

PUGWASH WATERFRONT DEVELOPMENT MASTER PLAN

CONCEPT ADVANCEMENT REPORT

2018-03-07



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1.0 INTRODUCTION

The Municipality of the County of Cumberland issued a request for proposals in late 2016 for consultant services to undertake a community consultation and concept advancement project related to the Waterfront Development Master Plan for the community of Pugwash. The project was awarded to a consultant team consisting of Architecture49 and WSP in early 2017. This report contains the outcomes of the community consultation and subsequent concept advancement process.

The overall project consists of a number of elements that were contained in a Waterfront Development Master Plan, developed by BDA Landscape Architects in 2015. The intended outcomes for these elements varied widely. Most required advancement of the concept; more detailed definition of requirements and preparation of cost estimates to assist in future budget allocation. Two elements were to be taken to the stage of being ready for tender; the replacement of the stage in Eaton Park and the extension of the existing boardwalk towards the north, around Thinkers' Lodge.

A key component of this study has been the engagement of stakeholder groups and the larger resident community. A series of meetings and workshops were held in the Village to give the community an opportunity to have their needs, desires and opinions reflected in the evolution of the Pugwash waterfront development concept. Details of the outcomes of the meetings, workshops and stakeholder engagement process are found in Appendices 1 to this report.

Each section in this report highlights an element of the project and outlines the goals, design approach, and concept for that element. The last piece of this report is an implementation plan, suggesting next steps for each of the master plan elements.

1.1 COMMUNITY CONSULTATION

Community consultation played a key role in guiding the advancement of the Waterfront Development Master Plan concept. The initial consultation phase of the Pugwash Waterfront Development Master Plan included four aspects: stakeholder meetings; community open house events; stakeholder briefs; and, community questionnaires. Four stakeholder meetings were held based on various aspects of the Waterfront Development Plan. These topics included:

- Development of the Multi-Purpose Centre
- Consultation with Pugwash's business community regarding the project
- Development of Village Square, Dinghy Beach, wayfinding signage, parking, Water and Durham Street improvements, Harbour Walk and board walk extension, and the Eaton Park Stage
- Development of the Harbour Centre

Two community open house events were held with the intention of 1. Gathering feedback on various aspects of the waterfront development plan; and, 2. Informing the public on the findings of the Environmental Effects Determinants Report and gathering feedback on the development of the Harbour Centre.

Seven completed stakeholder briefs and eight completed community questionnaires were received. For details on the information received, including notes from the meetings and copies of the briefs and questionnaires, refer to Appendix 1.

Discussion of the feedback gathered through the consultation process can be found in the design narrative for the project elements throughout this report.

2.0 WATERFRONT CONCEPT

The Waterfront Development Master Plan is based on the premise that the Pugwash waterfront is a valuable resource for tourism and community development. The Master Plan is composed of nine individual parts that compose a common vision for the future of the Pugwash waterfront based on an accumulation of community feedback and the outcomes of several community development projects - including the *Pugwash Waterfront Improvement Concept* (BDA), *Trees of Pugwash*, *Nova Scotia: Inventory and Recommendations for Improvement* (Dalhousie University - Duinker & Pilkington), *Pugwash and Area Community Master Plan* (Mount Allison University - Zwicker, Veinotte, & Marlin), *Pugwash Waterfront Feasibility Study* (Cantwell & Company), *Proposed Marina Project: Subsurface Soils Investigation* (Jacques Whitford and Associates Ltd.), and *Pugwash Library Centre Site Selection & Concept Design* (WHW Architects).

The location of the nine individual elements are illustrated on the site plan to the left: Eaton Park Trail Extension, New Eaton Park Stage, Village Square, Dinghy Beach, Water & Durham Street Improvement, New Multi-Purpose Centre, Harbour Centre, Harbour Walk, and Wayfinding Elements.

The concept advancement for each element is explained in detail in the ensuing parts of this report. An overview illustration of the concept advancement of the Waterfront Development Master Plan as described in this report is shown on the following page.

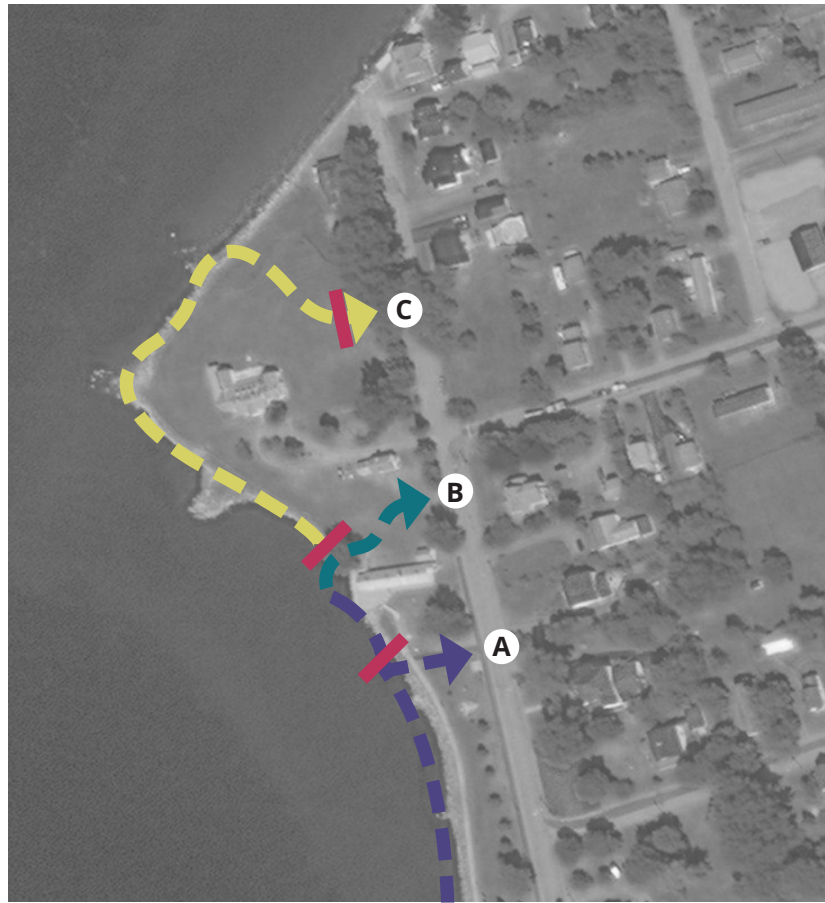


Waterfront Concept Features

- Trail Extension
- ✱ New Stage
- Village Square
- Dinghy Beach
- Water & Durham Street Improvement
- ✱ New Multi-Purpose Centre
- Harbour Centre
- ⊞ Harbour Walk
- Wayfinding Element

Pugwash Waterfront Development
Master Plan





Route Options for Eaton Park Trail Extension. Magenta lines represent gate locations for Option C.

3.0 EXTEND BOARDWALK / TRAIL AT EATON PARK

The BDA Pugwash Waterfront Improvement Concept explains:

The boardwalk currently ends at the lobster factory. A stonedust trail is proposed from the lobster factory along the breakwater edge looping around Thinkers Lodge back to the boardwalk. This trail provides an outstanding view of the mouth of the river particularly at sunset. A seating area with benches or adirondack chairs is to be included. This loop will also provide access to and from Thinkers Lodge from the boardwalk. This extension of the waterfront trail will provide a good loop ending of the Harbour Walk on the north end of the waterfront. (BDA 4)

During our community consultation we presented three route options for extending the trail (illustrated at left). Option A would maintain the current trail configuration. Option B would extend the trail around the Lobster Factory and toward the intersection of Water and King Street. Option C would extend the trail the full distance around Eaton Lodge Point and feature gates for restricting access during private events. Through the consultation process we heard from representatives of the Thinkers Lodge that the trail should not loop around Thinkers Lodge due to concerns over privacy and security during events. Other community members were excited by the fact that this could be a relatively low-budget improvement that could significantly improve the waterfront experience. Subsequent to the concerns raised by Thinkers Lodge representatives during our community consultation, attempts to negotiate an alternate path alignment around the point at Eaton Lodge were unsuccessful.

As a result, our concept advancement is based on Option B. It simply provides a crusher dust trail from the deck of the Lobster Factory towards the intersection of King Street and Water Street. The final alignment will be determined by a topographic survey or on-site calculations subsequent to this report. This information will be necessary to determine an alignment that will result in an accessible grade and preserve existing trees. While this short extension will not provide the dramatic views of the harbour and Eaton Lodge that the original BDA alignment would, it will at least serve to extend the waterfront experience by allowing people to walk to the Lobster Factory deck and carry on to Water Street without retracing their steps.

4.0 VILLAGE SQUARE

Regarding Village Square, the BDA Pugwash Waterfront Improvement Concept communicates:

The waterfront concept includes extending the waterfront boardwalk and lights from the parking area behind the [properties identified as civic numbers 89-103 Water Street] to connect to Dingy [sic] Beach. This area is currently vehicle dominated with parking and a boat launch. The concept will establish this space as a pedestrian dominated area set aside for outdoor markets and public gatherings; in Gaelic 'Cearnarch Margaith'. The boat launch is to be relocated to the proposed Harbour Center Marina in the inner harbour. New parking areas have been identified east of Water Street behind the Pharmasave and the Village Hall. Parking would be permitted in the square when the area is not used for public gatherings. Improvements can be phased; the boat launch should remain until the new launch at the proposed Harbour Center is completed. (BDA 6)

During our community consultation we heard that it was important to people that the Village Square should include a few key features. We heard that it should emphasize the view and entrance from Water Street, celebrate its waterfront location (possibly through a nautical theme), provide amenities such as moveable seating and aesthetically pleasing waste receptacles, feature permeable paving where possible, and in general provide a space that can be truly multi-functional.

Our concept advancement is based on three key ideas: 1. Improve the pedestrian experience, 2. Improve visual and physical connectivity from Water Street, and 3. Preserve existing patterns of use while providing opportunities for new uses.

4.1. IMPROVE THE PEDESTRIAN EXPERIENCE

To improve the pedestrian experience we are proposing a strong connection between the existing boardwalk and the corner of Water Street and Victoria Street by extending the pedestrian route between the Eaton Park boardwalk and Water Street. This route will feature a boardwalk surface along the waterfront and a concrete sidewalk surface from Water Street to the boat launch. This route will feature seating areas, waste receptacles, and planting to improve the pedestrian experience

and provide added visual interest. Quarry stone seating will be incorporated into the riprap shore armoring (revetment) to provide opportunities for people to sit closer to the water along the harbour. A planting strip will separate the boardwalk from the parking area to emphasize that the area is primarily for pedestrians.

Finishes, fixtures, and other components are selected from the Waterfront Development Master Plan Design Palette (see page 30). These include waste receptacles, benches (with and without backs), and colourful movable Adirondack style chairs. Recommended tree species have been selected from the list of those recommended for future use in The Trees of Pugwash report and selected for their suitability for harsh environments such as parking lots and waterfronts. These include native species: White Ash (*Fraxinus americana*), American Elm (any hybrid cultivar with increased resistance to Dutch Elm Disease), as well as non-native species: Basswood (*Tilia americana*), Hackberry (*Celtis occidentalis*), Freeman Maple (*Acer freemanii*). Trees are carefully located in Village Square to visually break up the parking area and screen the backs of the adjacent commercial buildings. Trees are intentionally *not* located along the waterfront in order to preserve unobstructed views of the harbour.

4.2 IMPROVE VISUAL AND PHYSICAL CONNECTIVITY FROM WATER STREET

To improve visual and physical connectivity from Water Street we are proposing to focus most of the design intervention on the intersection between Village Square and Dinghy Beach. This area is highly visible from the intersection of Water and Victoria Street and serves as the “face” of Village Square. This new plaza will feature wayfinding signage with a map for people to locate themselves, picnic tables, colourful Adirondack chairs, and stepped bench seating adjacent to the ramp to Dinghy Beach. An important consideration in this area is the existing bollard used for mooring salt ships to the nearby salt wharf. As this bollard cannot be moved without interfering with marine operations, it is incorporated into the design as a key feature and a reminder of Pugwash’s maritime heritage. Our design also features a new pedestrian link from the boardwalk to Water Street between the existing playground and the adjacent store. This link may require shifting the existing beach volleyball court and will require a set of stairs to reach the grade of the Water Street sidewalk. This link will significantly improve connectivity between Water Street and the waterfront.



Village Square & Dinghy Beach

4.3 PRESERVE EXISTING PATTERNS OF USE WHILE PROVIDING OPPORTUNITIES FOR NEW USES.

The existing municipal parking lot is currently used for daily parking for employees working in businesses along Water Street, boat launch access (and temporary parking of boat trailers), seasonal events such as the Gathering of the Clans midway, and temporary parking for people wanting a view of the harbour. Our design is careful to preserve the functionality of the space for these activities while providing additional parking area that can also be used for events or activities as required.

While various parking layouts were possible, we are proposing that Village Square maintain an outer drive loop for easy access for larger vehicles or those with trailers. This configuration also preserves the existing pattern of use where people loop their vehicles into the parking area and pause briefly along the waterfront edge to look at the Harbour. While this increases the paved area of Village Square, it maximizes the utility of the space. The parking area should be paved with a combination of asphalt and permeable unit pavers. The asphalt should be used for drive aisles for easy maintenance and cost savings. The permeable paving should be used for all parking spaces to reduce surface runoff and therefore minimize environmental impact. Examples of acceptable permeable paving products are Unilock Eco-Optiloc, Turfstone, and Uni Eco-Stone unit pavers. This paving treatment will minimize the amount of surface run-off while giving the parking area the appearance of a public square, rather than a commercial parking lot.

5.0 DINGHY BEACH

The original Village Square concept was presented in the BDA Pugwash Waterfront Improvement Concept as being:

an amazing asset for the village, having a beach in the village center [sic] is a great attraction for residents and visitors. Currently the beach access is very poor, particularly at high tide. The improvement plan for Dingy [sic] Beach includes a continuation of the boardwalk and rip-rap from the Market Square to the beach area. (BDA 6)

During our community consultation we heard that that people consider Dinghy Beach as a valuable asset that is safe and family-friendly. We also heard that the major issues are access, waste disposal, extension of the existing drainage outfall, and provision of interpretive signage.

Our concept advancement unifies Dinghy Beach with Village Square as a single entity that provides a huge amenity for the community of Pugwash. The boardwalk is extended around the point to join up with a connecting sidewalk to Water Street. The drainage outfall will be extended as required pending a topographic survey of the area.

The extension of Village Square to include the new plaza adjacent to the existing salt terminal bollard provides many additional amenities that serve both areas equally. Key features are picnic tables, waste receptacles, signage with a Village map, moveable Adirondack chairs, and stepped bench seating adjacent to the ramp to Dinghy Beach. This stepped seating provides an amazing opportunity for parents or guardians to sit and enjoy the scenery while supervising children on the beach.

6.0 EATON STAGE REPLACEMENT

The design of the new stage building has undergone some evolution since the outset of this project. As one of the two project elements that was intended for construction in the immediate term, it has had the farthest to develop. Initially seen as a like-for-like replacement, with improvements, of the deteriorated existing stage, it has grown to include washrooms for the performers and to incorporate a seating veranda on the west side facing the water.

The new stage has been sited in the same location as the existing building and the old stage will be demolished to make way for its replacement. This location allows easy access to and from the boardwalk for the veranda.

The new facility is designed to provide a covered stage of the same width as the existing stage, but approximately 9 feet deeper, front to back. Unlike the existing stage, the new one will be covered for its full width. The roof over the stage will also slope up toward the stage apron, better to direct sound to the audience. Flanking walls located at the sides of the stage, in front of the back wall (or cyclorama), effectively provide stage wings, allowing performers to enter and exit the stage as they would in a traditional theatre, and the crossover corridor behind the stage permits more options for staging a performance.

The enclosed portion of the building contains two dressing/green rooms which can be used separately or connectedly. There are also two single-fixture, gender-neutral and barrier free washrooms for performers, a small storage room for a limited amount of stage equipment, and a small space to serve as an office for a stage manager.

The new building will be constructed as a base building, “fitted for but not with” stage lighting and sound equipment. Provision for the location of controls for these has been made in the crossover corridor. It is intended that the deep beam over the stage at the front of the roof will hide much of the eventual stage lighting equipment, as well as provide a mounting point for a digital projector to permit movies and videos to be shown on the cyclorama wall.

In compliance with present practice and provincial and federal building code requirements, the new stage and its related facilities will be barrier-free, and this has increased the footprint of the building. It has also meant that the ramps and raised portions of the exterior deck (other than the edges of the stage) will need to be fitted with handrails and guards.

In the existing building, the benches that are used for audience seating are kept in a storage room inside the building. Getting the 8'-long benches in and out storage involves manoeuvring them through two doors. The consultants suggested making use of the space under the stage for bench storage. The benches are thus closer to where they will be used, and they need only be passed through one door to be stored and retrieved.

In recognition of the fact that the building is only intermittently occupied, the exterior windows and doors to the backstage areas can be enclosed behind solid sliding shutters and barn doors when the building is not in use, helping to protect points of potential unauthorised entry from vandalism. Exterior lighting will also help to deter inappropriate activity and provide a safe environment for people using the waterside veranda.

The exterior material palette of weathering wood shingles and painted trim is sympathetic to the materials used on many buildings in the Village and is intended as part of a consistent expression across the Multi-Purpose Centre, the wayfinding signage program, and the Eaton Stage. The interior materials will be simple, serviceable and durable; painted or varnished plywood walls and ceilings, resilient sheet flooring, and painted or stained wood doors.

The illustrations on pages 12-17 show the early concept for the stage replacement. Pages 18-20 are extracts from the development of the construction document package, illustrating the evolution of the design through the concept advancement process.

Appendix 4B contains the cost estimate for the stage replacement. The estimate is based on the 60% complete construction documents, and employs established quantity surveying practices for the preparation of construction estimates. The resulting opinion of probable construction cost is considerably higher than the design team were targeting and expecting, and we do not believe that it is truly representative of the construction cost.

There are a number of factors that may have led to this result. Primarily, the building is quite unusual; it is meant for temporary occupancy only and for a limited period of the year. It is therefore not easily comparable to other buildings of its type, as there are few examples on which to base a comparison. Another factor is the location, which would generally cause the cost estimators to include a location factor to account for a contractor having to bring in labour and materials for the project.

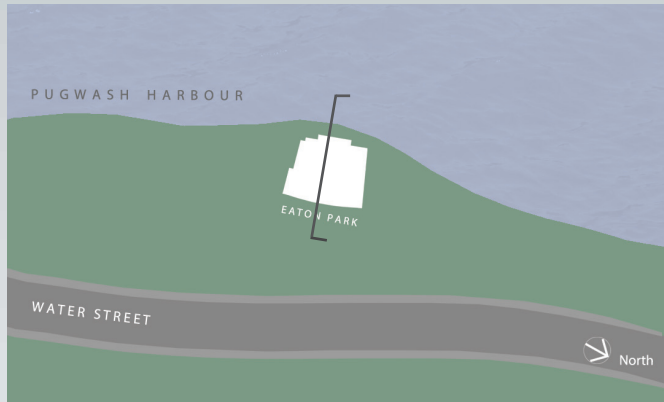
We believe that the type of construction involved can easily be undertaken by local contractors using readily available materials sourced close to Pugwash. The only possible exception to this would be for the limited amount of steel needed to frame a portion of the stage roof, but this is still similar in size to steel components that would be used for part of the frame of a mid- to large-sized house.

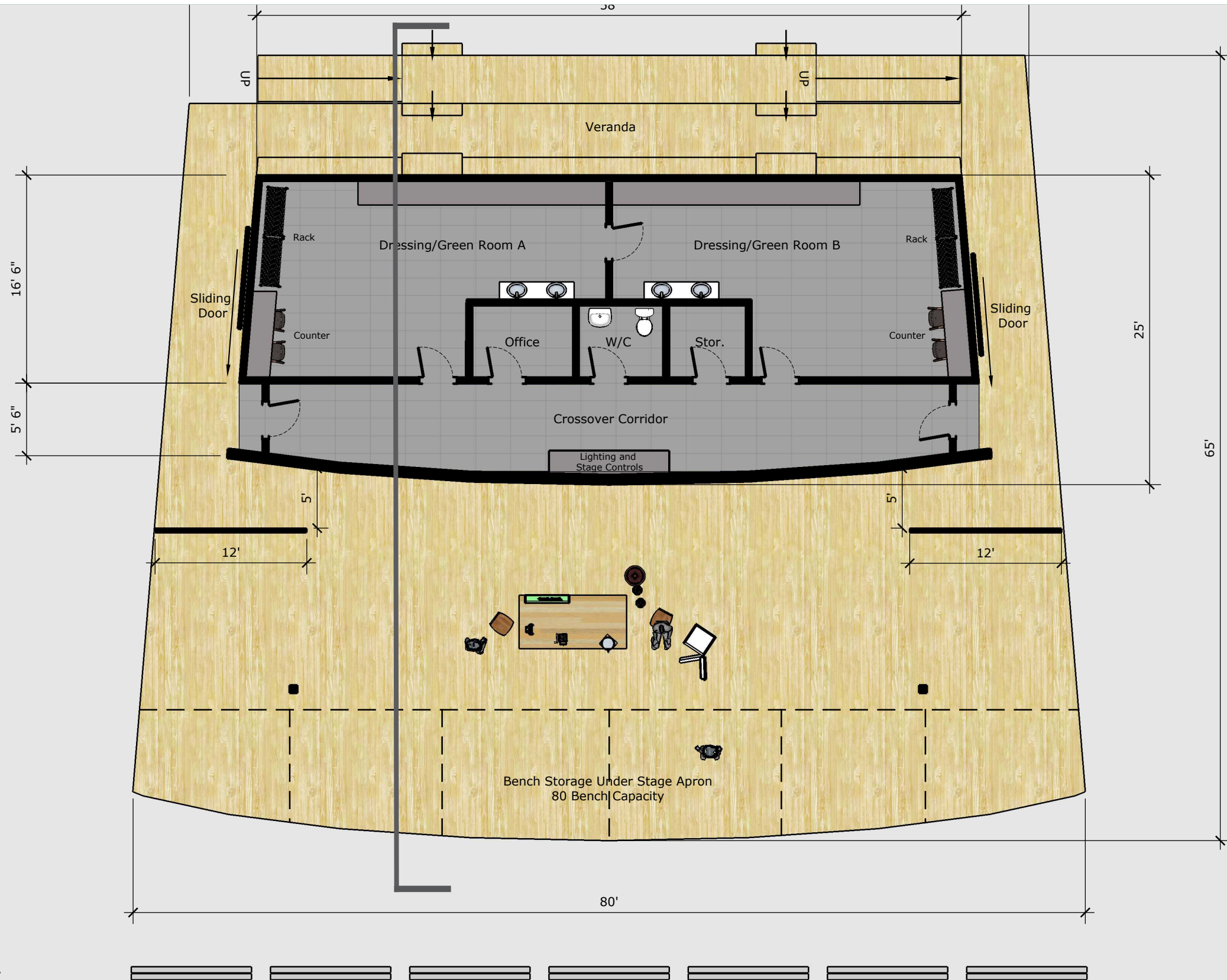
After a period of consideration, the Village Commission have indicated, through the County, that they are prepared to proceed with the completion of the construction documents package based on the design contained in this report. This work is being scheduled at the time of preparation of this report.



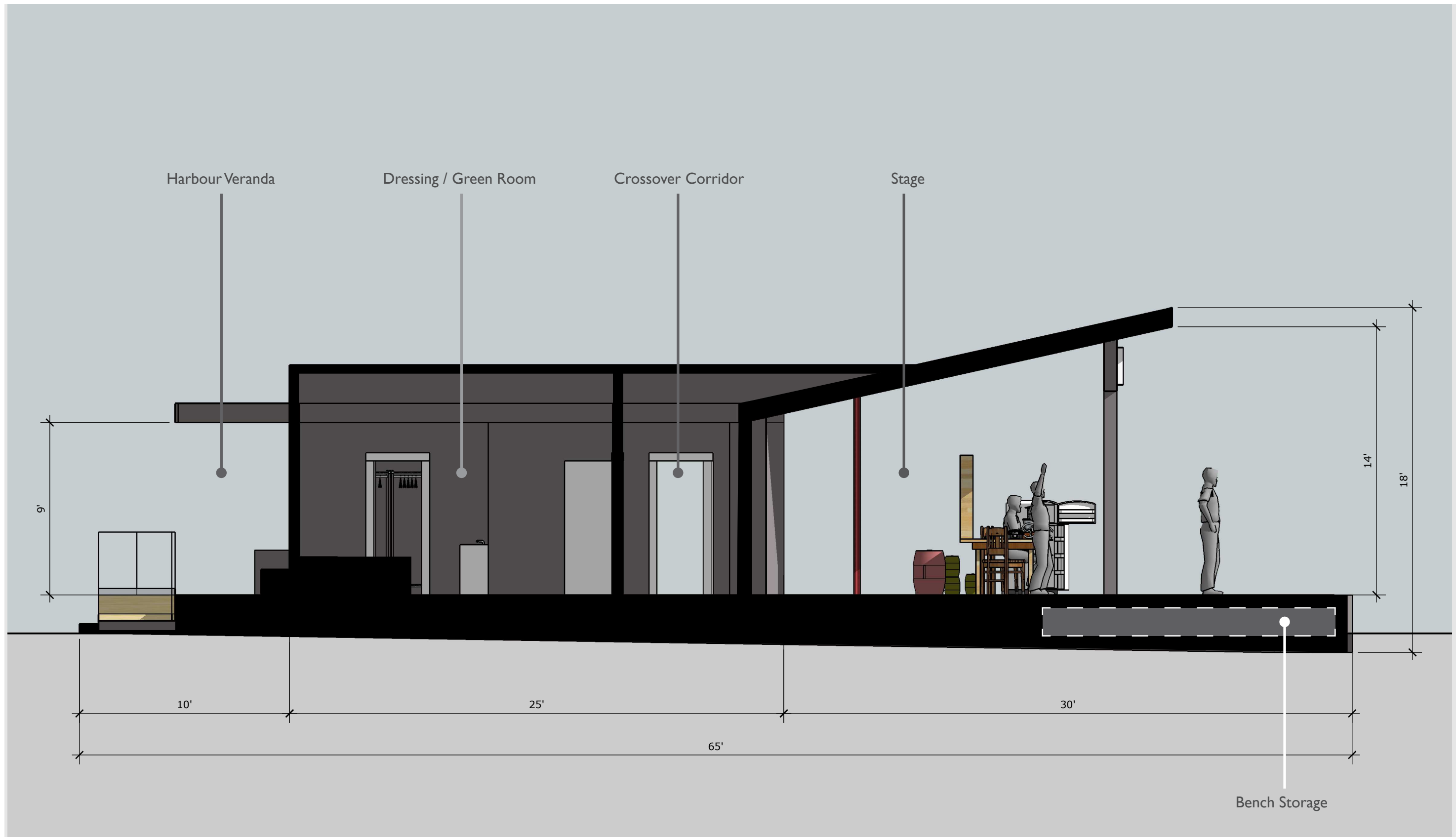


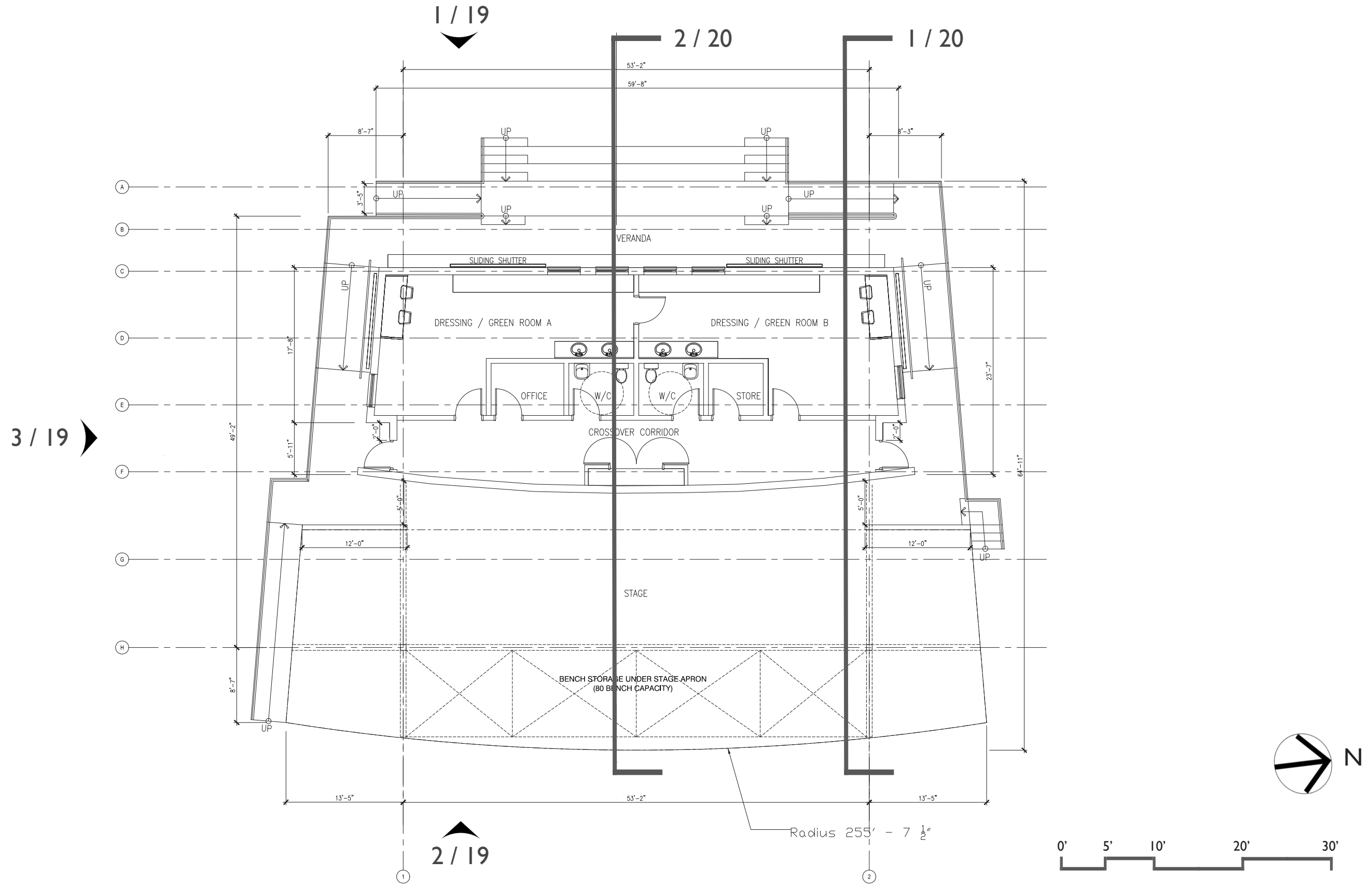


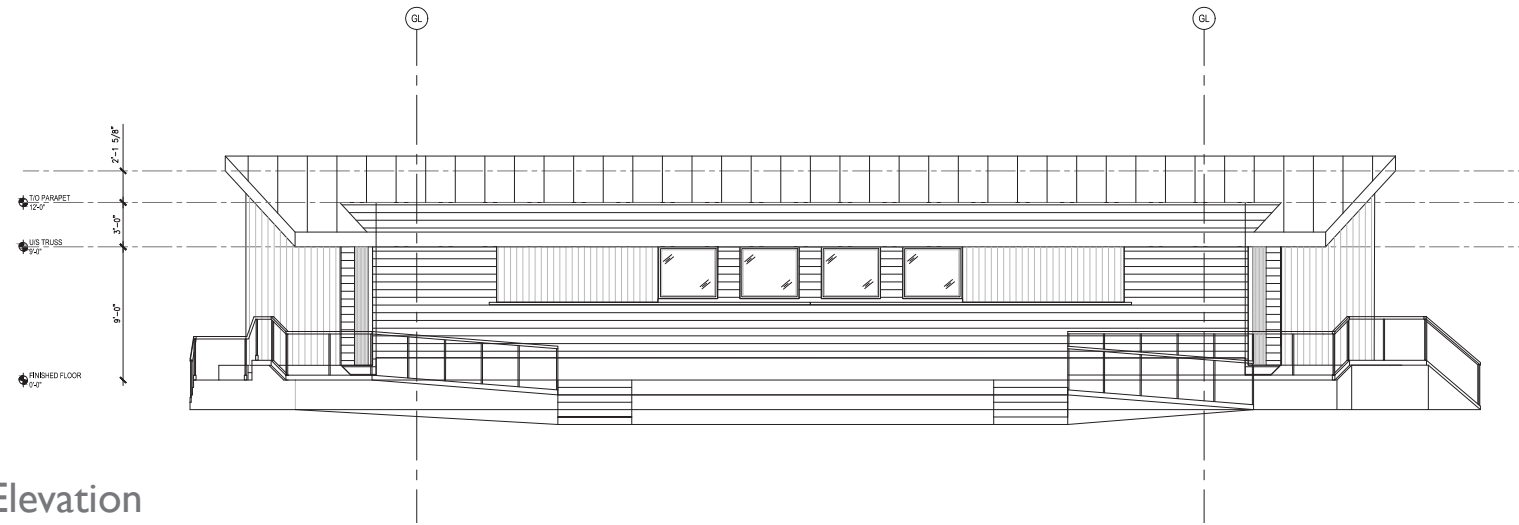




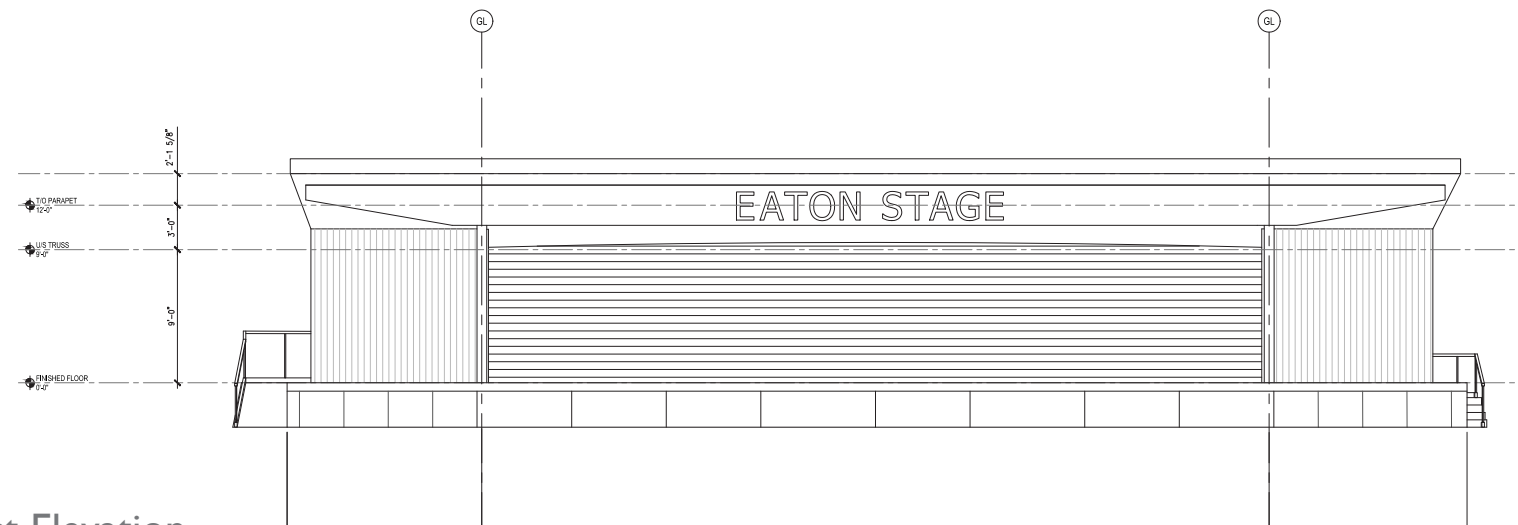
*NOTE: Early concept envisioned only one washroom for performers. Subsequent investigation revealed that Building Code would require 2 washrooms.



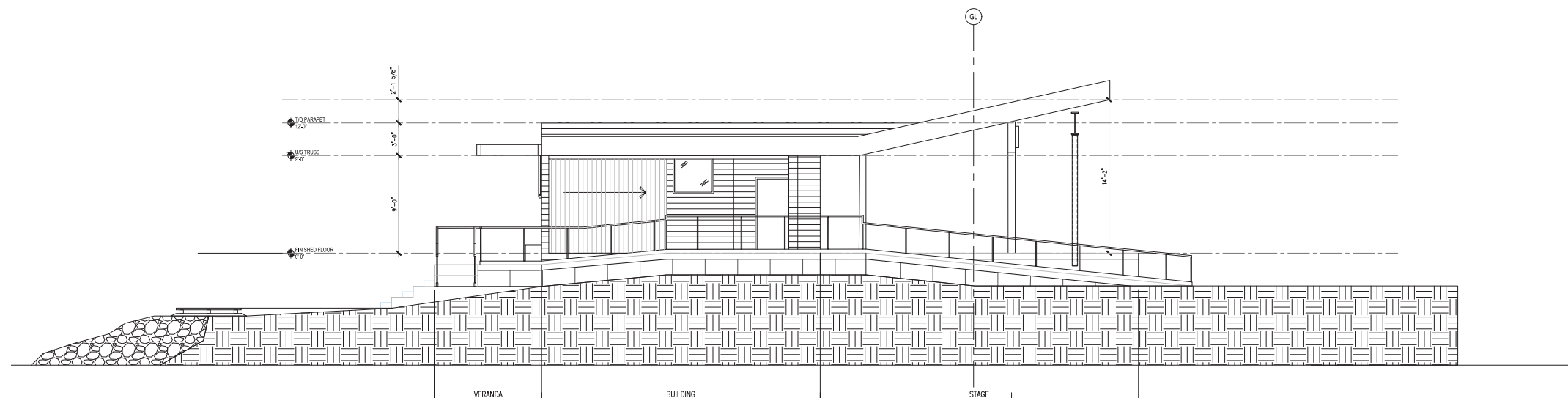




1 / 19 West Elevation

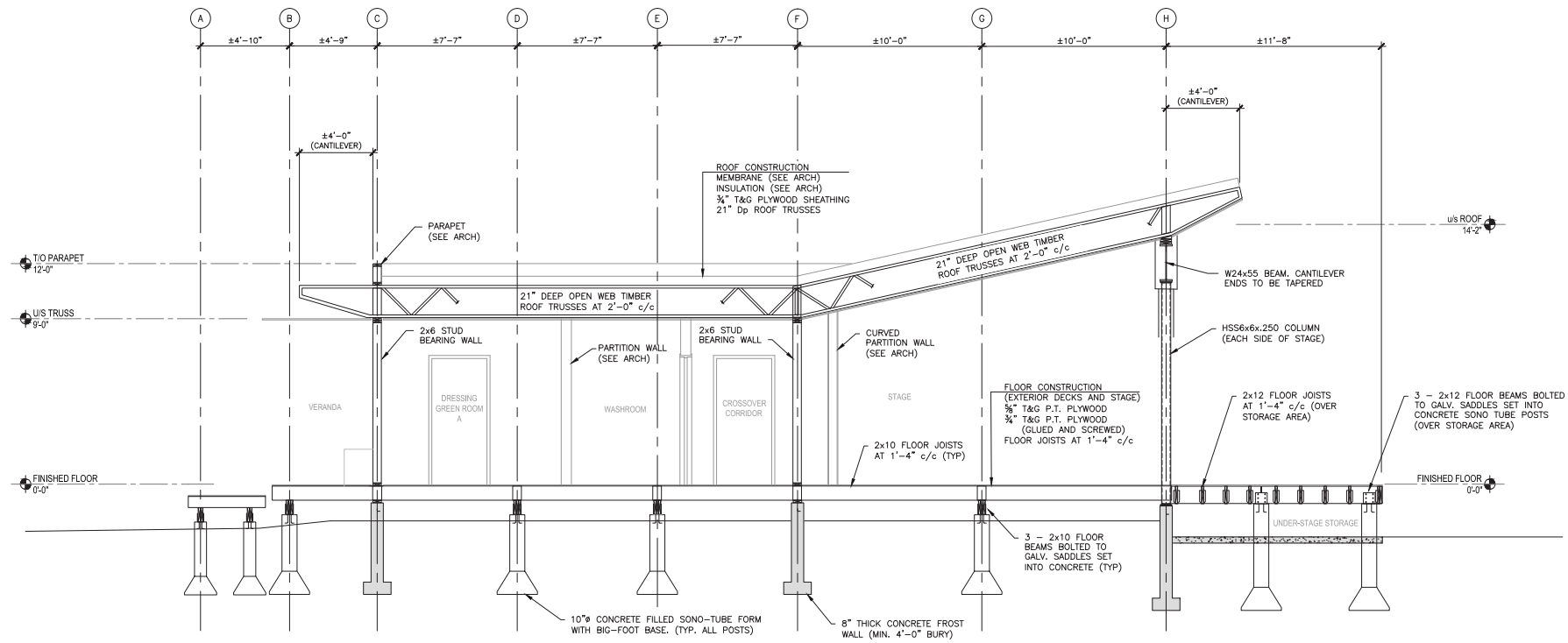


2 / 19 East Elevation

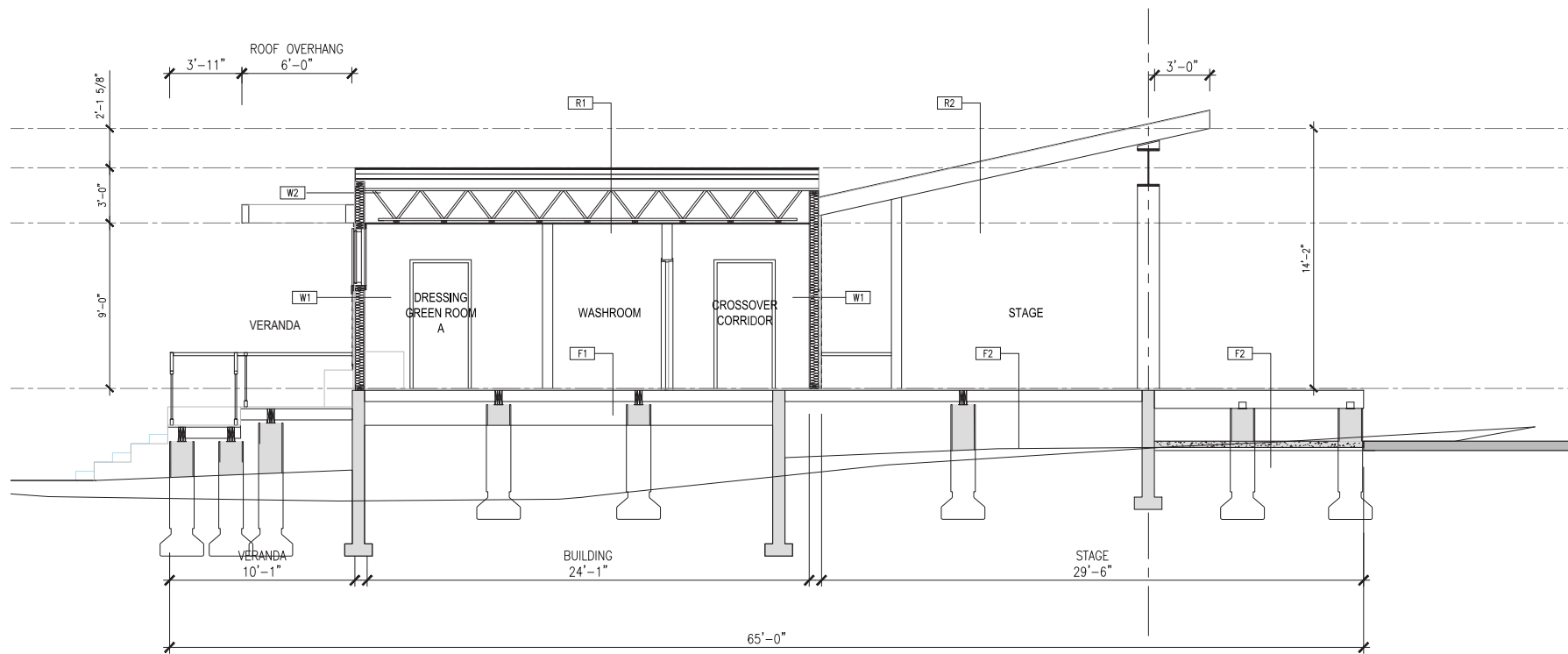


3 / 19 South Elevation

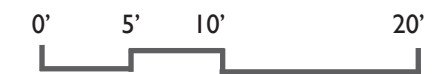




1 / 20



2 / 20



7.0 HARBOUR WALK

The BDA Pugwash Waterfront Improvement Concept includes the following narrative about the Harbour Walk component:

Every year more and more people are walking as a recreation and social pursuit. Pugwash recently construction [sic] a waterfront boardwalk that has become a popular walking and socializing amenity. The waterfront concept plan include [sic] a 'Harbour Walk' that connects all the attractions and activities on the waterfront. (BDA 19)

During our community consultation we heard that people are concerned about the perceived safety of the Harbour Walk due to its car dominance (inconsistent or nonexistent sidewalks). We also heard people express interest in blocking streets off to car traffic, extending sidewalks from the "downtown" to the Co-op / Foodland, and improving on-street parking conditions – particularly in front of Home Hardware. People thought that extending the Harbour Walk along the waterfront by the Harbour Centre would create a beautiful pedestrian experience along the waterfront.

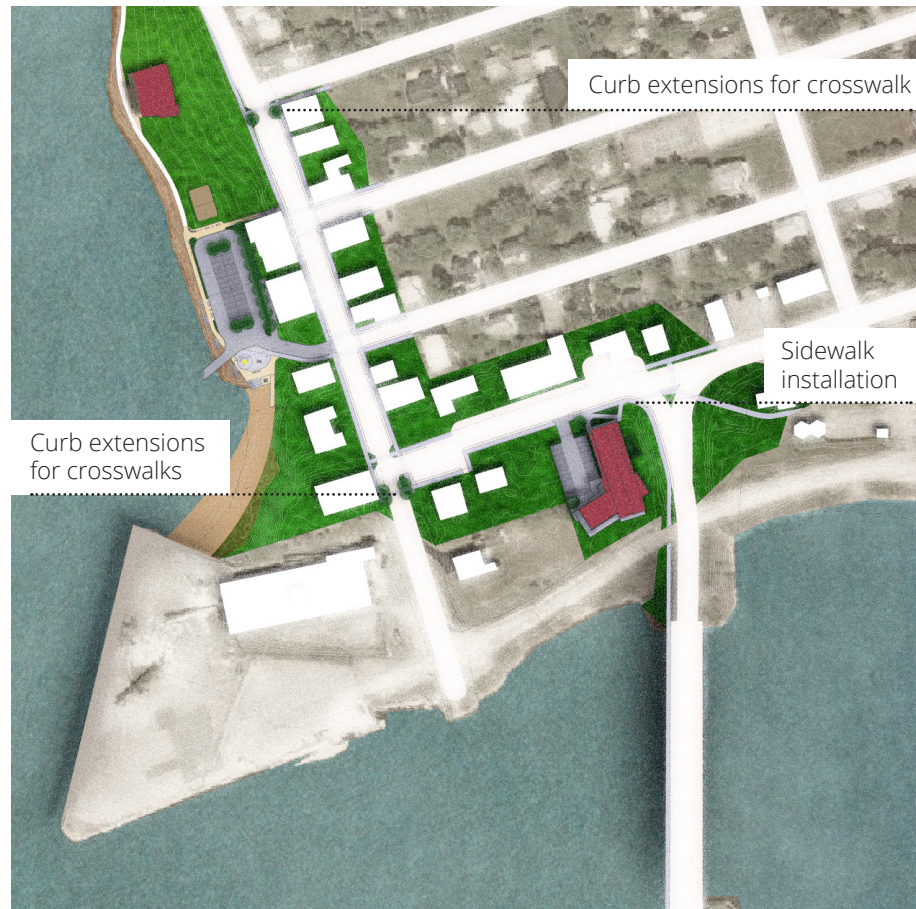
Our concept advancement was based on two key ideas: 1. Provide destinations, 2. Consider alternate materials.

7.1 PROVIDE DESTINATIONS

We are proposing the addition of two viewing platforms – one at the end of the Harbour Centre breakwater and one at the termination of the Harbour Walk at Page Point. These will provide dramatic views of the Pugwash Harbour and provide pedestrians a sense of purpose in that they are walking to a destination.

7.2 CONSIDER ALTERNATE MATERIALS

Whereas the BDA plan specified a "stonedust" trail along Route 6, we are suggesting that due to the limited space and the unknown condition of the base for this portion of the Harbour Walk that this portion should be a boardwalk. A boardwalk offers the possibility of creating a foundation over challenging terrain and does not require the width of shoulder area necessary to bring aggregate surfaces up to surrounding grades. Naturally, material selection for the Harbour Walk is subject to change pending a topographic survey to determine available area and existing terrain.



Extent of Water & Durham Street Improvements

8.0 WATER STREET & DURHAM STREET IMPROVEMENTS

Improvements to the downtown portions of Water and Durham Streets were another important component of the BDA Pugwash Waterfront Improvement Concept. The report stated that:

[t]he objective of the concept for Water and Durham Streets is to improve the pedestrian experience by providing upgraded sidewalks, lighting, and landscaping. [...]

The improvements to Water Street include:

- *new curb and sidewalks from the [V]illage hall to Durham Street*
- *use ‘safe cross’ expanded sidewalks at the crosswalks including landscaping.*
- *provide decorative lights similar to the boardwalk.*

[The improvements to the Water Street and Durham Street intersection include:]

- *remove the fence and wall and regrade along the Water Street side of Memorial Park to open the park visually. Provide street side seating benches to more completely incorporate the park into the downtown.*
- *create a ‘safe cross’ island on the south side of Durham Street adjacent to the post office to complete the intersection. Plant a tree in this island.*

[The improvements to Durham Street include:]

- *a new curb, sidewalk, and decorative lights on the north side of the street. This will involve easements from Home Hardware and the Chatterbox/Craft store [now Chesnutt Café] property. The proposed sidewalk is aligned to accommodate the existing parking.*
- *tree planting in strategic locations. (BDA 8)*

Building on these concepts put forward in the BDA report, during our community consultation we heard that people are strongly in favour of sidewalk extensions, that they would like them on both sides of Water and Durham Street but recognized this may be difficult or impossible in places. They also expressed that there should be sidewalk access to the new Multi-Purpose Centre.

Our concept advancement takes the basic ideas set out in the BDA plan and makes changes based on variable Right-Of-Way (ROW) widths, desired sidewalk and drive lane widths, and access to the new Multi-Purpose Centre. Finishes, fixtures, and other components are selected from the Waterfront Development Master Plan Design Palette. These include waste receptacles, benches (with and without backs), and street lighting. Recommended tree species have been selected from the list of those recommended for future use in *The Trees of Pugwash* report for their suitability for harsh environments such as parking lots and waterfronts. These include native species: White Ash (*Fraxinus americana*), American Elm (any hybrid or cultivar with increased resistance to Dutch Elm Disease), as well as non-native species: Basswood (*Tilia americana*), Hackberry (*Celtis occidentalis*), Freeman Maple (*Acer freemanii*). Hardy ornamental grasses and low shrubs that evoke a natural waterfront environment may be planted in curb extensions as desired.

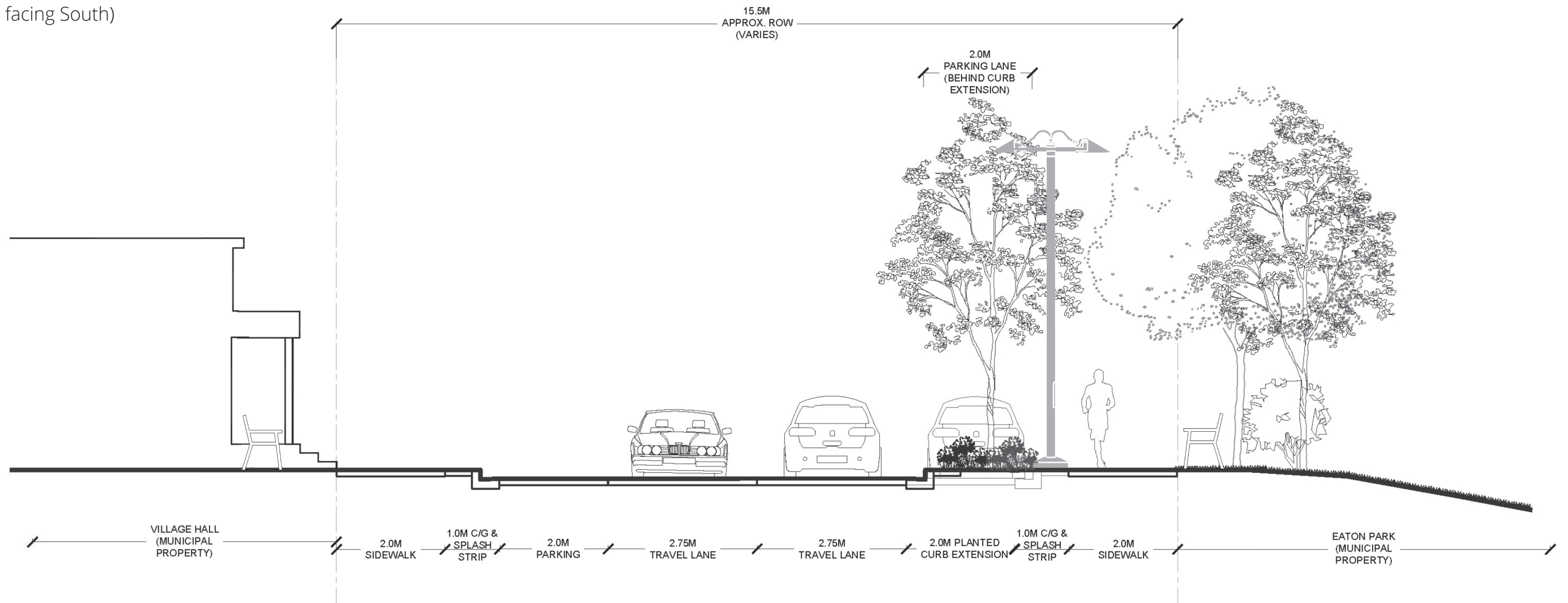
We have focused on four typical cross sections to communicate the details of our concept advancement. These cross sections follow on the next pages. Each cross section is accompanied by a small map showing the approximate location of the cross section.



CROSS SECTION A

This illustrates a typical street cross section at the intersection of Black Street and Water Street (by the Village Commission building). Here the ROW is wide enough to allow parking and a 2.0 metre sidewalk on both sides. This allows curb extensions at the intersection to mark the entrance to the village “downtown” and facilitate pedestrian crossing. These extensions can also be used as planting beds or potential rain gardens to slow and filter surface run-off.

Approximate location of cross section A
(Water St. & Black St. facing South)

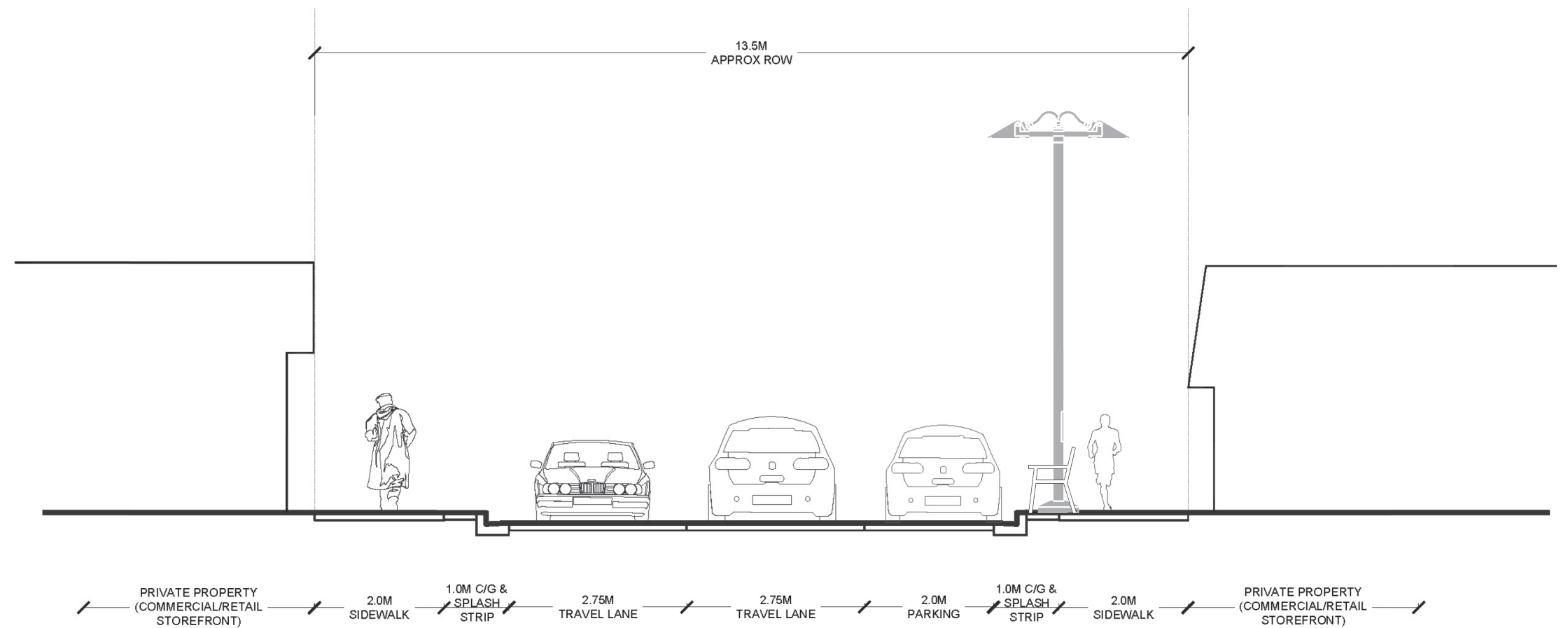




CROSS SECTION B

This illustrates a typical street cross section at the intersection of Prince Albert Street and Water Street (by the Pharmasave building). Here the ROW is notably narrower – only allowing space for parking on one side and a 2.0 metre sidewalk on both sides. This limits possibilities for using curb extensions at intersections. Intersections should be clearly marked by painted crossings. The use of unit pavers should be considered for sidewalks in order to provide visual interest where there may not be space for planters, benches, and other amenities.

Approximate location of cross section B
(Prince Albert St. & Water St. facing South)

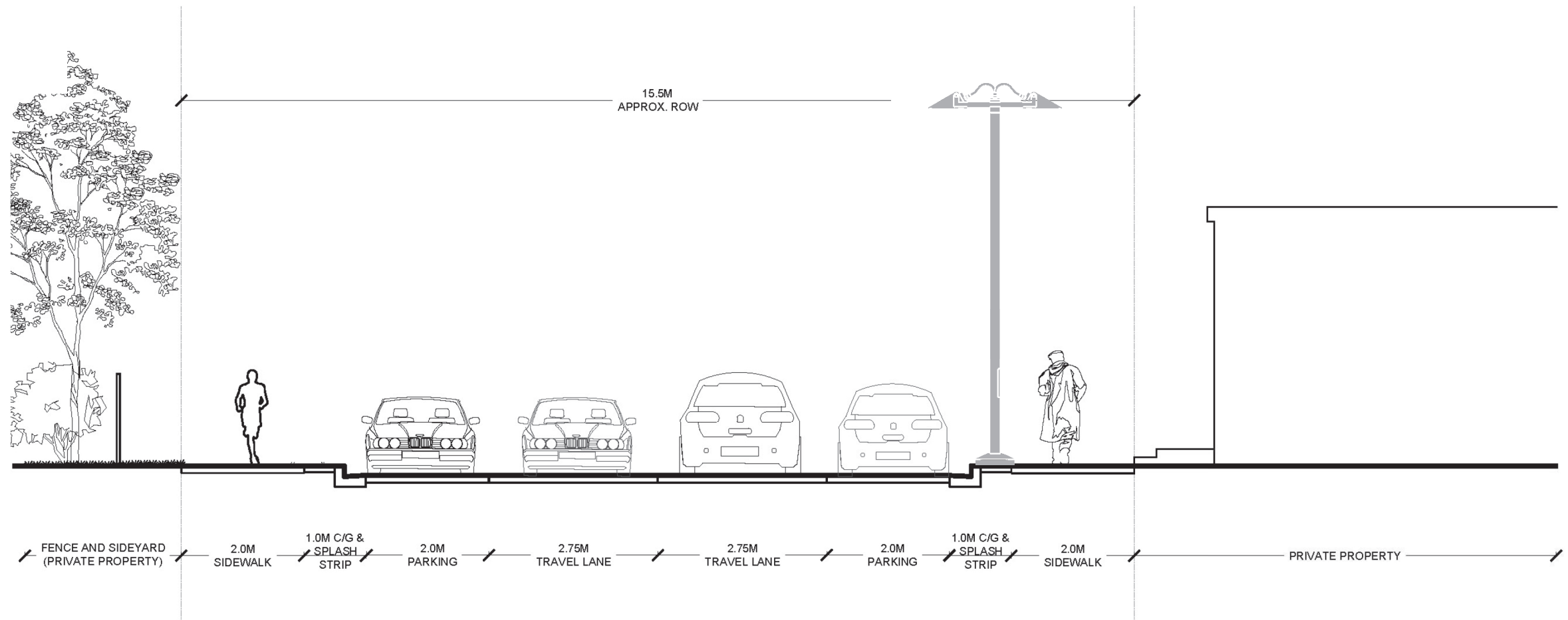




CROSS SECTION C

This illustrates a typical street cross section at the intersection of Victoria Street and Water Street (by the Scotiabank building). This part of Water Street features space for parking and a 2.0 metre sidewalk on both sides. The use of unit pavers should be considered for sidewalks in order to provide visual interest where there may not be space for planters, benches, and other amenities. Curb extensions are proposed at the nearby intersection of Durham Street and Water Street (not shown in this cross section). These help emphasize the importance of this intersection and provide a sense of arrival in the Village “downtown.”

Approximate location of cross section C
(Victoria St. & Water St. facing South)

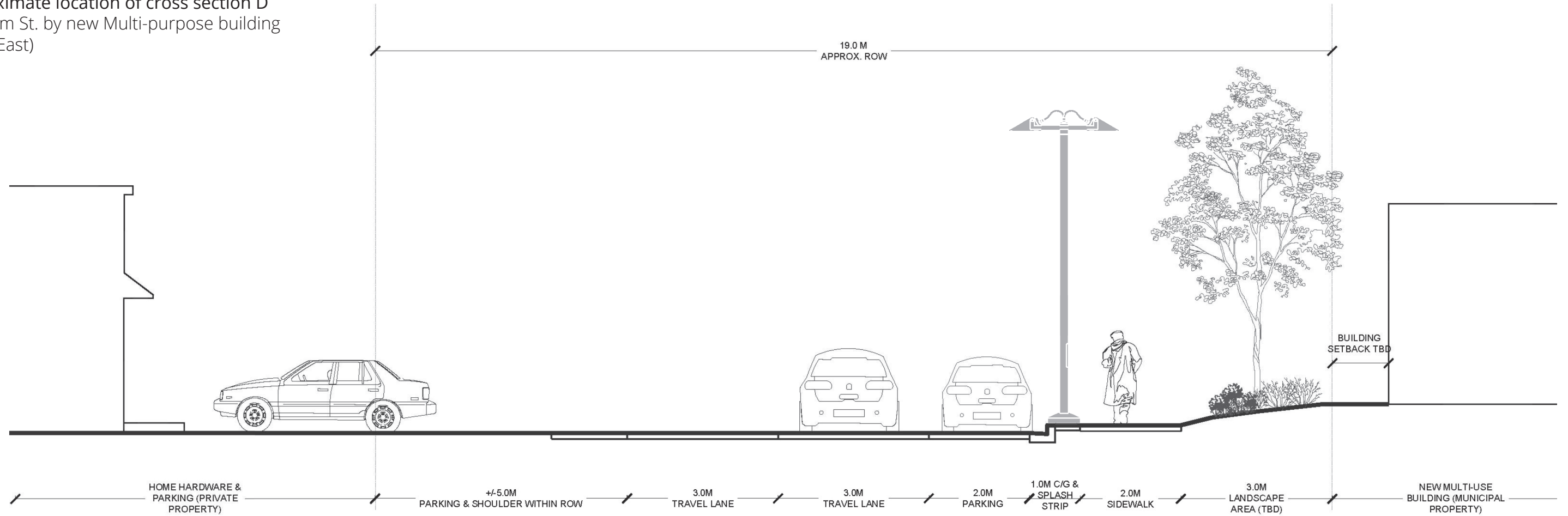




CROSS SECTION D

This illustrates a typical street cross section at Durham Street in front of the new Multi-purpose building. This cross section maintains parking in front of the Home Hardware, provides wider vehicular lanes due to the higher traffic in this area, and provides the main sidewalk along the south side (post office side) of Water Street. This provides easy access to the new Library / Multi-purpose building and opportunities for a seamless landscape treatment in front of this important new civic feature.

Approximate location of cross section D
(Durham St. by new Multi-purpose building facing East)



9.0 WAYFINDING SIGNAGE




The BDA Pugwash Waterfront Improvement Concept includes the following narrative about the wayfinding signage:

Two locations have been identified for directional signage to the [V]illage center [sic] and the major visitor attractions; the intersection of Highway 6 and Brickyard Road, and Highway 6 and Durham Street. These signs would also serve as welcome signs and are to be well crafted and painted to express the character of the community. (BDA 19)

During our community consultation we showed the public some different approaches to wayfinding. We heard that people generally preferred a “distance and direction to destination” approach, followed by a “visual spatial reference / location map” approach, followed in turn by a “placemaking / community identity” approach. More importantly, however, the key thing we heard was that people liked all of these approaches. People were enthusiastic in general about the idea of Pugwash featuring more signage (whether in one or a combination of all of these wayfinding approaches.)

Some of the other feedback we received during community consultation included public desire for: convincing people to “make the turn” to the downtown, including map signs in key locations so people can orient themselves, signs that are uniform in appearance, signs that benchmark the ones in Wolfville and Malagash, advertising panels that can be added or removed, Gaelic text, a clean-slate approach, new community branding (determined through a future study), use of icons, and signs that are fun and colourful.

Although the BDA plan calls for signs at two locations: the intersection of Highway 6 and Brickyard Road, and Highway 6 and Durham Street, we are proposing additional locations to maximize the effectiveness of the wayfinding elements (shown at right). The first is at the intersection of Highway 6 and Irishtown Road. This will address motorists approaching Pugwash from the East (from Wallace). We are also proposing at least one pedestrian-scale map sign intended to help orient pedestrians once they have parked their vehicle. We have also included a multi-purpose directional/arrival sign that can be used to mark points of interest within Pugwash (e.g. Village Square, Eaton Park, Thinker’s Lodge, Farmer’s Market, Schools, etc.) In this way, wayfinding elements will serve motorists

-  Directional wayfinding locations identified in RFP
-  Recommended directional wayfinding locations
-  Recommended wayfinding map



Location of proposed wayfinding elements

arriving in Pugwash from either direction, as well as motorists and pedestrians navigating within Pugwash.

Our concept advancement is based on three key ideas: 1. Communicate different messages at different scales 2. Tell a story, 3. Set a tone.

