Interpretation Planning for Purcell's Cove Quarries

Bachelor of Community Design Honours Thesis

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Acknowledgements

Thank you to John Zuck for all your direction and assistance with this project, especially hiking with us through the quarries and sharing your wealth of knowledge. It has been a pleasure to work with you on this project. Thank you to Marcos Zentilli and Rebecca Jamieson for sharing your expertise and passion for the area. Thank you to Patricia Manuel for your guidance throughout the year. Thank you to Jennifer Strang at the Dalhousie GIS Centre for helping us to track down data. Finally, thank you to Cole Grabinsky. There is no one else I would have rather collaborated with on this project.

Executive Summary

Purcell's Cove is located on the western shore of the Northwest Arm of Halifax Harbour, Nova Scotia. Historically there were six quarries located at Purcell's Cove; three granite quarries and three slate or bluestone quarries. The remains of these quarries and their operations can still be seen today. This project explores the Purcell's Cove Quarries through the lens of interpretation planning and with the intent of establishing the cultural significance and heritage value of the site. This project focuses on the geologic history theme and was completed in close collaboration with Cole Grabinsky, who focused on the industrial history theme.

A site inventory established the approximate extents of the granite and bluestone quarries and located trails in the area, the rail bed of a historic railroad track, as well as significant quarry remains and environmental features. This project provides an explanation of the geologic history of the area, which contributes to an understanding of the siting of these six quarries at this location. This work led to the identification of the character defining elements, which are the quarry pits, quarry cuts, granite whalebacks, glacial features, the slate strata and metamorphoses and the landscape of the contact between the granite and the slate. This also led to the identification of four possible stories for interpretation.

This project explores the planning policy that applies to the Purcell's Cove area, as well as the land ownership of the site, and the implications of these for the protection of this cultural landscape. It also investigates mechanisms that could be used by the Purcell's Cove community to recognize and protect the quarries. Based on this work a number of recommendations are made and the Maritime Archaeological Resource Inventory application has been filled out, which the community may choose to submit. The Purcell's Cove Quarries are a significant cultural landscape and recognition and protection of this valuable heritage resource should be pursued.

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Introduction

Purcell's Cove is located on the western shore of the Northwest Arm of Halifax Harbour. Historically there were six quarries located at Purcell's Cove[1]. Granite, ironstone and slate were removed from these quarries[2]. The rock was used to build many historic fortresses and buildings around Halifax, including Citadel Hill, the Town Clock and many buildings on the Dalhousie University campus[3]. The geology and location of Purcell's Cove made the area ideal for quarrying. The Purcell's Cove community places value on the cultural, industrial and natural history of the quarries and hopes to see them protected. However, the area is designated for development in the future.

This project involves preparing background information for an interpretation plan for the historic quarries at Purcell's Cove. Interpretation is "an educational activity which aims to reveal meanings and relationships through the use of original objects, by firsthand experience, and by illustrative media"[4]. Interpretation planning is an important part of creating effective interpretation for an area and contributing to the conservation of natural and cultural heritage resources. Interpretation planning is the process of identifying objectives for interpretation, the audience, the resources of a place, themes or stories that should be told and interpretation media[5].

The purpose of this project is to investigate the quarries at Purcell's Cove in a way that contributes to the community's objective of protecting the area. This will be achieved by preparing background information for an interpretation plan for the quarries, identifying the character defining elements of the place and investigating mechanisms the community can use to have the quarries protected.

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[1] Millington, E. (2000). *Purcell's Cove: The little place that helped build Halifax city*. Victoria: Desktop Publishing Ltd.
[2] Ibid.
[3] Ibid.
[4] Tilden, F. (1977). *Interpreting our heritage* (3rd ed.). Chapel Hill: University of North Carolina Press, 8.
[5] Carter, J. (Ed.). (2001). *A sense of place: An interpretive planning handbook* (2nd ed.). Scotland: Scottish Interpretation Network. Accessed November 2, 2015. http://www.greentourism.org.uk/SOFP.PDF

Background

Purcell's Cove is located on the western shore of the Northwest Arm of the Halifax Harbour. Historically there were six quarries located at Purcell's Cove[6]. Granite, ironstone and slate were removed from these quarries[7]. The rock was used to build many of the historic fortresses and buildings around Halifax, including Citadel Hill, the Town Clock and many buildings on the Dalhousie University campus[8].

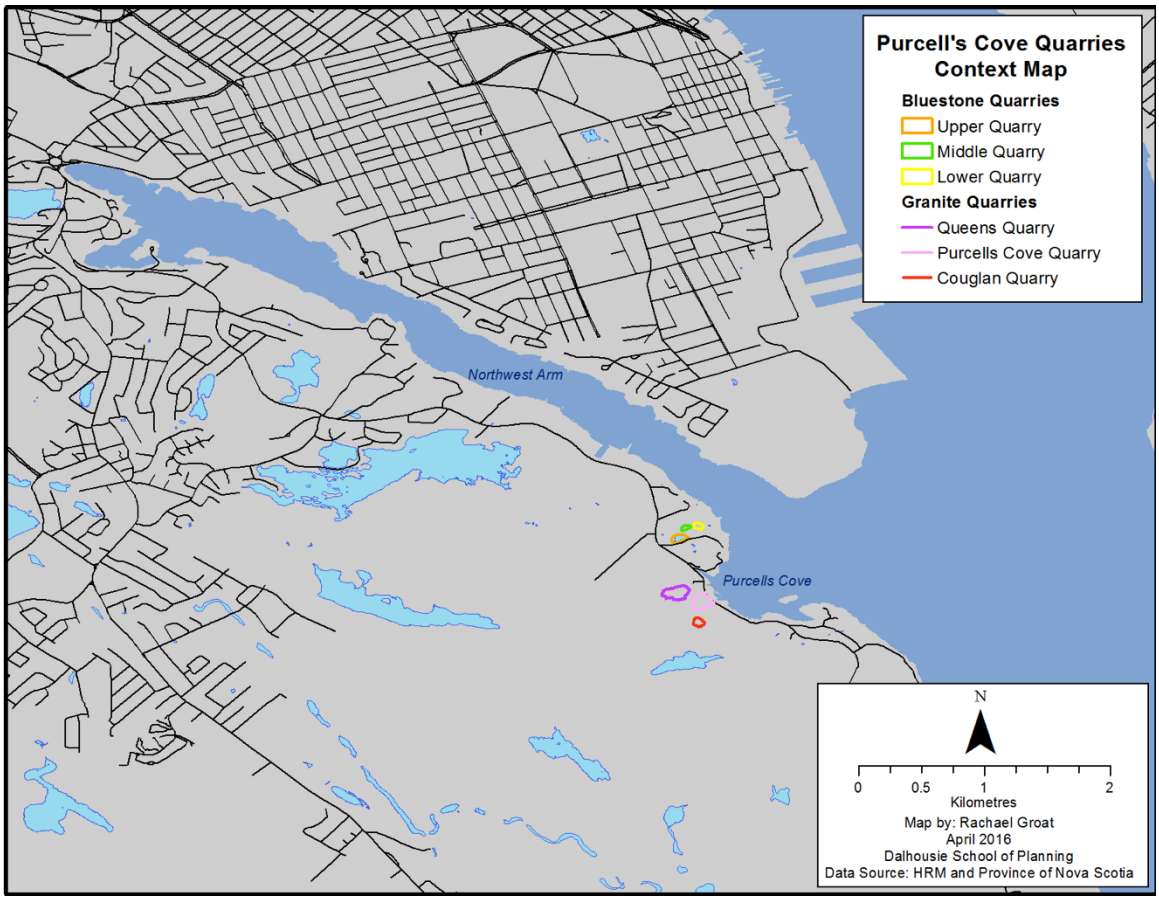

Figure 1: Map of the Context of the Purcell's Cove Quarries

[6] Millington. *Purcell's Cove: The little place that helped build Halifax city*.
[7] Ibid.
[8] Ibid.

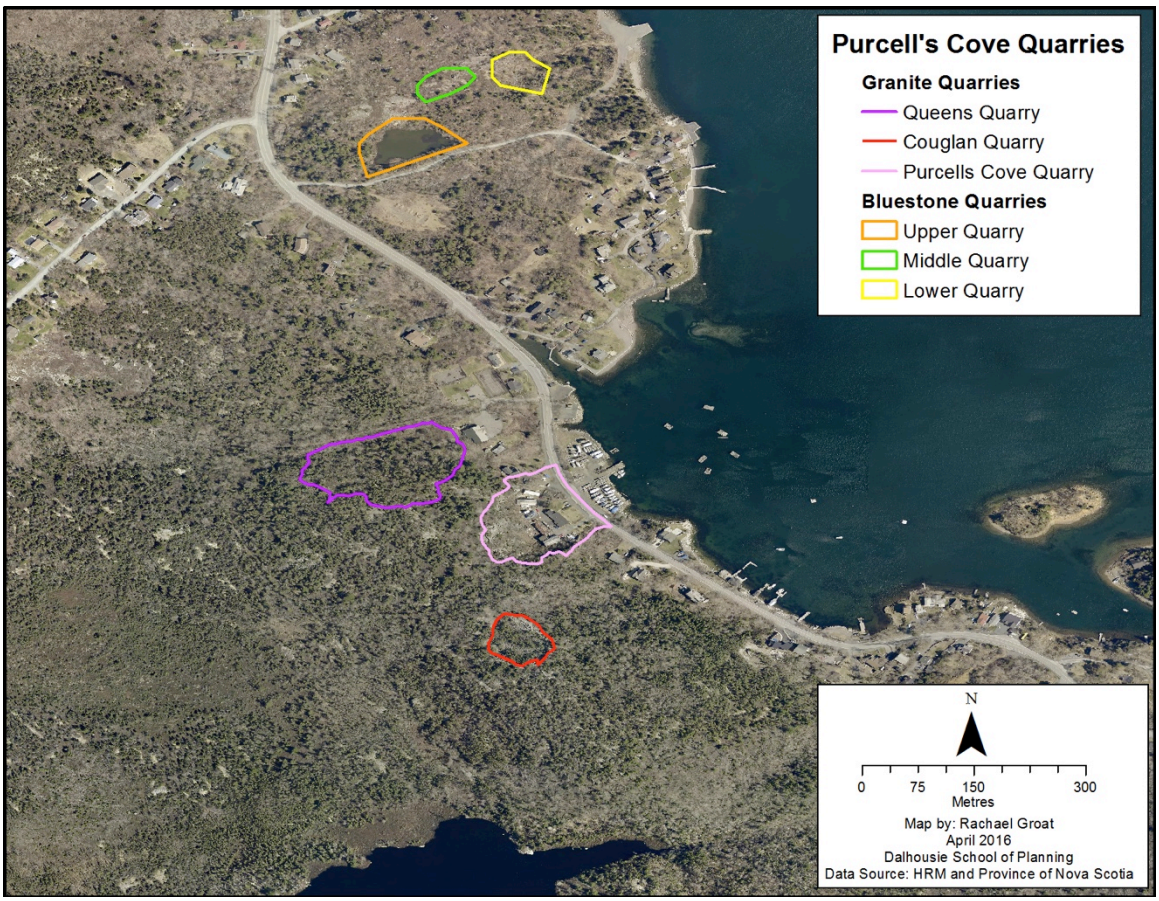

Figure 2: Map of the Purcell's Cove Quarries

The geology of Purcell's Cove is special because it is the contact point between the granite of the South Mountain Batholith and the slates of the Halifax Group, which are part of the Meguma Terrane[9]. Approximately 500 million years ago sediments were deposited on the ocean floor, forming sedimentary rocks[10]. These rocks were altered as they were heated and folded approximately 400 million years ago[11]. The South Mountain Batholith was formed approximately 380 million years ago, during the late Devonian Period, when granitic magma intruded the meta-sedimentary rock[12]. Heat from the intruding granite further metamorphosed the meta-sedimentary rocks, forming slate and ironstone[13]. Erosion of the layered rocks over the last 350 million years exposed the

[9] Marcos Zentilli, personal communication, November 3, 2015
[10] Ibid.
[11] Ibid.
[12] Davis, D. S., & Browne, S. (Ed.). (1996). *Natural history of Nova Scotia: Topics and habitats* (Vol. 1). Halifax, NS: Nova Scotia Museum of Natural History.
[13] Marcos Zentilli, personal communication, November 3, 2015

granite that is now seen at Purcell's Cove[14].

The Purcell's Cove granite quarries are part of the South Mountain Batholith, which extends in an arc from Yarmouth to Halifax[15]. It is the largest body of granatoid rocks in the Appalachian Mountain system[16]. Purcell's Cove is part of the Pennant Barrens Natural History region of Nova Scotia, which is entirely underlain by granite[17]. The Purcell's Cove Bluestone Quarries are found in the Bluestone Formation of the Halifax Group. These quarries have been used as a field trip site for Dalhousie geology students for many years.

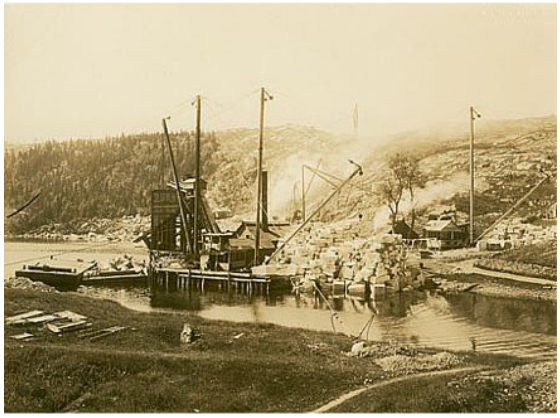

Figure 3: Historic Photo of a Granite Quarry at Purcell's Cove

Today evidence of the historic quarrying operations remains at Purcell's Cove, including the quarry pits, a number of piles of discarded rock, and shims and wedges pounded into the rock. This evidence presents a prime opportunity for interpretation.

[14] Marcos Zentilli, personal communication, November 3, 2015
[15] Davis, D. S., & Browne, S. (Ed.). (1996). *Natural history of Nova Scotia: Topics and habitats* (Vol. 1). Halifax, NS: Nova Scotia Museum of Natural History.
[16] Ibid.
[17] Davis, D. S., & Browne, S. (Ed.). (1996). *Natural history of Nova Scotia: Theme regions* (Vol. 2). Halifax, NS: Nova Scotia Museum of Natural History.

Rationale

Currently there is little interpretation about historic quarrying in Nova Scotia or about the landscape where the quarries are located. This site is in close proximity to Halifax and it tells a story about the building of many of Halifax's oldest structures. It is a significant opportunity for interpretation planning.

One of the objectives outlined in the *Interpretive Master Plan* for the Nova Scotia Museum is to increase the emphasis on natural history and to integrate natural and cultural stories in interpretation[18]. Interpretation planning for the Purcell's Cove quarries aligns with this objective. The *Interpretive Master Plan* recognizes the importance of industrial works in Nova Scotia's history and this project could contribute to including interpretation for quarrying in the plan.

Members of the Purcell's Cove community have expressed a keen interest in the conservation of the Purcell's Cove quarries and their natural and cultural significance. Interpretation may lead to greater appreciation and value for the quarries at Purcell's Cove, which could promote heritage conservation. The *Regional Municipality Planning Strategy* for the Halifax Regional Municipality (HRM) sets out the objectives of preserving cultural and heritage resources and assisting communities in "identifying and celebrating cultural and heritage assets"[19]. This work aligns with these objectives.

[18] Nova Scotia Tourism, Culture and Heritage. (2009). *Interpretive master plan*. Accessed November 27, 2015. https://museum.novascotia.ca/about-nsm/interpretive-master-plan
[19] Halifax Regional Municipality. (2014). *Regional Municipal Planning Strategy*. Accessed April 7, 2016. http://www.halifax.ca/regionalplanning/FinalRegPlan.php, 81.

