Environmental Assessment Registration

of a Class I Undertaking, Pursuant to Part IV of the Environment Act, N.S. Reg 52/2005

Project

Trimper Sand and Gravel Pit Expansion

Proponent

Ivan Trimper Construction Ltd.

Environmental Assessment Prepared by:
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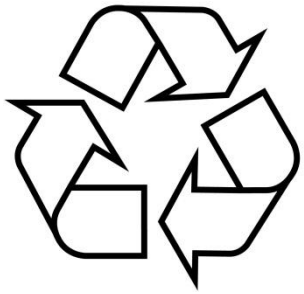

To ensure clarity of color images, the reader will note that the “back page” of graphics has been intentionally left blank throughout the document.

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Executive Summary

Ivan H. Trimper Construction Ltd. (the Proponent) wishes to expand its existing aggregate pit operations at Torbrook, Annapolis County, Nova Scotia. In proposing an aggregate pit expansion in excess of four hectares, the Proponent is required to register this project as a Class I Undertaking pursuant to Part IV of the Environment Act, N.S. Reg. 52/2005, and the Environmental Assessment Regulations, N.S. Reg. 26/95, before commencing work on the project.

The project site is situated on the north-facing slope of the Annapolis Valley's South Mountain, on lands owned by the Proponent. The project site lies in the rural community of Torbrook, near the eastern boundary of Annapolis County. The majority of the site is undeveloped with forest cover of varying ages.

The proposed Undertaking consists of the extracting, preparation, stockpiling and delivery of sand and gravel aggregates. Excavation of aggregates is anticipated to occur from the existing surface elevation to an elevation one meter above the local water table. The proposed Undertaking is intended to allow for the continuation of operations at the Trimper aggregate pit. As such, the annual aggregate production rate is anticipated to remain approximately constant at the current rate of roughly 20,000 metric tonnes/year. For the purpose of this Registration, a project timeline of 30 years is proposed. The project site is 65 ha in size, with aggregate extraction anticipated to occur across approximately 41 ha. Aggregate extraction and remediation will occur on an ongoing basis during the lifespan of the project, with only a fraction of the 41 ha working area opened at any one time.

An extensive range of mitigation measures are proposed to minimize impacts of the project. Taking these measures into account, several residual impacts are anticipated. These include: negative impacts of loss of forest cover, displacement of terrestrial and avian fauna, as well as positive impacts of provision of nesting habitat for selected avian species (Bank Swallows), supply of sand and gravel for local construction, and the securement of employment (11 positions). When the negative residual effects are considered within their ecological setting as well as temporal and spatial context, it is concluded that there will be no significant adverse environmental effects arising from the proposed project.

1. Proponent Description

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Environmental Assessment Registration Document

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Ivan Trimper
President, Ivan Trimper Excavating Ltd.

2. The Undertaking

2.1 Name

Trimper Sand and Gravel Pit Expansion

2.2 Location

The project site is situated on the north-facing slope of the Annapolis Valley's South Mountain, approximately 5.2 km south east of the town of Middleton (see Figure 1). The project site lies in the rural community of Torbrook, near the eastern boundary of Annapolis County. The majority of the site is undeveloped with forest cover of varying ages (see Figure 2).

3. Scope

Ivan H. Trimper Construction Ltd. wishes to expand its existing aggregate pit operations at Torbrook, Annapolis County, Nova Scotia. In proposing an expansion that would be in excess of four hectares, and as such Ivan H. Trimper Construction Ltd. is required to register this project as a Class I Undertaking pursuant to Part IV of the Environment Act, N.S. Reg. 52/2005, and the Environmental Assessment Regulations, N.S. Reg. 26/95, before commencing work on the project. This document is intended to fulfil the primary requirement for the project registration under the legislation.

3.1 Scope of Undertaking

The proposed Undertaking consists of the extracting, preparation, stockpiling and delivery of sand and gravel aggregates. The proposed primary activities to be undertaken at the site include:

- cutting, grubbing and piling of vegetation and topsoil,
- excavation of material,
- preparation of aggregates through screening, crushing and washing,
- stockpiling of prepared sand, gravel and stone,
- delivery of aggregates by truck through the principal pit access road to Highway 201, and
- reclamation of areas following aggregate removal.

Excavation of aggregates is anticipated to occur from the existing surface elevation to an elevation one meter above the local water table. The project footprint and boundaries are shown in Figure 1. The proposed Undertaking is intended to allow for the continuation of operations at the Trimper aggregate pit. As such, the annual aggregate production rate is anticipated to remain near the current rate of approximately 20,000 metric tonnes/year. The extractable reserves within the project footprint are estimated to be in excess of seven million tonnes of gravel and sand. Based on this extraction rate, the lifespan of the Undertaking is anticipated to be in excess of 400 years. For the purpose of this Registration, a project timeline of 30 years is proposed.

Site preparation, extraction and reclamation are anticipated to occur on a continuous basis with new pit opening, excavation and reclamation being performed concurrently. Further information on individual project components is presented in Section 5 – Description of Undertaking.

3.2 Purpose and Need for the Undertaking

The purpose of the Project is to allow Ivan H. Trimper Construction Ltd to expand the existing pit footprint to an area > 4 ha and continue current operations at the Torbrook pit. The pit is currently operating under an Industrial Approval (No. 2000-018068-R01), issued by NSE on January 10, 2011 and effective until January 7, 2021. A copy of the NSE Approval permit is included in Appendix 1.

The aggregates produced at the Ivan Trimper Pit are an important requirement for both local and regional construction projects. The aggregates are of suitable quality for highway construction and maintenance projects. Preliminary investigations by the proponent indicate that the aggregates in the proposed expansion area are of similar quality to those materials being extracted in the current pit.

Aggregate pits, such as the one under consideration, are important components of the province's natural resource sector and provide essential raw materials to local and regional construction industry. The pit currently provides both direct and indirect employment, in a region of the province with higher than average unemployment. The proposed expansion will allow these positions to be secured.