9.1 COMMUNICATE DIFFERENT MESSAGES AT DIFFERENT SCALES

We have designed wayfinding elements that work at varying scales. In other words, some elements are larger - meant to help direct motorists, while others are smaller - meant to help direct pedestrians. These wayfinding elements are described below and illustrated on the following pages.

Wayfinding element A is a single-sided welcome sign meant to catch motorists’ attention while travelling at 80 km/h and tell them that they should prepare to make a turn to avoid missing all that Pugwash offers. The message is “Welcome to the Village of Pugwash! You’re getting close... Don’t miss our downtown!”

Wayfinding element B is a double-sided arrival sign meant to inform motorists travelling at approximately 50km/h that they have arrived in the Village and need to decide where they want to go. It provides a more detailed list of destinations in Pugwash with general directions. The message is “You’ve arrived! Let us show you around.”

Wayfinding element C is a single-sided pedestrian-scale map meant to orient people parking before walking around the Village. The message is “You’re here. What would you like to see? Here’s how you get there.”

Wayfinding element D is a multi-purpose directional/arrival sign meant to direct motorists and pedestrians within Pugwash to points of interest. The message is “The feature you’re looking for is right over here.”

9.2 TELL A STORY

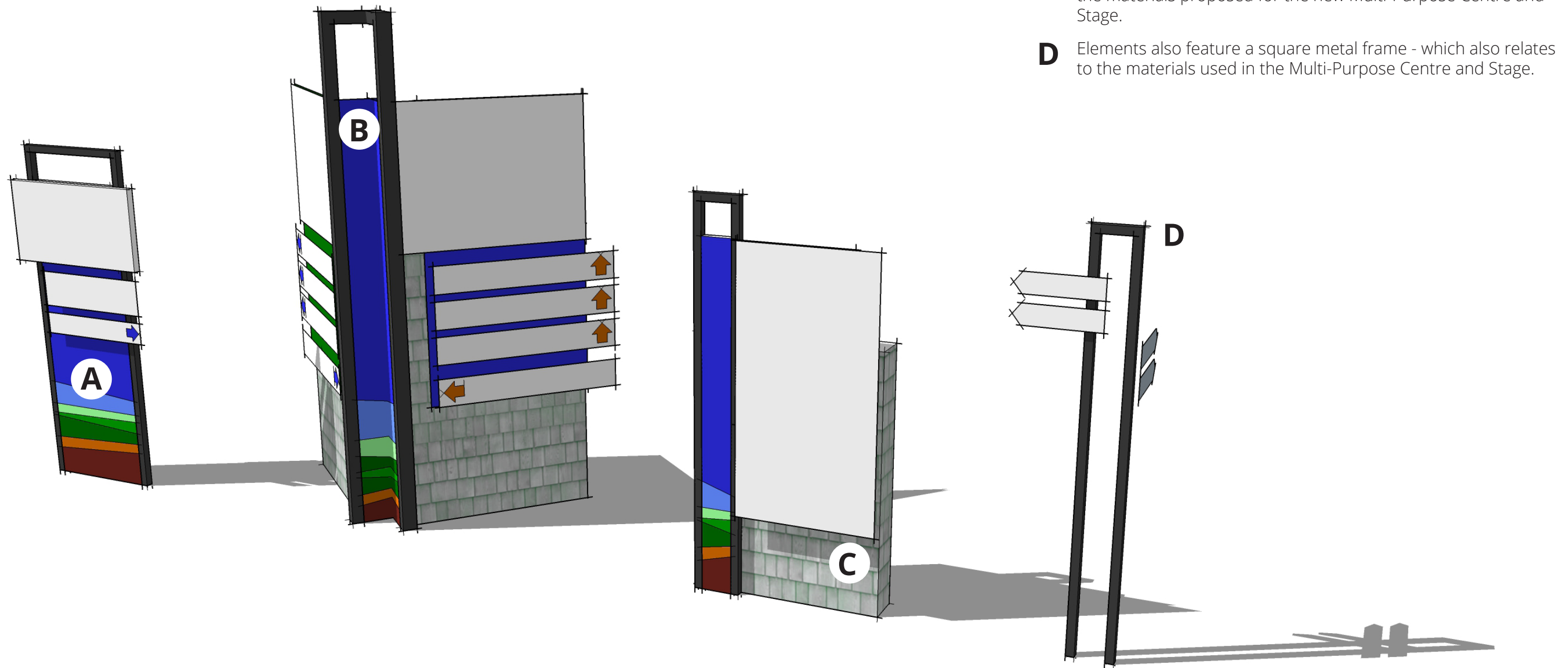
Our proposed wayfinding elements feature an abstracted representation of the natural heritage of the Pugwash Harbour and Estuary in colours referencing its surficial geology (red, orange, and brown tones), vegetation (green), and sea (blue). Wayfinding elements feature natural wood shingles and a square metal frame that relates to the materials used in the new Multi-Purpose Centre and Stage. The square metal frame also references the utilitarian aesthetic of Pugwash’s industrial heritage (shipbuilding, brickmaking, salt mining, etc.) These elements combine to create a thoughtful design solution that references Pugwash’s industrial past, surrounding environment, and joyful character. The result is a striking visual identity that balances utility, inspiration, and spirit.

9.3 SET A TONE

The wayfinding signage sets a design language that should be used throughout the Village to give it a cohesive visual identity. We have interpreted this design language in the materials and furnishings selected in the Waterfront Development Master Plan Design Palette. The key elements that are carried throughout are:

- Square forms
- Black metal frames with a square cross-section
- Weathered natural wood (or grey recycled plastic)
- Bright accent colours (specifically orange, green, and blue)

ILLUSTRATION & DESCRIPTION OF PROPOSED WAYFINDING ELEMENTS



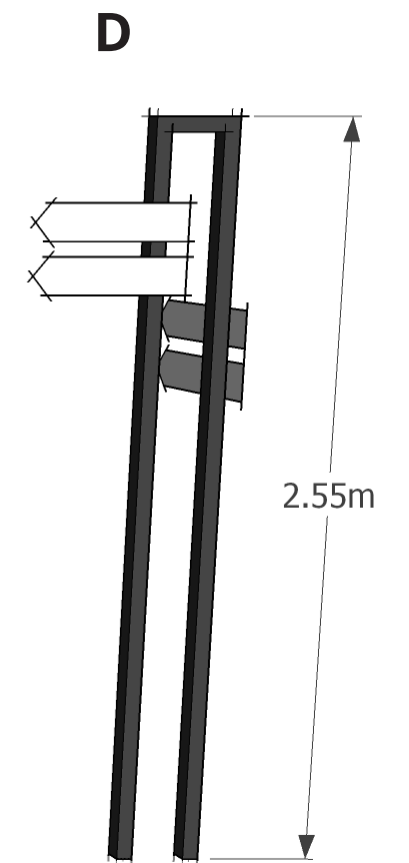
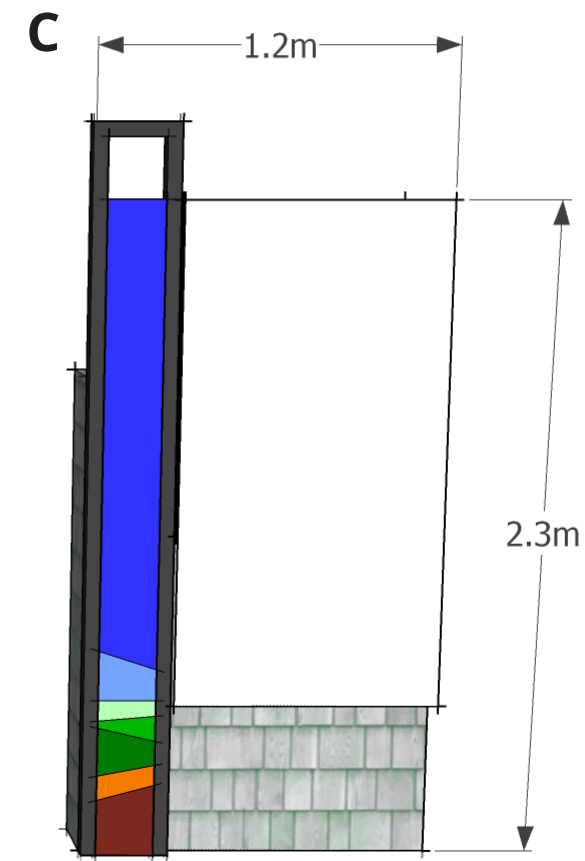
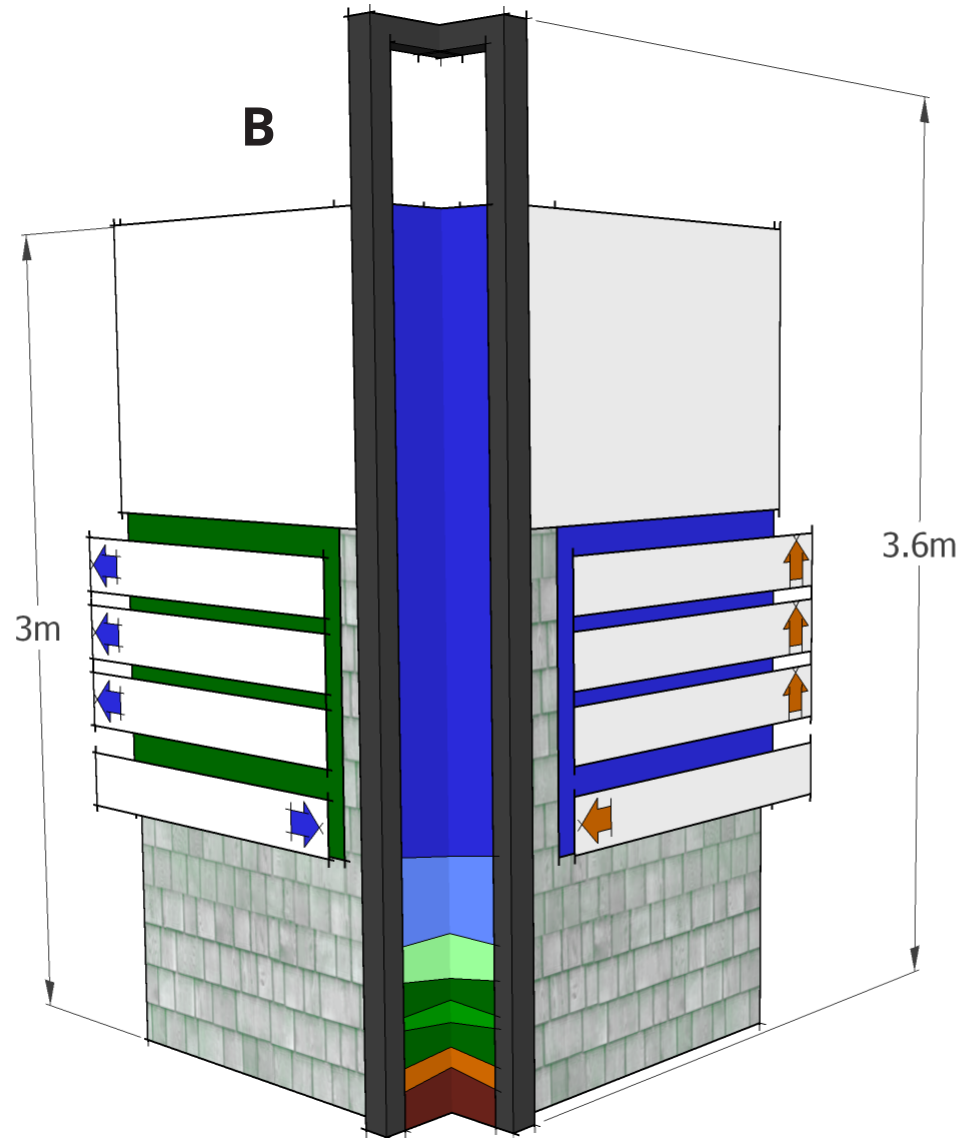
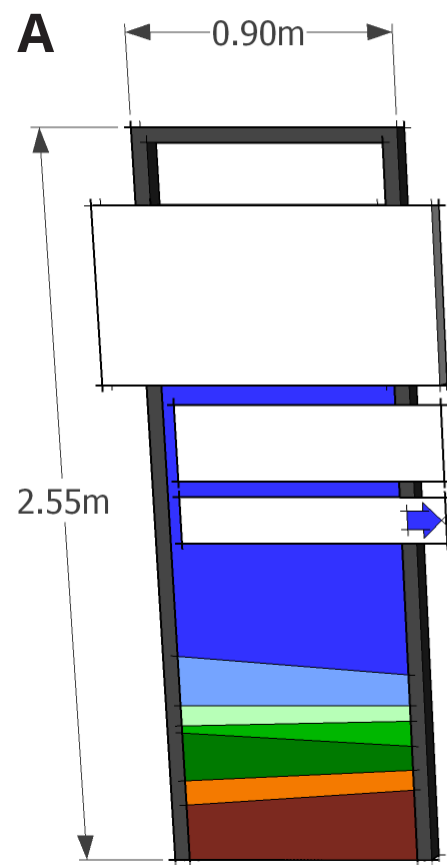
- A** Wayfinding elements feature an abstracted representation of the natural heritage of the Pugwash Harbour and Estuary in colours referencing the geology (red, orange, and brown), vegetation (green), and sea (blue)
- B** The arrival sign is the largest wayfinding element and is composed of two faces arranged at right angles to face traffic arriving in the Village from both directions.
- C** Wayfinding elements feature natural wood shingles to relate to the materials proposed for the new Multi-Purpose Centre and Stage.
- D** Elements also feature a square metal frame - which also relates to the materials used in the Multi-Purpose Centre and Stage.



Map showing proposed locations for wayfinding elements (A,B,C).

Note that element D is not located on the map as it is intended to be used as-needed basis to direct visitors to specific points of interest (e.g. Eaton Park, Curling Club, Farmers' Market, etc.)

- A** is a single sided welcome sign meant to give drivers a quick list of reasons to visit Pugwash and to alert them that they need to turn off the main highway to avoid missing it.
- B** is a double sided arrival sign meant to provide a more detailed list of destinations in Pugwash with general directions.
- C** is a single sided pedestrian-scale map meant to orient people parking at the Village square before walking around the Village.
- D** is a multi-purpose directional/arrival sign meant to mark points of interest within Pugwash (i.e. Village Square, Eaton Park, Thinker's Lodge, Farmer's Market, Dinghy Beach, etc.)



10.0 DESIGN PALETTE

Several elements contained in the request for proposals for this project required the selection of finishes, fixtures, and other components. We have developed a Design Palette of selected features that can be applied across all of the project elements. As individual parts of the Master Plan are further developed to the tender-ready stage, the finishes and fixtures in the design palette can be applied to each individual element as appropriate.

Our concept advancement for the design palette is based on two key ideas shared with our advancement of wayfinding elements: 1. Tell a story, and 2. Set a tone.

10.2 TELL A STORY

Just as our proposed design of wayfinding elements references Pugwash's industrial past, surrounding environment, and joyful character, our proposed design palette is intended to do the same and express the same visual identity.

10.3 SET A TONE

The design of the wayfinding signage sets the tone for a design language that should be used throughout the Village to foster a cohesive visual identity. Pugwash has a strong industrial heritage (forestry, fishery, shipbuilding, brickmaking, salt mining, etc.) To reference this history, the design palette is intentionally free of unnecessary decoration. Forms are clean, simple, and robust. Pugwash is also heavily dependent on its natural surroundings. Its very location is based on the existence of a natural harbour and estuary. To reference this history, the design palette features natural materials like wood (or recycled materials with a similar appearance) and vegetation that is native or similar in appearance to native species. Pugwash also possesses a strong creative spirit. The design palette features colourful seating options that can be used to create pops of colour in strategic places along the waterfront. Combined as a whole, the palette is intended to support a visual identity that balances utility, inspiration, and spirit.

The key elements carried throughout the palette are:

- Square forms
- Black metal frames with a square cross-section
- Weathered natural wood (or grey recycled plastic)
- Bright accent colours (specifically orange, green, and blue)

10.4 GROUND SURFACES

10.4.1 WOOD BOARDWALK

Select for waterfront areas or areas where existing conditions are constrained by area or rough terrain.

10.4.2 CRUSHER DUST PATH

Select for cost savings and installation in less visible areas or where existing conditions are not constrained by area or terrain.

11.4.3 ASPHALT

Select for high traffic areas of parking lots in Village Square, Multi-Purpose Centre, and Harbour Centre.

10.4.4 UNILOCK ECO-OPTILOC™ PERMEABLE PAVERS OR SIMILAR

Select for parking spaces in Village Square, Multi-Purpose Centre, and Harbour Centre.

10.5 VEGETATION

10.5.1 WHITE ASH

Fraxinus americana

10.5.2 AMERICAN ELM

Ulmus Americana (Any hybrid cultivar with increased resistance to Dutch Elm Disease)

10.5.3 BASSWOOD

Tilia americana

10.5.4 HACKBERRY

Celtis occidentalis

10.5.5 FREEMAN MAPLE

Acer freemanii

10.5.6 SHRUBS AND ORNAMENTAL GRASSES

Species similar in appearance to those naturally occurring in local coastal environments.

10.6 SITE FURNISHINGS

Site furnishings should be suitable for a marine waterfront application and environmentally friendly where possible.

10.6.1 RUTHERFORD PARK BENCH - ANGLED LEG

Bench with back from Wishbone Site Furnishings. Black metal frame with grey slats. Constructed with powder coated aluminum and recycled plastic slats.

10.6.2 RUTHERFORD PARK BENCH - STRAIGHT

Backless bench from Wishbone Site Furnishings. Black metal frame with grey slats. Constructed with powder coated aluminum frame and recycled plastic slats.

10.6.3 RUTHERFORD PICNIC TABLE

Picnic table from Wishbone Site Furnishings. Black metal frame with grey slats. Constructed with powder coated aluminum frame and recycled plastic slats.

10.6.4 URBAN FORM EASY ACCESS WASTE RECEPTACLE

Waste receptacle from Wishbone Site Furnishings. Black metal frame with grey slats. Constructed with powder coated aluminum frame and recycled plastic slats.

10.6.5 NOVARA BOLLARDS & LUMINAIRES

Novara lighting line from HessAmerica. Available as bollards for path lighting and various heights for parking lots and streets. Black metal. Constructed with cast aluminum and stainless steel.

10.6.6 FOUR SLAT STANDARD ADIRONDACK CHAIR

Adirondack chair from Lolltrade. Select from orange, green, or blue colour options. Constructed from 100% recycled HDPE.

10.6.7 ALFRESCO ROUND TABLE (44")

Dining table for deck applications (Multi-Purpose Centre & Harbour Centre) from Lolltrade. Select from orange, green, or blue colour options. Constructed from 100% recycled HDPE.

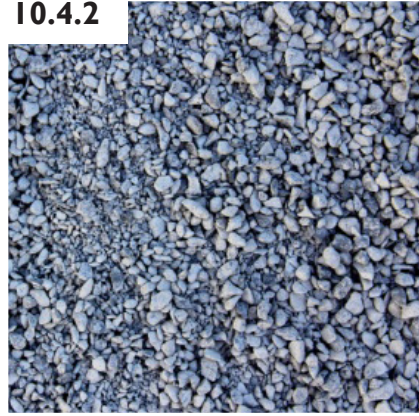
10.6.8 CRICKET HD DINING CHAIR

Dining chairs for deck applications (Multi-Purpose Centre & Harbour Centre) from Lolltrade. Select from orange, green, or blue colour options. Constructed from 100% recycled HDPE.

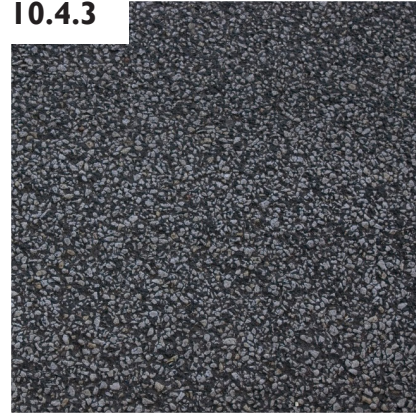
10.4.1



10.4.2



10.4.3



10.4.4



GROUND SURFACES

10.5.1



10.5.2



10.5.3



10.5.4



10.5.5



10.4.6



VEGETATION

10.6.1



10.6.2



10.6.3



10.6.4



10.6.5



SITE FURNISHINGS

10.6.6

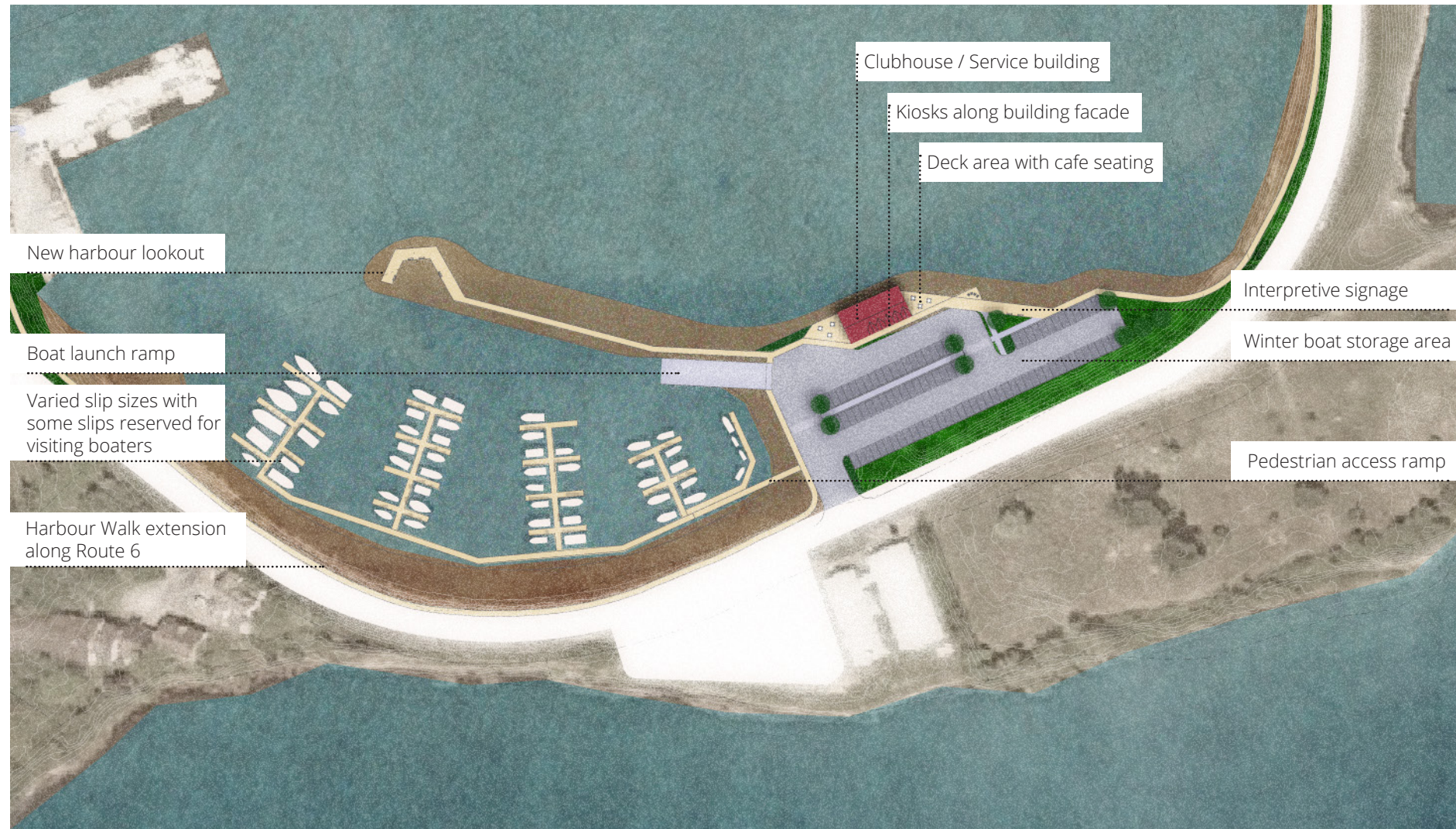


10.6.7



10.6.8





Harbour Centre and portion of Harbour Walk

11.0 HARBOUR CENTRE

The Harbour Centre was a key feature of the BDA Pugwash Waterfront Improvement Concept, which described it as:

[fulfilling] the demand for additional recreational boat slips and services but [...] also designed for related water based activity for residents and tourists. The Harbour Center will be the community focus for harbour and river environmental education and research. The Harbour Center will include:

Marine Services

- *boat basin with docking slips for local and visiting boats*
- *haul-out slipway*
- *fuel*
- *sewage pump-out*
- *showers and laundry*
- *boat storage*

Tourist attraction for water based experiences

- *boat tours*
- *boat/kayak rentals*
- *sailing lessons*
- *waterfront boardwalk and park*
- *retail outlets*

Environmental Research and Education Center [sic]

- *display of natural history of the Pugwash River*
- *educational programs about Pugwash River ecosystem, experiences for residents and visitors*
- *boat tours*
- *headquarters for restoration projects and monitoring wildlife and water quality (BDA 14)*

Further to this concept presented in the BDA report, during our community consultation we heard that people were very excited by this component (some referred to it as the most important component of the waterfront concept) - although acknowledged as the most costly. People felt it would be important for improving economic development through accommodating visiting and local boaters, enhancing the visitor experience for boaters and motorists alike, and improving quality of life for local residents. Key features that people wanted to see in the Harbour Centre included: additional slips with a range of sizes to accommodate visiting boaters, a boat lift, on-site boat storage, full service marina complete with fueling station, club house, shower and laundry facilities, additional parking, interpretation and programming opportunities for the Friends of the Pugwash Estuary, interpretive signage, opportunities for bird-watchers, an appealing place for motorists to stop, waterfront deck, a two-storey building if possible, and commercial / food service options.

Our concept advancement was based on three key ideas: 1. Provide a multi-functional marina with enough slips of varying sizes to accommodate both visiting and local boaters, 2. Get pedestrians close to the water, and 3. Give travelling motorists a reason to stop.

11.1 PROVIDE A MULTI-FUNCTIONAL MARINA

Community consultation revealed that people were generally positive about the concept set out in the BDA report. Our concept advancement focuses on addressing some of the practical aspects of the concept to improve functionality. One key aspect is re-orienting and lengthening the boat launch ramp and pedestrian ramp to the floating docks to accommodate a longer, more gradual slope as recommended in the marine engineering brief (see section 11.7). Fuelling facilities are proposed to be located as close as possible to the boat ramp for easy accessibility. The floating docks have been re-arranged to provide a variety of slip sizes and the necessary clearances between fingers to accommodate visiting and local boaters with vessels of varying sizes. The parking layout is preserved as substantially the same, as this provides ample space for boat storage during the off-season as well as a drive loop that is convenient for vehicles towing boat trailers. The parking area should be paved with a combination of asphalt and permeable unit pavers. The asphalt should be used for drive

aisles for easy maintenance and cost savings. The permeable paving should be used for all parking spaces to reduce surface runoff and therefore environmental impact. Examples of acceptable permeable paving products are Unilock Eco-Optiloc, Turfstone, and Uni Eco-Stone unit pavers. This treatment will minimize the amount of surface run-off while giving the parking area the appearance of a public square, rather than a commercial parking lot.

11.2 GET PEDESTRIANS CLOSE TO THE WATER

The Harbour Centre features a detour of the Harbour Walk component to follow the edge of the waterfront. This pedestrian route runs from the Pugwash Harbour Bridge along the waterfront past the marina building, past the boat launch and pedestrian ramps, and carries on around the harbour along the shoulder of the Sunrise Trail. A waterfront promenade runs along the marina breakwater to a dramatic viewing platform offering spectacular views of the Pugwash Harbour – including the Pugwash Harbour Bridge, salt terminal, fishing wharf, and a clear view to Eaton Lodge. This promenade offers ample opportunities for interpretive panels or other educational elements explaining community history, natural history, or environmental monitoring programs.

Finishes, fixtures, and other components are selected from the Waterfront Development Master Plan Design Palette. These include waste receptacles, benches (with and without backs), café seating adjacent to the marina building, and colourful Adirondack style chairs.

Recommended tree species have been selected from the list of those recommended for future use in The Trees of Pugwash report for their suitability for harsh environments such as parking lots and waterfronts. These include native species: White Ash (*Fraxinus americana*), American Elm (any hybrid cultivar with increased resistance to Dutch Elm Disease), as well as non-native species: Basswood (*Tilia americana*), Hackberry (*Celtis occidentalis*), Freeman Maple (*Acer freemanii*). Trees are carefully located in to visually break up the parking area and intentionally not located along the waterfront to preserve views of the harbour.

11.3 GIVE MOTORISTS A REASON TO STOP

The Harbour Centre concept integrates commercial kiosks into the street side of the marina building. This maximizes the visual interest of the building and provides ample reasons for the travelling public to stop. The building features flanking decks with moveable café seating to provide opportunities for picnicking or simply enjoying views of the harbour and marina activities. These decks are located along a prominent pathway featuring interpretive and wayfinding signage and dramatic views of the harbour and new Multi-Purpose Centre.

11.4 HARBOUR CENTRE CLUBHOUSE AND SERVICE BUILDING

This significant component of the Harbour Centre is “an element of an element” and, as such, the scope and budget for the current project could not be stretched far enough to examine each of these sub-elements in much detail. We have relied on the stakeholder engagement process to help identify the needs and expectations for a building (or buildings) to be located on the Harbour Centre site, and used this to help frame future discussions.

Chiefly, the items we heard included:

- Incorporate kiosks at the site for Friends of the Pugwash Estuary, ice cream, boating supplies shop, rentals
- Club house/lounge space
- A deck off the building, overlooking the water
- Shower/laundry facilities for boaters
- A two storey building desired
- Food services/restaurant – local business relocation desired so as not to compete with local business

Each of these will have both cost and revenue potential implications and needs to be tested in order to establish which items are absolutely essential to the success of the facility. The consultants offer the following observations to help frame those discussions:

- The core function of the building would be the provision of services to boaters. Thus, washroom, shower and laundry facilities would be essential.
- Functions related to the fostering of boating safety should be given suitable prominence. This could be an information kiosk or a common space where notices could be posted.
- A social component is a normal expectation of membership in a boat club and thus a lounge would be an important component of such a facility. A liquor license is often an important source of revenue for clubs. Staffing and security need to be considered.
- Depending on the type of food service being considered, provision of a “commercial kitchen” can add substantially to the cost of constructing a building. Who would own the kitchen equipment and pay for the insurance? Would removing an existing operator from the traditional downtown area harm their business's viability? What would be the relationship between the clubhouse's lounge and the restaurant operation? Two licensed establishments could dilute the market and adversely affect the success of both.
- A two storey building can help to conserve site area by reducing building footprint but brings with it the need to provide barrier-free access to an upper floor. This usually means an elevator or lift which will also add considerable construction cost and carry maintenance implications. (i.e. ongoing cost and obligation)
- Kiosks can add activity to the area they are located and could form an interesting architectural element to articulate the mass of a potential club house. Standalone kiosks could be more susceptible to damage and thus increase maintenance costs. Can a rent be charged for these?

Without an established program, it is almost impossible to give any sort of reliable indicative cost estimate for a clubhouse. As a means of establishing a target, if it is taken that the gross area for the building were approximately 3,000 square feet (or comparable to a mid- to large-sized contemporary house) and working with a rough cost of \$300/square foot, the potential cost of a clubhouse and service building could be on the order of \$900,000.

11.5 BOATING MARKET UPDATE

A marina market update was completed to better understand the feasibility of a Harbour Center on the Pugwash Waterfront. After reviewing the Pugwash Waterfront Feasibility Study prepared by Cantwell & Company (April, 2005), WSP researched a total of 22 facilities within the Northumberland Strait vicinity. Fourteen interviews were conducted and eight desktop reviews of online information were completed (two of these businesses appear to be no longer in operation). Based on available information, the total approximate vessel capacity for all facilities researched is 1,413 (capacity can vary depending on the size of vessels berthed at one time). Since 2004, the total capacity in PEI and NB slightly increased, based on the marinas surveyed when compared to the capacity identified in the Cantwell & Company report. Note that this current report included the Marina in Montague and the Charlottetown Marina which were not included in the 2005 report. Based on the marinas surveyed, the total capacity in Nova Scotia slightly decreased when compared to the 2004 numbers in the Cantwell & Company report. The Cantwell & Company report included a marina in Tidnish, however, based on this current study, no marina is identified as operating in Tidnish. When taken collectively, there was a slight increase in the Northumberland Strait's boating market capacity based on the comparative survey (overall increase of 1.87% from 2004). The average annual cost for a 25 foot boat is \$1,253 (a 55% increase since 2004). For further details on the facilities researched and data collected, please refer to Appendix 3.

11.6 ENVIRONMENTAL EFFECTS DETERMINATION

An Environmental Effects Determination Report based on the conceptual design of the Pugwash Harbour Centre Development has been completed by WSP. The scope of the assessment consists of direct environmental components, including land, marine, air and natural systems; indirect environmental components, including socio-economic and cultural effects; and other effects such as the acoustic environment. The report provides a description of the existing environment; an overview of environmental effects and recommended mitigation measures; cumulative effects; and regulatory and permitting requirements. Recommended further studies include:

- Benthic habitat survey;
- Marine sediment sampling program (MSSP);
- Archaeological Resource Impact Assessment (ARIA), and
- Mi'kmaq Ecological Knowledge Study.

The full Environmental Effects Determination report can be found in Appendix 2.

11.7 MARINA BASIN ASSESSMENT ENGINEERING BRIEF

A marina basin assessment was completed on the conceptual marina plan in order to provide estimates on potential capacity and order of magnitude construction costs. The assessment is limited to the marina basin, breakwater and floating docks, and does not include the reclaimed land area. The assessment considers a capacity of approximately 50 vessel berths for a mix of medium size vessels (25 to 30 ft.) and larger vessels (50 ft.). Larger vessels and sail boats require an increased dredge depth (water depth) and therefore would be restricted to a specific area of the basin. The overall estimated construction cost for the aspects included in the assessment is \$2.7 million. It is important to note this estimate is subject to a number of limitations such as a lack of topographic data and geotechnical soils information, estimated water levels and conditions, and assumed vessel type and size. Further, the variability of unit prices and services, dredge material and its disposal, and environmental measures that may be required could largely impact construction cost. The Engineering Brief, including a general arrangement plan and cross sections of the marina basin and breakwater, follows in this section.

RECIPIENT(S): Mr. Ron Burdock, Architecture49 Inc.
 Ms. Christina Lovitt, WSP Canada Inc.
 SENDER: Mr. Chris Glodowski, WSP Canada Inc.
 Mr. Nicolas Guillemette, WSP Canada Inc.
 COPY: Mr. Justin McKibbon, WSP Canada Inc.
 DATE: 10/10/2017
 SUBJECT: PUGWASH PROPOSED MARINA BASIN ASSESSMENT

INTRODUCTION

The Pugwash mandate requires a further development of the Harbour Centre component of the project with focus on strengthening community infrastructure related to marine tourism and services for visiting boaters: "Deliverables will include preliminary design and costing of the harbour centre components". A conceptual plan for the marina had previously been developed in the report, 'Pugwash Waterfront Improvement Concept, BDA - Landscape Architecture and Site Engineering, 2005'.

This part of the study by WSP is limited to assessing the conceptual marina plan and provides estimates of the potential capacity and order of magnitude construction costs for the marina basin, breakwater and floating docks. There are a number of significant limitations to the design assessment and the estimates. Hence, the assessment is order of magnitude and is not to be construed as a confirmation of the conceptual design.

The reclaimed land area on the east side of the development is not included and would consist of: demolition of existing infrastructure; construction of a containment berm; land reclamation inside the berm; and construction of buildings, parking facilities, services and landscaping.

BDA CONCEPTUAL PLAN

A copy of the BDA conceptual plan is shown on Figure 1. The main components of the marina basin are:

- dredged area of the basin
- rubble mound breakwater
- floating docks including finger floats & access floats
- pedestrian gangways from the land to the floats
- boat launch ramp in northeast corner



Figure 1 - BDA Conceptual Plan (Marina Basin on West Side of Harbour Centre)

LIMITATIONS OF ASSESSMENT OF BDA CONCEPT

WSP's evaluation of the capacity and construction estimates of the marina basin portion of the Harbour Centre development, are qualified by a number of considerations as described in Table 1.

Table 1 - Limitations in Available Data

Limitations	Implications
No hydrographic or topographic data were obtained for the study area. The elevations are manually estimated from large scale hydrographic chart (CHS Chart 4498, scale 1 : 12 000) and from Google Earth aerial images.	The quantity estimates are very approximate.
The only geotechnical soils information for the site is from a 1985 field investigation where bore hole locations are hand sketched on an 8.5x11 page.	Geotechnical conditions could vary considerably and have a large impact on construction costs.
Two of the bore holes are in the deeper area of the basin but there are no records in the shallow intertidal zone. The upper layer material in these locations is described as 'loose greybrown (or black) silt with trace sand and shell fragments'. Hard materials were encountered at elevations of -4 m to -6 m.	Soft soils materials may cause stability & settlement problems for the breakwater (& reclamation area). Dredge materials may be more expensive to dispose of and may not be suitable fill for the reclamation area.

Water level and wave conditions were estimated from nearby studies (revetment for boardwalk).	At this site, there could be adjustments required to elevation and material sizes.
Specific vessel sizes and types were assumed in order to estimate dredging requirements.	Two lengths of vessels were used for design. However, smaller vessels were also assumed to be sailboats requiring increased dredge depth compared to powered craft.

METHODOLOGY

The following describes WSP’s approach to estimating the number of vessels accommodated in the BDA concept and the related order of magnitude costs for the major components.

The arrangement of floating docks for the assessment is shown in Figure 2 – General Arrangement Plan of Marina Basin and Breakwater. A typical section through the approximate middle of the marina basin is shown in Figure 3 – Cross Sections of Marina Basin and Breakwater.

From tidal information, the water level elevation ranges from -0.2 m, LLWLT (lower low water large tide relative to chart datum) to +2.6 m, HHWLT (higher high water large tide) with a possible surge increasing high water to +2.9 m.

FLOATING DOCKS & GANGWAY

The arrangement of floating docks was developed similar to the layout shown in the BDA conceptual plan with a main access float along the south side of the basin and a series finger floats for the berths. There is also a floating dock in the lee of the breakwater for transient vessels.

The design vessels considered by the client were in lengths of 25 to 30 ft. (8.5 m, medium size) and 50 ft. (15 m, large). The docks assumed for the arrangement are double slips (i.e., two vessels between each finger float). The configurations of the docks and access channels or fairways in the marina are in accordance with published guidelines (PIANC, The World Association for Waterborne Transport Infrastructure, 2016), (California Department of Boating and Waterways, 2005).

Average vessel characteristics are listed in Table 2, including lengths and beams of recreational craft.

Table 2 - Vessel Characteristics

Name	Type	Length (m)	Beam (m)	Draft (m)	UKC (m)	LLWLT EL.	Dredge EL.
B-1	Rec. Motor	8.5	3.7	0.8	0.6	-0.2	-1.6
B-4	Rec. Sail	8.5	3	1.8	0.6	-0.2	-2.6
B-6	Rec. Sail	15	4.3	2.5	0.6	-0.2	-3.3

(where UKC is under keel clearance)

The vessel dimensions of length and beam are used as guide to determine minimum widths for channels, fairways and spacing of finger floats (note: channel is considered to have two passing vessels underway; fairway is between two main floats with only one vessel likely to be navigating to a slip). These clearances are indicated on the plan drawing.

The recommended maximum slope of a pedestrian gangway is 8.33%. Assuming that the upper elevation is at 3.5 m (CD), and that the gangway lands on a float that maintains a 0.5 m freeboard, the length of the gangway is about 38 m to reach LLWLT at maximum slope.

BREAKWATER

The breakwater cross section is estimated using wave and water level conditions similar to those developed for the revetment design work. Accepted coastal engineering practice is employed for sizing the breakwater dimensions and layers. However, large rock materials were not placed across the crest since it appears that landscaping is intended for pedestrian access. Any related issues of potential overtopping damage would have to be verified in design.

No additional costs or estimates were undertaken for possible loose soils conditions in the foundation area of the breakwater. It may be required to be remove the soft material layer and fill it with competent rock materials to support the structure above.

No additional estimates are included for landscaping the breakwater crest.

The breakwater location is moved further to the north compared to the conceptual layout of the BDA proposal. This was required to account for the sloping sides of the rubble mound that encroach upon the marina basin.

DREDGED BASIN

The dredged basin is configured to accommodate the approximate configuration of floating docks shown in the BDA conceptual plan while adhering to general guidelines for allowance of manoeuvring of small craft in the marina. For calculation purposes, the north part of the basin was dredged deeper to accommodate large sailboats compared to the south part that was dredged for medium sailboats.

As indicated in Table 2, dredge elevation could vary from -1.6 m to -3.3 m depending upon the vessel types and sizes to be accommodated. For the purpose of estimating, the dredge elevation is varied from -2.6 m on the south side of the basin to -3.3 m on the north side. This assumes that the basin can handle the 8.5 m (medium) sized sailing craft at any location, whereas, it may be optimized to reduce dredging if the fleet contains more motorized vessels in a designated area with a higher dredge elevation (refer to Table 2, Dredge Elevation).

DISCUSSION AND ESTIMATES

The arrangement plan in Figure 2 shows that the marina capacity is approximately 50 vessel berths which could increase or decrease slightly depending on details of the desired small craft to be accommodated. There are some additional differences from the BDA conceptual plan:

- The pedestrian gangways that access the main floating docks would be very steep at low water conditions (e.g., 16% grade for 20 m length). This steep a grade would not be user friendly. The gangway shown in Figure 2 has a slope of 8.33% and is about 38 m in run length.
- There is no space for the transient floating dock that sits in the lee of the breakwater (per the BDA concept). In order to provide this dock, the breakwater and dredge area would need to be located further to the north into deeper water. There is also no gangway shown in the plan. This component is not included in the assessment.
- The BDA plan also contains a boat launch ramp in the north east corner of the marina. The boat ramp was not included in the present assessment since a ramp at the recommended slope of 14% would require about 36 m in run length to reach an elevation of -1.6 m. Again it would require reconfiguring to provide more clearance in the northeast corner of the basin.

The more important issue is associated with the poor soils conditions that appear to be indicated in the 1985 geotechnical field program. These conditions can have a very high cost impact on the breakwater construction, the dredging and the reclamation.

Quantity and construction cost estimates are provided, but qualified by the limitations described in Table 1, by the variability of unit prices for materials and services, and by a lack of environmental measures that could be required for the work. No unit prices for the supply and installation of rock materials have been sought. The nature of the dredge material and its disposal may also result in large variations in cost, particularly if it is contaminated and/or not suitable for the land reclamation.

Table 3 contains a construction cost estimate based on all the limitations and qualifications provided herein. If the soils beneath the breakwater also require dredging and replacement, the construction cost would significantly increase.

Table 3 – Construction Cost Estimate Assuming No Soils Replacement under Breakwater

NO.	ITEM	UNIT	ESTIMATED QUANTITY	ESTIMATED UNIT COST	AMOUNT
1	Site Org.	%	1	5%	\$ 126,374
2	Mob /Demob.	LS	1	\$ 50,000	\$ 50,000
3	Armour Rock	tonnes	29	\$ 65.00	\$ 1,915
4	Filter Rock	tonnes	2,039	\$ 50.00	\$ 101,967
5	Core Rock	tonnes	12,499	\$ 20.00	\$ 249,980
6	Geotextile fabric	m2	1,500	\$ 8.00	\$ 12,000
7	Dredging	m3	48,640	\$ 25.00	\$ 1,216,000
8	Main Floating docks	m	300	\$ 2,000.00	\$ 600,000
9	Finger Floats	m	197	\$ 1,250.00	\$ 245,625
10	Pedestrian ramp	m	1	\$100,000.00	\$ 100,000
*Construction Grand Total					\$ 2,704,000

(*note: refer to above for all qualifying remarks)

SUMMARY COMMENTS

The BDA conceptual plan for the proposed Pugwash marina development would accommodate approximately 50 recreational motorized or sail vessels in the classes between 8 m to 15 m in length. Overall comments regarding the marina layout are:

- The marina basin is located in an intertidal zone and requires a significant amount of dredging to construct.
- The sloped rubble mound breakwater shown in the BDA conceptual plan would occupy more footprint than indicated, especially considering the dredging required for the basin. As a result, the breakwater would have to be moved further north into deeper water to provide the space for the marina basin.
- Ramp components shown in the plan, both the gangways and boat launch, will likely require more length and space to function adequately.
- The dredged basin will likely act as a siltation zone, and will require regular maintenance dredging activities, similar to those carried out at the adjacent fishermen's wharf.

The overriding feature of the site is the poor soils conditions that appear to be indicated from the 1985 geotechnical field program. The soils beneath the breakwater may require dredging and replacement with competent rock materials to several metres in depth. The dredge spoil from the basin and breakwater is not likely suitable for fill in the reclamation part of the project. This spoil may require expensive treatment and may have to be moved offsite.

The quantity estimates are not based on any survey data from the site. The quantities will increase significantly depending upon the soils and construction of the breakwater. The unit costs have not been verified locally. There could be significant increase in dredging cost depending upon the handling of the dredge spoil and any possible contamination that may be present.

In short, the estimates provided have many limitations which affect their reliability. It is recommended that a much more comprehensive program be developed to advance the Harbour Centre project. The program would involve more measured and developed site data along with structural options that minimized dredging and basin protection structures. A possible alternative to a fixed rubble mound breakwater could be a floating structure. Additional analyses would nonetheless be required in pursuing such an alternative (e.g., wave characteristics analyses, anchor systems, maintenance and storage logistics, etc.).

REFERENCES

- California Department of Boating and Waterways. (2005). *Design and Layout Guidelines for Marina Berthing Facilities*.
- PIANC, The World Association for Waterborne Transport Infrastructure. (2016). *Guidelines for Marina Design*, Report No. 149 / part 1.
- U.S. Army Corp of Engineers. (2011). *Coastal Engineering Manual*, EM 1110-2-1100. CECW-CE.

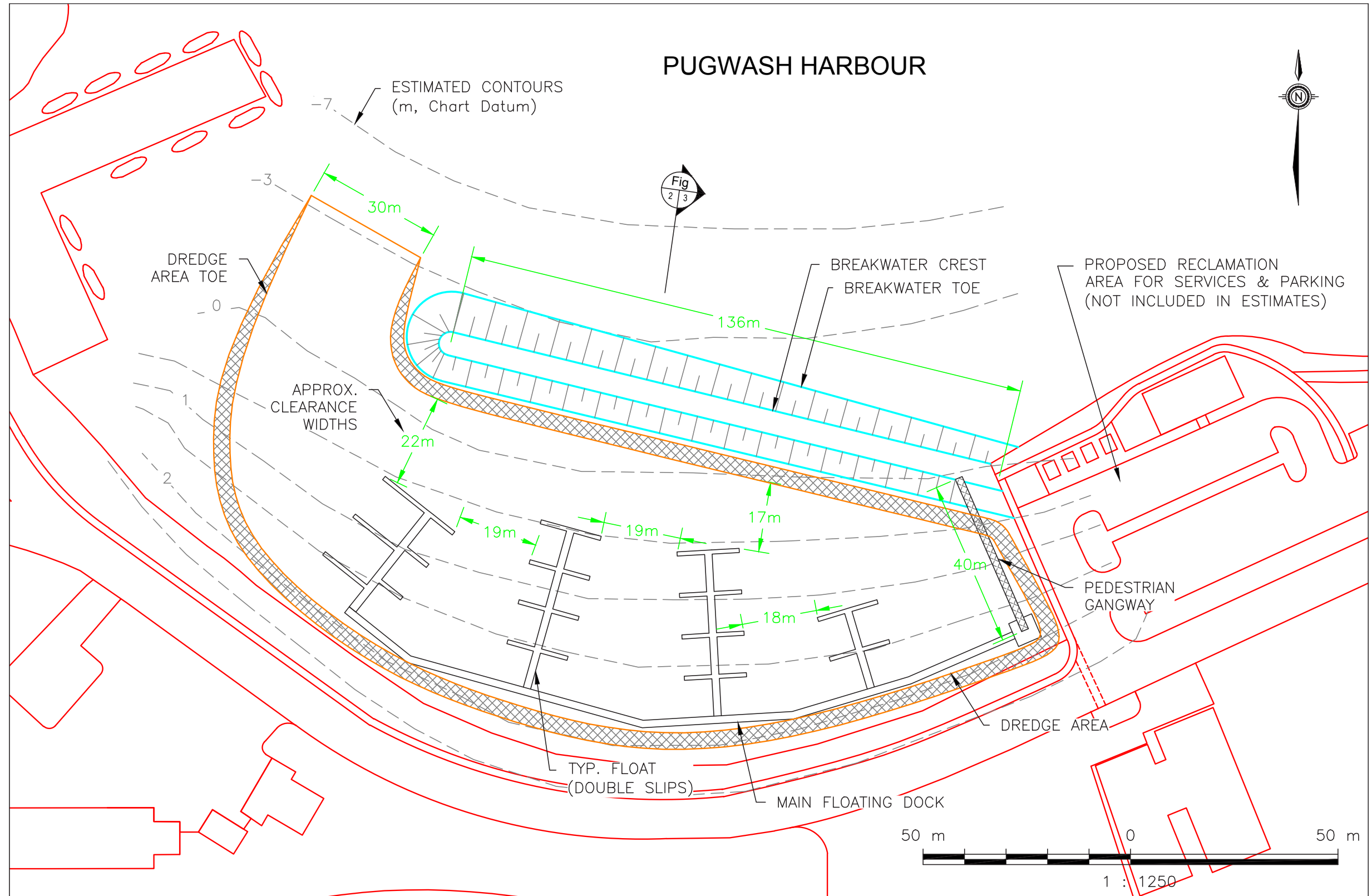


Figure 2 - General Arrangement Plan of Marina Basin and Breakwater

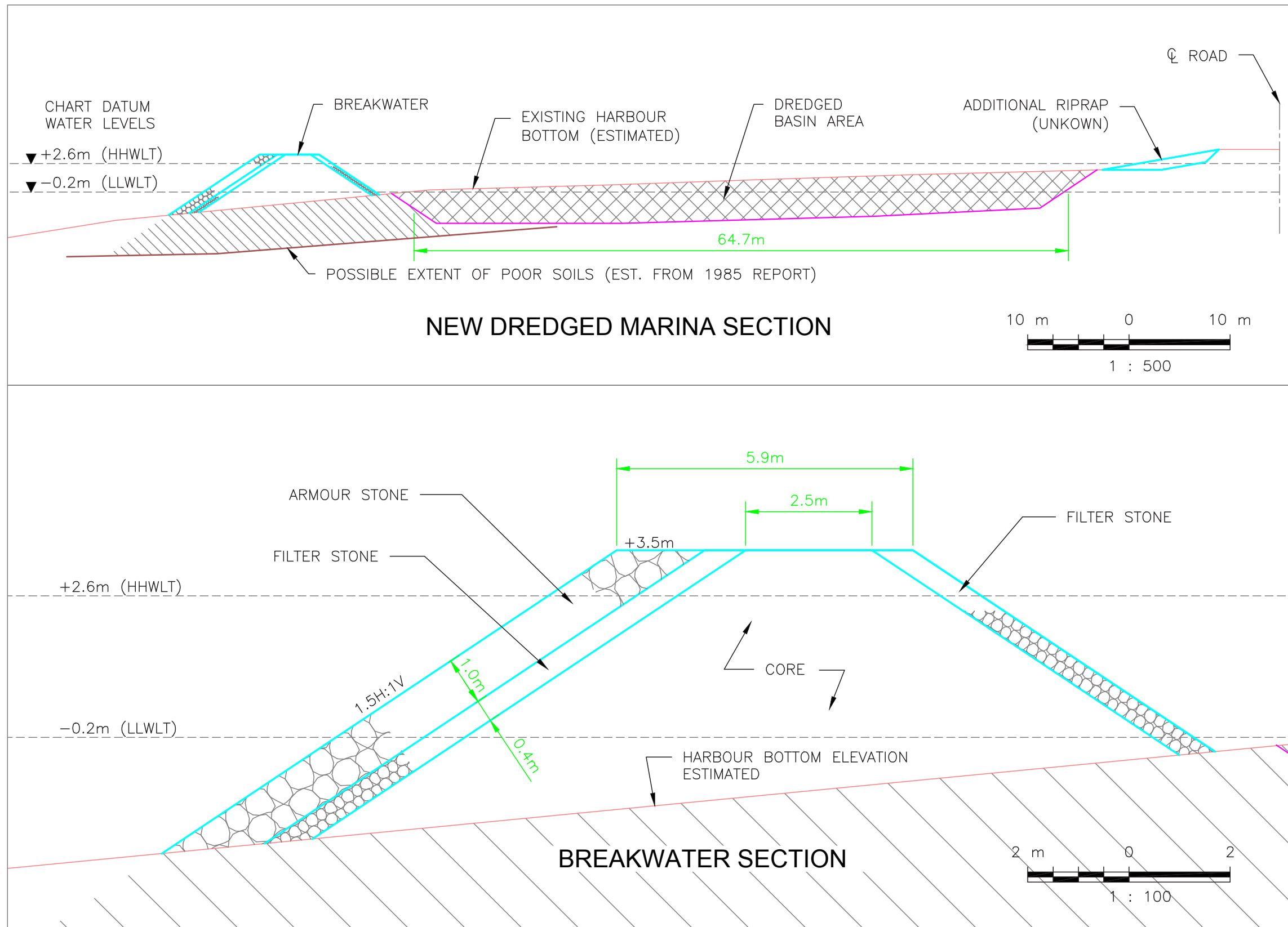


Figure 3 - Cross Sections of Marina Basin and Breakwater

12.0 LIBRARY / MULTI-PURPOSE CENTRE

The site that has been selected as the location for the new Pugwash Multi-Purpose Centre emerged out of the evolution of a process of site evaluation that was undertaken in 2014. This process identified a number of potential sites within the Village and ranked them against a range of criteria including location, access, visibility, capacity, appeal to user groups, ownership, site development costs, and compatibility with neighbouring uses. The present site was not on the list of evaluated sites as it was in private hands at the time. When it did come to market in 2016, it was evaluated using the same criteria and was determined to be highly suitable for the use. Its location beside one of the main road entry routes to the Village is particularly beneficial for being able to become a landmark.

The functional program for the building is also an evolution of a previous iteration of the project. The same study that produced the site assessment and selection in 2014 also contained building concepts for two potential sites. Those concepts were based on the net building areas shown in the table below. The table also shows the space sizes contained in the current concept.

Pugwash Library + Multi-Purpose Centre	2014 Program Area	2018 Concept
Library		
Collections	1,100	1,140
Seating	390	550
Staff Work Space	250	220
Meeting/Program Room	500	540
Public Access Computers	300	250
Special use Spaces	305	300
Multi-Purpose Centre		
Activity Room 1	400	350
Activity Room 2	400	550
Archive	300	N/A
Kitchen	150	140
Living Room	N/A	425
Storage	N/A	120
Total Gross	6250*	7475
Walking Track (Linear Feet)	N/A	240

*for 89-103 Water Street Site

Over the course of the stakeholder meetings and public consultation session held in early May 2017, a few amendments to this program emerged. Principally, these centred on three components: 1. The archive would no longer need to be housed in the facility, as that function has found a home elsewhere; 2. Walking programs are an important part of the physical activities of a number of residents, and the new building should be able to support this in all weathers; 3. The ability to use the kitchen for cooking classes/demonstrations, and not just as a catering kitchen, would be desired. It was also reinforced during those sessions that the multi-purpose spaces or activity rooms would need to accommodate a range of activity classes, including yoga, Pilates, and dance classes in addition to more passive pursuits and gatherings.

Alongside the functional and programmatic information, we also heard the community's wishes and expectations for the look and feel of the centre. It was expressed that the architecture should complement the Village but need not blend in; it should be colourful and eye-catching. Community members felt that the new centre needs to provide an identity to the Village, and give a focus for community activity that is presently lacking. The building should also be light and open, provide views to the water, and have a connection to the outdoors.

More detail on the outcomes of the stakeholder engagement sessions can be found in the Consultation Summary included in the Appendices to this report.

The building had been placed on the site to take advantage of the prominence of the site when viewed from the Highway 6 bridge, with the major mass forming the east side of the civic block and highly visible from Highway 6, whether approaching from the east or the south. The form consists of a principal pitched-roof volume with its glazed gable ends facing the water and Durham Street, intersected by a secondary lower, flat-roofed mass. This opens up two of the major building uses – the library collection and reading room and an informal “Village living room” – for views in and out of the building.

The library has the more civic view over Durham Street, and its façade is extended to the lot line at the street to give an edge to the street and a street presence to the building. The view to the water, and the view from the water and the bridge, are given to the Village living room. This concept is borrowed from the new Halifax Central Library, where the most prominent and popular space in the building connects the activity inside the building to the city.

The simple pitched roof form with dormers recalls a common pattern of house construction while the long roof ridge, sited perpendicular to the water makes reference to the buildings that existed along the west side of Water Street, a pattern still seen in the Lobster Factory at Thinkers' Lodge. The wood shingle exterior wall material also references the traditional local palette, while the addition of brightly coloured trims adds life to the exterior and complements the interior colour scheme.

The lower mass is placed to give views outward from the Activity Rooms towards the inner harbour. There is less emphasis here on the views into the building so eye-catching height is not a particular advantage. Instead, the focus is on the horizontal water view and the placement of windows reinforces this.

The building concept has been developed to allow the library and community activity spaces to take advantage of shared facilities, such as a common entrance, shared public washrooms and a kitchen, but at the same time, to ensure that the spaces are able to function independently. In other words, the facilities have been planned to allow direct access to the community spaces when the library isn't open (or vice versa), while maintaining after-hours security for each component. By placing the circulation areas in the multi-purpose wing of the building around the core functions, a space that can be used as a walking track is created. While somewhat less efficient from a building area point of view, this does add considerably to the “multi-purpose” character of the design.

Several stakeholders emphasized the importance of having a flexible facility that is able to host a variety of functions for a range of group sizes. Concerns were also expressed that the 800 square feet allocated in the 2014 concept might not be large enough. Instead of two activity rooms of equal size, the proposed concept contains two rooms of slightly different sizes, giving the possibility of having two rooms, one of 350 square feet and another of 550 square feet, or one room of 900 square feet. The moveable partition between the two rooms would be solid (opaque) allowing simultaneous use for separate functions. The perimeter walls facing the water would be glazed, allowing users of the activity space to still enjoy views of the estuary from the rooms.

During the workshop presentation in August, we heard that even 900 square feet might not be large enough for some of the group activities that could be held in the facility. The design team considered how best to accommodate the request for more area

without enlarging the building, which was already pressed close to the buildable limits of the site and concluded that, through the use of moveable partitions and pivoting slab doors, the entire west end of the multi-purpose wing could be closed off from the east end and opened up for a single use, giving a room of 1,900 square feet. With the pivoting doors opened, the floor area of the whole wing, including the 425 square-foot Village living room could be available for a reception or similar function.

It must be borne in mind, however, that all this flexibility comes at a cost, as the construction cost estimate shows. When the project moves to the next stage of its realisation (after this study) it may be necessary to examine whether some compromises will need to be made, either through reduction in areas, having slightly less flexibility, or sacrificing complete openness to the water views.

Energy efficiency and sustainability are always central to our design approach, both for buildings and their systems. At the present stage of design evolution, which is concept design, there is still much detail to be worked out in the project stages which will follow this. Even at this stage, it is certain that the design will comply with the prescriptive path of the National Energy Code, which has recently been adopted in Nova Scotia. This Code promotes use of energy efficient systems and technology. Energy modeling this early in the design process would be premature, as there is insufficient detail in the design to support reliable results from numerical analysis. The most appropriate time to complete the energy model would be during the design development phase when the building layout and system selection process have been further developed.

At present, the design concept does envision the incorporation of such features as:

- Low flow plumbing fixtures to reduce water usage
- Air source heat pumps for space heating and cooling. These offer an efficient means of heating when compared to electric or hydronic heating systems.
- Air handling equipment including economizers to take advantage of free cooling when outdoor conditions permit.
- Building energy management and controls system, which will include programming to optimize efficiency of building HVAC systems. Features include VFD's for fans, scheduling of HVAC systems, economizer control.

- A ventilation design that allows for the use of either natural or mechanical ventilation, as appropriate to prevailing conditions and season.
- Lighting controls including occupancy sensors and dimming/daylight control capability to limit the power usage of lighting.

Questions of sustainability are pinned on more than energy issues alone, and a design needs also to consider other factors that bear on the longer-term costs and impacts of the building. Life cycle costs, including regular maintenance cost, will be considered when selecting systems and equipment. As the design progresses, the designer will base decisions on final system and equipment selections on factors including:

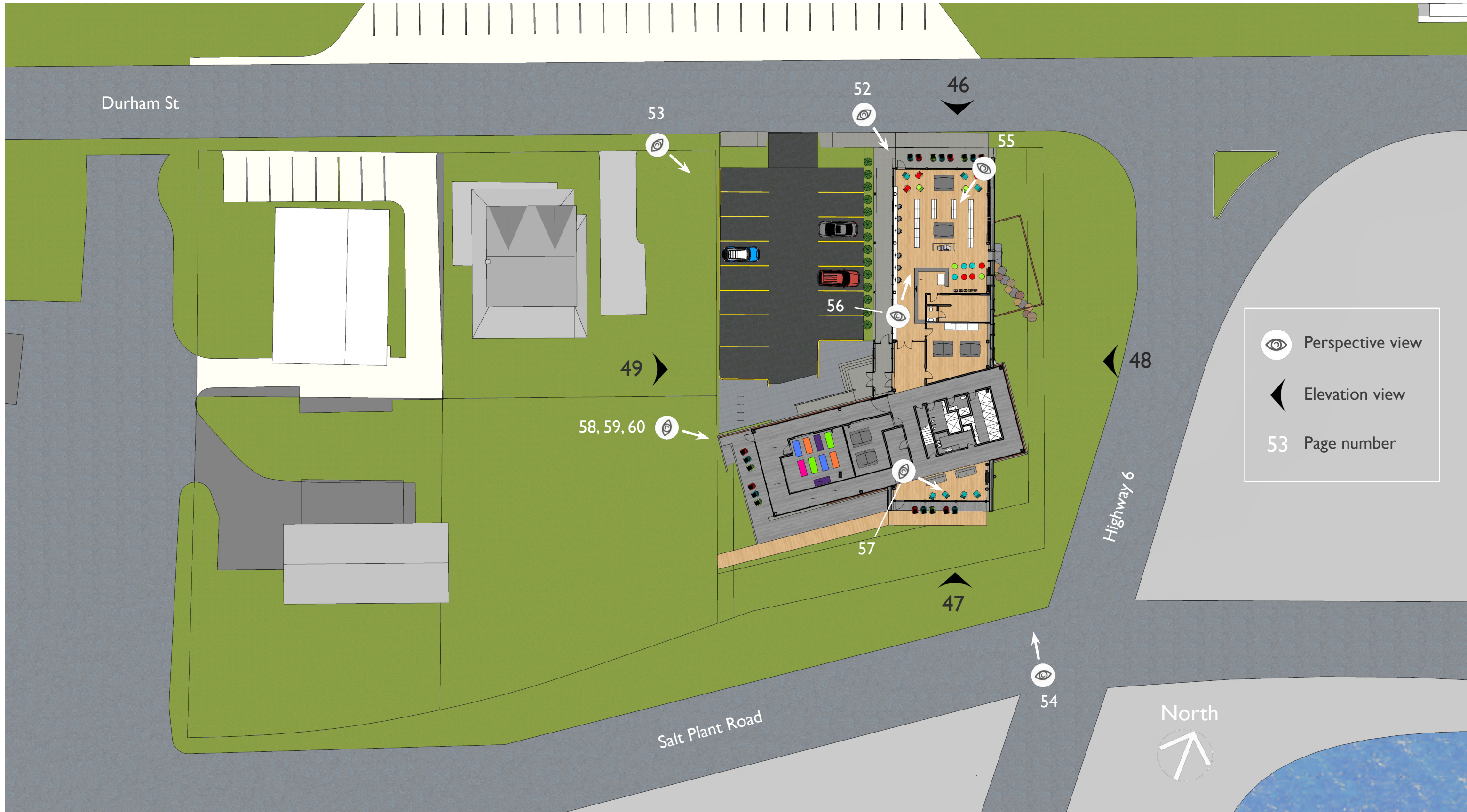
- Capital cost
- Life Cycle cost
- Energy usage
- Ease of operation/maintenance
- Reputation and track-record of manufacturer
- Capacity
- Physical size and weight of equipment
- Availability
- Local support

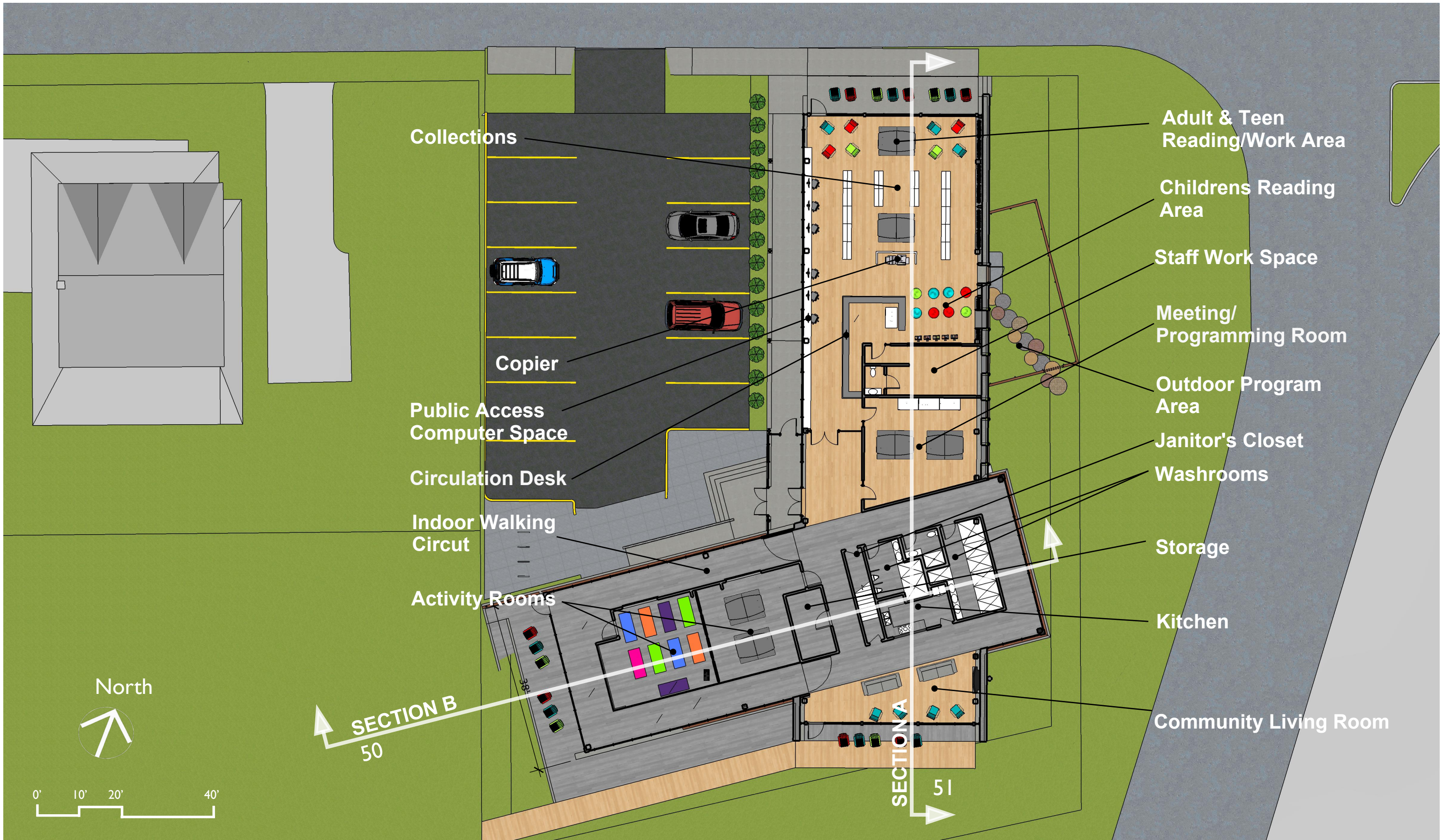
The economics of a number of renewable energy technologies are changing rapidly, but trends are evident that will continue to inform the decisions that will be made during the further development of the building design. Solar thermal heating for domestic hot water is well-established and can make sense in a broad range of project types, especially in buildings such as the Multi-Purpose Centre where demand is relatively low and not subject to peaks. Solar photovoltaic systems, whether building mounted or building integrated, are becoming steadily more affordable and are potential contributors to the energy solution for the Multi-Purpose Centre. The solar resource potential in Nova Scotia is generally quite favourable, and especially in Cumberland County. Geothermal energy or the use of harbour water as a heat source may also have a role to play. All of these potentials would be explored during the design development stage. Site-generated wind energy may not be suitable for a location such as this, as there are few options that provide satisfactory performance in a residential setting such as this one. Noise from wind turbine blades and gearboxes would likely present too much disturbance for surrounding residences to be acceptable.

