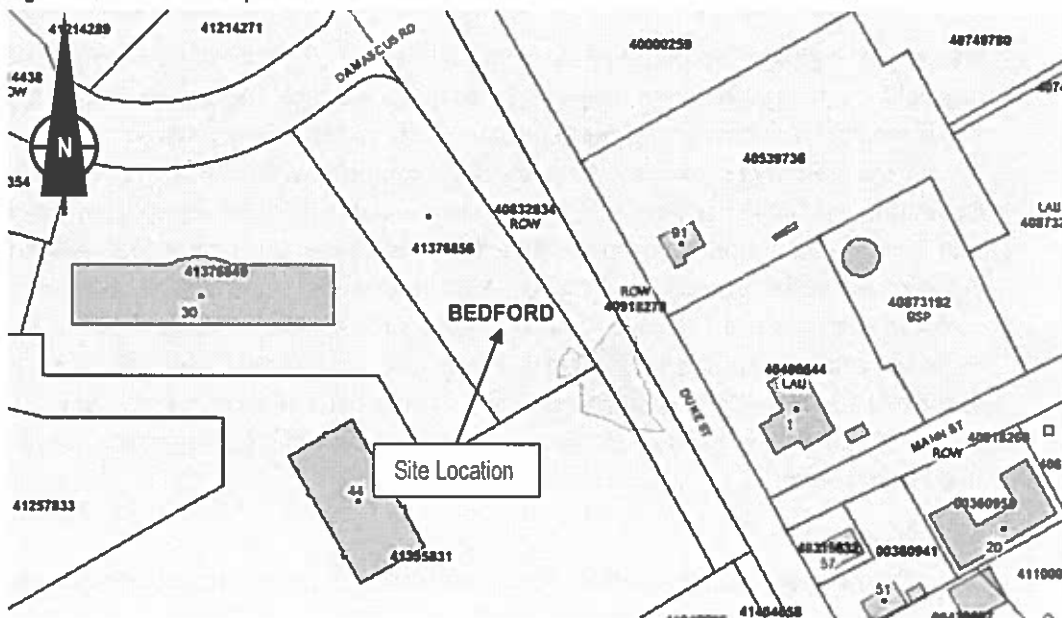
1 INTRODUCTION

Hampton Holdings Limited currently plans to construct two commercial buildings and a gas bar on Lot 12A-2 Duke Street (herein referred to as the subject property) in a commercial area of Bedford, Nova Scotia called "Bedford Common."

1.1 Site Description

The subject property contains a single wetland (Wetland 1) which is considered an environmentally sensitive area according to the 2015 *Bedford Municipal Planning Strategy* (MPS). The wetland is located on the west side of Duke Street, between Mann Street and Damascus Road. The entire wetland straddles two private properties (PID Nos. 41376856 and 41395831) and the Duke Street right-of-way. The entire wetland is 9114 m² in size, and the proposed development involves infilling 1587 m² of the 5222 m² of Wetland 1 that is within the subject property. It is planned that a portion of Wetland 1 will remain within the subject property to the south of the infill, following development. Refer to Figure 1-1 below for a site location map and Appendix 1 for site photographs and site development plans.

Figure 1-1. Site Location Map



Directly to the northwest, and beyond the narrow band of trees to the west, is Bedford Commons, a large commercial retail development. A former stormwater retention pond that was subsequently infilled, is present immediately north of the wetland. A narrow band of trees is present surrounding the wetland on the south side. Commercial developments are present to the south. Industrial activity is present beyond Duke Street to the east. The lands immediately

upgradient of the wetland are developed and asphalt surfaced; downgradient, the historic low lying lands between the wetland and Rocky Lake have been largely infilled for the construction of Duke Street and the development of the industrial properties.

1.2 Wetland

The following is a summary of the ecological character of Wetland 1, as described by Macallum Environmental Ltd. (MEL), in the Alteration Application submitted in September 2015.

Wetland 1 is a terrene outflow fresh water marsh in a headwater position. It receives passive overland drainage from adjacent uplands all of which is stormwater. There is a drainage outlet that flows through a culvert at the northern edge of the wetland under Damascus Drive. Overflow stormwater will backflow from the culvert at the northern end of the wetland and provide additional stormwater inflow into the wetland during severe storm events. The drainage pathways are described in more detail in Section 1.3. Standing water is present across approximately 90% of the wetland, to a depth exceeding 100cm. Highly decomposed saturated organic soil is present to a depth of 15cm restricted by rock. The vegetation is dominated by Broadleaved cattail, Canada Rush and American White Water Lily. There was no tree cover observed although small amounts of Red Maple saplings were observed. Trace amounts of exotic Yellow Iris was identified and trace amounts of Purple Loosestrife was also observed.

MEL determined that this wetland is an isolated, fresh water marsh with a drainage outlet flowing through a culvert which drains north along Duke Street. This drainage outlet also acts as an overflow inlet through the designed stormwater system during peak storm flows. Through the outlet culvert from Wetland 1, there is a direct connectivity with Sucker Brook (east of Duke Street). Sucker Brook has been infilled downstream and re-routed, limiting current connectivity with Rocky Lake. It is possible that resident fish (species unknown) are present within Wetland 1, but continued fish passage to Wetland 1 from downstream surface water systems has been compromised. Wetland 1 provides potential habitat for amphibians, reptiles, waterbirds, and waterfowl although it is located in a highly industrial and commercial area of Bedford. No species at risk were identified during site visit within its boundaries or within its associated upland buffers. The wetland type is common in Nova Scotia and the vegetation community is not unique or rare.

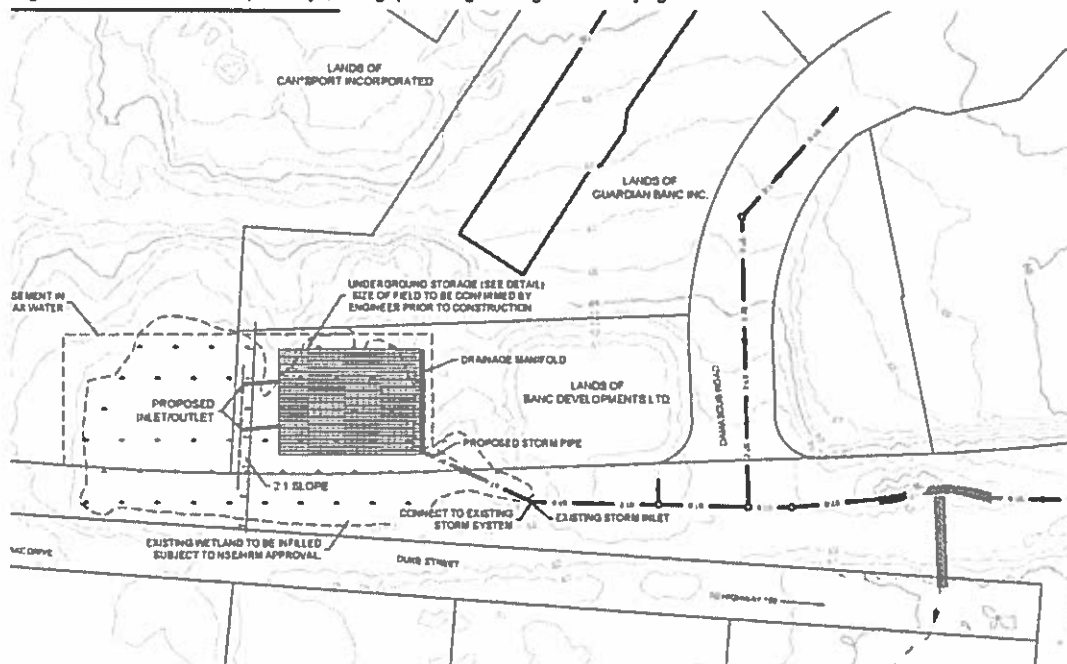
1.3 Site Drainage

Two drainage pipes (carrying surface water into Wetland 1 during precipitation events), each along Duke Street and the south western edge of Wetland 1, were observed. A culvert is located at the most northern extent of the wetland (corner of Duke and Damascus). Overflow stormwater will backflow from the culvert at the northern end of the wetland and provide additional stormwater inflow into the wetland during severe storm events. Standing water is present across approximately most of the wetland.

Currently the Bedford Commons retail/office development has a piped storm drainage system that discharges to a control storm manhole at the intersection of Duke Street and Damascus Road. At this control manhole the flow is split with the 1 in 5 year predevelopment flow amount being directed towards the northwest along Duke Street to an 1800mm diameter culvert crossing Duke Street, from this point the water flows in Sucker Brook to Rocky Lake.

The flow to the control manhole in excess of the 1 in 5 year predevelopment flow is directed towards the southeast in a pipe parallel to Duke Street where it discharges to Wetland 1. This wetland fills up during the peak of a rainstorm and drains back down through the control manhole once the storm has passed. The normal wetland water elevation is 40.0m and during the peak of a 1 in 5 year storm it would be as high as approx. 41.2m (Designpoint Engineering and Surveying Ltd, 2015). The stormwater patterns are depicted in Figure 1-2, below.

Figure 1-2. Stormwater flow pathways, Designpoint Engineering and Surveying Ltd.



Policy E-8 of the MPS states that it is prohibited to erect any structure or excavate or fill any land within 100 ft of a water retention area. The 100 ft area shall be maintained with existing vegetation or landscaped. A reduction in the buffer from 100 ft to 50 ft may be considered by a Development Agreement, where it is demonstrated that a property cannot be reasonably developed by complying with the 100 ft setback and site disturbance provisions. A development agreement shall be subject to the provisions of Policy Z-3, and the undertaking of an environmental study (i.e. this report) which addresses the issues of runoff, erosion, siltation and any other impacts on the water retention area during and after construction.