3.3 Consideration of Alternatives

In the consideration of alternatives, the possibility of an alternate site was examined. However, positive social, economic, and environmental factors of the existing site were greater than were apparent at other locations. For example, the proposed Undertaking is situated on an extensive area of glacial drumlins and kames, consisting of alluvial sands and gravels. The Project site is also situated in a rural area with very limited development or habitation in the vicinity. There are a limited number of sites in the region with comparable aggregate resources, in a similar rural setting with existing access and community support. Although not confirmed, it is reasonable to expect that local wildlife are somewhat habituated to the current activities and location, having already altered use and avoidance behaviours around the Project site

Screening, crushing, and stockpiling will be carried out at the Project site. The possibility exists to relocate the crusher, weigh bridge and wash areas to another area within the Project footprint. While theoretically possible, this would result in the disturbance of additional areas. Based on field assessments, these components are not providing significant stress to the natural environment at their current locations. Given that the aggregate production capacity for the Undertaking is expected to remain constant, the scale of existing facilities is anticipated to be sufficient for the foreseeable future.

The Undertaking proposes for the delivery of aggregates by truck via the main access road north to the Highway 201 to continue. There exists a second access road south to the Trimper Construction Ltd office and Trimper Lane. The southern access road, while a possible alternative, would result in additional trucking on the smaller Torbrook Road. The bulk of local construction activities and hence requirements for aggregate materials is in the Middleton, Greenwood and Kingston areas. The main access road north to Highway 201 provides the most direct access to these locations, with the fewest