Literature Review

Interpretation

Interpretation is "an educational activity which aims to reveal meanings and relationships through the use of original objects, by firsthand experience, and by illustrative media"[20]. Interpretation increases both enjoyment and understanding of a place[21]. Interpretation should provoke thought, reveal new insights and understandings, and convince people of the value of a place to encourage conservation[22]. Some of the other goals of interpretation include informing people, entertaining them, influencing their behaviour and developing a local sense of place[23].

Tilden's book, *Interpreting our Heritage*, was one of the first texts written about interpretation. Tilden discusses heritage interpretation in national parks and the six principles that make it great. The six principles that Tilden[24] presents are:

1. Any interpretation that does not somehow relate what is being displayed or described to something within the personality or experience of the visitor will be sterile.
2. Information, as such, is not Interpretation. Interpretation is revelation based on information. But they are entirely different things. However, all interpretation includes information.
3. Interpretation is an art, which combines many arts, whether the materials presented are scientific, historical, or architectural. Any art is to some degree teachable.
4. The chief aim of Interpretation is not instruction, but provocation.
5. Interpretation should aim to present a whole rather than a part, and must address itself to the whole person rather than any phase.
6. Interpretation addressed to children (say, up to the age of twelve) should not be a dilution of the presentation to adults, but should follow a fundamentally different approach. To be at its best it will require a separate program.

[20] Tilden. *Interpreting our heritage*, 8.
[21] Barrow, G.C. (2013). Interpretation planning and its role in sustainable tourism and visitor management at Geoheritage sites. *International Journal of Geoheritage, 1*(1), 30-38.
[22] Carter. *A sense of place.*
[23] Ibid.
[24] Tilden. *Interpreting our heritage*, 9.

Interpretation is about uncovering meaning behind historic facts and presenting them in an interesting and relatable way[25].

Interpretation Planning

Interpretation planning is an important part of creating effective interpretation for an area, feature or event, and contributing to the conservation of natural and cultural heritage resources. Interpretation planning is the process of deciding what themes or stories about a place should be conveyed and for whom, and in what way. The interpretation planning process should identify the objectives for interpretation, the audience, the resources of a place, themes or stories that should be told and methods for interpretation[26]. The interpretation planning process should be collaborative and involve the local community[27].

Ham stresses the need to understand the audience[28]. Ham refers to visitors as a non-captive audience, meaning that they do not have to pay attention to the interpretation unless they want to[29]. Interpretation therefore should be participatory and involve two-way communication[30]. In order to best engage with an audience, interpretation must be:

a. pleasurable, interesting and entertaining;
b. relevant, meaningful, and personal;
c. organized and have a logical flow; and
d. have a clear theme[31].

Interpretation should have a theme that is supported by information and evidence[32]. Thematic interpretation tells a story and conveys a specific message about a topic[33]. Ham argues that people can only absorb five ideas at a time, so a theme should have five or fewer supporting ideas. Thematic interpretation is easier for the audience to understand and helps the interpreter to focus his or her work.

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[25] Tilden. *Interpreting our heritage*.
[26] Carter. *A sense of place.*
[27] Barrow. Interpretation planning and its role in sustainable tourism.
[28] Ham, S. (1992). *Environmental interpretation: A practical guide for people with big ideas and small budgets*. Golden, CO: North American Press.
[29] Ibid.
[30] Ibid.
[31] Ibid.
[32] Carter. *A sense of place.;* Ham. *Environmental interpretation.*
[33] Ham. *Environmental interpretation.*

An interpretation plan should identify special features of a place, locations that people should or should not visit, who the audience is, any constraints of the site, the objectives of the interpretation, the form the interpretation will take, and a plan for implementation[34].

Interpretation Media

Interpretation can be presented in a variety of ways, using a variety of media. Carter and Ham discuss some of the forms that interpretation can take[35], including:

a. personal interpretation, such as guided walks, demonstrations, and re-enactments
b. outdoor panels or signs
c. publications, such as pamphlets or brochures
d. multi-media, such as audio-visual programs and computer-based interpretation
e. visitors centres

The decision about what media are appropriate for interpretation is particular to each interpretation site and situation.

Heritage Conservation

Interpretation planning can contribute to the conservation of heritage resources. The *Standards and Guidelines for the Conservation of Historic Places in Canada* is a document that provides "sound, practical guidance to achieve good conservation practice" and is a "tool for heritage conservation"[36]. These standards and guidelines have been adopted by HRM and therefore should guide the heritage conservation aspect of the interpretive planning process for the Purcell's Cove quarries.

Historic places can be sites, buildings, landscapes, districts or other places identified for their historic value[37]. The conservation decision-making process for a historic place involves identifying the heritage value and character defining elements of the place, documenting the current conditions and changes over time, selecting an appropriate use, determining necessary conservation measures and following the

[34] Barrow. Interpretation planning and its role in sustainable tourism
[35] Carter. *A sense of place.;* Ham. *Environmental interpretation.*
[36] Canada's Historic Places. (2010). *Standards and guidelines for the conservation of historic places in Canada* (2nd ed.), vi.
[37] Canada's Historic Places. *Standards and guidelines.*

standards and guidelines[38]. The heritage value of a place is "the aesthetic, historic, scientific, cultural, social or spiritual importance or significance for past, present and future generations"[39]. The character defining elements are "the materials, forms, location, spatial configurations, uses and cultural associations or meanings that contribute to the heritage value of an historic place, which must be retained to preserve its heritage value"[40]. It is important to begin by identifying the heritage value and character defining elements of a place and their significance in order to justify conservation and know what to conserve. Identifying the character defining elements helps establish the significance of the site and the elements that make it unique. Character defining elements are also essential pieces of supporting evidence for interpretation.

Objectives

The goal of this project is to investigate the quarries at Purcell's Cove in a way that tests the community's perception of heritage value and contributes to its objective of protecting the area. This project focuses on the geologic history of the area.

The objectives of the project are to:

a. Prepare background information for an interpretation plan
b. Identify and provide a map of the character defining elements
c. Establish the significance of the site
d. Investigate mechanisms the community could use to protect the quarries.

Approach

The approach to this project was to follow the interpretation planning process. I chose to focus on the geologic history theme. This project was completed in close collaboration with Cole Grabinsky who focused on the industrial history theme. These two themes were chosen because they are complimentary and they best fulfill the objective of integrating natural and cultural stories in interpretation in Nova Scotia.

[38] Canada's Historic Places. *Standards and guidelines.*
[39] Canada's Historic Places. *Standards and guidelines, 5.*
[40] Ibid.

Methods

The general interpretation planning process that was used for this project was:

1. Gather information about the site
2. Identify possible themes for interpretation
3. Gather information about the natural history of the Purcell's Cove quarries
4. Perform site inventory
5. Identify the character defining elements of the area
6. Establish significant stories and locations for interpretation
7. Produce background information for an interpretation plan
8. Explore mechanisms that could be used to recognize and protect the site

A more detailed description of the methods that were used for this project is below.

Data Collection, Organization and Analysis

Data about the geologic history was collected using a number of print and online published materials, including *The Last Billion Years* and *The Natural History of Nova Scotia*. This data was compiled into a timeline of significant natural history events. I gained an understanding of the geology of the granite and slate quarries and the surrounding area. Specifically I investigated the changes over geologic time and what made the area ideal for quarrying. I consulted with Rebecca Jamieson and Marcos Zentilli who are both experts in the field and have done extensive work studying the geology of the area. I also mapped the surficial and bedrock geology of the area using ArcGIS.

Data from the site was collected through a number of site visits. The free version of the BackCountry Navigator TOPO GPS app was used to trace the approximate extent of the granite quarries, trails through the area and to mark significant natural features and quarry remains as waypoints (Figure 4). This data was exported from the app as a KML file, imported into ArcGIS and converted into a shapefile, and then mapped using ArcGIS. The extent of the bluestone quarries was mapped using head-ups digitizing in ArcGIS. This involved spatially referencing an aerial photograph that Rebecca Jamieson had annotated with the locations of the quarries and then tracing their extents using the "Edit Features" tool in ArcGIS.

I gained an understanding of the local planning context by reviewing HRM's *Regional Municipal Planning Strategy* and *Land-Use Bylaw*, and associated maps, for the Halifax Mainland. Data about property ownership from 2013 was obtained from the Dalhousie GIS Centre and mapped using ArcGIS.

I investigated the mechanisms that could be used by the community to gain recognition for the site or protect it by reviewing a number of policies and mechanisms for protection. These included the Green Network Plan, the *Regional Municipal Planning Strategy*, the *Special Places Protection Act*, and the *Standards and Guidelines for the Conservation of Historic Places in Canada*. We consulted with Sean Weseloh-McKeane about the *Special Places Protection Act* specifically.

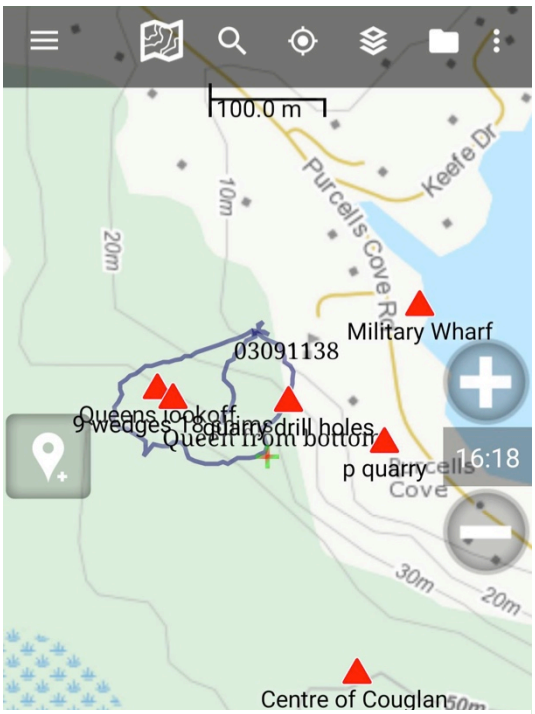

Figure 4: Screen Capture of the BackCountry Navigator App

Synthesis

Based on data collected about the quarries and at the site, Cole and I identified a number of character defining elements. The character defining elements and the geologic timeline enabled us to establish the significance of the site. The significant stories for interpretation arose from an analysis of the data explaining why the quarries exist where they do and the character defining elements.

Results

Site Overview

Purcell's Cove is located on the western shore of the Northwest Arm of Halifax Harbour. There have been six operational quarries located in the Purcell's Cove area. The remains of these quarries and their operations can still be seen today, although much of the area is overgrown with vegetation. Three of these quarries are granite and are located behind the Purcell's Cove Social Club, just off Purcells Cove Road. The granite quarries have been identified as Queens Quarry, Couglan Quarry, and Purcells Cove Quarry. The other three quarries are slate or bluestone quarries and are located along Bluestone Road.

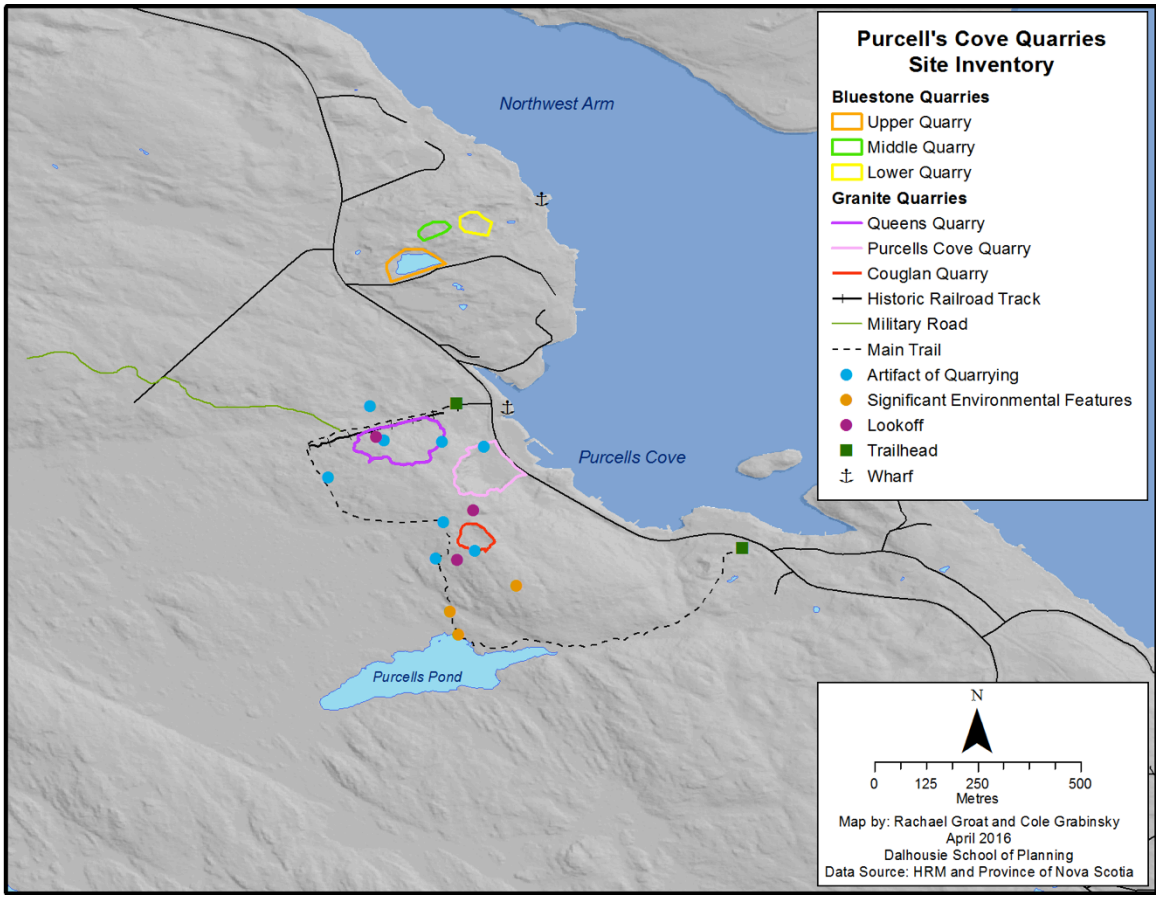

Figure 5: Site Inventory Map of the Purcell's Cove Quarries

Site Inventory

Through numerous site visits Cole and I, aided by John Zuck and Marcos Zentilli, were able to locate and map the approximate extents of the three granite quarries, trails in the area, as well as other significant features (Figure 5).

Trails

The main trail through the Purcell's Cove area starts at the parking lot of the Dalhousie Playground, next to the Purcell's Cove Social Club. There is a stone with a plaque that identifies the place as the site of the rail tracks that led to Queens Quarry (Figure 6). The main trail travels uphill on what was once 18th Battery Road, past Queens and Couglan Quarries, past Purcells Pond and then around to Purcells Cove Road. Partway up the hill the trail splits. The trail to the right is part of the old military road, which leads to a mock anti-aircraft battery.