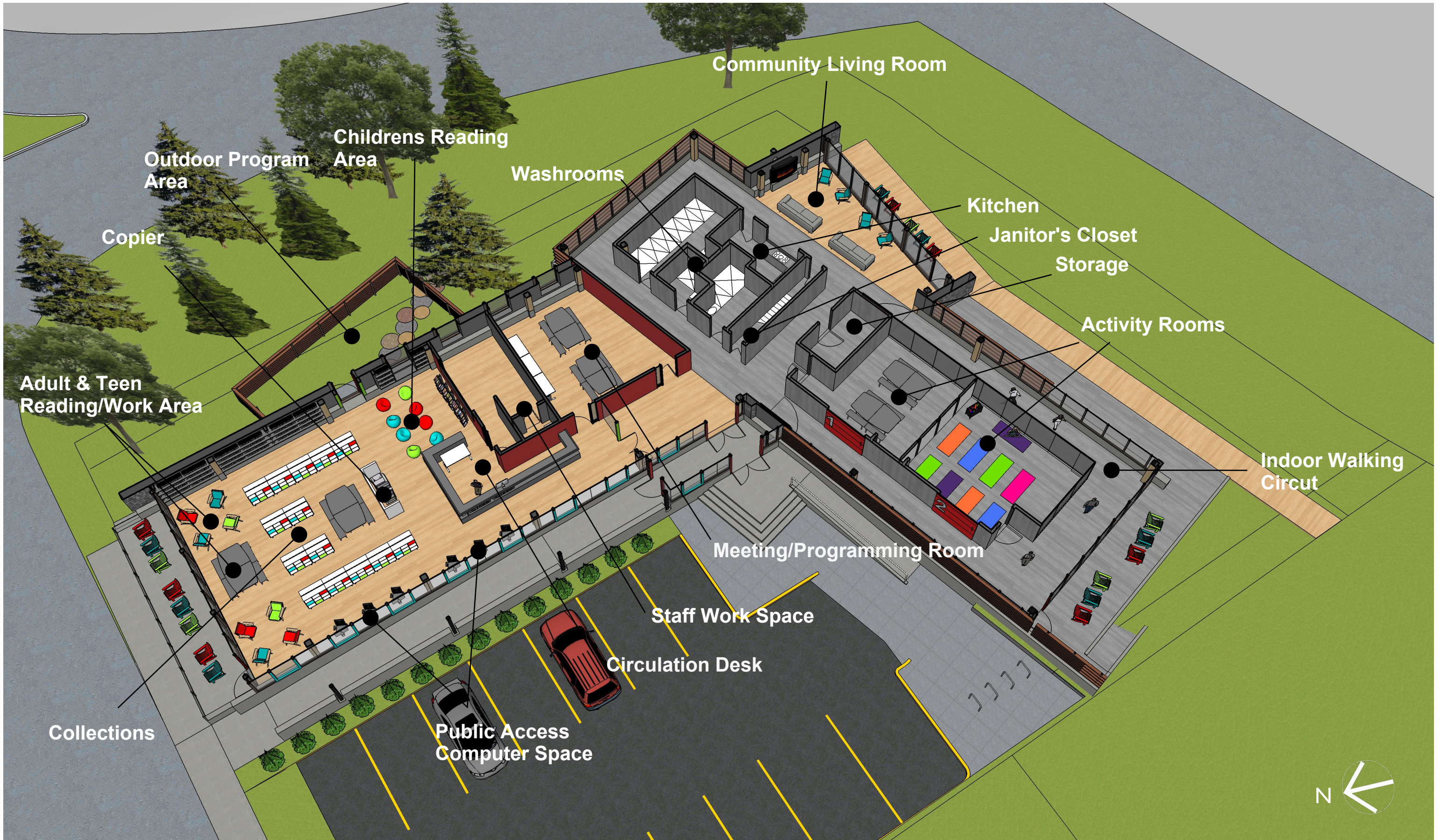
The design concept and cost estimate incorporate the use of generous areas of glazing on the south, west and north sides of the building, with more limited use on the east side, in order to take advantage of the setting and to provide natural light deep into the building during the day. Recognizing that achieving this level of natural light and views can come at the cost of heat loss or gain through the glazing, the intention would be to use an insulated glazing system such as Solera + Aerogel for portions of the glazing where considerations of view are not involved. This would include the upper gables of the north and south ends of the building, and in the dormers on the east side. This material can achieve an insulation level comparable to conventional wall construction; R-18 for Solera + Aerogel, compared to R-23 for a wall or R-4 for a standard window. This type of glazing provides a double benefit insulation as well as an even, glare-free distribution of and For other windows in the building, the use of high-performance sealed units with triple glazing may be warranted, yielding transparency and thermal performance higher than standard window units.

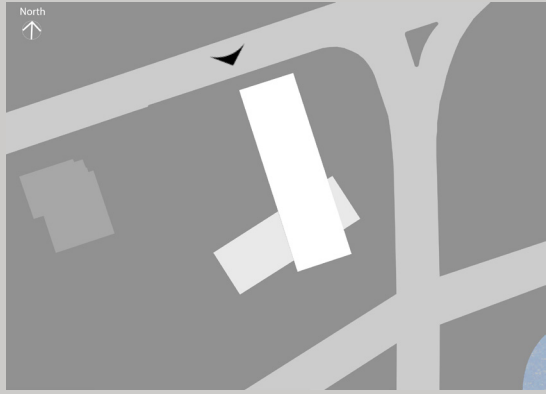
The project would benefit from the establishment of an exemplary sustainability benchmark goal such as LEED Platinum, PassivHaus, or Green Globes certification at the level of 5 Globes. These verifiable standards carry with them a stamp of credibility, attesting to the achievement of a leading level of environmental performance. They also have project cost impacts for capital investment and the certification process, which can be balanced against the anticipated energy and operating cost savings.

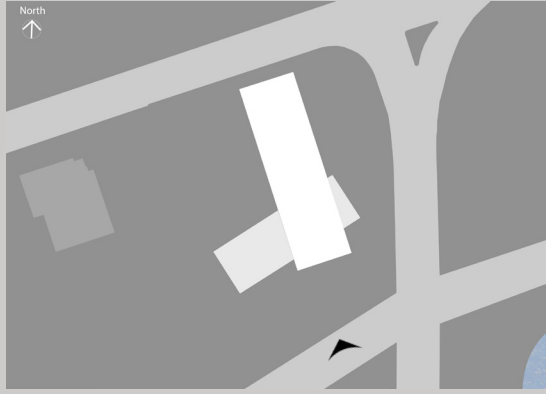
Is important to keep in mind that this is not the final design for the Multi-Purpose Center. It is a snapshot of the current stage of understanding of the project's needs and possible solutions. More work and consultation will be necessary to bring the design and the project to completion.

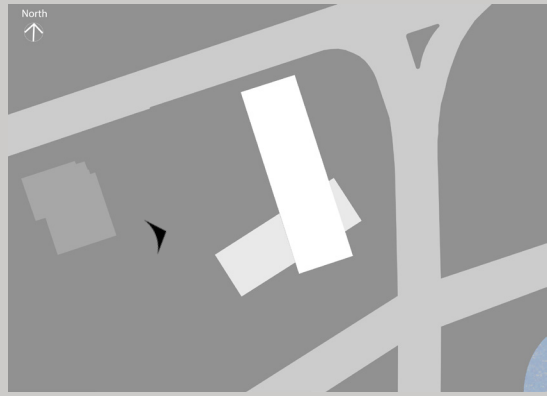


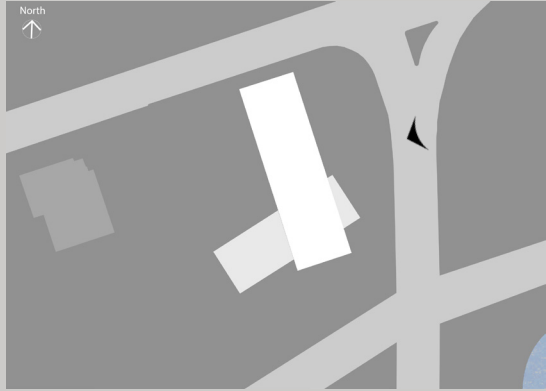


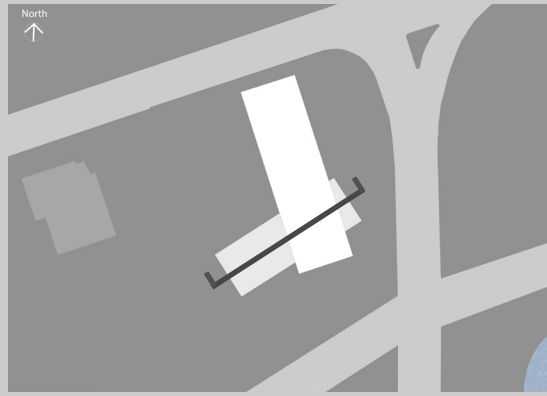






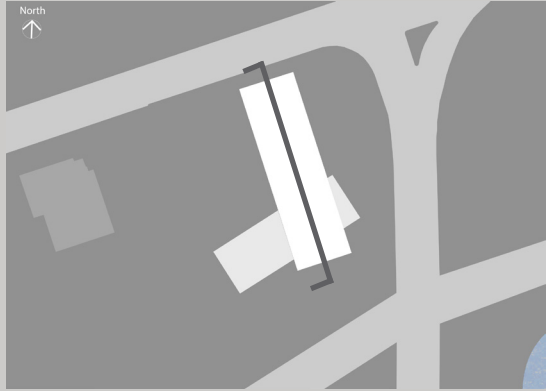






148'





110'







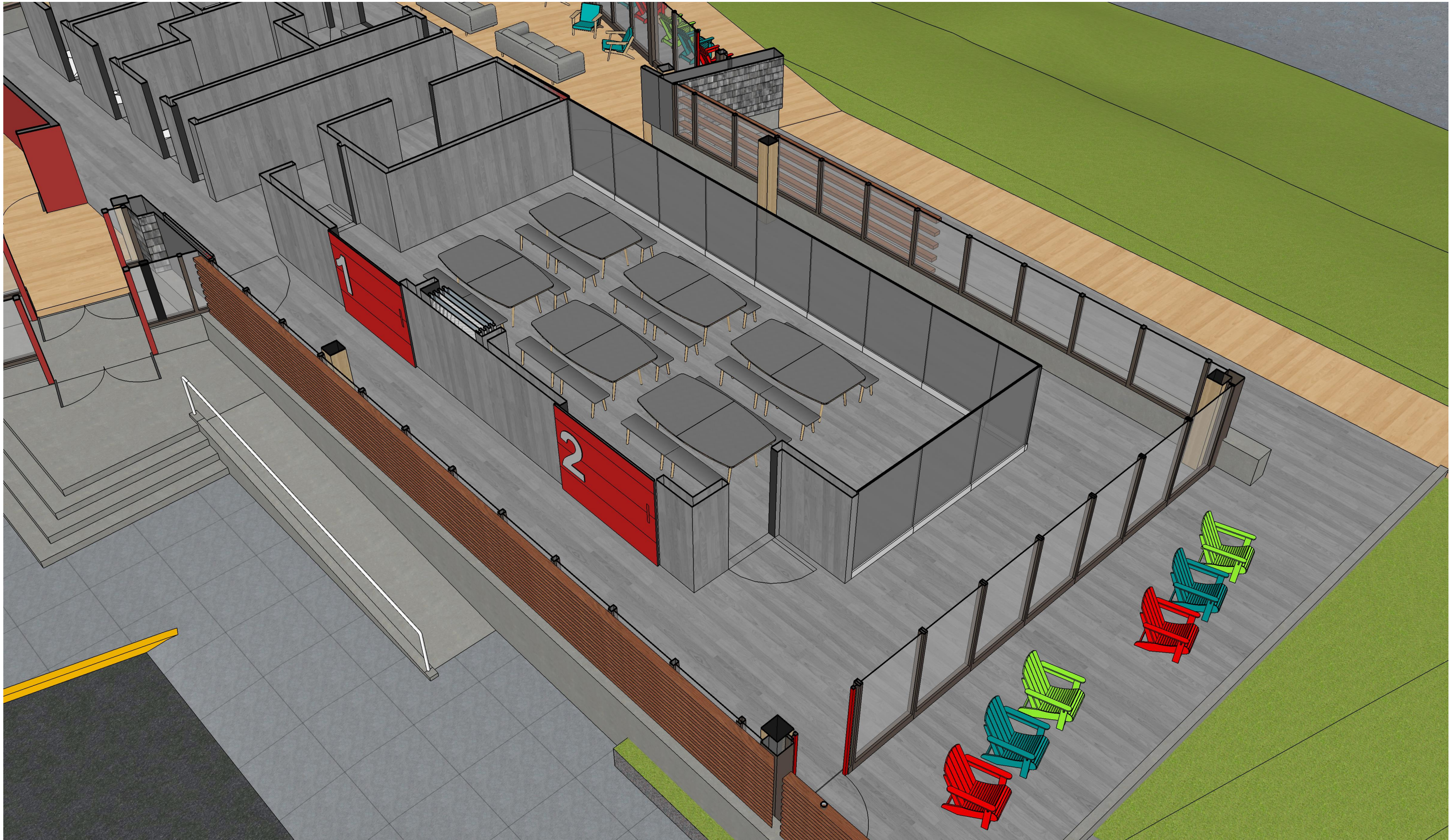














13.0 IMPLEMENTATION

As stated in the introduction to this report, the various Master Plan elements are in a number of different stages of development at the conclusion of this present project. The two pieces that were intended to be tender-ready are at or very close to that point. All other elements have been advanced in their overall path towards realisation but there are still steps to be taken before they are ready for construction.

Many of the Master Plan elements, especially the larger ones like the Multi-Purpose Centre or Harbour Centre, could beneficially be handled as stand-alone projects. The advantages of this approach are:

- To concentrate attention and effort on one particular task, giving clearer goals and expectations
- More likely to result in adequate funding being applied to the particular consulting job at hand
- Provides shorter term projects with identifiable outcome and tangible product while working towards completion of the overall Master Plan

For any of the projects, securing funding is the single most important impediment to or enabler for realisation. In most cases, the time required to secure the necessary funds will be a strong determinant of the sequence of execution. As was stated in BDA's 2015 report, some projects would logically follow others or be completed as part of other projects for logistical reasons. Examples of this would include street improvements to follow civil infrastructure works along the affected streets, or the segments of the Harbour Walk being completed as adjacent works, such as the Harbour Centre, are carried out.

This is not a hard-and-fast rule; some flexibility will need to be maintained to take advantage of eventual funding opportunities or to adapt to other influencing factors. It could, for example, emerge that the community would prefer not to wait for one of the large Master Plan elements in order to have an achievable short-term goal in place sooner. This strategy can provide a pay-off for the community's hard work and ambitions and foster a sense of accomplishment that sustains the longer-term effort towards full realisation of the Master Plan goals.

13.1 KEY ELEMENTS

13.1.1 MULTI-PURPOSE CENTRE

The proposed concept has sought to address the programmatic requirements and to answer as many of stakeholder and community aspirations as it can. It is an ambitious brief and the resulting building would definitely be an asset to the Village of Pugwash and for residents of a wide area of Cumberland County as well as neighbouring areas of Colchester County. The cost estimate of \$3.3 million, which is a reasonable one for what is proposed, may occasion a closer examination of what needs to be in the program, and help to solidify the project definition. A site topographic survey should be completed before the final design process begins.

13.1.2 EATON PARK

DINGHY BEACH

The first priority for this component is to address the issue of land ownership. The Municipality should explore options for acquiring either legal title or deeded right-of-way access easements to all land parcels affected by the Dinghy Beach concept to ensure access to this public amenity is preserved. This will also alleviate concerns about liability in the event that someone is injured while using the space. A current topographic survey will help determine the extent of private property and the location of the high-water mark – indicating the boundary between private and publicly accessible land.

VILLAGE SQUARE

Similar to Dinghy Beach, the first issue to address is land ownership. A significant portion of the existing Municipal Parking Lot is located on privately owned land. Access to the rear of the adjacent commercial buildings, however, appears to be gained over land owned by the Municipality. The Municipality should explore options for acquiring either legal title or deeded right-of-way access easements to all land parcels affected by the Village Square concept to ensure access to this public amenity is preserved while also alleviating concerns about liability in the event that someone is injured while using the space.

STAGE

At the time of writing, the construction document package for the stage is well advanced and a cost estimate based on the updated design has been prepared. This estimate indicates a project construction cost well in excess of that indicated in the BDA report. The figure given in that report would have to be considered too low to have realistically delivered an adequate replacement for the existing stage, and the functional program for the new stage has grown somewhat from the earlier discussions. Nevertheless, the consultants feel that further investigation is needed to identify the actual "on-the-ground" construction costs for this component as a basis for any required scope changes. Assuming an agreed scope is achieved quickly, an amended tender package should be able to be completed in short order, allowing construction in the spring of 2018.

13.1.3 DURHAM AND WATER STREETS

Existing topographic survey information will need to be compiled (or new information gathered) in order to further advance the design to a point where it can be tendered and built. Coordination with NSTIR will be required to determine the viability of new crossings and other associated work within the provincial ROW.

13.1.4 HARBOUR CENTRE

(Implementation steps are broken out in Section 13.2)

13.1.5 HARBOUR WALK

Current topographic information will need to be gathered in order to further advance the design to a point where it can be tendered and built. This information will be necessary to determine the structure of paths and boardwalks, accessible grades, drainage, and distance to property lines. Coordination with NSTIR will be required to determine the viability of new crossings and other associated work within the provincial ROW. The other priority for this component is to address the issue of land ownership. The Municipality should explore options for acquiring either legal title or deeded right-of-way access easements to all land parcels affected by the Harbour Walk concept (particularly at the end of Brick Yard Road at Page Point) to ensure public access can be maintained. This will also alleviate concerns about liability in the event that someone is injured while using the space.

13.2 HARBOUR CENTRE

It was acknowledged during the stakeholder consultation sessions that the Harbour Centre is the Master Plan component that has the longest lead time for realisation. This is true for a number of reasons, chiefly to do with the complexity of the project, the nature of the consultations and permits that will be required through the design and implementation process, and because it is likely the most costly of all the projects to construct, potentially requiring more time to secure necessary funding. It should be possible, and even advisable, to proceed with construction of the Harbour Centre as a phased project

The Engineering Brief identifies areas where more investigation work will be required to refine the marina concept and enable more accurate design and estimates of construction costs. Preparation of accurate and up-to-date hydrographic, topographic and geotechnical information will improve the reliability of subsequent project development stages.

13.3 REGULATORY AND PERMITTING

The following tables provide a summary of federal, provincial and municipal approvals/permits that may be required at the time for construction of structures and buildings proposed as part of the Pugwash Waterfront Development Master Plan.

Table 1 comes from Section 5 of the Environmental Effects Determinates Report which outlines Federal and Provincial Acts relating to the Harbour Centre. Many of these requirements are site specific and are dependent upon existing environmental and socio-economic conditions in the proposed Project area and existing infrastructure. Please note that this is a preliminary screening and may change once detailed Project design is completed.

Table 2 includes municipal approvals and permits that may be required for other components of the Pugwash Development Plan. These components include grading for any new structures, the construction of the proposed stage, the Multi-Purpose Centre, and the Harbour Centre. It is important that the Municipality review this section for accuracy as they are the governing body for Municipal approvals and permits. Furthermore, the approval and permit requirements should be reviewed closer to the time of construction as the process may change within that timeframe. Also note that permission from the Nova Scotia Department of Transportation and Infrastructure

Renewal (NSTIR) would be required for any work within the highway right-of-way. A permit from NSTIR is also required for any structures within 100m of the highway right-of-way.

As of the date of this report, the Municipality is undertaking a Municipal Planning Strategy (MPS) and Land-Use By-law (LUB) review called Plan Cumberland. It would be advantageous to apply appropriate designations and zoning to the project parcels through the Plan Cumberland process that allows for the kinds of community recreation uses proposed.

Table 1: Federal and Provincial Acts, Regulations, Permits, and Approvals that may be required for the proposed Harbour Centre

Acts	Related Regulations/ Policy	Approvals or Permits Required
Federal		
Canadian Environmental Assessment Act	A determination under Section 67 of the CEAA, 2012 is required.	Federal EA approval from responsible authorities, where triggered
Canadian Environmental Protection Act	No specific regulations related to this Act	Release of toxic substances, Air pollutants, Water pollutants
Navigation Protection Act-Transport Canada	Minor Works Order	NPA Approval or notification required
Fisheries Act	Applications for Authorization under Paragraph 35(2)(b) of the Fisheries Act Regulations	If any destruction to fish or fish habitat will occur as a result of the Project, Authorization For Work that May Result in Serious Harm to Fish is required
Species At Risk Act	No specific regulations related to this Act	No specific permit required. Adhere to species specific activity restrictions and recovery initiatives.
Migratory Bird Conventions Act	Migratory Birds Regulations	No specific permit required. Notification only.
Provincial		
Environment Act	Environmental Impact Assessment Regulation	Registration with EIA Branch, Nova Scotia Department of Environment, if triggered
Environment Act	Division I. Water	Permit for altering or using a watercourse or water resource and/ or altering a wetland (field investigation would need to be conducted to determine)
Environment Act Division III.	Municipal Waste	Permit required if Sewage, Storm drainage, or Septage installed.
Environment Act	Petroleum Management Regulations	Permit required if storing petroleum tanks greater than 230L or greater at a marina
Nova Scotia's Wilderness Areas Protection Act and Nature Reserves Protection Act	No specific regulations related to this Act	Permits for Activity in Protected Natural Areas
Crown Lands Act	Policy for Wharves, Floating Docks, Boat Ramps and Moorings on Submerged Crown Lands	Permit Application submitted to the Nova Scotia Department of Natural Resources to use Crown lands, this includes projects in coastal areas.
Occupational Health and Safety Act	Occupational Health and Safety	Regulations No specific permit required
Municipal Government Act	Municipal Planning Strategy	Development and Building permits for construction and operation of the Project
Nova Scotia Species at Risk Act	No specific regulations related to this Act	Notification to Department of Natural Resources, authorization may be required for clearing and site preparation
Special Places Protection Act	General Regulation - Heritage	Conservation Act Site alteration permit and Heritage Impact Assessment
Transportation of Dangerous Goods Act	No specific regulations related to this Act	Permit required for the transportation of dangerous goods

Table 2: Provincial and Municipal Approvals/Permits that may be required for other proposed Master Plan components

Acts	Related Regulations/Policy	Approvals or Permits Required	Proposed Master Plan Component
Provincial			
Public Highways Act	Improvement of highway by the municipality	Written consent from the Minister for municipal improvements to the highway	Harbour Walk
Public Highways Act	No structure within 100 metres of fence, hedge, etc. on highway	Permit from NSTIR to erect a structure within 100m of a public highway	Harbour Centre, way-finding signage
Municipal			
<i>Municipal Government Act</i>	<i>Draft Municipality of Cumberland Land-Use By-Law (LUB)*</i>	Parks + Open Space (P) Zone would permit the proposed use as-of-right.	Stage
<i>Municipal Government Act</i>	<i>Draft Municipality of Cumberland Land-Use By-Law (LUB)*</i>	Currently the properties are not shown on the draft zoning map. The Municipality is proposing to develop this through infilling to create a new lot. This property should be zoned Commercial Recreation or Parks and Open Space under the LUB to allow for as-of-right development.	Harbour Centre
<i>Municipal Government Act</i>	<i>Draft Municipality of Cumberland Land-Use By-Law (LUB)*</i>	Currently indicated as CM Zone (Mixed-Use Commercial) on draft zoning map. During the Plan Cumberland process the property should be changed to a zone which supports this community recreation use (Institutional or Parks and Open Space) so development can happen as of-right.	Multi-Purpose Centre
<i>Municipal Government Act</i>	<i>Draft Municipality of Cumberland Land-Use By-Law (LUB)*</i>	Currently indicated as CM Zone (Downtown Commercial) on draft zoning map. Appears to be an appropriate zone as the property will continue to function primarily as a commercial parking lot (as-of-right).	Market Square
<i>Municipal Government Act</i>	<i>Draft Municipality of Cumberland Land-Use By-Law (LUB)*</i>	Currently indicated as IND Zone (urban Industrial) on draft zoning map. Consider if a Parks and Open Space zone should be applied through the Plan Cumberland process to protect this as a community recreation space	Dinghy Beach
<i>Municipal Government Act</i>	<i>Draft Municipality of Cumberland Land-Use By-Law (LUB)*</i>	Development Permit for all structures	Stage and Multi-Purpose Centre

Municipal Government Act	Draft Municipality of Cumberland Land-Use By-Law (LUB)*	Building Permit for all Structures	Stage and Multi-Purpose Centre
Municipal Government Act	Draft Municipality of Cumberland Land-Use By-Law (LUB)*	Permit to connect to a Municipal water or sewer system (Issued by the Municipality which owns the utility)	Stage and Multi-Purpose Centre
Others			
		Call before you dig (in areas with natural gas pip-lines or buried utilities).	If there are natural gas pip-lines in proximity to any Master Plan component this will be required.

LAND OWNERSHIP CONSIDERATIONS

Land ownership will be an important consideration in realizing the full vision of the Pugwash Waterfront Development Plan. Most of the area along the waterfront where enhancements are proposed is owned by the Municipality. However, there are some areas in key locations throughout the plan area that are owned by private individuals.

The current conceptual plans for Dinghy Beach, a portion of the Board Walk (potential portion on Eaton Lodge property), and a portion of market square are privately owned. Further survey work also needs to be conducted to determine if portions of the proposed Water Street and Durham Street improvements and the Harbour Walk would be fully within the right-of-way or if agreements with private landowners would be needed. As well, further research should be conducted to determine if any easements exist that could affect construction of plan components.

In these instances, the Municipality will need to consider the best approach to public access and use. Even in such cases where private land owners agree that the public can generally use their property for recreational uses, agreements should be in place to protect the land owner. Enhancement and endorsement of private land for public access and recreation uses could open up private landowners to unintended liability. There are a few options to consider in resolving this conflict:

1. The Municipality attempts to purchase land from private landowners.
2. The Municipality negotiates easements on the portions of the properties that are going to be enhanced for public use.

Table 3 lists the properties that make up the Pugwash Waterfront Development Area. Note that the current marina property (the proposed location of the Harbour Centre) is not included in NS Property Online and therefore no property ID numbers or ownership information has been included in the table below.

Table 3: Property Ownership within the Pugwash Waterfront Development Master Plan area.

Property Identification Number (PID)	Address	Ownership	Total Area	Project Component
25156936	Water Street	Pugwash Park Commissioners	3.0 acres	Potential portion of board walk extension
25156944	135 Water Street	Village of Pugwash	6,314.0 sq. m.	Boardwalk extension and stage Market Square
25157157	103 Water Street	Private Ownership	9,250 sq. ft.	Market Square Boardwalk extension
25157173	95 Water Street	Private Ownership	5,800 sq. ft.	Market Square Boardwalk extension
25157207	Victoria Street	Village of Pugwash	15,500 sq. ft.	Market Square
25157223	73 Water Street	Private Ownership	5,500 sq. ft.	Dinghy Beach Access
25157249	67 Water Street	Private Ownership	19,000 sq. m.	Dinghy Beach Access
25391715	No. 6 Highway	Private Ownership (K+S Windsor Salt Ltd.)	2.35 acres	Dinghy Beach
25157264	47 Water Street	Private Ownership	20,000 sq. ft.	Dinghy Beach
25366634	Brickyard Road	Private Ownership (G.E. Collins and Sons Limited)	13.6 acres	Harbour Walk

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1 - CONSULTATION SUMMARY

STAKEHOLDER MEETINGS SUMMARY

As part of the Pugwash Waterfront Development Master Plan, four meetings took place with Stakeholder groups on May 9th and 10th. The topics of the meetings included:

1. Development of the Multi-Purpose Centre
2. Consultation with Pugwash's business community regarding the projects within the Waterfront Development Plan
3. Development of Village Square, Dinghy Beach, Wayfinding Signage, Parking/Sidewalks, Harbour Walk / boardwalk and the Stage
4. Development of the Harbour Centre

Notes from these meetings, including a list of attendees can be found in Appendix A.

COMMUNITY OPEN HOUSES SUMMARY

Two community open houses were also held the evenings of May 9th and May 10th. The intention of the meetings was to gather community feedback to confirm the directions provided in the Pugwash Waterfront Improvement Concept (BDA Landscape Architecture and Site Engineering, 2015) prior to commencing further design work. The topics of the meetings included:

1. Feedback on the development of Village Square, Dinghy Beach, Harbour walk/board walk, the Stage, the Multipurpose Centre, and Wayfinding Signage (May 9th meeting)
2. Informing the public of the findings from the Environmental Effects Determinanates Report completed by WSP's environmental division and feedback on the development of the Harbour Centre (May 10th meeting)

In total 24 people attended the meeting on May 9th and 27 people attended the meeting on May 10th. A record of the comments received from attendees at both meetings can be found in Appendix B. As part of the open House, attendees were asked to show preference for their desired wayfinding signage features/style. The results were: 24 votes for Style 1 (Distance and Direction to Destinations); 17 votes for Style 3 (Visual Spatial References); and 14 votes for Style 2 (Placemaking). Many attendees preferred a mix of the three styles.

STAKEHOLDER BRIEFS SUMMARY

Stakeholder groups were also asked to fill out a Request for Brief form to provide further feedback in advance of design work. As well, groups who were unable to attend the Stakeholder meetings could provide comment by submitting a Brief before the closing date of May 15th. The Municipality was responsible for distributing and collecting the Request for Brief documents. In total, seven completed Briefs were received.

A copy of the completed briefs can be found in Appendix C.

COMMUNITY QUESTIONNAIRES SUMMARY

A Community Questionnaire was made available to the public who attended the open houses and also online in PDF form for residents who were unable to attend a meeting. Completed questionnaires were gathered at the open houses or later by the Municipality until the closing date of May 15th. In total, eight completed Community Questionnaires were received.

A copy of the completed questionnaires can be found in Appendix D.

APPENDIX

A STAKEHOLDER MEETING NOTES

MEETING NOTES

JOB TITLE	Pugwash Waterfront Master Plan – Multipurpose Centre Meeting
DATE	9 May 2017
PRESENT	<ul style="list-style-type: none"> – Christina Lovitt, WSP Canada Inc. (Facilitator) – Ron Burdock, A49 (Facilitator) – Allie MacLean, Municipality of the County of Cumberland – Michelle Byers, Municipality of the County of Cumberland – Vivian Godfree, Friends of the Pugwash Library – Deborah Cameron, Chair – Pugwash Waterfront Steering Committee, Communities in Bloom – David Rickard, Chair – Multipurpose Committee – Denise Corey, Cumberland Public Libraries – Trina Clarke, YMCA of Cumberland – Elain Graham-Cook, MPB – Lisa Betts, Village of Pugwash – Jenn Houghtaling, Pugwash Farmers Market – Gordie Crowell, Gulf Shore Road

DISCUSSION SUMMARY

1.0 INTRODUCTIONS/HOPES	<ul style="list-style-type: none"> – YMCA: swimming lessons in the Harbour; building should be multipurpose use to offer more programs year-round – Cumberland Public Library: has 900 people a month using facility; need to have a larger, dedicated, purpose-built space; include a program room with convenient storage facilities; increased usage is desired and likely – Municipality: focal point, statement piece, welcoming, meeting community needs – Farmers Market: Neighbours, special occasion markets, indoors, yoga in space; playground/outdoor children’s space – C@P site: June to August is busiest; funding is limited and a user fee is charged; currently co-located with VIC; fax, printing and copying (fax is a frequent service); could be with future library or library with internet access (computers with internet access); hours for C@P vs. library: maybe split between VIC and library in the future – Wi-Fi: outdoor use/provide some access throughout the community; provide within the library – Exercise programs, various sports, yoga (current spaces not large enough) – Recreational programs, such as knitting (requires a comfortable space) – Art groups, indoor walking groups (currently uses the school but space is too small, circular) – 4H club – Multipurpose Centre Committee: Great spaces with community focus (have an iconic building statement) – Steering Committee/Communities in Bloom: should meet with them – Community needs, involvement/focus on landscape – Conference space would have an economic spin-off (weddings, gatherings, conferences, etc.) – A great space is needed: people will go to/use a great space – Friends of library: can’t be all things to all people, there is a limit; must keep reasonable expectations – Great site; add character; iconic; colorful; joyful; set an example: modern buildings can be energy efficient; solar (south-facing) – Allie MacLean discussed consulting with energy authority to give guidance – World class harbour/world known community; multipurpose Centre could draw more people to the community – Village of Pugwash: thought that they should manage buildings – Population is 763 year round (doubles in the summer)
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MEETING NOTES

<ul style="list-style-type: none"> – Storage is important – Space for dance class – Architecture to compliment the rest of the village, accessible – Expandable/expansion area on the site – Dedicated staff space – Kitchen available for events, but also available for cooking classes – Community/school garden – Agriculture association looking for community kitchen space; business growth, value added product; could possibly be a partner; would be expensive – Sprinkler building preferred
2.0 SITE FEATURES
<ul style="list-style-type: none"> – Space for kids to run, read, hang out – Have views of the water, a desk for community use – Building connection to the outdoors
3.0 IMAGE OF COMMUNITY
<ul style="list-style-type: none"> – Color/joyful; ‘wow’ factor; eye-catching; modern – Can help to build Village identity
4.0 MATERIALS
<ul style="list-style-type: none"> – Wood, maybe a steel/wood hybrid – Lots of windows – Floor finish is important for the Multipurpose space – Sound proofing between the rooms – Slab-on-grade
5.0 PROGRAMS
<ul style="list-style-type: none"> – Loan programs (boats, etc.) – Public washrooms (available after hours) – Access flexibility/after hour use – Ability to have library open and functioning when rest of the building is not – Possibility of having the building as an emergency comfort centre with a generator
6.0 ‘BUILDING PROGRAM’
<ul style="list-style-type: none"> – Municipal office (front desk space, possibly part time) – Janitor room – No Archives – Look closely at the multipurpose space configuration – Video conferencing/good acoustics – Library can’t loose space – Good reception area: facilitate programming into the evening – Alarm/security system

MEETING NOTES

JOB TITLE	Pugwash Waterfront Master Plan – Businesses Meeting
DATE	9 May 2017
PRESENT	<ul style="list-style-type: none"> – Christina Lovitt, WSP Canada Inc. (Facilitator) – Ron Burdock, A49 (Facilitator) – Allie MacLean, Municipality of the County of Cumberland – Michelle Byers, Municipality of the County of Cumberland – Linda Chesnutt, The Chesnutt Café – Marilyn & Fred Horton, Horton Gallery / CHB – Deborah Cameron, Chair PWDSC – John G. Carabaris, Basic Spirit – Bonnie Bond, Basic Spirit

DISCUSSION SUMMARY

1.0 INTRODUCTIONS/HOPES
<ul style="list-style-type: none"> – Thinkers Lodge Group: <ul style="list-style-type: none"> ○ Harbour walk/extending walk way – thought that it should follow the street rather than loop around Thinkers Lodge property ○ Need for privacy for events held at the Thinkers Lodge property ○ Security is a concern for staff and for visitors – Horton Gallery: excited about new development; great to have library located beside their gallery, great location in the community; upkeep of future MP Centre site/site maintenance is important – Chesnutt Café: development of waterfront is good for Pugwash – Basic Spirit Studio: currently renovating the old Masonic Hall (will likely become a community rental space/venue) – The attendees are not hearing negativity or major concerns from the rest of the Pugwash business community – Michelle Byers informed the group that the Municipality is looking to remove the existing house from the future MP Centre property by the end of June, 2017
2.0 MULTIPURPOSE (MP) CENTRE
<ul style="list-style-type: none"> – Should fit with historic nature (example: Tatamagouche concept) – The name of the centre will be important – Train Station: will have archives
3.0 VILLAGE SQUARE
<ul style="list-style-type: none"> – Electrical plug-ins – Flexible for events (provide parking when there are no events taking place) – Public boat launch move: opportunity for connection improvement <ul style="list-style-type: none"> ○ Connected boardwalk or harbour walk (private ownership of some aspects, such as the deed to high water mark, may be an issue for a fully connected pathway)
4.0 DINGHY BEACH
<ul style="list-style-type: none"> – Protected/nice sand; beach is stable and not subject to erosion – Safe – Lots of kid friendly uses/make it a family place – No issues with the business community; no conflict

MEETING NOTES

<ul style="list-style-type: none"> – Access issues: plans for improvement in July – Not much needed – Good to have ‘U’ wharf to protect it more for kids – Maintenance of interpretive panels an issue in some locations in the Village (snow plowing concerns) – More interpretive panels would be great – Trash/garbage needs to be considered
5.0 HARBOUR WALK
<ul style="list-style-type: none"> – Currently doesn’t feel safe because of the cars – Create a ‘walking village’: block off streets to cars – Lovely walk through Harbour Centre site via boardwalk – Have sidewalks bridge to the Co-op – Parking moved closer to road/Home Hardware location issue of hitting other cars
6.0 PARKING
<ul style="list-style-type: none"> – Issue in downtown – Snow storage/plowing is a concern – The Post Office needs access/parking – The Multipurpose Centre will generate more cars
7.0 STREETSCAPES
<ul style="list-style-type: none"> – Sidewalks: extend sidewalk to Church Street – Right now there is an issue where people back up at Home Hardware – Should have crosswalks on both sides or flip them to be in front of the Multipurpose Centre (in downtown, not on Highway 6/NSTIR owned) – Chesnutt Café: okay if there is no sidewalk in front (works better on the Multipurpose Centre side) – Sidewalks on both sides of Water Street and Durham are desired
8.0 WAYFINDING SIGNAGE
<ul style="list-style-type: none"> – Map based (cars can pull over) – Communities in Bloom Group could possibly be signage partner – Uniformity of signs desired – Wolfville and Malagash style signage are good examples – The Municipality should control the structure <ul style="list-style-type: none"> ○ Create standard spaces for business where panels can be added ○ Allow for parking/pull over ○ Include recreation/community features (consider tourism) – Have Gaelic on signs, shows the spirit of the community – Clean slate is needed – Sense of connection to the community – High functioning signs – Branding of Community desired (future study)

MEETING NOTES

JOB TITLE	Pugwash Waterfront Master Plan – Projects Stakeholder Meeting
DATE	9 May 2017
PRESENT	<ul style="list-style-type: none"> – Christina Lovitt, WSP Canada Inc. (Facilitator) – Ron Burdock, A49 (Facilitator) – Allie MacLean, Municipality of the County of Cumberland – Michelle Byers, Municipality of the County of Cumberland – Wally Vaters, Pugwash Harbour Fest – Gordie Crowell, Gulf Shore Road – MPC – Deborah Cameron, Chair – PWDSC – Lisa Betts, Village of Pugwash – Maureen Leahey, Communities in Bloom

DISCUSSION SUMMARY

1.0 INTRODUCTIONS/HOPES FOR FUTURE WATERFRONT DEVELOPMENT
<ul style="list-style-type: none"> – Friends of Pugwash Estuary not present – Harbourfest - 3 day festival in July; 10-50K people attend; 4th year of tall ships 2017 combined with Gathering of the Clans Festival; will be installing 8 floating docks at Dinghy Beach in a ‘U’ shape (will be a legacy project for the Village) that provides a safe and protected swimming area for the summer; celebrate natural beauty and support economic development – Communities in Bloom – would like to see more sidewalks and trees; clean up Durham Street; Water/Durham Street – sidewalks, good (uniform signage); crosswalks – Communities in Bloom was involved with Heritage Signage throughout the Village – Desire to have Salt Mine add to the visual aspect of the Village waterfront (paint the mine shaft/conveyor, project coloured lights onto the salt pile) – Communities in Bloom created a Community profile book of Pugwash in 2015 – Study of native species of trees was completed by Dalhousie University and should be considered – Marina Development: Plan for growth in design for 100 slips, even if in the first stage it is only built with 50 slips
2.0 VILLAGE SQUARE
<ul style="list-style-type: none"> – Grasscrete pavers: consider use of water permeable surface – Flexible/moveable chairs – Entrance from the street is an issue for the Village Square and Dinghy Beach – needs to ‘invite’ people to the space – Something like an archway and view of boats in the harbour could invite people to the space – Nautical theme – Issue: Where are the parking spaces going to go if used for public gatherings? Village mentioned that the two spaces that the Municipality has identified in the BDA plan will be used for other purposes already planned by the Village. – Space will be used for special events – Issue: some ownership of the land is private – Could be space for outdoor exercise – Concern: more use = more garbage in the area (Village/Municipality may want to consider a waste plan to minimize public dumping of garbage) – Need ecstatically pleasing garbage receptacles

MEETING NOTES

3.0 WAYFINDING SIGNAGE
<ul style="list-style-type: none"> – Entryway signage – Placemaking signage – Maps near library, Village Square and Harbour Centre desired – Desire to have removable placards that companies can buy and replace as businesses change (flexible signage) – Need the wayfinding signage to be a quick read, encourage people to ‘turn left’ to the Waterfront and Thinkers Lodge instead of right to continue on the highway – Make signage fun, colourful, easy to read, icons, destinations marked in walking times (mins) – Destinations to the left, label ‘more driving’ to the right – Known for having Gaelic on signs – Refer to the sign near Malagash
4.0 DINGHY BEACH
<ul style="list-style-type: none"> – Access to public washrooms/change rooms on the Waterfront – Accessible ramp needed – Beautification of slope – Could have increase use – Unknown if water testing occurs – Lifeguard at certain times would be good (unguarded now) – Canoe launch would be good – Current boat launch may need maintenance in the meantime until Harbour Centre is developed – Resident is looking to do improvements to make safer access this spring – Harbour Fest carries Insurance Waiver during the Festival while the docks are in place
5.0 STAGE
<ul style="list-style-type: none"> – Will have washrooms for performers – Storage needs to be large enough to accommodate benches – Acoustics important (roof now does not have good acoustics) – Should make the dressing rooms have a door between them (adjoining rooms) – Should have ramp access from boardwalk – Should have beam across the top to hang lights – Should have place for a stage manager/light control in storage room – Clean looking design is good – Porch around the back facing the water would give a place to sit, extend roof off the back of the stage – Photo spot ‘selfie station’ – sign near the road that frames the stage and water in the background, Scottish tam could be a feature – Back of stage currently is a gathering place, Gathering of the Clans Festival, Scottish tam is used as a photo backdrop – Stage could be used for outdoor movies (screen pulls down or hung from beam), exercise classes, live theatre <ul style="list-style-type: none"> – Digital projector could be hung from the Proscenium Arch, projecting onto the back of the stage
6.0 HARBOUR CENTRE
<ul style="list-style-type: none"> – Should plan like for and gain approval for the maximum amount of slips (then development can be phased) – Will be important for economic development – Commercial – Salt Mine use of the Harbour – Junior sailing program/sport and rec focus – will be important for future support and growth of the marina – Need feasibility study and operational plan completed (recommendation for further studies in final Master Plan)
7.0 MUNICIPALITY PRIORITIES (ORDER OF DEVELOPMENT FOR STRUCTURES)
<ul style="list-style-type: none"> – Stage – Multipurpose Centre – Harbour Centre likely last

MEETING NOTES

JOB TITLE	Pugwash Waterfront Master Plan – Harbour Centre Stakeholder Meeting
DATE	10 May 2017
PRESENT	<ul style="list-style-type: none"> – Christina Lovitt, WSP Canada Inc. (Facilitator) – Ron Burdock, A49 (Facilitator) – Allie MacLean, Municipality of the County of Cumberland – Michelle Byers, Municipality of the County of Cumberland – Deborah Cameron, Pugwash Waterfront Steering Committee, Communities in Bloom – Bill Mundle, Pugwash Chamber of Commerce – Jonathan Mundle, Pugwash Waterfront Steering Committee – Darren Clarke, Pugwash Yacht Club (PWYC) – Michael Cunningham, Pugwash Waterfront Steering Committee – Rod Benjamin, Pugwash Yacht Club (PWYC)

DISCUSSION SUMMARY

1.0	HOPES FOR A HARBOUR CENTRE DISCUSSION
	<ul style="list-style-type: none"> – Need for boating services – Chamber of Commerce – Six Rivers – Economics in the harbour – Bill has copies of studies completed over the years – Previous issue when trying to build onto fisheries wharf (stopped last development plan) – Want to know next steps to move HC forward – Need a full service marina with gas – Slip design: Need a balance of slips to accommodate large boats 100 ft. down to 15 ft. – Need to design/plan for full expansion – Michelle indicates that the Pugwash Waterfront Development Master Plan will be a 5 – 10 year build out
2.0	HARBOUR CENTRE USES DISCUSSION
2.1	Tourism <ul style="list-style-type: none"> – The attendees indicated that they approve of the list of services/uses provided in the BDA report – Anticipate a lot of visitors – have community services, port of boaters to stop in, shuttle to golf course – Comment to not lose sight of possibility for private investment – Would like to have a boat lift
2.2	Boat Storage/Parking Lot <ul style="list-style-type: none"> – Minimal boat storage will be required – Accommodate sail boats in the parking lot at one end – Should maintain some parking all year long for four-season use of the Harbour Centre
2.3	Research/Education/History <ul style="list-style-type: none"> – FOPE activities will occur on site (should get a stakeholder brief from that group) – Important to have boards about the harbour’s history to engage and draw non-boating community and visitors to the site – Bird watchers – Feeling of welcome, want the place to be inviting to tourist – Spot for ‘traffic’ to stop and learn about the history of Pugwash, invite people to ‘turn left’ to the waterfront

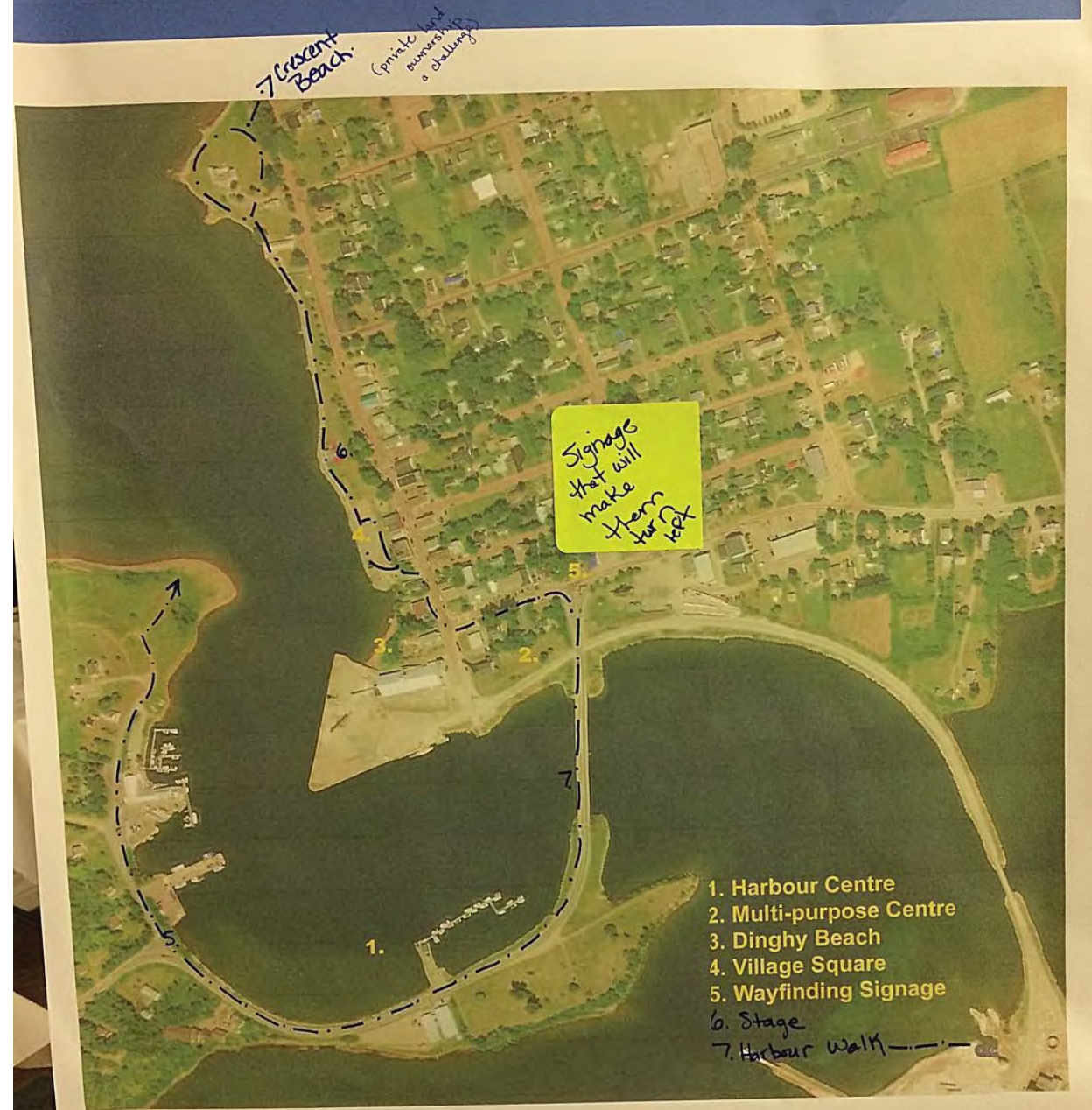
MEETING NOTES

3.0	Marine Services
	<ul style="list-style-type: none"> – Boat storage (gated surface storage) – Kiosks at the site (as shown in the BDA report) – FOPE, ice cream, boating supplies shop, rentals – Club house/lounge space – Deck off the building – Shower/laundry – Two storey building desired – Food services/restaurant – local business relocation desired (don’t want to compete with local business) – Likely not used for events such as weddings – Harbour Use: Salt Mine, Brickyard, Chase

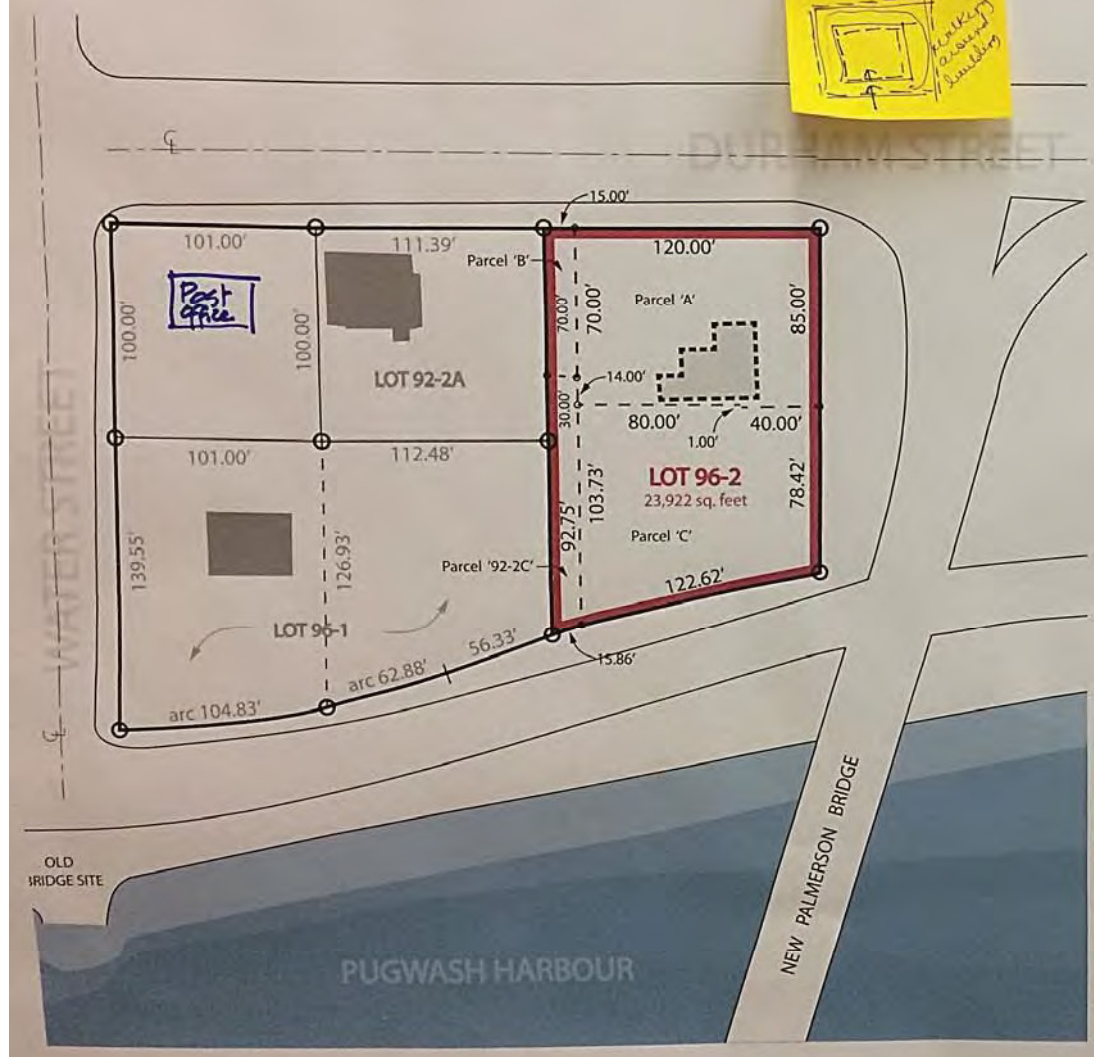
APPENDIX

B COMMUNITY OPEN HOUSES NOTES

VILLAGE OF PUGWASH WATERFRONT DEVELOPMENT



CONTEXT MAP



Functions/Activities

PLEASE INDICATE YOUR PRIORITY FOR THE FUNCTIONS BY PLACING DOTS NEXT TO THE SPACE TYPE

LIBRARY	
Collections and Reading Room.	
Public Meeting / Program Room.	
Public Access Computer Terminals.	
COMMUNITY CENTER	
Multi-Purpose Rooms.	
Kitchen / Catering Facility.	
OUTDOORS	
On-Site Parking.	
Nearby (Not On-Site Parking).	
Reading Garden.	

Others?
Please use a Post-it Note

Walking Circuit

MULTI-PURPOSE
- FITNESS CENTER



cumberland

ARCHITECTURE 49 WSP

Peter
Dünker
↳ Tree Study

Tree
boxes to
protect trees
from snow
plows

Star Park
Strip

Thyler's Lodge
improve current
sidewalk

Harbour
walk extend
sidewalk to
crescent beach
make connect or
a board
walk

VILLAGE OF PUGWASH WATERFRONT DEVELOPMENT

VILLAGE SQUARE

PROJECT DESCRIPTION: Create a pedestrian friendly waterfront area suitable for markets and public gatherings. The area may be used for parking when otherwise not in use. The design shall consider appropriate paving finishes/layouts, seating area design, lighting, and other services. The existing boat launch area shall be incorporated into the design although this is eventually to be relocated. Landscaping of this area will form part of the design. Fixtures shall match those used in the design of the Water and Durham Street streetscapes. The existing boardwalk and rip rap is to be extended approximately 130m.

PLEASE PROVIDE YOUR FEEDBACK

to new
water access
great to have
waterfront fully
open to community
Paving
to street
to street

green
space
between
sidewalk and
street

Summer
can't walk
up hill to
waterfront in
Village but
not great

DINGHY BEACH

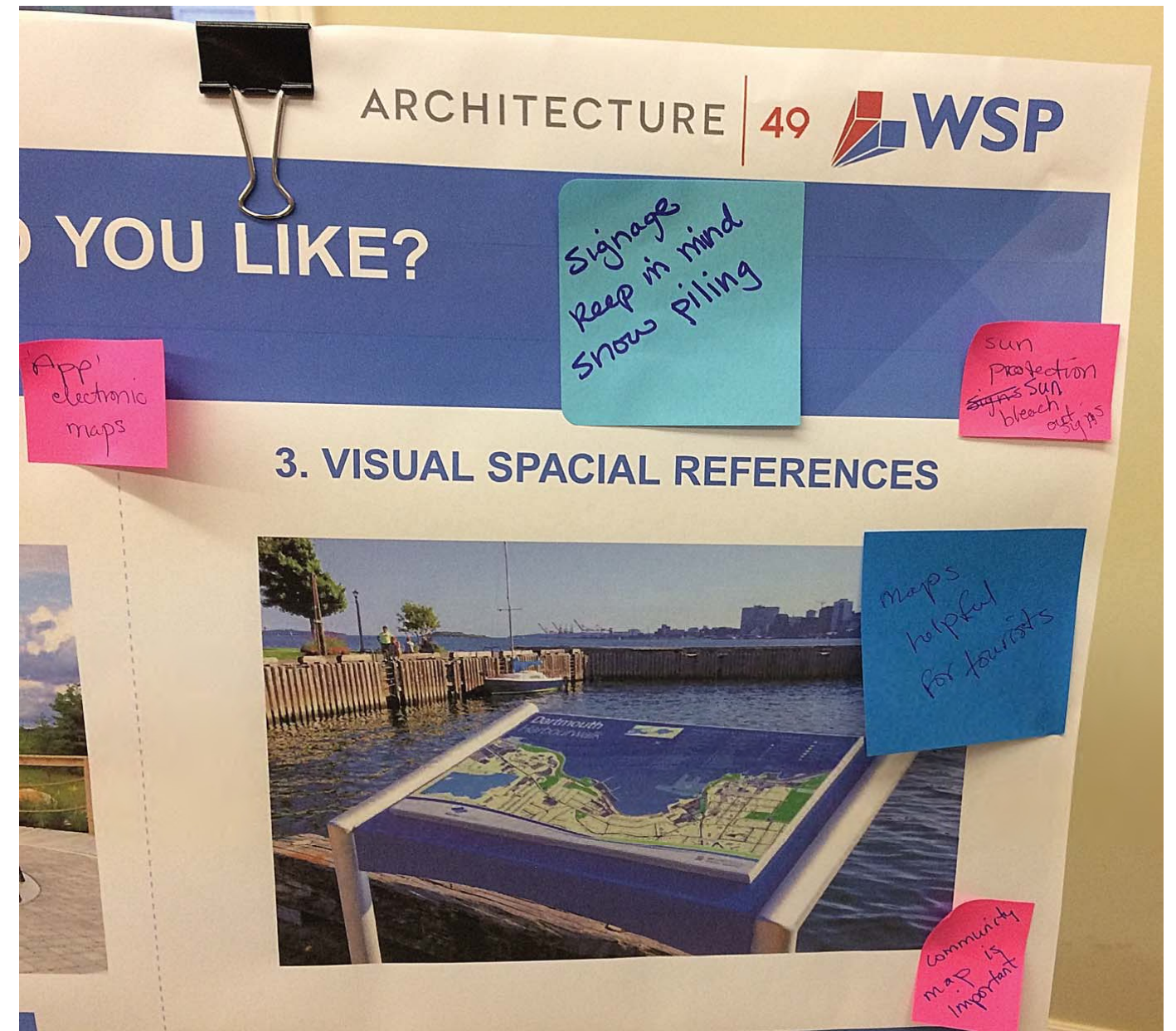
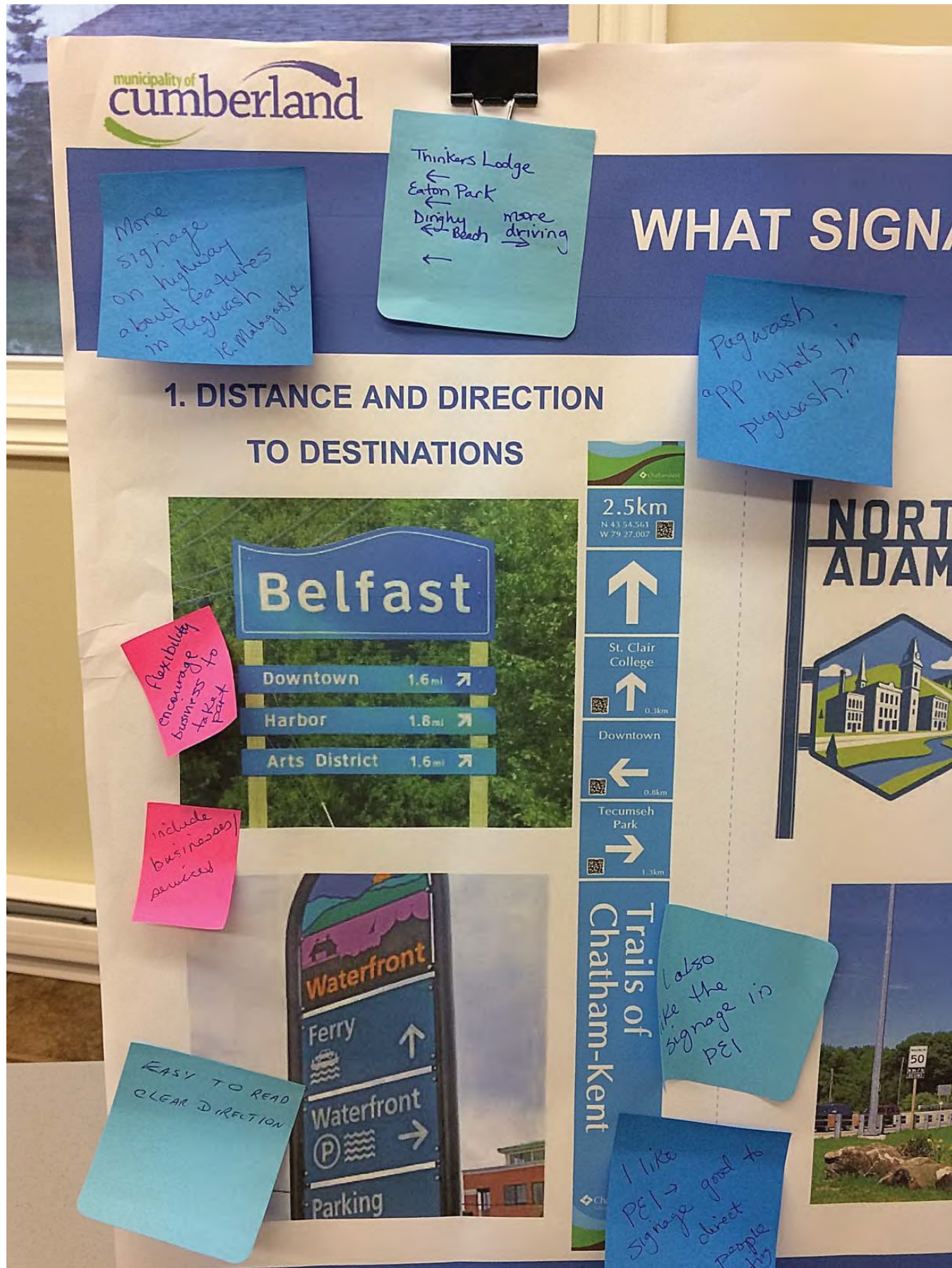
PROJECT DESCRIPTION: Extend the boardwalk approximately 10 m along with new rip rap and any repair needed to the existing rip rap to provide new fully accessible access to the beach at both low and high tides. Extend the storm pipe outfall as necessary. Extend market square lighting, seating areas, etc. as deemed appropriate for public use of a waterfront.