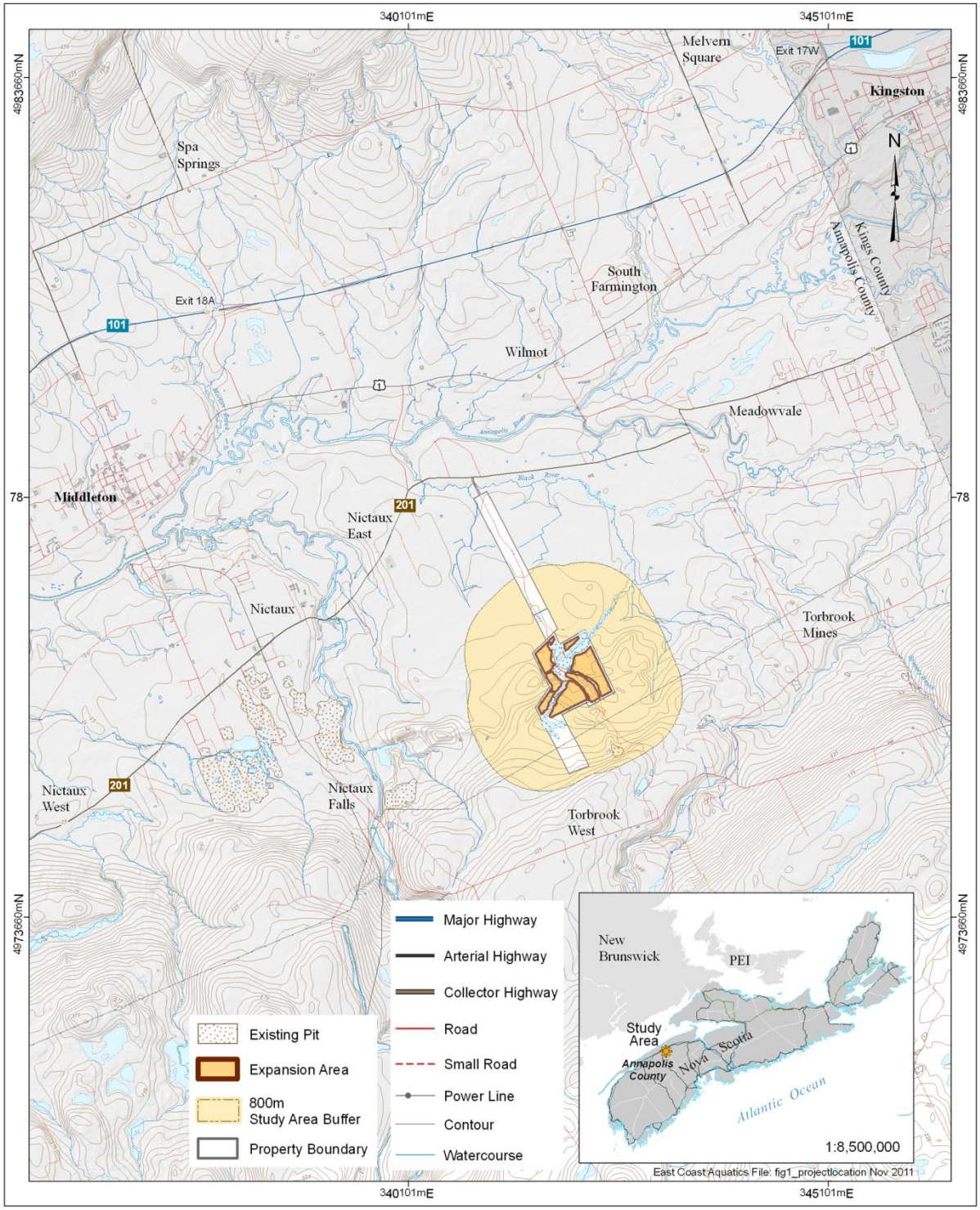

Figure 1

Project Location

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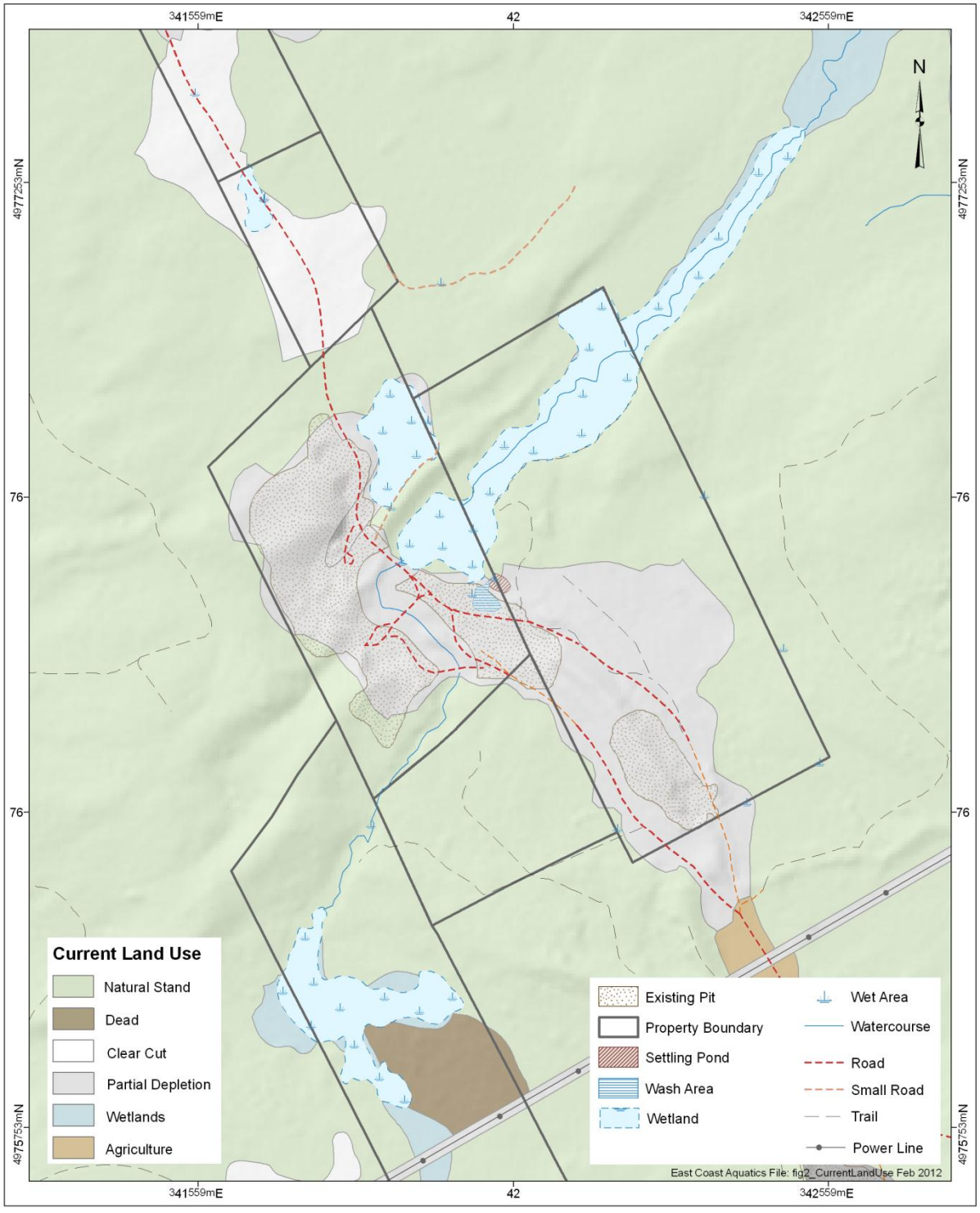

Figure 2

Current Land Use

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road miles required. The southern access road may be used occasionally during periods of maintenance on the northern road, or when local deliveries make the southern route the more direct route.

3.4 Scope of Environmental Assessment

The scope of the environmental assessment has been determined by the proponent and their consultants, East Coast Aquatics Inc. (ECA). Factors considered in the development of the scope include the components of the proposed Undertaking, the professional judgement and expert knowledge of the study team, consultations with regulatory officials and the public, and the findings of the field studies conducted as part of this environmental assessment. The ECA study team met with representatives of the NSE Western Regional Office and Environmental Assessment Branch on February 1, 2011 to discuss the proposed assessment and project scoping. The Guide to Preparing an EA Registration Document for Pit and Quarry Developments in Nova Scotia (NSEL 2009) was also used to determine the focus and scope of the assessment.

This environmental assessment registration seeks to evaluate the potential environmental effects of the proposed Undertaking, through all Project phases and for each of the Valued Environmental Components. The evaluation of each of these VECs, within the spatial and temporal project boundaries, is utilized to provide a valid assessment of project effects. Government guidance, consultation and professional judgement were utilized in the development of the following VEC list.

- Rare and Sensitive Species at Risk
- Terrestrial Flora
- Terrestrial Fauna
- Avian Fauna
- Surface Water Resources
- Fish and Fish Habitat
- Wetlands
- Groundwater and Geological Resources
- Archaeological and Heritage Resources
- Air Quality
- Noise
- Socio-Economic Environment

4. Public Involvement

The Proponent sought to undertake a proactive public involvement program, to engage adjacent communities through the environmental assessment process. These activities were guided by documentation prepared by NSE (2009a) and Nova Scotia Office of Aboriginal Affairs (2009).

4.1 Methods of Involvement

In March 2011, eighteen landowners within a one km radius of the project site were contacted in

writing. Two additional neighbouring landowners were contacted by telephone. The purpose of this initial contact was to advise the landowners of the planned environmental assessment, provide an outline of the proposed Undertaking, and provide an opportunity for these individuals to identify scoping issues, comment on the proposed project and express any concerns with current or proposed operations. The correspondence associated with this landowner consultation is included at Appendix 2.

Information letters were also sent in March 2011 to the Kwilmu'kw Maw-klusuagn Negotiation Office, the Confederacy of Mainland Mi'kmaq, the Native Council of Nova Scotia, as well as the Chief and Councils of the Annapolis Valley First Nation and Bear River First Nation (Appendix 2). The purpose of this correspondence was to invite comments and establish a discussion on the proposed Undertaking.