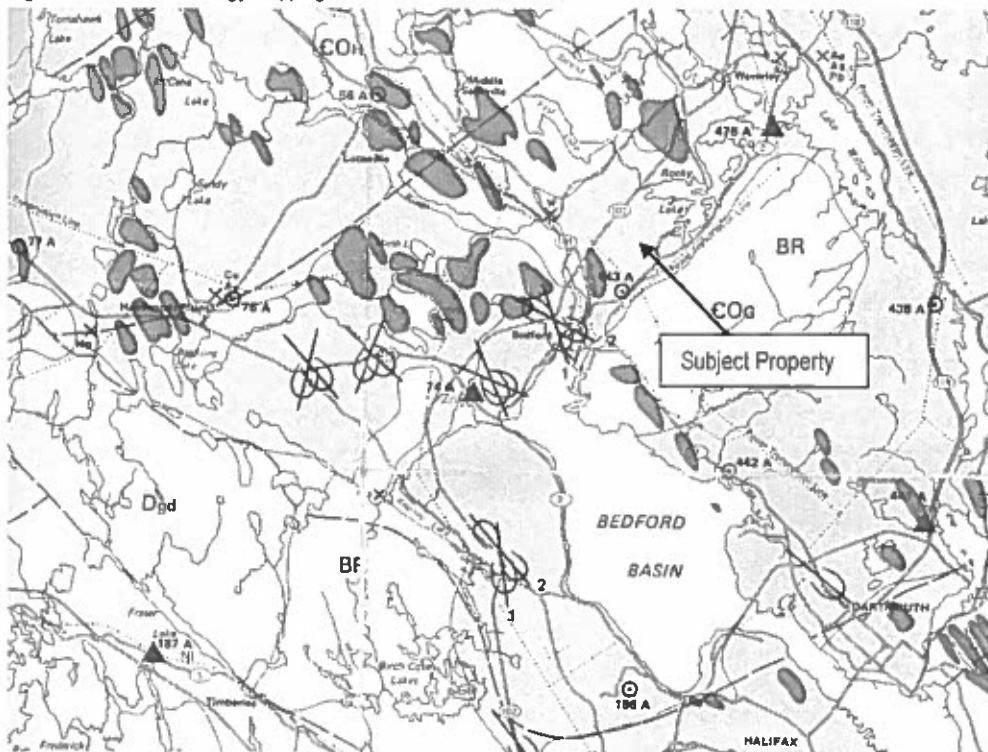
An impact assessment regarding the proposed commercial development and specifically, a reduction in the buffer from 100 ft to 50 ft, is presented in this report, and contains those items as indicated in Appendix A of the MPS. Topics include soils, surficial geology, and groundwater conditions, and respective limitations for development. A Development Agreement is being requested to reduce the buffer due to the fact that the Nova Scotia Department of Transportation and Infrastructure Renewal (NSTIR) will not allow for the driveway to be any closer to the intersection of Duke Street and Damascus Road than where it is shown on the site development plan in Appendix 1. As such, if the buffer is more than 50 ft, the site cannot be reasonably developed, as there won't be full access to the site.

2 SUBSURFACE CONDITIONS

The surficial geology of the area has been compiled and mapped by R.R. Stea and D. Hemsworth, 1978, and published by Nova Scotia Department of Mines and Energy, Sheet 4, Central Nova Scotia, Scale = 1:100,000, 1980 (refer to Figure 2-1).

The surficial geology mapping indicates that the native soils in this area are glacial deposits known regionally as Quartzite Till and are comprised of bluish-grey sands and/or silty sands with abundant gravel, cobble and boulder sizes. These glacial deposits are derived from the underlying bedrock geology.

Figure 2-1. Surficial Geology Mapping



2.1 Methodology

A geotechnical investigation of the subject property was carried out by Englobe on March 9 2016, to assess the subsurface conditions at select areas of the site. Seven (7) test pits were put down within the proposed development area (refer to the site development plan in Appendix 1 for test pit locations and Appendix 2 for test pit logs). Permission to access the existing wetland area was not available at the time of investigation. In summary, the soil conditions encountered were somewhat variable. Groundwater was encountered at 6 of 7 test pits. The following paragraphs further describe the subsurface conditions at the site.

Grass/Topsoil

A layer of grass/topsoil has been encountered at the surface of test pit TP 7. Minor vegetation was encountered at the surface of TP 1 and TP 5.

Fill

Fill deposits were encountered either below the organic soils or at the surface of all test pits. The fill generally varied from rockfill with large to small boulders and cobbles and trace gravel and silt, to silty sand, some boulders/cobbles, gravel and organic materials, and trace clay. Observations of the insitu deposits indicated that the material was loose to compact and light

brown to black in colour and its moisture content was described as moist to saturated. The fill was proven to a total depth of 5.5 metres below the existing ground surface at test pit TP 7.

Peat

Peat deposits are expected within the wetland area located to the southwest, beyond the area currently investigated. Permission to access this wetland area was not granted at time of investigation.

Previous probing of the current development area in 2009 indicated approximately 0.1 to 1.7 metre (0.3 to 5.5 feet) of soft deposits above more competent soils within the wetland areas .

Glacial Till

At all test pits site-native glacial deposits were encountered below the fill deposits. The glacial soil consisted of a mixture of silt, sand, and gravel with trace clay and occasional cobbles. Observations of the insitu deposits indicated that the material was compact, light brown to greyish brown in colour and its moisture content was described as wet to saturated. The site till deposits were proven to a total depth of 6.4 metres below the existing ground surface at test pit TP 7.

Bedrock

Bedrock was not confirmed during the current investigation; however, practical refusal on bedrock or large boulders was encountered at select test pits, below water level. Geology mapping of the area indicates the site is underlain by quartzite/greywacke. This corresponds with observations of nearby outcropping. Typically, bedrock in this area has only nominal natural soil cover.

Wetland

Field investigation of accessible wetland areas was conducted by Englobe on March 18, 2009. This was carried out by hand probing with small diameter fiberglass rods at strategic locations. Generally, shallow to moderate depth of organic deposit (0.1 to 1.7 metre (0.3 to 5.5 feet)) was inferred at the probe locations, below a shallow layer of surface water. Field results indicated refusal on bedrock (and possibly boulders) below the organic deposit. Exposed surface bedrock and boulders was observed in adjacent site areas, and is indicative of the local geology.

McCallum Environmental Ltd. (2016) completed a soil pit within the wetland to test for hydric soil conditions. They found highly decomposed saturated organic soil present to a depth of 15cm restricted by rock.

Other Considerations

The local topography in the subject property area is generally flat, and slopes do not exceed 20%. No areas of slumping or mass wasting, or unstable slopes were observed during field reconnaissance.

Soil erosion potential is not expected to be high based on the soil types observed during the field investigation.

2.2 Limitations for Development

The lot configuration, including the location of the wetland, is a limitation for development. The proximity of the subject property's frontage on Damascus Road in relation to the intersection of Damascus Road and Duke Street, as well as the existing boulevard layout of Damascus Road adjacent to the site, prohibits a principle access (right & left turn in and right & left turn out) to be provided to the site from Damascus Road. Therefore, in order to provide a principle access to the site, it must be located off Duke Street. The NSTIR does not allow a principle access driveway to be located off Duke Street any closer to the intersection of Damascus Street and Duke Street than what is currently shown on the Site Development Plan. Consequently, 962 m² of wetland must be infilled in order to construct the access driveway in the location required by NSTIR.

Peat can give rise to geotechnical problems in the area of settlement, stability, stabilisation and construction. There is therefore a tendency to either avoid building on these soils, or, when this is not possible, to simply remove or replace soils. Where organic materials are encountered in the proposed building areas at the subject property, all fill and organic deposits should be removed and replaced with structural fill. Organic soils are to be disposed of off-site or at approved green areas of the site. Temporary stockpiles should not be placed near the wetland on the subject or adjacent properties, in order to prevent runoff, erosion and siltation. To further minimize the effects of the proposed development on the wetland and to assist in required earthworks, a geotechnical barrier will be constructed between the developable area and the buffer. Environmental controls will be introduced prior to site works, including an anchored silt boom, silt fencing, etc. After completion of the geotechnical barrier, earthworks within the remaining lot area would be possible with expected minimal impact on the Wetland 1. A Nova Scotia Environment wetland alteration *Approval* has been issued to alter the wetland. In the parking areas that overlie the wetland, subsurface water retention will be incorporated into the parking structure design (more details are presented below), allowing for storm water to infiltrate the ground instead of running off and therefore reducing the siltation potential of the remaining wetland. Ideally the buffer zone will be vegetated with shrubs and trees to further prevent erosion and subsequent siltation, or promote infiltration.

As noted above, soil erosion potential is not expected to be high. However, to minimize the effects of the proposed development on the wetland area south of the infill, a geotechnical barrier will be constructed adjacent to the property boundary. Environmental controls will be introduced prior to site works, including an anchored silt boom, silt fencing, etc. After

completion of the geotechnical barrier, development within the remaining lot area would be possible with expected minimal impact on the adjacent remaining wetland areas.

3 GROUNDWATER

Elevations in the subject property area of the Bedford Common along Duke Street are generally flat, being located near the primary watershed divide between the Sackville River and Shubenacadie River watersheds. The site gradient slopes gently downwards in the north-northeast direction towards Rocky Lake. Local groundwater flow direction usually follows topography and therefore is presumed to flow towards Rocky Lake.

The subsurface conditions through the site and surrounding area consist of very thin glacial till overlying quartzite bedrock. Based on the subsurface characteristics of this area of the HRM, there is insufficient glacial till to support large quantities of shallow groundwater within the overburden. The groundwater table is typically within bedrock and deeper drilled bedrock well depths in this geologic unit (i.e. Goldenville Formation) range between 30 and 115 metres. The surrounding area is fully serviced and does not use groundwater resources for potable water.

3.1 Methodology

The geotechnical investigation by Englobe (2016) encountered shallow perched groundwater in all test pits except test pit TP 7 at depths ranging from 0.3 to 0.6 metres. In some cases, water was observed as high inflow from adjacent porous fill materials. Seasonal fluctuations in groundwater levels can be expected. This shallow perched groundwater ultimately drains into the wetland before it is redirected through the stormwater system into Sucker Brook and ultimately Rocky Lake as described above.