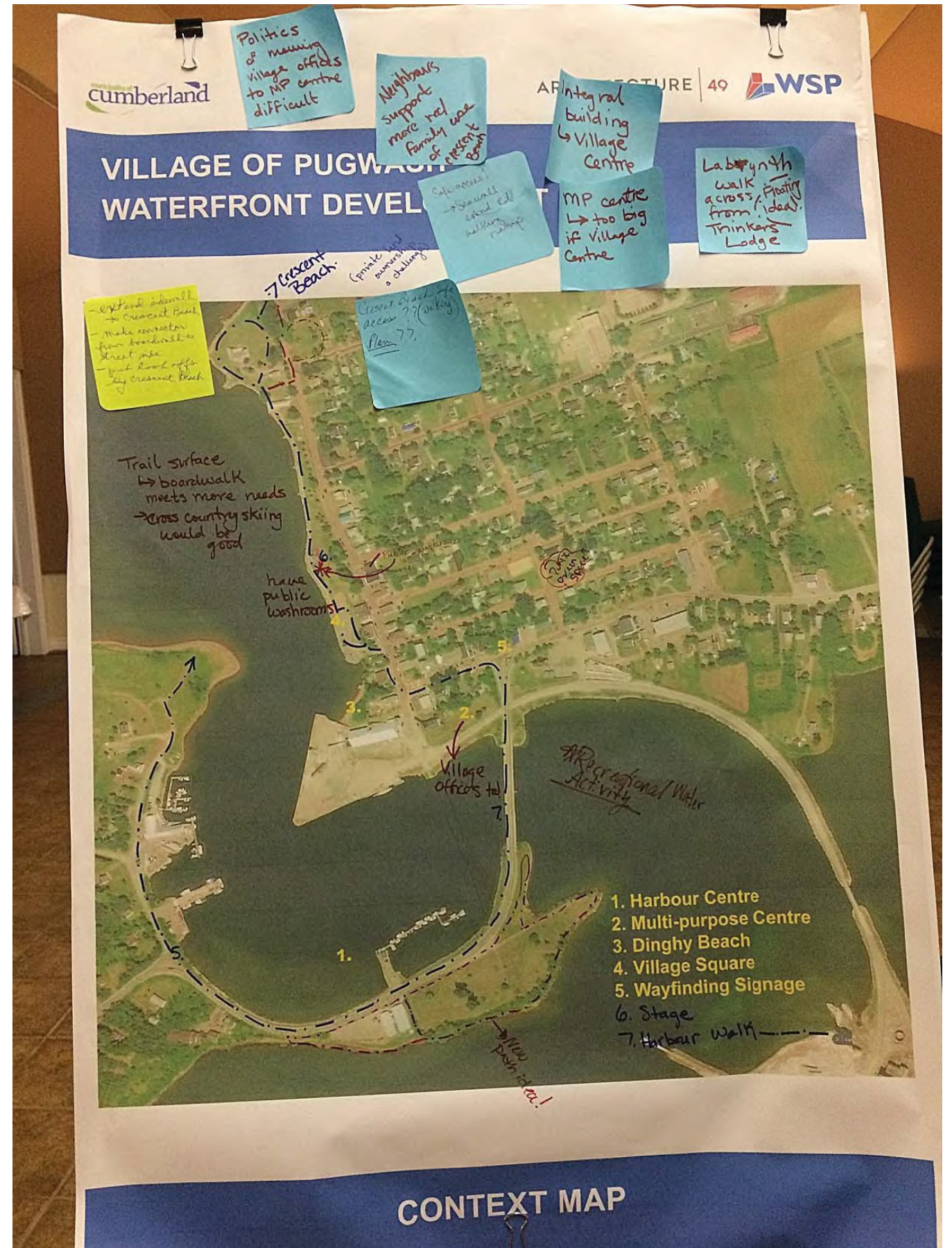
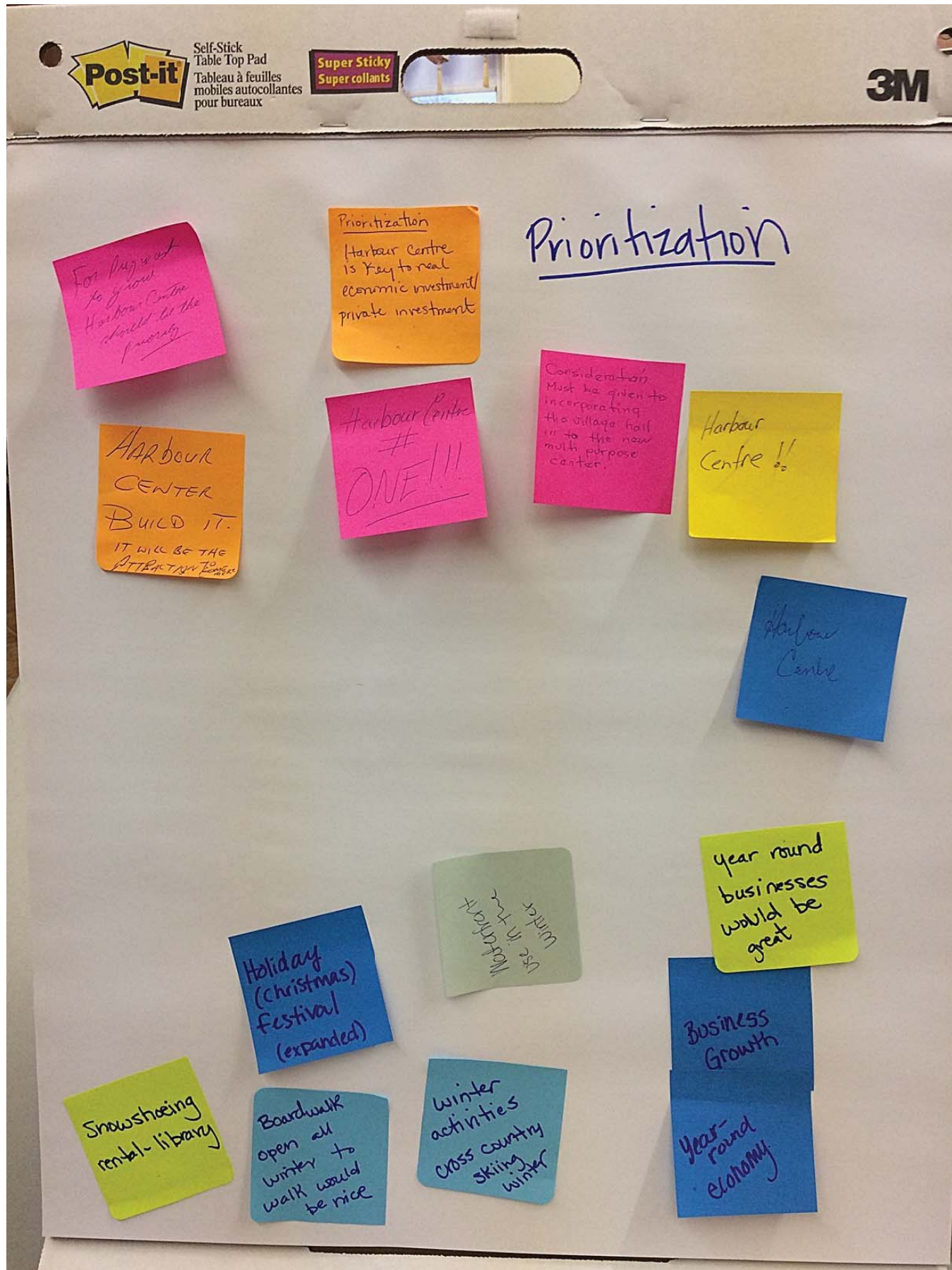
PLEASE PROVIDE YOUR FEEDBACK

keyek from
boat launch
parking
to support
that

would
be great
to foster more
walking in
the community

Engage the
youth





WSP WATERFRONT DEVELOPMENT

HARBOUR CENTRE

PROJECT DESCRIPTION: Further development of the Harbour Centre component of the project will focus on strengthening community infrastructure related to marine tourism services and enhancing the marine tourism services available in the community. Investigating the need to service visiting boaters in the community will be a priority. The Harbour Centre design should include the following:

- Display of natural history of the Pugwash River
- Educational programs about the Pugwash river ecosystem and experiences for residents and visitors
- Boat tours
- Headquarters for restoration projects and monitoring wildlife and water quality

PLEASE PROVIDE YOUR FEEDBACK

- Marine Services - 15 slips for local and visiting boats; get pre-approvals even if less than 100 are built
- Tourist attraction / water based experience / classes for sailing, kayaking
- Estuary + Northumberland Strait tours
- "ferry" tours to Malagast / Jost etc.

* Piloted Harbour
↳ Extra step (maybe)
↳ through DOT
↳ Navigational Protection Plan
↳ Lobster season
↳ Spring + Fall.





1 PROJECT DESCRIPTION

1.1 BACKGROUND

The Pugwash Harbour currently supports a wide variety of marine activity including commercial shipping of salt, a port for a local fishery, and a base for recreational boating. Previous surveys with community members and consultants have recognized the need and opportunity for additional recreational boating facilities within the Pugwash Harbour. The Pugwash waterfront development concept involves a new center for boating and water based activity known as the Harbour Centre (BDA Landscape Architecture Site Engineering, 2015).

The proposed Harbour Centre location is within the Pugwash Harbour, north of Route 6 in Cumberland County Nova Scotia. The proposed Harbour Center is intended to fulfill the demand for additional recreational boat slips and services but it is also designed for related water based activity for residents and tourists. The Harbour Center will be the community focus for harbour and river environmental education and research. Throughout this report the Project is referred as the proposed Harbour Centre (outlined in red below in Figure 1) including the development of a breakwater, parking lot, main building and retail buildings, and a floating wharf that will be able to hold approximately 25 to 75 recreational boats (See Figure 1, below).

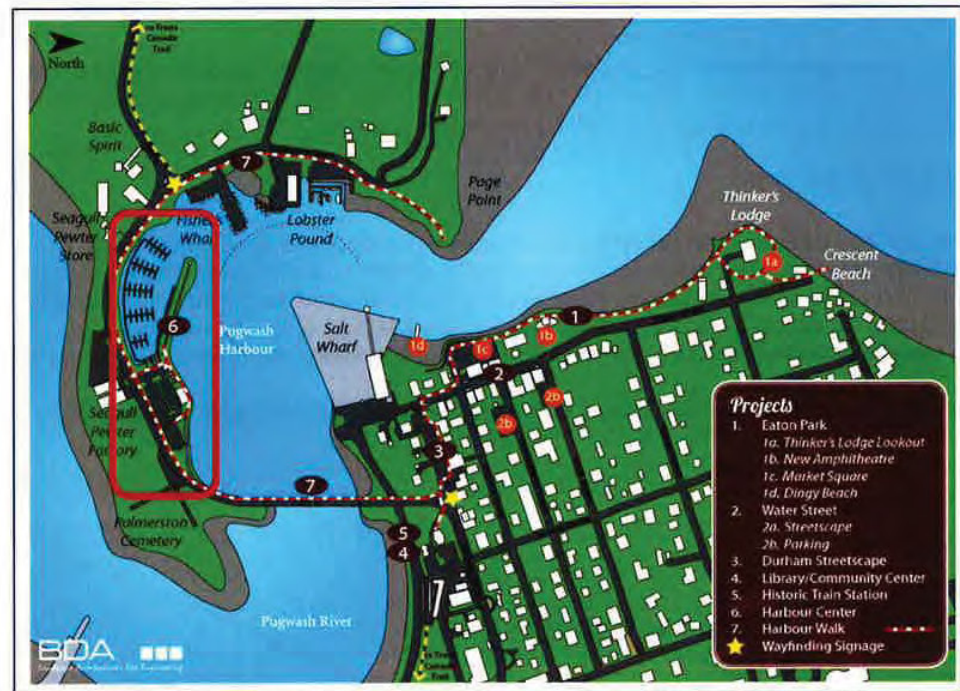


Figure 1. Conceptual plan of the proposed Harbour Center. Image taken from the Pugwash Waterfront Improvement Concept by BDA Landscape Architecture Site Engineering, 2015.

The Project is in the preliminary design phase and could include the following:

- Marine services
 - Boat basin with docking slips for local and visiting boats
 - Haul-out slipway
 - Fuel
 - Sewage pump-out
 - Showers and laundry
 - Boat storage
- Tourist attraction for water based experiences
 - Boat tours
 - Boat/kayak rentals
 - Sailing lessons
 - Waterfront boardwalk and park
 - Retail outlets
- Environmental research and education
 - Display of natural history of the Pugwash River
 - Educational programs about Pugwash River ecosystem, experiences for residents and visitors
 - Boat tours
 - Headquarters for restoration projects and monitoring wildlife and water quality

Handwritten notes:

- Travel Lift
- No priority
- Dredge for the maximum
- Bennyony Building
- 2 canoes
- 2 estuary groups and estuary groups
- Transportation to golf course
- CAMP

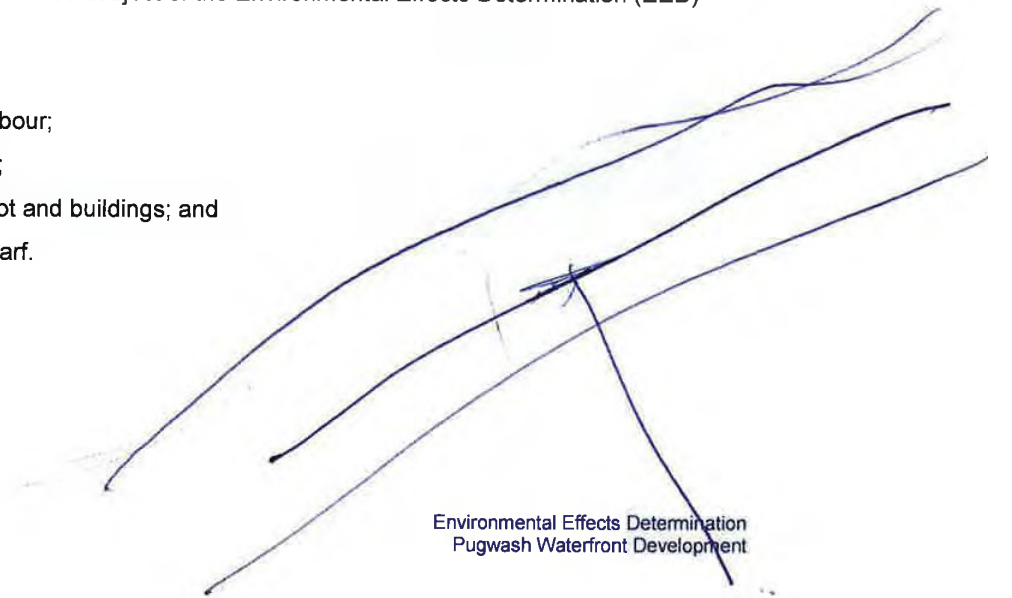
Additional locations were considered for the proposed Harbour Centre, however the Inner Harbour site was chosen based on known site conditions. The Project site is fully serviced with utilities; accessible with a public road; and its proximity to the village and visibility for visitors is good.

1.2 PROJECT SCOPE

WSP Canada Inc. (WSP) has been retained by the Municipality of Cumberland to complete an Environmental Effects Determination Report for the proposed Pugwash Harbour Centre Development. The project is currently in preliminary design phase, therefore only the conceptual design has been completed for the Project to date. This assessment is based on the conceptual design only. The results of this assessment are discussed in the Environmental Effects and Mitigation Measures Section 4.3 of this report.

The project phase/ components that will be subject of the Environmental Effects Determination (EED) include:

- Dredging the Harbour;
- Infilling sections of the Harbour;
- Constructing a breakwater;
- Construction of a parking lot and buildings; and
- Installation of a floating wharf.



APPENDIX

C STAKEHOLDER BRIEFS



The Municipality of Cumberland County intends to carry out various downtown and waterfront improvements in the Village of Pugwash over the next several years broadly in accordance with the Pugwash Waterfront Improvement Concept (BDA Landscape Architecture and Site Engineering, 2015).

Community residents and officials had come to realize that efforts to achieve individual project objectives could be more successful, and ultimately, the impact on community economic development in the area could be greatly increased, by integrating many of the projects into one comprehensive plan. Through the development of the Pugwash Waterfront Improvement Concept, meeting and brainstorming sessions were held with a community-led project steering committee and community meetings and open houses took place.

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ORGANIZATIONAL PROFILE

Please indicate and briefly describe the organization/business you represent:

YMCA of Cumberland
- multiple community program capacity for children, youth, adults + older adults from fitness, recreation to development in personal + mental health initiatives.

Contact information

Contact person name, position/title:
Trina Clarke, CEO

Daytime telephone number for follow-up (if required): 902 667-9112



FACILITY USE & NEEDS

1. Please describe if and how your organization/business currently uses the Pugwash Waterfront and the amenity spaces. What spaces do you currently use and do they meet your organization's needs?

~~Organization/business currently uses the Pugwash Waterfront and the amenity spaces. What spaces do you currently use and do they meet your organization's needs?~~
Not currently

2. For the specific component projects, what design priorities/issues should be considered?

Village Square:
[Empty box]

Dinghy Beach:
[Empty box]

Harbour Centre:
[Empty box]

Multipurpose Centre:
Large multipurpose room for youth groups, fitness classes, educational programs for groups
Replacing Stage:
[Empty box]

Water Street & Durham Street improvements:
[Empty box]

Extending boardwalk/trail at Eaton Park:
[Empty box]

Harbour Walk:
walking programs

Parking:
adequate parking to accommodate attendees for programs at multipurpose centre.
Wayfinding signage:
[Empty box]

3. Do you see any major challenges in pursuing these projects?

Managing expectations as this project cannot be all things to all people. Keeping the scope of the Multipurpose Centre offerings realistic is important but community input and engagement is critical. Happy to see this is being done!

OTHER COMMENTS

4. Please provide any other comments that you feel would assist us in the study or you feel are important to stakeholder groups/businesses regarding the Pugwash Waterfront.

Flexibility + forward thinking of what the space (Multi Purpose Centre) may need to be used for. With the YMCA ^{construction} we have learned that concrete block walls do not lend themselves to flexibility when the requirements of the space changes + you need to make rooms bigger or smaller.

Thank you for providing us with your input!

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ORGANIZATIONAL PROFILE

Please indicate and briefly describe the organization/business you represent:

Pugwash Communities in Bloom (CIB)

Contact information

Contact person name, position/title:

Maureen Leakey, Chair

Daytime telephone number for follow-up (if required): 902-243-3454

FACILITY USE & NEEDS

1. Please describe if and how your organization/business currently uses the Pugwash Waterfront and the amenity spaces. What spaces do you currently use and do they meet your organization's needs?

we try to beautify bridge, Eaton Park, Water & Durham streets

2. For the specific component projects, what design priorities/issues should be considered?

Village Square:

But for waterfront boating rentals, swimming, kiosks, sunset views

Dinghy Beach: *great for boating & attracting people*

Crescent Beach should be added to project - more beautiful for swimming than Dinghy Beach.

Harbour Centre:

Multipurpose Centre:

Replacing Stage:

Water Street & Durham Street improvements:

need sidewalks, curbs, trees, signage, removal of old sign banners

Extending boardwalk/trail at Eaton Park:

eng good to extend to Crescent Beach. No need to go across Thinkers Lodge lawn. Just extend boardwalk & sidewalk

Harbour Walk: *down Water Street*

Parking:

Wayfinding signage:

Necessary! Consider having it at entrance to village (where signs are), at end of bridge, on Water St & corner of Church St & Rte 6.

3. Do you see any major challenges in pursuing these projects?

Will Thinkers Lodge owners give permission for any boardwalk extension to Crescent Beach? I doubt it.

OTHER COMMENTS

4. Please provide any other comments that you feel would assist us in the study or you feel are important to stakeholder groups/businesses regarding the Pugwash Waterfront.

A place to put garbage is very important to include in the plan. Currently the village has 2 fulltime maintenance staff working in the summer. 20 hrs./wk. is spent by one staff in picking up garbage. This means other activities are not done.

Thank you for providing us with your input!

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ORGANIZATIONAL PROFILE	
Please indicate and briefly describe the organization/business you represent:	
Friends of the Pugwash Library (FOPL) North Cumberland Historical Society (NCHS)	
Contact information	
Contact person name, position/title:	
Vivian Godfrek	
Daytime telephone number for follow-up (if required):	
902 243 2804	

1

FACILITY USE & NEEDS

- Please describe if and how your organization/business currently uses the Pugwash Waterfront and the amenity spaces. What spaces do you currently use and do they meet your organization's needs?
 Use of the library in the old train station
 Archives for NCHS stored upstairs
- For the specific component projects, what design priorities/issues should be considered?
 Village Square:
 Dinghy Beach:
 Harbour Centre:
 Multipurpose Centre:
 Modern building with joyful, colourful character *
 Replacing Stage:
 Water Street & Durham Street improvements:
 Sidewalks
 Extending boardwalk/trail at Eaton Park:
 Harbour Walk:
 Parking:
 Wayfinding signage:

* Forward ^{looking} use of energy efficiency and alternative energy - solar, geothermal. A building suitable for a carbon neutral world.

3. Do you see any major challenges in pursuing these projects?

Concerned about inadequate planning for storm surges for the waterfront project
(I apologize for not asking about this because you may have planned for rising sea levels & erosion)

OTHER COMMENTS

4. Please provide any other comments that you feel would assist us in the study or you feel are important to stakeholder groups/businesses regarding the Pugwash Waterfront.

Design should be simple and efficient to minimize capital cost and maintenance costs.

Thank you for providing us with your input!

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ORGANIZATIONAL PROFILE

Please indicate and briefly describe the organization/business you represent:

The Pugwash waterfront development steering committee,

Contact information

Contact person name, position/title:

Jonathan Mundle Member at large

Daytime telephone number for follow-up (if required): 902-694-0968

FACILITY USE & NEEDS

1. Please describe if and how your organization/business currently uses the Pugwash Waterfront and the amenity spaces. What spaces do you currently use and do they meet your organization's needs?

my family have been avid boaters on the North Shore for years. Pugwash needs to provide services to boaters & tourist with fuel, water, showers ect...

2. For the specific component projects, what design priorities/issues should be considered?

Village Square:

Community waterfront events, scenery, maps,

Dinghy Beach:

Public Access to a safe swim area

Harbour Centre:

Services, water, marina, fuel, club house, food, maps, tourist info

Multipurpose Centre:

Library, village offices, public washrooms, Great room overlooking harbour centre & marina (Deck maybe)

Replacing Stage:

Keep view of harbour obstruction to a minimum,

Water Street & Durham Street improvements:

Consult snow plow operations prior to improvements

Extending boardwalk/trail at Eaton Park:

Perhaps ~~use~~ usable year round

Harbour Walk:

Signage throughout trail

Parking:

Paved

Wayfinding signage:

Attractive, placed throughout village, harbour centre, Perhaps some being removable for winter months?

3. Do you see any major challenges in pursuing these projects?

No, financially maybe,

OTHER COMMENTS

4. Please provide any other comments that you feel would assist us in the study or you feel are important to stakeholder groups/businesses regarding the Pugwash Waterfront.

Thank you for providing us with your input!

Organizational Profile

The Cumberland Regional Library Board was established under the Libraries Act of Nova Scotia in 1967. The Board manages and operates the Cumberland Public Libraries (CPL). CPL serves the county of Cumberland in rural, northwestern Nova Scotia with seven branch libraries in the communities of: Amherst, Springhill, Oxford, Pugwash, Parrsboro, River Hebert and Advocate. Borrow by Mail service is also provided free of charge to those who live at least 5 kms away from a library or are physically unable to visit the library. CPL serves a population of over 30,000 citizens and offers recreational, educational and cultural programs for all ages such as: book clubs; classic and family movie nights; computer training classes; crafting groups; information sessions on various topics and summer reading programs for all ages. As well, CPL offers traditional library services and holds over 70,000 items that are available for library patrons to borrow. These items consist of books, e-books, large print materials, audiobooks, movies, TV series, documentaries, magazines, graphic novels and e-book readers.

Contact Person

Denise Corey, Chief Librarian
Denise.corey@cumberlandpubliclibraries.ca
902-667-2135

Facility Use and Needs

Current Facility

The current Pugwash Library location does not adequately meet the needs of the community. Although the building is too small to hold enough materials or allow for much in the way of programming the population continues to use the service.

Background

Location & Jurisdiction:

- Moved into train station in 1988.
- Municipality owns and maintains the building.
- Municipalities are responsible to provide the physical space of a library. The Cumberland Regional Library Board outfits the facility and provides staff, materials and computers through annual operating funds.

Service Area:

- With information available we estimate our user base comes from Pugwash, Northport, Wentworth, Malagash, Wallace, and surrounding areas.

User Base:

- Population served – 2,900 +/-
- Open 25-28 hours per week including 2 evenings and Saturday mornings.
- Staff 0.8 FTE
- Library Visits – 6,231 (2014/15)
- Material Circulated – 10,883 items (2014/15)
- Computer Use – 530 hours (2014/15)
- Wireless Use - 547 hours (2014/15)

- Programs – 51 with 613 in attendance (2014/15)
- Serves all age groups from pre-school to seniors. They request everything from fiction, non-fiction, picture books and reference books.
- Limited space impacts the services the library can offer.
- Non-readers often use the library for other purposes such as to use the internet, check email, file for unemployment insurance, etc.
- Library has 891 active registered users (the total number of people who have used their library cards in the last 3 years).

Why do we need to move?

- Outgrown present space of approx. 1,000 square feet
- Lack of space limits the materials and services we can provide.
- Building not wheelchair accessible
- Heating is lacking as the system is insufficient and the mortar between bricks has fallen away so the wind comes through.
- Unsafe – the building is deteriorating. There are flooding issues. A piece of the ceiling fell in this winter.

Minimum Requirements for a New Library

(Based on 2001 Provincial Standards)

- 2,500 square feet all on one level.
- Wheelchair accessible from the street with an automatic door.
- Wheelchair accessible bathrooms.
- Collection of approximately 10,000 items for all ages in a variety of formats (DVDs, books, books on CD, kits for kids, etc.).
- Free computers available for public use with high speed dedicated lines.
- Phone lines.
- Separate program room
- Windows with lots of natural light.
- Daily janitorial service.
- Storage room for extra supplies (books, craft supplies, etc.) and janitor's cleaning supplies.
- Free customer parking adjacent to the building with a minimum of 8 parking spots.
- A dedicated exterior door.

Benefits of a New Library

- Enhance services and collection available to make Pugwash an even more attractive place to live.
- Serve as a local gathering place for the community.
- Room to provide regularly scheduled programs for children, teens and adults.

Other Comments

The Friends of the Pugwash Library have raised just over \$50,000 to contribute to new furniture and equipment for a new library.

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ORGANIZATIONAL PROFILE	
Please indicate and briefly describe the organization/business you represent:	
PUGWASH FARMERS MARKET - venue for local producers to sell their wares	
Contact information	
Contact person name, position/title:	
Jenn Houghtaling President	
Daytime telephone number for follow-up (if required):	
902 297 3867	

FACILITY USE & NEEDS

1. Please describe if and how your organization/business currently uses the Pugwash Waterfront and the amenity spaces. What spaces do you currently use and do they meet your organization's needs?

We will neighbour the MFC and Harbour Center and both will boost out customers and provide extra space for special events.

2. For the specific component projects, what design priorities/issues should be considered?

Village Square:

consider high winds in design

Dinghy Beach:

awareness of safe swimming zone for kids/access

Harbour Centre:

walking access to market/village

Multipurpose Centre

outdoor or deck sitting space / kitchen / large room for indoor market - *energy efficient

Replacing Stage

washrooms / modern design

Water Street & Durham Street improvements

SIDEWALKS

Extending boardwalk/trail at Eaton Park

TRAIL FROM EATON PARK TO FARMERS MARKET

Harbour Walk

same

Parking

yes please

Wayfinding signage

matching color + design

A Future of Possibilities

What if a little Market had big dreams ...

3. Do you see any major challenges in pursuing these projects?

funding.

OTHER COMMENTS

4. Please provide any other comments that you feel would assist us in the study or you feel are important to stakeholder groups/businesses regarding the Pugwash Waterfront.

In every part of this project we should incorporate renewable & efficient energy sources.
The market has designed a new structure that we are hoping to have built in 2018.
I have attached a sketch of the end result. This will be across the road from the MPC.
*sorry about the photocopy.

Thank you for providing us with your input!



**Village of Pugwash
Waterfront Development Design
Request for Brief**



The Municipality of Cumberland County intends to carry out various downtown and waterfront improvements in the Village of Pugwash over the next several years broadly in accordance with the Pugwash Waterfront Improvement Concept (BDA Landscape Architecture and Site Engineering, 2015).

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ORGANIZATIONAL PROFILE

Please indicate and briefly describe the organization/business you represent:

Thinkers Lodge National Historic Site

Contact information

Contact person name, position/title:

John Eaton

Daytime telephone number for follow-up (if required): 510.599.1082 (California)

**Village of Pugwash
Waterfront Development Design
Request for Brief**



FACILITY USE & NEEDS

- Please describe if and how your organization/business currently uses the Pugwash Waterfront and the amenity spaces. What spaces do you currently use and do they meet your organization's needs?

Thinkers Lodge is a National Historic Site that houses both the Nobel Peace Prize and the Lenin Peace prize. We hold numerous events each year that focus on Peace and Education. We also have become a sought after wedding venue in the summers. The Lobster Factory which is part of the National Historic Site is also used for numerous local and regional events.
- For the specific component projects, what design priorities/issues should be considered?

Village Square:

Dinghy Beach:

Harbour Centre:

Multipurpose Centre:

Replacing Stage:

Water Street & Durham Street improvements:

Extending boardwalk/trail at Eaton Park:

In a letter dated June 6, 2016 to the Pugwash Waterfront Development Committee, we expressed our

Harbour Walk:

Parking:

Wayfinding signage:

Village of Pugwash
Waterfront Development Design
Request for Brief



3. Do you see any major challenges in pursuing these projects?

Here is a copy of the text from our June 6, 2016 letter:
June 6, 2016

Jonathon Mundle
Vice Chair
Pugwash Waterfront Development Committee

OTHER COMMENTS

4. Please provide any other comments that you feel would assist us in the study or you feel are important to stakeholder groups/businesses regarding the Pugwash Waterfront.

Thinkers Lodge National Historic Site is considering a project to set aside the site at the corner of Water Street and King Street in Pugwash for local volunteers to create a small park consisting of a Native Plant Garden and a Labyrinth. The project will be on land owned by the Pugwash Park Commissioners and implemented by a group of citizen from Pugwash.

This "eco garden" could be a good tribute to the scientists of the Pugwash Conferences - those saner minds who prevail. Sustainability and low maintenance would be key objectives of this eco garden in creating an oasis of native plant color and pollinator friendly plants.

In the Middle Ages, walking a cathedral labyrinth was a substitute for going on a pilgrimage to Jerusalem. Not everyone could make the long and arduous journey to the Holy Land, so walking a labyrinth in a church was a devotional activity. Today meandering labyrinths are often used as walking meditations, to focus the mind and put the walker in tune with the greater reality metaphorically represented by the labyrinth.

An important consideration is linking the boardwalk to this small community park. We look forward to working with Architecture49 and WSP and all the stakeholders.

Thank you for providing us with your input!

APPENDIX

D COMMUNITY QUESTIONNAIRES

Village of Pugwash
Waterfront Development Design
Community Feedback



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FACILITY USE & NEEDS

1. Please describe if and how you currently uses the Pugwash Waterfront and the amenity spaces.

WALKING, PHOTOGRAPHY, RELAXING

2. Do you feel the current spaces adequate, why or why not?

Village of Pugwash
Waterfront Development Design
Community Feedback



3. For the specific component projects, what design priorities/issues should be considered?

Village Square:

SEATING OTHER THAN IN THE PARK.

Dinghy Beach:

BETTER ACCESS

Harbour Centre:

Multipurpose Centre:

ARE MEETING ROOMS NEEDED CONSIDERING WHAT IS ALREADY AVAILABLE

Replacing Stage:

I WOULD LIKE TO SEE THE OLD STAGE GO.

Water Street & Durham Street improvements:

MAKE PLACES TO SIT/WALKWAY ON SOUTH SIDE OF DURHAM

Extending boardwalk/trail at Eaton Park:

GOOD IDEA, GOOD VIEW OF HARBOUR MOUTH FROM EATON PROPERTY

Harbour Walk:

GOOD IDEA, LOTS OF WALKERS IN THE VILLAGE

Parking:

I HAVE NOT FOUND PARKING TO BE A PROBLEM.

Wayfinding signage:

JIM McDONALD ON WATER STREET HAS SIGNAGE ON HIS FRONT LAWN

4. Do you see any major challenges in pursuing the Pugwash Waterfront Development projects?

OTHER COMMENTS

5. Please provide any other comments that you feel would assist us in the study or you feel are important to residents regarding the Pugwash Waterfront.

WHAT ABOUT PUBLIC WASHROOMS.

Thank you for providing us with your input!

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If you have any questions about the study, please contact Michelle Byers, Community Economic Development Coordinator, Municipality of Cumberland County at (902) 297-2765 during regular business hours.

FACILITY USE & NEEDS

1. Please describe if and how you currently uses the Pugwash Waterfront and the amenity spaces.

Walk for exercise on the board walk
Go to Eaton Park for all events in the summer.
Own a boat and keep it at so called marina

2. Do you feel the current spaces adequate, why or why not?

Spaces are not adequate in present state.
Water street and Durham street need to be rebuilt with curbs, sidewalks, enhanced lighting and signage as planned.

Village of Pugwash
Waterfront Development Design
Community Feedback



3. For the specific component projects, what design priorities/issues should be considered?

Village Square:

?

Dinghy Beach:

Dinghy beach is washed out, needs immediate repair

Harbour Centre:

This is most important for marina and economic growth.

Multipurpose Centre:

Excellent for library, meeting rooms. Should replace village office building. Should have tourist office.

Replacing Stage:

Absolutely necessary. New design is ugly!

Water Street & Durham Street improvements:

Both streets need to be rebuilt with sidewalks, also drainage.

Extending boardwalk/trail at Eaton Park:

Should definitely pass in front of lodge and return up Water Street.

Harbour Walk:

Excellent plan to extend to Page Point on east side of harbour.

Parking:

Behind Drugstore, Dinghy Beach area and old station area.

Wayfinding signage:

Some is well done now but needs to be upgraded and expanded.

4. Do you see any major challenges in pursuing the Pugwash Waterfront Development projects?

The biggest challenge is the cost but many other communities have been upgraded and Pugwash is long past due.

2

Village of Pugwash
Waterfront Development Design
Community Feedback



OTHER COMMENTS

5. Please provide any other comments that you feel would assist us in the study or you feel are important to residents regarding the Pugwash Waterfront.

In the long run the most important project of the overall waterfront development is the Harbour Centre. The very first and crucial part will be government approval to dredge for a marina that will accommodate 100 to 125 slips for both sail and power boats. Full service facilities will be essential. Until full government approval is obtained we cannot proceed with a specific marina design. Without the design we cannot be effective in raising substantial funding. We are aware that substantial private funding is absolutely essential.

Thank you for providing us with your input!

3

Village of Pugwash
Waterfront Development Design
Community Feedback



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FACILITY USE & NEEDS

1. Please describe if and how you currently uses the Pugwash Waterfront and the amenity spaces.
 - Frequently walk in the park and on the boardwalk, and around the village
 - Our grandchildren use the playground
 - Use the library all the time
 - Go to exercise groups
2. Do you feel the current spaces adequate, why or why not?
 - Library inadequate for many reasons
 - Exercise groups have hard time finding spaces
 - Insufficient sidewalks to encourage walking

1

Village of Pugwash
Waterfront Development Design
Community Feedback



3. For the specific component projects, what design priorities/issues should be considered?

Village Square:

Dinghy Beach:

Harbour Centre:

Protection against rising sea levels and storm surges

Multipurpose Centre:

Simple colourful modern building with character - energy neutral

Replacing Stage:

yes

Water Street & Durham Street improvements:

Sidewalks

Extending boardwalk/trail at Eaton Park:

Yes

Harbour Walk:

Better verges on the west side of the bridge

Parking:

Wayfinding signage:

Yes

4. Do you see any major challenges in pursuing the Pugwash Waterfront Development projects?
 Rising sea levels and storm surges

OTHER COMMENTS

5. Please provide any other comments that you feel would assist us in the study or you feel are important to residents regarding the Pugwash Waterfront.

The Multipurpose building is a building which will be used by everybody and I believe should take priority. It should also be an example of a forward thinking use of energy, and concern for the environment.

The Marina and Harbour Centre are more exclusive but still valuable in promoting Pugwash as a destination

Thank you for providing us with your input!

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FACILITY USE & NEEDS

1. Please describe if and how you currently uses the Pugwash Waterfront and the amenity spaces.

- WALKING - ALL SEASONS -
- BOATING - FRIENDS WITH BOATS VISITING
- ACCESS SERVICES
- SPECIAL EVENTS
- DESTINATION POINT FOR VISITORS

2. Do you feel the current spaces adequate, why or why not?

- NO
- LIMITED BOARDWALK - NEEDS TO BE EXPANDED
- NO BOATING SERVICES
- NEEDS DEFINED SIDEWALKS
- MORE BOUTIQUE SHOPS
- NEED A REASON TO TURN (L) FORWARD WATER STREET

3. For the specific component projects, what design priorities/issues should be considered?

Village Square:

Dinghy Beach:

Harbour Centre:

Multipurpose Centre:

Replacing Stage:

Water Street & Durham Street improvements:

Extending boardwalk/trail at Eaton Park:

Harbour Walk:

Parking:

Wayfinding signage:

4. Do you see any major challenges in pursuing the Pugwash Waterfront Development projects?

OTHER COMMENTS

5. Please provide any other comments that you feel would assist us in the study or you feel are important to residents regarding the Pugwash Waterfront.

• Great opportunity to put Pugwash on the map.
• if the plan as outlined in the BDA report is followed - you'll have a winner!

Thank you for providing us with your input!

**Village of Pugwash
Waterfront Development Design
Community Feedback**



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FACILITY USE & NEEDS

1. Please describe if and how you currently uses the Pugwash Waterfront and the amenity spaces.

I use the Eaton Park, the library and the boardwalk.

2. Do you feel the current spaces adequate, why or why not?

The space is adequate but it needs development especially for a marina, kayak, canoe launch.

**Village of Pugwash
Waterfront Development Design
Community Feedback**



3. For the specific component projects, what design priorities/issues should be considered?

Village Square:

Traffic control & parking

Dinghy Beach:

access and parking, life guard & swimming lanes.

Harbour Centre:

Marina with kayak, canoe launch & slips for lg. boats.

Multipurpose Centre:

A library is important.

Replacing Stage:

None.

Water Street & Durham Street improvements:

Extending boardwalk/trail at Eaton Park:

Good idea to extend under the bridge.

Harbour Walk:

Excellent

Parking:

Wayfinding signage:

4. Do you see any major challenges in pursuing the Pugwash Waterfront Development projects?

NO. Let's get going. Start with marina.

OTHER COMMENTS

5. Please provide any other comments that you feel would assist us in the study or you feel are important to residents regarding the Pugwash Waterfront.

Thank you for providing us with your input!

The Municipality of Cumberland County intends to carry out various downtown and waterfront improvements in the Village of Pugwash over the next several years broadly in accordance with the Pugwash Waterfront Improvement Concept (BDA Landscape Architecture and Site Engineering, 2015).

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FACILITY USE & NEEDS

1. Please describe if and how you currently uses the Pugwash Waterfront and the amenity spaces.

I attend events taking place on the waterfront

2. Do you feel the current spaces adequate, why or why not?

I feel that with forward thinking additional spaces could bring positive things to the Village

Village of Pugwash
Waterfront Development Design
Community Feedback



3. For the specific component projects, what design priorities/issues should be considered?

Village Square: 2

Dinghy Beach: 10

Harbour Centre: 1

Multipurpose Centre: 5

Replacing Stage: 3

Water Street & Durham Street improvements: 4

Extending boardwalk/trail at Eaton Park: > 6

Harbour Walk: 8

Parking: 8

Wayfinding signage: 17

4. Do you see any major challenges in pursuing the Pugwash Waterfront Development projects?

Environmental approval
Funding

Village of Pugwash
Waterfront Development Design
Community Feedback



OTHER COMMENTS

5. Please provide any other comments that you feel would assist us in the study or you feel are important to residents regarding the Pugwash Waterfront.

I feel this design is a wonderful addition to Pugwash. It will require very careful planning to accommodate the major increase of people + traffic, parking etc. Another concern would be cost to maintain these additions in future years. I wish all those involved complete success, and hope as a senior citizen that I live to see its completion.

Thank you for providing us with your input!

**Village of Pugwash
Waterfront Development Design
Community Feedback**



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FACILITY USE & NEEDS

1. Please describe if and how you currently uses the Pugwash Waterfront and the amenity spaces.

Thinkers Lodge is a National Historic Site that houses both the Nobel Peace Prize and the Lenin Peace prize. We hold numerous events each year that focus on Peace and Education. We also have become a sought after wedding venue in the summers. The Lobster Factory which is part of the National Historic Site is also used for numerous local and regional events.

2. Do you feel the current spaces adequate, why or why not?

**Village of Pugwash
Waterfront Development Design
Community Feedback**



3. For the specific component projects, what design priorities/issues should be considered?

Village Square:

Dinghy Beach:

Harbour Centre:

Multipurpose Centre:

Replacing Stage:

Water Street & Durham Street improvements:

Extending boardwalk/trail at Eaton Park:

Harbour Walk:

Parking:

Wayfinding signage:

4. Do you see any major challenges in pursuing the Pugwash Waterfront Development projects?

Thinkers Lodge National Historic Site is considering a project to set aside the site at the corner of Water Street and King Street in Pugwash for local volunteers to create a small park consisting of a Native Plant Garden and a Labyrinth. The project will be on land owned by the Pugwash Park Commissioners and implemented by a group of citizen from Pugwash.

OTHER COMMENTS

5. Please provide any other comments that you feel would assist us in the study or you feel are important to residents regarding the Pugwash Waterfront.

Thank you for providing us with your input!

Facility Use & Needs

1. Please describe if and how you currently use the Pugwash Waterfront and the amenity spaces.
In the past the Chase's successfully ran a business on Water Street, which was re-located to Durham Street in January 2017.

Have a long history of a commercial buy stations for various fish species, in Pugwash Harbour. Have a lobster holding facility, shipping seafood across Canada, and around the world.

Marine dockage for commercial & recreational boats. Currently the only private concrete boat launch used by both commercial & recreational vessels.

2. Do you feel the current spaces adequate, why or why not?

A number of the current amenities on Pugwash Waterfront are available, and with some enhancements could be greatly improved.

Although it is great to have a *want* list, the one major factor holding back the area, is the need to have better leadership to bring more people and business to the area. With improved economic conditions, and more individuals in the area spending money, will lead to natural business expansion.

From a Marine perspective, there are far worse commercial fishing ports, which have far greater fishing catches, more variety of species caught, being used more months of the year than in Pugwash. Pugwash is blessed to have what we do.

One amenity which is needed locally, is the availability of fueling services to recreational boaters.

There is numerous berthing vacancies available in Pugwash Harbour and others locations in the surrounding area. This is caused by a combination of factors. Berthing expansion projects over the past number of years in Port Howe, Wallace, Charlottetown, ect. Additionally, there are fewer boaters in the immediate area today than there was just 5 years ago. Finally, should berthing rates come more in line with rates charged in other areas, could also create additional vacancies in the current berthing market, or would lead to additional services added.

3. For the specific components projects, what design priorities / issues should be considered?

a. Village Square

Great Idea, hope to see the Saturday's Farmers market take advantage of the great space. Will be a great use of the purposed way finding signs to direct traffic to the new location, but will take time to educate every one of the change in location.

b. Dinghy Beach

Is a great beach however, feel can be unsafe place for swimming. Strong currents, and large waves from boats (fishing and pleasure boats). Cressent beach at the other end of Water Street, in my view is a much better, and safer beach for everyone. Was great to see swimming lessons offered by YMCA during summer of 2016 at this beach. This beach is better than, and could be busier than is both Heathers Beach, and Gulf Shore Picnic Park Beach.

c. Harbour Center

See other comments.

d. Replacing Stage

The current stage has outlived its usefulness. Will be great to see the stage be replaced. Ideally a new stage will include public washrooms which can be used by individuals enjoying their walk around the harbour.

e. Water Street & Durham Street improvements

These changes will be greatly welcomed by all. Over the past 6 months have moved one of the *Chase's* business from Water Street, to Durham Street. It is greatly hoped that improvements will be included to our section of Durham Street.

f. Extending boardwalk / trail at Eaton Park

This should be a very simple project, taking very little time to completed. Looking forward to it being completed! Suggest that the boardwalk/trail have appropriate set-backs from harbour to reduce future maintenance costs, as November/December storms can/will be costly.

g. Harbour Walk

Sidewalks on route 6 near Seagull Pewter needs to fixed right away, due to wash out from last November/Decembers fall storms. This cannot wait for other projects.

h. Parking

i. Way finding signage

This will be great! Trust they will be consistent, and used throughout the entire village/area. There are a number people who come into the area from a way for business reasons who see, or not *invited to the rest of the area*. To illustrate by example how many business people from a way visit the Dairy farm on Pugwash Point, Sun Set Adult home or Salt mine in West Pugwash, or Marina, Fisherman's wharf, Lobster pound on Brickyard road.

4. Do you see any major challenges in pursuing the Pugwash Waterfront Development projects?

Their will need to be more engagement and input from local residents under the age of 60, for any of these projects to sustainable. Unfortunately, it appears the majority of leadership on key issues appears to be coming either from individuals over the age of 65 or 70, or paid staff of the County. Where will the current individuals in these ages be in ten years to keep things going? Be engaged in many formal and informal NPO and networking groups, there is very little engagement or opportunities for engagement to these projects.

5. Please provide any other comments that you feel would assist us in the study or you feel are important to residents regarding the Pugwash Waterfront.

What current report provides factual evidence to show the need for additional docking berths for the area? Is this factual or an opinion?

When compared to 15 years ago; How many marine berths were available in 2002 vs 2017 in a 20km radius of Pugwash? What indications are there that growth in other areas will or will not continue?

2 - ENVIRONMENTAL EFFECTS DETERMINATION

PUGWASH WATERFRONT DEVELOPMENT

ENVIRONMENTAL EFFECTS DETERMINATION

PUGWASH HARBOUR CENTRE DEVELOPMENT

SEPTEMBER 2017

ENVIRONMENTAL EFFECTS
DETERMINATION
PUGWASH HARBOUR CENTRE
DEVELOPMENT
Pugwash Waterfront Development

FINAL REPORT

Project No: 179-00080-00
Date: September 2017

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September 1, 2017

Michelle Byers,
Community Economic Development Coordinator
Municipality of the County of Cumberland
1395 Blair Lake Road
Upper Nappan, NS
B4H 3Y4

Dear Michelle,

Subject: Environmental Effects Determination

WSP Canada Inc. (WSP) is pleased to submit the final version of our *Environmental Effects Determination Report for the Pugwash Harbour Centre Development*, located in Pugwash, Nova Scotia.

We trust this report meets your requirements. If you have any questions or concerns, please do not hesitate to contact us at your earliest convenience.

Yours sincerely,

WSP Canada Inc.

Marina Dulmage, M.Sc., B.Sc.
Biologist

MD/kaf/CL

cc:
Encl.

REVISION HISTORY

VERSION	DATE	DESCRIPTION
2	SEPTEMBER 1, 2017	Final Report
1	MAY 4, 2017	Draft Report

SIGNATURES

PREPARED BY

Marina Dulmage, M.Sc., B.Sc.
Biologist

REVIEWED BY

Christina Laflamme, M.Sc. EP
Senior Biologist

The original of the technology-based document sent herewith has been authenticated and will be retained by WSP for a minimum of ten years. Since the file transmitted is now out of WSP's control and its integrity can no longer be ensured, no guarantee may be given to by any modifications to be made to this document.

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1 PROJECT DESCRIPTION

1.1 BACKGROUND

The Pugwash Harbour currently supports a wide variety of marine activity including commercial shipping of salt, a port for a local fishery, and a base for recreational boating. Previous surveys with community members and consultants have recognized the need and opportunity for additional recreational boating facilities within the Pugwash Harbour. The Pugwash waterfront development concept involves a new center for boating and water based activity known as the Harbour Centre (BDA Landscape Architecture Site Engineering, 2015).

The proposed Harbour Centre location is within the Pugwash Harbour, north of Route 6 in Cumberland County Nova Scotia. The proposed Harbour Center is intended to fulfill the demand for additional recreational boat slips and services but it is also designed for related water based activity for residents and tourists. The Harbour Center will be the community focus for harbour and river environmental education and research. Throughout this report the Project is referred as the proposed Harbour Centre (outlined in red below in Figure 1) including the development of a breakwater, parking lot, main building and retail buildings, and a floating wharf that will be able to hold approximately 25 to 75 recreational boats (See Figure 1, below).



Figure 1. Conceptual plan of the proposed Harbour Center. Image taken from the Pugwash Waterfront Improvement Concept by BDA Landscape Architecture Site Engineering, 2015.

The Project is in the preliminary design phase and could include the following:

- Marine services
 - Boat basin with docking slips for local and visiting boats
 - Haul-out slipway
 - Fuel
 - Sewage pump-out
 - Showers and laundry
 - Boat storage
- Tourist attraction for water based experiences
 - Boat tours
 - Boat/kayak rentals
 - Sailing lessons
 - Waterfront boardwalk and park
 - Retail outlets
- Environmental research and education
 - Display of natural history of the Pugwash River
 - Educational programs about Pugwash River ecosystem, experiences for residents and visitors
 - Boat tours
 - Headquarters for restoration projects and monitoring wildlife and water quality

Additional locations were considered for the proposed Harbour Centre, however the Inner Harbour site was chosen based on known site conditions. The Project site is fully serviced with utilities; accessible with a public road; and its proximity to the village and visibility for visitors is good.

1.2 PROJECT SCOPE

WSP Canada Inc. (WSP) has been retained by the Municipality of Cumberland to complete an Environmental Effects Determination Report for the proposed Pugwash Harbour Centre Development. The project is currently in preliminary design phase, therefore only the conceptual design has been completed for the Project to date. This assessment is based on the conceptual design only. The results of this assessment are discussed in the Environmental Effects and Mitigation Measures Section 4.3 of this report.

The project phase/ components that will be subject of the Environmental Effects Determination (EED) include:

- Dredging the Harbour;
- Infilling sections of the Harbour;
- Constructing a breakwater;
- Construction of a parking lot and buildings; and
- Installation of a floating wharf.

1.2.1 TEMPORAL BOUNDARIES

The temporal boundaries for the assessment of the potential environmental effects of the Project include the duration of Project Construction, Operation and Maintenance for the lifespan of the Project.

1.2.2 SPATIAL BOUNDARIES

The approximate spatial boundary for the assessment of the potential environmental effects of the Project includes the area highlighted in red above in Figure 1.

1.3 SCOPE OF ASSESSMENT

The potential interaction between various environmental components and project activities is shown in Table 1 below. Only the potential Project-Environment interactions are included in the scope of determination in this assessment.

1.3.1 DIRECT ENVIRONMENTAL COMPONENTS

1.3.1.1 LAND COMPONENTS

The Project has the potential to affect one Land Component: Erosion/Slope Stability. During construction the dredging and infilling could affect both erosion and slope stability of the existing harbour.

1.3.1.2 MARINE COMPONENTS

The Project has the potential to affect two Marine Components: Aquatic Sediments and Marine Water Quality. Dredging and infilling of the harbour to create a breakwater, parking lot and potential building foundations, as well as installing a floating wharf all have the potential to directly disturb the existing aquatic sediments. Project construction such as dredging and infilling may produce erodible and other material that could potentially run into the rest of the Pugwash Harbour. Any increase in sediment may have negative effects on the surface water quality of the Harbour. It is unlikely that construction activity would increase temperature or chemical signature of the harbour since the harbour is tidal and the project construction will be over a short term.

1.3.1.3 AIR COMPONENTS

The Project has the potential to affect one Air Component: Air Quality. Air Quality is considered good in the general area due to the rural landscape with no heavy manufacturing or industrial processes. Project activity with equipment such as excavators, dump trucks, etc. will emit CO₂ and exhaust gases into the local air shed. This could potentially affect nearby residents during the duration of the project construction, but since the duration of the project will be short duration, it will have a minimal effect.

1.3.1.4 NATURAL SYSTEMS COMPONENTS

The Project may have the potential to affect three Natural System Components: Fish and Fish Habitat, Wildlife/Wildlife Habitat, and Migratory Birds. All project components that disturb the Harbour may have adverse effects on fish and/or fish habitat in the area. Increase or loss of sediment due to dredging and infilling may temporarily decrease the fish habitat quality. Any potential effects would be highly localized and have a short duration. Fish are susceptible to vibration disturbance and may vacate the local area during construction.

1.3.2 INDIRECT ENVIRONMENTAL COMPONENTS

1.3.2.1 SOCIO-ECONOMIC EFFECTS

The Project has the potential to affect two Socio-Economic Components: Human Health and Safety, and Navigation. The Project will install a permanent breakwater and marine platform (parking lot and buildings) and may affect navigation of the existing Harbour during the project construction, however it should increase the amount of boats in the area, since recreational boats will now have a wharf to use.

1.3.2.2 CULTURAL

The project has the potential to affect two Cultural Components: Aboriginal Use and Historical/Archaeological Site. The Project will result in dredging and infilling work along the mudflats of Pugwash Harbour which may be a site of aboriginal and historical activities. Construction on such a site could possibly result in a loss of cultural information and artifacts. Construction could also have a short term effect on Aboriginal use in the area, based on personnel communication with Clifford Allen from the Harbour Authority one Aboriginal boat has been identified within the project area.

1.3.3 OTHER ENVIRONMENTAL COMPONENTS

1.3.3.1 OTHER EFFECTS

The Project has the potential to affect one Other Component: Acoustic Environment. The construction of the Project will require some heavy machinery. Large trucks and excavators working in the Project area may increase the noise in the local area, thus lowering the sound quality of the landscape. It is expected that the construction phase of the Project will be short in duration therefore having a minimal effect.

Table 1. Potential Project Environmental Components Interaction Matrix

PROJECT PHASES / COMPONENTS	ENVIRONMENTAL COMPONENTS																												
	DIRECT ENVIRONMENTAL EFFECTS														INDIRECT ENV. EFFECTS				Other										
	Land				Marine				Air		Natural Systems				Socio-Economic		Cultural												
	Terrain and Topography	Soil Quality	Erosion / Slope Stability	Other	Marine/Coastal Sediments	Marine Water Quality	Marine Water Quantity	Groundwater Quality	Groundwater Quantity	Other	Air Quality	Climate Change	Other	Vegetation	Wetlands	Species at Risk	Migratory Birds	Wildlife / Wildlife Habitat	Fish and Fish Habitat	Other	Human Health / Safety	Navigation Related	Land Use	Other	Physical and Cultural Heritage	Aboriginal Use	Historical / Archaeological Site	Acoustic Environment (noise)	Vibration
Construction:																													
- Harbour Dredging			X		X	X				X						X	X	X			X	X				X	X	X	
- Infilling Sections of the Harbour			X		X	X				X						X	X	X			X	X							X
- Construction of breakwater			X		X	X				X						X	X	X			X	X							X
- Parking Lot and building construction					X	X				X						X	X				X	X							X
- Floating wharf installation					X	X				X						X	X	X			X	X							X
Operation:																													
- Maintenance																					X	X							

2 DESCRIPTION OF EXISTING ENVIRONMENT

2.1 DESCRIPTION OF BIOPHYSICAL ENVIRONMENT

2.1.1 PHYSICAL ENVIRONMENT

Available bedrock mapping indicates bedrock of the Windsor Group underlies the Project site and surrounding area (Appendix A, Map 1). Bedrock of the Windsor Group is comprised of halite, anhydrite, gypsum and mudstone (Keppie, 2000).

Available surficial geology mapping (Stea, Conley and Brown, 1992) describes the soils at the site as being Ground Moraine and Streamlined Drift (Appendix A, Map 2). The Project site and surrounding area is comprised of silty till plain and drumlins and hummocky ground moraine. The silty till plain and drumlins is composed of silty till and red clay. The hummocky ground moraine is composed of sandy, stony till with loose inclusions of waterlain sediment. The soils in the Pugwash area are generally well drained sandy loam to sandy clay loam (CBCL Limited, 2012).

Based on a subsurface soil investigation completed by Jacques, Whitford and Associates Limited (1985) for the proposed marina project (Harbour Centre Development), the site soil conditions may be classified as organic sandy silt underlain by hard sandy clay till. Bedrock was not encountered in any boreholes during the field investigation. In addition, in all boreholes, a layer of sandy organic silt and sand with some shell fragments were encountered (Jacques, Whitford & Associated Ltd, 1985).

2.1.2 MARINE ENVIRONMENT

The proposed Harbour Centre is located within the Pugwash River Watershed north of mainland Nova Scotia within Pugwash Harbour. The watershed originates in Birchwood near the TransCanada Highway, flows to the north, discharges into Pugwash Basin/Harbour and then ultimately into the Northumberland Strait.

Based on available provincial 1:10,000 topographical mapping, the total tributary area of the Pugwash River watershed is estimated to be approximately 170.5 square kilometres (km²). The delineated watershed boundary is outlined in Appendix A (Map 3).

The coastal environment of the Pugwash Harbour consists mainly of large boulder, small boulders, cobbles, and sand, as shown in Photo 1 and 2 below. The Harbour is tidal and has large boulders along the shoreline to protect it from erosion. With respect to the marine environment on the tidal mudflat and within the main channel of the river, more information is required. A benthic habitat survey in addition to a marine sediment sampling program (MSSP) is recommended. This information is necessary to assist in the evaluation of potential impacts to fish and fish habitat as well as a requirement for dredging disposal at sea or land applications.



Photo 1. The proposed Project area looking east.



Photo 2. East of the proposed Project area looking west.

Environment & Climate Change Canada monitors water quality throughout the Pugwash River, Basin and Harbour. Parameters including fecal coliforms, temperature and salinity were measured at eight different locations within the Harbour from 2014 to 2016 during the months of July, August, September and October at different tide levels. Faecal Coliform ranged from 1.9 to 17 MPN/100ml, temperature ranged from 13°C to 24°C, and salinity ranged from 27 parts per thousand (PPT) to 32 PPT. All of the monitoring results can be seen in Appendix B.

According to the Government of Canada Guidelines for Canadian Recreational Water Quality, the guideline values for enterococci for marine waters include ≤ 35 enterococci/100 mL for geometric mean concentration (minimum of five samples) and ≤ 70 enterococci/100 mL for a single-sample maximum concentration (Government of Canada, 2012). The Canadian Council of Ministers of the Environment (CCME) does not have any data on salinity and temperature for marine water quality guidelines for the protection of aquatic life (CCME, 2017).

The faecal coliform levels recorded by Environment & Climate Change Canada fall within the acceptable limits for enterococci for marine waters set by the Government of Canada for Canadian Recreational Water Quality.

2.1.3 ATMOSPHERIC ENVIRONMENT

The Natural History of Nova Scotia (n.d.), published by the Nova Scotia Museum of Natural History divides Nova Scotia into nine broad climatic regions. The Project site lies within the Northumberland Shore Region, a section along the coast from New Brunswick to Livingstone Cove. This region is described as having a delayed spring, a warm summer and fall, but a cold winter and the lowest precipitation in the province, being sheltered from storm winds from the south and east (Nova Scotia Museum, n.d.).

The total annual precipitation is defined as the total rainfall plus water equivalent of snowfall and other forms of frozen precipitation and is recorded as 1052.2 millimetres (mm) (CBCL Limited, 2012). Monthly precipitation ranges from 70.3 mm in February to 101.6 mm in December. Temperature varies across the Atlantic Provinces, however the daily mean temperature for Pugwash is 6.6°C (CBCL Limited, 2012).

2.1.4 TERRESTRIAL / AQUATIC ENVIRONMENT

2.1.4.1 VEGETATION

There are several types of habitats found in and around the Pugwash area and include: hardwood forest, softwood forest, agriculture, clear cut, old fields, urban, brush/scrub, wetlands and watercourses. The terrestrial habitat found within the Project area is classified as urban consisting of mowed lawn and ornamental trees. According to Nova Scotia Department of Natural Resources (NSDNR) online mapping, there are no mapped wetlands within the Project area. The nearest wetland in relation to the proposed Harbour Centre is 664 metres (m) southwest of the Project area. Another wetland is located 784 m to the west of the Project area as shown on Appendix A: Map 3.

2.1.4.2 FISH & FISH HABITAT

Multiple fish species are found throughout the Pugwash Harbour. The Department of Fisheries and Oceans Community Aquatic Monitoring Program (CAMP) Data has collected fish and water quality data from 2004-2016 within the Pugwash Harbour Area. Six monitoring locations collected data for the Pugwash Area. Of these six stations, four monitoring locations within close proximity to the project (Stations 1-4, See Appendix C) identified the following fish and invertebrate species within the Harbour: black spotted stickleback (*Gasterosteus wheatlandi*), 3 spine stickleback (*Gasterosteus aculeatus*), 4 spine stickleback (*Apeltes quadracus*), 9 spine stickleback (*Pungitius pungitius*), mummichog (*Fundulus heteroclitus*), sand shrimp (*Crangon septemspinosa*), Atlantic silverside (*Menidia menidia*), smooth flounder (*Pleuronectes putnami*), winter flounder (*Pseudopleuronectes americanus*), Atlantic tomcod (*Microgadus tomcod*), green rock crab (*Carcinus maenas*), cunner (*Tautoglabrus adspersus*), windowpane flounder (*Scophthalmus aquosus*), grass shrimp (*Palaemonetes vulgaris*), gasterosteus (*Gasterosteus sp. (YOY)*), rock crab (*Cancer irroratus*), alewife (*Alosa pseudoharengus*), American sand lance (*Ammodytes americanus*), rainbow smelt (*Osmerus mordax*), lady crab (*Ovalipes ocellatus*), mud crab (*Panopeidae Family*), grubby (*Myoxocephalus*

ae-naeus), rock gunnel (*Pholis gunnellus*), rainbow trout (*Oncorhynchus mykiss*), shorthorn sculpin (*Myoxocephalus Scorpius*) and American eel (*Anguilla rostrata*).

Traditional Fishing Knowledge (TFK) maps (Appendix D) indicate the area has the following migratory fish species: alewife (*Alosa pseudoharengus*), striped bass (*Morone saxatilis*), and American Smelt (*Osmerus mordax*) with American Eel (*Anguilla rostrata*) located just to the north and south of the proposed Project footprint. With respect to shellfish, TFK mapping indicates there are no shellfish within the proposed Project footprint, however Blue Mussel (*Mytilus edulis*) is identified to the south and Softshell Clam (*Mya arenaria*) directly to the north.

As discussed in Section 2.1.2, there is limited data available regarding the existing conditions on the tidal mudflats and within the main channel of the river. A benthic habitat survey in addition to a marine sediment sampling program (MSSP) is recommended in order to better evaluate the potential impacts the Project may have on fish and fish habitat.

2.1.4.3 BIRDS AND MAMMALS

In and around the Pugwash area several bird species have been identified and include shorebirds, raptors and songbirds. It is likely that the migratory bird species, which are protected under the *Migratory Birds Convention Act*, use the Harbour and its mud flats for foraging. However, it is unlikely that the Project area is used for nesting due to the limited habitat available and high disturbance.

With respect to mammals, Pugwash and its surrounding area provides habitat for several species of mammals including mainland moose which is listed as Endangered under Nova Scotia's SARA. Due to the urban setting of the proposed Project, typical urban species such as squirrels, raccoons and skunks are likely to be noted. The Project footprint does not provide suitable foraging habitat for mainland moose.

2.1.5 SPECIES OF CONSERVATION CONCERN AND HABITAT

The Atlantic Canada Conservation Data Centre (ACCDC) is part of the NatureServe network, a non-government agency which maintains conservation data for the Atlantic Provinces. An information request was received from the ACCDC on April 20, 2017 for a list of occurrences of rare and endangered flora and fauna within and near the proposed Study Area (Appendix E). S1, S2, and S3 ranked species are considered to be extremely rare to uncommon within its range in the Province. S4 and S5 ranked species are considered to be widespread and their occurrences are fairly common to abundant. The report and explanations of the S-Ranks are included in Appendix E.

The ACCDC report identified seven flora species of conservation concern within the study area: Black Ash (*Fraxinus nigra*), Vasey Rush (*Juncus vaseyi*) (S1), Greene's Rush (*Juncus greenei*) (S1S2), Halberd-leaved Tearthumb (*Polygonum arifolium*) (S2), Triangular-valve Dock (*Rumex salicifolius var. mexicanus*) (S2), Prickly Hornwort (*Ceratophyllum echinatum*) (S2S3) and Hop Sedge (*Carex lupulina*) (S3).

Black Ash is common in swamps and river bottomlands (Hinds, 2000). This species is listed as Threatened under the Nova Scotia *Species at Risk Act* (SARA). Vasey Rush is typically found grown in rock crevices along wet sandy shores and in dune hollows (Hinds, 2000). Greene's rush is found in wet meadows (Hinds, 2000). Halberd-leaved Tearthumb is generally found in swampy areas (Hinds, 2000). Triangular-valve Dock can be observed on coastal sands, shores and gravel roadsides (Hinds, 2000). Prickly Hornwort are found in quiet, cold, acidic lakes, ponds and marsh pools. Hop Sedge is generally found along the borders of wet woods and along swampy shores (Hinds, 2000). Of these species only Vasey Rush and Triangular-valve Dock could potentially occur within the Project footprint.

ACCDC identified 40 bird species of conservation within 5 kilometres (km) of the Project area (Appendix E). Of these, eight bird species were listed as species at risk and include the Piping Plover (*Charadrius melodus melodus*), Bank Swallow (*Riparia riparia*), Barn Swallow (*Hirundo rustica*), Olive-sided Flycatcher (*Contopus cooperi*), Canada Warbler (*Wilsonia canadensis*), Bobolink (*Dolichonyx oryzivorus*), Barrow's Goldeneye Eastern pop. (*Bucephala islandica [Eastern pop.]*), and the Eastern Wood-Pewee (*Contopus virens*). Table 2 lists the identified bird species, their protection status and their potential presence within the Project footprint.

Table 2. Species at Risk – ACCDC Report Summary

SCIENTIFIC NAME	COMMON NAME	NATIONAL PROTECTION STATUS (COSEWIC)	NATIONAL PROTECTION STATUS - SPECIES AT RISK (SARA)	S-RANK	NS PROVINCIAL STATUS RANK	POTENTIALLY PRESENT
FAUNA						
<i>Charadrius melodus melodus</i>	Piping Plover melodus spp.	Endangered	Endangered	S1B	1 At Risk	Yes
<i>Riparia riparia</i>	Bank Swallow	Threatened		S2S3B	2 May Be At Risk	Yes
<i>Hirundo rustica</i>	Barn Swallow	Threatened	Threatened-	S3B	1 At Risk	Yes
<i>Contopus cooperi</i>	Olive-sided Flycatcher	Threatened	Threatened	S3B	1 At Risk	No
<i>Wilsonia Canadensis</i>	Canada Warbler	Threatened	Threatened	S3S4B	1 At Risk	No
<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened		S3S4B	3 Sensitive	No
<i>Bucephala islandica (Eastern pop.)</i>	Barrow's Goldeneye – Eastern pop.	Special Concern	Special Concern	S1N	1 At Risk	Yes
<i>Contopus virens</i>	Eastern Wood-Pewee	Special Concern		S3S4B	3 Sensitive	No

Piping Plovers are protected under the *Migratory Bird Convention Act* (1994) and listed as 'Endangered' under COSEWIC as well as the federal and provincial SARA. Currently, there are only approximately forty breeding pairs remaining in Nova Scotia. Their preferred habitat is generally confined to sandy beaches and alkali flats. Plovers forage in marine and bayside intertidal zones in sand, mud and algal flats on insects, worms and small invertebrates. They will nest on wide sand, gravel and/or cobble beaches usually free of dense vegetation (*The Cornell Lab of Ornithology, 2015*). Plovers have been sited within 5 km of the Project site along the inlet to River Philip. It is unlikely that Piping Plovers will forage or nest within the proposed project area, since during high tide there is no sand or cobble for them to nest on, and there is currently a significant amount of human disturbance in the area including the main road and existing dockyard and infrastructure.

Bank Swallows (*Riparia riparia*) are protected under the *Migratory Bird Convention Act* (1994). These species are also listed by COSEWIC as 'Threatened'. These swallows nest in large colonies in streamside banks and cliffs and can also be found to nest in road cuts and quarries. They usually forage on insects above water and open ground (*The Cornell Lab of Ornithology, 2015*). Bank Swallows have been identified within 5 km of the Project site but more inland. It is unlikely that they would nest within the Project footprint due to the limited breeding habitat available at the Project location.

Barn Swallows (*Hirundo rustica*) are protected under the *Migratory Bird Convention Act* (1994) and are listed by COSEWIC as 'Threatened' and 'Endangered' under the provincial SARA. These species have

been identified within 5 km of the site. Barn Swallows are known to nest on man-made structures including the undersides of bridges, and culverts (*The Cornell Lab of Ornithology, 2015*). It is unlikely that Barn Swallows will be present within the Project area due to the limited breeding habitat available at the Project location.

Barrows Goldeneye (*Bucephala islandica (Eastern pop.)*) are protected under the *Migratory Bird Convention Act* (1994) and are listed as 'Special Concern' under COSEWIC and federal SARA. This duck species breeds along lakes in parklands and winters along rocky coasts eating aquatic invertebrates, small fish and fish eggs (*The Cornell Lab of Ornithology, 2015*). This duck could be present near the Project area during winter months, but is not likely to be observed during the summer.