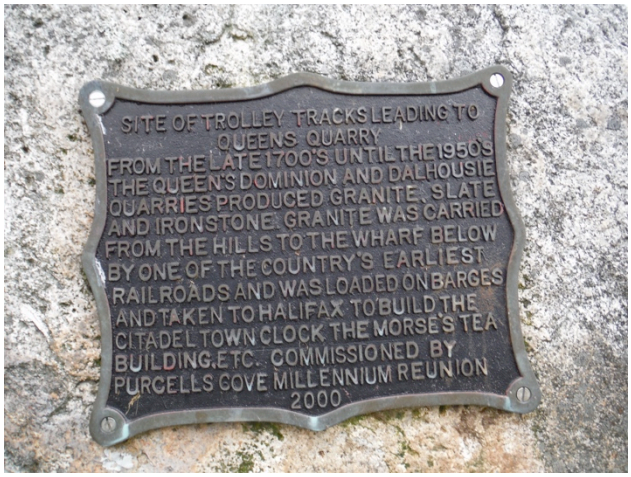

Figure 6: Plaque at the trailhead of the main trail

Granite Quarries

Figure 5 shows the approximate extents of the three granite quarries. Queens Quarry covers the largest area (Figure 8). The landscape 'steps down' from the top of the hill, presumably from the nature of the quarrying operations. Purcells Cove Quarry can be seen from Purcells Cove Road (Figure 9). It is an oval shaped, sheer cliff. Couglan Quarry is the smallest of the three quarries (Figure 7). The area around the quarries contains piles of discarded granite, much of which


Figure 7: Couglan Quarry

shows evidence of having been cut. Rock from these quarries was used to built significant features of Halifax such as the Citadel and St. Mary's Basilica[41].

Figure 8: View from the top of Queens Quarry

Figure 9: View of Purcells Cove Quarry from Purcells Cove Road

Bluestone Quarry

Rebecca Jamieson has identified an upper, middle and lower quarry of the Bluestone Quarry, also called the Dalhousie Quarry and King Quarry at various points in history[42]. The upper quarry has been filled in by water and is now a pond (Figure 10). The inside of the lower quarry (Figure 11) can be accessed via a trail from the wharf. The edges of this part of the quarry are quite steep. Slate and bluestone removed from these quarries were used to build many of the buildings at Dalhousie University[43].

Figure 10: Upper Bluestone Quarry

Figure 11: Lower Bluestone Quarry

[41] Millington. *Purcell's Cove: The little place that helped build Halifax city*.
[42] Rebecca Jamieson, personal communication, February 10, 2016
[43] Millington. *Purcell's Cove: The little place that helped build Halifax city*.

Historic Railroad Track

The rail bed of the historic railroad track runs uphill parallel to the main trail. This is believed to be the site of the earliest railroad in Eastern Canada, established around 1834[44]. The railroad tracks were used to transport granite downhill to the wharf at Purcells Cove. Historic photos show the tracks diverging at the top of the hill. The site inventory map (Figure 5) shows the portion of the railroad track that we were able to identify with certainty and does not show where the tracks diverged.

Figure 12: Remains of the Railroad Track

Figure 13: Historic Photo of the Railroad Track (PANS)

Quarry Remains

The site inventory map (Figure 5) identifies a number of the locations of evidence of quarrying operations. These include shims and wedges, drill holes, rocks that have been cut, crane anchors and a rock wall foundation.

[44] Marcos Zentilli, personal communication, November 3, 2015

Significant Environmental Features

The significant environmental features that have been identified are a granite whaleback, Purcells Pond and Rocking Stone, a glacial erratic. Whalebacks are smooth, elongated granite ridges[45]. Rocking Stone is a large glacial erratic, carried from elsewhere and dropped by a melting glacier[46]. Many people over the years have tried to roll or move Rocking Stone, but to no avail.

Figure 14: Granite Whaleback

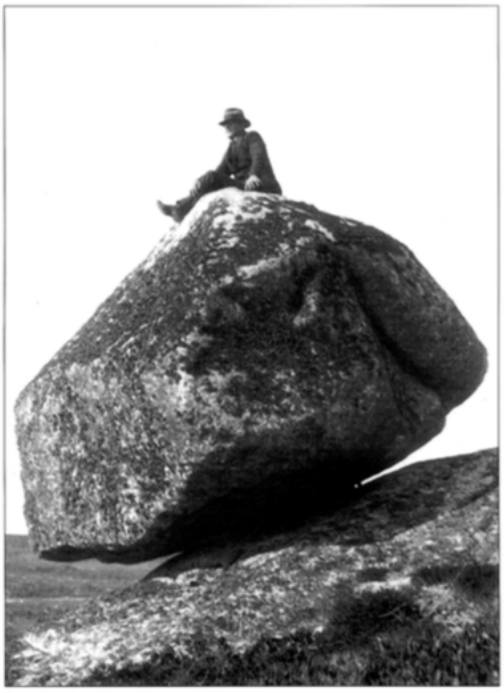

Figure 15: Historic Photo of Rocking Stone

Figure 16: Rocking Stone Today

[45] Zentilli, M. (2014). "Geological Notes". Accessed March 24, 2016. http://backlandscoalition.ca/janeswalk/GeoNotesMay3rev.docx.htm
[46] Ibid.

Geologic History

The geology of Purcell's Cove is special because it is the contact between the granite of the South Mountain Batholith and the slates of the Halifax Group. The geologic history of the Purcell's Cove area helps provide an explanation of this contact and for the siting of multiple quarries, of different types, in close proximity to each other. An abbreviated geologic timeline is included in Appendix A.

Approximately 500 million years ago muds and silts were deposited on the floor of the Rheic Ocean, likely off the coast of the African part of Gondwana[47]. These clastic sediments were deposited in layers, together known as strata[48]. These sediments were lithified, transformed into stone, or compacted into sedimentary rocks over 100 million years, forming the Meguma Terrane[49].

Approximately 400 million years ago the sedimentary rocks of the Meguma Terrane were heated and folded over the course of 20 million years, transforming the rocks into meta-sedimentary rock[50]. This folding also produced a series of synclines and anticlines (Figure 17), which is revealed by the tilting of the rocks, and formed mountains[51]. This mountain building event is known as the Acadian Orogeny[52]. At this time parts of the Meguma Terrane were uplifted and emerged above sea level[53].

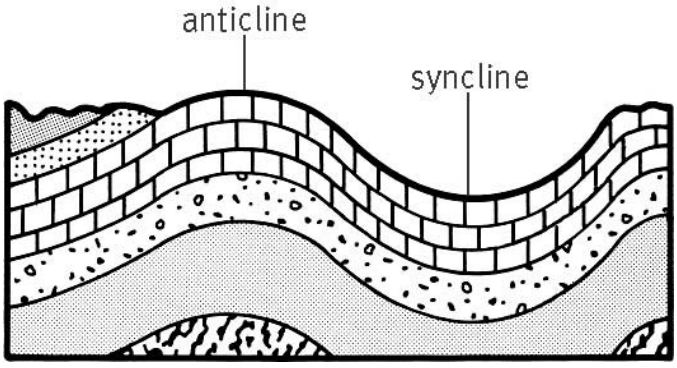

Figure 17: Synclines and anticlines (Gail Piazza)

Approximately 390 million years ago the Meguma Terrane "slid into place" against the Avalon Terrane[54] (Figure 18). The crust of the Rheic Ocean was subducted resulting in a mountain-building event

[47] Atlantic Geoscience Society. (2001). *The Last Billion Years*. Halifax: Nimbus Publishing Ltd.
[48] Ibid.
[49] Rebecca Jamieson, personal communication, February 10, 2016
[50] Ibid.
[51] Ibid.
[52] Jamieson, R.A., Hart, G.G., Chapman, G.G., & Tobey, N.W. (2012). The contact aureole of the South Mountain Batholith in Halifax, Nova Scotia: geology, mineral assemblages, and isograds. *Canadian Journal of Earth Science*, 49, 1280–1296.
[53] Atlantic Geoscience Society. *The Last Billion Years.*

called the Southern Acadian Orogeny[55]. Further uplift of the Appalachian Mountains occurred during this event[56].

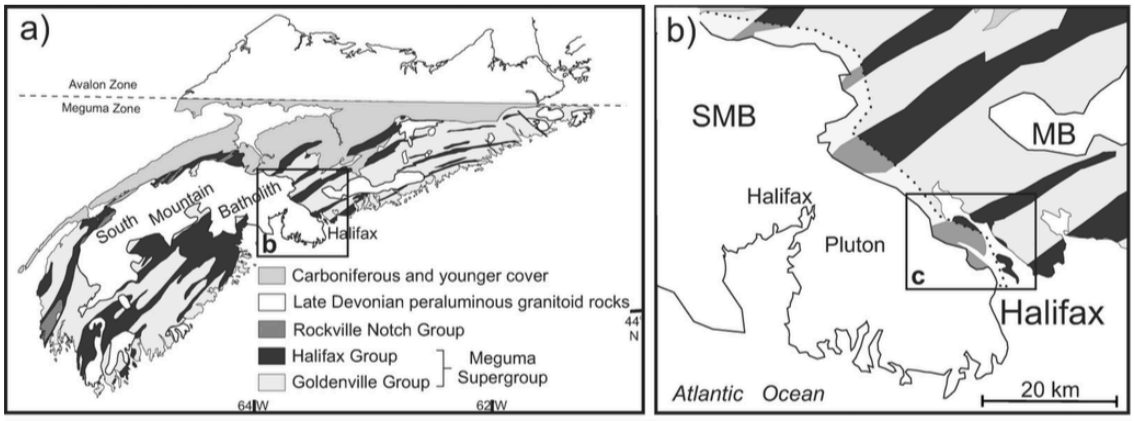

Figure 18: The South Mountain Batholith and the Halifax Pluton (Jamieson, R.A., Hart, G.G., Chapman, G.G., & Tobey, N.W., 2012)

The Southern Acadian orogeny also generated granitic magma deep in the earth's crust[57]. Approximately 380 million years ago this granitic magma pluton, known as the Halifax Pluton, rose and intruded into the meta-sedimentary rocks of the Meguma Terrane, forming the South Mountain Batholith (Figure 18)[58]. Magma is less dense than the surrounding rock and therefore rises into it[59]. Plutons are large bodies of magma that cool and solidify slowly kilometres below the earth's surface, forming intrusive igneous rock such as granite[60]. Most granite plutons are formed when continents or an ocean and a continent collide to form mountain ranges[61]. A batholith is a large intrusive pluton[62]. Over the last 350 million years geologic uplift and erosion has occurred, exposing the granitoid rocks of the South Mountain Batholith at the surface[63]. The South Mountain Batholith extends in an arc from Halifax almost to Yarmouth[64]. With an area of

[54] Atlantic Geoscience Society. *The Last Billion Years.*
[55] Ibid.
[56] Ibid.
[57] Ibid.
[58] Rebecca Jamieson, personal communication, February 10, 2016
[59] Atlantic Geoscience Society. *The Last Billion Years.*
[60] Ibid.
[61] Ibid.
[62] Ibid.
[63] Ibid.
[64] Davis & Browne. *Natural history of Nova Scotia: Topics and habitats* (Vol. 1).

approximately 10,000 km^2, it is the largest granatoid body in the Appalachian region of North America[65].

The heat from the intruding granite pluton "baked" the meta-sedimentary rocks of the Meguma Terrane, producing a contact aureole of approximately 2km[66]. A contact aureole is a 'bake zone' or "region in which country rock surrounding an igneous intrusion have been recrystallized in response to the heat supplied by the intrusion"[67]. This is known as thermal metamorphism[68]. The intruding granite would have been approximately 700°C to 750°C, baking the meta-sedimentary rocks at approximately 300°C[69]. The heat from the intruding granite transformed the slates of the Halifax Group into hornfels, a harder metamorphic rock[70].

Approximately 200 million years ago a sinistral or strike-slip fault formed along what is today the Northwest Arm[71]. Evidence for this fault comes from the fact that the geologic units are not aligned on the western and southern shores of the Northwest Arm[72]. Brecciated rocks, which are less resistant to erosion, have been found in cores of the Northwest Arm, meaning that the Northwest Arm was more easily eroded than the rocks of the ridge on the western shore of the Northwest Arm[73]. The Northwest Arm may have been a glacial river during periods of glaciation and interglaciation[74].

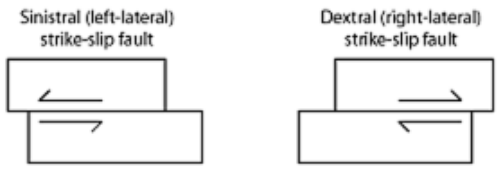

Figure 19: Strike-slip faults

Approximately 500,000 years ago ice sheets first spread over the Maritimes[75]. A number of glacial and interglacial episodes occurred between 500,000 and 11,000 years

[65] Davis & Browne. *Natural history of Nova Scotia: Topics and habitats* (Vol. 1).
[66] Rebecca Jamieson, personal communication, February 10, 2016
[67] Ibid.
[68] Jamieson, R.A., Hart, G.G., Chapman, G.G., & Tobey, N.W. (2012). The contact aureole of the South Mountain Batholith in Halifax, Nova Scotia: geology, mineral assemblages, and isograds. *Canadian Journal of Earth Science*, 49, 1280–1296.
[69] Rebecca Jamieson, personal communication, February 10, 2016
[70] Ibid.
[71] Ibid.
[72] Ibid.
[73] Ibid.
[74] Ibid.
[75] Atlantic Geoscience Society. *The Last Billion Years.*

ago[76]. Approximately 11,000 years ago a warming trend began, melting the glaciers of the last glacial period[77]. These glacial and interglacial episodes are part of the Pleistocene glaciation, characterized by periods of warming and cooling[78]. It is believed that the last 10,000 years are part of an interglacial or warm period[79].

Approximately 11,500 years ago sea level in the Maritimes was around 65m below the present sea level[80]. As the glaciers melted the sea level rose, drowning the landscape and creating the coastline of Nova Scotia today. Sea level has continued to rise since this time due crustal subsidence in this region.

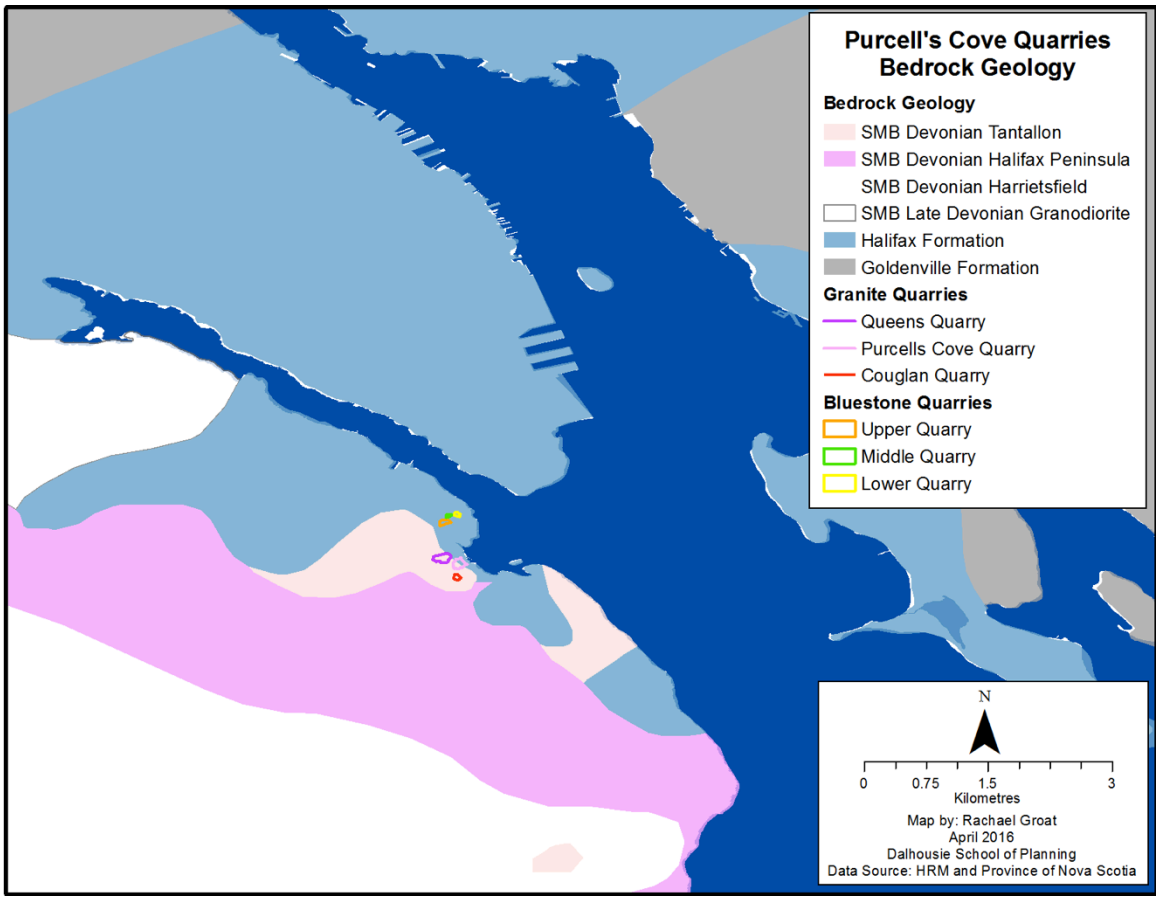

Figure 20: Map of Purcell's Cove Bedrock Geology

[76] Atlantic Geoscience Society. *The Last Billion Years.*
[77] Ibid.
[78] Roland, A.E. (1982). *Geological Background and Physiography of Nova Scotia*. Halifax: The Nova Scotia Institute of Science.
[79] Ibid.
[80] Atlantic Geoscience Society. *The Last Billion Years, 193.*

Granite

Granite is an intrusive igneous rock that forms underground when magma cools and crystalizes over thousands or millions of years[81]. It is a hard and impermeable crystalline rock, which is resistant to erosion[82]. This makes it an ideal building material. Granite consists mainly of quartz and feldspar crystals[83]. Granite plutons release heat to the surrounding rocks, meaning that they cool from the outside to the inside[84]. The gradual cooling of the intruding granite of the South Mountain Batholith created horizontal rifts or joints in the granite, which made the rock ideal for quarrying[85].