3.2 Limitations for Development

Shallow perched water will be controlled by the stormwater management plan that has been designed by Designpoint Engineering and Surveying Ltd. (2015) to replace the lost storage area offered by the wetland within the boundaries of the subject property. The proposed plan involves the construction of an underground stormwater management system. Preliminary design has shown that this system can be constructed to manage all stormwater that is currently being held by the on-site portion of the wetland. The underground system will feed into the wetland and therefore will ensure that the water level in the wetland remains generally the same and not introduce sediment into the remaining wetland. Details of the storage system are provided in Appendix 3.

The Nova Scotia Environment wetland alteration *Approval* requires the installation of a shallow monitoring well within remaining wetland habitat at the property line between the subject property and the southern adjacent property in order to establish baseline surface water levels and demonstrate there is no effect on the remaining wetland.



4 CONCLUSION

Based on the existing space constraints and site entrance requirements from Duke Street, the proposed site development cannot maintain the 100ft buffer (Policy E-8 of the MPS) between the developable area and the wetland. Based on previous reports and the information gathered and observations made during site reconnaissance, the assessment has revealed that there are no major soil, topographical, geological or groundwater limitations to development of the project. Provided the developer follow applicable guidelines and suggested best practices, no negative impacts from this project are expected to result if the setback requirement is reduced from 100ft to 50ft.

5 REPORT USE AND CONDITIONS

This report was prepared for the exclusive use of Hampton Holdings and is based on data and information obtained during a site visit by Englobe on the subject property; and is based solely upon the condition of the property on the date of such inspection, supplemented by information obtained and described herein.

The evaluation and conclusions contained in this report have been prepared in light of the expertise and experience of Englobe. In evaluating the property, Englobe has relied in good faith upon representation and information furnished by individuals noted in the report with respect to operations and existing property conditions and the historic use of the property to the extent that they have not been contradicted by data obtained by other sources.

Accordingly, Englobe accepts no responsibility for any deficiency or inaccuracy in this report as a result of omissions, misstatements or misrepresentations of the persons interviewed. In addition, Englobe will not accept liability for loss, injury, claim or damage arising from any use or reliance on this report as a result of misrepresentation or fraudulent information.

Environmental conditions are dynamic in nature and changing circumstances in the environment and in the use of the property can alter radically the conclusions and information contained herein.

Appendix 1

Site Photographs and Site Development Plan



Photo 1: View of the subject property located at Lot 12-A2 Duke Street, from the east side of Duke Street (November 14, 2016).



Photo 2: View of the subject property located at Lot 12-A2 Duke Street, from the west side of Duke Street (November 14, 2016).



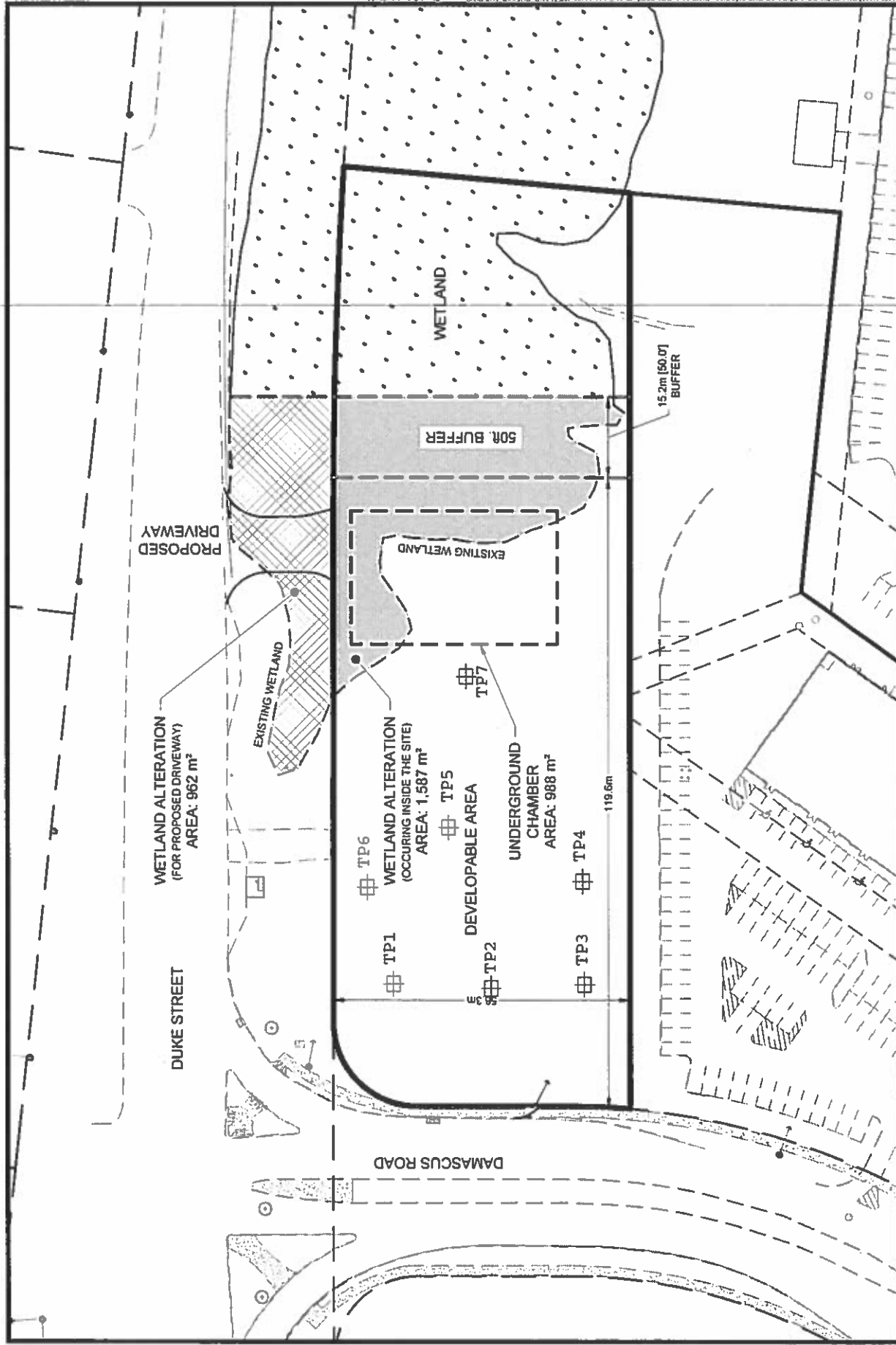
Photo 3: View of the north subject property boundary located at Lot 12-A2 Duke Street (November 14, 2016).



Photo 4: Looking south towards the subject property located at Lot 12-A2 Duke Street from the north property boundary (November 14, 2016).



Photo 5: View of the wetland to the south on the adjacent property (November 14, 2016).



SITE PLAN
DUKE STREET / DAMASCUS ROAD
 Bedford, Nova Scotia

SCALE



DATE: 13-JANUARY-2017

Note: This drawing has been modified by Englobe to include the test pit (TP) locations. TP locations are approximate.

Appendix 2

Test Pit Logs



Englobe

TEST PIT LOG

PROJECT

Geotechnical Investigation
Lot 12A2 Damascus Road, Bedford, NS

LOGGED/DWN. NMD

CKD. SS

DATE OF INVEST. 3/9/16

JOB NO. 21394

TEST PIT TP 1

WC %		wp-□	w-●	wl-△	DEPTH ft m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION		SOIL SAMPLE			BACKHOE TYPE
10	20	30	40	50				DATUM	Existing Ground Surface	COND.	TYPE	POCKET PENE.	Excavator
													OTHER TESTS
					1			FILL: rockfill, large to small boulders and cobbles, trace gravel and silt, compact, moist to saturated, grey, voids present within coarse rockfill.		×	G1		
					2			Minor surface vegetation.					
					3	1							
					4								
					5								
					6	2		FILL: rockfill, large to small boulders and cobbles, some organics/peat, trace gravel and silt, compact, saturated, grey/black.		×	G2		
					7								
					8		TILL: sandy gravelly silt, trace clay, compact, saturated, dark brown.						
					9		End of Test Pit at 2.4 metres in Till.						
					10	3	Groundwater encountered in Test Pit at 0.5 metres below ground surface.						
					11								
					12								
					13	4							
					14								
					15								
					16	5							
					17								
					18								
					19								
					20	6							



Englobe

TEST PIT LOG

PROJECT
Geotechnical Investigation
Lot 12A2 Damascus Road, Bedford, NS

LOGGED/DWN. NMD		CKD. SS		DATE OF INVEST. 3/9/16		JOB NO. 21394		TEST PIT TP 2		
WC % 10 20 30 40 50		DEPTH ft m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION		SOIL SAMPLE		BACKHOE TYPE	
wp-□	w-●				wl-△	DATUM	SURFACE ELEVATION	COND.	TYPE	POCKET PENE.
OTHER TESTS										
		1			FILL: rockfill, large to small boulders and cobbles, trace gravel and silt, compact, moist to saturated, grey, voids present within coarse rockfill.					
		2								
		3	1							
		4								
		5								
		6								
		7	2		TILL: sandy gravelly silt, trace clay, compact, saturated, light to greyish brown.					
		8			End of Test Pit at 2.3 metres in Till.					
		9			Groundwater encountered in Test Pit at 0.6 metres below ground surface.					
		10	3							
		11								
		12								
		13	4							
		14								
		15								
		16	5							
		17								
		18								
		19								
		20	6							



Englobe

TEST PIT LOG

PROJECT

Geotechnical Investigation
Lot 12A2 Damascus Road, Bedford, NS

LOGGED/DWN. NMD		CKD. SS		DATE OF INVEST. 3/9/16		JOB NO. 21394		TEST PIT TP 3	
		DEPTH ft m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION		SOIL SAMPLE		BACKHOE TYPE
WC % wp-□ w-● wl-△ 10 20 30 40 50					DATUM Existing Ground Surface	COND.	TYPE	POCKET PENE.	Excavator
				SURFACE ELEVATION				OTHER TESTS	
		1			FILL: rockfill, large to small boulders and cobbles, trace gravel and silt, loose to compact, moist to saturated, grey, voids present within coarse rockfill.				
		2							
		3	1						
		4							
		5							
		6			TILL: sandy gravelly silt, trace clay, compact, saturated, brown.		X	G1	
		7	2		End of Test Pit at 1.8 metres in Till.				
		8			Groundwater encountered in Test Pit at 0.6 metres below ground surface.				
		9							
		10	3						
		11							
		12							
		13	4						
		14							
		15							
		16	5						
		17							
		18							
		19							
		20	6						