2.2 PROTECTED AREAS

The ACCDC report identified seven (7) managed areas and three (3) significant areas within 5 km of the proposed Project. The seven (7) managed areas include: Brown's Woodlot, Victoria Island, Pugwash River Estuary, Crowley Road, Pugwash Junction, Pugwash Spur Rail Corridor, Gulf Shore and Goat Island, Pugwash. The Brown's Woodlot is owned and management by Ducks Unlimited and is a freshwater marsh located approximately 5 km east of the proposed Project. Victoria Island, located approximately 460 m southwest of the proposed Harbour Centre Development, is a protected area of Land Trust managed by a non-governmental organization. The island is home to a Great-blue Heron colony. The Pugwash River Estuary and Crowley Road, Pugwash Junction parcel of land, both located approximately 4 to 4.5 km to the south of the Project, are protected and managed by the Nature Conservancy Council of Canada. These areas are considered to be important waterfowl breeding habitat, waterfowl migration habitat and home to a Great-blue Heron colony. The Pugwash Spur Rail Corridor is a recreational trail managed by NSDNR. The start of the trail is located approximately 4.5 km northeast of the Project. The Gulf Shore located less than 1 km east of the Project, is a provincial park managed by NSDNR and protected under the *Provincial Parks Act*. This park boasts a sandy beach with warm waters. Goat Island, Pugwash located less than 1 km east of the Project, is managed by the Eastern Habitat Joint Venture group and protected under the *Wildlife Act*.

The three (3) significant areas are the River Philip Estuary located approximately 5 km to the west of the Project, Wallace Bay located approximately 5 km to the southeast of the Project, and the Pugwash River Estuary in which the Project is located in. These areas are all managed by NSDNR and are considered to provide significant habitat for various flora and faunal species.

Although the Project is located within the Pugwash River Estuary it is not anticipated that Project activities will result in a significant impact to existing conditions. The Project area is in a highly disturbed location.

2.3 SOCIO-ECONOMIC FEATURES

The Village of Pugwash in the Cumberland County was incorporated as a Village in 1948 and is approximately 60 km from the Nova Scotia - New Brunswick border. Pugwash is located on the shores of the Northumberland Strait, along Highway 6. According to the 2016 Census, the population of Pugwash was 736 compared to the 2011 Census that reported 744 people which is a decrease of 1.1% (Statistics Canada, 2017). The Pugwash economy is dependent on fishing, mining, tourism, wood lot harvesting, small-scale manufacturing and farming.

Pugwash once had a village population with over 3,000 permanent residents and was home to a thriving lumber industry, shipbuilding, several hotels, a productive fishery and a major exporting port. Located in the Pugwash Village today the amenities include: an elementary school and a high school, RCMP detachment, ground search & rescue, four churches, post office, financial institution, grocery, gift shop, hardware store, pharmacy, as well as liquor and convenience stores. There are also two gas stations, funeral services, restaurants, a Community Access Program (C@P), and more. The C@P offers public internet access for locals and visitors.

Pugwash is also a home to many seasonal residents. During the summer months, the village service area grows to over 5,000 permanent and seasonal residents with the majority of the seasonal residents located along the coast of the Northumberland Strait (Statistics Canada, 2017).

2.3.1 LAND USE & ECONOMIC ACTIVITY

The current land use surrounding the proposed Harbour Centre includes: open space, industrial and limited rural commercial (Municipality of Cumberland, 2016). The land located to the south of the proposed Harbour Centre is classified as open space. It should be noted, however, that this area is a cemetery and not available for development.

The main sources of employment found in Pugwash include a salt mine, commercial fishing, Irving MacTara (forestry), Seagull Pewter, Basic Spirit and Sunset Industries (manufacturing), as well as the Fox Harbour Golf Resort (hospitality). The salt mine presently employs approximately 200 people with a life span of 100 years (opened in 1959). The Pugwash Harbour is an important asset to the community as it is home to three marinas. It is also situated on the dividing line of two fishing areas, therefore Pugwash benefits from two lobster seasons (CBCL Limited, 2012). The fisherman also fish herring in September as well as scallops from November to December (Allen, 2017). Other sources of employment include agriculture, health care and social services. The employment rate for Pugwash residents over the age of 25 decreased by 3.9% to 49.1% between 1996 and 2006. During the same time period, Nova Scotia's employment rate experienced an increase of 3.6% to 58% (Zwicker, Veinotte & Marlin, 2010).

2.3.2 TRANSPORTATION

The proposed Project is located along Route 6 which is designated by Nova Scotia Tourism as the Sunrise Trail. Route 6 follows the coast from the New Brunswick border along the Northumberland shore to the Canso Causeway. This road is considered to be a scenic route used by local traffic and tourists.

2.3.3 CULTURE

The Pugwash Basin and associated rivers and tributaries are believed to have been areas actively used by First Nations prior to European settlements (Davis MacIntyre & Associates Ltd. , 2012). The Pugwash region was traditionally used by the Mi'kmaq as summer camps and by Acadians in the eighteenth century. They took advantage of the marsh lands for farming and the coastal region for engagement in the fishery.

English and Scottish settlers were engaged in farming, fishing and forestry in the nineteenth century (Davis MacIntyre & Associates Ltd. , 2012).

Historians have suggested there was a French Settlement at Pugwash around 1750. Pugwash was settled by United Empire Loyalists who had fled the American colonies at the end of the Revolution in 1783 at the end of the eighteenth century (Davis MacIntyre & Associates Ltd. , 2012). To date an Archeological Resource Impact Assessment (ARIA) has not been conducted. Prior to construction, it is recommended that one is performed to determine the archeological potential for the site.

3 ENVIRONMENTAL EFFECTS AND MITIGATION MEASURES

3.1 ENVIRONMENTAL EFFECTS ON BIOPHYSICAL COMPONENTS

The assessment of each of the environmental components is presented in Table 3. The table is organized under the categories of environmental component, project activity, potential environmental effect, significance of effect, proposed mitigation, and predicted residual environmental effect with the applied mitigation. The mitigation is based on best practice measures developed for watercourses and wetlands, and the professional opinion of the WSP assessment team. The significance of the residual environmental effects was determined after a consideration of the magnitude, geographic extent, duration/frequency, reversibility and ecological context.

3.2 ENVIRONMENTAL EFFECTS ON SOCIO-ECONOMIC AND CULTURAL COMPONENTS

3.2.1 NAVIGABLE PROTECTION ACT (NPA)

The Pugwash Harbour is navigable by commercial boats, recreational boats, canoes and kayaks. During construction of the new harbour centre, use of the waterway is to be restricted for safety reasons. Since the Project area does not span the entire width of the Harbour, vessels may still pass through the Harbour to the basin during construction. The proposed Project will effect only a small area of the Harbour where the parking lot, buildings, and floating wharfs are to be installed. Once the Project is complete there will be an increase in recreational boat activity in the Harbour centre. Overall, the Project will not have a significant effect due to the limited area needed for construction, limited construction duration period and overall benefit the Project will have for the Harbour and the surrounding communities.

3.3 OTHER ENVIRONMENTAL EFFECTS

3.3.1 ACCIDENTS AND MALFUNCTIONS

The potential environmental effects of accidents and malfunctions are not considered in Table 3. Accidents or malfunctions related to the construction, operation and maintenance of the Project would include hazardous material spills, erosion and sediment control failure, and fire. These events may be significant when they occur, but they are extremely low in frequency of occurrence, duration, and geographical extent.

3.3.1.1 HAZARDOUS MATERIAL SPILL

The likelihood of a hazardous materials spill is considered low, and will be minimized through the following mitigation measures:

- Minimize the area of disturbance;
- Minimize work in the harbour;
- No heavy equipment to work directly within the harbour;
- Follow conditions of Approval Permits for the Project;
- Work in-the-dry where possible;

- Hazardous materials storage areas should be at least 100 m from all watercourses or wetlands;
- During Demolition and Construction of the Project, equipment maintenance and refueling will not occur within 30 m of the water body; and
- The storage and handling of hazardous materials is potentially significant in the event of a spill. Surface and groundwater resources as well as fish and fish habitat in the river could be affected. However, based on the consideration of the potential environmental effects of hazardous materials spills during the Project, the proposed mitigation, and the residual environmental effects are rated as potentially significant, but not likely.

3.3.1.2 EROSION AND SEDIMENT CONTROL FAILURE

Erosion and sediment control (ESC) measures will be implemented and will include:

- Construction sequencing to minimize soil exposure;
- Retaining existing vegetation as long as possible;
- Vegetation and mulching of cleared areas;
- Diverting runoff away from cleared areas;
- Minimize surface water runoff velocities;
- Proper sizing and protecting of drainage ways and outlets;
- Intercepting of sediments on site with silt curtains;
- Regular inspection and maintenance of all ESC structures;
- Diversion berms will be constructed on slopes to intercept sheet flow on exposed surfaces and divert the flow to undisturbed areas; and
- Re-vegetation of cleared slopes and embankments within a reasonable time.

These measures will be monitored during construction by the proponent or its agent, particularly after a heavy precipitation event or snow melt that results in the visible overland flow of water. Remedial action will be taken as necessary. Based on the consideration of the potential environmental effects of failure of erosion and sediment, control measures, the proposed mitigation, and the potential residual environmental effects, the residual environmental effects are rated as potentially significant, but not likely.

3.3.1.3 FIRE

The potential environmental effects of a fire will be mitigated as described:

- Take all necessary fire prevention measures possible;
- Keep worksite free of flammable wastes;
- Ensure sufficient firefighting equipment is kept on site;
- Follow project specific environmental management plan, which will include a fire contingency and emergency response plan

Therefore, based on the consideration of the potential environment effects of Project-induced fires, the proposed mitigation, the overall residual environmental effects of this accident type in the assessment area is predicted to be potentially significant, but not likely to occur.

3.3.2 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

Potential effects the environment may have on the project include:

- Erosion and mass wasting;
- Weather (including wind, extreme precipitation, blowing and drifting snow, fog);
- Floods; and
- Seismic activity

There are a number of Project planning, Project designs, and Project construction methods and strategies intended to minimize the potential effects of the environment on the Project so that the risk of serious damage to the Project or interruption of service can be reduced to acceptable levels. Mitigation measures include, but are not limited to, designing structures to relevant codes and scheduling of activities to accommodate weather interruptions. All construction activities will be taking place outside and thus weather has been, and will be factored into the design, construction, operation and maintenance of the Project.

3.3.2.1 EROSION AND MASS WASTING

The potential effects of erosion caused by the environment on the Project may include, but are not limited to:

- Erosion causing slope instability or structure failure.

The geological setting of the Project precludes the potential effects of natural erosion on the landscape (e.g., moderate relief with rounded hills and ridges). Existing roads and developments within the Project development area have not historically experienced landslides or slope failure.

Construction activities, may include some clearing of vegetation in development of this Project. ESC structures (silt fencing) to slow the rate of moving water and reduce possible erosion will be used on all erodible slopes.

Standard structure construction practices, techniques, and design strategies such as installation of erosion control structures, work progression, and appropriately sized armour stone for protection against erosion and scour ensure that the environmental effects of erosion are minimized or prevented.

Regular inspections during construction, operation and maintenance phases will be conducted to verify the effectiveness of the erosion control measures in place and to identify where additional measures or maintenance is required. It is not likely that erosion will have a significant environmental effect on the Project.

3.3.2.2 WEATHER

The general climate conditions are presented in Section 2.1. The effect of weather on the Project may include construction slowdowns or delays.

During the operational phase of the Project, extreme rain, ice, or snow, may limit accessibility for visitors. Under extreme precipitation conditions, operation of the Project can be temporarily suspended at the discretion of the Municipality and RCMP officials. However, since the frequency of extreme events is low, this is highly unlikely for the Project.

3.3.2.3 FLOODS

The Project is in a tidal area and has the potential for flooding. Flooding will be assessed during the design and permitting phase of the Project to ensure the wharf, parking lot and buildings are designed properly. Should flooding become an issue at a future time, the structures can be replaced or modified as needed, and will be subject to the environmental approvals process in place at that time. Therefore, it is not likely that floods will have a significant effect on the Project or subsequently on the environment.

3.3.2.4 SEISMIC ACTIVITY

The Geological Survey of Canada maintains a National Earthquake Database (NEDB) containing information on Canadian earthquakes. Historical information, including location (e.g., epicentres) and magnitude, for the Northern Appalachians Seismic Zone, within which the Project is located, is available on-line at: <http://www.earthquakescanada.nrcan.gc.ca/index-eng.php>.

Eastern Canada is located in a stable continental region with the North American Plate, and as a consequence, has a relatively low rate of earthquake activity. Nova Scotia is in Zone 1, a zone of low risk on the seismic hazard map used in the National Building Code provisions for earthquake-resistant design of buildings. The calculated risk for earthquake activity in Nova Scotia is uniform throughout the province.

The Project will be designed to the applicable standards for earthquakes. The intent of these design standards is to ensure the integrity of the facilities based on the level of risk for an earthquake in the Assessment Area. Service could be interrupted due to earthquake damage in an extreme event but this is a very unlikely scenario as the area is not prone to seismic activity. It is not likely that earthquakes will have a significant effect on the Project or subsequently on the environment.

Table 3. Potential Environmental Effects Analysis

Environmental Components	Project Activity	Description of Potential Environmental Effects	Significance of the Effect	Recommended Mitigation Measures or Best Management Practices	Residual Effect	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Ecological Socio-cultural and Economic Context	Significance of Residual Effect*	Monitoring	Follow-up
Marine Sediments	Dredging, infilling and armour stone placement	- Increase in sediment in water - Decrease in amount of aquatic sediments	S	- Install all ESC structures as indicated - Work in-the-dry when possible - Equipment that has been in the marine environment should be cleaned of any sediments, plants or animals and washed with freshwater prior to being mobilized to the project site.	There is a small potential that the watercourse could have an increase in sediment load during construction.	1	1	1	1	I	NA	NS	On site construction monitoring such as visual turbidity monitoring, take remedial actions when necessary.	NA
	Parking Lot and Building Construction	- Increase in sediment in water	S	- If a marine mammal is identified within the vicinity of the project, work shall stop until the animal is gone. - Activities should limit the amount of fines and debris that may enter nearby aquatic environments. - Equipment entering the marine environment should be inspected to ensure no invasive species are not introduced.		1	1	1	1	I	NA	NS		
	Floating wharf installation	- Disturbance of sediment in the water.	S	- No construction or infill material may be obtained from any coastal feature such as a beach, dune, or coastal wetland. - Onsite crews must have emergency spill clean-up equipment suitable for the activity involved on site.		1	1	1	1	I	NA	NS		
Erosion/Slope Stability	Dredging, infilling and armour stone placement	- Increase in erosion - Decrease in slope stability	S	- Install all ESC structures as indicated - Protect banks from decreased stability by limiting equipment movement off road surfaces	There is a small potential of destabilizing a slope should a piece of equipment have to move off the existing surface or during the excavation when the site is being prepped for construction.	1	1	1	1	I	NA	NS	On site construction monitoring, take remedial actions when necessary.	NA
Marine Water Quality	Dredging, infilling and armour stone placement	- Decrease in water quality by debris and sediment entering the water	S	- Install all ESC structures as indicated - Use clean stone - Work in-the-dry when possible - Equipment that has been in the marine environment should be cleaned of any sediments, plants or animals and washed with freshwater prior to being mobilized to the project site.	There is a small potential for sediment to make it into the waterbody, even with the ESC installed correctly.	1	1	1	1	I	NA	NS	On site construction monitoring, take remedial actions when necessary.	NA
	Parking Lot and Building Construction	- Decrease in water quality by sediment entering the water	S	- If a marine mammal is identified within the vicinity of the project, work shall stop until the animal is gone. - Activities should limit the amount of fines and debris that may enter nearby aquatic environments. - Equipment entering the marine environment should be inspected to ensure no invasive species are not introduced.		1	1	1	1	I	NA	NS		
	Floating wharf installation	- Decrease in water quality by sediment being disturbed within the water	S	- No construction or infill material may be obtained from any coastal feature such as a beach, dune, or coastal wetland. - Onsite crews must have emergency spill clean-up equipment suitable for the activity involved on site.		1	1	1	1	I	NA	NS		

Environmental Components	Project Activity	Description of Potential Environmental Effects	Significance of the Effect	Recommended Mitigation Measures or Best Management Practices	Residual Effect	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Ecological/Socio-cultural and Economic Context	Significance of Residual Effect*	Monitoring	Follow-up
Air Quality	Dredging, infilling and armour stone placement	- Decrease in air quality through an increase in local air emissions from heavy equipment use	S	<ul style="list-style-type: none"> - Ensure all equipment is in good working order - Implement a no idling policy to reduce fugitive exhaust emissions - Apply dust suppressants as required - Follow equipment maintenance schedules - Minimize activities that generate large quantities of dust during high winds. 	A small reduction in local air quality may be detected by local residents of Pugwash Harbour due to the increased number of trucks and heavy equipment coming to the Project site. This would be a very localized and short duration occurrence.	1	1	1	1	I	NA	NS	On site construction monitoring, take remedial actions when necessary.	NA
	Parking Lot and Building Construction	- Decrease in air quality through an increase in local air emissions from heavy equipment use	S			1	1	2	1	I	NA	NS		
	Floating wharf installation	- Decrease in air quality through an increase in local air emissions from heavy equipment use	S			1	1	1	1	I	NA	NS		
Species of Conservation Concern and Habitat	All Construction Phases	- Potential migratory bird habitat destruction and harm to birds during construction.	S	<ul style="list-style-type: none"> - Check for bird nests prior to construction. If found, conduct demolition outside of migratory bird breeding season (April 1st to August 30th) or until birds have fledged. 	There is a small potential bird species of conservation concern, their young, and habitat could be affected from construction.	1	1	1	1	I	NA	NS	Check for bird nests prior to construction. Contact NSDNR and/or CWS prior to construction to ensure no piping plovers have been spotted in the project area. Check for bird nests prior to construction.	NA
Marine and Coastal Birds/ Wildlife and Wildlife Habitat	All Construction Phases	- Potential migratory bird habitat destruction and harm to birds during demolition.	S	<ul style="list-style-type: none"> - Check for bird nests prior to construction. If found, conduct demolition outside of migratory bird breeding season (April 1st to August 30th) or until birds have fledged. - If a marine mammal is identified within the vicinity of the project, work shall stop until the animal is gone. 	There is a small potential migratory bird and their young could be affected from construction.	1	1	1	1	I	NA	NS	Check for bird nests prior to construction.	NA
Fish and Fish Habitat	Dredging, infilling and armour stone placement	<ul style="list-style-type: none"> - Decrease in fish habitat by loss of natural habitat (sediment removal and infilling of area) - Introduction of invasive species. - Interference with spawning or migration - Benthic smothering 	S	<ul style="list-style-type: none"> - Install all ESC structures as indicated - Use clean stone - Work in-the-dry when possible - Equipment that has been in the marine environment should be cleaned of any sediments, plants or animals and washed with freshwater prior to being mobilized to the project site. - Activities should limit the amount of fines and debris that may enter nearby aquatic environments. - Equipment entering the marine environment should be inspected to ensure no invasive species are not introduced. - Onsite crews must have emergency spill clean-up equipment suitable for the activity involved on site. 	The net residual effect is temporary disturbance to fish habitat quality, and a minor reduction in fish habitat due to the project footprint.	1	1	1	1	I	NA	NS	On site construction monitoring, take remedial actions when necessary.	NA – unless stipulated by Conditions in Water Approvals
	Floating wharf installation	<ul style="list-style-type: none"> - Decrease in fish habitat by temporary loss of natural habitat - Interference with spawning or migration 	S			1	1	2	1	I	NA	NS		
Navigation	All Construction Phases	<ul style="list-style-type: none"> - No navigation within Project area during construction, and maintenance - Short-term interference with vessel traffic during dredging and disposal. 	S	<ul style="list-style-type: none"> - Use signage to prevent people from entering Project Site 	No residual effect for a local population to have a new Harbour Centre. Pugwash Harbour will still be navigable outside the Project area during the duration of the Project.	1	1	2	1	R	NA	NS	On site construction monitoring, take remedial actions when necessary.	NA

Environmental Components	Project Activity	Description of Potential Environmental Effects	Significance of the Effect	Recommended Mitigation Measures or Best Management Practices	Residual Effect	Magnitude	Geographic Extent	Duration	Frequency	Reversibility	Ecological/Socio-cultural and Economic Context	Significance of Residual Effect*	Monitoring	Follow-up
Human Health/ Safety	All Phases	- Decrease in safety, access during construction (potential) - Decrease in access to the existing wharf and project footprint area.	S	- Use traffic signage to indicate areas for construction personnel and authorized visitors only	No residual effect for a local population to have a new Harbour Centre.	1	1	5	6	I	NA	NS	N/A	N/A
Aboriginal Use	Construction Phases	- Interference with the use of marine and coastal resources	S	- Consultation to inform aboriginals of the project	The net residual effect is access will be temporality unavailable to the Project area during construction.	1	1	1	1	I	NA	NS	NA	NS
Historical/ Archeological	Dredging, infilling and armour stone placement	- Potential archeological artifacts damaged	S	- Avoid excavation in known archeological area	Small potential for historical artifacts to be damaged.	1	1	1	1	I	NA	NS	NA	NS
Acoustic Environment	All Phases	- Increase in noise levels	S	-Ensure all equipment is in good working order - Implement a no idling policy to reduce fugitive exhaust emissions - Use scheduling restrictions where warranted. - Ensure all equipment have quality mufflers and are well maintained - Ensure residents are notified of major construction activities - Complaint follow-up and response procedure.	Minor amounts of disturbance related to activity at the bridge site for a short duration. While there are local residents, scheduling during the working hours will reduce disturbance to acceptable level.	1	1	1	1	I	NA	NS	NA	NS
Key: Magnitude: 1 = Low: localized effect on specific group, habitat, or ecosystem, returns to pre-Project levels in one generation or less, within natural variation 2 = Medium: portion of a population or habitat, or ecosystem, returns to pre- Project levels in one generation or less, rapid and unpredictable change, temporarily outside range of natural variability 3 = High: affecting a whole stock, population, habitat or ecosystem, outside the range of natural variation, such that communities do not return to pre-Project levels for multiple generations Geographic Extent: 1 = <1 km ² 2 = 1 – 10 km ² 3 = 11 – 100 km ² 4 = 101 – 1,000 km ² 5 – 1,001 – 10,000 km ² 6 = > 10,000 km ² Duration: 1 = < 1 month 2 = 1 – 12 months 3 = 13 – 36 months 4 = 37 – 72 months					5 = >72 months Frequency: 1 = <11 events/year 2 = 11 – 50 events/year 3 = 51 100 events/year 4 = 101 – 200 events/year 5 = >200 events/year 6 = continuous Reversibility: R = Reversible I = Irreversible Ecological/Socio-cultural and Economic Context: 1 = Relatively pristine area or area not adversely affected by human activity. 2 = Evidence of adverse environmental effects. S = Significant adverse environmental effect ME = Minor adverse effect/ mitigatable effect (not significant) NS = Not significant adverse environmental effect N/A = Not Applicable (A) = Adverse									

4 CUMULATIVE EFFECTS

Past, present and future projects and activities may have environmental effects that overlap or may possibly interact with the residual effects of this Project. Projects considered to have potential cumulative effects were searched for based on:

- Their proximity to the Pugwash Harbour Project area; and
- The possibility of interactions with the environmental effects of the Project.

The level of inclusion of any projects and activities is limited by data availability and the degree to which the effects may overlap, or in conjunction with the current Project due to their proximity to each other. Based on the professional observations and judgment of members of the Project team, no projects were considered to be cumulative with this Project, due to the location of this Project.

5 REGULATORY AND PERMITTING

Table 4 below presents a preliminary overview of the Acts, Regulations, permits, and approvals that may apply to the Project. Many of these requirements are site specific and are dependent upon existing environmental and socio-economic conditions in the proposed Project area and existing infrastructure. Please note that this is a preliminary screening and may change once detailed Project design is completed.

Table 4. Federal and Provincial Acts, Regulations, Permits, and Approvals that may be required for the Project.

Acts	Related Regulations/ Policy	Approvals or Permits Required
Federal		
<i>Canadian Environmental Assessment Act</i>	A determination under Section 67 of the CEAA, 2012 is required.	Federal EA approval from responsible authorities, where triggered
<i>Canadian Environmental Protection Act</i>	No specific regulations related to this Act	Release of toxic substances, Air pollutants, Water pollutants
<i>Navigation Protection Act- Transport Canada</i>	Minor Works Order	NPA Approval or notification required
<i>Fisheries Act</i>	<i>Applications for Authorization under Paragraph 35(2)(b) of the Fisheries Act Regulations</i>	If any destruction to fish or fish habitat will occur as a result of the Project, Authorization For Work that May Result in Serious Harm to Fish is required
<i>Species At Risk Act</i>	No specific regulations related to this Act	No specific permit required. Adhere to species specific activity restrictions and recovery initiatives.
<i>Migratory Bird Conventions Act</i>	<i>Migratory Birds Regulations</i>	No specific permit required. Notification only.
Provincial		
<i>Environment Act</i>	<i>Environmental Impact Assessment Regulation</i>	Registration with EIA Branch, Nova Scotia Department of Environment, if triggered
<i>Environment Act</i>	<i>Division I. Water</i>	Permit for altering or using a watercourse or water resource and/ or altering a wetland (field investigation would need to be conducted to determine)
<i>Environment Act</i>	<i>Division III. Municipal Waste</i>	Permit required if Sewage, Storm drainage, or Septage installed.
<i>Environment Act</i>	<i>Petroleum Management Regulations</i>	Permit required if storing petroleum tanks greater than 230L or greater at a marina
<i>Nova Scotia's Wilderness Areas Protection Act and Nature Reserves Protection Act</i>	No specific regulations related to this Act	Permits for Activity in Protected Natural Areas

Acts	Related Regulations/ Policy	Approvals or Permits Required
<i>Crown Lands Act</i>	Policy for Wharves, Floating Docks, Boat Ramps and Moorings on Submerged Crown Lands	Permit Application submitted to the Nova Scotia Department of Natural Resources to use Crown lands, this includes projects in coastal areas.
<i>Occupational Health and Safety Act</i>	<i>Occupational Health and Safety Regulations</i>	No specific permit required
<i>Municipal Government Act</i>	<i>Municipal Planning Strategy</i>	Development and Building permits for construction and operation of the Project
<i>Nova Scotia Species at Risk Act</i>	No specific regulations related to this Act	Notification to Department of Natural Resources, authorization may be required for clearing and site preparation
<i>Special Places Protection Act</i>	<i>General Regulation - Heritage Conservation Act</i>	Site alteration permit and Heritage Impact Assessment
<i>Transportation of Dangerous Goods Act</i>	No specific regulations related to this Act	Permit required for the transportation of dangerous goods

5.1 RECOMMENDATIONS

This report is a high level EED and does not cover all of the information required for federal and provincial approval applications. In order to satisfy all stakeholders additional studies are recommended, including:

- Benthic habitat survey;
- Marine sediment sampling program (MSSP);
- Archeological Resource Impact Assessment (ARIA), and
- Mi'kmaq Ecological Knowledge Study.

6 PUBLIC PARTICIPATION

This Project is considered to have an overall net benefit. Public participation for the Harbour Center will involve a Stakeholder meeting and a Community meeting. These will both take place on May 10th, 2017 in Pugwash and the proposed methodology is shown below in detail.

6.1 STAKEHOLDER/BUSINESS MEETING

The consultants will lead a facilitated process that will enable participants (invited stakeholder groups and business owners) to contribute in a structured and positive manner. The focused discussion format at the workshop will:

- Provide an overview of the study objectives;
- Identify stakeholders/business's needs; and
- Identify issues and priorities to consider in the design of specific component projects.

Responses will be captured and displayed to the group to aid in discussions. We will then have participants flag the most important/key feedback. The participants will also have an opportunity to fill out the provided Request for Brief document.

6.2 COMMUNITY OPEN HOUSES

The community meeting will be open-house style and will include a brief introductory presentation. Through the meeting the consultants will seek input to confirm the vision for the Pugwash Waterfront as well as identify issues and priorities to consider in the design of specific project components. We will also aim to build a sense of ownership of the Waterfront Area. The open house will include:

- A brief presentation by the consultants with a description of the planning process and desired outcomes
- Visual aids for the public to view and interact with showing the overall study area and stations for the project components. Information will include a summary of needs assumptions and some of the high-level findings from the early analyses to provide a broad context for discussion. Visual aids will include large maps, 'voting' jars and poster boards with areas for comments. The consultants will tend to the stations and engage in discussions with attendees.
- A brief community survey (paper format) to be completed by meeting attendees.

6.3 COMMUNITY AND FIRST NATION KNOWLEDGE

This Project is considered to have a low impact, and a minimal footprint. The Project will allow ongoing use of the Harbour by boat and is not likely to have any significant environmental effects. The need for Consultation with the Mi'kmaq of Nova Scotia will be assessed by the Municipality of Cumberland County and their engagement with Nova Scotia Office of Aboriginal Affairs.

7 CLOSURE

This report has been completed for the sole benefit of the Municipality of Cumberland County. Any use that a third party makes of this report, or any reliance on or decisions made based on it, is the sole responsibility of the third party. WSP accepts no responsibility for damages, if any, suffered by any third party as a result of the decisions made or actions conducted based on this report.

The conclusions presented in this report represent the best judgment of the assessor based on the current environmental standards and land use. The assessor is unable to certify against undiscovered environmental liabilities due to the nature of the investigation and the limited data available. In evaluating the property, WSP has relied in good faith upon representation and information supplied by individuals noted in the report with respect to existing property conditions. Accordingly, WSP accepts no responsibility for any deficiency or inaccuracy in this report as a result of omissions, misstatements or misinterpretations of the persons involved. In addition, WSP 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.

This report was prepared from information collected during review of available environmental online information. This report has been prepared by Marina Dulmage, M.Sc., and reviewed by Christina LaFlamme, M.Sc., EP.

Yours truly,

WSP Canada Inc.



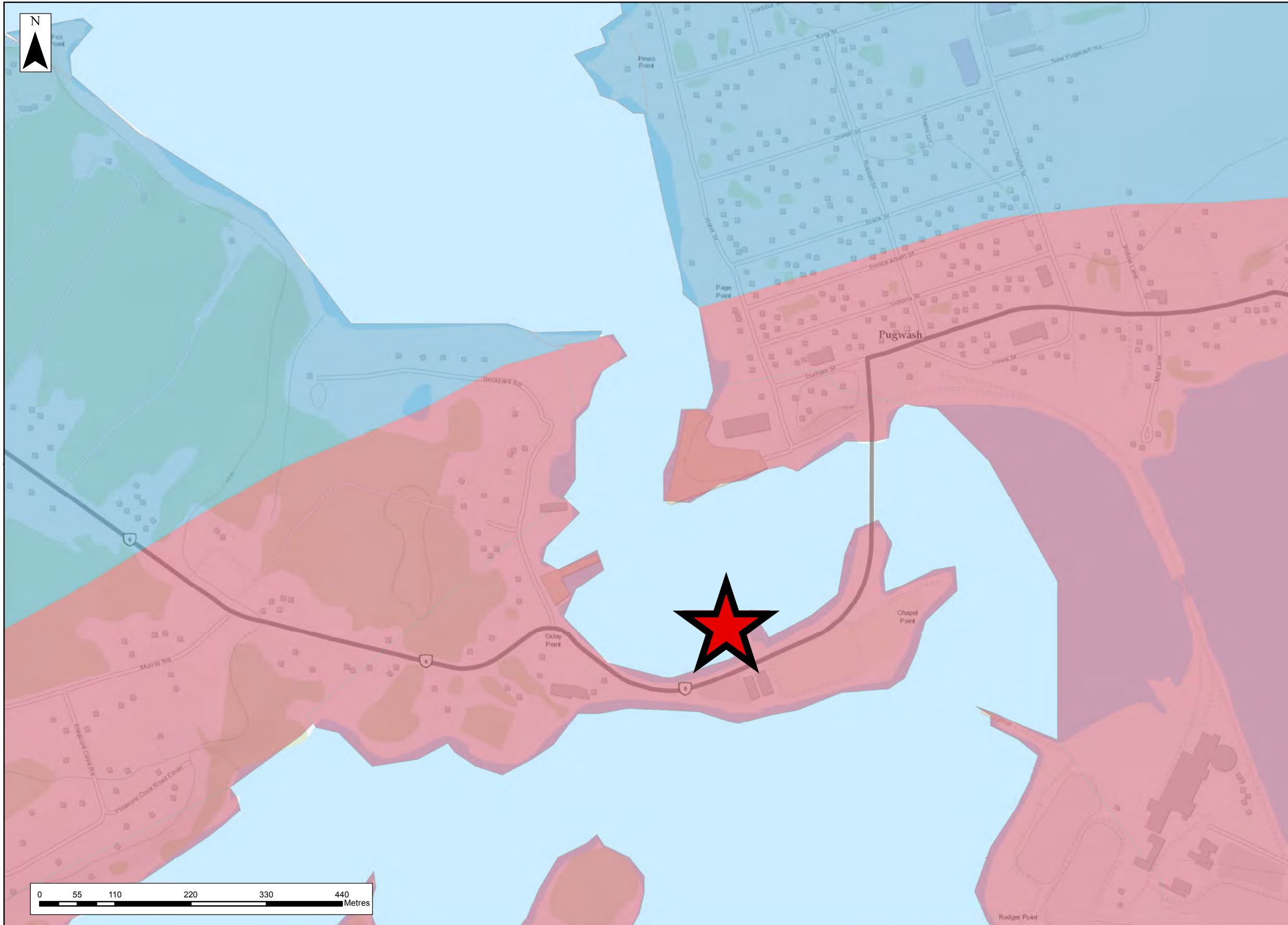
Christina LaFlamme, M.Sc., EP
Project Manager / Environmental Scientist

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Appendix 2A

MAPS



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Legend

Bedrock Geology

- Cumberland Group
- Windsor Group (Middle)

REFERENCE:
 Digital Topographic Mapping by Nova Scotia
 Geomatics Centre.
 Projection: NAD 83 UTM Zone 20N

CLIENT:

PREPARED BY: M. Ritchie

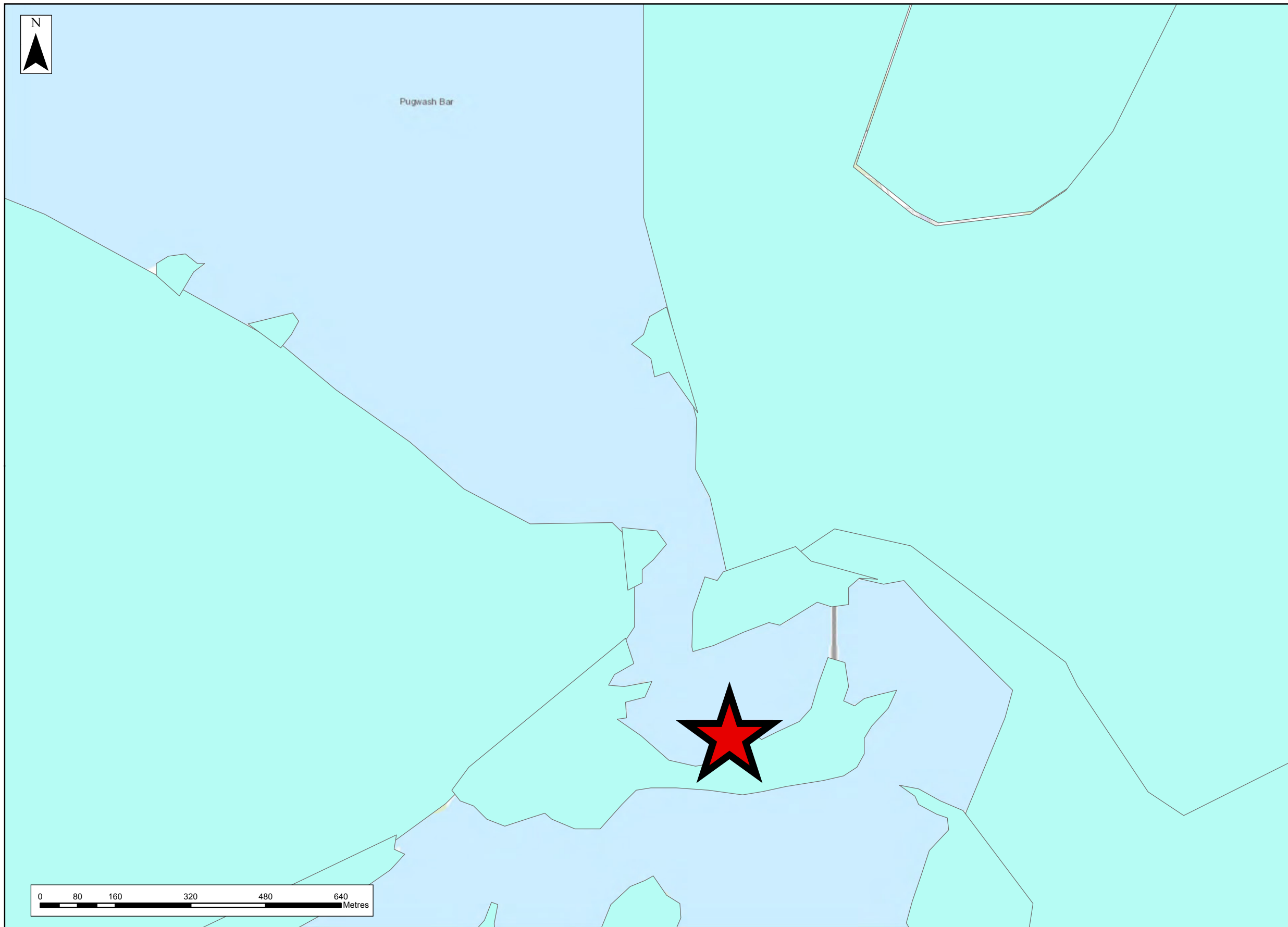
CHECKED BY: C. Laflamme

DATE: April 28, 2017

PROJECT NO: 179-00080

PROJECT:
**Pugwash Harbour
 Centre Development**

MAP 1:
Bedrock Geology



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Legend
 [Cyan box] Ground Moraine and Streamlined Drift

REFERENCE:
 Digital Topographic Mapping by Nova Scotia Geomatics Centre.
 Projection: NAD 83 UTM Zone 20N

CLIENT:

PREPARED BY: M. Ritchie

CHECKED BY: C. Laflamme

DATE: April 28, 2017

PROJECT NO: 179-00080

PROJECT:
**Pugwash Harbour
 Centre Development**

MAP 2:
Surficial Geology

Appendix 2B

ENVIRONMENT AND CLIMATE CHANGE CANADA
WATER QUALITY DATA



TABLE B-1 FAECAL COLIFORM DENSITIES (MPN/100mL) FOR PUGWASH HARBOUR & BASIN (NS-01-010-005)

Station	24 Jul 14	07 Aug 14	21 Aug 14	09 Sep 14	01 Oct 14	17 Jun 15	14 Jul 15	29 Jul 15	12 Aug 15	24 Sep 15	29 Jun 16	12 Jul 16	28 Jul 16	15 Aug 16	31 Aug 16
47	2	2	1.9	13	23	2	1.9	2	4	5	1.9	1.9	1.9	2	1.9
50	1.9	1.9	1.9	2	2	1.9	1.9	130	1.9	4	2	2	1.9	1.9	1.9
51	4	79	8	5	8	1.9	1.9	350	5	5	1.9	2	1.9	4	1.9
56	2	2	1.9	5	17	5	2	13	1.9	7	1.9	1.9	1.9	1.9	2
57	2	8	1.9	11	7	4	1.9	8	2	2	1.9	2	4	2	2
60	1.9	8	2	13	5	2	17	4	2	5	2	1.9	1.9	1.9	11
62	5	13	7	13	2	1.9	1.9	11	2	13	1.9	1.9	1.9	1.9	11
63	1.9	17	2	5	5	2	2	23	1.9	1.9	1.9	1.9	1.9	1.9	4
Tide	MT-MT	MF-MF	MT-MF	MR-MR	LR-LR	HR-HR	HF-HF	HF-HF	HT-HT	HF-HF	MF-MF	MT-MT	HF-HF	HT-HT	HT-HT
Rain (mm)															
0-24h	0.0	20.0	0.0	0.0	1.0	10.0	0.0	3.5	0.5	0.4	0.0	2.0	0.0	12.8	0.2
0-48h	0.0	24.8	0.0	0.0	1.0	10.0	0.4	4.1	0.7	0.4	0.0	20.4	3.4	14.2	5.4
0-72h	0.0	27.4	21.0	18.0	1.0	10.0	0.4	6.6	15.7	0.4	0.0	20.4	3.4	19.4	5.6

Note: 1.9 represents < 2 MPN/100mL HT = High Tide HF = High Falling HR = High Rising MT = Mid Tide MF = Mid Falling MR = Mid Rising
 LT = Low Tide LF = Low Falling LR = Low Rising

TABLE B-2 WATER TEMPERATURE (°C) FOR PUGWASH HARBOUR & BASIN (NS-01-010-005)

Station	24 Jul 14	07 Aug 14	21 Aug 14	09 Sep 14	01 Oct 14	17 Jun 15	14 Jul 15	29 Jul 15	12 Aug 15	24 Sep 15	29 Jun 16	12 Jul 16	28 Jul 16	15 Aug 16	31 Aug 16
47	19	22	20	17	13	15	21	19	20	18	20	19	23	20	22
50	21	22	19	17	13	15	18	19	20	18	20	18	23	20	22
51	21	21	19	17	14	16	21	19	19	18	21	18	23	20	22
56	21	22	19	18	14	15	22	19	19	18	20	18	23	21	22
57	21	23	20	18	14	14	21	19	20	18	21	18	23	21	22
60	21	23	20	17	14	15	22	19	20	18	21	18	23	21	22
62	22	24	20	18	14	17	21	19	20	18	22	19	24	21	22
63	21	23	20	18	14	16	21	20	20	18	22	19	24	21	23
Tide	MT-MT	MF-MF	MT-MF	MR-MR	LR-LR	HR-HR	HF-HF	HF-HF	HT-HT	HF-HF	MF-MF	MT-MT	HF-HF	HT-HT	HT-HT
Rain (mm)															
0-24h	0.0	20.0	0.0	0.0	1.0	10.0	0.0	3.5	0.5	0.4	0.0	2.0	0.0	12.8	0.2
0-48h	0.0	24.8	0.0	0.0	1.0	10.0	0.4	4.1	0.7	0.4	0.0	20.4	3.4	14.2	5.4
0-72h	0.0	27.4	21.0	18.0	1.0	10.0	0.4	6.6	15.7	0.4	0.0	20.4	3.4	19.4	5.6

HT = High Tide HF = High Falling HR = High Rising MT = Mid Tide MF = Mid Falling MR = Mid Rising

TABLE B-3 SALINITY (PPT) FOR PUGWASH HARBOUR & BASIN (NS-01-010-005)

Station	24 Jul 14	07 Aug 14	21 Aug 14	09 Sep 14	01 Oct 14	17 Jun 15	14 Jul 15	29 Jul 15	12 Aug 15	24 Sep 15	29 Jun 16	12 Jul 16	28 Jul 16	15 Aug 16	31 Aug 16
47	29	29	28	29	27	29	30	30	30	31	29	29	30	30	30
50	29	29	28	30	30	29	30	29	30	31	29	29	30	31	30
51	29	29	28	30	30	29	30	30	30	31	29	29	30	30	31
56	29	30	28	30	29	29	30	30	30	32	29	29	30	30	30
57	29	29	28	30	28	29	28	30	30	32	29	29	30	30	30
60	29	30	28	30	29	29	30	30	30	31	29	29	30	30	30
62	29	29	27	30	28	29	29	29	29	31	29	28	30	30	30
63	29	29	27	30	27	29	29	27	30	30	29	28	30	31	30
Tide	MT-MT	MF-MF	MT-MF	MR-MR	LR-LR	HR-HR	HF-HF	HF-HF	HT-HT	HF-HF	MF-MF	MT-MT	HF-HF	HT-HT	HT-HT
Rain (mm)															
0-24h	0.0	20.0	0.0	0.0	1.0	10.0	0.0	3.5	0.5	0.4	0.0	2.0	0.0	12.8	0.2
0-48h	0.0	24.8	0.0	0.0	1.0	10.0	0.4	4.1	0.7	0.4	0.0	20.4	3.4	14.2	5.4
0-72h	0.0	27.4	21.0	18.0	1.0	10.0	0.4	6.6	15.7	0.4	0.0	20.4	3.4	19.4	5.6

HT = High Tide HF = High Falling HR = High Rising MT = Mid Tide MF = Mid Falling MR = Mid Rising
 LT = Low Tide LF = Low Falling LR = Low Rising

Appendix 2C

COMMUNITY AQUATIC MONITORING PROGRAM DATA



Table C-1
Community Aquatic Monitoring Program Data

Site	Station	Month	Year	BSS	BSS	3SS	3SS	3SS	Gasterosteus	4SS	4SS	4SS	9SS	9SS	9SS	MUM	MUM	MUM	SSH	SSH	SSH	GSH	GSH	GSH	SILV	SILV	SILV	SFL	SFL	SFL	WFL	WFL	WFL	WNFL	WNFL	WNFL	FLOU	FLOU	FLOU	KIL					
				(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	sp. (YOY)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)				
PUGW	1	6	2016	21	0	21	0	0	0	3	0	3	10	0	10	162	13	175	317	0	317	0	0	0	2	0	2	1	0	1	25	0	25	0	0	0	0	0	0	0	0	0			
PUGW	2	6	2016	5	0	5	0	0	0	11	0	11	0	0	0	5	0	5	206	0	206	25	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	3	6	2016	0	0	0	1	0	1	0	0	0	0	0	0	0	0	122	0	122	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	4	6	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	5	6	2016	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	21	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	6	6	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	52	0	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	1	7	2016	7	0	7	5	0	5	0	0	0	0	0	0	6	0	6	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	2	7	2016	6	0	6	45	0	45	0	4	0	4	0	0	78	0	78	236	0	236	0	0	0	1	1	2	2	0	2	1	0	1	0	1	0	0	0	0	0	0	0			
PUGW	3	7	2016	4	0	4	71	0	71	0	0	0	0	0	0	3	0	3	6	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0			
PUGW	4	7	2016	4	0	4	2	0	2	5	0	0	1	0	1	2	0	2	11	0	11	0	0	0	5	5	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0		
PUGW	5	7	2016	0	0	0	1	0	1	1	0	0	1	0	1	3	0	3	17	0	17	0	0	0	3	2	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	6	7	2016	1	0	1	1	0	1	0	0	0	0	0	0	0	0	5	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	1	8	2016	0	0	0	0	0	0	0	0	0	0	0	0	20	1	21	0	0	0	3	0	3	2	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	2	8	2016	0	0	0	18	0	18	1	1	0	1	0	0	46	6	52	0	0	0	1	0	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	3	8	2016	0	0	0	1	0	1	0	0	0	0	0	0	0	0	9	0	9	0	0	0	0	72	3	75	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PUGW	4	8	2016	0	0	0	0	0	0	77	0	0	0	1	0	1	0	0	0	0	0	0	0	139	36	175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PUGW	5	8	2016	0	0	0	0	0	0	15	0	0	0	1	0	1	0	1	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	6	8	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	26	20	46	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PUGW	1	6	2015	48	0	48	10	0	10	0	0	0	1	0	1	6	0	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	2	6	2015	2	0	2	10	0	10	0	19	0	19	0	0	1580	0	1580	25	0	25	0	0	2	0	2	2	0	2	1	0	1	0	1	0	0	0	0	0	0	0	0	0		
PUGW	3	6	2015	0	0	0	93	0	93	0	1	0	1	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	4	6	2015	1	0	1	22	0	22	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	5	6	2015	0	0	0	0	0	0	0	0	0	1	0	1	0	0	23	0	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PUGW	6	6	2015	1	0	1	10	0	10	0	0	0	0	0	0	3	0	3	11	0	11	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PUGW	1	7	2015	0	0	0	0	0	0	0	0	0	0	0	0	132	14	146	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PUGW	2	7	2015	0	0	0	2	0	2	0	0	0	0	0	0	317	26	343	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PUGW	3	7	2015	1	0	1	1	0	1	0	0	0	0	0	0	0	0	18	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PUGW	4	7	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	23	0	23	0	0	0	0	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PUGW	5	7	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	15	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PUGW	6	7	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PUGW	1	8	2015	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	1	1	1	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PUGW	2	8	2015	0	0	0	0	0	0	0	5	0	5	0	0	103	312	415	95	0	95	0	0	5	226	231	3	22	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PUGW	3	8	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	17	0	17	0	0	0	188	188	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PUGW	4	8	2015	0	0	0	1	0	1	0	0	0	0	0	0	0	0	28	0	28	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PUGW	5	8	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	690	0	690	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
PUGW	6	8	2015	0	0	0	0	0	0	0	0	0	0	0	0	12	0	12	0	0	0	0	12	165	177	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PUGW	1	6	2014	82	0	82	17	0	17	0	17	0	16	0	16	24	0	24	75	0	75	48	0	48	19	0	19	3	0	3	6	0	6	0	0	0	0	0	1	1	0	0	0		
PUGW	2	6	2014	3	0	3	1	0	1	0	161	0	161	0	0	471	0	471	381	0	381	50	0	50	1	0	1	3	0	3	4	0	4	0	0	0	0	0	0	0	0	0	0	0	
PUGW	3	6	2014	0	0	0	1	0	1	0	1	0	0	0	0	0	0	89	0	89	1	0	1	1	0	1	0	0	0	12	0	12	3	0	3	0	0	0	0	0	0	0	0	0	
PUGW	4	6	2014	0	0	0	1	0	1	0	0	0	1	0	1	1	0	1	118	0	118	0	0	0	0	0	2	0	2	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	
PUGW	5	6	2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1285	0	1285	0	0	0	0	0	0	0	0	0	0	1	0	1	2	0	2	0	0	0	0	0	0	0		
PUGW	6	6	2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	33	0	33	0	0	0	0	0																				

Table C-1
Community Aquatic Monitoring Program Data

Site	Station	Month	Year	ROCK	ROCK	SKAT	SKAT	SKAT	WHHA	WHHA	WHHA	CYPR	CYPR	CYPR	YEFL	YEFL	YEFL	WHSU	WHSU	WHSU	LACH	LACH	LACH	ALOSA	ALOSA	ALOSA	GRUB	GRUB	GRUB	BBUL	BBUL	BBUL	BRST	BRST	BRST	Unknown	Unknown	Unknown	SP.	TOTAL	
				(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)		(YOY)
PUGW	1	6	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	559	
PUGW	2	6	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	255
PUGW	3	6	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	128
PUGW	4	6	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3
PUGW	5	6	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	26
PUGW	6	6	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	52
PUGW	1	7	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	23	
PUGW	2	7	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	385	
PUGW	3	7	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	86	
PUGW	4	7	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	44	
PUGW	5	7	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	35	
PUGW	6	7	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	9	
PUGW	1	8	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	27	
PUGW	2	8	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	77	
PUGW	3	8	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	87	
PUGW	4	8	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	266	
PUGW	5	8	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	20	
PUGW	6	8	2016	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	54	
PUGW	1	6	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	67	
PUGW	2	6	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	1642		
PUGW	3	6	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	98		
PUGW	4	6	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	24	
PUGW	5	6	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	28	
PUGW	6	6	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	27	
PUGW	1	7	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	150	
PUGW	2	7	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	350	
PUGW	3	7	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	20	
PUGW	4	7	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	27	
PUGW	5	7	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	15	
PUGW	6	7	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	6	
PUGW	1	8	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4	
PUGW	2	8	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	844	
PUGW	3	8	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	208	
PUGW	4	8	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	31	
PUGW	5	8	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	695	
PUGW	6	8	2015	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	190	
PUGW	1	6	2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	12	315	
PUGW	2	6	2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	1076	
PUGW	3	6	2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	0	0	0	0	0	0	0	0	0	12	121	
PUGW	4	6	2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	126	
PUGW	5	6	2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1288	
PUGW	6	6	2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	34	
PUGW	1	7	2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	125	
PUGW	2	7	2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	62	
PUGW	3	7	2014	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	396	
PUGW	4	7	2014																																						

Table C-1
Community Aquatic Monitoring Program Data

Site	Station	Month	Year	BSS	BSS	BSS	3SS	3SS	3SS	Gasterosteus	4SS	4SS	4SS	9SS	9SS	9SS	MUM	MUM	MUM	SSH	SSH	SSH	GSH	GSH	GSH	SILV	SILV	SILV	SFL	SFL	SFL	WFL	WFL	WFL	WNFL	WNFL	WNFL	FLOU	FLOU	FLOU	KIL
				(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	sp. (YOY)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)
PUGW	1	6	2012	2	0	2	6	0	6	0	0	2	1	0	1	299	0	299	1	0	1	0	0	0	1	0	1	0	0	0	1	0	1	0	0	0	0	0			
PUGW	2	6	2012	9	0	9	1	0	1	0	0	14	0	0	0	864	0	864	21	0	21	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	3	6	2012	0	0	0	1	0	1	0	0	1	0	0	0	7	0	7	27	0	27	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	4	6	2012	1	0	1	118	0	118	0	0	0	0	0	0	11	0	11	8	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	5	6	2012	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	39	0	39	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	6	6	2012	0	0	0	2	0	2	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	1	7	2012	0	0	0	9	0	9	0	12	0	12	2	0	2	4	0	4	0	0	0	0	0	0	9	0	9	0	0	0	0	0	0	0	0	0	0	0		
PUGW	2	7	2012	0	0	0	3	0	3	1	28	0	28	0	0	0	0	0	3	0	3	2	0	2	2	0	2	0	0	0	0	0	0	0	0	0	0	0			
PUGW	3	7	2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	58	0	58	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	4	7	2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	5	7	2012	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	29	0	29	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	6	7	2012	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	1	8	2012	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	2	8	2012	0	0	0	0	0	0	0	4	0	4	0	0	0	670	0	670	53	0	53	7	0	7	7	0	7	0	0	0	0	0	0	0	0	0	0	0		
PUGW	3	8	2012	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	22	0	22	0	0	0	58	0	58	1	0	1	0	0	0	0	0	0	0	0	0		
PUGW	4	8	2012	0	0	0	0	0	0	0	0	0	1	0	1	3	0	3	28	0	28	0	0	0	201	0	201	0	0	0	1	0	1	0	0	0	0	0	0		
PUGW	5	8	2012	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	509	0	509	0	0	0	176	0	176	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	6	8	2012	0	0	0	0	0	0	0	0	0	0	0	0	0	0	32	0	32	0	0	0	184	0	184	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	1	6	2011	5	0	5	3	0	3	0	3	0	3	0	0	2	0	2	1250	0	1250	8	0	8	10	0	10	1	1	2	0	0	0	0	0	0	0	0			
PUGW	2	6	2011	3	0	3	21	0	21	0	45	0	45	0	0	0	297	0	297	1553	0	1553	3	0	3	1	0	1	0	0	3	0	3	0	0	0	0	0			
PUGW	3	6	2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	313	0	313	0	0	0	51	0	51	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	4	6	2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51	0	51	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	5	6	2011	0	0	0	0	0	0	0	0	0	0	0	0	9	0	9	959	0	959	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	6	6	2011	0	0	0	0	0	0	0	0	0	0	0	0	0	0	40	0	40	0	0	0	8	0	8	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	1	7	2011	0	0	0	3	0	3	0	0	0	1	0	1	28	0	28	2	0	2	0	0	3	17	20	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	2	7	2011	0	0	0	3	0	3	0	8	0	8	0	0	12	0	12	25	1	26	0	0	0	2	1	3	0	0	0	1	0	1	0	0	0	0	0			
PUGW	3	7	2011	1	0	1	0	0	0	0	0	0	0	0	0	48	0	48	1	0	1	0	0	6	0	6	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	4	7	2011	0	0	0	0	0	0	0	0	0	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	5	7	2011	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	6	7	2011	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	13	0	13	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	1	8	2011	0	0	0	0	0	0	0	1	0	1	0	0	21	1	22	0	0	0	0	0	2	3	5	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	2	8	2011	0	0	0	0	0	0	0	0	0	1	0	1	34	1	35	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	3	8	2011	0	0	0	0	0	0	0	0	0	1	0	1	1	0	1	17	0	17	0	0	0	16	7	23	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	4	8	2011	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	5	8	2011	0	0	0	0	16	16	0	0	0	0	0	0	1	0	1	1	0	1	0	0	0	0	0	0	0	1	1	0	3	3	0	0	0	0	0			
PUGW	6	8	2011	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	0	0	0	0	0	151	36	187	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	1	5	2010	0	0	0	1	0	1	0	0	0	1	0	1	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	2	5	2010	1	0	1	1	0	1	0	21	0	21	1	0	1	333	0	333	0	0	0	1	0	1	17	0	17	0	0	0	0	0	0	0	0	0	0	0		
PUGW	3	5	2010	10	0	10	10	0	10	0	0	0	1	0	1	0	0	41	0	41	2	0	2	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0			
PUGW	4	5	2010	19	0	19	171	0	171	0	0	0	0	0	0	0	0	13	0	13	0	0	0	58	0	58	0	0	2	0	2	0	0	0	0	0	0	0			
PUGW	5	5	2010	0	0	0	0	0	0	0	0	0	0	0	0	0	0	121	0	121	0	0	0	7	0	7	0	0	1	0	1	0	0	0	0	0	0	0			
PUGW	6	5	2010	2	0	2	3	0	3	0	0	0	0	0	0	0	0	12	0	12	0	0	0	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	1	6	2010	2	0	2	0	0	0	0	2	0	2	5	0	5	181	0	181	10	0	10	1	0	4	0	4	1	0	1	0	0	0	0	0	0	0	0			
PUGW	2	6	2010	7	0	7	2	0	2	0	11	0	11	1	0	1	181	0	181	1	0	1	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	3	6	2010	2	0	2	4	0	4	0	0	0	0	0	0	33	0	33	6	0	6	0	0	9	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	4	6	2010	2	0	2	279	0	279	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	5	6	2010	0	0	0	3	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	1	0	1	0									

Table C-1
Community Aquatic Monitoring Program Data

Site	Station	Month	Year	Temperature	Salinity	Dis O2	sediment % humidity	sediment % Organic	MeanGrainSize um	EELGRASS	WIDGEON	GREEN	BROWN FUZZY	FUCUS	COMMON RED	COMMON BROWN	KELP	INVASIVE	Silicate (µM)	Phosphate (µM)	Nitrate=NO3+NO2 (µM)	Ammonia (µM)	Nitrite (µM)
PUGW	1	6	2012	18.6	24.66	9.71				3.00	0.00	0.00	0.67	0.25	0.00	0.00	0.00	0.00		0.110	0.065		0.027
PUGW	2	6	2012	19.0	25.32	10.40				2.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.365	0.170		0.041
PUGW	3	6	2012	18.1	25.70	8.00				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.310	0.075		0.024
PUGW	4	6	2012	17.6	25.90	10.87				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.250	0.280		0.037
PUGW	5	6	2012	18.6	25.90	11.60				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.210	0.105		0.026
PUGW	6	6	2012	17.0	26.10	18.20				0.00	0.00	1.67	0.00	0.00	0.00	0.00	0.00	0.00		0.265	0.215		0.097
PUGW	1	7	2012	23.0	26.30	6.60				0.00	3.00	0.00	0.17	0.00	0.00	0.00	0.00	0.00					
PUGW	2	7	2012	21.9	26.57	6.28				0.00	2.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00					
PUGW	3	7	2012	20.8	26.65	9.21				0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	4	7	2012	20.1	26.84	8.00				0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00					
PUGW	5	7	2012	20.4	26.81	8.30				0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00					
PUGW	6	7	2012	20.4	27.00	9.04				0.00	0.00	0.00	0.50	0.33	0.00	0.00	0.00	0.00					
PUGW	1	8	2012	24.0	26.99	5.60	34.24	28.85	202.88	1.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00		0.260	0.090		0.018
PUGW	2	8	2012	24.4	26.85	6.66	25.74	8.14	228.72	1.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00		0.460	1.920		0.222
PUGW	3	8	2012	22.4	27.20	8.25	16.17	0.45	560.06	0.00	0.00	1.42	0.00	0.25	0.00	0.00	0.00	0.00		0.510	1.800		0.164
PUGW	4	8	2012	22.2	27.27	8.87	25.18	1.58	240.09	0.17	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00		0.510	2.180		0.141
PUGW	5	8	2012	22.7	27.30	8.75	25.19	0.57	241.66	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.490	0.980		0.111
PUGW	6	8	2012	22.0	27.02	9.75	25.13	0.77	201.64	0.00	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00		0.405	1.140		0.106
PUGW	1	6	2011	21.1	21.70	7.28				1.92	0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00		0.300	0.180		0.040
PUGW	2	6	2011	18.4	24.00	9.40				1.67	0.00	0.33	0.00	0.17	0.00	0.00	0.00	0.00		0.140	0.160		0.012
PUGW	3	6	2011	19.5	24.60	8.33				0.00	0.00	0.67	0.08	0.08	0.00	0.33	0.00	0.00		0.110	0.180		0.012
PUGW	4	6	2011	21.0	25.10	10.85				1.08	0.00	0.58	0.00	0.25	0.00	0.00	0.00	0.00		0.150	0.140		0.019
PUGW	5	6	2011	18.8	25.10	10.20				0.00	0.00	0.00	0.50	0.50	0.00	0.00	0.00	0.00		0.190	0.570		0.014
PUGW	6	6	2011	20.7	26.40	9.36				0.00	0.00	0.50	0.00	0.00	0.50	0.00	0.00	0.00		0.160	0.120		0.007
PUGW	1	7	2011	19.2	24.10	6.16				2.42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	2	7	2011	19.0	24.90	8.96				2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	3	7	2011	18.6	25.10	7.60				0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00					
PUGW	4	7	2011	18.2	25.90	7.98				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	5	7	2011	18.3	25.90	8.27				0.50	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00					
PUGW	6	7	2011	17.8	26.50	8.10				0.00	0.00	0.00	0.00	0.50	0.50	0.00	0.00	0.00					
PUGW	1	8	2011	23.2	23.40	7.95	68.00	18.24	213.28	3.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.540	0.420		0.078
PUGW	2	8	2011	22.3	25.00	7.86	29.10	2.13	250.96	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.460	0.250		0.033
PUGW	3	8	2011	21.1	25.50	8.08	19.72	0.93	945.86	0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00		0.420	0.740		0.027
PUGW	4	8	2011	21.0	26.10	8.78	16.91	0.70	1754.49	0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00		0.380	0.200		0.013
PUGW	5	8	2011	21.0	26.30	8.06	20.26	0.55	582.60	0.00	0.00	0.50	0.50	0.33	0.50	0.00	0.00	0.00		0.410	0.180		0.023
PUGW	6	8	2011	21.2	26.40	8.68	16.17	0.82	2000.00	0.50	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00		0.540	0.310		0.017
PUGW	1	5	2010	18.7	27.10	7.75				0.00	3.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	2	5	2010	13.5	27.40	7.95				0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	3	5	2010	13.1	27.20	8.96				0.00	0.00	0.33	0.00	0.40	0.00	0.00	0.00	0.00					
PUGW	4	5	2010	13.0	27.40	8.96				0.00	0.00	0.25	0.00	0.58	0.00	0.00	0.00	0.00					
PUGW	5	5	2010	13.2	27.60	8.83				0.00	0.00	0.17	0.00	0.40	0.00	0.00	0.00	0.00					
PUGW	6	5	2010	12.8	28.10	8.80				0.00	0.00	0.00	0.00	0.00	0.00	0.08	0.00	0.00					
PUGW	1	6	2010	19.6	24.40	7.10				2.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.490	0.340		0.075
PUGW	2	6	2010	19.5	26.70	9.15				4.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00		0.340	0.075		0.030
PUGW	3	6	2010	18.9	27.20	7.10				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.230	0.085		0.025
PUGW	4	6	2010	19.2	27.40	9.50				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.245	0.080		0.025
PUGW	5	6	2010	18.9	27.50	7.70				0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00					
PUGW	6	6	2010	18.7	27.80	7.60				0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	1	7	2010	22.6	24.20	5.68				2.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	2	7	2010	23.4	25.90	6.15				4.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	3	7	2010	22.0	26.00	7.24				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	4	7	2010	21.8	27.50	7.80				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	5	7	2010	22.2	27.50	7.66				0.00	0.00	0.40	0.40	0.33	0.40	0.00	0.00	0.00					
PUGW	6	7	2010	21.2	27.00	6.91				0.00	0.00	1.08	0.00	0.40	0.00	0.00	0.00	0.00					
PUGW	1	8	2010	22.8	27.60	7.40				2.08	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.975	0.215		0.050
PUGW	2	8	2010	22.9	28.10	7.50				2.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.485	0.050		0.005
PUGW	3	8	2010	22.5	28.00	7.60				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.510	0.055		0.005
PUGW	4	8	2010	22.2	28.10	6.75				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.425	0.145		0.015
PUGW	5	8	2010	22.9	27.60	7.80				0.00	0.00	0.00	0.00	1.00	0.00	0.00	0.00	0.00		0.425	0.280		0.005
PUGW	6	8	2010	22.2	28.50	7.70				0.00	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00		0.430	0.100		0.015
PUGW	1	9	2010	15.6	24.70	9.65	58.59	13.83	211.42	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	2	9	2010	15.4	25.50	9.25	16.44	0.33	454.44	5.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	3	9	2010	15.2	26.20	8.62	17.40	0.08	465.28	1.25	0.00	0.00	0.00	2.33	0.00	0.00	0.00	0.00					
PUGW	4	9	2010	15.3	26.60	8.45	16.37	0.08	1174.78	0.40	0.00	0.00	0.00	0.40	0.0								