A rift is the easiest seam to split the rock along[86]. The next-easiest seam to split the granite along is called the grain[87]. The grain in the granite at Purcell's Cove runs vertically from north to south[88]. In order to cut the granite into smaller blocks, it is cut along the hardway or cutoff, which runs vertically from east to west in the granite[89]. This is not a natural seam and historically would have required quarrymen to use feathers and wedges split the granite[90].

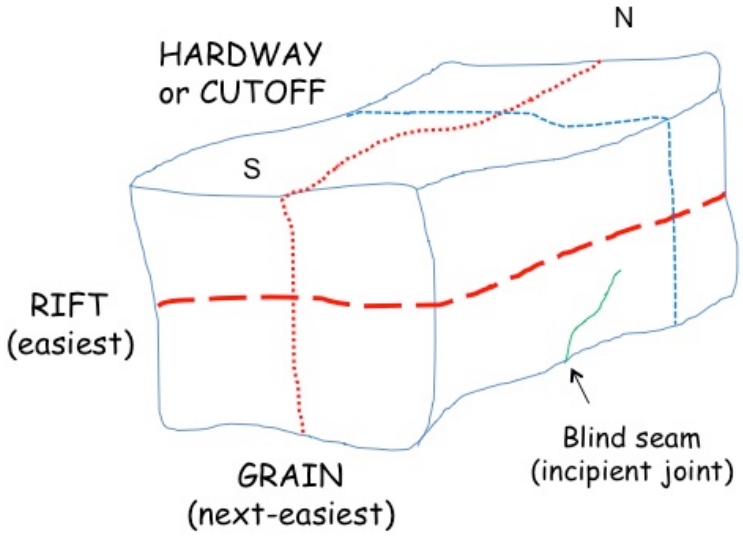

Figure 21: Image of granite seams (Marcos Zentilli, 2015)

[81] Atlantic Geoscience Society. *The Last Billion Years.*
[82] Davis & Browne. *Natural history of Nova Scotia: Topics and habitats* (Vol. 1).
[83] Atlantic Geoscience Society. *The Last Billion Years.*
[84] Ibid.
[85] Marcos Zentilli, personal communication, November 3, 2015
[86] Ibid.
[87] Ibid.
[88] Howse, C.K. (1933). *Report on the geology of the Purcell's Cove area, Halifax County, Nova Scotia*. Department of Geology, Dalhousie University, Halifax, Nova Scotia.
[89] Ibid.
[90] Marcos Zentilli, personal communication, November 3, 2015

Bluestone

The Meguma Terrane is divided into the Halifax Group and the Goldenvile Group. The Halifax Group is divided into the Beaverbank Formation, the Cunard Formation and the Bluestone Formation. The Bluestone Formation is further subdivided into the Point Pleasant member, the Black Rock Beach member, the Chain Rock member and the Quarry Pond member[91] (Figure 22). The Bluestone Formation is found at the tip of the Halifax Peninsula, largely in Point Pleasant Park, as well as along the western shore of the Northwest Arm, in the area of the Bluestone Quarries.

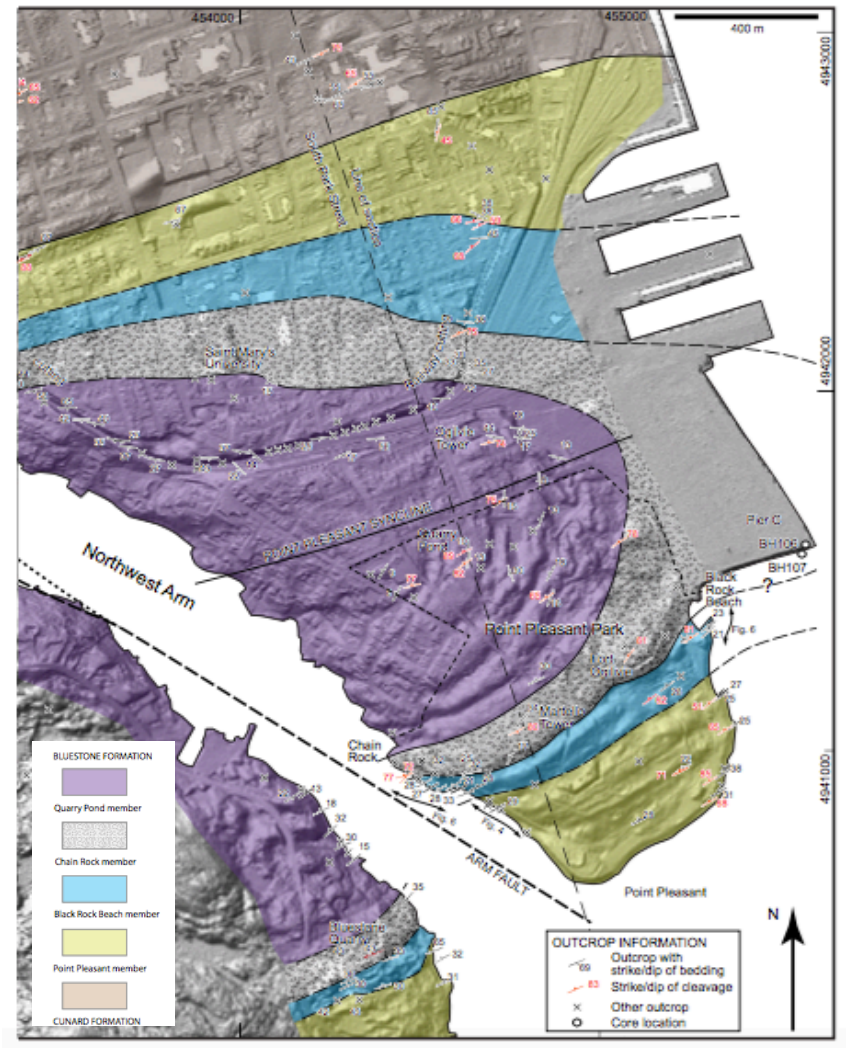

Figure 22: Map of the Bluestone Formation (Waldron, J W.F., Jamieson, R.A., Pothier, H.D., & White, C.E., 2015)

[91] Waldron, J W.F., Jamieson, R.A., Pothier, H.D., & White, C.E. (2015). Sedimentary and tectonic setting of a mass-transport slope deposit in the Halifax Group, Halifax Peninsula, Nova Scotia, Canada. *Atlantic Geology, 51*, 84-104.

The rocks of the Bluestone Quarry Formation on the western side of the Northwest Arm are part of the contact aureole and were therefore metamorphosed into harder and more massive rocks[92]. The North West Arm is the dividing line between rocks that were 'really baked' and 'not so baked' by the heat of the intruding granite[93]. The rocks closer to the contact were baked more and are harder and therefore more resistant to erosion[94].

The rocks removed from the Bluestone Quarries are primarily part of the Black Rock Beach member. The Black Rock Beach member splits easily along its bedding into layered, tabular pieces[95]. It only splits in one direction, as cleavages from the folding of the rocks have been baked away[96]. The rocks are tough and blue-grey in colour[97]. These factors made the Black Rock Beach member ideal for quarrying. Quarrying of the Bluestone Formation stopped when the Chain Rock member was reached, as it is comprised of a mass transport deposit that occurred before the rocks were lithified[98]. A mass transport deposit is a debris flow or rock slide that occurred on the floor of the ocean[99]. The Chain Rock member is comprised of this debris flow, and therefore is not neatly layered and does not split well[100].

Landscape

Purcell's Cove is part of the Granite Barrens Natural History District of Nova Scotia, specifically the Pennant Barrens Unit[101]. This area is colloquially known as the Purcell's Cove Backlands. This landscape is underlain entirely by granite and is characterized by rounded granite uplands, which contrast with the slate lowlands in the surrounding area[102]. The landscape is also characterized by exposed bedrock[103] (Figure 23). The movement of glaciers across the landscape left scattered glacial erratics and

[92] Rebecca Jamieson, personal communication, February 10, 2016
[93] Ibid.
[94] Ibid.
[95] Ibid.
[96] Ibid.
[97] Ibid.
[98] Ibid.
[99] Ibid.
[100] Ibid.
[101] Davis & Browne. *Natural history of Nova Scotia: Theme regions* (Vol. 2).
[102] Ibid.
[103] Ibid.

scoured the surface of the granite, leaving glacial striations[104]. In some places the granite has a thin cover of soil. The soils are acidic and have few nutrients and minerals, which limits the vegetation growth that occurs here. The plant communities that grow here are specially adapted to the low nutrient environment of the granite barrens.

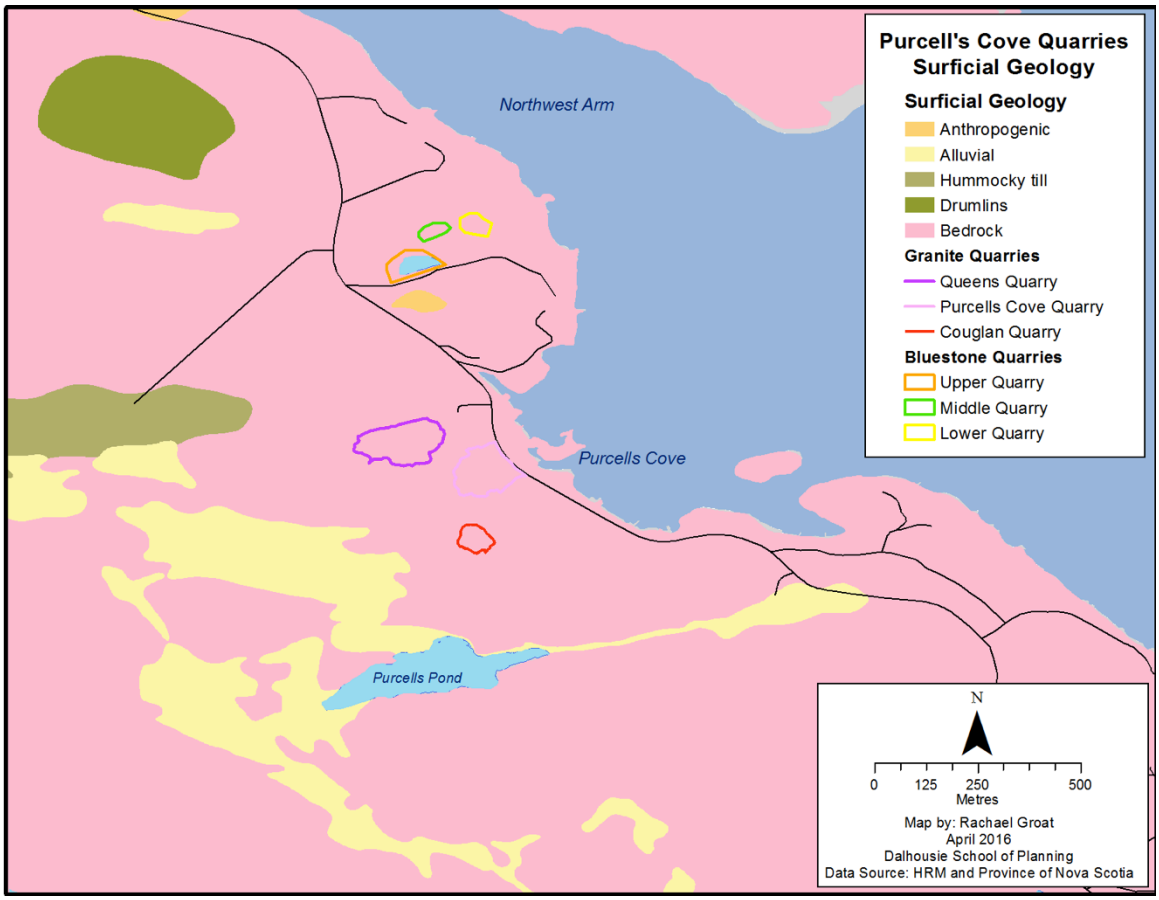

Figure 23: Map of Surficial Geology of Purcell's Cove

The Purcell's Cove Backlands landscape is highly susceptible to fire[105]. The plant communities are adapted to and dependent on fire. One of the significant plant communities that occurs in the Purcell's Cove Backlands is Jack Pine/Broom Crowberry Barrens[106]. The Jack Pine/Broom Crowberry Barrens plant communities are "nationally unique to Nova Scotia, globally rare and of high conservation significance"[107]. This and

[104] Davis & Browne. *Natural history of Nova Scotia: Theme regions* (Vol. 2).
[105] Patriquin, D. (2014). *Ecological Assessment of the Plant Communities of the Williams Lake Backlands*.
[106] Ibid.
[107] Patriquin, D. (2014). *Ecological Assessment of the Plant Communities of the Williams Lake Backlands*, iv.

other similar plant communities occur on the natural granite landscape surrounding the quarries.

Since operation of the quarries stopped, natural succession has altered the landscape. Queens Quarry is the oldest quarry in the area. There are areas within Queens Quarry where significant amounts of soil have accumulated over time, enabling greater vegetation growth (Figure 24). Couglan Quarry, which operated until the 1960s, has less soil cover, but has been reclaimed largely by pine and birch trees.

Figure 24: Soil accumulation at Queens Quarry

Planning Policy

The land use planning policy that applies in the Purcell's Cove area is the *Regional Municipal Planning Strategy* (*Regional Plan*) and the Land Use By-law for the Halifax Mainland. The land around the granite quarries is zoned as Urban Reserve and Protected Area (Figure 25). Urban Reserve is a designation intended to ensure a supply of land is available for serviced development in the future, and therefore applies for the life of the Regional Plan (until 2031)[108]. There has been pressure from private developers to rezone this area to Rural Commuter, which would allow low to medium density development to take place here[109].