On October 20, 2011, ECA hosted an Open House at the Three Rivers Community Hall in Torbrook, Annapolis County to provide the opportunity for members of the community to obtain additional information concerning the project and to present the findings of the 2011 field surveys. Adjacent landowners and First Nations organizations were again contacted by mail to inform them of the meeting. The event was also advertised through the on-line classified advertisements of the local newspaper, the Annapolis Spectator. An attendance sheet was maintained for the meeting, with a total of eight individuals attending. Comments sheets were provided at the Open House, for participants to record issues, concerns and questions concerning the project. No comment sheets were completed by the participants.

4.2 Stakeholder Comments and Steps Taken To Address Issues

Following the initial March 2011 correspondence, one individual contacted ECA staff to discuss the proposed Undertaking. The neighbouring landowner wanted to advise ECA of a wetland that straddled the property boundary between the caller's and the Trimper property. The caller had no specific issues or concerns, but simply wanted to pass along the information. This wetland has been mapped and is discussed in greater detail in Section 6.7 (Wetlands). No response from First Nations was received as a result of this correspondence.

Only one issue arose from the Open House, where a neighbouring landowner to the northeast of the project felt that the indicated property boundaries used in project mapping were incorrect. The landowner and ECA contacted the Lawrencetown Land Registration office to seek clarification of the issue. Investigation of the issue indicated that there existed at least two false property lines and one correct line. Based on this investigation, which involved the Proponent retaining the services of a licenced Surveyor, Land Information Services made changes to the public files regarding the location of the property line. The base maps for the project have been revised to reflect to the correct property alignment.

The EA Registration will be subject to a public review as required under provincial legislation. This will include the document being posted on the NSE website, with paper copies being made available. Notices indicating the occurrence and availability of this EA Registration document will be posted in local and provincial media as required.

5. Description of the Undertaking

5.1 Geographic Location

The project site is situated on the north-facing slope of the Annapolis Valley's South Mountain, lying at the boundary of the Western and Valley & Central Lowlands ecoregions (NSDNR, 2011). The Universal Transverse Mercator (UTM) coordinates for the centre of the site are: 20T 341867 4976624 (NAD83). The project site lies in a rural area near the eastern boundary of Annapolis and Kings Counties. The majority of the site is undeveloped with forest cover of varying ages (Figure 2). The majority of the pit area is described at well drained, coarse textured soil on ridged topography although the northern portion of the project footprint is described as well drained, coarse textured soil in hummocky terrain.

A small watercourse originates near the southwest corner of the project site and passes diagonally through the property in an approximate northeastern direction. The watercourse is a tributary of the Black River, which flows into the Annapolis River. While the watercourse is not named on topographic maps, it is known locally as both the Parker Brook and Bald Hill Brook. For the sake of consistency, the watercourse shall be referred to as Bald Hill Brook for the remainder of this report. A review of various mapping sources has also indicated that a second drainaged named Black River lies immediately east of the Black River referred to in this report. The more eastern system enters the Annapolis River near Torbrook Road, while the Black River into which Bald Hill Brook flows enters the Annapolis River near Carleton Road. The western Black River is sometimes referred to as Black Brook. For the sake of clarity, the watercourse shall be referred to as Black River for the remainder of this report.

5.2 Project Constraints

The proposed expansion of the Trimper Pit has been developed within a number of constraints. Some of these constraints, such as watercourse and property boundary setbacks, were applied early within the proposed expansion process, while others such as wetland boundaries and setbacks were applied after completion of field surveys that identified these constraints. These constraints are presented within this section such that the reader may be aware that they were considered during the project development process. However, further details on the various constraints can be found under other relevant headings within this registration document.

A 30 m setback has been applied to all proposed expansion locations of the Undertaking from both outside property boundaries that are shared with owners other than the proponent, and from all watercourses and wetlands. However, there are a number of features associated with the existing pit operations to address, within the context of this environmental assessment. Aggregate extraction has occurred at this site for over 20 years. Some historic project infrastructure (e.g. access roads and material removal sites) are less than 30 m from wetlands and watercourses, as they were constructed during a period of less stringent environmental requirements. Re-location of these existing operational features would result in added environmental impacts. The proponent will ensure setbacks are observed with respect to future expansion operations, but in some cases, such as the location of historical infrastructure, this will be neither practical nor environmentally desirable. An example of this is the main access road between the pit and Highway 201, which passes to the west of a ericaceous shrub bog (Figure 3). Although the separation distance between the road and bog is less than the

recommended 30 m, a vegetated buffer has been maintained. Similarly, the wash area and settling pond are located less than 30 m from the adjacent wetland. The settling pond is periodically excavated to maintain its volume. The boundary of these wetlands has been examined, with no apparent adverse effects. There are no known compliance issues or problems associated with these features. There are no plans with the proposed Undertaking to make changes to these features. At the northwestern corner and along the southern boundary of the Project Area, historic excavation activities may have occurred within 30 m of the property boundary. The excavation along the southern boundary abuts with gravel extraction activities on property owned by Lafarge. This practice is based on a verbal agreement between the Proponent and Lafarge. There are no known problems or issues associated with these excavations. These areas will remediated in a manner consistent with that described for the proposed Undertaking. The 30m setbacks are shown on a number of graphics within, including Figure 3.

The proposed Undertaking is situated in a rural area and is surrounded by mixed forest. There are aero (0) residences within 500m of the project boundaries. The closest residence is approximately 1200m to the project boundary. There are 33 residences within 1500m of the project boundaries. There are 59 residences within 200m of the project boundaries. These residential buildings are well in excess of the required minimum 90 m setback.

Potential constraints that have been considered in the proposed Undertaking also include site use by Species at Risk and species of conservation concern (discussed in detail in Section 6.8). Constraints to timing of operational activities such as grubbing, clearing, and aggregated extraction from a sand face are proposed in order to minimize impact on seasonal use by avian species. Thirty (30m) setbacks have been proposed for plant Species at Risk and species of conservation concern that were identified during field surveys.

Other operational constraints have been applied to the proposed pit expansion operation, including time of day and day of the week constraints. These constraints are discussed in Section 6.12.