Table C-1
Community Aquatic Monitoring Program Data

Site	Station	Month	Year	BSS	BSS	BSS	3SS	3SS	3SS	Gasterosteus sp. (YOY)	4SS	4SS	4SS	9SS	9SS	9SS	MUM	MUM	MUM	SSH	SSH	SSH	GSH	GSH	GSH	SILV	SILV	SILV	SFL	SFL	SFL	WFL	WFL	WFL	WNFL	WNFL	WNFL	FLOU	FLOU	FLOU	KIL								
				(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)		(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)					
PUGW	1	6	2009	0	0	0	0	0	0	0	1	0	1	1	3	4	28	0	28	0	0	0	3	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
PUGW	2	6	2009	3	0	3	2	0	2	0	2	0	2	0	0	0	600	0	600	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
PUGW	3	6	2009	115	0	115	37	0	37	0	2	0	2	3	0	3	12	0	12	23	0	23	0	0	0	18	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
PUGW	4	6	2009	43	0	43	2	0	2	0	0	0	0	0	0	0	1	0	1	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
PUGW	5	6	2009	16	0	16	2	0	2	0	1	0	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
PUGW	6	6	2009	1	0	1	2	0	2	0	0	0	0	25	0	25	0	0	0	26	0	26	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
PUGW	1	7	2009	0	0	0	0	0	0	0	14	0	14	5	0	5	32	76	108	18	0	18	9	0	9	83	92	5	2	7	0	0	0	0	0	0	0	0	0	0	0	0	0						
PUGW	2	7	2009	1	0	1	13	0	13	0	33	0	33	2	0	2	0	0	0	3	0	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0						
PUGW	3	7	2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	976	0	976	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
PUGW	4	7	2009	0	0	0	1	1	2	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	5	6	11	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
PUGW	5	7	2009	0	0	0	1	0	1	0	0	0	0	0	0	0	29	0	29	897	0	897	0	0	0	40	2	42	0	0	0	0	1	0	1	0	1	0	1	0	1	0	1	0	1				
PUGW	6	7	2009	0	0	0	0	0	0	0	0	0	0	0	0	0	52	4	56	2	0	2	0	0	6	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
PUGW	1	8	2009	0	0	0	0	0	0	0	0	0	0	0	0	0	14	14	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0					
PUGW	2	8	2009	0	0	0	0	0	0	0	243	15	258	1	0	1	6	4	10	15	0	15	14	0	14	8	49	57	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
PUGW	3	8	2009	0	0	0	4	2	6	0	2	1	3	9	3	12	2	2	4	17	0	17	0	0	0	14	722	736	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	4	8	2009	0	0	0	0	0	0	0	0	0	0	2	0	2	0	0	0	3	0	3	0	0	9	833	842	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	5	8	2009	0	0	0	0	0	148	148	0	0	0	0	0	0	20	20	18	0	18	0	0	0	3	59	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	6	8	2009	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	16	0	16	0	0	0	0	158	158	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	1	9	2009	0	0	0	0	0	0	0	1	0	1	1	0	1	11	27	38	15	0	15	16	0	16	0	76	76	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
PUGW	2	9	2009	0	0	0	0	0	0	0	58	0	58	0	0	0	7	167	174	149	0	149	82	0	82	0	118	118	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	3	9	2009	0	0	0	0	0	0	0	0	0	0	0	0	0	6	6	12	0	12	1	0	1	22	23	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
PUGW	4	9	2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0	5	3	0	3	0	60	60	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	5	9	2009	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	38	0	38	50	0	50	0	3	3	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1		
PUGW	6	9	2009	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	0	7	0	0	0	32	133	165	1	0	1	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2		
PUGW	1	5	2008	88	0	88	162	0	162	0	6	0	6	1	0	1	38	0	38	11	0	11	0	0	62	0	62	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	2	5	2008	0	0	0	4	0	4	0	1	0	1	2	0	2	65	0	65	3	0	3	1	0	1	67	0	67	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	3	5	2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	6	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	4	5	2008	1	0	1	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	5	5	2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	6	5	2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	456	0	456	0	0	0	12	0	12	0	0	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2	0	2		
PUGW	1	6	2008	48	0	48	54	5	59	0	4	0	4	89	3	92	50	0	50	2	0	2	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	2	6	2008	3	0	3	9	0	9	0	75	0	75	0	0	0	151	0	151	4	0	4	4	0	4	25	0	25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	3	6	2008	11	0	11	140	0	140	0	0	0	0	0	0	0	3	0	3	32	0	32	0	0	18	0	18	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	4	6	2008	2	0	2	106	0	106	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	5	6	2008	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	86	0	86	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0			
PUGW	6	6	2008	8	0	8	3	0	3	0	0	0	0	0	0	0	2	0	2	20	0	20	0	0	52	0	52	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	1	7	2008	0	0	0	1	0	1	0	0	0	0	0	0	0	97	1	98	0	0	0	0	0	0	89	89	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	2	7	2008	0	0	0	1	0	1	0	0	0	0	1	0	1	114	6	120	0	0	0	0	0	139	19	158	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PUGW	3	7	2008	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	24	0	24	0	0	0	1601	10	1611	0	0	0	0	0	0	1	1	0	1	1	0	1	1	0	1	1	0	1	1	0	1
PUGW	4	7	2008	3	41	44	9	49	58	0	0	0	0	0	0	0	1	0	1	1	0	1	0	0	2	13	15	0	0	0																			

Table C-1
Community Aquatic Monitoring Program Data

Site	Station	Month	Year	Temperature	Salinity	Dis O2	sediment % humidity	sediment % Organic	MeanGrainSize um	EELGRASS	WIDGEON	GREEN	BROWN FUZZY	FUCUS	COMMON RED	COMMON BROWN	KELP	INVASIVE	Silicate (µM)	Phosphate (µM)	Nitrate=NO3+NO2 (µM)	Ammonia (µM)	Nitrite (µM)	
PUGW	1	6	2009	18.5	27.10	18.23				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
PUGW	2	6	2009	16.8	27.40	8.23				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
PUGW	3	6	2009	16.7	27.40	7.85				0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00						
PUGW	4	6	2009	16.3	27.60	7.92				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
PUGW	5	6	2009	16.4	27.50	8.41				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
PUGW	6	6	2009	17.2	27.50	7.90				0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00						
PUGW	1	7	2009	24.0	25.50	8.18				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
PUGW	2	7	2009	22.6	27.70	9.34				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
PUGW	3	7	2009	22.2	27.80	11.11				0.75	0.00	0.40	0.00	0.40	0.00	0.00	0.00	0.00						
PUGW	4	7	2009	23.1	27.10	10.27				0.00	0.00	0.00	0.00	0.92	0.00	0.00	0.00	0.00						
PUGW	5	7	2009	23.1	27.90	10.91				0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00						
PUGW	6	7	2009	25.1	28.40	13.07				0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00						
PUGW	1	8	2009	23.7	26.60	8.66				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
PUGW	2	8	2009	24.0	27.40	10.85				0.00	0.00	0.00	0.00	0.33	0.00	0.00	0.00	0.00						
PUGW	3	8	2009	23.2	27.60	9.33				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
PUGW	4	8	2009	24.6	27.60	13.12				0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00						
PUGW	5	8	2009	23.1	26.60	11.32				0.00	0.00	0.00	0.00	0.08	0.00	0.00	0.00	0.00						
PUGW	6	8	2009	22.0	28.00	7.38				0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00						
PUGW	1	9	2009	17.7	26.20	7.76	22.37	2.31	284.16	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
PUGW	2	9	2009	18.7	26.90	11.45	20.96	0.99	204.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
PUGW	3	9	2009	17.0	27.00	8.54	18.18	0.73	341.80															
PUGW	4	9	2009	17.7	26.80	9.11	14.70	0.61	2000.00	0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00						
PUGW	5	9	2009	16.9	27.10	8.77	21.07	0.74	255.22	0.00	0.00	0.00	0.00	1.08	0.00	0.00	0.00	0.00						
PUGW	6	9	2009	17.6	27.50	8.96	15.25	0.47	1786.61	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00						
PUGW	1	5	2008	11.5	20.90	7.88				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.227	0.158	0.398	1.578	0.027	
PUGW	2	5	2008	10.2	24.20	8.08				0.00	1.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00	2.435	0.193	0.299	0.512	0.007	
PUGW	3	5	2008	10.6	21.50	8.73				0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	5.994	0.447	0.829	2.001	0.015	
PUGW	4	5	2008	9.6	23.40	9.14				0.00	0.00	0.00	0.00	3.00	0.00	0.00	3.00	0.00	4.974	0.271	0.387	0.780	0.037	
PUGW	5	5	2008	9.5	25.80	9.14				0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	1.585	0.177	0.307	0.809	0.008	
PUGW	6	5	2008	11.1	26.60					0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.00	0.00	2.405	0.130	0.299	1.793	0.005	
PUGW	1	6	2008	21.7	25.80	7.52				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.701	0.301	0.320	1.032	0.019	
PUGW	2	6	2008	20.9	26.00	8.08				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.859	0.285	0.296	0.673	0.008	
PUGW	3	6	2008	19.5	25.90	7.76				0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	2.419	0.213	0.202	0.857	0.016	
PUGW	4	6	2008	19.0	26.00	8.46				0.00	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00	2.403	0.218	0.193	0.911	0.018	
PUGW	5	6	2008	18.5	26.00	7.90				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.514	0.236	0.198	0.909	0.023	
PUGW	6	6	2008	18.5	26.30	8.71				0.00	0.00	0.08	0.00	0.00	0.00	0.00	0.00	0.00	1.654	0.240	0.208	1.365	0.034	
PUGW	1	7	2008	22.0	25.50	6.42				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.865	0.554	0.439	2.516	0.067	
PUGW	2	7	2008	20.8	26.10	6.68				3.67	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.714	0.417	0.302	1.705	0.042	
PUGW	3	7	2008	20.3	26.00	6.88				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.829	0.341	0.364	2.155	0.036	
PUGW	4	7	2008	20.6	25.50	6.71				0.40	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00	3.118	0.331	0.313	1.488	0.031	
PUGW	5	7	2008	20.2	23.90	6.40				0.40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.617	0.623	7.598	2.144	0.138	
PUGW	6	7	2008	20.1	25.10	6.82				0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	3.032	0.455	1.215	2.373	0.109	
PUGW	1	8	2008	19.5	23.80	6.31																		
PUGW	2	8	2008	20.0	24.60	7.83				0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	4.902	0.486	0.379	3.149	0.102	
PUGW	3	8	2008	18.0	23.40	7.50														8.157	0.924	0.760	1.679	0.175
PUGW	4	8	2008	19.2	24.90	7.45														5.236	0.517	0.217	1.176	0.065
PUGW	5	8	2008	18.9	25.10	7.11				0.40	0.00	0.00	0.00	0.40	0.40	0.00	0.00	0.00	4.498	0.463	0.256	3.673	0.070	
PUGW	1	9	2008	19.8	23.20	8.95	44.64	11.53	196.90	0.33	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00	8.025	0.399	0.345	2.038	0.098	
PUGW	2	9	2008	17.4	23.90	8.85	24.60	1.46	222.61	1.17	0.00	0.50	0.00	0.50	0.00	0.00	0.00	0.00	6.093	0.328	0.315	1.105	0.069	
PUGW	3	9	2008	20.5	24.10	8.25	23.72	0.38	221.29	0.50	0.00	0.50	0.00	0.50	0.50	0.00	0.00	0.00	5.412	0.424	0.641	0.974	0.059	
PUGW	4	9	2008	22.2	25.40	10.90	24.02	0.86	151.17	3.58	0.00	0.50	0.00	2.50	0.00	0.00	0.00	0.00	2.784	0.420	0.131	1.253	0.026	
PUGW	5	9	2008	18.7	24.80	11.75	24.57	0.38	211.65	0.00	0.00	0.00	0.00	0.50	0.50	0.00	0.00	0.00	4.011	0.275	0.148	0.597	0.036	
PUGW	6	9	2008	16.6	25.00	10.62	24.15	0.46	198.62	0.00	0.00	0.00	0.00	0.08	0.00	0.50	0.00	0.00	1.952	0.321	0.126	0.613	0.032	
PUGW	1	5	2007	10.8	13.40	9.60				1.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.796	0.046	1.367	3.194	0.065	
PUGW	2	5	2007	9.5	19.80	10.01				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.734	0.191	0.860	3.681	0.026	
PUGW	3	5	2007	10.4	27.90	10.74				0.00	0.00	1.25	0.00	0.25	0.00	0.00	0.00	0.00	9.050	0.198	0.728	1.146	0.034	
PUGW	4	5	2007	10.1	21.70	9.84				0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	7.297	0.157	0.815	4.042	0.030	
PUGW	5	5	2007	9.8	21.00	10.25				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	8.390	0.133	0.646	1.338	0.011	
PUGW	6	5	2007	11.8	27.40	9.62				0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00	2.128	0.270	0.677	2.798	0.012	
PUGW	1	6	2007	17.8	13.10	9.73				0.00	1.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.917	0.229	0.482	2.554	0.000	
PUGW	2	6	2007	17.6	19.70	9.89				0.00	0.40	0.00	0.00	0.25	0.00	0.00	0.00	0.00	2.291	0.186	0.461	2.132	0.000	
PUGW	3	6	2007	17.6	26.40	10.32				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.590	0.195	0.443	1.665	0.000	
PUGW	4	6	2007	17.5																				

Table C-1
Community Aquatic Monitoring Program Data

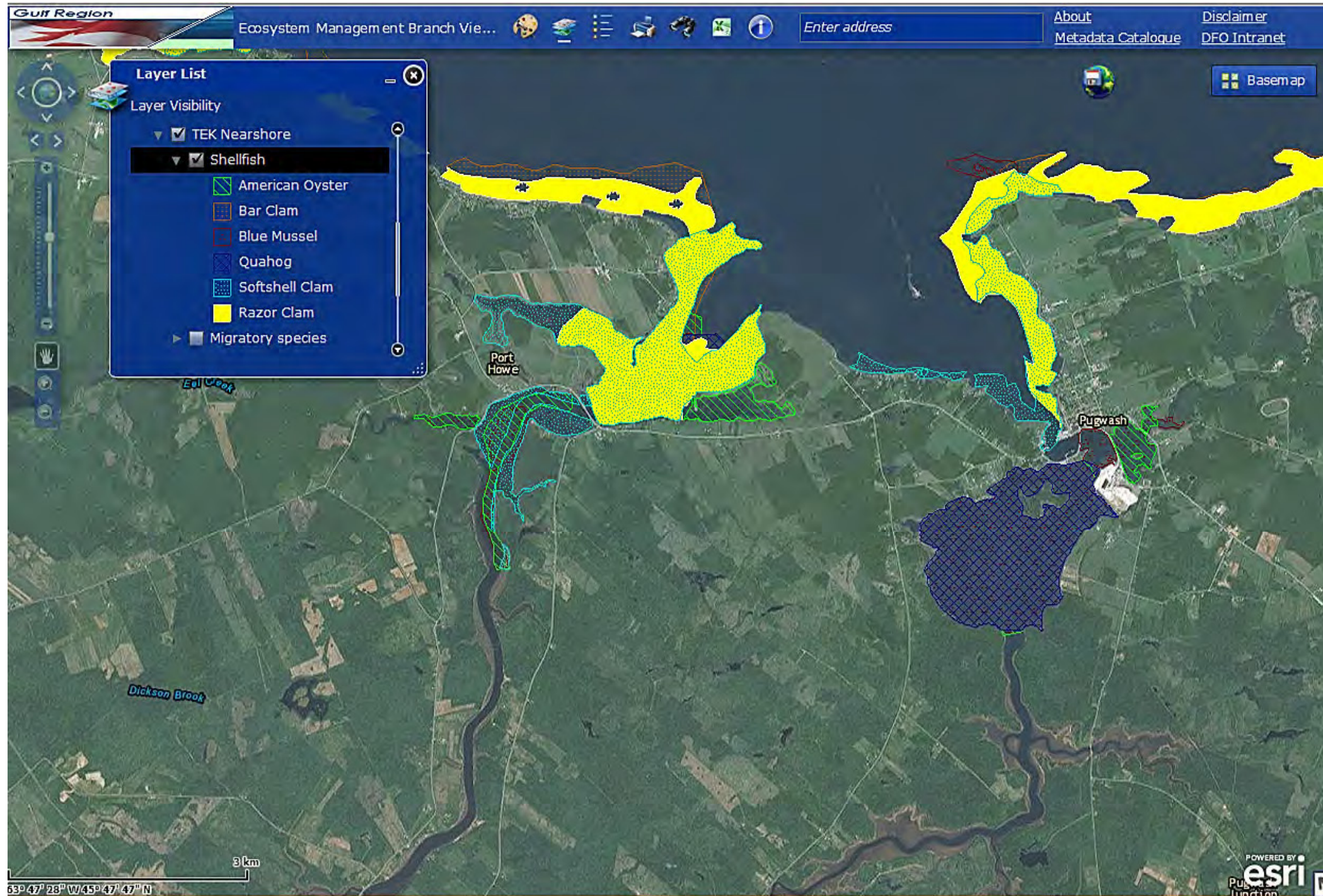
Site	Station	Month	Year	ROCK	ROCK	SKAT	SKAT	SKAT	WHHA	WHHA	WHHA	CYPR	CYPR	CYPR	YEFL	YEFL	YEFL	WHSU	WHSU	WHSU	LACH	LACH	LACH	ALOSA	ALOSA	ALOSA	GRUB	GRUB	GRUB	BBUL	BBUL	BBUL	BRST	BRST	BRST	Unknown	Unknown	Unknown	SP.	TOTAL		
				(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)	(YOY)	(TOT)	(A)		(YOY)	(TOT)
PUGW	2	8	2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	239	
PUGW	3	8	2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	113
PUGW	4	8	2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	189
PUGW	5	8	2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	192
PUGW	6	8	2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	245
PUGW	1	9	2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	200
PUGW	2	9	2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	48
PUGW	3	9	2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	59
PUGW	4	9	2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	39
PUGW	5	9	2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	109
PUGW	6	9	2007	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1524
PUGW	1	5	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	330
PUGW	2	5	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	538	
PUGW	3	5	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	81	
PUGW	1	6	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	190	
PUGW	2	6	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	9	777	
PUGW	3	6	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	578	
PUGW	1	7	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	158
PUGW	2	7	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	195	
PUGW	3	7	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	1109	
PUGW	1	8	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	137	
PUGW	2	8	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	89	
PUGW	3	8	2006	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	162	
PUGW	1	5	2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	10	411	
PUGW	2	5	2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	648	
PUGW	3	5	2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	63	
PUGW	1	6	2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	888	
PUGW	2	6	2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1763	
PUGW	3	6	2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	126	
PUGW	1	7	2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	7	164	
PUGW	2	7	2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	665	
PUGW	3	7	2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	222	
PUGW	1	8	2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	54	
PUGW	2	8	2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	346	
PUGW	3	8	2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	354	
PUGW	1	9	2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	54	
PUGW	2	9	2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	608	
PUGW	3	9	2005	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	187	
PUGW	1	7	2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	263	
PUGW	2	7	2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	796	
PUGW	3	7	2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	614	
PUGW	1	8	2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	134	
PUGW	2	8	2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	8	1399	
PUGW	3	8	2004	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	342	
PUGW	1	9	2004	0	0	0																																				

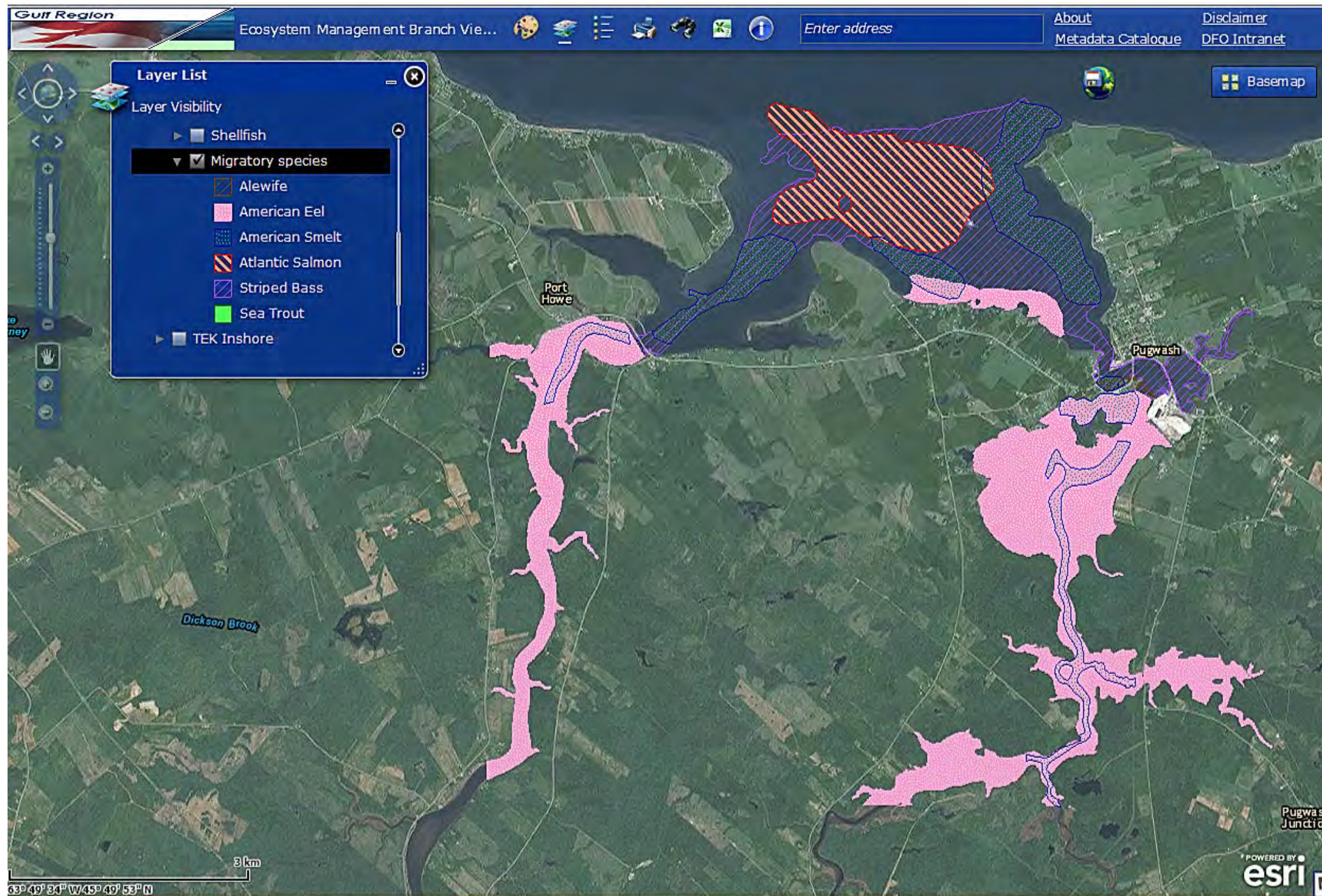
Table C-1
Community Aquatic Monitoring Program Data

Site	Station	Month	Year	Temperature	Salinity	Dis O2	sediment %	sediment %	MeanGrainSize	EELGRASS	WIDGEON	GREEN	BROWN	FUCUS	COMMON	COMMON	KELP	INVASIVE	Silicate	Phosphate	Nitrate=NO3+NO2	Ammonia	Nitrite
							humidity	Organic	um				FUZZY		RED	BROWN			(µM)	(µM)	(µM)	(µM)	(µM)
PUGW	2	8	2007	21.0	29.00	9.04				0.00	1.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	2.757	0.430	0.521	3.694	0.000
PUGW	3	8	2007	20.7	29.10	9.10				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.724	0.355	0.439	1.887	0.000
PUGW	4	8	2007	20.6	29.10	9.34				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1.845	0.421	0.449	3.088	0.000
PUGW	5	8	2007	20.4	28.50	8.56				0.08	0.00	0.00	0.00	0.73	0.00	0.00	0.00	0.00	1.833	0.376	0.517	2.946	0.000
PUGW	6	8	2007	20.2	29.40	9.06				0.00	0.00	0.00	0.00	0.40	0.00	0.00	0.00	0.00	1.543	0.361	0.439	2.594	0.000
PUGW	1	9	2007	19.1	25.30	8.21	30.83	2.17	192.60	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	3.896	0.478	0.690	2.686	0.049
PUGW	2	9	2007	24.7	27.40	13.72	86.55	50.37	281.35	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.007	0.417	0.555	1.015	0.015
PUGW	3	9	2007	19.1	26.60	9.44	14.43	0.44	1246.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.928	0.398	0.542	1.523	0.005
PUGW	4	9	2007	17.6	27.00	8.72	16.14	0.95	1881.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.500	0.318	0.500	0.693	0.000
PUGW	5	9	2007	19.2	26.90	10.68	20.96	0.60	348.05	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.433	0.383	0.521	0.495	0.000
PUGW	6	9	2007	18.1	26.40	10.26	16.99	0.98	769.47	0.00	0.00	0.00	0.00	0.00	0.40	0.00	0.40	0.00	0.344	0.380	0.529	0.575	0.000
PUGW	1	5	2006	12.9	26.90	7.77				2.63	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	2	5	2006	12.8	27.10	5.09				0.63	0.00	0.04	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	3	5	2006	12.8	27.10	4.12				0.00	0.00	0.02	0.00	0.04	0.00	0.00	0.00	0.00					
PUGW	1	6	2006	18.8	21.70	6.67				2.33	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	2	6	2006	18.7	23.80	6.20				1.21	0.00	0.00	0.00	0.25	0.00	0.00	0.00	0.00					
PUGW	3	6	2006	17.3	25.60	7.61				0.00	0.00	0.08	0.00	0.42	0.00	0.00	0.00	0.00					
PUGW	1	7	2006	25.3	27.10	7.55				2.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	2	7	2006	24.0	27.50	8.48				2.58	0.48	0.00	0.00	0.08	0.00	0.00	0.00	0.00					
PUGW	3	7	2006	21.9	27.70	8.05				0.23	0.00	0.27	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	1	8	2006	20.2	27.10	6.18				0.00	1.92	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	2	8	2006	20.1	27.60	6.69				0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	3	8	2006	19.1	28.40	6.76				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	1	5	2005	9.9	19.90	9.64				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	2	5	2005	8.5	20.30	8.84				0.00	0.00	0.00	0.00	0.50	0.00	0.00	0.00	0.00					
PUGW	3	5	2005	8.2	26.40	9.45				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	1	6	2005	18.3	23.30	8.60				0.58	0.00	0.04	0.00	0.04	0.00	0.00	0.00	0.00					
PUGW	2	6	2005	17.6	25.40	8.95				0.17	0.00	0.00	0.00	0.06	0.00	0.00	0.00	0.00					
PUGW	3	6	2005	15.0	26.70	9.40				0.00	0.00	0.50	0.00	0.67	0.00	0.00	0.00	0.00					
PUGW	1	7	2005	19.3	25.50	11.54				1.25	0.00	0.02	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	2	7	2005	18.4	26.40	8.51				0.38	0.00	0.38	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	3	7	2005	17.8	26.40	8.32				0.00	0.00	0.00	0.00	0.83	0.00	0.00	0.00	0.00					
PUGW	1	8	2005	24.2	27.20	7.41				0.44	0.00	0.50	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	2	8	2005	22.9	27.60	7.30				0.25	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	3	8	2005	21.1	27.40	8.13				0.00	0.00	0.71	0.00	1.46	0.00	0.00	0.00	0.00					
PUGW	1	9	2005	18.6	28.40	7.89	65.01	8.45	140.00	0.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	2	9	2005	17.4	28.50	7.70	43.28	3.74	173.00	0.23	0.00	0.00	0.00	0.04	0.00	0.00	0.00	0.00					
PUGW	3	9	2005	17.5	28.50	7.72	21.48	0.42	458.00	0.00	0.00	0.00	0.00	0.42	0.00	0.00	0.00	0.00					
PUGW	1	7	2004	20.5	27.20	6.53				0.00	0.00	0.25	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	2	7	2004	21.5	27.60	7.06				0.00	0.00	1.00	0.00	0.25	0.00	0.00	0.00	0.00					
PUGW	3	7	2004	22.7	27.90	7.50				0.17	0.00	0.00	0.00	0.17	0.00	0.00	0.00	0.00					
PUGW	1	8	2004	22.7	28.40	6.52				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	2	8	2004	21.7	28.90	7.25				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	3	8	2004	22.5	28.80	8.06				0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	1	9	2004	16.7	28.30	7.10	17.95	0.62	477.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					
PUGW	2	9	2004	16.1	28.50	7.40	48.78	4.20	198.95	0.00	0.00	0.56	0.00	0.06	0.00	0.00	0.00	0.00					
PUGW	3	9	2004	16.2	28.30	7.65	15.69	8.44	368.44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00					

Appendix 2D

TRADITIONAL FISHING KNOWLEDGE MAPS (TFK)





Appendix 2E

ATLANTIC CANADA CONSERVATION DATA CENTRE (ACDC)
DATA REPORT

Data Report 5830: Pugwash Harbour, NS

Prepared 20 April 2017
by J. Churchill, Data Manager

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Map 1. A 100 km buffer around the study area

1.0 PREFACE

The Atlantic Canada Conservation Data Centre (ACCDC) is part of a network of NatureServe data centres and heritage programs serving 50 states in the U.S.A, 10 provinces and 1 territory in Canada, plus several Central and South American countries. The NatureServe network is more than 30 years old and shares a common conservation data methodology. The ACCDC was founded in 1997, and maintains data for the jurisdictions of New Brunswick, Nova Scotia, Prince Edward Island, and Newfoundland and Labrador. Although a non-governmental agency, the ACCDC is supported by 6 federal agencies and 4 provincial governments, as well as through outside grants and data processing fees. URL: www.ACCDC.com.

Upon request and for a fee, the ACCDC queries its database and produces customized reports of the rare and endangered flora and fauna known to occur in or near a specified study area. As a supplement to that data, the ACCDC includes locations of managed areas with some level of protection, and known sites of ecological interest or sensitivity.

1.1 DATA LIST

Included datasets:

Filename	Contents
PugwashHrNS_5830ob.xls	All Rare and legally protected <i>Flora and Fauna</i> in your study area
PugwashHrNS_5830ob100km.xls	A list of Rare and legally protected <i>Flora and Fauna</i> within 100 km of your study area
PugwashHrNS_5830ma.xls	All <i>Managed Areas</i> in your study area
PugwashHrNS_5830sa.xls	All <i>Significant Natural Areas</i> in your study area
PugwashHrNS_5830bc.xls	Rare and common <i>Colonial Birds</i> in your study area

1.2 RESTRICTIONS

The ACCDC makes a strong effort to verify the accuracy of all the data that it manages, but it shall not be held responsible for any inaccuracies in data that it provides. By accepting ACCDC data, recipients assent to the following limits of use:

- a) Data is restricted to use by trained personnel who are sensitive to landowner interests and to potential threats to rare and/or endangered flora and fauna posed by the information provided.
- b) Data is restricted to use by the specified Data User; any third party requiring data must make its own data request.
- c) The ACCDC requires Data Users to cease using and delete data 12 months after receipt, and to make a new request for updated data if necessary at that time.
- d) ACCDC data responses are restricted to the data in our Data System at the time of the data request.
- e) Each record has an estimate of locational uncertainty, which must be referenced in order to understand the record's relevance to a particular location. Please see attached Data Dictionary for details.
- f) ACCDC data responses are not to be construed as exhaustive inventories of taxa in an area.
- g) The absence of a taxon cannot be inferred by its absence in an ACCDC data response.

1.3 ADDITIONAL INFORMATION

The attached file DataDictionary 2.1.pdf provides metadata for the data provided.

Please direct any additional questions about ACCDC data to the following individuals:

Plants, Lichens, Ranking Methods, All other Inquiries

Sean Blaney, Senior Scientist, Executive Director
Tel: (506) 364-2658
sblaney@mta.ca

Animals (Fauna)

John Klymko, Zoologist
Tel: (506) 364-2660
jklymko@mta.ca

Plant Communities

Sarah Robinson, Community Ecologist
Tel: (506) 364-2664
srobinson@mta.ca

Data Management, GIS

James Churchill, Data Manager
Tel: (902) 679-6146
jchurchill@mta.ca

Billing

Jean Breau
Tel: (506) 364-2657
jrbreau@mta.ca

Questions on the biology of Federal Species at Risk can be directed to ACCDC: (506) 364-2658, with questions on Species at Risk regulations to: Samara Eaton, Canadian Wildlife Service (NB and PE): (506) 364-5060 or Julie McKnight, Canadian Wildlife Service (NS): (902) 426-4196.

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in New Brunswick, please contact Stewart Lusk, Natural Resources: (506) 453-7110.

For provincial information about rare taxa and protected areas, or information about game animals, deer yards, old growth forests, archeological sites, fish habitat etc., in Nova Scotia, please contact Sherman Boates, NSDNR: (902) 679-6146. To determine if location-sensitive species (section 4.3) occur near your study site please contact a NSDNR Regional Biologist:

Western: Duncan Bayne
(902) 648-3536
Duncan.Bayne@novascotia.ca

Western: Donald Sam
(902) 634-7525
Donald.Sam@novascotia.ca

Central: Shavonne Meyer
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Central: Kimberly George
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Eastern: Mark Pulsifer
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Eastern: Donald Anderson
(902) 295-3949
Donald.Anderson@novascotia.ca

Eastern: Terry Power
(902) 563-3370
Terrance.Power@novascotia.ca

For provincial information about rare taxa and protected areas, or information about game animals, fish habitat etc., in Prince Edward Island, please contact Garry Gregory, PEI Dept. of Communities, Land and Environment: (902) 569-7595.

2.0 RARE AND ENDANGERED SPECIES

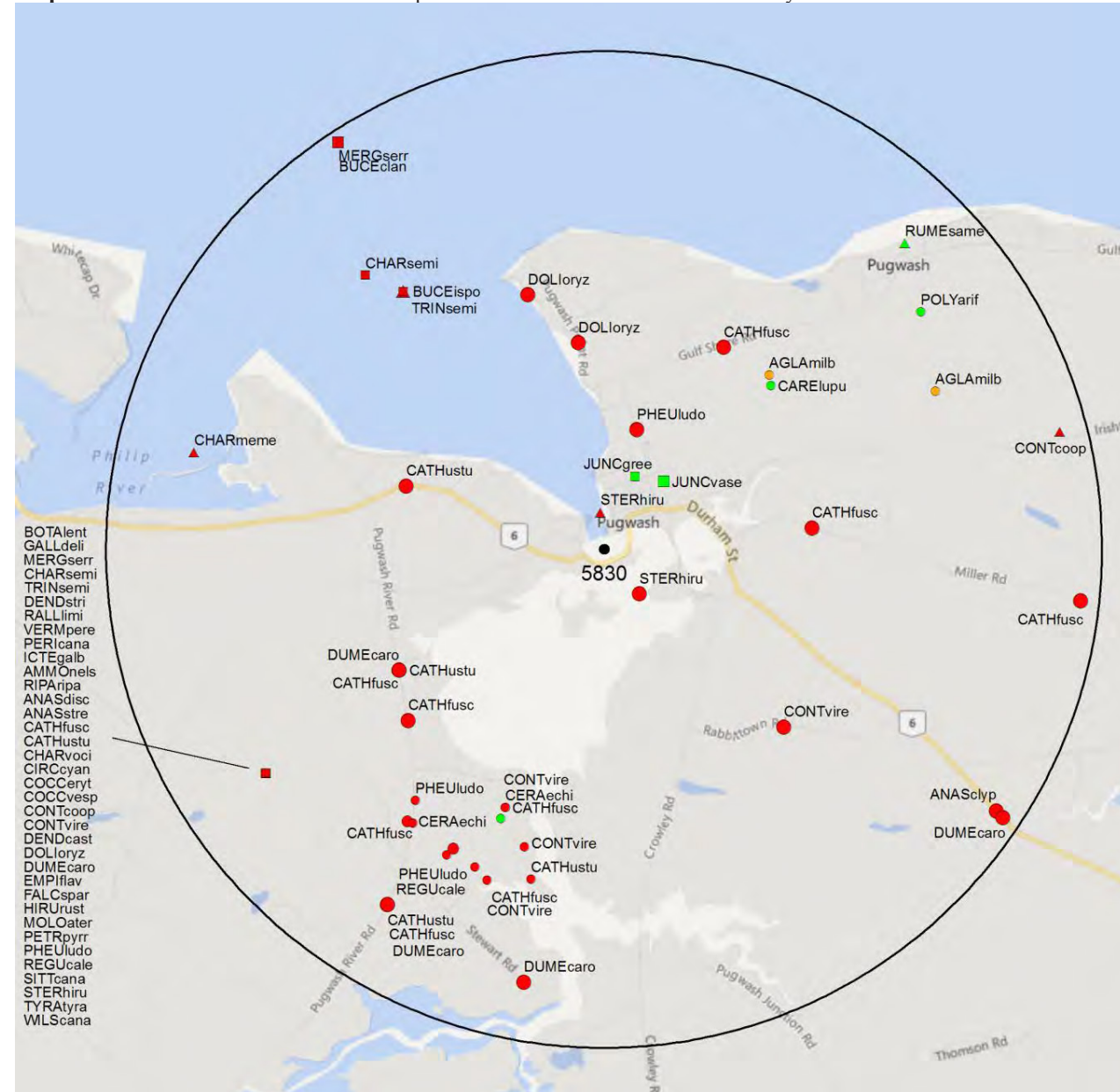
2.1 FLORA

The study area contains 7 records of 6 vascular, no records of nonvascular flora (Map 2 and attached: *ob.xls).

2.2 FAUNA

The study area contains 147 records of 40 vertebrate, 2 records of 1 invertebrate fauna (Map 2 and attached data files - see 1.1 Data List). Please see section 4.3 to determine if 'location-sensitive' species occur near your study site.

Map 2: Known observations of rare and/or protected flora and fauna within the study area.



3.0 SPECIAL AREAS

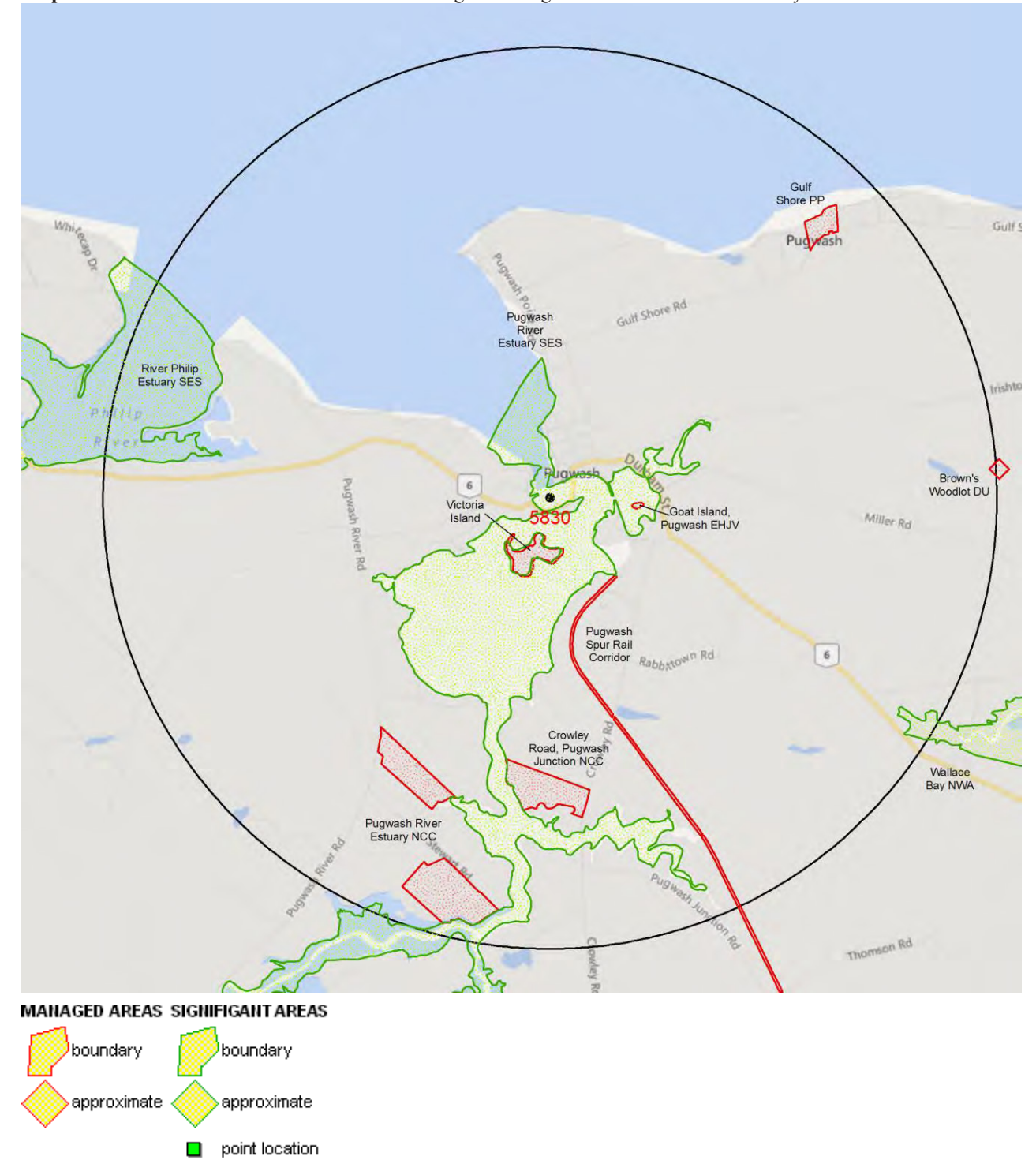
3.1 MANAGED AREAS

The GIS scan identified 7 managed areas in the vicinity of the study area (Map 3 and attached file: *ma*.xls)

3.2 SIGNIFICANT AREAS

The GIS scan identified 3 biologically significant sites in the vicinity of the study area (Map 3 and attached file: *sa*.xls)

Map 3: Boundaries and/or locations of known Managed and Significant Areas within the study area.



4.0 RARE SPECIES LISTS

Rare and/or endangered taxa (excluding “location-sensitive” species, section 4.3) within the study area listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation (\pm the precision, in km, of the record). [P] = vascular plant, [N] = nonvascular plant, [A] = vertebrate animal, [I] = invertebrate animal, [C] = community. Note: records are from attached files *ob.xls/*ob.shp only.

4.1 FLORA

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
P	<i>Juncus vaseyi</i>	Vasey Rush				S1	2 May Be At Risk	1	0.9 \pm 10.0
P	<i>Juncus Greenei</i>	Greene's Rush				S1S2	2 May Be At Risk	1	0.8 \pm 5.0
P	<i>Polygonum arifolium</i>	Halberd-leaved Tearthumb				S2	3 Sensitive	1	4.0 \pm 0.0
P	<i>Rumex salicifolius</i> var. <i>mexicanus</i>	Triangular-valve Dock				S2	3 Sensitive	1	4.3 \pm 0.0
P	<i>Ceratophyllum echinatum</i>	Prickly Hornwort				S2S3	3 Sensitive	2	2.8 \pm 0.0
P	<i>Carex lupulina</i>	Hop Sedge				S3	4 Secure	1	2.3 \pm 0.0

4.2 FAUNA

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	<i>Charadrius melodus melodus</i>	Piping Plover melodus ssp	Endangered	Endangered	Endangered	S1B	1 At Risk	4	4.2 \pm 0.0
A	<i>Riparia riparia</i>	Bank Swallow	Threatened			S2S3B	2 May Be At Risk	2	4.1 \pm 7.0
A	<i>Hirundo rustica</i>	Barn Swallow	Threatened		Endangered	S3B	1 At Risk	5	4.1 \pm 7.0
A	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Threatened	Threatened	Threatened	S3B	1 At Risk	2	4.1 \pm 7.0
A	<i>Wilsonia canadensis</i>	Canada Warbler	Threatened	Threatened	Endangered	S3S4B	1 At Risk	4	4.1 \pm 7.0
A	<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened		Vulnerable	S3S4B	3 Sensitive	7	2.1 \pm 0.0
A	<i>Bucephala islandica</i> (Eastern pop.)	Barrow's Goldeneye - Eastern pop.	Special Concern	Special Concern		S1N	1 At Risk	1	3.3 \pm 1.0
A	<i>Contopus virens</i>	Eastern Wood-Pewee	Special Concern		Vulnerable	S3S4B	3 Sensitive	7	2.5 \pm 0.0
A	<i>Sterna hirundo</i>	Common Tern	Not At Risk			S3B	3 Sensitive	6	0.4 \pm 0.0
A	<i>Circus cyaneus</i>	Northern Harrier	Not At Risk			S3S4B	4 Secure	4	4.1 \pm 7.0
A	<i>Ammodramus nelsoni</i>	Nelson's Sparrow	Not At Risk			S3S4B	4 Secure	5	4.1 \pm 7.0
A	<i>Charadrius semipalmatus</i>	Semipalmated Plover				S1B,S3S4M	4 Secure	2	3.6 \pm 7.0
A	<i>Anas clypeata</i>	Northern Shoveler				S2B	2 May Be At Risk	1	4.7 \pm 0.0
A	<i>Anas strepera</i>	Gadwall				S2B	2 May Be At Risk	1	4.1 \pm 7.0
A	<i>Molothrus ater</i>	Brown-headed Cowbird				S2B	4 Secure	2	4.1 \pm 7.0
A	<i>Bucephala clangula</i>	Common Goldeneye				S2B,S5N	4 Secure	3	4.9 \pm 10.0
A	<i>Rallus limicola</i>	Virginia Rail				S2S3B	5 Undetermined	1	4.1 \pm 7.0
A	<i>Tringa semipalmata</i>	Willet				S2S3B	2 May Be At Risk	6	3.3 \pm 7.0
A	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow				S2S3B	2 May Be At Risk	5	4.1 \pm 7.0
A	<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak				S2S3B	3 Sensitive	10	1.2 \pm 0.0
A	<i>Icterus galbula</i>	Baltimore Oriole				S2S3B	2 May Be At Risk	2	4.1 \pm 7.0
A	<i>Perisoreus canadensis</i>	Gray Jay				S3	3 Sensitive	1	4.1 \pm 7.0
A	<i>Sitta canadensis</i>	Red-breasted Nuthatch				S3	4 Secure	2	4.1 \pm 7.0
A	<i>Falco sparverius</i>	American Kestrel				S3B	4 Secure	3	4.1 \pm 7.0
A	<i>Charadrius vociferus</i>	Killdeer				S3B	3 Sensitive	2	4.1 \pm 7.0
A	<i>Gallinago delicata</i>	Wilson's Snipe				S3B	3 Sensitive	4	4.1 \pm 7.0
A	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo				S3B	2 May Be At Risk	1	4.1 \pm 7.0
A	<i>Tyrannus tyrannus</i>	Eastern Kingbird				S3B	3 Sensitive	4	4.1 \pm 7.0
A	<i>Dumetella carolinensis</i>	Gray Catbird				S3B	2 May Be At Risk	7	2.4 \pm 0.0
A	<i>Botaurus lentiginosus</i>	American Bittern				S3S4B	3 Sensitive	3	4.1 \pm 7.0
A	<i>Anas discors</i>	Blue-winged Teal				S3S4B	2 May Be At Risk	4	4.1 \pm 7.0
A	<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher				S3S4B	3 Sensitive	1	4.1 \pm 7.0
A	<i>Regulus calendula</i>	Ruby-crowned Kinglet				S3S4B	3 Sensitive	5	3.4 \pm 0.0
A	<i>Catharus fuscescens</i>	Veery				S3S4B	4 Secure	12	2.1 \pm 0.0
A	<i>Catharus ustulatus</i>	Swainson's Thrush				S3S4B	4 Secure	7	2.1 \pm 0.0

	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)
A	<i>Vermivora peregrina</i>	Tennessee Warbler				S3S4B	3 Sensitive	2	4.1 ± 7.0
A	<i>Dendroica castanea</i>	Bay-breasted Warbler				S3S4B	3 Sensitive	1	4.1 ± 7.0
A	<i>Dendroica striata</i>	Blackpoll Warbler				S3S4B	3 Sensitive	1	4.1 ± 7.0
A	<i>Coccothraustes vespertinus</i>	Evening Grosbeak				S3S4B,S3N	4 Secure	4	4.1 ± 7.0
A	<i>Mergus serrator</i>	Red-breasted Merganser				S3S4B,S5N	4 Secure	3	4.1 ± 7.0
I	<i>Aglais milberti</i>	Milbert's Tortoiseshell				S2	4 Secure	2	2.4 ± 0.0

4.3 LOCATION SENSITIVE SPECIES

The Department of Natural Resources in each Maritimes province considers a number of species “location sensitive”. Concern about exploitation of location-sensitive species precludes inclusion of precise coordinates in this report. Those intersecting your study area are indicated below with “YES”.

Nova Scotia

Scientific Name	Common Name	SARA	Prov Legal Prot	Known within the Study Site?
<i>Fraxinus nigra</i>	Black Ash		Threatened	YES
<i>Emydoidea blandingii</i>	Blanding's Turtle - Nova Scotia pop.	Endangered	Vulnerable	No
<i>Glyptemys insculpta</i>	Wood Turtle	Threatened	Threatened	No
<i>Falco peregrinus pop. 1</i>	Peregrine Falcon - anatum/tundrius pop.	Special Concern	Vulnerable	No
<i>Bat Hibernaculum</i>		[Endangered]¹	[Endangered]¹	No

¹ *Myotis lucifugus* (Little Brown Myotis), *Myotis septentrionalis* (Long-eared Myotis), and *Perimyotis subflavus* (Tri-colored Bat or Eastern Pipistrelle) are all Endangered under the Federal Species at Risk Act and the NS Endangered Species Act.

4.4 SOURCE BIBLIOGRAPHY

The recipient of these data shall acknowledge the ACCDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

# recs	CITATION
71	Lepage, D. 2014. Maritime Breeding Bird Atlas Database. Bird Studies Canada, Sackville NB, 407,838 recs.
54	Erskine, A.J. 1992. Maritime Breeding Bird Atlas Database. NS Museum & Nimbus Publ., Halifax, 82,125 recs.
13	Blaney, C.S.; Mazerolle, D.M. 2012. Fieldwork 2012. Atlantic Canada Conservation Data Centre, 13,278 recs.
5	Blaney, C.S.; Mazerolle, D.M.; Klymko, J.; Spicer, C.D. 2006. Fieldwork 2006. Atlantic Canada Conservation Data Centre. Sackville NB, 8399 recs.
5	Staff, DNR 2007. Restricted & Limited Use Land Database (RLUL).
4	Amirault, D.L. & Stewart, J. 2007. Piping Plover Database 1894-2006. Canadian Wildlife Service, Sackville, 3344 recs, 1228 new.
4	Hicks, Andrew. 2009. Coastal Waterfowl Surveys Database, 2000-08. Canadian Wildlife Service, Sackville, 46488 recs (11149 non-zero).
3	Benjamin, L.K. (compiler) 2012. Significant Habitat & Species Database. NS Dept of Natural Resources.
1	Atlantic Canada Conservation Area Database (ARCAD)
1	Benjamin, L.K. (compiler). 2007. Significant Habitat & Species Database. Nova Scotia Dept Natural Resources, 8439 recs.
1	Daury, R.W. & Bateman, M.C. 1996. The Barrow's Goldeneye (<i>Bucephala islandica</i>) in the Atlantic Provinces and Maine. Canadian Wildlife Service, Sackville, 47pp.
1	NSDNR website
1	Roland, A.E. & Smith, E.C. 1969. The Flora of Nova Scotia, 1st Ed. Nova Scotia Museum, Halifax, 743pp.
1	Wilhelm, S.I. et al. 2011. Colonial Waterbird Database.
1	Wilhelm, S.I. et al. 2011. Colonial Waterbird Database. Canadian Wildlife Service, Sackville, 2698 sites, 9718 recs (8192 obs).
1	Zinck, M. & Roland, A.E. 1998. Roland's Flora of Nova Scotia. Nova Scotia Museum, 3rd ed., rev. M. Zinck; 2 Vol., 1297 pp.

5.0 RARE SPECIES WITHIN 100 KM

A 100 km buffer around the study area contains 53202 records of 142 vertebrate and 1126 records of 63 invertebrate fauna; 6129 records of 287 vascular, 96 records of 57 nonvascular flora (attached: *ob100km.xls).

Taxa within 100 km of the study site that are rare and/or endangered in the province in which the study site occurs. All ranks correspond to the province in which the study site falls, even for out-of-province records. Taxa are listed in order of concern, beginning with legally listed taxa, with the number of observations per taxon and the distance in kilometers from study area centroid to the closest observation (± the precision, in km, of the record).

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
A	<i>Myotis lucifugus</i>	Little Brown Myotis	Endangered	Endangered	Endangered	S1	1 At Risk	92	40.7 ± 0.0	NS
A	<i>Myotis septentrionalis</i>	Northern Long-eared Myotis	Endangered	Endangered	Endangered	S1	1 At Risk	97	40.7 ± 0.0	NS
A	<i>Perimyotis subflavus</i>	Eastern Pipistrelle	Endangered	Endangered	Endangered	S1	1 At Risk	16	65.3 ± 1.0	NS
A	<i>Salmo salar pop. 1</i>	Atlantic Salmon - Inner Bay of Fundy pop.	Endangered	Endangered		S1	2 May Be At Risk	27	41.5 ± 1.0	NS
A	<i>Charadrius melodus melodus</i>	Piping Plover melodus ssp	Endangered	Endangered	Endangered	S1B	1 At Risk	2342	4.2 ± 0.0	NS
A	<i>Morone saxatilis pop. 2</i>	Striped Bass- Bay of Fundy pop.	Endangered			S1B	2 May Be At Risk	1	95.6 ± 0.0	NS
A	<i>Dermochelys coriacea (Atlantic pop.)</i>	Leatherback Sea Turtle - Atlantic pop.	Endangered	Endangered		S1S2N		2	38.7 ± 1.0	NB
A	<i>Calidris canutus rufa</i>	Red Knot rufa ssp	Endangered		Endangered	S2M	1 At Risk	891	32.6 ± 0.0	NS
A	<i>Caprimulgus vociferus</i>	Whip-Poor-Will	Threatened	Threatened	Threatened	S1?B	1 At Risk	10	18.1 ± 7.0	NS
A	<i>Catharus bicknelli</i>	Bicknell's Thrush	Threatened	Special Concern	Endangered	S1S2B	1 At Risk	3	15.5 ± 7.0	NS
A	<i>Glyptemys insculpta</i>	Wood Turtle	Threatened	Threatened	Threatened	S2	3 Sensitive	194	8.0 ± 1.0	NS
A	<i>Acipenser oxyrinchus</i>	Atlantic Sturgeon	Threatened			S2	2 May Be At Risk	5	82.6 ± 0.0	NS
A	<i>Anguilla rostrata</i>	American Eel	Threatened			S2	4 Secure	9	41.4 ± 1.0	NS
A	<i>Chaetura pelagica</i>	Chimney Swift	Threatened	Threatened	Endangered	S2B,S1M	1 At Risk	132	13.9 ± 7.0	NS
A	<i>Chordeiles minor</i>	Common Nighthawk	Threatened	Threatened	Threatened	S2S3B	1 At Risk	255	7.0 ± 7.0	NS
A	<i>Riparia riparia</i>	Bank Swallow	Threatened			S2S3B	2 May Be At Risk	774	4.1 ± 7.0	NS
A	<i>Hirundo rustica</i>	Barn Swallow	Threatened		Endangered	S3B	1 At Risk	1149	4.1 ± 7.0	NS
A	<i>Contopus cooperi</i>	Olive-sided Flycatcher	Threatened	Threatened	Threatened	S3B	1 At Risk	631	4.1 ± 7.0	NS
A	<i>Wilsonia canadensis</i>	Canada Warbler	Threatened	Threatened	Endangered	S3S4B	1 At Risk	534	4.1 ± 7.0	NS
A	<i>Dolichonyx oryzivorus</i>	Bobolink	Threatened		Vulnerable	S3S4B	3 Sensitive	1110	2.1 ± 0.0	NS
A	<i>Sturnella magna</i>	Eastern Meadowlark	Threatened			SHB	3 Sensitive	6	48.6 ± 1.0	NB
A	<i>Ixobrychus exilis</i>	Least Bittern	Threatened	Threatened		SUB	5 Undetermined	13	40.3 ± 0.0	NS
A	<i>Hylocichla mustelina</i>	Wood Thrush	Threatened			SUB	5 Undetermined	39	40.6 ± 0.0	NS
A	<i>Falco peregrinus pop. 1</i>	Peregrine Falcon - anatum/tundrius	Special Concern	Special Concern	Vulnerable	S1B,SNAM	3 Sensitive	237	32.8 ± 0.0	NB
A	<i>Bucephala islandica (Eastern pop.)</i>	Barrow's Goldeneye - Eastern pop.	Special Concern	Special Concern		S1N	1 At Risk	93	3.3 ± 1.0	NS
A	<i>Asio flammeus</i>	Short-eared Owl	Special Concern	Special Concern		S1S2B	2 May Be At Risk	48	16.8 ± 7.0	NS
A	<i>Euphagus carolinus</i>	Rusty Blackbird	Special Concern	Special Concern	Endangered	S2B	2 May Be At Risk	129	7.8 ± 0.0	NS
A	<i>Balaenoptera physalus</i>	Fin Whale - Atlantic pop.	Special Concern	Special Concern		S2S3		1	92.0 ± 1.0	NB
A	<i>Phalaropus lobatus</i>	Red-necked Phalarope	Special Concern			S2S3M	3 Sensitive	21	35.7 ± 1.0	NB
A	<i>Chelydra serpentina</i>	Snapping Turtle	Special Concern	Special Concern	Vulnerable	S3	3 Sensitive	30	27.6 ± 0.0	NS
A	<i>Contopus virens</i>	Eastern Wood-Pewee	Special Concern		Vulnerable	S3S4B	3 Sensitive	770	2.5 ± 0.0	NS
A	<i>Podiceps auritus</i>	Horned Grebe	Special Concern			S4N	4 Secure	49	32.8 ± 0.0	NB
A	<i>Tryngites subruficollis</i>	Buff-breasted Sandpiper	Special Concern			SNA	8 Accidental	12	52.7 ± 2.0	NB
A	<i>Lynx canadensis</i>	Canadian Lynx	Not At Risk		Endangered	S1	1 At Risk	4	71.1 ± 1.0	NB
A	<i>Accipiter cooperii</i>	Cooper's Hawk	Not At Risk			S1?B	5 Undetermined	4	74.0 ± 7.0	NS
A	<i>Fulica americana</i>	American Coot	Not At Risk			S1B	5 Undetermined	58	39.6 ± 0.0	NS
A	<i>Chlidonias niger</i>	Black Tern	Not At Risk			S1B	2 May Be At Risk	38	40.3 ± 0.0	NS
A	<i>Sorex dispar</i>	Long-tailed Shrew	Not At Risk	Special Concern		S2	3 Sensitive	6	41.3 ± 5.0	NS
A	<i>Aegolius funereus</i>	Boreal Owl	Not At Risk			S2?B	5 Undetermined	11	29.0 ± 0.0	NS
A	<i>Glaucomys volans</i>	Southern Flying Squirrel	Not At Risk	Special Concern		S2S3	3 Sensitive	1	97.9 ± 10.0	NS
A	<i>Hemidactylium</i>	Four-toed Salamander	Not At Risk			S3	4 Secure	3	16.3 ± 0.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
	<i>scutatatum</i>									
A	<i>Sterna hirundo</i>	Common Tern	Not At Risk			S3B	3 Sensitive	574	0.4 ± 0.0	NS
A	<i>Sialia sialis</i>	Eastern Bluebird	Not At Risk			S3B	3 Sensitive	164	10.2 ± 7.0	NS
A	<i>Buteo lagopus</i>	Rough-legged Hawk	Not At Risk			S3N	4 Secure	4	35.7 ± 1.0	NB
A	<i>Accipiter gentilis</i>	Northern Goshawk	Not At Risk			S3S4	4 Secure	120	13.9 ± 7.0	NS
A	<i>Lagenorhynchus acutus</i>	Atlantic White-sided Dolphin	Not At Risk			S3S4		2	43.4 ± 1.0	PE
A	<i>Circus cyaneus</i>	Northern Harrier	Not At Risk			S3S4B	4 Secure	539	4.1 ± 7.0	NS
A	<i>Ammodramus nelsoni</i>	Nelson's Sparrow	Not At Risk			S3S4B	4 Secure	299	4.1 ± 7.0	NS
A	<i>Alces americanus</i>	Moose			Endangered	S1	1 At Risk	84	13.2 ± 0.0	NS
A	<i>Salmo salar</i>	Atlantic Salmon				S1	2 May Be At Risk	40	7.4 ± 0.0	NS
A	<i>Picoides dorsalis</i>	American Three-toed Woodpecker				S1?	5 Undetermined	9	8.5 ± 7.0	NS
A	<i>Passerina cyanea</i>	Indigo Bunting				S1?B	5 Undetermined	25	51.0 ± 0.0	NS
A	<i>Nycticorax nycticorax</i>	Black-crowned Night-heron				S1B	2 May Be At Risk	4	48.5 ± 1.0	NB
A	<i>Anas acuta</i>	Northern Pintail				S1B	2 May Be At Risk	149	7.0 ± 7.0	NS
A	<i>Oxyura jamaicensis</i>	Ruddy Duck				S1B	4 Secure	93	32.4 ± 1.0	NB
A	<i>Gallinula chloropus</i>	Common Moorhen				S1B	5 Undetermined	37	23.0 ± 0.0	NS
A	<i>Myiarchus crinitus</i>	Great Crested Flycatcher				S1B	2 May Be At Risk	28	13.9 ± 7.0	NS
A	<i>Cistothorus palustris</i>	Marsh Wren				S1B	5 Undetermined	43	29.3 ± 3.0	NB
A	<i>Mimus polyglottos</i>	Northern Mockingbird				S1B	4 Secure	115	13.9 ± 7.0	NS
A	<i>Toxostoma rufum</i>	Brown Thrasher				S1B	5 Undetermined	14	14.4 ± 0.0	NS
A	<i>Vireo gilvus</i>	Warbling Vireo				S1B	5 Undetermined	35	29.3 ± 7.0	NS
A	<i>Dendroica pinus</i>	Pine Warbler				S1B	5 Undetermined	54	23.2 ± 7.0	NS
A	<i>Calidris minutilla</i>	Least Sandpiper				S1B,S3M	4 Secure	1650	19.5 ± 0.0	NS
A	<i>Charadrius semipalmatus</i>	Semipalmated Plover				S1B,S3S4M	4 Secure	2727	3.6 ± 7.0	NS
A	<i>Pluvialis dominica</i>	American Golden-Plover				S1S2M	3 Sensitive	283	32.6 ± 0.0	NS
A	<i>Limosa haemastica</i>	Hudsonian Godwit				S1S2M	3 Sensitive	733	35.7 ± 1.0	NB
A	<i>Vireo philadelphicus</i>	Philadelphia Vireo				S2?B	5 Undetermined	53	13.6 ± 7.0	NS
A	<i>Anas clypeata</i>	Northern Shoveler				S2B	2 May Be At Risk	194	4.7 ± 0.0	NS
A	<i>Anas strepera</i>	Gadwall				S2B	2 May Be At Risk	246	4.1 ± 7.0	NS
A	<i>Empidonax traillii</i>	Willow Flycatcher				S2B	3 Sensitive	30	38.3 ± 7.0	PE
A	<i>Dendroica tigrina</i>	Cape May Warbler				S2B	3 Sensitive	234	13.6 ± 7.0	NS
A	<i>Piranga olivacea</i>	Scarlet Tanager				S2B	5 Undetermined	21	32.9 ± 7.0	NS
A	<i>Poocetes gramineus</i>	Vesper Sparrow				S2B	2 May Be At Risk	86	13.9 ± 7.0	NS
A	<i>Molothrus ater</i>	Brown-headed Cowbird				S2B	4 Secure	248	4.1 ± 7.0	NS
A	<i>Bucephala clangula</i>	Common Goldeneye				S2B,S5N	4 Secure	133	4.9 ± 10.0	NS
A	<i>Branta bernicla</i>	Brant				S2M	3 Sensitive	30	12.3 ± 0.0	NS
A	<i>Phalacrocorax carbo</i>	Great Cormorant				S2S3	3 Sensitive	93	33.2 ± 1.0	NB
A	<i>Asio otus</i>	Long-eared Owl				S2S3	2 May Be At Risk	31	27.8 ± 7.0	NS
A	<i>Carduelis pinus</i>	Pine Siskin				S2S3	3 Sensitive	295	7.0 ± 7.0	NS
A	<i>Cathartes aura</i>	Turkey Vulture				S2S3B	3 Sensitive	92	34.5 ± 0.0	NB
A	<i>Rallus limicola</i>	Virginia Rail				S2S3B	5 Undetermined	116	4.1 ± 7.0	NS
A	<i>Tringa semipalmata</i>	Willet				S2S3B	2 May Be At Risk	1634	3.3 ± 7.0	NS
A	<i>Petrochelidon pyrrhonota</i>	Cliff Swallow				S2S3B	2 May Be At Risk	401	4.1 ± 7.0	NS
A	<i>Pheucticus ludovicianus</i>	Rose-breasted Grosbeak				S2S3B	3 Sensitive	601	1.2 ± 0.0	NS
A	<i>Icterus galbula</i>	Baltimore Oriole				S2S3B	2 May Be At Risk	84	4.1 ± 7.0	NS
A	<i>Pinicola enucleator</i>	Pine Grosbeak				S2S3B,S5N	2 May Be At Risk	67	7.0 ± 7.0	NS
A	<i>Numenius phaeopus hudsonicus</i>	Hudsonian Whimbrel				S2S3M	3 Sensitive	474	35.7 ± 1.0	NB
A	<i>Calidris melanotos</i>	Pectoral Sandpiper				S2S3M	4 Secure	461	31.3 ± 0.0	NS
A	<i>Phalaropus fulicarius</i>	Red Phalarope				S2S3M	3 Sensitive	2	75.1 ± 0.0	PE
A	<i>Perisoreus canadensis</i>	Gray Jay				S3	3 Sensitive	380	4.1 ± 7.0	NS
A	<i>Poecile hudsonica</i>	Boreal Chickadee				S3	3 Sensitive	456	7.0 ± 7.0	NS
A	<i>Sitta canadensis</i>	Red-breasted Nuthatch				S3	4 Secure	892	4.1 ± 7.0	NS