[108] Halifax Regional Municipality. (2014). *Regional Municipal Planning Strategy*. Accessed April 7, 2016. http://www.halifax.ca/regionalplanning/FinalRegPlan.php

[109] Bousquet, T. (2014) "Purcells Cove backlands targeted for development." *The Coast*. Accessed April 7, 2016. http://www.thecoast.ca/RealityBites/archives/ 2014/02/20/purcells-cove-backlands-targeted-for-development

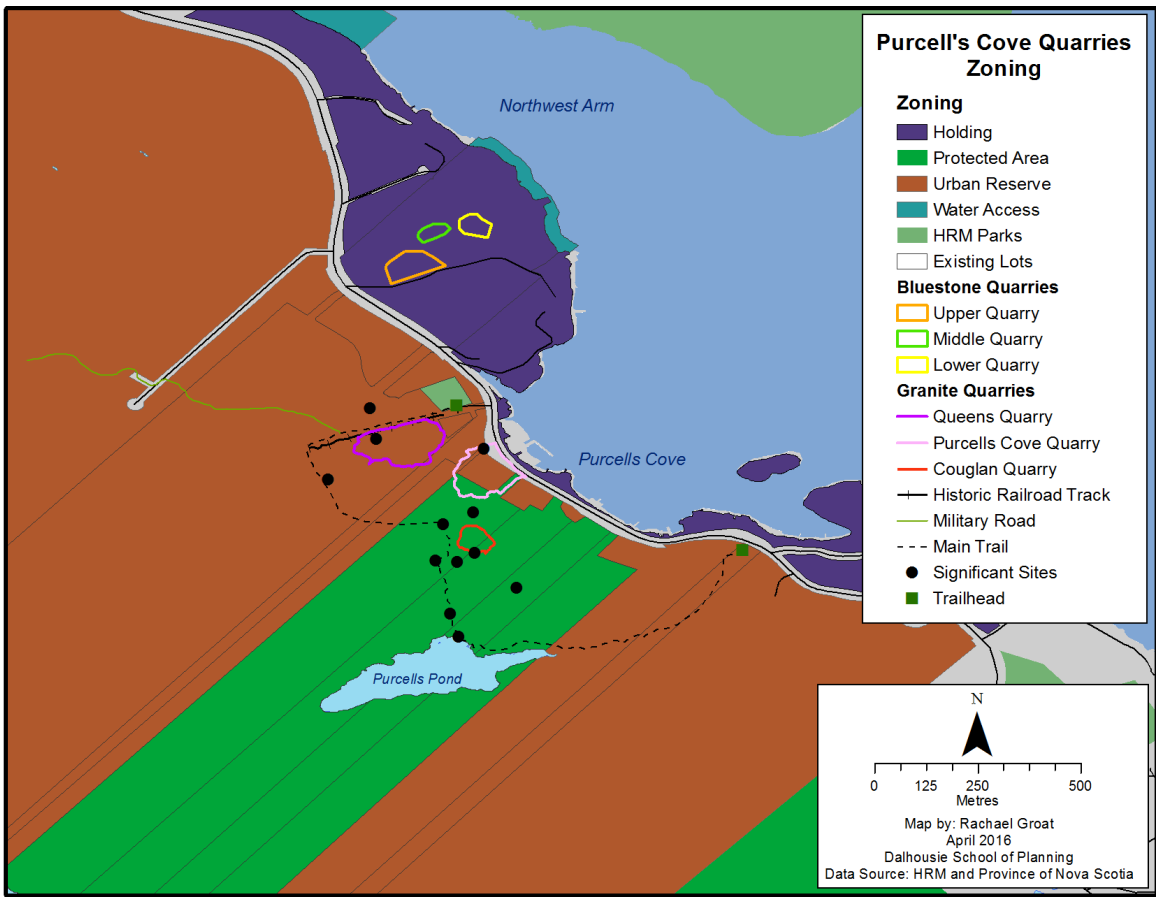

Figure 25: Zoning Map for the Purcell's Cove Quarries

The uses permitted in the Urban Reserve Zone are single family dwellings on existing lots, passive recreations uses, and uses accessory to those uses[110]. A private on-site sewage disposal system and well must be provided on each lot[111]. Uses permitted in the Protected Area zone are scientific study and education (involving no buildings), trails, boardwalks or walkways, conservation uses, and uses accessory to those uses. The land around the Bluestone Quarries is designated a Holding Zone. Similarly to the Urban Reserve Zone detached single-family dwellings are permitted, given that a sewage system and a well are provided. Public parks, playgrounds, and recreation centres are also permitted.

[110] Halifax Regional Municipality. (2015). *Land Use By-law: Halifax Mainland*. Accessed March 24, 2016. http://www.halifax.ca/planning/documents/HalifaxMainland_LUB.pdf
[111] Ibid.

Ownership

There a number of private and corporate land owners in the Purcell's Cove area. Queens Quarry, the historic rail bed and a portion of the main trail are located on land owned by Battery Hill Development Company (Figure 26). Although there are no known immediate plans to develop this area, there is potential for this area to be developed in the future. Development could occur here if the zoning were to change. This could occur at the end of the life of the *Regional Plan*, or even before. Development has the potential to destroy both the heritage value of the quarries and a community recreation site.

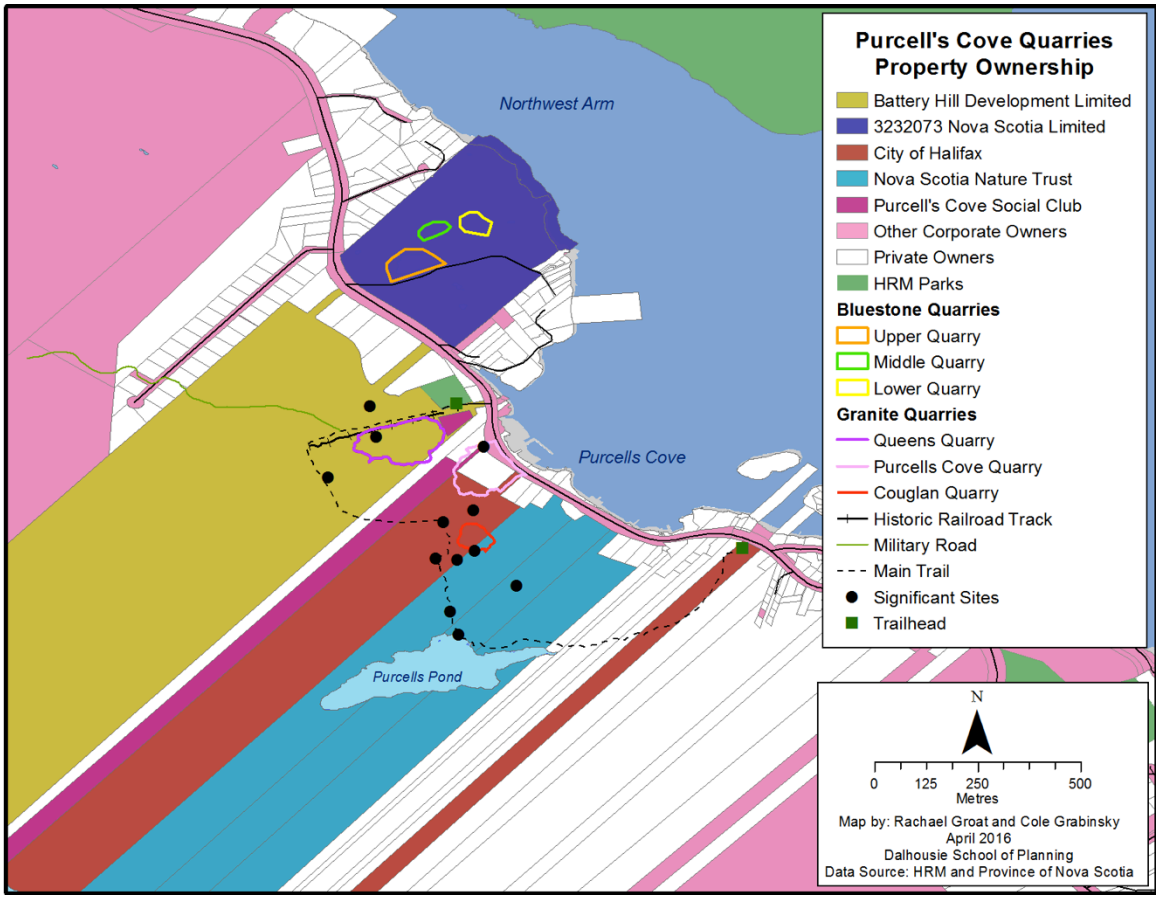

Figure 26: Map of Property Ownership

Mechanisms

The Purcell's Cove community has expressed interest in protecting the area surrounding the quarries, because of its heritage value and cultural significance. Interpretation planning can lead to greater appreciation for an area and contribute to its preservation. There are also a number of policy mechanisms that can be used to protect a place. Some of the applicable mechanisms are discussed here.

The Green Network Plan

HRM is currently in the process of developing the Halifax Green Network Plan, which will be a planning framework for protecting and managing open space in HRM[112]. The *State of the Landscape Report* identifies five open space themes, which represent open space functions and attributes that are valued by HRM citizens. The five open space themes are cultural landscapes, communities, ecosystems and biodiversity, recreation and trails, and working landscapes[113]. A cultural landscape is a "distinct geographical area or property uniquely representing the combined work of nature and people".[114]

The Purcell's Cove Neighbourhood Committee has submitted a recommendation that the Purcell's Cove Backlands be protected as a cultural landscape under this plan. This recommendation is included in Appendix C.

Regional Municipal Planning Strategy

HRM's *Regional Municipal Planning Strategy* includes a section on protecting cultural and heritage resources. Some of the objectives of this section of the plan include:

a. Preserve cultural and heritage resources in HRM and develop policies, programs and regulations to protect and enhance them
b. Assist communities in identifying and celebrating cultural and heritage assets

[112] O2 Planning & Design. (2015). *Halifax Green Network: State of the Landscape Report*. Accessed April 7, 2016. http://www.halifax.ca/HalifaxGreenNetwork/
[113] Ibid.
[114] Government of Nova Scotia. (2010). *Heritage Property Act*. Accessed April 7, 2016. http://nslegislature.ca/legc/statutes/heritage.htm

c. Broaden heritage protection through the identification and preservation of cultural landscapes.[115]

The *Regional Plan* sets out that HRM shall develop a Culture and Heritage Priorities Plan and through that plan "consider the recognition, preservation, and promotion of significant cultural landscapes" through mapping, inventories, and policies.[116] The development of the Culture and Heritage Priorities Plan will take place in two phases: an Inventory phase and an Analysis and Prioritization phase.[117] Although the Culture and Heritage Priorities Plan is in its earliest stages of development there is potential that the Purcell's Cove quarries could be included in the inventory of potential cultural and heritage resources and that they could be protected by the outcomes of this plan.

There are also opportunities to protect the Purcell's Cove quarries through planning policy and zoning change. Much of this area is currently zoned as Urban Reserve. Although there would be resistance from property owners in this area, the case could be made to Regional Council that this area is significant enough that it should be protected by changing the zoning designation. For example, it could be zoned as a Protected Area.

The Special Places Protection Act

The *Special Places Protection Act* enables the Nova Scotia government to protect heritage sites. The purpose of the act is to "provide for the preservation, protection, regulation, exploration, excavation, acquisition and study of archaeological and historical remains and palaeontological sites, which are considered important parts of the natural or human heritage of the Province"[118]. There are currently six sites in Nova Scotia protected under the *Special Places Protection Act*[119]. Heritage research by a professional would

[115] Halifax Regional Municipality. (2014). *Regional Municipal Planning Strategy*. Accessed April 7, 2016. http://www.halifax.ca/regionalplanning/FinalRegPlan.php, 81.
[116] Halifax Regional Municipality. (2014). *Regional Municipal Planning Strategy*. Accessed April 7, 2016. http://www.halifax.ca/regionalplanning/FinalRegPlan.php, 86.
[117] Ibid.
[118] Government of Nova Scotia. (2011). "Special Place Protection Act". Accessed March 24, 2016. http://nslegislature.ca/legc/statutes/specplac.htm
[119] Communities, Culture and Heritage Nova Scotia. (2016). "Special Places". Accessed March 24, 2016. https://cch.novascotia.ca/exploring-our-past/special-places/getting-site-designated-protected-site

need to be carried out in order for a site to be protected. The Minister of the Department of Communities, Culture and Heritage Special Places issues three categories of permits: Reconnaissance, Research and Resource Impact Assessment.

The Maritime Archaeological Resource Inventory is an inventory list of potential archaeological sites and resources[120]. There are currently no quarrying resources in the area recorded in the inventory[121]. Anytime a development is proposed in an area this inventory must be checked for significant sites[122]. Inclusion of the Purcell's Cove quarries in this inventory could be a stepping-stone to having the place protected under the *Special Places Protection Act* and should ensure that development does not proceed until an archaeologist has completed a proper investigation of the site. In order for a site to be included in the inventory the Maritime Archaeological Resource Inventory application must be submitted. This application provides a template for recording the archaeological resources of a site.

Canada's Historic Places

Canada's Historic Places, administered by Parks Canada, maintains the Canadian Registry of Historic Places in Canada, which is a registry of places that have been recognized for their heritage value[123]. Canada's Historic Places also produced the *Canadian Standards and Guidelines for the Conservation of Historic Places in Canada*. A federal, provincial, territorial or municipal government must first formally recognize a historic place before it can be included in the registry[124]. Including the Purcell's Cove quarries in this registry is therefore not possible at this time, but may be possible if it is formally recognized in the future.

[120] Sean Weseloh-McKeane, personal communication, March 2, 2016
[121] Ibid.
[122] Ibid.
[123] Canada's Historic Places. (n.d). "About Us". Accessed March 24, 2016. http://www.historicplaces.ca/en/pages/about-apropos.aspx
[124] Canada's Historic Places. (n.d). "Frequently Asked Questions". Accessed March 24, 2016. http://www.historicplaces.ca/en/pages/more-plus/faq.aspx

Synthesis

Character Defining Elements

Identifying the character defining elements of a place helps establish its heritage value and highlights the features that should be protected. These character defining elements also provide prime opportunities for interpretation sites and stories. The character defining elements of the Purcell's Cove Quarries are:

a. Quarry pits
b. Quarry cuts
c. Granite whalebacks
d. Glacial features
e. Slate strata and metamorphoses
f. The landscape of the contact between the granite and the slate

Not all of these character defining elements have been mapped specifically. Figure 21 shows the locations of some of these character defining elements, or examples of them.