Englobe

TEST PIT LOG

PROJECT

Geotechnical Investigation
Lot 12A2 Damascus Road, Bedford, NS

LOGGED/DWN. NMD		CKD. SS		DATE OF INVEST. 3/9/16		JOB NO. 21394		TEST PIT TP 4	
		DEPTH ft m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION		SOIL SAMPLE		BACKHOE TYPE
WC % 10 20 30 40 50 wp-□ w-● wl-△					DATUM Existing Ground Surface	COND.	TYPE	POCKET PENE.	Excavator
					SURFACE ELEVATION				OTHER TESTS
		1		[Hatched Pattern]	FILL: rockfill, large to small boulders and cobbles, trace gravel and silt, loose to compact, moist to saturated, grey, voids present within coarse rockfill.				
		2							
		3	1						
		4							
		5			FILL: rockfill, large to small boulders and cobbles, some organic material (wood/peat), trace gravel and silt, compact, saturated, grey/black.		X	G1	
		6		Refusal of excavator bucket at 2.0 metre depth - Possible large boulder or bedrock.					
		7	2						
		8		Groundwater encountered in Test Pit at 0.3 metres below ground surface.					
		9							
		10	3						
		11							
		12							
		13	4						
		14							
		15							
		16	5						
		17							
		18							
		19							
		20	6						



Englobe

TEST PIT LOG

PROJECT
 Geotechnical Investigation
 Lot 12A2 Damascus Road, Bedford, NS

LOGGED/DWN. NMD		CKD. SS		DATE OF INVEST. 3/9/16		JOB NO. 21394		TEST PIT TP 5		
WC %		DEPTH		MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION		SOIL SAMPLE		BACKHOE TYPE
wp-□	w-●	ft	m			DATUM	COND.	TYPE	POCKET PENE.	OTHER TESTS
10	20	30	40	50		Existing Ground Surface				Excavator
						SURFACE ELEVATION				
			1			FILL: rockfill, large to small boulders and cobbles, trace gravel and silt, compact, moist to saturated, grey, voids present within coarse rockfill.				
			2			Minor surface vegetation.				
			3	1						
			4							
			5							
			6			TILL: sandy gravelly silt, trace clay, compact, saturated, brownish grey. End of Test Pit at 1.7 metres in Till.				
			7	2		Groundwater encountered in Test Pit at 0.5 metres below ground surface.				
			8							
			9							
			10	3						
			11							
			12							
			13	4						
			14							
			15							
			16	5						
			17							
			18							
			19							
			20	6						



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TEST PIT LOG

PROJECT
 Geotechnical Investigation
 Lot 12A2 Damascus Road, Bedford, NS

LOGGED/DWN. NMD		CKD. SS		DATE OF INVEST. 3/9/16		JOB NO. 21394		TEST PIT TP 6	
WC % 10 20 30 40 50		DEPTH ft m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION		SOIL SAMPLE		BACKHOE TYPE
wp-□	w-●				wl-△	DATUM	SURFACE ELEVATION	COND.	TYPE
OTHER TESTS									
		1			FILL: rockfill, large to small boulders and cobbles, trace gravel and silt, compact, moist to saturated, grey, voids present within coarse rockfill.				
		2							
		3	1						
		4							
		5			FILL: rockfill, large to small boulders and cobbles, some organics/peat, trace gravel and silt, compact, saturated, grey/black.				
		6	2		TILL: sandy gravelly silt, trace clay, compact, wet, dark brown to grey.				
		7			End of Test Pit at 2.1 metres in Till.				
		8			Groundwater encountered in Test Pit at 0.3 metres below ground surface.				
		9							
		10	3						
		11							
		12							
		13	4						
		14							
		15							
		16	5						
		17							
		18							
		19							
		20	6						



Englobe

TEST PIT LOG

PROJECT
Geotechnical Investigation
Lot 12A2 Damascus Road, Bedford, NS

LOGGED/DWN. NMD		CKD. SS		DATE OF INVEST. 3/9/16		JOB NO. 21394		TEST PIT TP 7	
		DEPTH ft m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION		SOIL SAMPLE		BACKHOE TYPE
WC %	wp-□ w-● wl-△				DATUM	Existing Ground Surface	COND.	TYPE	POCKET PENE.
10	20 30 40 50				SURFACE ELEVATION				OTHER TESTS
		1			Topsoil/Organic Soils. Rootmat at 0.33 metres below surface.				
		2			FILL: sand, gravel, cobbles, some boulders, zones of silty sand with trace of clay, loose with compact zones, moist to wet, light brown.				
		3	1						
		4							
		5							
		6	2						
		7							
		8							
		9							
		10	3						
		11							
		12							
		13	4						
		14							
		15							
		16	5						
		17			FILL: boulders and cobbles, some grubbings/organic material, loose, wet, grey/black.				
		18			TILL: Silty sand, some gravel, occasional cobble, compact, wet, brown.				
		19							
		20	6						



Englobe

TEST PIT LOG

PROJECT
Geotechnical Investigation
Lot 12A2 Damascus Road, Bedford, NS

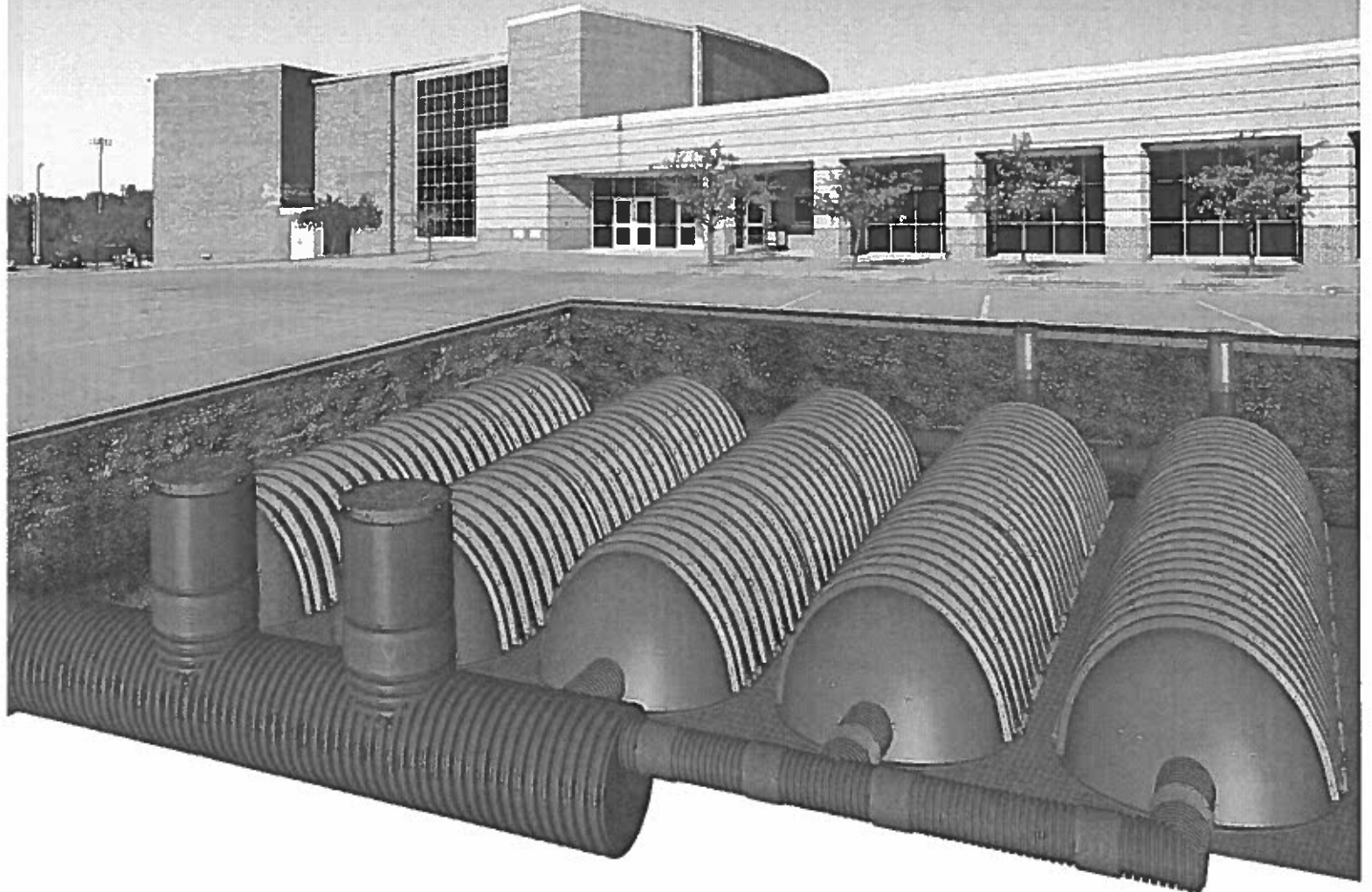
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		DEPTH ft m	MODIFIED USCS	SOIL SYMBOL	SOIL DESCRIPTION		SOIL SAMPLE		BACKHOE TYPE
WC % wp-□ w-● wl-△ 10 20 30 40 50					DATUM Existing Ground Surface	COND.	TYPE	POCKET PENE.	Excavator
				SURFACE ELEVATION				OTHER TESTS	
		22			End of Test Pit at 6.4 metres in Till. Test Pit dry upon completion.				
		23	7						
		24							
		25							
		26	8						
		27							
		28							
		29							
		30	9						
		31							
		32							
		33	10						
		34							
		35							
		36	11						
		37							
		38							
		39							
		40	12						
		41							