5.3 Physical Components

The existing pit operations consists of several lay down areas for portable crushing equipment and screeners, various aggregate stockpiles, the pit floor and active working faces, a wash area and adjacent settling pond, weigh scales and private access road to Highway 201 (Figure 4). There is no bulk storage of petroleum fuels on site. No hazardous materials are stored on site.

The proposed Undertaking will allow for the continued operations of the pit beyond its current 4 ha footprint (Figure 5). The physical components and annual aggregate production with the proposed Undertaking will be consistent with the existing operation.

Prior to aggregate extraction, timber will be cut with topsoil and roots being grubbed and stockpiled onsite. Stockpiled topsoil and organics are utilized in the progressive site reclamation activities. Similar practices will continue through the development and operation of the proposed expansion area.

Excavated aggregates are typically processed through a series of portable screens and crushing equipment to produce the aggregates of various dimensions (Photograph Appendix 4.1, 4.2, 4.3, 4.4). Processed aggregates are currently stockpiled at various locations within the pit limits until being trucked off site. It is anticipated that this production pattern will continue.

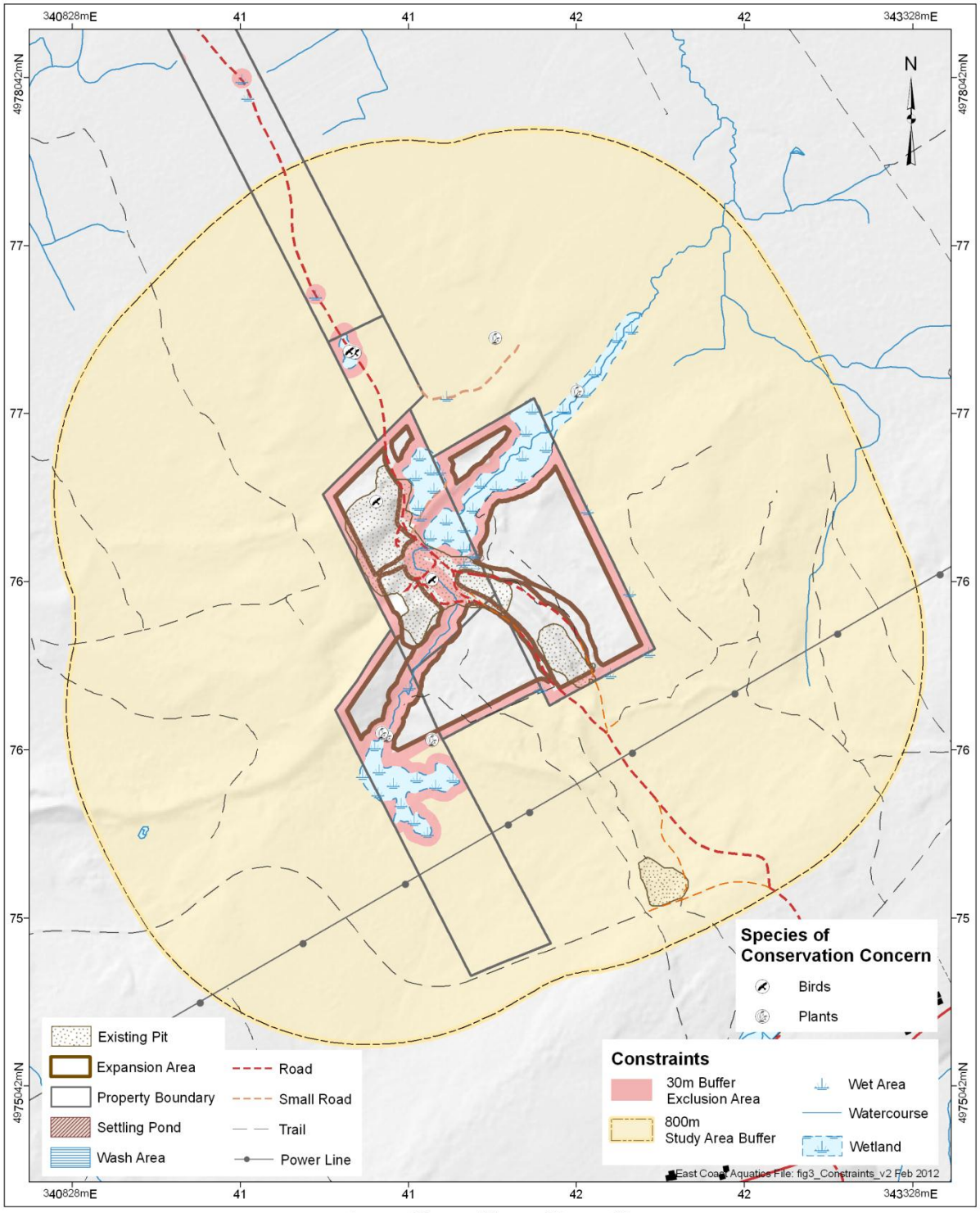

Figure 3
Constraints

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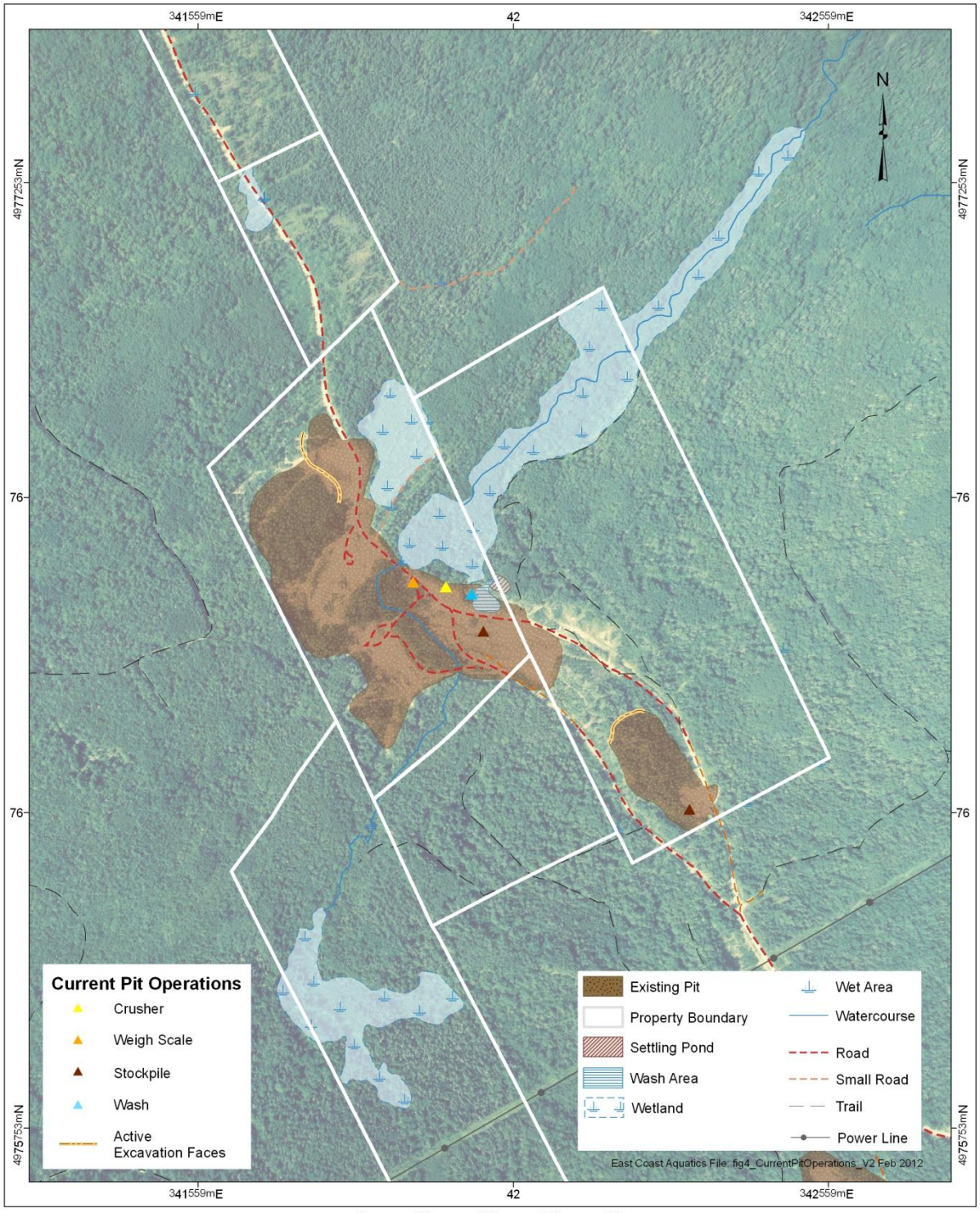

East Coast Aquatics

Data Courtesy of:
The PROVINCE OF NOVA SCOTIA
Geonova 2011
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Universal Transverse Mercator (UTM) Projection, Zone 20
North American Datum (NAD83) 1983

Figure 4
Current Pit Operations

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Pit drainage and surface runoff collection and controls will be put in place for the extended pit, in accordance with the Nova Scotia Pit and Quarry Guidelines and the existing Industrial Approval. A vegetated riparian buffer of 30 m will be maintained between the production areas and watercourses to limit sedimentation impacts. The washing of aggregates will be confined to a single area, with the runoff directed to an adjacent settling pond that will require periodic cleaning. Excavations will not take place below the local groundwater table. Given that there is no anticipated change in the aggregate production rate from the current rate, the existing wash area and settling pond is felt to be adequate for the proposed Undertaking.