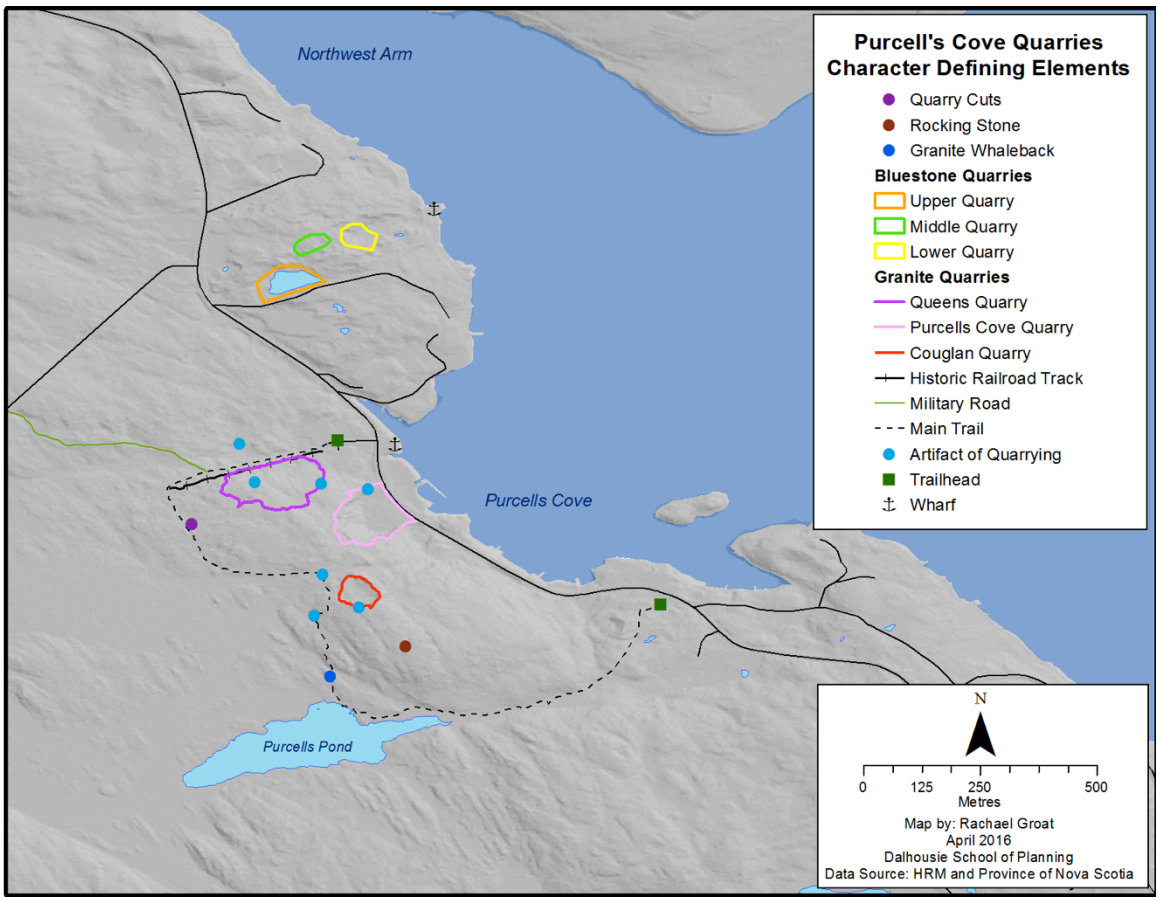

Figure 27: Map of Character Defining Elements

Quarry Pits

The quarry pits themselves are the primary character defining element of the Purcell's Cove quarries. The quarry pits reveal that quarrying did take place here, as well as reveal the nature of quarrying operations. The quarry pits also provide an opportunity to view the structure of the underlying rock, specifically the granite rifts and the strata of the Bluestone Formation. Without preserving the landscape that has been altered by quarrying, much of the evidence for historic quarrying would be lost.

Quarry Cuts

These granite quarry cuts, which appear as steps, show how granite was removed from the landscape. The quarry cuts reveal the natural rift and grain of the

Figure 28: Granite Quarry Cuts

granite, which the rock was cut along. Also evident at this site is the disposal of the top layer of granite, because of its shape and the fact that it has been exposed to weathering[125].

Granite whalebacks

Granite whalebacks are smooth, elongated ridges, which are characteristic of granite landscapes. There are numerous granite whalebacks throughout the Purcell's Cove Backlands.

Glacial features

There are two primary features that reveal that glaciers once covered this landscape: glacial erratics and glacial striations. There are a number of glacial erratics found throughout the area. Rocking Stone is one of the largest glacial erratics in the area and also has cultural significance as a landmark. Glacial striations, which are grooves or scratches cut into the bedrock by the movement of glaciers over the landscape, can also be found on the exposed granite throughout the area.

Slate strata and metamorphoses

The strata of the slate in this area is divided into four members of the Bluestone Formation: the Point Pleasant member, the Black Rock Beach member, the Chain Rock member and the Quarry Pond member. The Bluestone Quarries reveal the contact between some of these members in a number of places[126]. The angle of the strata (Figure 30) also reveals the folding of the rocks, which form a syncline (Figure 29).

[125] Marcos Zentilli, personal communication, November 3, 2015
[126] Waldron, J W.F., Jamieson, R.A., Pothier, H.D., & White, C.E. (2015). Sedimentary and tectonic setting of a mass-transport slope deposit in the Halifax Group, Halifax Peninsula, Nova Scotia, Canada. *Atlantic Geology, 51*, 84-104.

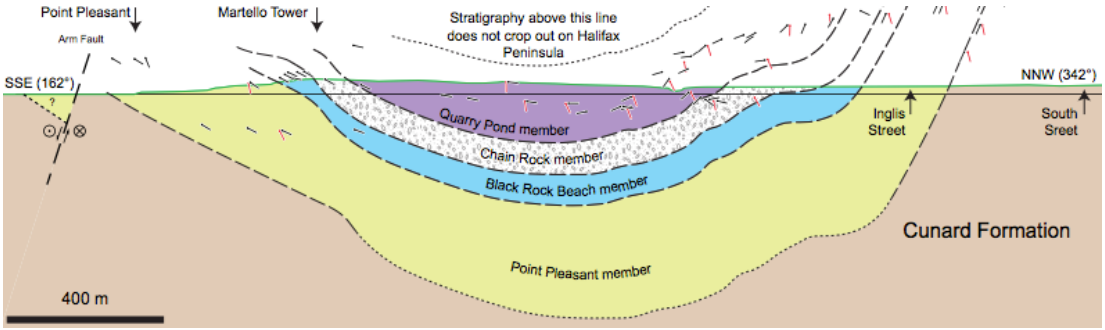

Figure 29: Syncline of the Bluestone Formation

Also evident in the Bluestone Formation are the varying degree to which the rocks were metamorphosed by the intruding granite pluton. Cleavages in the rocks on the western side of the Northwest Arm have largely been baked away.

Figure 30: Slate strata near the Upper Bluestone Quarry

The landscape of the contact between the granite and the slate

This area is one location where the contact between the granite of the South Mountain Batholith and the slates of the Halifax Group is evident. In the area immediately surrounding Purcell's Cove this contact roughly follows Purcells Cove Road, but can also be seen along the main trail. This contact has contributed to the siting of two different types of quarries in close proximity to each other.

The contact also leads to the landscape in the area, which is characterized by granite uplands and slate lowlands, divided by the Northwest Arm. The granite uplands afford wonderful views of Halifax from the area behind Purcell's Cove.

Figure 31: View of Halifax from the top of Couglan Quarry

Possible Stories for Interpretation

Based on the data that has been collected, the site inventory and the character defining elements, there are a number of possible stories that could be used for interpretation of the Purcell's Cove Quarries. These include:

a. The story of the formation of the geology of the area
b. The story of the siting of the quarries at Purcell's Cove
c. The story of the landscape found in the area
d. The story of the contact between the granite and the slate

The formation of the geology of the area

The geologic history timeline (Appendix A) could be used to tell the story of the formation of the geology in the area. Interpretation could also include an explanation of a number of the significant geologic processes that contributed to the current geology.

The siting of the quarries at Purcell's Cove

This story could provide an explanation of the siting of multiple quarries, of two different types, at Purcell's Cove. This explanation should include:

a. the formation of the granite and the metamorphism of the slate, which made the rock ideal for quarrying,
b. the fact that the bedrock is exposed in this area, and
c. the proximity of the location to both the coast, which made transporting the rock easier, and to Halifax, where much of the stone was used for building.

The landscape found in the area

This story is related to the formation of the geology in the area, but could focus on landscape features such as the granite barrens and granite whalebacks. It could also highlight the ways in which the landscape has been shaped by glaciers and erosion, as evidenced by the granite uplands and slate lowlands, and glacial features such as glacial erratics and striations.

The contact between the granite and the slate

This story encompasses all three of the previous stories, but is another angle from which these stories could be told. This story could provide an explanation for the contact between the granite and the slate at Purcell's Cove based on the geologic history, as well as the implications this had for the siting of the quarries at this location.

Many of these proposed stories overlap and could be told in combination with each other to provide a more comprehensive interpretation story. Further, any of these geologic or landscape history stories would be complimentary to interpretation stories about the history of quarrying operations at Purcell's Cove. Cole Grabinsky has proposed and developed the background information for some of these stories in his work. There are numerous sites throughout the area that could be used as sites for interpretation, many of which have been identified by the site inventory. Specifically, the locations of the character defining elements are prime sites for interpretation.

Significance of the Site

The Purcell's Cove community has expressed their belief that this area has cultural and heritage value. The information that was collected through this project, as well as identifying the character defining elements, contributes to establishing the significance of the site. This project identifies that the Purcell's Cove quarries are significant cultural landscape and have heritage value because:

a. Evidence of quarrying can still be found on the site, including the quarry pits, quarry cuts, the rail bed and other quarrying artifacts
b. The site reveals an interesting geologic history that covers 500 million years and is the contact between two different geologic formations
c. The stone from the quarries was used to build significant parts of Halifax
d. The site tells an interesting story of industrial heritage in Nova Scotia
e. There are currently no other sites in Nova Scotia where interpretation of granite or slate quarrying occurs and this site is a prime opportunity for interpretation to take place

The Purcell's Cove quarries are certainly a significant cultural and heritage resource, with unique character defining elements. Pursuing protection of this heritage

resource should be a priority going forward.

Maritime Archaeological Resource Inventory

Based on the information collected about the mechanisms that the community could use to have the Purcell's Cove Quarries protected, submitting an application to the Maritime Archaeological Resource Inventory seems like a first step. As this was something that we could do within the timeframe of this project Cole and I decided to fill out the application. The information that we have collected through this project and the site inventory that we have completed allowed us to do this with relative ease. Our application is included in Appendix D. Our intention is to make this available to Marcos Zentilli to formally submit this application, so that he can be the contact person going forward.

Recommendations

This project, along with Cole Grabinsky's project, provides background information and possible stories that could be used to create an interpretation plan for the Purcell's Cove Quarries. It also identifies the character defining elements and establishes the significance of the site. There are many opportunities for this project to be continued in a number of different ways. The following are opportunities for further work:

a. This work could be used as a stepping-stone to prepare a complete interpretation plan for the Purcell's Cove Quarries.
b. A further investigation into the natural landscape and reclamation of the quarries could take place.

The following recommendations and action items are also proposed:

a. The Purcell's Cove community should submit the completed Maritime Archaeological Resource Inventory application to the Nova Scotia Department of Communities, Culture and Heritage.
b. An archaeological investigation of the Purcell's Cove quarries could be performed with the intention of, and the potential for, having the site protected under the Nova Scotia Special Places Protection Act. A permit for this work can be obtained under the *Nova Scotia Special Places Protection Act*.
c. The Culture and Heritage Priorities Plan may be an opportunity to have this site recognized as a significant cultural landscape in the future. The development of this plan and its future outcomes should be explored.

Conclusion

This project explored the Purcell's Cove Quarries through the lens of interpretation planning and with the intent of establishing the cultural significance and heritage value of the site. An examination of the geologic and natural history of the area revealed an interesting story of why the quarries are located at Purcell's Cove. A site inventory uncovered a number of significant natural and cultural features related to quarrying operations and the geologic story. A number of these features have been deemed character defining elements, which are significant to the site and should be preserved in order to maintain its heritage value. The Purcell's Cove quarries are a prime site for interpretation, and could be used to tell many interesting geologic and industrial stories. This project also explored ways in which the community could pursue recognition and preservation of this cultural landscape and its heritage resources and recommends action going forward. The Purcell's Cove Quarries are a significant cultural landscape, which I have come to appreciate through this project. I hope that this project can contribute to formal recognition of this cultural and heritage value in the future.

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Appendices

Appendix A: Geologic History Timeline

Appendix B: Mainland Land Use Zoning Map

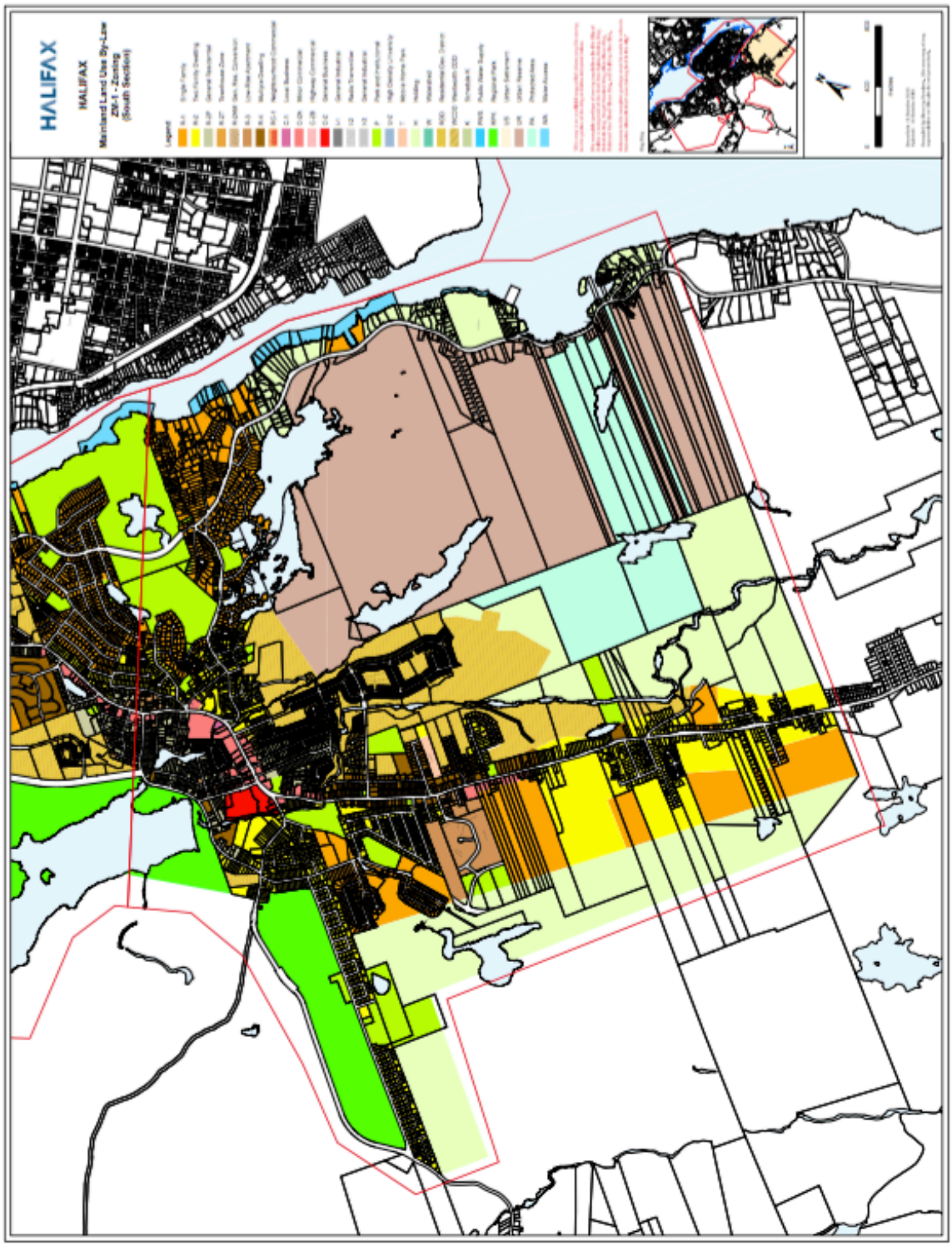
Appendix C: Purcell's Cove Neighbourhood Committee's Green Network Plan Submission

Appendix D: Maritime Archaeological Resource Inventory Application

Appendix A: Geologic History Timeline

Date	Event
500 million years ago	Muds and silts were deposited on the ocean floor along the continental margin of Gondwana, forming the Meguma Terrane over 100 million years
400 million years ago	Sedimentary rocks of the Meguma Terrane were heated and folded, transforming them into meta-sedimentary rocks
390 million years ago (middle Devonian)	Meguma Terrane 'slid into place' against the Avalon Terrane Southern Acadian Orogeny and further uplift of the Appalachian Mountains occured
380 million years ago (late Devonian)	South Mountain Batholith formed when granitic magma rose into the meta-sedimentary rocks of the Meguma Terrane Metamorphism of these rocks occured
350 million years ago +	Uplift and erosion exposed the South Mountain Batholith
200 million years ago	Creation of the sinistral fault along the Northwest Arm
500,000 years ago	Ice sheets first spread over the Maritimes
500,000 years ago to 10,000 years ago	Glacial and interglacial episodes occurred in the Maritimes
20,000 years ago	Sea level begins to rise and drowns the landscape
1749	Quarrying begins at Purcell's Cove

Appendix B: Mainland Land Use Zoning Map



Appendix C: Purcell's Cove Neighbourhood Committee's Green Network Plan Submission

PCNC Submission: The Halifax Green Network Plan, July 10, 2015

Halifax Green Network Public Submissions Process
Greenbelting and Public Open Spaces Priority Plan
c/o Halifax Regional Municipality Parks and Recreation Office
Halifax, Nova Scotia
Attn. Holly Richardson

Protecting the Backlands within the Halifax Green Network

The Purcell's Cove Neighbourhood Committee

Recommendations and Summary

The Purcell's Cove/William's Lake/Herring Cove Backlands: Within five minutes of Halifax's city center lies a unique 1300 hectare wilderness area that contains six lakes and three ponds, hills with spectacular views of the whole area and dozens of kilometers of informal hiking and biking trails. Our community believes this to be a resource that must be recognized as an essential part of the Halifax Green Network. In accordance with the principles and objectives laid out in the updated Regional Municipal Planning Strategy (October 2014), we make the following recommendations.