Appendix 3

Details of Underground Storage System



SOLENO
Mastering Storm Water



HydroStorTM

THE SYSTEM FOR EXPERTS

.....
Eliminates all risk of clogging

HydroStor™

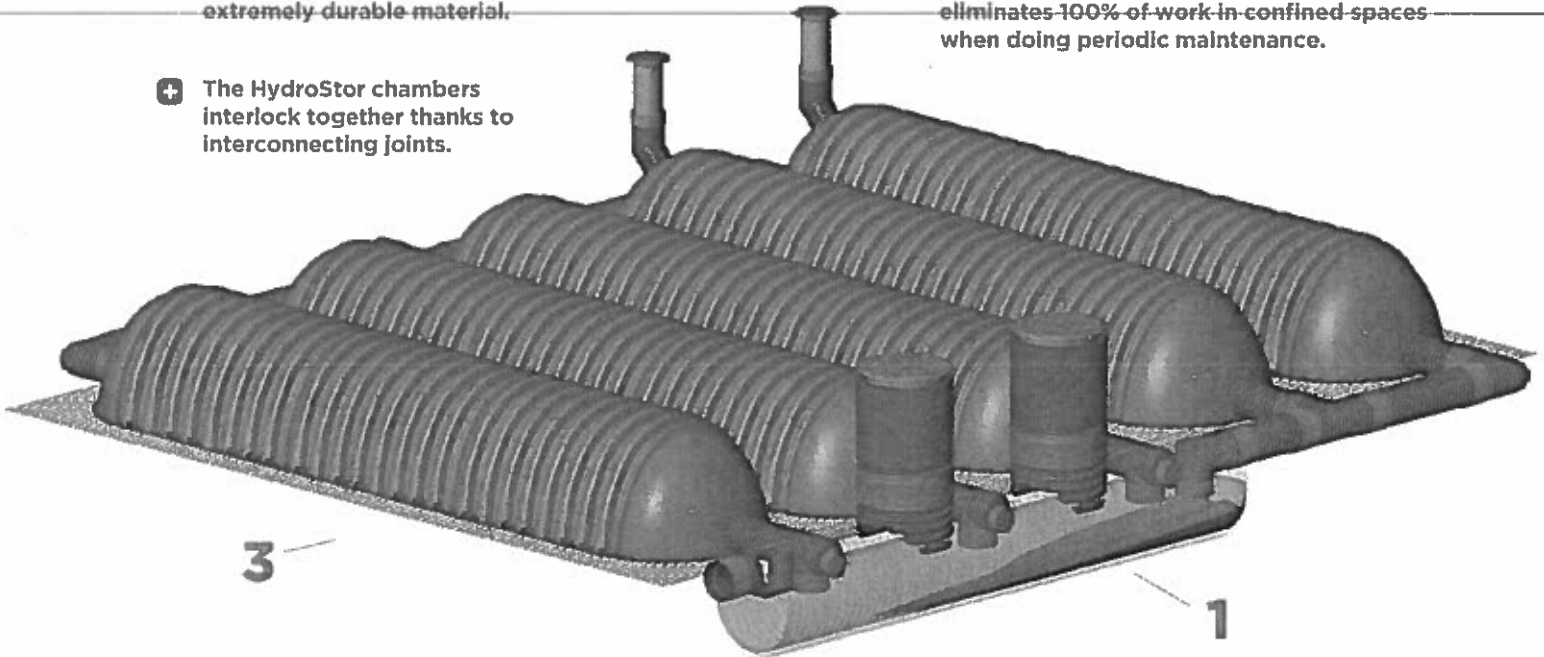
RETENTION & DETENTION SYSTEMS

The HydroStor™ storage system is exceptionally efficient. It effectively prevents the spread of sediment, eliminating any risk of clogging. The pretreatment unit captures hydrocarbons and floating debris, thus preserving the quality of the water table.

+ The system is made of a fully recyclable, extremely durable material.

+ The HydroStor chambers interlock together thanks to interconnecting joints.

+ The HydroStor pretreatment system eliminates 100% of work in confined spaces when doing periodic maintenance.



1 The HydroStor pretreatment unit which is included in the system upstream of the diffuser eliminates the possibility of sediment migration to the chambers. Fine particles, obeying the Stokes law*, remain trapped there. With its unique design, the system prevents the dispersion of hydrocarbons and floating debris.

2 Because it's factory-made, the performance of the HydroStor pretreatment system never depends on the quality of the installation.

3 The HydroStor geogrid ensures a solid and stable foundation to the base of the chambers, by distributing linear loads over a larger surface.

No geotextile underneath the chambers of the Hydrostor system eliminates any risk of clogging.

*Stokes law defines the behaviour of settling solid particles in a fluid.

LEED® CANADA-NC :

SS 6.1

Our retention basins with groundwater replenishment may directly help in obtaining Stormwater Design credit: Quantity Control, when integrated in a development plan to maintain natural storm water flows by promoting infiltration.

SS Precondition 1

Our detention systems can directly contribute to obtaining the Storm Water Management Rate and Quantity credit, as they facilitate the reuse of storm water for purposes that do not require potable water such as landscaping irrigation and building and automobile maintenance.

MR 4.1 / 4.2 / 5.1 / 5.2

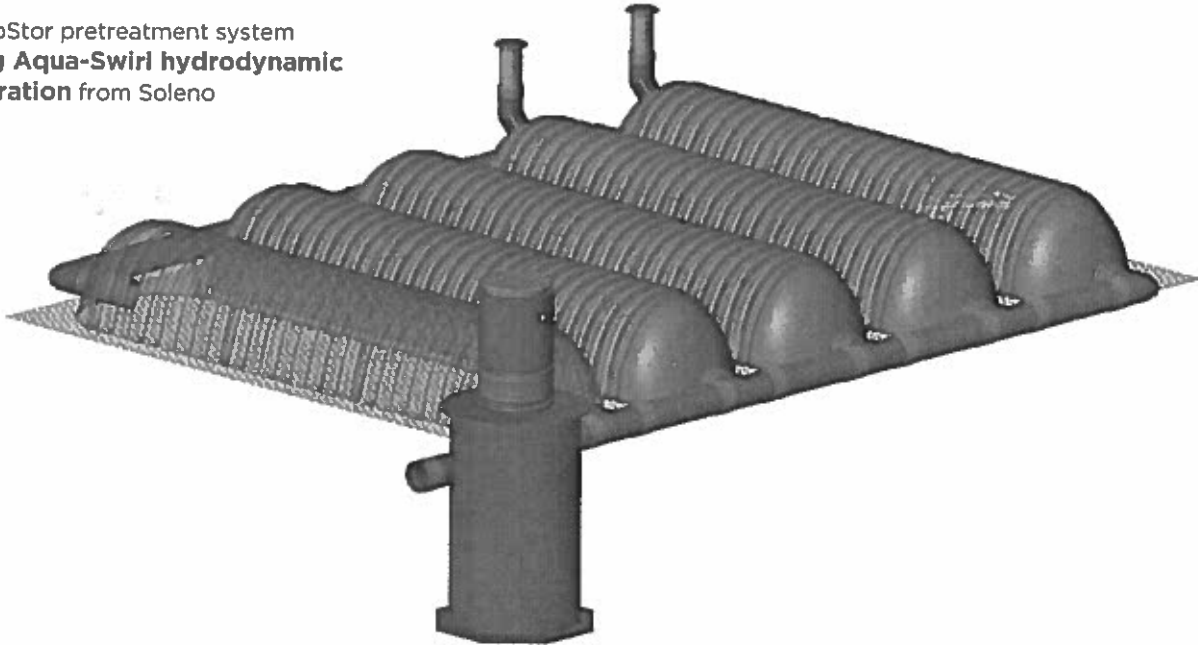
All our solutions qualify for earning points in the Materials and Resources category.



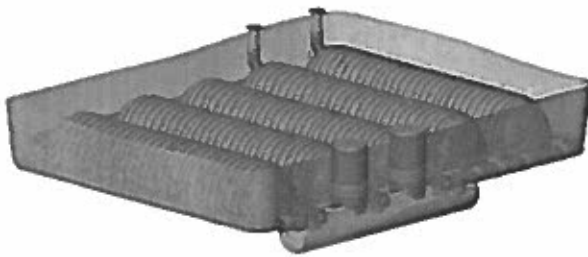
STORAGE

Alternative system configurations

HydroStor pretreatment system using Aqua-Swirl hydrodynamic separation from Soleno



Basin without groundwater replenishment with waterproof geomembrane



System without pretreatment, with diffuser



We recommend contacting Soleno Technical Services before specifying a HydroStor system without pretreatment.

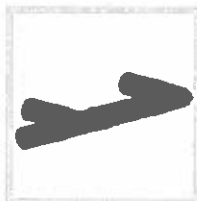
Options



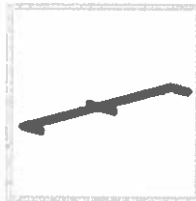
Aqua-Swirl



HydroStor pretreatment



Diffuser



Collector



Access port



Flow regulator

Technical Data



HS75

Designed for projects with limited burial depth. The HydroStor HS75 chamber stores 1 m³ rainwater per linear meter or 2.12 m³ per chamber.*



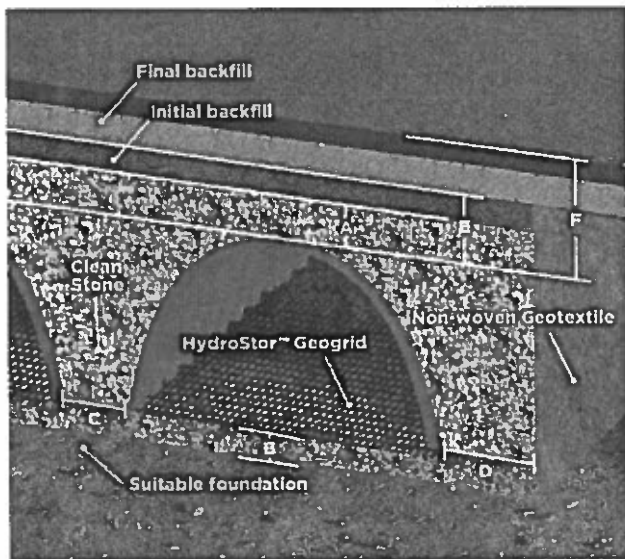
HS180

Designed for high volume projects or when space is restricted. The HydroStor HS180 chamber stores 2.4 m³ of rainwater per linear meter or 5.1 m³ per chamber.*

212 m ³ (75 ft ³) per chamber	Installed Storage Capacity	5.1 m ³ (180 ft ³) per chamber
754 mm (29.7 in)	Height	1156 mm (45.5 in)
1295 mm (51 in)	Width	1976 mm (77.8 in)
2212 mm (87.1 in)	Length	2253 mm (88.7 in)
2157 mm (84.9 in)	Installed length	2166 mm (85.3 in)
318 kg (70 lbs)	Weight	576 kg (127 lbs)
Integrated handles	Special Feature	Integrated handles

The two retention chambers meet CSA B184.2, ASTM F2418 and ASTM F2787 standards.