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A	<i>Alosa pseudoharengus</i>	Alewife				S3	3 Sensitive	14	20.1 ± 0.0	NS
A	<i>Salvelinus fontinalis</i>	Brook Trout				S3	3 Sensitive	10	49.3 ± 0.0	NS
A	<i>Sorex maritimensis</i>	Maritime Shrew				S3	4 Secure	105	49.9 ± 1.0	NB
A	<i>Synaptomys cooperi</i>	Southern Bog Lemming				S3	4 Secure	17	88.8 ± 0.0	NS
A	<i>Pekania pennanti</i>	Fisher				S3	3 Sensitive	2	38.9 ± 5.0	NB
A	<i>Calidris maritima</i>	Purple Sandpiper				S3?N	3 Sensitive	67	35.7 ± 10.0	NB
A	<i>Calcarius lapponicus</i>	Lapland Longspur				S3?N	4 Secure	38	32.8 ± 0.0	NB
A	<i>Falco sparverius</i>	American Kestrel				S3B	4 Secure	539	4.1 ± 7.0	NS
A	<i>Charadrius vociferus</i>	Killdeer				S3B	3 Sensitive	1046	4.1 ± 7.0	NS
A	<i>Gallinago delicata</i>	Wilson's Snipe				S3B	3 Sensitive	834	4.1 ± 7.0	NS
A	<i>Sterna paradisaea</i>	Arctic Tern				S3B	2 May Be At Risk	28	33.8 ± 0.0	NB
A	<i>Coccyzus erythrophthalmus</i>	Black-billed Cuckoo				S3B	2 May Be At Risk	120	4.1 ± 7.0	NS
A	<i>Tyrannus tyrannus</i>	Eastern Kingbird				S3B	3 Sensitive	469	4.1 ± 7.0	NS
A	<i>Dumetella carolinensis</i>	Gray Catbird				S3B	2 May Be At Risk	475	2.4 ± 0.0	NS
A	<i>Wilsonia pusilla</i>	Wilson's Warbler				S3B	3 Sensitive	81	12.7 ± 7.0	NS
A	<i>Tringa melanoleuca</i>	Greater Yellowlegs				S3B,S3S4M	3 Sensitive	2983	5.3 ± 0.0	NS
A	<i>Oceanodroma leucorhoa</i>	Leach's Storm-Petrel				S3B,S5M	4 Secure	1	69.6 ± 0.0	NB
A	<i>Rissa tridactyla</i>	Black-legged Kittiwake				S3B,S5N	3 Sensitive	3	42.2 ± 0.0	NS
A	<i>Fratercula arctica</i>	Atlantic Puffin				S3B,S5N	3 Sensitive	1	33.8 ± 0.0	NB
A	<i>Pluvialis squatarola</i>	Black-bellied Plover				S3M	4 Secure	2895	12.1 ± 0.0	NS
A	<i>Tringa flavipes</i>	Lesser Yellowlegs				S3M	4 Secure	1777	19.5 ± 0.0	NS
A	<i>Arenaria interpres</i>	Ruddy Turnstone				S3M	4 Secure	1395	19.5 ± 0.0	NS
A	<i>Calidris pusilla</i>	Semipalmated Sandpiper				S3M	3 Sensitive	3073	19.5 ± 0.0	NS
A	<i>Calidris fuscicollis</i>	White-rumped Sandpiper				S3M	4 Secure	1223	19.5 ± 0.0	NS
A	<i>Limnodromus griseus</i>	Short-billed Dowitcher				S3M	4 Secure	1783	6.1 ± 0.0	NS
A	<i>Calidris alba</i>	Sanderling				S3M,S2N	4 Secure	2181	19.5 ± 0.0	NS
A	<i>Chroicocephalus ridibundus</i>	Black-headed Gull				S3N	4 Secure	10	29.3 ± 4.0	NB
A	<i>Somateria mollissima</i>	Common Eider				S3S4	4 Secure	154	29.8 ± 12.0	NS
A	<i>Picoides arcticus</i>	Black-backed Woodpecker				S3S4	3 Sensitive	98	13.6 ± 7.0	NS
A	<i>Loxia curvirostra</i>	Red Crossbill				S3S4	4 Secure	90	11.0 ± 0.0	NS
A	<i>Sorex palustris</i>	American Water Shrew				S3S4	4 Secure	4	49.9 ± 1.0	NB
A	<i>Botaurus lentiginosus</i>	American Bittern				S3S4B	3 Sensitive	332	4.1 ± 7.0	NS
A	<i>Anas discors</i>	Blue-winged Teal				S3S4B	2 May Be At Risk	441	4.1 ± 7.0	NS
A	<i>Actitis macularius</i>	Spotted Sandpiper				S3S4B	3 Sensitive	946	7.0 ± 7.0	NS
A	<i>Empidonax flaviventris</i>	Yellow-bellied Flycatcher				S3S4B	3 Sensitive	415	4.1 ± 7.0	NS
A	<i>Regulus calendula</i>	Ruby-crowned Kinglet				S3S4B	3 Sensitive	1180	3.4 ± 0.0	NS
A	<i>Catharus fuscescens</i>	Veery				S3S4B	4 Secure	487	2.1 ± 0.0	NS
A	<i>Catharus ustulatus</i>	Swainson's Thrush				S3S4B	4 Secure	1237	2.1 ± 0.0	NS
A	<i>Vermivora peregrina</i>	Tennessee Warbler				S3S4B	3 Sensitive	369	4.1 ± 7.0	NS
A	<i>Dendroica castanea</i>	Bay-breasted Warbler				S3S4B	3 Sensitive	388	4.1 ± 7.0	NS
A	<i>Dendroica striata</i>	Blackpoll Warbler				S3S4B	3 Sensitive	52	4.1 ± 7.0	NS
A	<i>Passerella iliaca</i>	Fox Sparrow				S3S4B	4 Secure	9	44.3 ± 7.0	NS
A	<i>Coccothraustes vespertinus</i>	Evening Grosbeak				S3S4B,S3N	4 Secure	352	4.1 ± 7.0	NS
A	<i>Mergus serrator</i>	Red-breasted Merganser				S3S4B,S5N	4 Secure	180	4.1 ± 7.0	NS
A	<i>Bucephala albeola</i>	Bufflehead				S3S4N	4 Secure	68	18.3 ± 11.0	NS
A	<i>Leucophaeus atricilla</i>	Laughing Gull				SHB	4 Secure	8	32.5 ± 0.0	NB
A	<i>Progne subis</i>	Purple Martin				SHB	2 May Be At Risk	47	18.1 ± 7.0	NS
A	<i>Eremophila alpestris</i>	Horned Lark				SHB,S4S5N	4 Secure	23	33.2 ± 1.0	NB
A	<i>Morus bassanus</i>	Northern Gannet				SHB,S5M	4 Secure	116	28.3 ± 0.0	NB
A	<i>Aythya americana</i>	Redhead				SHB,SNAM	4 Secure	10	43.5 ± 7.0	NS
I	<i>Barnea truncata</i>	Atlantic Mud-piddock	Threatened			S1	1 At Risk	1	50.5 ± 1.0	NS
I	<i>Alasmidonta varicosa</i>	Brook Floater	Special Concern		Threatened	S1S2	3 Sensitive	10	22.1 ± 0.0	NS
I	<i>Danaus plexippus</i>	Monarch	Special Concern	Special Concern		S2B	3 Sensitive	75	6.2 ± 0.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
	<i>Bombus terricola</i>	Yellow-banded Bumblebee	Special Concern			S3	3 Sensitive	11	34.6 ± 1.0	NS
	<i>Papilio brevicauda bretonensis</i>	Short-tailed Swallowtail				S1	1 At Risk	1	75.3 ± 0.0	NB
	<i>Satyrium acadica</i>	Acadian Hairstreak				S1	5 Undetermined	15	48.1 ± 0.0	NS
	<i>Erora laeta</i>	Early Hairstreak				S1	2 May Be At Risk	2	47.9 ± 0.0	PE
	<i>Somatochlora brevicincta</i>	Quebec Emerald				S1	2 May Be At Risk	1	55.2 ± 1.0	NS
	<i>Leptodea ochracea</i>	Tidewater Mucket				S1	3 Sensitive	22	37.5 ± 0.0	NS
	<i>Strophitus undulatus</i>	Creepers				S1	2 May Be At Risk	6	22.2 ± 1.0	NS
	<i>Chlosyne nycteis</i>	Silvery Checkerspot				S1?	5 Undetermined	4	81.6 ± 0.0	NB
	<i>Polygonia comma</i>	Eastern Comma				S1?	1 At Risk	3	73.9 ± 0.0	PE
	<i>Polygonia satyrus</i>	Satyr Comma				S1?	3 Sensitive	5	58.2 ± 100.0	PE
	<i>Nymphalis l-album</i>	Compton Tortoiseshell				S1S2	4 Secure	9	58.2 ± 100.0	PE
	<i>Somatochlora kennedyi</i>	Kennedy's Emerald				S1S2	2 May Be At Risk	8	37.5 ± 0.0	NS
	<i>Coenagrion resolutum</i>	Taiga Bluet				S1S2	2 May Be At Risk	66	35.3 ± 0.0	NB
	<i>Stylurus scudderi</i>	Zebra Clubtail				S1S2	2 May Be At Risk	4	92.4 ± 0.0	NB
	<i>Lycaena hyllus</i>	Bronze Copper				S2	4 Secure	80	6.8 ± 0.0	NS
	<i>Lycaena dospassosi</i>	Salt Marsh Copper				S2	1 At Risk	95	7.5 ± 0.0	NS
	<i>Satyrium calanus</i>	Banded Hairstreak				S2	5 Undetermined	2	48.5 ± 1.0	NS
	<i>Boloria chariclea</i>	Arctic Fritillary				S2	3 Sensitive	13	39.0 ± 1.0	NS
	<i>Aglais milberti</i>	Milbert's Tortoiseshell				S2	4 Secure	17	2.4 ± 0.0	NS
	<i>Epitheca princeps</i>	Prince Baskettail				S2	3 Sensitive	9	16.6 ± 0.0	NS
	<i>Somatochlora williamsoni</i>	Williamson's Emerald				S2	2 May Be At Risk	23	34.5 ± 0.0	NB
	<i>Williamsonia fletcheri</i>	Ebony Boghaunter				S2	2 May Be At Risk	9	16.3 ± 0.0	NS
	<i>Margaritifera margaritifera</i>	Eastern Pearlshell				S2	3 Sensitive	126	12.4 ± 1.0	NS
	<i>Pantala hymenaea</i>	Spot-Winged Glider				S2?B	3 Sensitive	3	55.2 ± 1.0	NS
	<i>Thorybes pylades</i>	Northern Cloudywing				S2S3	3 Sensitive	8	48.1 ± 1.0	NS
	<i>Amblyscirtes hegon</i>	Pepper and Salt Skipper				S2S3	4 Secure	7	87.9 ± 5.0	NB
	<i>Satyrium liparops</i>	Striped Hairstreak				S2S3	5 Undetermined	6	11.0 ± 0.0	NS
	<i>Satyrium liparops strigosum</i>	Striped Hairstreak				S2S3	3 Sensitive	8	60.0 ± 10.0	PE
	<i>Euphydryas phaeton</i>	Baltimore Checkerspot				S2S3	4 Secure	38	31.8 ± 1.0	NS
	<i>Gomphus desertus</i>	Harpoon Clubtail				S2S3	3 Sensitive	5	18.2 ± 1.0	NS
	<i>Ophiogomphus aspersus</i>	Brook Snaketail				S2S3	2 May Be At Risk	4	21.3 ± 0.0	NS
	<i>Ophiogomphus mainensis</i>	Maine Snaketail				S2S3	2 May Be At Risk	2	60.0 ± 0.0	NS
	<i>Somatochlora forcipata</i>	Forcipate Emerald				S2S3	2 May Be At Risk	3	81.6 ± 1.0	PE
	<i>Somatochlora franklini</i>	Delicate Emerald				S2S3	3 Sensitive	6	16.3 ± 1.0	NS
	<i>Alasmidonta undulata</i>	Triangle Floater				S2S3	4 Secure	26	60.0 ± 10.0	NS
	<i>Carabus maeander</i>	a Ground Beetle				S3	3 Sensitive	1	90.4 ± 1.0	NB
	<i>Hippodamia parenthesis</i>	Parenthesis Lady Beetle				S3	5 Undetermined	5	90.4 ± 1.0	NB
	<i>Chilocorus stigma</i>	Twice-stabbed Lady Beetle				S3	4 Secure	2	90.4 ± 1.0	NB
	<i>Naemia seriata</i>	a Ladybird beetle				S3	3 Sensitive	1	94.8 ± 1.0	NS
	<i>Callophrys henrici</i>	Henry's Elfin				S3	4 Secure	3	72.0 ± 0.0	PE
	<i>Callophrys lanoraieensis</i>	Bog Elfin				S3	2 May Be At Risk	12	55.8 ± 0.0	NB
	<i>Speyeria aphrodite</i>	Aphrodite Fritillary				S3	4 Secure	18	39.6 ± 1.0	NS
	<i>Polygonia faunus</i>	Green Comma				S3	4 Secure	17	21.3 ± 0.0	NS
	<i>Megisto cymela</i>	Little Wood-satyr				S3	4 Secure	25	7.7 ± 0.0	NS
	<i>Oeneis jutta</i>	Jutta Arctic				S3	2 May Be At Risk	17	35.8 ± 0.0	NS
	<i>Aeshna clepsydra</i>	Mottled Darner				S3	4 Secure	1	98.0 ± 0.0	NS
	<i>Aeshna constricta</i>	Lance-Tipped Darner				S3	4 Secure	35	20.5 ± 0.0	NS

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I	<i>Boyeria graefiana</i>	Ocellated Darner				S3	3 Sensitive	5	20.5 ± 0.0	NS
I	<i>Gomphaeschna furcillata</i>	Harlequin Darner				S3	3 Sensitive	4	71.4 ± 0.0	PE
I	<i>Somatochlora tenebrosa</i>	Clamp-Tipped Emerald				S3	4 Secure	5	28.3 ± 0.0	NS
I	<i>Nannothemis bella</i>	Elfin Skimmer				S3	4 Secure	17	38.2 ± 0.0	NS
I	<i>Sympetrum danae</i>	Black Meadowhawk				S3	3 Sensitive	6	59.4 ± 1.0	PE
I	<i>Enallagma vernale</i>	Vernal Bluet				S3	5 Undetermined	3	18.2 ± 1.0	NS
I	<i>Amphiagrion saucium</i>	Eastern Red Damsel				S3	4 Secure	8	60.1 ± 1.0	NS
I	<i>Polygonia interrogans</i>	Question Mark				S3B	4 Secure	97	11.6 ± 0.0	NS
I	<i>Erynnis juvenalis</i>	Juvenal's Duskywing				S3S4	4 Secure	1	48.5 ± 1.0	NS
I	<i>Amblyscirtes vialis</i>	Common Roadside-Skipper				S3S4	4 Secure	12	34.5 ± 0.0	NS
I	<i>Polygonia progne</i>	Grey Comma				S3S4	4 Secure	37	20.4 ± 0.0	NS
I	<i>Lanthus parvulus</i>	Northern Pygmy Clubtail				S3S4	4 Secure	6	20.5 ± 0.0	NS
I	<i>Lampsilis radiata</i>	Eastern Lampmussel				S3S4	3 Sensitive	55	11.9 ± 0.0	NS
N	<i>Peltigera hydrothyria</i>	Eastern Waterfan	Threatened			S1	2 May Be At Risk	3	36.4 ± 1.0	NS
N	<i>Sclerophora peronella</i> (Nova Scotia pop.)	Frosted Glass-whiskers Lichen - Nova Scotia pop.	Special Concern	Special Concern		S1?		1	91.9 ± 0.0	NS
N	<i>Degelia plumbea</i>	Blue Felt Lichen	Special Concern	Special Concern	Vulnerable	S3	4 Secure	1	82.2 ± 0.0	NS
N	<i>Fissidens exilis</i>	Pygmy Pocket Moss	Not At Risk			S1S2	1 At Risk	3	84.9 ± 1.0	NS
N	<i>Collema cristatum</i>	Fingered Tarpaper Lichen				S1	5 Undetermined	3	96.8 ± 0.0	NS
N	<i>Peltigera lepidophora</i>	Scaly Pelt Lichen				S1	2 May Be At Risk	1	95.1 ± 0.0	NS
N	<i>Aloina rigida</i>	Aloe-Like Rigid Screw Moss				S1?	2 May Be At Risk	2	25.3 ± 0.0	NS
N	<i>Campylostelium saxicola</i>	a Moss				S1?	3 Sensitive	2	47.7 ± 0.0	PE
N	<i>Tortula obtusifolia</i>	a Moss				S1?	5 Undetermined	2	60.7 ± 1.0	NS
N	<i>Paludella squarrosa</i>	Tufted Fen Moss				S1?	3 Sensitive	2	95.7 ± 0.0	NS
N	<i>Aulacomnium heterostichum</i>	One-sided Groove Moss				S1S2	3 Sensitive	1	58.9 ± 1.0	NS
N	<i>Plagiothecium latebricola</i>	Alder Silk Moss				S1S2	3 Sensitive	1	55.0 ± 3.0	NS
N	<i>Timmia megapolitana</i>	Metropolitan Timmia Moss				S1S2	3 Sensitive	3	32.0 ± 0.0	NS
N	<i>Tortula mucronifolia</i>	Mucronate Screw Moss				S1S2	3 Sensitive	1	81.6 ± 3.0	NS
N	<i>Bryohaplcladium microphyllum</i>	Tiny-leaved Haplcladium Moss				S1S2		1	60.1 ± 5.0	NS
N	<i>Anacamptodon splachnoides</i>	a Moss				S2?	3 Sensitive	1	55.0 ± 3.0	NS
N	<i>Anomodon viticulosus</i>	a Moss				S2?	3 Sensitive	1	21.9 ± 5.0	NS
N	<i>Atrichum angustatum</i>	Lesser Smoothcap Moss				S2?	3 Sensitive	2	44.7 ± 5.0	NS
N	<i>Campylium polygamum</i>	a Moss				S2?	5 Undetermined	1	57.0 ± 0.0	PE
N	<i>Ditrichum rhynchostegium</i>	a Moss				S2?	3 Sensitive	1	66.2 ± 0.0	PE
N	<i>Philonotis marchica</i>	a Moss				S2?	5 Undetermined	2	63.3 ± 0.0	NS
N	<i>Saelania glaucescens</i>	Blue Dew Moss				S2?	3 Sensitive	1	39.8 ± 0.0	NS
N	<i>Seligeria donniana</i>	Donian Beardless Moss				S2?	3 Sensitive	1	38.7 ± 3.0	NS
N	<i>Pseudotaxiphyllum distichaceum</i>	a Moss				S2?	3 Sensitive	1	67.1 ± 1.0	NB
N	<i>Cyrtomnium hymenophylloides</i>	Short-pointed Lantern Moss				S2?	3 Sensitive	1	39.8 ± 0.0	NS
N	<i>Leptogium teretiusculum</i>	Beaded Jellyskin Lichen				S2?	3 Sensitive	2	93.0 ± 0.0	NS
N	<i>Peltigera collina</i>	Tree Pelt Lichen				S2?	3 Sensitive	1	99.7 ± 2.0	NS
N	<i>Ephemerum serratum</i>	a Moss				S2S3	3 Sensitive	2	60.5 ± 3.0	NS
N	<i>Eurhynchium hians</i>	Light Beaked Moss				S2S3	3 Sensitive	2	99.6 ± 25.0	NS
N	<i>Platydictya subtilis</i>	Bark Willow Moss				S2S3	3 Sensitive	4	47.7 ± 0.0	PE
N	<i>Tortula truncata</i>	a Moss				S2S3	3 Sensitive	1	84.3 ± 300.0	NS

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N	<i>Limprichtia revolvens</i>	a Moss				S2S3	3 Sensitive	1	95.6 ± 0.0	NS
N	<i>Solorina saccata</i>	Woodland Owl Lichen				S2S3	2 May Be At Risk	4	96.8 ± 0.0	NS
N	<i>Leptogium milligranum</i>	Stretched Jellyskin Lichen				S2S3	3 Sensitive	1	81.0 ± 0.0	NS
N	<i>Parmeliopsis ambigua</i>	Green Starburst Lichen				S2S3	3 Sensitive	1	73.6 ± 4.0	PE
N	<i>Collema nigrescens</i>	Blistered Tarpaper Lichen				S3	3 Sensitive	1	44.6 ± 0.0	NS
N	<i>Sticta fuliginosa</i>	Peppered Moon Lichen				S3	3 Sensitive	2	16.3 ± 0.0	NS
N	<i>Fuscopannaria ahlneri</i>	Corrugated Shingles Lichen				S3	4 Secure	1	34.7 ± 0.0	NS
N	<i>Heterodermia speciosa</i>	Powdered Fringe Lichen				S3	4 Secure	1	82.2 ± 0.0	NS
N	<i>Leptogium lichenoides</i>	Tattered Jellyskin Lichen				S3	2 May Be At Risk	5	95.8 ± 0.0	NS
N	<i>Nephroma bellum</i>	Naked Kidney Lichen				S3	3 Sensitive	1	83.9 ± 0.0	NS
N	<i>Calliergon giganteum</i>	Giant Spear Moss				S3?	3 Sensitive	1	90.0 ± 2.0	PE
N	<i>Anomodon tristis</i>	a Moss				S3?	3 Sensitive	6	81.5 ± 1.0	NS
N	<i>Helodium blandowii</i>	Wetland-plume Moss				S3?	4 Secure	2	58.4 ± 3.0	NS
N	<i>Mnium stellare</i>	Star Leafy Moss				S3?	5 Undetermined	2	58.9 ± 1.0	NS
N	<i>Sphagnum riparium</i>	Streamside Peat Moss				S3?	3 Sensitive	1	96.5 ± 0.0	PE
N	<i>Cladina stygia</i>	Black-footed Reindeer Lichen				S3?	3 Sensitive	1	54.9 ± 0.0	NB
N	<i>Anomodon rugelii</i>	Rugel's Anomodon Moss				S3S4	3 Sensitive	1	84.7 ± 0.0	NS
N	<i>Dicranum leioneuron</i>	a Dicranum Moss				S3S4	4 Secure	1	71.0 ± 0.0	NB
N	<i>Encalypta procerca</i>	Slender Extinguisher Moss				S3S4	4 Secure	1	38.7 ± 3.0	NS
N	<i>Myurella julacea</i>	Small Mouse-tail Moss				S3S4	3 Sensitive	1	39.8 ± 0.0	NS
N	<i>Thamnobryum alleghaniense</i>	a Moss				S3S4	3 Sensitive	3	57.7 ± 4.0	NS
N	<i>Hylocomiastrum pyrenaicum</i>	a Feather Moss				S3S4	3 Sensitive	1	38.7 ± 3.0	NS
N	<i>Leptogium saturninum</i>	Bearded Jellyskin Lichen				S3S4	5 Undetermined	1	93.0 ± 0.0	NS
N	<i>Parmeliopsis hyperopta</i>	Gray Starburst Lichen				S3S4	5 Undetermined	1	62.1 ± 1.0	NS
N	<i>Bryoria capillaris</i>	Gray Horsehair Lichen				S3S4	5 Undetermined	3	73.6 ± 4.0	PE
N	<i>Evernia prunastri</i>	Valley Oakmoss Lichen				S3S4	3 Sensitive	1	73.6 ± 4.0	PE
P	<i>Bartonia paniculata ssp. paniculata</i>	Branched Bartonia	Threatened	Threatened		SNA		1	98.3 ± 10.0	NS
P	<i>Lilaeopsis chinensis</i>	Eastern Lilaeopsis	Special Concern	Special Concern	Vulnerable	S2	3 Sensitive	16	9.4 ± 0.0	NS
P	<i>Isoetes prototypus</i>	Prototype Quillwort	Special Concern	Special Concern	Vulnerable	S2	3 Sensitive	13	36.1 ± 0.0	NS
P	<i>Floerkea proserpinacoides</i>	False Mermaidweed	Not At Risk			S2	3 Sensitive	1	63.8 ± 7.0	NS
P	<i>Cypripedium arietinum</i>	Ram's-Head Lady's-Slipper			Endangered	S1	1 At Risk	74	16.1 ± 0.0	NS
P	<i>Thuja occidentalis</i>	Eastern White Cedar			Vulnerable	S1	1 At Risk	95	8.0 ± 0.0	NS
P	<i>Acer saccharinum</i>	Silver Maple				S1	5 Undetermined	2	73.4 ± 20.0	PE
P	<i>Sanicula odorata</i>	Clustered Sanicle				S1	2 May Be At Risk	10	67.7 ± 10.0	NS
P	<i>Zizia aurea</i>	Golden Alexanders				S1	2 May Be At Risk	36	56.4 ± 1.0	NS
P	<i>Antennaria parlinii</i>	a Pussytoes				S1	2 May Be At Risk	11	55.4 ± 0.0	NS
P	<i>Bidens hyperborea</i>	Estuary Beggarticks				S1	2 May Be At Risk	2	13.1 ± 0.0	NS
P	<i>Prenanthes racemosa</i>	Glaucous Rattlesnakeroot				S1	2 May Be At Risk	2	73.4 ± 20.0	PE
P	<i>Ageratina altissima</i>	White Snakeroot				S1	2 May Be At Risk	2	86.6 ± 0.0	NB
P	<i>Cynoglossum virginianum var. boreale</i>	Wild Comfrey				S1	2 May Be At Risk	3	99.6 ± 1.0	NS
P	<i>Draba glabella</i>	Rock Whitlow-Grass				S1	2 May Be At Risk	2	81.1 ± 0.0	NS
P	<i>Lobelia spicata</i>	Pale-Spiked Lobelia				S1	2 May Be At Risk	14	7.3 ± 5.0	NS
P	<i>Stellaria crassifolia</i>	Fleshy Stitchwort				S1	2 May Be At Risk	4	61.8 ± 5.0	PE
P	<i>Hudsonia tomentosa</i>	Woolly Beach-heath				S1	2 May Be At Risk	67	47.3 ± 0.0	NB
P	<i>Elatine americana</i>	American Waterwort				S1	2 May Be At Risk	2	14.4 ± 0.0	NS
P	<i>Desmodium canadense</i>	Canada Tick-trefoil				S1	2 May Be At Risk	20	61.6 ± 5.0	NS
P	<i>Desmodium glutinosum</i>	Large Tick-Trefoil				S1	2 May Be At Risk	6	92.1 ± 0.0	NS
P	<i>Ribes americanum</i>	Wild Black Currant				S1	5 Undetermined	4	60.7 ± 5.0	NS

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P	<i>Fraxinus americana</i>	White Ash				S1	2 May Be At Risk	144	2.8 ± 0.0	NS
P	<i>Fraxinus pennsylvanica</i>	Red Ash				S1	2 May Be At Risk	6	66.0 ± 0.0	PE
P	<i>Polygonum achoreum</i>	Leathery Knotweed				S1	5 Undetermined	4	53.8 ± 0.0	NB
P	<i>Polygonum careyi</i>	Carey's Smartweed				S1	5 Undetermined	3	82.0 ± 3.0	NS
P	<i>Montia fontana</i>	Water Blinks				S1	2 May Be At Risk	2	61.2 ± 5.0	PE
P	<i>Clematis occidentalis</i>	Purple Clematis				S1	2 May Be At Risk	3	45.4 ± 0.0	NS
P	<i>Ranunculus pensylvanicus</i>	Pennsylvania Buttercup				S1	2 May Be At Risk	25	5.2 ± 0.0	NS
P	<i>Amelanchier nantucketensis</i>	Nantucket Serviceberry				S1	2 May Be At Risk	1	68.2 ± 1.0	NS
P	<i>Salix myrtilifolia</i>	Blueberry Willow				S1	2 May Be At Risk	24	77.5 ± 0.0	NB
P	<i>Agalinis pauperula</i> var. <i>borealis</i>	Small-flowered Agalinis				S1		9	27.2 ± 0.0	NS
P	<i>Dirca palustris</i>	Eastern Leatherwood				S1	2 May Be At Risk	43	80.1 ± 1.0	NB
P	<i>Boehmeria cylindrica</i>	Small-spike False-nettle				S1	2 May Be At Risk	2	95.6 ± 0.0	NS
P	<i>Pilea pumila</i>	Dwarf Clearweed				S1	2 May Be At Risk	45	64.8 ± 0.0	PE
P	<i>Carex chordorrhiza</i>	Creeping Sedge				S1	2 May Be At Risk	54	37.5 ± 0.0	NS
P	<i>Carex garberi</i>	Garber's Sedge				S1	2 May Be At Risk	5	64.0 ± 0.0	NS
P	<i>Carex granularis</i>	Limestone Meadow Sedge				S1	2 May Be At Risk	2	37.4 ± 0.0	NS
P	<i>Carex haydenii</i>	Hayden's Sedge				S1	2 May Be At Risk	3	25.7 ± 50.0	NS
P	<i>Carex pellita</i>	Woolly Sedge				S1	2 May Be At Risk	12	10.9 ± 0.0	NS
P	<i>Carex laxiflora</i>	Loose-Flowered Sedge				S1	2 May Be At Risk	1	88.3 ± 1.0	NS
P	<i>Carex ormostachya</i>	Necklace Spike Sedge				S1	2 May Be At Risk	1	36.4 ± 1.0	NB
P	<i>Carex plantaginea</i>	Plantain-Leaved Sedge				S1	2 May Be At Risk	3	60.4 ± 0.0	NS
P	<i>Carex prairea</i>	Prairie Sedge				S1	2 May Be At Risk	1	70.2 ± 0.0	PE
P	<i>Carex tenuiflora</i>	Sparse-Flowered Sedge				S1	2 May Be At Risk	5	37.6 ± 0.0	NS
P	<i>Carex tinctoria</i>	Tinged Sedge				S1	2 May Be At Risk	1	61.0 ± 5.0	PE
P	<i>Cyperus lupulinus</i> ssp. <i>macilentus</i>	Hop Flatsedge				S1	2 May Be At Risk	2	79.8 ± 0.0	NS
P	<i>Blysmus rufus</i>	Red Bulrush				S1	2 May Be At Risk	7	56.1 ± 1.0	PE
P	<i>Schoenoplectus torreyi</i>	Torrey's Bulrush				S1	2 May Be At Risk	1	90.6 ± 0.0	NB
P	<i>Juncus vaseyi</i>	Vasey Rush				S1	2 May Be At Risk	4	0.9 ± 10.0	NS
P	<i>Allium tricoccum</i>	Wild Leek				S1	2 May Be At Risk	17	50.3 ± 1.0	NS
P	<i>Malaxis brachypoda</i>	White Adder's-Mouth				S1	2 May Be At Risk	5	55.6 ± 1.0	NS
P	<i>Bromus latiglumis</i>	Broad-Glumed Brome				S1	2 May Be At Risk	31	18.6 ± 0.0	NS
P	<i>Calamagrostis stricta</i> ssp. <i>inexpansa</i>	Slim-stemmed Reed Grass				S1	3 Sensitive	1	47.1 ± 1.0	NB
P	<i>Elymus wiegandii</i>	Wiegand's Wild Rye				S1	2 May Be At Risk	21	20.0 ± 0.0	NS
P	<i>Elymus hystrix</i> var. <i>bigeloviana</i>	Spreading Wild Rye				S1	2 May Be At Risk	12	67.6 ± 1.0	NS
P	<i>Puccinellia fasciculata</i>	Saltmarsh Alkali Grass				S1	5 Undetermined	1	93.9 ± 1.0	NS
P	<i>Adiantum pedatum</i>	Northern Maidenhair Fern				S1	2 May Be At Risk	6	59.3 ± 1.0	NS
P	<i>Selaginella rupestris</i>	Rock Spikemoss				S1	2 May Be At Risk	1	99.9 ± 0.0	NS
P	<i>Solidago hispida</i>	Hairy Goldenrod				S1?	2 May Be At Risk	1	64.8 ± 10.0	NB
P	<i>Suaeda rolandii</i>	Roland's Sea-Blite				S1?	2 May Be At Risk	6	43.5 ± 7.0	NS
P	<i>Crataegus robinsonii</i>	Robinson's Hawthorn				S1?	5 Undetermined	3	60.7 ± 5.0	NS
P	<i>Carex pennsylvanica</i>	Pennsylvania Sedge				S1?	2 May Be At Risk	1	9.7 ± 0.0	NS
P	<i>Schoenoplectus robustus</i>	Sturdy Bulrush				S1?	5 Undetermined	2	11.2 ± 5.0	NS
P	<i>Dichanthelium acuminatum</i> var. <i>lindheimeri</i>	Woolly Panic Grass				S1?	5 Undetermined	1	87.7 ± 0.0	NS
P	<i>Fraxinus nigra</i>	Black Ash			Threatened	S1S2	1 At Risk	194	4.0 ± 0.0	NS
P	<i>Rudbeckia laciniata</i>	Cut-Leaved Coneflower				S1S2	2 May Be At Risk	27	17.1 ± 0.0	NS
P	<i>Arabis hirsuta</i> var. <i>pycnocarpa</i>	Western Hairy Rockcress				S1S2	2 May Be At Risk	2	61.0 ± 0.0	NS

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P	<i>Cardamine maxima</i>	Large Toothwort				S1S2	2 May Be At Risk	3	83.9 ± 0.0	PE
P	<i>Proserpinaca intermedia</i>	Intermediate Mermaidweed				S1S2	2 May Be At Risk	1	98.6 ± 0.0	NS
P	<i>Anemone virginiana var. alba</i>	Virginia Anemone				S1S2	3 Sensitive	5	58.6 ± 7.0	NS
P	<i>Hepatica nobilis var. obtusa</i>	Round-lobed Hepatica				S1S2	2 May Be At Risk	34	17.9 ± 0.0	NS
P	<i>Gratiola neglecta</i>	Clammy Hedge-Hyssop				S1S2	3 Sensitive	11	36.1 ± 0.0	NS
P	<i>Carex livida var. radicaulis</i>	Livid Sedge				S1S2	2 May Be At Risk	20	37.7 ± 0.0	NS
P	<i>Juncus greenei</i>	Greene's Rush				S1S2	2 May Be At Risk	10	0.8 ± 5.0	NS
P	<i>Juncus alpinoarticulatus ssp. nodulosus</i>	Richardson's Rush				S1S2	2 May Be At Risk	10	61.6 ± 3.0	PE
P	<i>Platanthera huronensis</i>	Fragrant Green Orchid				S1S2	5 Undetermined	1	95.2 ± 10.0	NS
P	<i>Calamagrostis stricta ssp. stricta</i>	Slim-stemmed Reed Grass				S1S2	3 Sensitive	7	40.4 ± 0.0	NS
P	<i>Cinna arundinacea</i>	Sweet Wood Reed Grass				S1S2	2 May Be At Risk	19	81.4 ± 0.0	NS
P	<i>Festuca subverticillata</i>	Nodding Fescue				S1S2	2 May Be At Risk	12	48.5 ± 0.0	NS
P	<i>Cryptogramma stelleri</i>	Steller's Rockbrake				S1S2	2 May Be At Risk	1	51.1 ± 0.0	NS
P	<i>Carex vacillans</i>	Estuarine Sedge				S1S3	5 Undetermined	1	48.1 ± 0.0	NB
P	<i>Conioselinum chinense</i>	Chinese Hemlock-parsley				S2	3 Sensitive	6	60.9 ± 0.0	NS
P	<i>Osmorhiza longistylis</i>	Smooth Sweet Cicely				S2	2 May Be At Risk	26	48.7 ± 1.0	NS
P	<i>Erigeron philadelphicus</i>	Philadelphia Fleabane				S2	3 Sensitive	8	37.0 ± 0.0	NB
P	<i>Lactuca hirsuta var. sanguinea</i>	Hairy Lettuce				S2	3 Sensitive	3	60.4 ± 5.0	PE
P	<i>Solidago multiradiata</i>	Multi-rayed Goldenrod				S2	2 May Be At Risk	10	77.6 ± 0.0	NB
P	<i>Symphotrichum undulatum</i>	Wavy-leaved Aster				S2	3 Sensitive	2	93.4 ± 1.0	NS
P	<i>Symphotrichum ciliolatum</i>	Fringed Blue Aster				S2	3 Sensitive	18	18.8 ± 0.0	NS
P	<i>Impatiens pallida</i>	Pale Jewelweed				S2	3 Sensitive	1	81.2 ± 1.0	NS
P	<i>Caulophyllum thalictroides</i>	Blue Cohosh				S2	2 May Be At Risk	55	12.8 ± 0.0	NS
P	<i>Arabis drummondii</i>	Drummond's Rockcress				S2	3 Sensitive	11	28.5 ± 2.0	NS
P	<i>Cardamine parviflora var. arenicola</i>	Small-flowered Bittercress				S2	3 Sensitive	3	80.8 ± 0.0	NS
P	<i>Draba arabisans</i>	Rock Whitlow-Grass				S2	3 Sensitive	12	66.1 ± 0.0	NS
P	<i>Stellaria humifusa</i>	Saltmarsh Starwort				S2	3 Sensitive	12	55.8 ± 1.0	PE
P	<i>Stellaria longifolia</i>	Long-leaved Starwort				S2	3 Sensitive	16	33.0 ± 0.0	NS
P	<i>Chenopodium rubrum</i>	Red Pigweed				S2	2 May Be At Risk	10	73.4 ± 20.0	PE
P	<i>Hudsonia ericoides</i>	Pinebarren Golden Heather				S2	3 Sensitive	5	73.4 ± 20.0	PE
P	<i>Hypericum majus</i>	Large St John's-wort				S2	3 Sensitive	7	24.1 ± 0.0	NS
P	<i>Crassula aquatica</i>	Water Pygmyweed				S2	3 Sensitive	2	77.7 ± 5.0	PE
P	<i>Myriophyllum farwellii</i>	Farwell's Water Milfoil				S2	3 Sensitive	11	22.9 ± 1.0	NS
P	<i>Myriophyllum verticillatum</i>	Whorled Water Milfoil				S2	3 Sensitive	15	40.4 ± 0.0	NS
P	<i>Oenothera fruticosa ssp. glauca</i>	Narrow-leaved Evening Primrose				S2	5 Undetermined	5	58.6 ± 7.0	NS
P	<i>Polygonum arifolium</i>	Halberd-leaved Tearthumb				S2	3 Sensitive	63	4.0 ± 0.0	NS
P	<i>Rumex salicifolius var. mexicanus</i>	Triangular-valve Dock				S2	3 Sensitive	4	4.3 ± 0.0	NS
P	<i>Primula mistassinica</i>	Mistassini Primrose				S2	3 Sensitive	16	58.6 ± 7.0	NS
P	<i>Anemone canadensis</i>	Canada Anemone				S2	2 May Be At Risk	1	98.1 ± 7.0	NS
P	<i>Anemone quinquefolia</i>	Wood Anemone				S2	3 Sensitive	17	20.8 ± 0.0	NS
P	<i>Anemone virginiana</i>	Virginia Anemone				S2	3 Sensitive	17	63.2 ± 0.0	NS

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P	<i>Anemone virginiana</i> <i>var. virginiana</i>	Virginia Anemone				S2	3 Sensitive	2	67.7 ± 7.0	NS
P	<i>Caltha palustris</i>	Yellow Marsh Marigold				S2	3 Sensitive	90	33.9 ± 1.0	NB
P	<i>Galium boreale</i>	Northern Bedstraw				S2	2 May Be At Risk	10	29.8 ± 5.0	NS
P	<i>Galium labradoricum</i>	Labrador Bedstraw				S2	3 Sensitive	39	36.1 ± 0.0	NB
P	<i>Salix pedicellaris</i>	Bog Willow				S2	3 Sensitive	59	39.2 ± 0.0	NS
P	<i>Comandra umbellata</i>	Bastard's Toadflax				S2	2 May Be At Risk	38	51.0 ± 1.0	NB
P	<i>Saxifraga paniculata</i> <i>ssp. neogaea</i>	White Mountain Saxifrage				S2	3 Sensitive	4	80.4 ± 1.0	NS
P	<i>Tiarella cordifolia</i>	Heart-leaved Foamflower				S2	3 Sensitive	216	41.6 ± 1.0	NS
P	<i>Viola nephrophylla</i>	Northern Bog Violet				S2	3 Sensitive	8	53.0 ± 1.0	NS
P	<i>Carex atratiformis</i>	Scabrous Black Sedge				S2	3 Sensitive	3	64.8 ± 1.0	NS
P	<i>Carex bebbii</i>	Bebb's Sedge				S2	3 Sensitive	25	19.7 ± 0.0	NS
P	<i>Carex capillaris</i>	Hairlike Sedge				S2	3 Sensitive	1	47.1 ± 0.0	NS
P	<i>Carex castanea</i>	Chestnut Sedge				S2	2 May Be At Risk	1	79.9 ± 0.0	NS
P	<i>Carex comosa</i>	Bearded Sedge				S2	3 Sensitive	9	31.7 ± 5.0	NS
P	<i>Carex hystericina</i>	Porcupine Sedge				S2	2 May Be At Risk	8	34.4 ± 1.0	NS
P	<i>Carex tenera</i>	Tender Sedge				S2	3 Sensitive	10	5.7 ± 0.0	NS
P	<i>Carex tuckermanii</i>	Tuckerman's Sedge				S2	3 Sensitive	37	12.9 ± 6.0	NS
P	<i>Vallisneria americana</i>	Wild Celery				S2	2 May Be At Risk	4	14.4 ± 0.0	NS
P	<i>Juncus stygius</i> <i>ssp.</i> <i>americanus</i>	Moor Rush				S2	3 Sensitive	13	37.3 ± 0.0	NS
P	<i>Allium schoenoprasum</i>	Wild Chives				S2	2 May Be At Risk	3	41.9 ± 1.0	NB
P	<i>Allium schoenoprasum</i> <i>var. sibiricum</i>	Wild Chives				S2	2 May Be At Risk	1	58.6 ± 7.0	NS
P	<i>Lilium canadense</i>	Canada Lily				S2	2 May Be At Risk	96	11.2 ± 0.0	NS
P	<i>Cypripedium</i> <i>parviflorum</i> <i>var.</i> <i>pubescens</i>	Yellow Lady's-slipper				S2	3 Sensitive	8	67.0 ± 5.0	PE
P	<i>Cypripedium</i> <i>parviflorum</i> <i>var.</i> <i>makasin</i>	Small Yellow Lady's-Slipper				S2	3 Sensitive	5	99.7 ± 0.0	NS
P	<i>Cypripedium reginae</i>	Showy Lady's-Slipper				S2	2 May Be At Risk	33	29.6 ± 3.0	NS
P	<i>Goodyera pubescens</i>	Downy Rattlesnake-Plantain				S2	3 Sensitive	5	91.9 ± 0.0	NS
P	<i>Platanthera flava</i> <i>var.</i> <i>flava</i>	Southern Rein Orchid				S2	3 Sensitive	1	98.1 ± 7.0	NS
P	<i>Platanthera flava</i> <i>var.</i> <i>herbiola</i>	Pale Green Orchid				S2	5 Undetermined	8	49.5 ± 0.0	NS
P	<i>Platanthera</i> <i>macrophylla</i>	Large Round-Leaved Orchid				S2	3 Sensitive	13	25.8 ± 0.0	NS
P	<i>Spiranthes lucida</i>	Shining Ladies'-Tresses				S2	2 May Be At Risk	24	49.4 ± 0.0	NS
P	<i>Calamagrostis stricta</i>	Slim-stemmed Reed Grass				S2	3 Sensitive	17	38.8 ± 0.0	NS
P	<i>Dichanthelium</i> <i>linearifolium</i>	Narrow-leaved Panic Grass				S2	3 Sensitive	5	63.4 ± 0.0	NS
P	<i>Piptatherum</i> <i>canadense</i>	Canada Rice Grass				S2	3 Sensitive	7	49.8 ± 1.0	NS
P	<i>Potamogeton friesii</i>	Fries' Pondweed				S2	2 May Be At Risk	23	47.4 ± 0.0	PE
P	<i>Potamogeton</i> <i>richardsonii</i>	Richardson's Pondweed				S2	2 May Be At Risk	5	56.7 ± 7.0	NS
P	<i>Dryopteris fragrans</i> <i>var. remotiuscula</i>	Fragrant Wood Fern				S2	3 Sensitive	11	39.0 ± 1.0	NS
P	<i>Woodsia glabella</i>	Smooth Cliff Fern				S2	3 Sensitive	2	39.4 ± 1.0	NS
P	<i>Symphyotrichum</i> <i>boreale</i>	Boreal Aster				S2?	3 Sensitive	19	34.9 ± 7.0	NS
P	<i>Cuscuta cephalanthi</i>	Buttonbush Dodder				S2?	5 Undetermined	4	74.4 ± 1.0	NS
P	<i>Epilobium coloratum</i>	Purple-veined Willowherb				S2?	3 Sensitive	5	54.1 ± 1.0	NB
P	<i>Rumex maritimus</i> <i>var.</i>	Peach-leaved Dock				S2?	2 May Be At Risk	5	58.9 ± 5.0	PE

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P	<i>persicarioides</i>									
P	<i>Crataegus submollis</i>	Quebec Hawthorn				S2?	5 Undetermined	4	29.1 ± 5.0	NS
P	<i>Carex peckii</i>	White-Tinged Sedge				S2?	2 May Be At Risk	4	56.9 ± 0.0	NS
P	<i>Eleocharis ovata</i>	Ovate Spikerush				S2?	3 Sensitive	13	23.3 ± 0.0	NS
P	<i>Scirpus pedicellatus</i>	Stalked Bulrush				S2?	3 Sensitive	8	5.5 ± 0.0	NS
P	<i>Potamogeton pulcher</i>	Spotted Pondweed			Vulnerable	S2S3	3 Sensitive	3	97.0 ± 2.0	NS
P	<i>Hieracium robinsonii</i>	Robinson's Hawkweed				S2S3	3 Sensitive	3	56.8 ± 7.0	NS
P	<i>Iva frutescens ssp. oraria</i>	Big-leaved Marsh-elder				S2S3	3 Sensitive	15	91.3 ± 0.0	NS
P	<i>Senecio pseudoarnica</i>	Seabeach Ragwort				S2S3	3 Sensitive	1	58.6 ± 7.0	NS
P	<i>Sagina nodosa ssp. borealis</i>	Knotted Pearlwort				S2S3	4 Secure	4	77.7 ± 5.0	PE
P	<i>Ceratophyllum echinatum</i>	Prickly Hornwort				S2S3	3 Sensitive	26	2.8 ± 0.0	NS
P	<i>Hypericum dissimulatum</i>	Disguised St John's-wort				S2S3	3 Sensitive	3	21.7 ± 0.0	NS
P	<i>Triosteum aurantiacum</i>	Orange-fruited Tinker's Weed				S2S3	3 Sensitive	49	49.8 ± 0.0	NS
P	<i>Shepherdia canadensis</i>	Soapberry				S2S3	3 Sensitive	51	77.5 ± 1.0	NB
P	<i>Empetrum eamesii ssp. atropurpureum</i>	Pink Crowberry				S2S3	3 Sensitive	4	74.9 ± 5.0	PE
P	<i>Empetrum eamesii ssp. eamesii</i>	Pink Crowberry				S2S3	3 Sensitive	2	48.8 ± 5.0	PE
P	<i>Chamaesyce polygonifolia</i>	Seaside Spurge				S2S3	3 Sensitive	12	30.6 ± 0.0	NB
P	<i>Hedeoma pulegioides</i>	American False Pennyroyal				S2S3	3 Sensitive	8	6.3 ± 5.0	NS
P	<i>Polygonum buxiforme</i>	Small's Knotweed				S2S3	5 Undetermined	6	48.3 ± 7.0	NS
P	<i>Polygonum raii</i>	Sharp-fruited Knotweed				S2S3	5 Undetermined	4	73.4 ± 5.0	PE
P	<i>Amelanchier fernaldii</i>	Fernald's Serviceberry				S2S3	5 Undetermined	4	24.9 ± 5.0	NS
P	<i>Potentilla canadensis</i>	Canada Cinquefoil				S2S3	3 Sensitive	1	68.0 ± 5.0	NS
P	<i>Galium aparine</i>	Common Bedstraw				S2S3	3 Sensitive	18	44.8 ± 8.0	NS
P	<i>Galium obtusum</i>	Blunt-leaved Bedstraw				S2S3	3 Sensitive	2	36.4 ± 1.0	NB
P	<i>Salix pellita</i>	Satiny Willow				S2S3	3 Sensitive	8	13.9 ± 7.0	NS
P	<i>Carex adusta</i>	Lesser Brown Sedge				S2S3	3 Sensitive	8	21.2 ± 0.0	NS
P	<i>Carex hirtifolia</i>	Pubescent Sedge				S2S3	3 Sensitive	46	18.6 ± 0.0	NS
P	<i>Carex houghtoniana</i>	Houghton's Sedge				S2S3	3 Sensitive	5	22.3 ± 0.0	NS
P	<i>Eleocharis olivacea</i>	Yellow Spikerush				S2S3	3 Sensitive	4	82.6 ± 0.0	NS
P	<i>Eriophorum gracile</i>	Slender Cottongrass				S2S3	3 Sensitive	52	18.5 ± 0.0	NS
P	<i>Coeloglossum viride var. virescens</i>	Long-bracted Frog Orchid				S2S3	2 May Be At Risk	3	42.0 ± 0.0	NS
P	<i>Cypripedium parviflorum</i>	Yellow Lady's-slipper				S2S3	3 Sensitive	344	35.7 ± 5.0	NS
P	<i>Poa glauca</i>	Glaucous Blue Grass				S2S3	3 Sensitive	5	80.4 ± 1.0	NS
P	<i>Stuckenia filiformis</i>	Thread-leaved Pondweed				S2S3	3 Sensitive	2	73.5 ± 20.0	PE
P	<i>Stuckenia filiformis ssp. alpina</i>	Thread-leaved Pondweed				S2S3	3 Sensitive	5	73.4 ± 20.0	PE
P	<i>Botrychium lanceolatum var. angustisegmentum</i>	Lance-Leaf Grape-Fern				S2S3	3 Sensitive	12	16.1 ± 1.0	NS
P	<i>Botrychium simplex</i>	Least Moonwort				S2S3	3 Sensitive	3	48.7 ± 0.0	NS
P	<i>Ophioglossum pusillum</i>	Northern Adder's-tongue				S2S3	3 Sensitive	10	42.0 ± 50.0	NS
P	<i>Angelica atropurpurea</i>	Purple-stemmed Angelica				S3	4 Secure	25	17.8 ± 2.0	NS
P	<i>Erigeron hyssopifolius</i>	Hyssop-leaved Fleabane				S3	3 Sensitive	28	44.8 ± 0.0	NS
P	<i>Hieracium paniculatum</i>	Panicled Hawkweed				S3	4 Secure	7	51.8 ± 0.0	NS
P	<i>Megalodonta beckii</i>	Water Beggarticks				S3	4 Secure	26	22.9 ± 1.0	NS
P	<i>Packera paupercula</i>	Balsam Groundsel				S3	4 Secure	29	61.8 ± 5.0	PE
P	<i>Betula pumila</i>	Bog Birch				S3	3 Sensitive	20	64.7 ± 0.0	PE

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P	<i>Betula pumila</i> var. <i>pumila</i>	Bog Birch				S3	3 Sensitive	1	56.4 ± 1.0	NS
P	<i>Campanula aparinoides</i>	Marsh Bellflower				S3	3 Sensitive	41	11.2 ± 0.0	NS
P	<i>Viburnum edule</i>	Squashberry				S3	3 Sensitive	2	62.0 ± 0.0	NS
P	<i>Empetrum eamesii</i>	Pink Crowberry				S3	3 Sensitive	12	77.5 ± 3.0	PE
P	<i>Vaccinium boreale</i>	Northern Blueberry				S3	3 Sensitive	5	43.6 ± 1.0	NS
P	<i>Vaccinium caespitosum</i>	Dwarf Bilberry				S3	4 Secure	19	64.9 ± 0.0	NS
P	<i>Geranium bicknellii</i>	Bicknell's Crane's-bill				S3	4 Secure	10	15.9 ± 2.0	NS
P	<i>Proserpinaca palustris</i>	Marsh Mermaidweed				S3	4 Secure	14	16.3 ± 1.0	NS
P	<i>Proserpinaca palustris</i> var. <i>crebra</i>	Marsh Mermaidweed				S3	4 Secure	22	16.5 ± 0.0	NS
P	<i>Proserpinaca pectinata</i>	Comb-leaved Mermaidweed				S3	4 Secure	4	64.0 ± 5.0	NS
P	<i>Teucrium canadense</i>	Canada Germander				S3	3 Sensitive	58	30.3 ± 0.0	NS
P	<i>Decodon verticillatus</i>	Swamp Loosestrife				S3	4 Secure	1	83.6 ± 0.0	PE
P	<i>Epilobium strictum</i>	Downy Willowherb				S3	3 Sensitive	31	32.8 ± 1.0	NS
P	<i>Polygala sanguinea</i>	Blood Milkwort				S3	3 Sensitive	20	7.0 ± 7.0	NS
P	<i>Polygonum pensylvanicum</i>	Pennsylvania Smartweed				S3	4 Secure	19	5.6 ± 0.0	NS
P	<i>Polygonum scandens</i>	Climbing False Buckwheat				S3	3 Sensitive	37	5.8 ± 0.0	NS
P	<i>Plantago rugelii</i>	Rugel's Plantain				S3	4 Secure	5	58.6 ± 7.0	NS
P	<i>Primula laurentiana</i>	Laurentian Primrose				S3	4 Secure	2	94.1 ± 1.0	NS
P	<i>Samolus valerandi</i> ssp. <i>parviflorus</i>	Seaside Brookweed				S3	3 Sensitive	29	9.8 ± 0.0	NS
P	<i>Pyrola asarifolia</i>	Pink Pyrola				S3	4 Secure	21	18.2 ± 0.0	NS
P	<i>Pyrola minor</i>	Lesser Pyrola				S3	3 Sensitive	4	37.9 ± 0.0	NS
P	<i>Ranunculus gmelinii</i>	Gmelin's Water Buttercup				S3	4 Secure	81	31.3 ± 5.0	NS
P	<i>Rhamnus alnifolia</i>	Alder-leaved Buckthorn				S3	4 Secure	163	5.6 ± 0.0	NS
P	<i>Agrimonia gryposepala</i>	Hooked Agrimony				S3	4 Secure	97	13.9 ± 0.0	NS
P	<i>Amelanchier stolonifera</i>	Running Serviceberry				S3	4 Secure	17	14.6 ± 5.0	NS
P	<i>Geocaulon lividum</i>	Northern Comandra				S3	4 Secure	6	8.4 ± 0.0	NS
P	<i>Limosella australis</i>	Southern Mudwort				S3	4 Secure	47	9.0 ± 0.0	NS
P	<i>Lindernia dubia</i>	Yellow-seeded False Pimperel				S3	4 Secure	31	11.2 ± 0.0	NS
P	<i>Laportea canadensis</i>	Canada Wood Nettle				S3	3 Sensitive	46	22.1 ± 0.0	NS
P	<i>Verbena hastata</i>	Blue Vervain				S3	4 Secure	119	10.2 ± 5.0	NS
P	<i>Carex cryptolepis</i>	Hidden-scaled Sedge				S3	4 Secure	14	14.1 ± 0.0	NS
P	<i>Carex eburnea</i>	Bristle-leaved Sedge				S3	3 Sensitive	6	67.6 ± 0.0	NS
P	<i>Carex lupulina</i>	Hop Sedge				S3	4 Secure	35	2.3 ± 0.0	NS
P	<i>Carex rosea</i>	Rosy Sedge				S3	4 Secure	28	49.2 ± 0.0	NS
P	<i>Carex tribuloides</i>	Blunt Broom Sedge				S3	4 Secure	12	32.7 ± 0.0	NS
P	<i>Carex wiegandii</i>	Wiegand's Sedge				S3	3 Sensitive	30	37.8 ± 0.0	NS
P	<i>Carex foenea</i>	Fernald's Hay Sedge				S3	4 Secure	18	5.9 ± 0.0	NS
P	<i>Eleocharis nitida</i>	Quill Spikerush				S3	4 Secure	12	38.6 ± 0.0	NS
P	<i>Elodea canadensis</i>	Canada Waterweed				S3	4 Secure	21	25.9 ± 0.0	NS
P	<i>Juncus subcaudatus</i> var. <i>planisepalus</i>	Woods-Rush				S3	3 Sensitive	10	51.0 ± 3.0	NS
P	<i>Juncus dudleyi</i>	Dudley's Rush				S3	4 Secure	27	37.3 ± 0.0	NS
P	<i>Goodyera oblongifolia</i>	Menzies' Rattlesnake-plantain				S3	3 Sensitive	1	90.1 ± 0.0	PE
P	<i>Goodyera repens</i>	Lesser Rattlesnake-plantain				S3	3 Sensitive	19	39.5 ± 100.0	NS
P	<i>Listera australis</i>	Southern Twayblade				S3	4 Secure	11	44.5 ± 0.0	NS
P	<i>Platanthera grandiflora</i>	Large Purple Fringed Orchid				S3	4 Secure	94	30.1 ± 0.0	NS
P	<i>Platanthera hookeri</i>	Hooker's Orchid				S3	4 Secure	22	5.9 ± 0.0	NS
P	<i>Platanthera orbiculata</i>	Small Round-leaved Orchid				S3	4 Secure	38	25.5 ± 0.0	NS
P	<i>Spiranthes ochroleuca</i>	Yellow Ladies'-tresses				S3	4 Secure	7	47.2 ± 0.0	NS
P	<i>Alopecurus aequalis</i>	Short-awned Foxtail				S3	4 Secure	28	17.8 ± 0.0	NS

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P	<i>Dichanthelium clandestinum</i>	Deer-tongue Panic Grass				S3	4 Secure	78	80.0 ± 0.0	NS
P	<i>Potamogeton obtusifolius</i>	Blunt-leaved Pondweed				S3	4 Secure	27	14.0 ± 0.0	NS
P	<i>Potamogeton praelongus</i>	White-stemmed Pondweed				S3	3 Sensitive	42	14.0 ± 0.0	NS
P	<i>Potamogeton zosteriformis</i>	Flat-stemmed Pondweed				S3	3 Sensitive	20	37.8 ± 0.0	NS
P	<i>Sparganium natans</i>	Small Burreed				S3	4 Secure	23	12.9 ± 0.0	NS
P	<i>Asplenium trichomanes</i>	Maidenhair Spleenwort				S3	4 Secure	7	66.0 ± 1.0	NS
P	<i>Asplenium trichomanes-ramosum</i>	Green Spleenwort				S3	3 Sensitive	8	32.4 ± 7.0	NS
P	<i>Equisetum pratense</i>	Meadow Horsetail				S3	3 Sensitive	14	39.9 ± 0.0	NS
P	<i>Equisetum variegatum</i>	Variegated Horsetail				S3	4 Secure	49	25.7 ± 3.0	NS
P	<i>Isoetes acadensis</i>	Acadian Quillwort				S3	3 Sensitive	2	35.2 ± 1.0	NS
P	<i>Lycopodium sitchense</i>	Sitka Clubmoss				S3	4 Secure	5	48.7 ± 0.0	NB
P	<i>Huperzia appalachiana</i>	Appalachian Fir-Clubmoss				S3	3 Sensitive	16	38.6 ± 1.0	NS
P	<i>Botrychium dissectum</i>	Cut-leaved Moonwort				S3	4 Secure	10	37.5 ± 0.0	NB
P	<i>Polypodium appalachianum</i>	Appalachian Polypody				S3	5 Undetermined	17	38.1 ± 0.0	NS
P	<i>Asclepias incarnata ssp. pulchra</i>	Swamp Milkweed				S3?	5 Undetermined	42	93.8 ± 0.0	NS
P	<i>Polygonum amphibium var. emersum</i>	Water Smartweed				S3?	5 Undetermined	1	95.7 ± 0.0	NS
P	<i>Lycopodium sabinifolium</i>	Ground-Fir				S3?	4 Secure	13	52.9 ± 0.0	NS
P	<i>Atriplex franktonii</i>	Frankton's Saltbush				S3S4	4 Secure	9	7.2 ± 5.0	NS
P	<i>Suaeda calceoliformis</i>	Horned Sea-blite				S3S4	4 Secure	31	5.3 ± 0.0	NS
P	<i>Myriophyllum sibiricum</i>	Siberian Water Milfoil				S3S4	4 Secure	37	45.8 ± 0.0	NS
P	<i>Nuphar lutea ssp. pumila</i>	Small Yellow Pond-lily				S3S4	4 Secure	8	18.6 ± 2.0	NS
P	<i>Sanguinaria canadensis</i>	Bloodroot				S3S4	4 Secure	89	12.8 ± 0.0	NS
P	<i>Polygonum fowleri</i>	Fowler's Knotweed				S3S4	4 Secure	6	49.7 ± 1.0	NS
P	<i>Rumex maritimus</i>	Sea-Side Dock				S3S4		72	36.5 ± 1.0	NB
P	<i>Rumex maritimus var. fueginus</i>	Tierra del Fuego Dock				S3S4	4 Secure	10	61.9 ± 2.0	PE
P	<i>Crataegus succulenta</i>	Fleshy Hawthorn				S3S4	5 Undetermined	7	64.0 ± 5.0	PE
P	<i>Fragaria vesca ssp. americana</i>	Woodland Strawberry				S3S4	4 Secure	64	38.9 ± 0.0	NS
P	<i>Salix petiolaris</i>	Meadow Willow				S3S4	4 Secure	68	19.6 ± 0.0	NS
P	<i>Agalinis neoscotica</i>	Nova Scotia Agalinis				S3S4	4 Secure	2	83.8 ± 0.0	NS
P	<i>Viola sagittata var. ovata</i>	Arrow-Leaved Violet				S3S4	4 Secure	6	55.6 ± 1.0	PE
P	<i>Symplocarpus foetidus</i>	Eastern Skunk Cabbage				S3S4	4 Secure	114	30.4 ± 0.0	NB
P	<i>Carex argyrantha</i>	Silvery-flowered Sedge				S3S4	4 Secure	5	69.0 ± 0.0	PE
P	<i>Eriophorum russeolum</i>	Russet Cottongrass				S3S4	4 Secure	169	36.1 ± 0.0	NS
P	<i>Triglochin gaspensis</i>	Gasp Arrowgrass				S3S4	5 Undetermined	12	37.7 ± 0.0	NB
P	<i>Juncus acuminatus</i>	Sharp-Fruit Rush				S3S4	4 Secure	4	20.0 ± 2.0	NS
P	<i>Luzula parviflora</i>	Small-flowered Woodrush				S3S4	4 Secure	2	50.8 ± 0.0	NS
P	<i>Liparis loeselii</i>	Loesel's Twayblade				S3S4	4 Secure	28	9.9 ± 0.0	NS
P	<i>Panicum tuckermanii</i>	Tuckerman's Panic Grass				S3S4	4 Secure	16	5.5 ± 0.0	NS
P	<i>Trisetum spicatum</i>	Narrow False Oats				S3S4	4 Secure	13	63.1 ± 0.0	NS
P	<i>Cystopteris bulbifera</i>	Bulblet Bladder Fern				S3S4	4 Secure	75	56.4 ± 1.0	NS
P	<i>Equisetum hyemale</i>	Common Scouring-rush				S3S4	4 Secure	4	95.3 ± 0.0	NS
P	<i>Equisetum hyemale var. affine</i>	Common Scouring-rush				S3S4	4 Secure	43	7.0 ± 10.0	NS

Taxonomic Group	Scientific Name	Common Name	COSEWIC	SARA	Prov Legal Prot	Prov Rarity Rank	Prov GS Rank	# recs	Distance (km)	Prov
P	<i>Equisetum scirpoides</i>	Dwarf Scouring-Rush				S3S4	4 Secure	58	6.0 ± 0.0	NS
P	<i>Lycopodium complanatum</i>	Northern Clubmoss				S3S4	4 Secure	17	23.0 ± 6.0	NS
P	<i>Viola canadensis</i>	Canada Violet				SH	0.1 Extirpated	2	63.8 ± 7.0	NS

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The recipient of these data shall acknowledge the ACCDC and the data sources listed below in any documents, reports, publications or presentations, in which this dataset makes a significant contribution.

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3 - BOATING MARKET UPDATE

MEMO

TO: Ron Burdock, Architecture49
FROM: Brandi Murphy, WSP Canada Inc.
SUBJECT: Pugwash Waterfront, Boat Market Update Information
DATE: December 5, 2017

DRAFT**MARINA CASE STUDIES**

In most cases, information in the following paragraphs were obtained through interviews with the marina operators. In a few cases, interviews were not possible. Efforts were made to obtain information based on online desktop research as presented below.

PRINCE EDWARD ISLAND

1. THE SILVER FOX

Location: Summerside, PE

The Silver Fox Entertainment Complex is home to the Summerside Yacht Club and Marina. The marina has 90 slips and can accommodate boats up to 100 ft. The annual membership fee is \$190 plus slip rental of \$27 per ft. In addition, there is an annual dock fund cost of \$200 plus \$2 per ft. Therefore, a member with a 25 ft. boat would pay \$1,115 annually. Visitor rates are \$1.50 per ft. per night.

The full service marina offers the only pump-out facility on PEI, which is a main attraction for visiting boats. With roughly 500 visitor boats each season, the marina is typically close to capacity. The past season had on average three or four vacancies at a time. The marina caters to a mix of power and sail boats (roughly 50% power and 50% sail). The General Manager indicated he's noticed an increased demand for smaller boats, which is unique to boat size trends identified by other marinas.

2. CHARLOTTETOWN YACHT CLUB

Location: Charlottetown, PE

Attempts at conducting an interview with the Charlottetown Yacht Club were unsuccessful, therefore a desktop review was completed.

The Charlottetown Yacht Club has 114 docks and can accommodate boats up to 130 ft. Membership fees are \$1,395 for boats up to 25 ft., plus: \$43 per additional ft. for boats 26 – 30 ft.; \$44 per additional ft. for boats 31 – 35 ft.; \$45 per additional foot for boats 36 – 40 ft.; or \$46 per additional ft. for boats over 40 ft. Visiting boat rates, per ft. per night, are: \$1.92 for boats under 40 ft.; \$2.20 for boats 40 – 49 ft.; \$3.25 for boats 50 – 79 ft.; and \$5.10 for boats over 80 ft.

3. PEAKE'S QUAY MARINA & CHARLOTTETOWN MARINA

Location: Charlottetown, PE

Peake's Quay and Charlottetown Marina are located only a block away from each other and are under the same ownership. Each marina has approximately 100 slips and can accommodate boats up to 56 ft. Seasonal rates range from \$1,170 to \$2,000+, depending on the size of boat. A 25 ft. boat would pay \$1,690 per season. Weekly rates range from \$189 to \$340+ and nightly rates are \$2 per ft. for boats under 50 ft. and \$2.60 per ft. for boats over 50 ft.

Peake's Quay caters mainly to visiting boats and is on average 85% full. About 90% of their clientele are power boats, with only a small number of sail boats each season.

Charlottetown Marina caters mainly to seasonal members and is on average 90% full. With slightly more sail boats than Peake's Quay, Charlottetown Marina has about 85% power boats. The Charlottetown Marina also has 'easy docks' available for Jet Skis at a seasonal rate of \$600.

The co-owner indicated that over the past several years the average boat size has increased, which is a common trend identified throughout this survey. Also operated under the same ownership as Peake's Quay and Charlottetown Marina is Quartermaster Marine, a boating sales and service company.

NEW BRUNSWICK

4. SHEDIAC BAY YACHT CLUB

Location: Shediac, NB

Identified as the largest marina east of Quebec, the Shediac Bay Yacht Club has 174 berths and can accommodate boats up to 54 ft. The club has 'Senior Members' (long-term lease holders who must go through an application process) who are guaranteed a berth each season for an annual fee of \$1,800 – \$2,100 and 'Seasonal Renters' who can rent for a seasonal fee of \$2,200 – \$3,000 but are not guaranteed a berth the following season. Transient boats are welcome based on availability.

The club is on average close to capacity and caters to a mix of sail and power boats (roughly 50/50). The past season saw a 30% decrease in transient boats due to a high number of seasonal renters. Similar to other marinas, the club manger identified an increase in average boat size over the past several years; now the average boat size is 30 – 35 ft. whereas previously it was 24 – 30 ft.

5. POINTE DU CHÊNE YACHT CLUB

Location: Shediac, NB

Attempts at conducting an interview with Pointe Du Chêne Yacht Club were unsuccessful, therefore a desktop review was completed.

The facility has 125 berths for shareholders and 19 berths for rentals and can accommodate boats up to 50 ft. The cost to become a Shareholder (a full-time berth owner) is \$6,000 for Class A (25 ft. berth), \$5,000 for Class B (20 ft. berth) or \$8,000 for Class C (35 ft. berth) plus an annual fee of \$819.25 (including tax, membership dues and a contingency fund). The club also has Associate Members for a

seasonal fee of \$40; this includes access to the clubhouse and facilities, and access to the docks if visiting friends and family.

Seasonal rental rates are: \$1,826 for a 20 ft. berth, \$1,937 for a 25 ft. berth, \$2,122 for a 35 ft. berth, and \$1,024 for a Sea-doo. Daily/weekly/monthly rental fees are \$1.50 per ft. per day.

6. COCAGNE MARINA BOATERS CLUB

Location: Cocagne, NB

Attempts at conducting an interview with Cocagne Marina Boaters Club were unsuccessful, therefore a desktop review was completed.