1. ***That the Purcell's Cove Backlands – the area bordered roughly by Williams Lake Road in the north, Purcells Cove Road in the east, Herring Cove Road in the west and Powers Pond in the south - be included as a key feature of the new Halifax Green Network.***

2. ***That the linkages between the Backlands and other nearby protected areas in the form of interlocking watersheds and natural habitats be formally recognized and described in the Halifax Green Network plan to help maintain and protect its connectivity with the larger green network.***

3. ***That the economic, recreational, ecological and cultural assets and potential of the Backlands be recognized in the Halifax Green Network Plan.***

The background for these recommendations are given below, but the main reasons for recognizing the Backlands within the Green Network can be summarized as follows:

- **The Backlands *proximity* to the city makes it an ideal place for the open space and recreational goals of Halifax.**
    - People from the core of Halifax have easy access to an area that has great recreational potential (e.g., hiking, mountain biking, canoeing, swimming, skating, geo-cashing).

1

Protecting this area would make Halifax renown as a socially and ecologically progressive, truly 21st century city, as it would foster a rare synthesis between quality of life, social/cultural values, human well-being and the environment that hardly any major urban centre can match today.

- **The Backlands contain significant cultural and historical value that is an integral part of Halifax's on-going narrative.**
    - Indian Cove and the environ around Purcell's Cove were commonly used sites by the First Nation's people before British settlement. When the British did settle on the peninsula, rock from the quarries in the Backlands was used to build many large structures and buildings that define the face of Halifax to this day. Throughout the centuries, military defence infrastructure in this area played a key role in shaping the world political landscape, including our own nation. Finally, the Backlands are an integral part of individual histories of those who come to visit its lakes and trails to this day, histories that collectively create the cultural fabric of our city.
- **The Backlands' ecological features are diverse, interesting, and some are globally rare.**
    - Notable features of its rugged terrain include the globally rare jack pine/broom crowberry barrens. Typically this consists of the signature jack pines growing among large whaleback–shaped granite outcrops, along with the low-growing broom crowberry. In late spring some of the valleys contain pockets of lady slippers. The soil in these barrens can be very shallow in spots. This makes for a unique if not fragile landscape, affording spectacular views from the higher ridges. Lakes, ponds and streams are found in the area as well as many wetlands.
- **The Backlands area is *geologically hostile* to real estate development because of its rugged terrain, which would impose huge infrastructure costs on the municipality should they be developed.**
    - There are good reason that this area has not been developed while the city grew up around it. The granite bedrock that is never far from the surface (and often exposed) means that development would require extensive blasting that would destroy the area's ecological integrity. Moreover, traffic to and from the area, if it were developed, would soon overwhelm the Armdale roundabout, forcing expensive traffic infrastructure development. Even small scale developments (such as those at Fortress Drive and Aaron's Way) would damage watersheds and fragile wetlands and put more people at risk in a fire prone area.

Of course the Backlands should not be thought of in isolation. Active transportation and ecotourism can be enhanced by improving connections: for example, the bike lanes that now extend to Purcell's Cove should eventually be continued to the beaches at Crystal Crescent Beach Provincial Park. In terms of wildlife ecology links to Long Lake Provincial Park, and an interconnected green areas including the Terrance Bay Wilderness Area and across the length and breadth of the Chebucto Peninsula should be maintained.

Who we are and why we care

Our group: Purcell's Cove Neighbourhood Committee (PCNC), formed in 2012, evolved from community groups stretching back to the 1970s. Its main aim is to promote, protect and provide a voice for Purcell's Cove and surrounds as a unique mixed residential and multi-use recreational area within HRM. PCNC is an affiliate of Our HRM Alliance and the Backlands Coalition. It coordinates closely with other local groups including the Williams Lake Conservation Company and the Ferguson's Cove Neighbourhood Association. Our website can be found at http://www.pcnc.chebucto.org/.

Our community: Purcell's Cove is not a suburb of the city – it is a picturesque corner with substantial natural beauty, with a unique social and historical heritage, a special community spirit and a reputation as a welcoming retreat just a stone's throw from the urban core. It is a community with many outstanding features, near the heart of Halifax. The roughly 350 residents of the Purcell's Cove area include young families, artists, cultural workers, retirees, professionals, tradespeople, service workers, health workers and the self-employed. Only five minutes drive from the Rotary, it is a special blend of suburban and rural, residential areas and 'pocket wilderness'. Its main features are the Cove itself, with its small yacht anchorage as well as unobstructed views of the harbour, Point Pleasant Park and McNab's Island, and a substantial and unique Backlands area that encompasses undeveloped and minimally-developed private land, Crown Land, HRM land, DND land, and a segment of conservation lands donated by the Field and Napier families to the Nova Scotia Nature Trust in 2003 and 2009 respectively.

Why we want to protect the Backlands: We believe that one of the most remarkable and valuable aspects of the Backlands is the location of this extensive wilderness area virtually at the city's doorstep. Not everyone in HRM is aware of the existence of the Backlands and the fact that they provide a vital and ecologically diverse link or 'bridge' between the urban core and outlying natural wilderness areas of the Chebucto Peninsula. The existence of such stunningly beautiful and largely untouched land with outstanding physical features and spectacular vistas, so close to the city centre, provides Halifax with the unprecedented potential to create a green network that is fully accessible to residents of the urban core as well as visitors to the city.

Ecology, geology, flora, fauna and watersheds: The Backlands' geology is characterized by striking 'whaleback' granite ridges and huge boulders shaped by the last glacial age. The granite itself is 380 million years old, while the whalebacks were shaped by glaciation approximately 10,000 years ago. (It has taken that much time for nature to produce the meagre layer of soil in the cracks at the crest of the granite whalebacks where the Jack pine thrive.) There are at least three scenic high points in the Backlands with elevations

of roughly 80 metres -- including Piggy Mountain with its clear views of Chebucto Head and peninsular Halifax. Two geologically significant drumlins with deep soils can be found west and south of Williams Lake.

Approximately 100 acres of land around Purcell's Pond are administered by the Nova Scotia Nature Trust (see www.nsnt.ca). Other groups such as the Backlands Coalition (www.backlandscoalition.ca), the Williams Lake Conservation Company (WLCC, www.williamslakecc.org) and the McIntosh Run Watershed Association (MRWA, www.mcintoshrun.ca) are concerned with, and work actively to publicize and protect, the unique features of the Backlands area as a whole. The WLCC has commissioned several excellent studies pertaining to birds, watershed features and vegetation, and, most recently, the *Ecological Assessment of the Plant Communities of the Williams Lake Backlands* (February 2014) which highlights important ecological features such as the globally rare Jack pine/ broom crowberry barrens that are found throughout both the Backlands.

The two watersheds of the Backlands form a contiguous area of high outcrops and wet low valleys which are home to a remarkable amount of wildlife. Within the lands administered by the Nova Scotia Nature Trust alone, dozens of species of plants, birds, lichens and insects have been observed. There are also regular sightings of rabbit, beaver, muskrat, mink, coyote, fox and deer. The uniqueness and rarity of these pristine urban fresh water landscapes and watersheds form a unique web of such value as to warrant serious protection and stewardship. In particular, the tiny gem of Flat Lake and the surrounding area (which falls between the McIntosh Run and Williams Lake watersheds and is partly situated on HRM land) provides a superb example of a pristine Backlands location which could potentially be connected to the NSNT conservation lands. Massive granite whalebacks and primordial-looking glacial erratic boulders surround the small unspoiled lake which attracts many seasonal birds. A local artist who has painted extensively in the Backlands comments that Flat Lake gives us a rare glimpse of ancient landscape only a short distance from peninsular Halifax.

Recreational trails: The Backlands contain an extensive network of formal and informal trails for hiking and mountain biking and it is regularly accessed by such groups as the Halifax Field Naturalists and the Chebucto Hiking Club. Many of these rough trails were utilized by the Mi'kmaq people long before Europeans arrived. The MRWA has done a remarkable job in mapping out potential formal trails on existing HRM and Crown Lands in the southern Backlands adjoining Herring Cove. We fully support their efforts to establish an extensive trail system (starting in 2015 with construction of phase one of their planned 30 kilometre trail network) through remarkable scenery that can be accessed and enjoyed by anyone in Halifax within a short bus ride or drive from the city centre.

Cultural and historical: Indian Cove at the north end of Purcell's Cove (formerly Mackerel Cove) was a long-established site where First Nations people fished and celebrated festivals. The Mi'kmaq occupied the Purcell's

4

Cove shoreline and the whole of the present Backlands to support their lifestyle prior to and for years after the British settled in peninsular Halifax 1749. The little inlet at the north end of the cove was called Indian Cove. From there began a trail called Indian Path, which was the head of a network of trails used to access the fishing lakes and hunting grounds in the Backlands. Established in 1759, the historic granite and slate quarries of the Backlands were used to build the forts, batteries and many historic Halifax buildings. The quarries extended from Indian Cove to the plateau 70 metres above. In 1834 the quarries started using a steam railroad (possibly the first industrial railway in Nova Scotia) to access the quarries and the old tramway bed is well preserved. Although mostly overgrown, some segments show sturdy stonework beds which are now used as scenic walking trails. Old maps in the Nova Scotia archives show an 18th century road connecting the military batteries above Ferguson's Cove with Spryfield through the heart of the Backlands. Parts of this road are still used by hikers.

The Backlands is also the subject of local painters and photographers whose works of art remind us that the extraordinary rugged beauty of the area is worth appreciating for its own sake. For example, the work of local landscape painter Geoffrey Grantham, chosen in 2012 as a CBC 'Sharing the View' artist, provides a compelling first-hand visual record of the Backlands' many moods and seasons.

The Green Network: Given our deep-rooted interest in preserving the quality of life in HRM, PCNC welcomes the chance to put the Backlands on the map as an area within the Green Network Plan. We see this as an opportunity to share with others the special features and assets of the Backlands in its entirety and want to highlight the need to provide effective regional stewardship for these areas. As a member of Our HRM Alliance, we fully endorse the Green Network as a way to concentrate growth in the urban core, to preserve green areas that are vital in addressing climate change, and to protect watersheds and ecologically sensitive areas, and provide healthy outdoor recreational opportunities. The Green Network is very important for the future preservation and effective collective use of the space surrounding Halifax. The inclusion of the Backlands in this plan would recognize that a regional municipality is much more than simply an area in which economic development takes place. It is also a location to foster a rare synthesis between quality of life, social/cultural values, human well-being and the environment.

Overall, we believe that there is significant prestige to be gained for Halifax (both nationally and internationally) if the true potential of the urban greenbelt is realized. Portions of the Backlands are currently Crown or HRM land, but in the area immediately south of Williams Lake and behind Purcell's Cove itself there remain private lands zoned as 'urban reserve'. This designation does offer some protection, at least for the time being. But in the long run the area as a whole needs the formal recognition protection that can only come from its incorporation into the Green Network and we hope that private landowners and developers can also see the many advantages in allowing their lands to be considered as part of this initiative. The Backlands, incorporating the McIntosh Run and Williams Lake watersheds and ecological systems, is a great natural landscape that remains so close to the downtown

core which can be properly designated an "urban wilderness." To lose the opportunity to protect this area from development would seriously undermine Halifax's potential as a socially and ecologically progressive community.

We would be happy to provide any further information as required. We look forward to receiving acknowledgement from the coordinator of the Green Network Plan regarding our input and we hope that our information will contribute substantially to the planning process.

Yours sincerely,
For the Purcell's Cove Neighbourhood Committee

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Cc: clerks@halifax.ca for distribution to the Mayor and City Councillors

Painting (p. 5) courtesy of Geoffrey Grantham. Photographs (p. 3, 6) N. Brett; (p. 4), NS Archives.

Appendix D: Maritime Archaeological Resource Inventory Application

MARITIME ARCHAEOLOGICAL RESOURCE INVENTORY

Date Form Filled Out (YYYY/MM/DD)
2016/04/06

NB ○ NS ◉ PEI ○

A. SITE NAME, LOCATION AND ACCESS

A1 SUGGESTED SITE NAME: Purcells Cove Quarries

A2 TEMPORARY SITE NUMBER:

A3 PERMIT/LICENSE NUMBER:

A4 PERMIT/LICENSE TYPE:

A5 WHEN DID YOU GATHER THE INFORMATION FOR THIS REPORT ?

03/11/2015 through 21/03/2016

A6 ADDITIONAL INFORMATION AND/OR RESOURCES:

	Submitted	Available
Video Footage	☐	☐
Maps / Plans	☐	☒
Still Photos	☐	☒
Drawings	☐	☐
Archival Information	☐	☒
Artifacts	☐	☒
Articles	☐	☐
Contacts	☐	☒

Other: Dalhousie University Theses Projects

A7 ACTIVITY

a)	Surface collecting	☐
b)	Surface recording	☒
c)	Site Revisit	☒
b)	Subsurface testing	☐
c)	Extensive excavation	☐
d)	Monitoring	☐
e)	Surveillance	☐

A8 COUNTY: Halifax Regional Municipality

A9 LOCATION DESCRIPTION

This site is located on the western shore of the Northwest Arm in Purcell's Cove, Nova Scotia.

A10 LOCATION ACCESS

Take Purcells Cove Road (Highway 253) from the Armdale Rotary towards Purcell's Cove for 5.9km. Turn right onto 18th Battery Road. Pull into the parking lot to the north of the Purcell's Cove Social Club (505 Purcells Cove Rd). The entrance to the site is located to the south of the Dalhousie playground.

A11 SITE LOCATION MAP NUMBER: 11D12 (Attach section of NTS 1:50000 scale map and indicate the site location. Make sure that the map number is indicated. eg. 21H16).

Borden No.

A12 **SITE ACCESS MAP NUMBER** 1044600063500 (Attach photocopied section of a larger scale map and show your access route to the site location. Make sure that the map number and scale is indicated) Scale: 1:10 000

A13 **SITE POSITION**

UTM (eg. 20TKE 1447 5362) Zone 20T E 454411 N 4939654

Latitude ____ ____ ' . ____ N Longitude ____ ____ ' ____ W

A14 **METHOD(S) OF DETERMINING LOCATION** and/or position.

Projection ____ Datum ____

GPS	estimated error 10 m	☑	Total Station ☐
Differential GPS		☐	Estimate from description ☐
Map (scale =1: ____)		☐	
Aerial Photo (scale =1: ____)		☐	Other (please specify) ____

A15 **SITE ELEVATION**

Elevation 0 m. (A.S.L.) to 60 m. (A.S.L.)