Installation Requirements



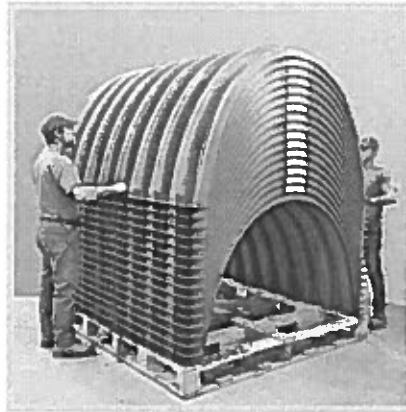
HS75		HS180
150 mm (6 in) minimum	A Clean stone above the chambers	300 mm (12 in) minimum
150 mm (6 in) minimum	B Bedding	225 mm (9 in) minimum
150 mm (6 in)	C Space between chambers	200 mm (8 in)
300 mm (12 in)	D Backfill along the periphery of the system	300 mm (12 in)
457 mm (18 in)	E Minimum backfill height	597 mm (23.5 in)
2.44 m (8 ft)	F Maximum backfill height	2.44 m (8 ft)

* Installed Storage Capacity

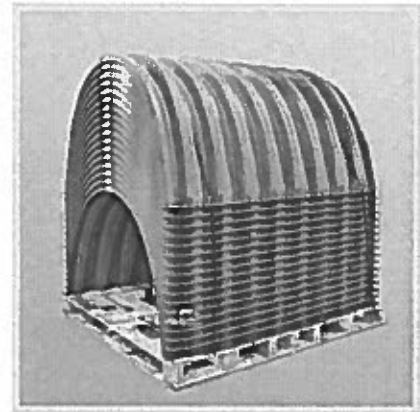
Details that make the difference



4 integrated handles streamline the installation onsite

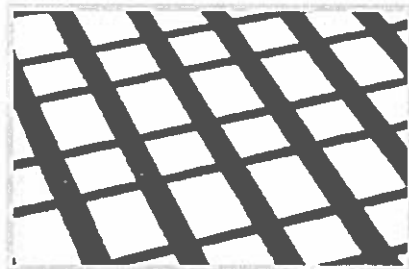


Two people can easily unload each unit using the lifting handles and molded spacers.



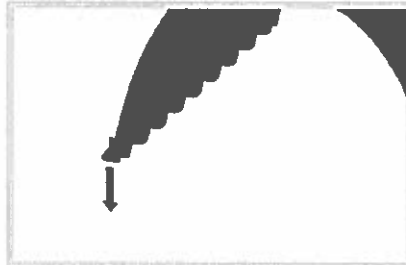
Sturdy pallet supports 17 HS180 units or 32 HS75 units **safely**.

Building on a solid foundation thanks to the HydroStor geogrid



The HydroStor geogrid is used to distribute the load at the foot of the arches and to prevent the stone from being displaced under the flow of water. It must be installed underneath all chambers.

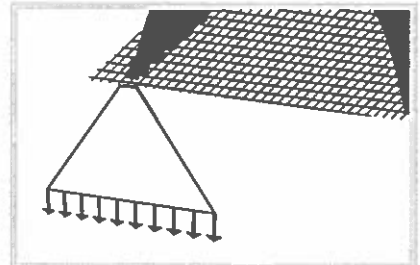
Load sharing **without** the HydroStor geogrid



Without geogrid

Non-distributed loads create critical pressure points.

Load sharing principle **with** the HydroStor geogrid



With geogrid

The loads are evenly distributed.

The storage system with the easiest maintenance

The HydroStor pretreatment system captures sediment, hydrocarbons and floating debris. Maintenance is made simple with two access ports and requires **no work in confined space**. To operate at full efficiency, the system must be maintained regularly.

Contact your Soleno representative for more information on the services offered by Soleno Services or see our maintenance guide, at soleno.com/hydrostor





Our expertise is always available

At Soleno, our solutions excellence is based on our **specialized consulting services** and expertise developed over the years with designers, water system managers and contractors responsible for the installation and maintenance of civil infrastructure.

Our engineers are available to help you identify and implement the best management practices to protect water resources that might be impacted by water runoff in urban or rural areas.



Visit soleno.com/hydrostor/en to learn more about the HydroStor system. See our installation video, installation guide, technical specifications and estimates.



Soleno is accredited ISO 9001
(Saint-Jean-Sur-Richelieu plant only)

Our HDPE and PP products and solutions are designed and manufactured as per the most rigorous industry standards.



Soleno complies with all **ECORESPONSIBLE** sustainable development program criteria and was awarded the **LEVEL 1 certification - ENGAGEMENT** from the Council of Sustainable Industries.

Soleno is a member of the following associations:

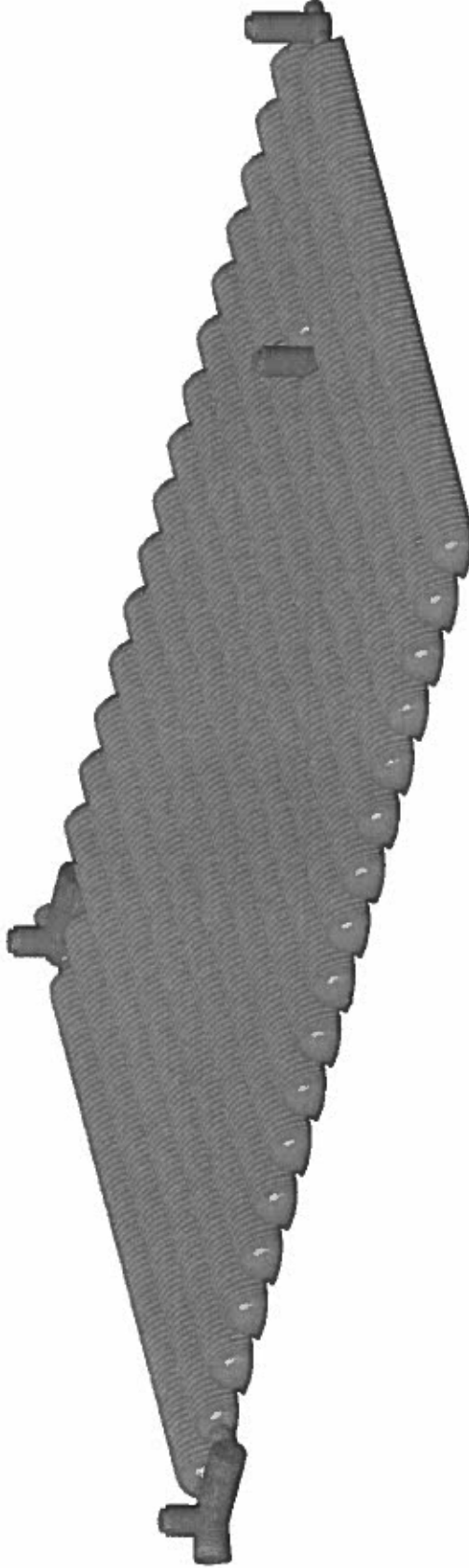




SOLENO
Mastering Storm Water

66232 SOLENO HYDROSTOR HSIBO SYSTEM 176 CHAMBERS 950m³

PROJECT: DUKE STREET GAS BAR
JOB LOCATION: HALIFAX (NS)
CONTACT: RYAN BARKHOUSE
OWNER/ENGINEERING FIRM/CONTRACTOR NAME: WSP CANADA



1. INSTALLATION MUST BE MADE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS
2. SYSTEM IS DESIGNED TO WITHSTAND A CL-625 (H-30) LIVE LOAD

APPROVAL: _____

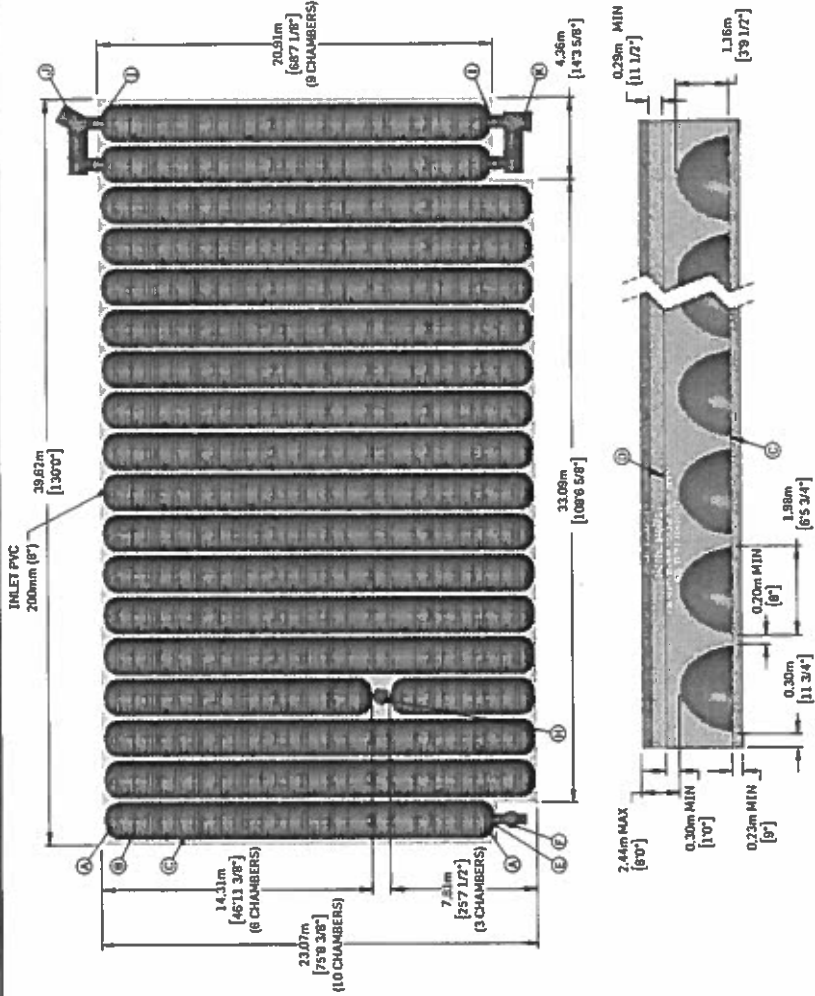
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2016-06-09