The facilities within the existing pit (crusher, weigh bridge, loader etc.) are also currently used to crush and stockpile basalt rock, brought from the Proponent's Vault Road quarry on the North Mountain at Melvern Square. Approximately 4,500 tonnes of rock per year are transported to the Torbrook pit, requiring between 170 and 321 truck trips, depending on the size of truck used. This practice will continue as part of the proposed Undertaking.

5.4 Site Preparation and Construction

The existing aggregate pit has been in operation for approximately 20 years. Access to the existing pit is via two roads, south to Trimper Lane and Torbrook Road, and north to Highway 201. These two roads will continue to be utilized, with the access road to Highway 201 being the principal route for trucking of aggregates from the pit. Additional roads will be built on an as needed basis to access resource as phased expansion areas are developed. It is anticipated that the existing weigh scales, screening and crusher lay down areas, stockpile areas, and wash and settling ponds will continue to be used with the proposed expansion, and no relocation or new construction associated with these sites is anticipated.

The progressive development of aggregate resources will be undertaken to minimize risk and impacts to potential receptors. In order to minimize impacts to avian fauna, grubbing and site clearing will not occur during the mid-April to mid-August avian nesting period. Furthermore, grubbing and removal of topsoil will only occur on an as needed basis in order to accommodate aggregate excavation. Organics and topsoil will be stockpiled for later use in reclamation activities.

5.5 Operation and Maintenance

Excavators and front end loaders will be used to excavate material from the active working faces. Material will be processed onsite through portable screens and one or two rock crushers. The various aggregate products will be stockpiled in adjacent areas within the pit. Piles will be constructed so as to ensure segregation of material and prevent contamination by mixing of different piles. A combination of conveyor belts and front end loaders will be used to move material from the screens and crusher to the stockpiles. Front end loaders will be used to load stockpiled material onto trucks. Products will be transported from the pit via tandem and tractor trailer trucks along the existing access road to Highway 201. The average number of vehicle movements is anticipated to be five to eight trucks per day, depending on market demand. Tractor trailers have a capacity of approximately 27 tonnes with tandem trucks having a capacity of approximately 14 tonnes. This is consistent with the current truck volumes.