A16 **METHOD(S) OF DETERMINING ELEVATION**

Projection ____ Datum ____

GPS		☑	Total Station ☐
Differential GPS		☐	Geodetic Marker (# ____) ☐
Map (scale =1: ____)		☐	Estimate from description ☐
Aerial Photo (scale =1: ____)		☐	

Other (please specify) ____

A17 **OTHER MAP(S)** ____

A18 **AERIAL PHOTO NUMBER(S)** ____

A19 **PROPERTY IDENTIFIER NUMBER(S)** 00269282, 00334367, 00334375, 40068793, 40555526, 00334383, 00334391

A20 **PROPERTY TYPE** Private ☑ Federal Crown ☐ Provincial Crown ☐ First Nation Land ☐ Unknown ☐

A21 **NEAREST FIRST NATION COMMUNITY** (if applicable) ____

Contacted ? Yes ☐ No ☐

B. SITE ENVIRONMENT

B1 **NATURAL REGION # (Provincial)** 851 **NATURAL REGION # (Federal)** ____

B2 **HABITAT DESCRIPTION** (please check those appropriate)

Offshore
- 1.1 Open Water ☐
- 1.2 Benthic ☐

Coastal
- 2.1 Rocky Shore ☐
- 2.2 Boulder/Cobble Shore ☐
- 2.3 Sandy Shore ☐
- 2.4 Mud Flat ☐
- 2.5 Tidal Marsh ☐
- 2.6 Dune System ☐

Terrestrial Unforested
- 5.1 Barren ☑
- 5.2 Oldfield ☐
- 5.3 Cliff and Bank ☐
- 5.4 Talus Slope ☐
- 5.5 Cave ☐

Freshwater
- 3.1 Open-Water Lotic (Rivers and Streams) ☐
- 3.2 Open-Water Lentic (Lakes and Ponds) ☐
- 3.3 Bottom Lotic (Rivers and Streams) ☐
- 3.4 Bottom Lentic (Lakes and Ponds) ☐
- 3.5 Water's Edge Lotic (Rivers and Streams) ☐
- 3.6 Water's Edge Lentic (Lakes and Ponds) ☐

Freshwater Wetland
- 4.1 Bog ☐
- 4.2 Fen ☐
- 4.3 Swamp ☐
- 4.4 Freshwater Marsh (Inland) ☐

Forests
- 6.1 Hardwood Forest ☐
- 6.2 Softwood Forest ☐
- 6.3 Mixedwood Forest ☐

Additional Habitat Description ____

C. SITE DESCRIPTION

C1 Period

Palaeo-Indian (> 9000 BP)	☐	Contact (1500 - 1604)	☐
Early/Middle Archaic (9000 - 6000 BP)	☐	Colonial (1604 - 1867)	☑
Late Archaic (6000 - 3000 BP)	☐	Early Post-Confederation (1867 to 1950)	☐
Maritime Woodland (3000 - 500 BP)	☐	Other	

Basis of identification

Property deeds and land grants for the quarries available through Nova Scotia Archives.

C2 Tradition

Palaeo-Indian	☐	Middle/Late Woodland	☐	Jamaican Maroon	☐
Early/Middle Maritime Archaic	☐	Maliseet	☐	Planter	☐
Laurentian Archaic	☐	Mi'kmaq	☑	Loyalist	☐
Shield Archaic	☐	Passamaquody	☐	Black Loyalist	☐
Late Maritime Archaic	☐	British	☑	German	☐
Susquehanna	☐	French	☐	Irish	☐
Early Maritime Woodland	☐	Acadian	☐	Unspecified	☐
		Scottish	☐		

Other

C6 Site Function

Aeroplane	☐	General Activity	☐	Religious/Sacred	☐
Agricultural	☐	Hunting & Gathering	☐	Residence	☐
Commercial	☐	Manufacturing	☐	Settlement	☐
Construction	☐	Military	☐	Transportation	☐
Extractive	☐	Mining	☐	Undetermined	☐
Fishing	☐	Miscellaneous	☐	Vessel	☐
Forestry	☐				

Other: Quarrying

C7 General Site Description

There are three granite quarry pits located at Purcell's Cove. These have been identified as Queens Quarry, Purcell's Cove Quarry and Couglan Quarry. The rail bed of a trolley track, which may have been the first railroad in Eastern Canada, travels uphill towards the quarries. A trail used for recreation by the local community runs parallel to the trolley track. Evidence of quarry operations can be found throughout the site, including ledges where rocks have been cut from the granite and discarded waste rock. There are at least two locations where shims and wedges can be found. Much of the quarry pits have been reclaimed by vegetation, but the evidence of quarrying operation remains.

C8 Observed Site Dimensions

Length _____ m Width _____ m

C9 Estimated Site Dimensions

Length 375 m Width 230 m

C10 Distance to Water

50 m

C11 Orientation to Water

Perpendicular ☐ Parallel ☑ Not applicable ☐

C12 DESTRUCTIVE AGENTS

	High		Medium		Low	
a *Natural*	Existing	Future	Existing	Future	Existing	Future
Marine Erosion	☐	☐	☐	☐	☐	☐
Lacustrine Erosion	☐	☐	☐	☐	☐	☐
Vegetation Growth	☐	☐	☑	☐	☐	☐
Bioturbation	☐	☐	☐	☐	☐	☐
b *Cultural*	Existing	Future	Existing	Future	Existing	Future
Agriculture	☐	☐	☐	☐	☐	☐
Construction	☐	☐	☐	☑	☐	☐
Transportation	☐	☐	☐	☐	☐	☐
Forestry	☐	☐	☐	☐	☐	☐
Mining/Quarrying	☐	☐	☐	☐	☐	☐
Dam/reservoir	☐	☐	☐	☐	☐	☐
Vandalism	☐	☐	☐	☐	☐	☐
Site Visitation	☐	☐	☐	☐	☐	☐
Military	☐	☐	☐	☐	☐	☐
Other						
_____	☐	☐	☐	☐	☐	☐

BASIS OF ASSESSMENT

Through site visits and reviewing historic photographs, we observed that vegetation growth is currently reclaiming artifacts of quarrying. Construction is a potential destructive agent as much of the land is owned by a private development company. Property ownership data is available through Dalhousie's GIS Centre.

D. REPORTER INFORMATION

D1 REPORTER'S NAME Cole Grabinsky and Rachael Groat

D2 MAILING ADDRESS 6172 Quinpool Road Apt.1 **D3 POSTAL CODE** B3L 1A3

D4 PHONE (H) 902-809-3748 **D5 PHONE (W)**

D6 FAX **D7 E-MAIL** rachael.groat@dal.ca

D8 AFFILIATION Dalhousie School of Planning

D9 HOW DID YOU FIND THE SITE?

Chance Find	☐	Field Survey	☐	Local Contacts	☑
Map Or Chart	☐	Historical Research	☐	Existing Site Records	☐

Comments

Marcos Zentilli and John Zuck

D10 CONTACT'S NAME Marcos Zentilli

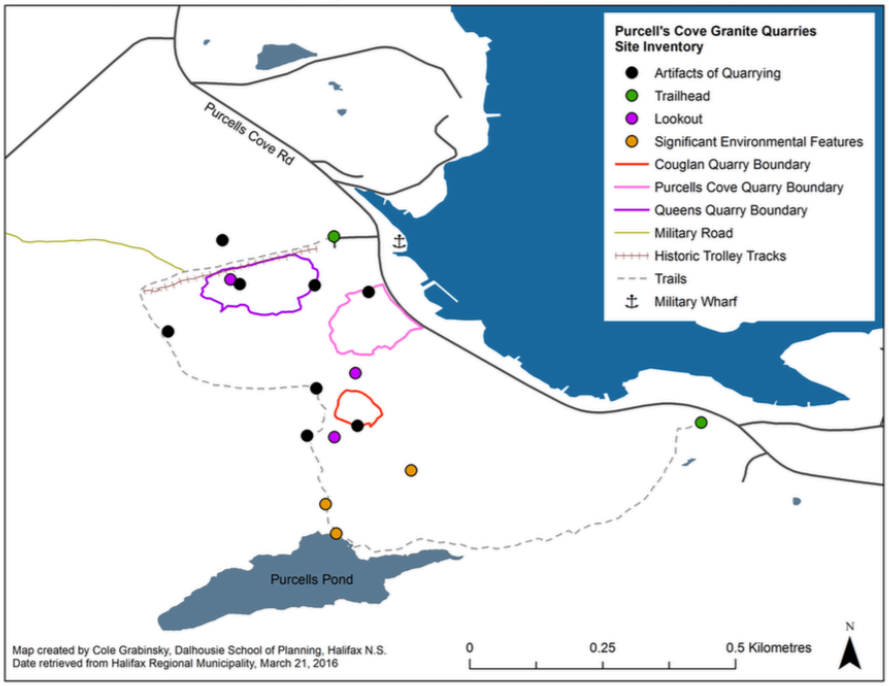
D11 MAILING ADDRESS

D12 POSTAL CODE

D13 PHONE (H) **D14 PHONE (W)**

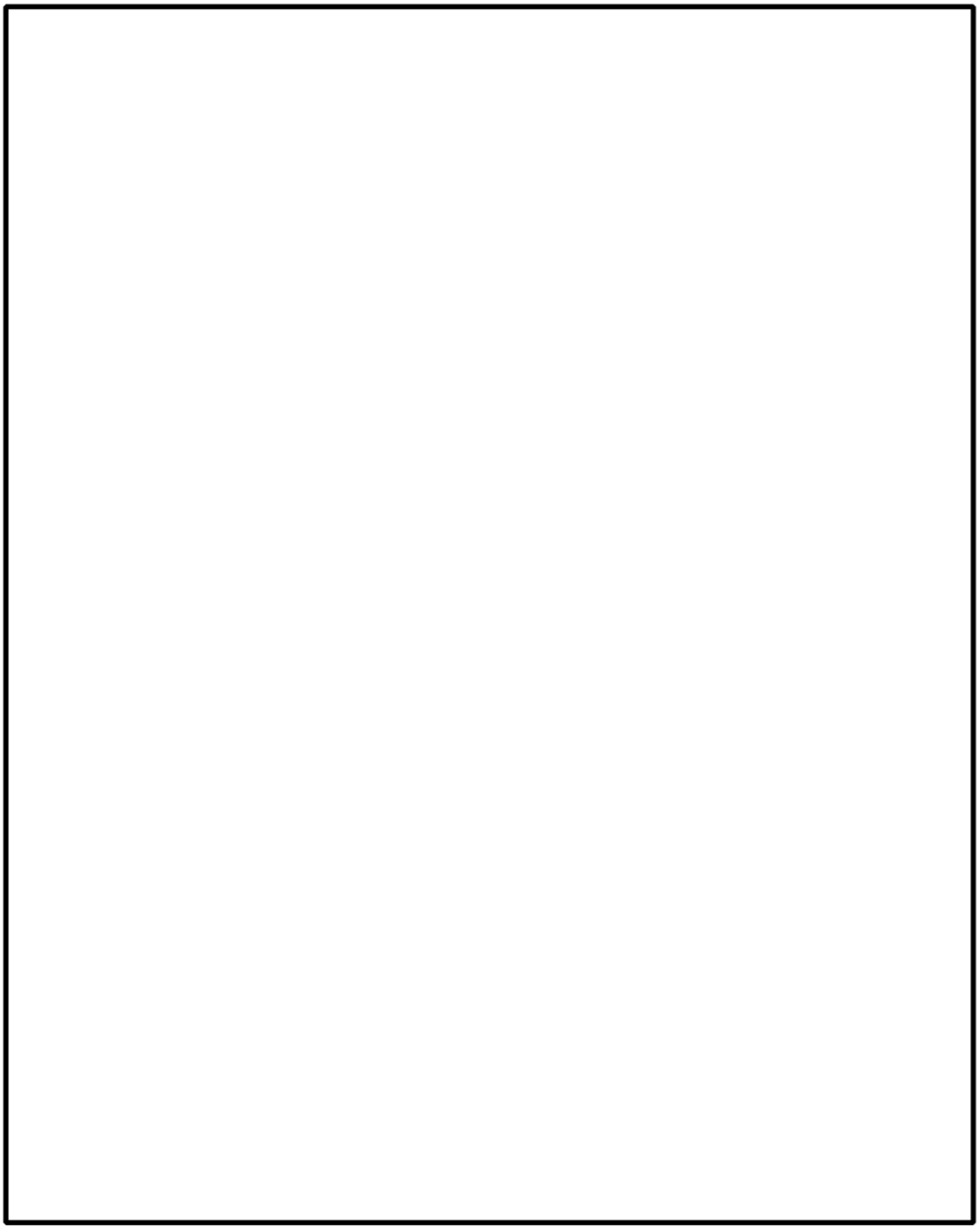
E. SITE PLAN

Please provide a drawing or sketch of the site, indicating prominent features, the orientation of the site and overall dimension, including artifact scatter fields. Relate the location of features in the Site Plan with features identified in the Site Access Map. Note the direction of true North and the scale of the plan.

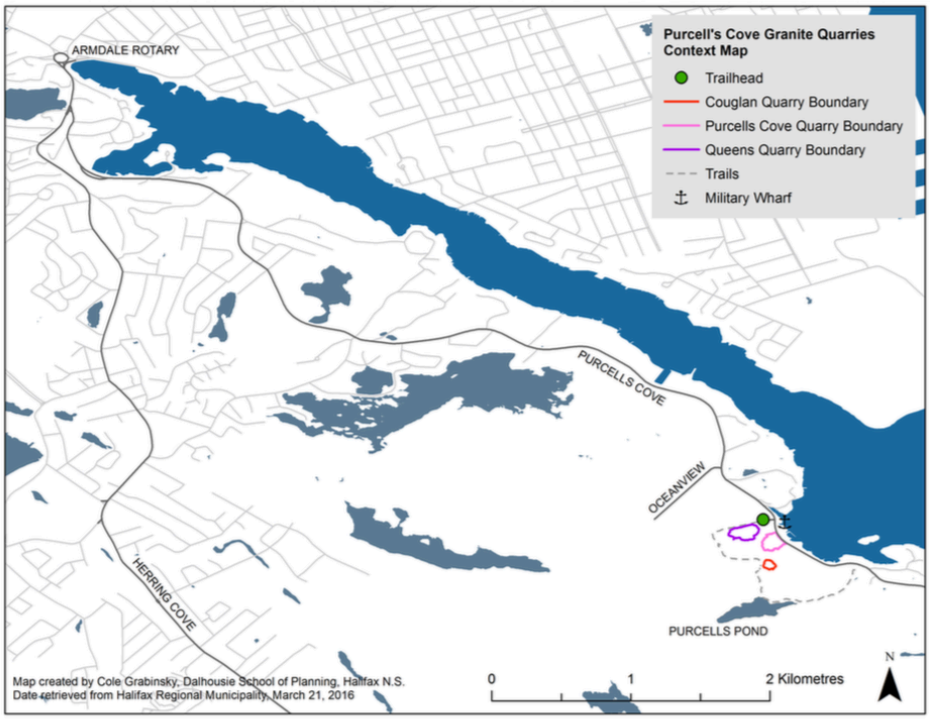


Extent of Site/Étendue du Site	1:50,000 Map No./Carte No. _____
Building/Édifice	
Foundation/Fondation	True/Vrai [ ]
Road/Chemin	Magnetic/Magnetique [ ]
Trail/Sentir	
Railway/Voie Ferrée	Date _____
Fence/Cloture	Scale/Echelle 1cm=___m.
River-Creek/Riviére-Ruisseau	
Steep Rise/Pente Abrupte	

F. SITE LOCATION MAP (general view e.g. 1:50000)



G. SITE LOCATION MAP (detail view e.g. 1:10000)



H. REMARKS