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Mastering Storm Water

66232 SOLENO HYDROSTOR HS180 SYSTEM 176 CHAMBERS 950m³



PART	DESCRIPTION	QTY
A	HYDROSTOR END CAP HS180	28
B	HYDROSTOR CHAMBER HS180	176
C	STABILIZATION NETTING (PROVISION)	7
D	SOLENO TX-90 SEPARATION (1) TEXTILE (PROVIDED BY OTHERS)	3
E	STD LENGTH 6m (236') SOLFO MAX 450mm (18")	1
F	MHT-A MANHOLE SOLFO MAX 750mm (30") WITH INLET SOLFO MAX 450mm (18") BTGC AND DUCT SOLFO MAX 450mm (18") BTGC. ADJUSTABLE FRAME AND COVER (BY DISTRIBUTOR)	1
G	STD LENGTH 6m (236') SOLFO MAX 200mm (8")	1
H	CB-4 CATCH BASIN SOLFO MAX 750mm (30") WITH OUTLET SOLFO MAX 200mm (8") BTGC. ADJUSTABLE FRAME AND GRATE (BY DISTRIBUTOR)	1
I	STD LENGTH 6m (236') SOLFO MAX 600mm (24")	1
J	MHT-C MANIFOLD WITH INLET 2 STUBS SOLFO MAX 900mm (36") - 600mm (24") WITH OUTLET SOLFO MAX 900mm (36") BTGC. ADJUSTABLE FRAME AND COVER (BY DISTRIBUTOR)	1
K	MHT-E MANIFOLD REDUCED 2 STUBS SOLFO MAX 900mm (36") - 600mm (24") WITH INLET SOLFO MAX 900mm (36") BTGC. ADJUSTABLE FRAME AND COVER (BY DISTRIBUTOR)	1

APPROVAL: _____

REVISION 0
2018-06-09

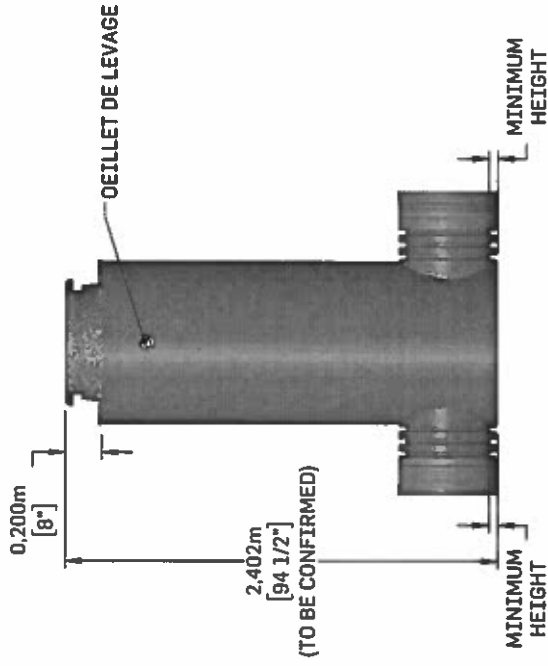
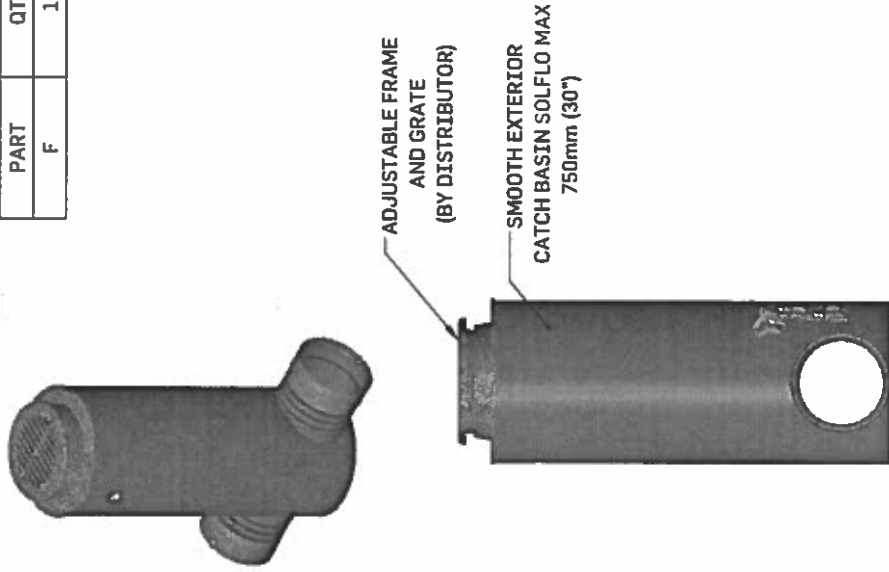
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Mastering Storm Water

66232 PART F

PART	QTY
F	1



TOLERANCES: ± 1 CORRUGATION

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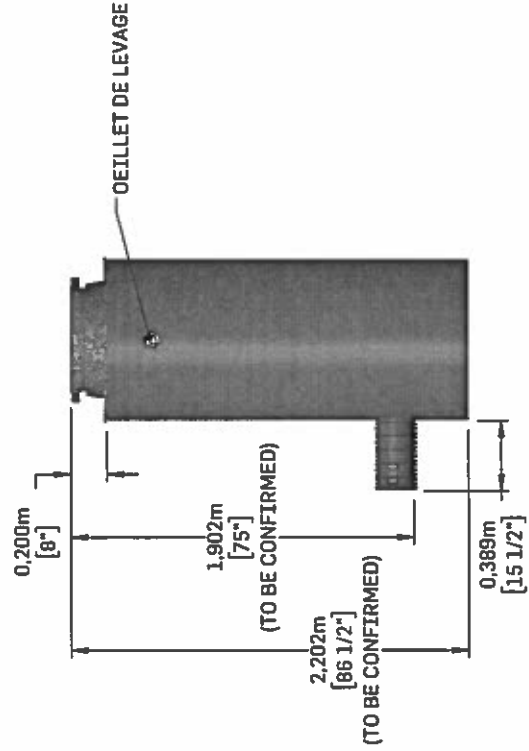
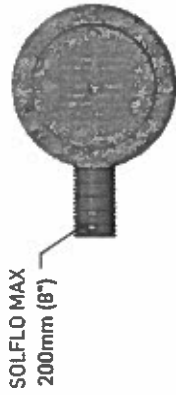
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66232 PART H

PART	QTY
H	1



TOLERANCES: ± 1 CORRUGATION

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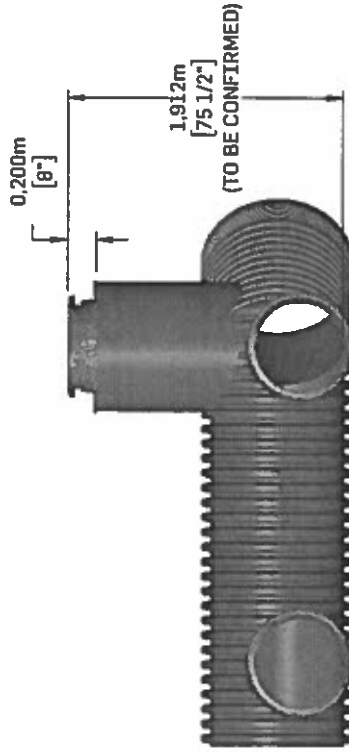
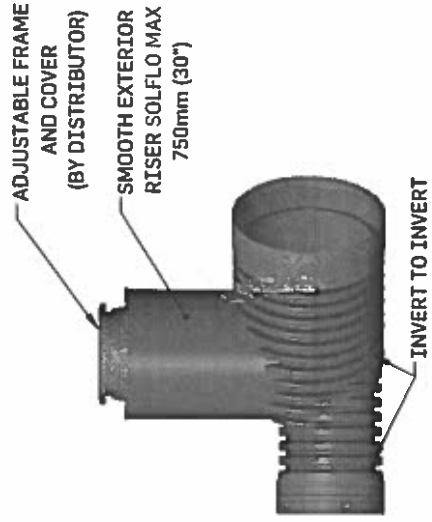
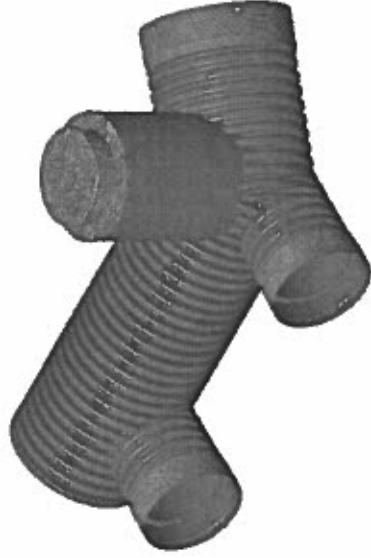
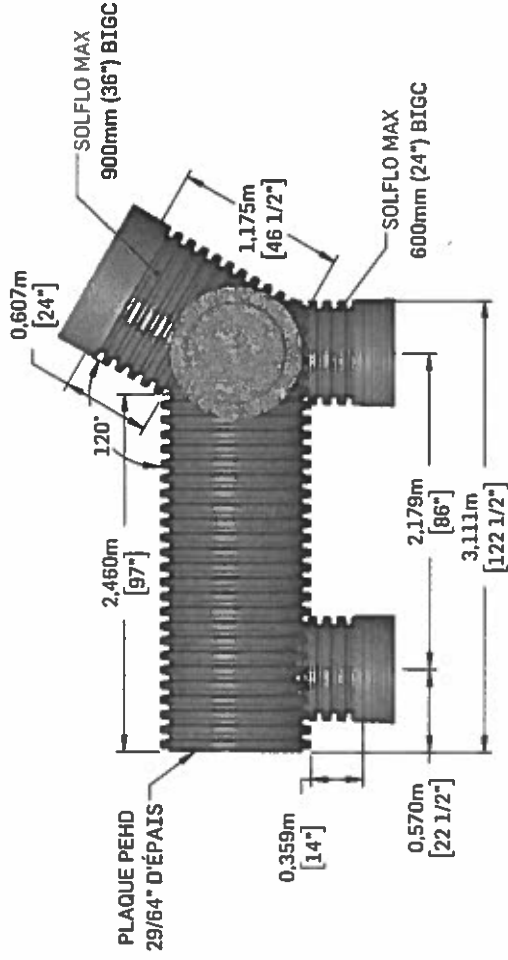
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2016-06-09