The anticipated production rate of the proposed Undertaking is 20,000 metric tonnes per year. The

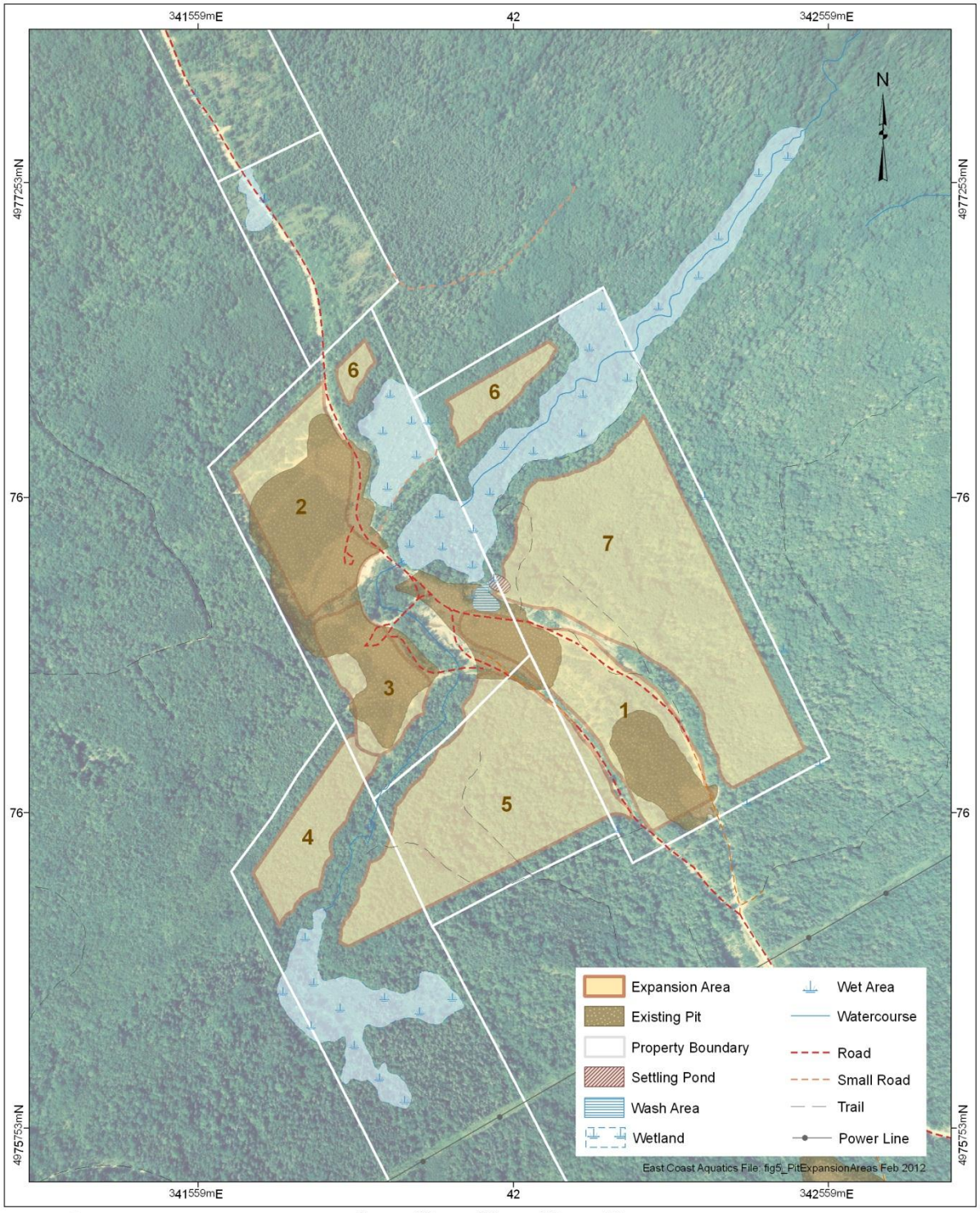
proposed operating hours for the pit expansion are 07:30 to 17:00, Monday to Friday, weather permitting. The planned production season is May to December. On occasion, client demand may require material loading and delivery at times outside the typical operating hours. This proposed schedule is consistent with the current operating schedule.

The extractable aggregate resource for the proposed Undertaking is estimated to be 7.5 million tonnes of gravel and sand (Table 1). This was determined using the site topography and a minimum pit floor elevation of 35 m, which is the elevation of the pit floor in the existing operation. With the proposed Undertaking, pit development and excavation will occur in Areas 1 and 2 until these reserves are depleted (Figure 5). Development activities will then transition to Areas 3, 4 and 5. This will allow remediation activities to be carried out in Areas 1 and 2. As reserves in Pit Areas 3, 4, and 5 are depleted, pit development will transition to Areas 6 and 7, allowing remediation activities on Areas 3, 4 and 5 to be carried out. Decommissioning of the pit will involve remediation of Pit Areas 6 and 7.

Table 1: Extractable sand and gravel tonnages

Pit Area	Surface Area (m^2)	Volume (m^3)	Tonnage (tonnes)
1	45,850	797,838	1,436,108
2	43,500	277,071	498,728
3	23,825	326,585	587,852
4	21,450	701,394	1,262,510
5	87,700	2,227,736	4,009,924
6	74,475	9,131	16,435
7	111,550	849,507	1,529,112
Total tonnage (tonnes)			9,340,670
Assume 20% of tonnage is topsoil or not sand/gravel (tonnes)			1,868,134
Net Total Reserve (tonnes)			**7,472,536**

As was noted above, the proposed Undertaking will strive to ensure that 30 m setbacks are observed for wetlands and watercourses from existing operations and ensure the setbacks are observed for expansion works. There is one case where a deviation from this policy is anticipated. Expansion Area 6 (Figure 5) is located in the northeast corner of the Project Area. Accessing Area 6 will require vehicle movements along an existing track, which passes along the southern border of the ericaceous shrub bog. The existing track is separated from the bog by a two to three meter strip of shrub vegetation. Development of Area 6 will require the track to be upgraded to accommodate trucks and other heavy equipment. Upgrading of the track will entail it being widened to the south. No encroachment into the ericaceous bog is anticipated in conjunction with the upgrading. However, setbacks from the ericaceous bog and alder thicket along Bald Hill Brook to the south will be less than 30 m in order to accommodate the proposed roadway that is necessary to access material in Area 6. To minimize potential impacts on the bog, a gravel berm will be maintained between road surface and the shrub vegetation along the bog. This will ensure that drainage from road surface is directed away from the bog and into adjacent upland vegetation. A natural height of land separates surface drainage from the wetland to the south along Bald Hill Brook.