The Cocagne Marina Boaters Club has 65 berths and is currently fully subscribed. Seasonal rates are \$1,050 for a 16 ft. berth, \$1,250 for a 24 ft. berth and \$1,450 for a 32 ft. berth. Monthly rates are \$500 for a 16 ft. berth, \$650 for a 24 ft. berth and \$750 for a 32 ft. berth. Weekly rates are \$200 for a 16 ft. berth, \$250 for a 24 ft. berth, and \$300 for a 32 ft. berth. Daily rates are \$35 for a 16 ft. berth, \$40 for a 24 ft., berth and \$45 for a 32 ft. berth.

7. COCAGNE CAPE MARINA

Location: Cocagne, NB

The Cocagne Cape Marina has 80 slips, accommodating a maximum boat size of 42 ft. Unlike other marinas, Cocagne Cape Marina charges a standard rate regardless of boat size. The annual fee is \$1,400 and the visitor fee is \$30 per night. The past season was fully subscribed which resulted in a low number of transients, similar to the Shediac Bay Yacht Club. Although the marina previously catered to more sail than power boats, the mix is now 50/50. The marina President indicated that boats are now, in general, bigger and heavier than before.

NOVA SCOTIA

8. HECTOR QUAY MARINA

Location: Pictou, NS

The Hector Quay Marina has approximately 36 berths, depending on the size of boats docked. The annual fee is \$40 per ft. and the nightly visitor rate is \$1.50 per ft. On average, the marina is at 80% capacity. The past season had some vacancies due to seasonal members selling their boats. As well, transients were down due to poor weather; they would book in advance and then cancel due to high winds.

While visiting boats are most often sail boats, the marina's seasonal members are typically power boats (past season members were 90% power boats).

9. PICTOU MARINA LTD.

Location: Pictou, NS

Attempts at conducting an interview with Pictou Marina Ltd. were unsuccessful, therefore a desktop review was completed.

Pictou Marina Ltd. has approximately 95 sheltered slips and can accommodate boats up to 40 ft. Seasonal rates are \$44 per ft. for boats up to 30 ft. and \$45 for boats over 30 ft. The full service marina is home to the Pictou Yacht Club, which offers Full Membership for boat owners at \$120, Associate Membership for non-boat owners at \$40, and Junior Membership for children under 18 years of age at \$10.

10. PIER B MARINA

Location: Pictou, NS

The Pier B Marina is a small facility with a capacity of approximately 10 boats (depending on boat size). The marina caters only to long term clients (no transients) and is at full capacity. With mostly smaller boats, the marina has a 50/50 mix of power and sail boats. Although the facility would not share their rates, the employee interviewed did mention that the marina is not a main source of income for the owner, who operates Straitline Stevedoring Limited.

11. THE NEW GLASGOW MARINA

Location: New Glasgow, NS

The New Glasgow Marina has 30 berths, plus two reserved for transients. The annual fee is \$45 per ft. The marina is typically at full capacity but does not have a waiting list. Due to the nearby bridge and the height restrictions, the marina caters mostly to power boats (about 80% power / 20% sail boats). Although boaters can request the bridge be raised, most sail boats won't bother with this and will choose to dock somewhere else. Marina Days, an annual event, brings in a lot of business for the marina.

12. SUNRISE SHORE MARINA

Location: Barrachois Harbour, Tatamagouche, NS

Sunrise Shore Marina and Cottages has 72 slips. Prices depend on size of boat and length of stay. The approximate annual cost for a 25 ft. boat is \$1,700. The nightly visitor rate is \$1.50 per ft. The marina is typically at 70% capacity and caters mainly to seasonal customers with only a few transients each season. It has roughly 55% power and 45% sail boats.

13. BALLANTYNE'S COVE MARINA

Location: Ballantyne's Cove, NS

Attempts at conducting an interview with Ballantyne's Cove Marina were unsuccessful, therefore a desktop review was completed.

Ballantyne's Cove Marina is operated by the Harbour Authority of Ballantyne's Cove. It has 40 slips and services include water, fuel, launch ramp, pump-out facility, showers, laundry and a canteen.

14. STRAIGHT OF CANSO YACHT CLUB (PORT HAWKESBURY MARINA)

Location: Port Hawkesbury, NS

The Straight of Canso Yacht Club has capacity for up to 43 boats and can accommodate boats up to 60 ft. The annual berth fee is \$575 for boats up to 25 ft. plus \$23 per each additional ft. There is also a seasonal membership fee of \$50. Visitor rates are \$1.30 per ft. per night, with the 7th night fee.

With approximately 60% sail boats and 40% power boats, the club currently has capacity to accept 12 more members. It has on average 1–3 visiting boats per night (1-2 each night throughout June & September, and 2-3 each night throughout July & August). The marina representative identified a slow but steady increase in the number of local boat owners, as well as a steady increase in the number of transient boats, especially those traveling from France.

15. ST. PETER'S MARINA

Location: St. Peter's, NS (entrance of Bras d'Or Lake)

The St. Peter's Marina has 68 slips and can accommodate boats up to 150 ft. Rates, which are per ft., are: \$32 for seasonal docking; \$16 for monthly; \$8 for weekly; and, \$1.30 for nightly. The Manager indicated that the nightly rate will likely increase to \$1.35 per ft. next season.

Due to the marina's location at the entrance of Bras d'Or Lake, it gets lots of transients. The marina keeps about 15 slips available for transients. While the marina is typically at capacity, the Manager indicated a 10 – 15% decrease during the tall ships event in Halifax. The marina sees about 60% power boats and 40 % sail boats. The Manager indicated an increase in boat size, both length and width, over the years. In mid-1990's, the marina's larger boats were around 36 ft. whereas now the marina's larger boats are 60 ft.

16. FOX HARBOUR MARINA

Location: Wallace, NS

Attempts at conducting an interview with Fox Harbour Marina were unsuccessful, therefore a desktop review was completed.

The marina, part of Fox Harbour Resort, has 25 slips and can accommodate boats up to 80 ft. It is a full service marina with fuel, power, catering, phone and television available.

PUGWASH, NS

17. CANADA SALT COMPANY

Location: Pugwash, NS

The Canada Salt Company's wharf located in Pugwash can accommodate about five boats, depending on their size. The wharf's main purpose is for loading/unloading company boats. The Pugwash facility currently deals only with domestic (not foreign) cargo, due to the extra security measures that Transport Canada (TC) requires for international travel/shipping. The wharf is used for various events held by the Community of Pugwash (such as Tall Ships) at no cost. On occasion, recreational yachts have requested

use of the wharf and at times this has been allowed. This is not a common occurrence and is permitted on a case by case basis. Yachts traveling internationally cannot be permitted, again due to the extra security measures that would be required by TC.

18. BRICKYARD MARINA

Location: Pugwash, NS

Through correspondence with the Harbour Authority of Pugwash, it has been determined that the Brickyard Marina is no longer in operation.

19. HARBOUR AUTHORITY OF PUGWASH

Location: Pugwash, NS

The Harbour Authority of Pugwash caters mainly to the fishing industry, although they also get the occasional recreational boat for a night (the past season had 3 recreational boats). The facility can accommodate 11 boats at a time and has 10 spring fishermen and 10 fall fishermen. Due to a small overlap in the lobster and herring fishing seasons, there is a week in September where about 16 boats are berthed at one time meaning some have to double bank (berth alongside each other). The fishermen pay a yearly berthage fee and there is an overnight fee for recreational boats, however the facility would not disclose their rates. Similar to trends identified in the recreational industry, it was indicated that fishermen are buying bigger/faster boats.

20. PUGWASH YACHT CLUB

Location: Pugwash, NS

The Pugwash Yacht Club can accommodate approximately 20 boats and is fully subscribed. The marina previously kept spots available for transients, but due to the low number of transients each season vs. the high demand for seasonal membership, there are no longer spots reserved for transients. Similar to most marinas, transients are now welcome based on availability (if a seasonal member is traveling and not berthed at the marina, their spot becomes available to transients during that time). The club is maintained by its members and does not have any employees, therefore its rates are quite low compared to other marinas. The rates per ft. are: \$21 annually; \$12 monthly; and \$4 weekly. Visitor rates are \$25 per night. Of the 20 members, the club has roughly 15 power and 5 sail boats (75% power/25% sail).

21. CANADIAN SAILING EXPEDITIONS

Through desktop research, it appears that Canadian Sailing Expeditions is no longer in operation. An article dated December 3, 2009 found on the Cruise Critic website states: "In a letter on the cruise line's Web site dated November 13, Canadian Sailing Expeditions' owners announced that the line had ceased to operate due to financial difficulties." Although this letter could not be located, the Canadian Sailing Expeditions website appears outdated and provides no contact information, rates or schedules. In addition, on the Small Cruise Adventures website, Canadian Sailing Expeditions is listed as being "out of service".

CASE STUDY MARINA SUPPLY – NORTHUMBERLAND STRAIT AND ADJACENT AREAS

Depending on the type of dock a facility has and its configuration, a facility’s capacity may vary depending on the size of the boats berthed at one time. With this consideration in mind, the following table provides the approximate capacity for each facility identified in the case studies. Note that in some cases, approximate capacity was not able to be obtained at this time. This affects the 2017 Nova Scotia subtotal.

Note that information from 1997 and 2004 was obtained from the *Pugwash Waterfront Feasibility Study*, Cantwell & Company, 2005.

Facility	Approx. Capacity 1997	Approx. Capacity 2004	Approx. Capacity 2017
The Silver Fox, Summerside, PE	80	120	90
Charlottetown Yacht Club, PE	51	125	114
Peake’s Quay Marina, Charlottetown, PE	125	170	100
Charlottetown Marina, PE	-	-	100
Montague Marina, PE	30	30	75
Brudenell Marina, Montague, PE	-	-	30
PE Subtotal	286	445	509
Shediac Bay Yacht Club, NB	193	210	174
Pointe Du Chêne Yacht Club, NB	125	125	144
Cocagne, NB (Cocagne Marina Boaters Club and Cocagne Cape Marina)	98	110	145
NB Subtotal	416	445	463
Hector Quay Marina, NS	30	35	36
Pictou Marina Ltd., NS	110	110	95
Pier B Marina, NS	16	16	10
New Glasgow Marina, NS	14	32	32
Sunrise Shore Marina, Barrachois Harbour, NS	32	80	72
Ballantyne’s Cove Marina, NS	10	40	40
Straight of Canso Yacht Club, NS (Port Hawkesbury Marina)	40	40	43
St. Peter’s Marina, NS	6	57	68
Fox Harbour Marina, NS	-	25	25
Brickyard Marina, NS	28	28	0*
Pugwash Yacht Club, NS	14	14	20
Tidnish, NS	20	20	-
NS Subtotal	320	497	441
Total	1,022	1,387	1,413

* The Brickyard Marina is no longer in operation during the time this study was completed.

SEASONAL RATES

Rates do not include extra services (such as power, water or lift equipment). Note that information from 2004 was obtained from the *Pugwash Waterfront Feasibility Study*, Cantwell & Company, 2015.

Annual/Seasonal rental rate for a 25 ft. boat:

Facility	Rates 2004	Rates 2017
The Silver Fox, Summerside, PE	\$475	\$1,115
Charlottetown Yacht Club, PE	-	\$1,395
Peake’s Quay Marina, PE	\$1,000	\$1,690
Charlottetown Marina, PE	-	\$1,690
Montague Marina, PE	-	\$600
Brudenell Marina, Montague, PE	-	\$550
Shediac Bay Yacht Club, NB	\$1,575	\$2,200 - \$3000
Pointe Du Chêne Yacht Club, NB	\$1,340	\$1,937
Cocagne Marina Boaters Club, NB	\$700	\$1,450
Cocagne Cape Marina, NB	-	\$1,400
Hector Quay Marina, NS	\$875	\$1,000
Pictou Marina Ltd., NS	\$850	\$1,100
Pier B Marina, NS	-	-
New Glasgow Marina, NS	\$975	\$1,125
Sunrise Shore Marina, Barrachois Harbour, NS	\$750	\$1,700
Ballantyne’s Cove Marina, NS	-	-
Straight of Canso Yacht Club, NS (Port Hawkesbury Marina)	\$550	\$625
St. Peter’s Marina, NS	\$550	\$800
Fox Harbour Marina, NS	-	-
Brickyard Marina, NS	\$475	N/A
Pugwash Yacht Club, NS	\$375	\$525
Average Rate	\$807	\$1,253

4 - COST ESTIMATES

**PUGWASH LIBRARY & COMMUNITY CENTRE
NEW CONSTRUCTION
PUGWASH, NOVA SCOTIA**

Hanscomb

CLASS 'D' ESTIMATE

December 11, 2017

**PUGWASH LIBRARY & COMMUNITY CENTRE
NEW CONSTRUCTION
PUGWASH, NOVA SCOTIA**

CLASS 'D' ESTIMATE

Prepared For:

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December 11, 2017

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1. INTRODUCTION

1.1 Purpose: This Class 'D' Estimate is intended to provide a realistic allocation of direct and indirect construction costs for the demolition of the existing stage and construct new, located in Pugwash, Nova Scotia, with exceptions of items listed in 1.4 below.

1.2 Methodology: From the documentation and information provided, quantities of all major elements were assessed or measured where possible and priced at rates considered competitive for a project of this type under a stipulated sum form of contract in Pugwash, Nova Scotia.

Pricing shown reflects probable construction costs obtainable in the Pugwash, Nova Scotia area on the effective date of this report. This estimate is a determination of fair market value for the construction of this project. It is not a prediction of low bid. Pricing assumes competitive bidding for every portion of the work.

1.3 Specifications: For building components and systems where specifications and design details are not available, quality standards have been established based on discussions with the design team.

1.4 Exclusions: This Class 'D' Estimate does not provide for quantities of works or costs in excess of what is specified in this estimate for the following items:

- Cost of Design Exclusions, Omissions, & Errors
- Professional Fees and Expenses
- Phased Construction Premiums
- Escalation Allowance
- Land Acquisition and Impost Charges
- Development Charges
- Permits (Building, Plumbing, Access, etc)
- Legal Fees and Expenses
- Value Added Taxes (GST, HST, QST, etc.)
- Right of Way Charges or Easement Requirements
- Financing Fee's & Carrying Costs
- Fund Raising Requirements
- Owner's Staff and Associated Management
- Owner Furnished Material or Associated Labour

1. INTRODUCTION

1.4 Exclusions:
(continued)

- Impact of Adjacent Properties and their Conditions
- Mitigation of Water Conditions
- Winter Conditions Affecting the Work

2. DOCUMENTATION

This Class 'D' Estimate has been prepared from documentation included in Appendix B of this report, and received from Architecture 49.

Design changes and / or additions made subsequent to this issuance of the documentation noted above have not been incorporated in this report.

3. COST CONSIDERATIONS

- 3.1 Cost Base: All costs are estimated on the basis of competitive bids (a minimum of 5 to 6 general contractor bids and at least 4 to 5 subcontractor bids for each trade) being received in December 2017 from general contractors and all major subcontractors and suppliers based on a stipulated sum form of contract.
- 3.2 Escalation: No allowance has been made for construction cost escalation that may occur between December 2017 and the anticipated bid date of for the project. It is recommended that the Owner make separate provision for construction cost escalation in the overall project budget.
- 3.3 Contingencies: An allowance of 15.0% has been included to cover design and pricing unknowns. This allowance is not intended to cover any program space modifications but rather to provide some flexibility for the designers and cost planners during the remaining contract document stages.
- An allowance of 5.0% has been made to cover construction (post contract) unknowns.
- 3.4 Unit Rates: The unit rates in the preparation of this Class 'D' Estimate include labour and material, equipment, Subcontractor's overheads and profits.
- 3.5 Taxes: No provision has been made for the HST. It is recommended that the owner make separate provision for HST in the project budget.
- 3.6 Statement of Probable Costs: Hanscomb has no control over the cost of labour and materials, the Contractor's method of determining prices, or competitive bidding and market conditions. This opinion of probable cost of construction is made on the basis of experience, qualifications and best judgement of the professional consultant familiar with the construction industry. Hanscomb cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from this or subsequent cost estimates.

3. COST CONSIDERATIONS (cont'd)

- 3.6 Statement of Probable Costs: (continued) Hanscomb has prepared this estimate in accordance with generally accepted principles and practices. Hanscomb's staff are available to discuss its contents with any interested party.
- 3.7 Ongoing Cost Control: Hanscomb recommends that the Owner and Design Consultant carefully review this document, including line item description, unit prices, clarifications, exclusions, inclusions and assumptions, contingencies, escalation and mark-ups. If the Project is over budget, or if there are unresolved budgeting issues, alternative systems / schemes should be evaluated before proceeding into the next design phase.
- Requests for modifications of any apparent errors or omissions to this document must be made to Hanscomb within ten (10) days of receipt of this estimate. Otherwise, it will be understood that the contents have been concurred with and accepted.
- It is recommended that a final update estimate be produced by Hanscomb using bid documents to determine overall cost changes which may have occurred since the preparation of this estimate. The final updated estimate will address changes and additions to the documents, as well as addenda issued during the bidding process. Hanscomb cannot reconcile bid results to any estimate not produced from bid documents including all addenda.

4. GROSS FLOOR AREA

Description	New Construction SF
New Construction	8347
Total Gross Floor Area	8,347

The above areas have been measured in accordance with the Canadian Institute of Quantity Surveyors' Method of Measurement of Buildings by Area and Volume.

5. CONSTRUCTION COST ESTIMATE SUMMARY

COST SUMMARY:

Element	Cdn \$
Shell	\$ 957,200
Interiors	\$ 376,200
Mechanical - Bldg	\$ 333,500
Electrical - Bldg	\$ 305,600
Total - Less Site	\$ 1,972,500
Site Development	\$ 113,630
Mechanical Site Services	\$ 40,000
Electrical Site Services	\$ 65,500
Demolition	\$ -
Alterations	\$ -
Net Building Costs - Including Site	\$ 2,191,600
General Requirements & Fee 15.0%	\$ 328,740
Design & Pricing Contingency 10.0%	\$ 252,030
Escalation Contingency 0.0%	
Construction Contingency 5.0%	\$ 138,620
Location Factor 10.0%	\$ 291,100
Total Construction Estimate - Contingencies	\$ 3,202,100
Taxes - excluded 0.0%	\$ -
Total Construction Estimate	\$ 3,202,100

Project : Pugwash Library & Community Centre
Location : Pugwash, Nova Scotia
Owner : Village of Pugwash
Consultant : Architecture 49
Report date : 11 Dec 2017
Page No. : 1
Bldg Type :
C.T. Index : 0.0
GFA : 8,347 SF

ELEMENTAL COST SUMMARY

Element	Ratio to GFA	Elemental Cost		Elemental Amount		Rate per SF		%
		Quantity	Unit rate	Sub-Total	Total	Sub-Total	Total	
A SHELL		8,347 SF			957,200		114.68	38.0
A1 SUBSTRUCTURE					110,400		13.23	4.4
A11 Foundations	0.311	2,595 SF	39.60	102,860		12.32		
A12 Basement Excavation				0		0.00		
A13 Special Conditions	0.000	Sum	7,500.00	7,500		0.90		
A2 STRUCTURE					274,000		32.83	10.9
A21 Lowest Floor Construction	1.000	8,347 SF	7.20	60,100		7.20		
A22 Upper Floor Construction	1.000	8,347 SF	2.00	16,340		1.96		
A23 Roof Construction	1.000	8,347 SF	23.70	197,560		23.67		
A3 EXTERIOR ENCLOSURE					572,800		68.62	22.7
A31 Walls Below Grade				0		0.00		
A32 Walls Above Grade	0.493	4,116 SF	52.70	217,080		26.01		
A33 Windows & Entrances	0.000	Sum	133,020.00	133,020		15.94		
A34 Roof Coverings	1.000	8,347 SF	19.10	159,260		19.08		
A35 Projections	0.000	Sum	63,450.00	63,450		7.60		
B INTERIORS		8,347 SF			376,200		45.07	14.9
B1 PARTITIONS & DOORS					171,900		20.59	6.8
B11 Partitions	0.811	6,771 SF	19.40	131,030		15.70		
B12 Doors	0.003	21 Lvs	1,947.60	40,900		4.90		
B2 FINISHES					135,700		16.26	5.4
B21 Floor Finishes	1.000	8,347 SF	9.40	78,740		9.43		
B22 Ceiling Finishes	1.000	8,347 SF	4.60	38,200		4.58		
B23 Wall Finishes	1.640	13,686 SF	1.40	18,780		2.25		
B3 FITTINGS & EQUIPMENT					68,600		8.22	2.7
B31 Fittings & Fixtures	1.000	8,347 SF	8.20	68,620		8.22		
B32 Equipment	1.000	8,347 SF	0.00	0		0.00		
B33 Elevators				0		0.00		
B34 Escalators				0		0.00		
C SERVICES		8,347 SF			639,100		76.57	25.4
C1 MECHANICAL					333,500		39.95	13.2
C11 Plumbing & Drainage	1.000	8,347 SF	10.60	88,660		10.62		
C12 Fire Protection	1.000	8,347 SF	0.20	1,670		0.20		
C13 HVAC	1.000	8,347 SF	25.10	209,760		25.13		
C14 Controls	1.000	8,347 SF	4.00	33,390		4.00		
C2 ELECTRICAL					305,600		36.61	12.1
C21 Service & Distribution	1.000	8,347 SF	5.80	48,040		5.76		
C22 Lighting, Devices & Heating	1.000	8,347 SF	17.40	145,240		17.40		
C23 Systems & Ancillaries	1.000	8,347 SF	13.50	112,270		13.45		
NET BUILDING COST - EXCLUDING SITE					\$ 1,972,500		236.31	78.3
D SITE & ANCILLARY WORK		8,347 SF			219,100		26.25	8.7
D1 SITE WORK					219,100		26.25	8.7
D11 Site Development	0.000	1 Sum	113,630.00	113,630		13.61		
D12 Mechanical Site Services	0.000	1 Sum	40,000.00	40,000		4.79		
D13 Electrical Site Services	0.000	1 Sum	65,500.00	65,500		7.85		
D2 ANCILLARY WORK					0		0.00	0.0
D21 Demolitions				0		0.00		
D22 Alterations				0		0.00		
NET BUILDING COST - INCLUDING SITE					\$ 2,191,600		262.56	87.0
Z1 GENERAL REQUIREMENTS & FEE					328,740	328,700	39.38	13.0
Z11 General Requirements & Fee		15.0 %		328,740		39.38		
TOTAL CONSTRUCTION ESTIMATE - EXCLUDING ALLOWANCES					\$ 2,520,300		301.94	100.0
Z2 ALLOWANCES					681,800		81.68	
Z21 Design & Pricing Allowance		10.0 %		252,030		30.19		
Z22 Escalation Allowance		0.0 %		0		0.00		
Z23 Construction Allowance		5.0 %		138,620		16.61		
Z24 Location Factor		10.0 %		291,100		34.87		
TOTAL CONSTRUCTION ESTIMATE - INCLUDING ALLOWANCES					\$ 3,202,100		383.62	
VALUE ADDED TAX (GST/HST)					0	0	0.00	0.00
Value Added Tax (GST/HST)		0.0 %		0		0.00		
TOTAL CONSTRUCTION ESTIMATE					\$ 3,202,100	\$	383.62	

Appendix
A - Detailed Elemental Cost Estimate

CLASS 'D' ESTIMATE

Hanscomb

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CLASS 'D' ESTIMATE

Hanscomb

A1 SUBSTRUCTURE	Quantity	Unit rate	Amount
A11 Foundations			
1 Exterior reinforced concrete frost wall and strip footings	2,355 SF	25.00	58,880
- reinforced concrete frost wall c/w concrete, formwork and rebar, allow 5'	2,355 SF	20.00	47,100
- reinforced concrete strip footings , c/w concrete, formwork and rebar	471 lf	25.00	11,775
2 Interior reinforced concrete frost wall and strip footings	240 SF	25.00	6,000
- reinforced concrete frost wall c/w concrete, formwork and rebar, allow 5'	240 SF	20.00	4,800
- reinforced concrete strip footings , c/w concrete, formwork and rebar	48 lf	25.00	1,200
3 Allowance for miscellaneous pad footings		Allow	7,500
4 Excavation and backfill	635 CY	48.00	30,480
A11 Foundations TOTAL : \$	2,595 SF	39.64	102,860
A13 Special Conditions			
1 Dewatering, erosion and sediment control		Allow	2,500
2 Winter heating - assuming construction takes place during winter months		Allow	5,000
A13 Special Conditions TOTAL : \$	1 #Sum	7,500.00	7,500

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CLASS 'D' ESTIMATE

Hanscomb

A2 STRUCTURE	Quantity	Unit rate	Amount
A21 Lowest Floor Construction			
1 Reinforced 4" concrete slab on grade c/w concrete, formwork, rebar and rigid insulation	8,347 SF	7.20	60,100
A21 Lowest Floor Construction TOTAL : \$	8,347 SF	7.20	60,100
A22 Upper Floor Construction			
1 Mechanical, wood framed mezzanine above the kitchen and washroom areas	567 SF	20.00	11,340
2 Steel stair with railings to above mezzanine (assume simple construction)	1 Flight	5,000.00	5,000
A22 Upper Floor Construction TOTAL : \$	8,347 SF	1.96	16,340
A23 Roof Construction			
1 Main roof - sloped (Plan Area)	4,017 SF	35.00	140,600
- pre-engineered heavy timber trusses, timber columns & sheathing	4,017 sf	35.00	140,595
2 Flat roof	4,330 SF	12.00	51,960
- dimensional lumber joists, LVL beams & timber columns	4,330 sf	12.00	51,960
3 Extra over - miscellaneous steel reinforcement and connections to roof construction		Allow	5,000
A23 Roof Construction TOTAL : \$	8,347 SF	23.67	197,560

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CLASS 'D' ESTIMATE

Hanscomb

**Pugwash Library & Community Centre
New Construction
Pugwash, Nova Scotia**

Report date : December 2017

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A3 EXTERIOR ENCLOSURE	Quantity	Unit rate	Amount
A32 Walls Above Grade			
1 Eastern Hemlock shingle on thermally broken girts c/w sheathing, wood stud, framing, insulation, stapping and GWB	2,496 SF	25.00	62,400
2 Curtain wall	1,680 SF	70.00	117,600
3 Extra over, Screen wall consisting of horizontal wood pieces at various spacing	2,472 SF	15.00	37,080
4 Exposed concrete foundation		NIL	
A32 Walls Above Grade TOTAL : \$	4,116 SF	52.74	217,080
A33 Windows & Entrances			
1 Aluminum framed windows	2,033 SF	55.00	111,820
2 Aluminum entry doors c/w frame, hardware and finish - fully glazed	7 Lvs	2,171.40	15,200
- single	5 lvs	2,200.00	11,000
- double	1 pair	4,200.00	4,200
3 Extra over - automatic door operators - allow at main entrance vestibule doors	2 No	3,000.00	6,000
A33 Windows & Entrances TOTAL : \$	1 #Sum	133,020.00	133,020
A34 Roof Coverings			
1 Flat roof - 2 ply modified bitumen	4,330 SF	15.00	64,950
2 Sloped roof - profiled metal roof (Plan Area)	4,017 SF	23.50	94,310
- metal roof - sloped area	4,491 sf	21.00	94,311
A34 Roof Coverings TOTAL : \$	8,347 SF	19.08	159,260

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CLASS 'D' ESTIMATE

Hanscomb

**Pugwash Library & Community Centre
New Construction
Pugwash, Nova Scotia**

Report date : December 2017

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A3 EXTERIOR ENCLOSURE	Quantity	Unit rate	Amount
A35 Projections			
1 Canopy at entrance c/w structural framing and supports, roof coverings & soffit finish	548 SF	65.00	35,620
2 Parapet construction		NIL	
3 Chimney for fireplace including bracing for chimney		Sum	2,500
4 Tempered glass railing to exterior deck at the end of the library (it appears that the other exterior decks do not require railings)	45 LF	200.00	9,000
5 Wooden deck to seating areas	653 SF	25.00	16,330
A35 Projections TOTAL : \$	1 #Sum	63,450.00	63,450

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CLASS 'D' ESTIMATE

Hanscomb

B1 PARTITIONS & DOORS	Quantity	Unit rate	Amount
B11 Partitions			
1 Typical partition c/w abuse resistant GWB, stud, and insulation	5,040 SF	10.50	52,920
2 Typical dividing partition c/w abuse resistant GWB, studs and insulation	555 SF	10.50	5,830
3 Glazed partitions to vestibule	228 SF	65.00	14,820
4 Sliding, non glazed accoustical partition	684 SF	50.00	34,200
5 Sliding glazed partition	264 SF	75.00	19,800
6 Partial height GWB partition around perimeter of mechanical mezzanine	384 SF	9.00	3,460
B11 Partitions	TOTAL : \$	6,771 SF	19.35
B12 Doors			
1 Solid core wood door and frame c/w hardware and finish - single	13 Lvs 13 lvs	1,500.00 1,500.00	19,500 19,500
2 Aluminum framed, fully glazed door c/w hardware and finishes - vestibule - double	4 Lvs 2 pair	2,100.00 4,200.00	8,400 8,400
3 Sliding barn doors c/w hardware and finish to corridors around activity rooms	2 No	3,500.00	7,000
4 Swinging barn doors c/w hardware and finish to corridors around activity rooms	2 No	3,000.00	6,000
B12 Doors	TOTAL : \$	21 Lvs	1,947.62

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CLASS 'D' ESTIMATE

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B2 FINISHES	Quantity	Unit rate	Amount
B21 Floor Finishes			
1 10mm rubber sport flooring to walking track and multi-purpose space	3,910 SF	8.20	32,060
2 Anti-slip vinyl flooring c/w integral base to kitchen	116 SF	3.50	410
3 12mm cork backed engineered wood flooring to library and community living room space	3,900 SF	11.00	42,900
4 Porcelain tile to washrooms	421 SF	8.00	3,370
B21 Floor Finishes	TOTAL : \$	8,347 SF	9.43
B22 Ceiling Finishes			
1 ACT - suspended, t-bar acoustic ceiling	7,926 SF	4.50	35,670
2 GWB (moisture resistant) c/w suspended support framing to washrooms	421 SF	6.00	2,530
B22 Ceiling Finishes	TOTAL : \$	8,347 SF	4.58
B23 Wall Finishes			
1 Exterior walls - paint	2,496 SF	1.10	2,750
2 Interior walls - paint	10,686 SF	1.10	11,750
3 Porcelain wall tile to bathrooms up to 7'	504 SF	8.50	4,280
B23 Wall Finishes	TOTAL : \$	13,686 SF	1.37

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CLASS 'D' ESTIMATE

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B3 FITTINGS & EQUIPMENT	Quantity	Unit rate	Amount
B31 Fittings & Fixtures			
1 Bathroom accessories		Sum	5,080
- grab bars	4 no	350.00	1,400
- toilet paper dispensers	3 no	125.00	375
- paper towel dispenser / receptacle	3 no	300.00	900
- soap dispensers	4 no	65.00	260
- clothes hook	4 no	35.00	140
- baby change table	2 no	500.00	1,000
- mirror	4 no	250.00	1,000
2 Toilet partitions		Sum	7,750
- standard	1 no	1,500.00	1,500
- accessible	3 no	1,750.00	5,250
- urinal screens	2 no	500.00	1,000
3 Millwork		Sum	49,290
- circulation desk	47 lf	450.00	21,150
- allow for miscellaneous millwork		allow	5,000
- library shelving, tables, seating by tenant		nil	
- washroom vanities	14 lf	185.00	2,590
- kitchen counters and cabinets	19 lf	450.00	8,550
- work counter in library along exterior wall	60 lf	200.00	12,000
4 Corner guards to public corridors and service areas		Allow	3,000
5 Fireplace to community living room c/w mantal		Sum	3,500
B31 Fittings & Fixtures	TOTAL : \$	8,347 SF	8.22
B32 Equipment			
1 Equipment - assume not required		NIC	
B32 Equipment	TOTAL : \$	8,347 SF	0.00

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CLASS 'D' ESTIMATE

Hanscomb

C1 MECHANICAL	Quantity	Unit rate	Amount
C11 Plumbing & Drainage			
1 Fixtures & rough-in	1 Sum	35,460.00	35,460
- Water closet, flr. mt'd tank type	7 No.	800.00	5,600
- Water closet, flr. mt'd tank type , HC	4 No.	860.00	3,440
- Urinal	2 No.	1,200.00	2,400
- Lavatory, countertop, manual faucet	10 No.	750.00	7,500
- Kitchen sink	1 No.	1,200.00	1,200
- Janitor sink	1 No.	800.00	800
- Drinking fountain, allow	2 No.	2,400.00	4,800
- Fixture rough-in	27 No.	360.00	9,720
2 Domestic water	1 Sum	27,200.00	27,200
- Water meter & backflow preventor assembly	1 Sum	5,000.00	5,000
- Electric DHW heater, 60USG, 6kW	1 No.	3,000.00	3,000
- DHW recirc. pump	1 No.	1,200.00	1,200
- Allow for piping distribution c/w valves, NFHB etc.	1 Sum	18,000.00	18,000
3 Sanitary draiange & vent - Allow c/w PVC XFR for above grade	1 Sum	24,000.00	24,000
4 Storm drainge - slope roof, gutters and down spout by arch.	1 Nil	0.00	0
5 Natural gas - Not provided	1 Nil	0.00	0
6 Miscellaneous	1 Sum	2,000.00	2,000
- Setting out & sleeving	1 Sum	1,000.00	1,000
- Tagging & identification	1 Sum	200.00	200
- Testing & disinfecting	1 Sum	800.00	800
C11 Plumbing & Drainage	TOTAL : \$	8,347 SF	10.62
C12 Fire Protection			
1 Sprinkler system - Not sprinklered	1 Nil	0.00	0
2 Fire extinguishers	8,347 SF	0.20	1,670
C12 Fire Protection	TOTAL : \$	8,347 SF	0.20

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CLASS 'D' ESTIMATE

Hanscomb

C1 MECHANICAL	Quantity	Unit rate	Amount
C13 HVAC			
1 Electric heating - Allow for Entrance heaters , BBH etc.	8,347 SF	1.50	12,520
2 Air distribution equipment - Packaged heat pump units c/w DX cooling, electric heating, total 30 ton	8,347 SF 1 Sum	10.80 90,000.00	90,000
3 Air distribution ductwork & devices	8,347 SF	9.00	75,120
4 Exhaust & ventilation	8,347 SF	1.50	12,520
5 24/ 7 cooling, allow	1 Sum	5,000.00	5,000
6 Testing, adjusting & balancing	1 Sum	4,000.00	4,000
7 Commissioning	1 Sum	6,000.00	6,000
8 Miscellaneous	1 Sum	4,600.00	4,600
- Setting out & sleeving	1 Sum	1,000.00	1,000
- Tagging & identification	1 Sum	600.00	600
- Rigging of equipment	1 Sum	3,000.00	3,000
C13 HVAC TOTAL : \$	8,347 SF	25.13	209,760
C14 Controls			
1 DDC controls	8,347 SF	4.00	33,390
C14 Controls TOTAL : \$	8,347 SF	4.00	33,390

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CLASS 'D' ESTIMATE

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C2 ELECTRICAL	Quantity	Unit rate	Amount
C21 Service & Distribution			
1 400A 600V 3P 4W main distribution c/w breakers, metering & SPD		Sum	18,000
2 Balance of distribution equipment, feeders & grounding	8,347 SF	3.00	25,040
3 Permits, fees, inspections, as-built drawings, etc.		Sum	5,000
C21 Service & Distribution TOTAL : \$	8,347 SF	5.76	48,040
C22 Lighting, Devices & Heating			
1 Lighting supply, install & wiring - allow for architectural LED lighting, high bay fixtures & LED troffers in meeting rooms	8,347 SF 8,347 SF	8.30 8.30	69,280 69,280
2 Exit & emergency lighting - allow for running man exit lights, remote heads & emergency battery units	8,347 SF 8,347 SF	0.60 0.60	5,010 5,008
3 Lighting control - provision for local switches, dimming switches, occupancy & vacancy sensors	8,347 SF 8,347 SF	1.50 1.50	12,520 12,521
4 Power outlets, devices & connections - allow for power outlets, devices & connections	8,347 SF 8,347 SF	4.00 4.00	33,390 33,388
5 Electric heating - provision for electric baseboard heating throughout building	8,347 SF 8,347 SF	2.00 2.00	16,690 16,694
6 Mechanical connections - allow	8,347 SF	1.00	8,350
C22 Lighting, Devices & Heating TOTAL : \$	8,347 SF	17.40	145,240

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C2 ELECTRICAL	Quantity	Unit rate	Amount
C23 Systems & Ancillaries			
1 Fire alarm	8,347 SF	3.70	30,880
- provision for fully addressable, single stage FA system	8,347 SF	3.70	30,884
2 Communications empty conduit	8,347 SF	1.00	8,350
- allow for communications rough-in, zone conduit, cable tray & firestopping	8,347 SF	1.00	8,347
3 Communications cabling	8,347 SF	3.00	25,040
- allow for horizontal drops, fibre optic cabling & cable management	8,347 SF	3.00	25,041
4 Security intrusion alarm system	8,347 SF	4.30	35,890
- provision for intrusion alarm system c/w devices, wiring & testing	8,347 SF	4.30	35,892
5 Public address system	8,347 SF	1.20	10,020
- allow for PA system c/w speakers, cabling & head-end equipment	8,347 SF	1.20	10,016
6 CATV system	8,347 SF	0.30	2,090
- allow for outlets, cables, splitters/attenuators & distribution amplifiers	8,347 SF	0.25	2,087
C23 Systems & Ancillaries	TOTAL : \$	8,347 SF	13.45
			112,270

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CLASS 'D' ESTIMATE

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D1 SITE WORK	Quantity	Unit rate	Amount
D11 Site Development			
1 Asphalt c/w typical subgrade below	5,082 SF	4.50	22,870
2 Curb to perimeter of parking	319 LF	25.00	7,980
3 Concrete slab to pathways	2,291 SF	7.50	17,180
4 Concrete ramps c/w tempered glass		Allow	12,000
5 Main entrance stairs and landing	188 SF	25.00	4,700
6 Unit pavers at front entry way	913 SF	25.00	22,830
7 Stone walkway to outdoor program area	116 SF	65.00	7,540
8 Fence enclosure to, allow for wooden frame and finish to outdoor program area	67 LF	32.00	2,140
9 Topsoil and SOD to entrance areas	1,043 SF	2.50	2,610
10 Topsoil and seeding	4,228 SF	0.80	3,380
11 Line painting		Allow	1,500
12 Allowance for soft landscapes and plantings		Allow	2,500
13 Allowance for signage		Allow	5,000
14 Bike racks	4 No	350.00	1,400
15 Site furnishings - NIC		NIC	
D11 Site Development	TOTAL : \$	1 Sum	113,630.00
			113,630
D12 Mechanical Site Services			
1 Water main	1 Sum	20,000.00	20,000
- Allow for street connection, max. 100' from building	1 Sum	20,000.00	20,000
		Carried Forward :	20,000

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D1 SITE WORK	Quantity	Unit rate	Amount
D12 Mechanical Site Services (Continued)		Brought Forward :	20,000
2 Sanitary drainage	1 Sum	20,000.00	20,000
- Allow for street connection, max. 100' from building	1 Sum	20,000.00	20,000
3 Storm drairage - Assume not provided, surface run off	1 Nil	0.00	0
D12 Mechanical Site Services TOTAL : \$	1 Sum	40,000.00	40,000
D13 Electrical Site Services			
<u>Incoming power</u>			
1 Primary ductbank - allow		Sum	10,000
2 Transformer by Utility		Nil	
3 Transformer pad & grounding - allow		Sum	8,500
4 Secondary ductbank & cabling - allow		Sum	20,000
<u>Incoming communication</u>			
5 Incoming U/G communication ductbank - allow		Sum	5,000
<u>Site lighting</u>			
6 Provision for building mounted luminaires - full cut-off & dark sky compliant		Sum	12,000
7 Miscellaneous parking lot lighting c/w U/G conduit & wiring		Sum	10,000
D13 Electrical Site Services TOTAL : \$	1 Sum	65,500.00	65,500

**Appendix
B - Drawing List**

APPENDIX B - Drawing List

ARCHITECTURAL

Number	Drawings Title	Dated	Received
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STRUCTURAL

Number	Drawings Title	Dated	Received
--------	-------------------	-------	----------

CIVIL

Number	Drawings Title	Dated	Received
--------	-------------------	-------	----------

LANDSCAPE

Number	Drawings Title	Dated	Received
--------	-------------------	-------	----------

ELECTRICAL

Number	Drawings Title	Dated	Received
--------	-------------------	-------	----------

MECHANICAL

Number	Drawings Title	Dated	Received
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RENDERINGS

Rendering drawings were provided for the purpose of this Class 'D' estimate. The renderings consisted of plan view, cross sections, birds eye and elevation views which were used to build the Class 'D' estimate.

A 14 page, written, word document was provided which included the general summary of work. This document was used in conjunction with the renderings to complete the Class 'D' estimate.

**EATON STAGE REPLACEMENT
DEMOLITION AND BUILD NEW
STRUCTURE
PUGWASH, NOVA SCOTIA**

CLASS 'D' ESTIMATE

December 8, 2017

Hanscomb

**EATON STAGE REPLACEMENT
DEMOLITION AND BUILD NEW STRUCTURE
PUGWASH, NOVA SCOTIA**

CLASS 'D' ESTIMATE

Prepared For:

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December 8, 2017

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3.	Cost Considerations	5
4.	Gross Floor Area	7
5.	Construction Cost Estimate Summary	8

Appendices

A - Detailed Elemental Cost Estimate

B - Drawing List

1. INTRODUCTION

1.1 Purpose: This Class 'D' Estimate is intended to provide a realistic allocation of direct and indirect construction costs for the demolition of the existing stage and construct new, located in Pugwash, Nova Scotia, with exceptions of items listed in 1.4 below.

1.2 Methodology: From the documentation and information provided, quantities of all major elements were assessed or measured where possible and priced at rates considered competitive for a project of this type under a stipulated sum form of contract in Pugwash, Nova Scotia.

Pricing shown reflects probable construction costs obtainable in the Pugwash, Nova Scotia area on the effective date of this report. This estimate is a determination of fair market value for the construction of this project. It is not a prediction of low bid. Pricing assumes competitive bidding for every portion of the work.

1.3 Specifications: For building components and systems where specifications and design details are not available, quality standards have been established based on discussions with the design team.

1.4 Exclusions: This Class 'D' Estimate does not provide for quantities of works or costs in excess of what is specified in this estimate for the following items:

- Cost of Design Exclusions, Omissions, & Errors
- Professional Fees and Expenses
- Phased Construction Premiums
- Escalation Allowance
- Land Acquisition and Impost Charges
- Development Charges
- Permits (Building, Plumbing, Access, etc)
- Legal Fees and Expenses
- Value Added Taxes (GST, HST, QST, etc.)
- Right of Way Charges or Easement Requirements
- Financing Fee's & Carrying Costs
- Fund Raising Requirements
- Owner's Staff and Associated Management
- Owner Furnished Material or Associated Labour

1. INTRODUCTION

1.4 Exclusions:
(continued)

- Impact of Adjacent Properties and their Conditions
- Mitigation of Water Conditions
- Winter Conditions Affecting the Work

2. DOCUMENTATION

This Class 'D' Estimate has been prepared from documentation included in Appendix B of this report, and received from Architecture 49.

Design changes and / or additions made subsequent to this issuance of the documentation noted above have not been incorporated in this report.

3. COST CONSIDERATIONS

- 3.1 Cost Base: All costs are estimated on the basis of competitive bids (a minimum of 5 to 6 general contractor bids and at least 4 to 5 subcontractor bids for each trade) being received in December 2017 from general contractors and all major subcontractors and suppliers based on a stipulated sum form of contract.
- 3.2 Escalation: No allowance has been made for construction cost escalation that may occur between December 2017 and the anticipated bid date of for the project. It is recommended that the Owner make separate provision for construction cost escalation in the overall project budget.
- 3.3 Contingencies: An allowance of 6.0% has been included to cover design and pricing unknowns. This allowance is not intended to cover any program space modifications but rather to provide some flexibility for the designers and cost planners during the remaining contract document stages.
- An allowance of 5.0% has been made to cover construction (post contract) unknowns.
- 3.4 Unit Rates: The unit rates in the preparation of this Class 'D' Estimate include labour and material, equipment, Subcontractor's overheads and profits.
- 3.5 Taxes: No provision has been made for the HST. It is recommended that the owner make separate provision for HST in the project budget.
- 3.6 Statement of Probable Costs: Hanscomb has no control over the cost of labour and materials, the Contractor's method of determining prices, or competitive bidding and market conditions. This opinion of probable cost of construction is made on the basis of experience, qualifications and best judgement of the professional consultant familiar with the construction industry. Hanscomb cannot and does not guarantee that proposals, bids, or actual construction costs will not vary from this or subsequent cost estimates.

3. COST CONSIDERATIONS (cont'd)

- 3.6 Statement of Probable Costs: (continued) Hanscomb has prepared this estimate in accordance with generally accepted principles and practices. Hanscomb's staff are available to discuss its contents with any interested party.
- 3.7 Ongoing Cost Control: Hanscomb recommends that the Owner and Design Consultant carefully review this document, including line item description, unit prices, clarifications, exclusions, inclusions and assumptions, contingencies, escalation and mark-ups. If the Project is over budget, or if there are unresolved budgeting issues, alternative systems / schemes should be evaluated before proceeding into the next design phase.
- Requests for modifications of any apparent errors or omissions to this document must be made to Hanscomb within ten (10) days of receipt of this estimate. Otherwise, it will be understood that the contents have been concurred with and accepted.
- It is recommended that a final update estimate be produced by Hanscomb using bid documents to determine overall cost changes which may have occurred since the preparation of this estimate. The final updated estimate will address changes and additions to the documents, as well as addenda issued during the bidding process. Hanscomb cannot reconcile bid results to any estimate not produced from bid documents including all addenda.

4. GROSS FLOOR AREA

Description	Existing SF	New Construction SF
Stage	4775	4775
Total Gross Floor Area	4,775	4,775

The above areas have been measured in accordance with the Canadian Institute of Quantity Surveyors' Method of Measurement of Buildings by Area and Volume.

5. CONSTRUCTION COST ESTIMATE SUMMARY

COST SUMMARY:

Element		Cdn \$
Shell		\$ 304,500
Interiors		\$ 74,800
Mechanical - Bldg		\$ 76,300
Electrical - Bldg		\$ 48,200
Total - Less Site		\$ 503,800
Site Development		\$ 10,000
Mechanical Site Services		\$ -
Electrical Site Services		\$ 5,000
Demolition		\$ 26,260
Alterations		\$ -
Net Building Costs - Including Site		\$ 545,100
General Requirements	20.0%	\$ 98,100
Design & Pricing Contingency	15.0%	\$ 38,590
Escalation Contingency	0.0%	
Construction Contingency	10.0%	\$ 34,590
Location Factor	10.0%	\$ 71,590
Total Construction Estimate - Contingencies		\$ 787,500
Taxes - excluded	0.0%	\$ -
Total Construction Estimate		\$ 787,500

Appendix
A - Detailed Elemental Cost Estimate

Project		Eaton Stage Replacement		Report date		8 Dec 2017		
Location		Pugwash, Nova Scotia		Page No.		1		
Owner		Village of Pugwash		Bldg Type				
Consultant		Architecture 49		C.T. Index		0.0		
				GFA		4,775 SF		
ELEMENTAL COST SUMMARY								
Element	Ratio to GFA	Elemental Cost		Elemental Amount		Rate per SF		%
		Quantity	Unit rate	Sub-Total	Total	Sub-Total	Total	
A SHELL		4,775 SF			304,500		63.77	47.3
A1 SUBSTRUCTURE					68,200		14.28	10.6
A11 Foundations	0.283	1,350 SF	47.90	64,720		13.55		
A12 Basement Excavation				0		0.00		
A13 Special Conditions	0.000	Sum	3,500.00	3,500		0.73		
A2 STRUCTURE					120,200		25.17	18.7
A21 Lowest Floor Construction	1.000	4,775 SF	11.80	56,130		11.75		
A22 Upper Floor Construction	0.130	620 SF	11.90	7,380		1.55		
A23 Roof Construction	1.000	4,775 SF	11.90	56,690		11.87		
A3 EXTERIOR ENCLOSURE					116,100		24.31	18.1
A31 Walls Below Grade				0		0.00		
A32 Walls Above Grade	0.412	1,967 SF	26.80	52,680		11.03		
A33 Windows & Entrances	0.000	Sum	5,060.00	5,060		1.06		
A34 Roof Coverings	1.000	4,775 SF	11.10	52,880		11.07		
A35 Projections	0.000	Sum	5,440.00	5,440		1.14		
B INTERIORS		4,775 SF			74,800		15.66	11.6
B1 PARTITIONS & DOORS					17,500		3.66	2.7
B11 Partitions	0.324	1,548 SF	7.00	10,840		2.27		
B12 Doors	0.001	7 Lvs	950.00	6,650		1.39		
B2 FINISHES					31,600		6.62	4.9
B21 Floor Finishes	1.000	4,775 SF	3.90	18,660		3.91		
B22 Ceiling Finishes	0.269	1,285 SF	5.00	6,370		1.33		
B23 Wall Finishes	1.060	5,063 SF	1.30	6,580		1.38		
B3 FITTINGS & EQUIPMENT					25,700		5.38	4.0
B31 Fittings & Fixtures	1.000	4,775 SF	5.40	25,700		5.38		
B32 Equipment	1.000	4,775 SF	0.00	0		0.00		
B33 Elevators				0		0.00		
B34 Escalators				0		0.00		
C SERVICES		4,775 SF			124,500		26.07	19.4
C1 MECHANICAL					76,300		15.98	11.9
C11 Plumbing & Drainage	1.000	4,775 SF	7.50	35,660		7.47		
C12 Fire Protection	1.000	4,775 SF	0.20	960		0.20		
C13 HVAC	1.000	4,775 SF	7.80	37,150		7.78		
C14 Controls	1.000	4,775 SF	0.50	2,500		0.52		
C2 ELECTRICAL					48,200		10.09	7.5
C21 Service & Distribution	1.000	4,775 SF	1.60	7,500		1.57		
C22 Lighting, Devices & Heating	1.000	4,775 SF	7.20	34,400		7.20		
C23 Systems & Ancillaries	1.000	4,775 SF	1.30	6,330		1.33		
NET BUILDING COST - EXCLUDING SITE					\$ 503,800		105.51	78.3
D SITE & ANCILLARY WORK		4,775 SF			41,300		8.65	6.4
D1 SITE WORK					15,000		3.14	2.3
D11 Site Development	0.000	1 Sum	10,000.00	10,000		2.09		
D12 Mechanical Site Services	0.000	1 Sum	0.00	0		0.00		
D13 Electrical Site Services	0.000	1 Sum	5,000.00	5,000		1.05		
D2 ANCILLARY WORK					26,300		5.51	4.1
D21 Demolitions	0.000	1 Sum	26,260.00	26,260		5.50		
D22 Alterations				0		0.00		
NET BUILDING COST - INCLUDING SITE					\$ 545,100		114.16	84.7
Z1 GENERAL REQUIREMENTS & FEE					98,100		20.54	15.3
Z11 General Requirements & Fee		18.0 %		98,120		20.55		
TOTAL CONSTRUCTION ESTIMATE - EXCLUDING ALLOWANCES					\$ 643,200		134.70	100.0
Z2 ALLOWANCES					144,300		30.22	
Z21 Design & Pricing Allowance		6.0 %		38,590		8.08		
Z22 Escalation Allowance		0.0 %		0		0.00		
Z23 Construction Allowance		5.0 %		34,090		7.14		
Z24 Location Factor		10.0 %		71,590		14.99		
TOTAL CONSTRUCTION ESTIMATE - INCLUDING ALLOWANCES					\$ 787,500		164.92	
VALUE ADDED TAX (GST/HST)					0		0.00	
- Value Added Tax (GST/HST)		0.0 %		0		0.00		
TOTAL CONSTRUCTION ESTIMATE					\$ 787,500		\$ 164.92	

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A1 SUBSTRUCTURE	Quantity	Unit rate	Amount
A11 Foundations			
1 12" Concrete filled sono-tube c/w big foot base - LP3	90 No	300.00	27,000
2 8" Reinforced concrete frost wall to stage	73 LF	125.10	9,130
- reinforced concrete first wall c/w concrete, formwork and rebar. allow 5'	365 sf	20.00	7,300
- reinforced concrete strip footings c/w concrete, formwork and rebar	73 lf	25.00	1,825
3 8" Reinforced concrete frost wall to Building	197 LF	125.00	24,630
- reinforced concrete first wall c/w concrete, formwork and rebar. allow 5'	985 sf	20.00	19,700
- reinforced concrete strip footings c/w concrete, formwork and rebar	197 lf	25.00	4,925
4 Excavation and backfill	396 CY	10.00	3,960
A11 Foundations TOTAL : \$	1,350 SF	47.94	64,720
A13 Special Conditions			
1 Dewatering, erosion and sediment control (Premium Due to Location of Construction)		Allow	3,500
2 Winter heat		Nil	
A13 Special Conditions TOTAL : \$	1 #Sum	3,500.00	3,500

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A2 STRUCTURE	Quantity	Unit rate	Amount
A21 Lowest Floor Construction			
1 4" Reinforced concrete slab on grade c/w concrete, formwork, rebar & 4" rigid insulation (Chair Storage)	620 SF	7.20	4,460
2 Floor and deck construction	3,880 SF	11.90	46,170
- 5/8" T&G plywood (wearing surface)	3,880 sf	3.50	13,580
- 3/4" T&G plywood deck	3,880 sf	3.20	12,416
- structural members	3,880 sf	4.20	16,296
- miscellaneous metals	3,880 sf	1.00	3,880
3 Ramp construction	275 SF	20.00	5,500
A21 Lowest Floor Construction TOTAL : \$	4,775 SF	11.75	56,130
A22 Upper Floor Construction			
1 Floor and deck construction (Above Stair Storage)	620 SF	11.90	7,380
- 5/8" T&G plywood (wearing surface)	620 sf	3.50	2,170
- 3/4" T&G plywood deck	620 sf	3.20	1,984
- structural members	620 sf	4.20	2,604
- miscellaneous metals	620 sf	1.00	620
A22 Upper Floor Construction TOTAL : \$	620 SF	11.90	7,380
A23 Roof Construction			
1 Conventional stick frame - sloped joists	1,090 SF	9.00	9,810
- R3	1,090 sf	9.00	9,810
2 Conventional stick frame - Joists	2,822 SF	8.00	22,580
- R1	1,978 sf	8.00	15,824
- R2	844 sf	8.00	6,752
3 Remaining - No work required	863 SF	0.00	0
4 Timber columns	20 No	115.00	2,300
		Carried Forward :	34,690

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A2 STRUCTURE	Quantity	Unit rate	Amount
A23 Roof Construction (Continued)		Brought Forward :	34,690
5 Allow for miscellaneous steel, girders & trusses		Allow	22,000
A23 Roof Construction	TOTAL : \$	4,775 SF	11.87
			56,690

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A3 EXTERIOR ENCLOSURE	Quantity	Unit rate	Amount
A32 Walls Above Grade			
1 Eastern hemlock shingle c/w sheathing, wood stud, insulation, strapping, GWB	1,967 SF	25.00	49,180
2 Allow for flashings and trims		Sum	3,500
A32 Walls Above Grade	TOTAL : \$	1,967 SF	26.78
			52,680
A33 Windows & Entrances			
1 Vinyl framed windows, allow for standard sizes	76 SF	35.00	2,660
2 Hollow metal entry doors c/w frame, hardware finish - single	2 Lvs 2 lvs	1,200.00 1,200.00	2,400 2,400
A33 Windows & Entrances	TOTAL : \$	1 #Sum	5,060.00
			5,060
A34 Roof Coverings			
1 R1 - 2 Ply modified bitumen	1,978 SF	15.00	29,670
2 R2 - 2 Ply modified bitumen	844 SF	12.00	10,130
3 R3 - 2 Ply modified bitumen	1,090 SF	12.00	13,080
4 Remaining areas - no work required	863 SF	0.00	0
A34 Roof Coverings	TOTAL : \$	4,775 SF	11.07
			52,880
A35 Projections			
1 W2 - parapet construction	80 LF	20.00	1,600
2 Skirts to perimeter of stage and veranda, allow miscellaneous blocking and lattis	480 SF	8.00	3,840
A35 Projections	TOTAL : \$	1 #Sum	5,440.00
			5,440

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B1 PARTITIONS & DOORS	Quantity	Unit rate	Amount
B11 Partitions			
1 Typical partition c/w sheathing, stud and batt	1,548 SF	7.00	10,840
B11 Partitions TOTAL : \$	1,548 SF	7.00	10,840
B12 Doors			
1 Solid core wood door and frame c/w hardware and finish	7 Lvs	950.00	6,650
- single (dressing room)	3 lvs	950.00	2,850
- single (office)	1 lvs	950.00	950
- single (washrooms)	2 lvs	950.00	1,900
- single (storage)	1 lvs	950.00	950
B12 Doors TOTAL : \$	7 Lvs	950.00	6,650

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B2 FINISHES	Quantity	Unit rate	Amount
B21 Floor Finishes			
1 Dressing rooms, allow resilient sheet flooring	717 SF	5.00	3,590
2 Cross over corridor, allow resilient sheet flooring	380 SF	5.00	1,900
3 Office, allow resilient sheet flooring	54 SF	5.00	270
4 Storage, allow resilient sheet flooring	40 SF	5.00	200
5 Washrooms, allow resilient sheet flooring	94 SF	5.00	470
6 Stage, allow for weather treatments, slip resistant	1,917 SF	3.50	6,710
7 Veranda, allow for weather treatments, slip resistant	1,576 SF	3.50	5,520
B21 Floor Finishes TOTAL : \$	4,775 SF	3.91	18,660
B22 Ceiling Finishes			
1 5/8 plywood sheathing c/w miscellaneous wood strapping - allow to be painted	1,285 SF	3.00	3,860
2 Exposed ceilings to underside of stage and veranda - allow paint	1,934 SF	1.30	2,510
B22 Ceiling Finishes TOTAL : \$	1,285 SF	4.96	6,370
B23 Wall Finishes			
1 Allow for paint	5,063 SF	1.30	6,580
B23 Wall Finishes TOTAL : \$	5,063 SF	1.30	6,580

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B3 FITTINGS & EQUIPMENT	Quantity	Unit rate	Amount
B31 Fittings & Fixtures			
1 Bathroom accessories to washrooms and dressing rooms	2 No	2,400.00	4,800
2 Millwork	33 LF	200.00	6,600
- vanities	19 lf	200.00	3,800
- sit-at counters	14 lf	200.00	2,800
- benches - NIC		nic	
3 Aluminum railing system to building access ramp	118 LF	100.00	11,800
4 Miscellaneous FF&E for storage under stage apron		Allow	2,500
B31 Fittings & Fixtures	TOTAL : \$	4,775 SF	5.38
B32 Equipment			
1 Equipment - assume not required		NIC	
B32 Equipment	TOTAL : \$	4,775 SF	0.00

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C1 MECHANICAL	Quantity	Unit rate	Amount
C11 Plumbing & Drainage			
1 Fixtures & rough-in	1 Sum	9,800.00	9,800
- Water closet, fir. mt'd tank type , HC	2 No.	860.00	1,720
- Lavatory, wall hung, manual faucet	2 No.	1,000.00	2,000
- Sink, countertop, manual faucet	4 No.	800.00	3,200
- Fixture rough-in	8 No.	360.00	2,880
2 Domestic water	1 Sum	14,480.00	14,480
- Water meter & backflow preventor assembly - assume new	1 Sum	3,600.00	3,600
- Electric DHW heater, 40USG	1 No.	3,000.00	3,000
- Piping	220 LF	24.00	5,280
- Insulation	220 LF	5.00	1,100
- Allow for valves	1 Sum	500.00	500
- Heat trace main line to drain valve	1 Sum	1,000.00	1,000
3 Sanitary drairage & vent	1 Sum	9,980.00	9,980
- Drainage piping below grade c/w trenching & bedding	160 LF	33.00	5,280
- Vent piping	100 LF	26.00	2,600
- FCO	2 No.	300.00	600
- VTR	1 No.	300.00	300
- FD	3 No.	400.00	1,200
4 Storm drainge - slope roof, gutters and down spout by arch.	1 Nil	0.00	0
5 Natural gas - Not provided	1 Nil	0.00	0
6 Miscellaneous	1 Sum	1,400.00	1,400
- Setting out & sleeving	1 Sum	600.00	600
- Tagging & identification	1 Sum	200.00	200
- Testing & disinfecting	1 Sum	600.00	600
C11 Plumbing & Drainage	TOTAL : \$	4,775 SF	7.47
C12 Fire Protection			
1 Sprinkler system - Not sprinklered	1 Nil	0.00	0
2 Fire extinguishers	4,775 SF	0.20	960
C12 Fire Protection	TOTAL : \$	4,775 SF	0.20

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C1 MECHANICAL	Quantity	Unit rate	Amount
C13 HVAC			
1 Electric heating - Not required	1 Nil	0.00	0
2 Air distribution equipment	4,775 SF	1.30	6,000
- HRV, allow 450CFM	1 No.	6,000.00	6,000
3 Air distribution ductwork & devices	4,775 SF	5.50	26,050
- Ductwork	2,600 lb	8.00	20,800
- Insulation	800 SF	4.00	3,200
- Diffusers	5 No.	180.00	900
- Grilles	5 No.	150.00	750
- Side wall grille for O/A, E/A	2 No.	200.00	400
4 Testing, adjusting & balancing	1 Sum	1,500.00	1,500
5 Commissioning	1 Sum	2,200.00	2,200
6 Miscellaneous	1 Sum	1,400.00	1,400
- Setting out & sleeving	1 Sum	1,000.00	1,000
- Tagging & identification	1 Sum	400.00	400
C13 HVAC	TOTAL : \$	4,775 SF	7.78
			37,150
C14 Controls			
1 Controls - assume local stand alone controls, allow for HRV only	1 Sum	2,500.00	2,500
C14 Controls	TOTAL : \$	4,775 SF	0.52
			2,500

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C2 ELECTRICAL	Quantity	Unit rate	Amount
C21 Service & Distribution			
1 Allowance for new service entrance c/w panel, metering & grounding		Sum	6,500
2 Allowance for U/G feeders & ductbank - carried in D13		Nil	
3 Permits, fees, inspections, as-built drawings, etc.		Sum	1,000
C21 Service & Distribution	TOTAL : \$	4,775 SF	1.57
			7,500
C22 Lighting, Devices & Heating			
1 Lighting supply, install & wiring	4,775 SF	3.70	17,820
- exterior wall mounted luminaire	7 no.	550.00	3,850
- pot light fixture	11 no.	345.00	3,795
- 2'x2' troffer	4 no.	280.00	1,120
- LED strip fixture	9 no.	260.00	2,340
- conduit & wiring	41 no.	150.00	6,150
- empty conduit below stage for future stage lighting	80 LF	7.00	560
2 Exit & emergency lighting	4,775 SF	0.40	2,070
- exit light	2 no.	300.00	600
- remote emergency fixture c/w dual heads	2 no.	135.00	270
- emergency battery unit c/w dual heads	1 no.	450.00	450
- conduit & wiring	5 no.	150.00	750
3 Lighting control	4,775 SF	0.60	3,000
- dual technology occupancy sensor	4 no.	250.00	1,000
- balance of lighting control c/w local switching, occupancy sensors, conduit & wiring		sum	2,000
4 Power outlets, devices & connections	4,775 SF	1.90	9,120
- 15A duplex receptacle	12 no.	125.00	1,500
- 15A duplex receptacle GFI	6 no.	145.00	870
- 15A duplex receptacle WP	3 no.	170.00	510
- direct connection	1 no.	200.00	200
- power connection to signage	1 no.	200.00	200
- allow for additional devices & connections	4,775 SF	0.50	2,388
			(Continued)
		Carried Forward :	32,010

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C2 ELECTRICAL	Quantity	Unit rate	Amount
C22 Lighting, Devices & Heating (Continued)		Brought Forward :	32,010
4 Power outlets, devices & connections (Continued)			
- conduit & wiring	23 no.	150.00	3,450
5 Mechanical connections - allow	4,775 SF	0.50	2,390
C22 Lighting, Devices & Heating TOTAL : \$	4,775 SF	7.20	34,400
C23 Systems & Ancillaries			
1 Fire alarm	4,775 SF	0.10	500
- allow for smoke detectors wired to lighting circuits		sum	500
2 Communications IT	4,775 SF	0.20	1,050
- voice/data outlets	1 No.	150.00	150
- horizontal drops c/w termination	2 No.	200.00	400
- testing & certification		sum	500
3 Security system - allow	4,775 SF	1.00	4,780
C23 Systems & Ancillaries TOTAL : \$	4,775 SF	1.33	6,330

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D1 SITE WORK	Quantity	Unit rate	Amount
D11 Site Development			
1 Grading and make good area in preparation for new construction		Allow	5,000
2 Site landscaping, allow		Allow	5,000
3 Miscellaneous site furnishings		NIC	
D11 Site Development TOTAL : \$	1 Sum	10,000.00	10,000
D12 Mechanical Site Services			
1 Water main - Assume existing	1 Nil	0.00	0
2 Sanitary drainage - Assume existing	1 Nil	0.00	0
3 Storm draiange - Assume not provided, surface run off	1 Nil	0.00	0
D12 Mechanical Site Services TOTAL : \$	1 Sum	0.00	0
D13 Electrical Site Services			
1 Allowance for incoming ductbank & feeders		Sum	5,000
D13 Electrical Site Services TOTAL : \$	1 Sum	5,000.00	5,000

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D2 ANCILLARY WORK	Quantity	Unit rate	Amount
D21 Demolitions			
1 Demolitions of existing building	4,775 SF	5.50	26,260
D21 Demolitions TOTAL : \$	1 Sum	26,260.00	26,260

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CLASS 'D' ESTIMATE

Hanscomb

**EATON STAGE REPLACEMENT
DEMOLITION AND BUILDING NEW STRUCTURE
PUGWASH, NOVA SCOTIA**

Report Date : DECEMBER 2017

**Appendix
B - Drawing List**

CLASS 'D' ESTIMATE

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APPENDIX B - Drawing List

ARCHITECTURAL

Drawings			
Number	Title	Dated	Received
A-200	Floor Plan / Reflective Ceiling Plan	20-Nov-17	27-Nov-17
A-250	Roof Plan and Details	20-Nov-17	27-Nov-17
A-300	Section Elevations	20-Nov-17	27-Nov-17

STRUCTURAL

Drawings			
Number	Title	Dated	Received
S-100	Construction Notes and Schedules	20-Nov-17	27-Nov-17
S-101	Foundation Plan	20-Nov-17	27-Nov-17
S-102	Floor and Deck Framing Plan	20-Nov-17	27-Nov-17
S-103	Roof Framing Plan	20-Nov-17	27-Nov-17

CIVIL

Drawings			
Number	Title	Dated	Received

LANDSCAPE

Drawings			
Number	Title	Dated	Received

ELECTRICAL

Drawings			
Number	Title	Dated	Received
E-100	Power and Lighting Plans	20-Nov-17	27-Nov-17

MECHANICAL

Drawings			
Number	Title	Dated	Received
M-100	Plumbing and HVAC Plans	20-Nov-17	27-Nov-17

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