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66232 PART J

PART	QTY
J	1



TOLERANCES: ± 1 CORRUGATION

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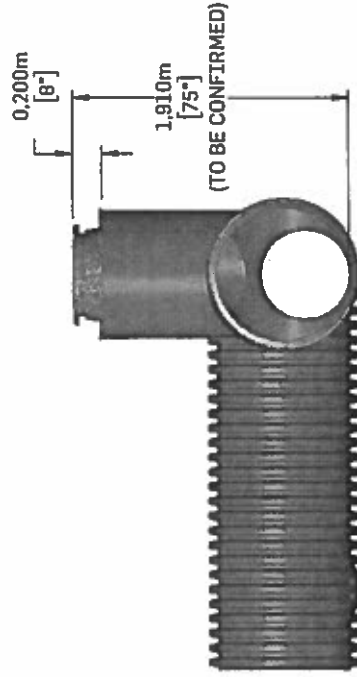
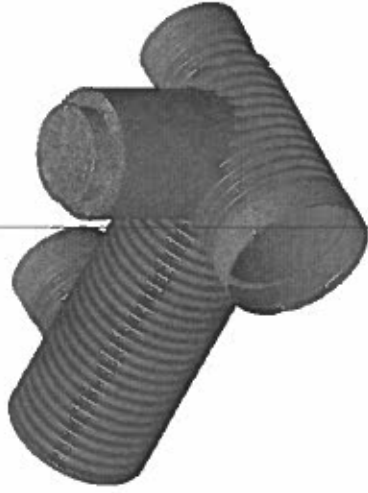
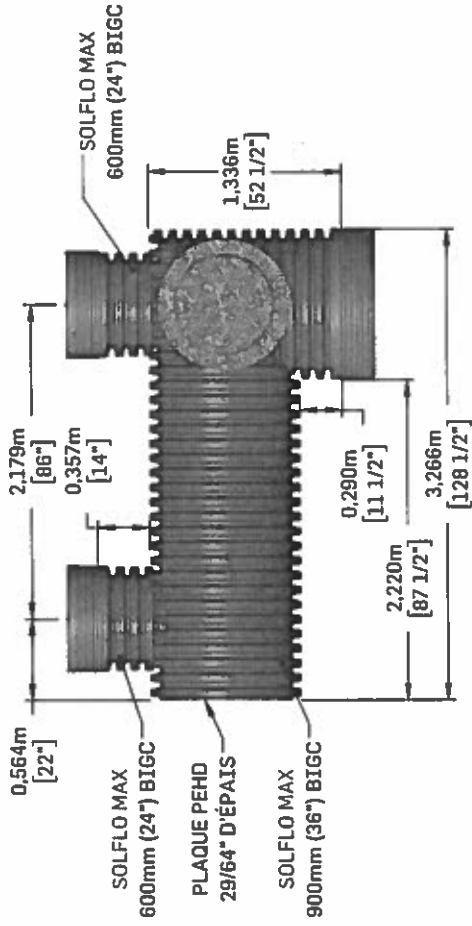
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2016-06-09



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66232 PART K

PART	QTY
K	1



ADJUSTABLE FRAME AND COVER (BY DISTRIBUTOR)
SMOOTH EXTERIOR RISER SOLFLO MAX 750mm (30")

INVERT TO INVERT

TOLERANCES: ± 1 CORRUGATION

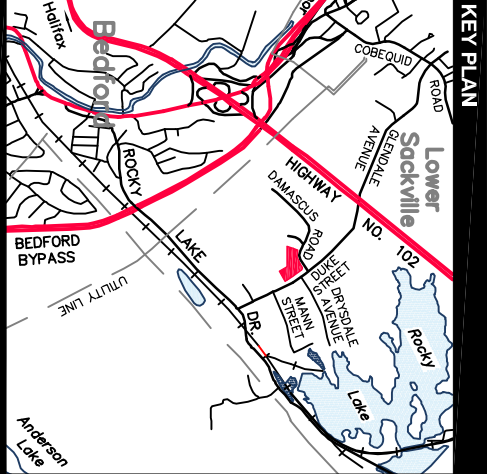
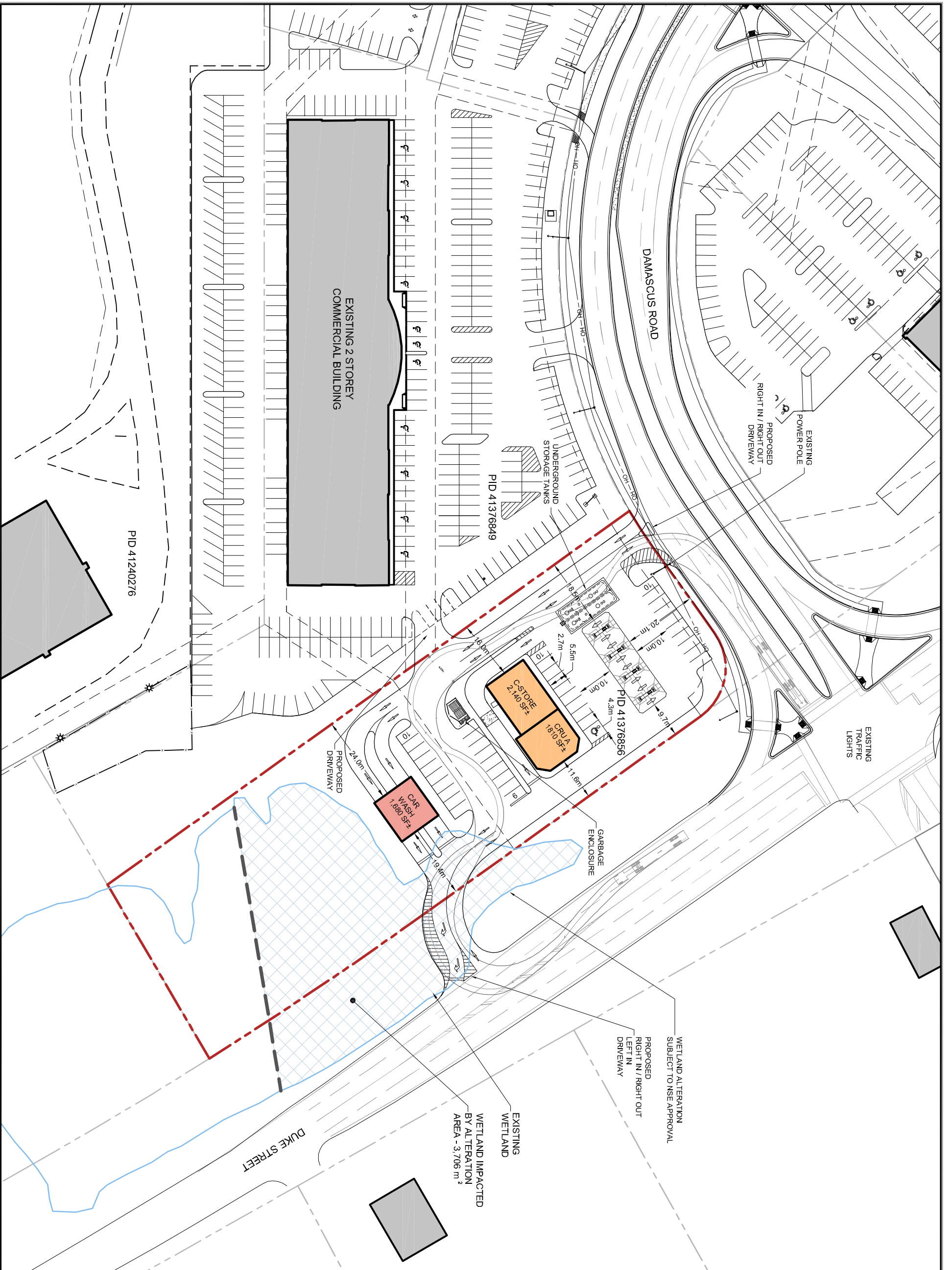
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Englobe



LEGEND

- Site Boundary
- Adjacent Property Boundary
- NSPI Easement
- Existing Zone - I/L1 (Light Industrial Zone)

SITE SUMMARY:

- Existing Zone - I/L1 (Light Industrial Zone)

BUILDING AREA	REQUIRED	PROVIDED	RATIO
C-STORE	2,140 SF	10	-
CRU A	1,810 SF	29	-
Total	3,950 SF	39	9.8

NOTES:

- Subject to detailed planning review.

SOURCES:

- Wetland delineation received from McCallum Environmental on January 23, 2015. File name Bedford_Commons_Wetland_A15177.DWG

Designer: **K.WATTERS / I.GRANT**

Engineer: **G.GOBREN**

Planner: **B.MORRISON**

VERSION 1.4

CONCEPT PLAN

DAMASCUS RD. / DUKE STREET

BEDFORD, NOVA SCOTIA

MAY 25, 2015

141-14425_DUKEST_V14

NORTH