East Coast Aquatics

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Geonova 2011
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Universal Transverse Mercator (UTM) Projection, Zone 20
North American Datum (NAD83) 1983

Figure 5
Pit Expansion Areas

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Hydrocarbon fuels (diesel and gasoline) will be used in the operation of all heavy equipment. The onsite storage of hydrocarbon fuels will be limited to the onboard fuel tanks for this equipment. The fuel tank capacities for this equipment are: excavator 60 gallons, crusher 90 gallons, and loader 68 gallons. A fuel truck will be used to deliver hydrocarbon fuels to this equipment on an as-needed basis. No other hazardous materials or large volumes of petroleum products will be stored onsite. The maintenance of vehicles and equipment will occur off site.

In accordance with best practices and standard NSE requirements, runoff controls will be put in place to ensure that effluent generated during operations is managed appropriately. Slopes will be contoured to allow pit drainage and surface runoff to collect on the pit floor. Based on current operations, there is very little overland flow or ponding of surface runoff on the pit floor, given the highly porous sand and gravel substrate in the area. Similar practices will be utilized with the proposed expansion to minimize sedimentation impacts.

Any overflow from the pit area will be monitored and sampled in accordance with the terms and conditions of the existing approval and the Pit and Quarry Guidelines. This will allow suspended sediment levels to be tracked to ensure that the effluent discharge limits are not exceeded. In the unlikely event that flows exceed the discharge limits, such as in the case of significant rain fall, contingency measures will be employed. These may include pumping of sediment laden water into areas of dense vegetation or through filter bags in order to reduce sediment loads. A storm water management plan addressing these operational components will be developed as part of the Pit Development Plan and submitted to NSE for review.

Dust emissions will be controlled, as necessary, through the application of water, obtained from the spring-fed wash pond. Stockpiled organics and topsoil will be seeded to minimize dust generation. Monitoring of airborne dust emissions will be conducted at the request of NSE and in accordance with the Nova Scotia Pit and Quarry Guidelines.

The Trimper aggregate pit has been in operation for approximately 20 years, with no issues or formal complaints being identified through public meetings or discussions with NSE staff. This is do due to the relatively small scope of the operation, its physical separation from adjacent residences and the overall management approach employed at the pit. Given that the production rate and methods will remain essentially constant under the proposed Undertaking, it is unlikely that issues of water, dust, noise or light emissions from the site will arise.

5.6 Decommissioning and Reclamation

Trimper Construction will seek to complete a progressive decommissioning and reclamation program at the pit site. It is anticipated that all areas affected by the pit activities will be rehabilitated. In this program, only the area needed for excavation in a particular year would be cleared and grubbed. Organics and topsoil will be stockpiled in an unused portion of the pit and seeded for later use. Following the completion of aggregate extraction in distinct pit areas, slopes will be graded to a stable gradient (maximum 3:1). Contours will be established to reinforce existing drainage patterns. These inactive areas will be covered with topsoil and organics. Seeding and planting of native species may occur in cases where there is insufficient residual seed supply in the topsoil. Where seeding is required, seed mixes containing naturalized species which are well established in Nova Scotia will be used. Care will be taken to avoid aggressive, exotic, or invasive plant species.

A full reclamation plan will be developed for the proposed expansion and submitted to NSE as part of the Pit Development Plan. The reclamation plan will described the proposed final topography, maximum slopes, re-vegetation plans, alternate end uses for the property, and an outline for progressive reclamation of the site.

6. Valued Environmental Components and Effects Management

6.1 Methodology

As part of the preparation of the Environmental Assessment Registration for the proposed Undertaking, East Coast Aquatics Inc. (ECA) undertook a desktop review of existing information, reports and data sources. This included, but was not limited to, the following sources:

- Air photography and topographic site mapping'
- Nova Scotia Wet Areas Mapping,
- NSDNR Wetland Inventory,
- NSDNR Groundwater Map database,
- NSDNR Ecological Land Classification System,
- Consultations with local government officials, such as Mark Elderkin, NSDNR SAR Biologist,
- Maritime Breeding Bird Atlas,
- Statistics Canada,
- Environment Canada Climate Database, and
- Environment Canada Hydrometric data.
- Atlantic Canada Conservation Data Center

Ecological field studies were conducted by ECA between April and October 2011. The purpose of these studies was to investigate the existing conditions at the site and to determine appropriate mitigation, if necessary, to minimize environmental effects from the proposed Project. Surveys were undertaken by qualified individuals retained by ECA. Surveys were conducted for vascular plants, aquatic fauna, terrestrial fauna, avian fauna, fish habitat and archaeological resources (Table 2). In total, approximately 24 field days of effort were utilized in completing these studies.

The following sections describe the areas and times within which the Valued Ecosystem Components (VECs) are likely to interact with, or be influenced by, the Project. Both the temporal and spatial boundaries for the assessment vary according to the VEC. Temporal boundaries are generally limited to the duration of, and for a period of time after, the Project is active. Spatial boundaries are generally limited to the immediate Project area unless otherwise noted.

The spatial boundaries of the proposed Undertaking are shown in Figure 4 and follow the external property lines. The Study Boundary for this Environmental Assessment extends 800 m beyond the Project Boundaries (Figure 1). The desktop and field studies focused on the area described by the Study Boundary, to ensure that sensitive receptors around the periphery of the project area were identified and considered.

Table 2: Summary of 2011 Field Survey Activities

Field Survey Activity	Type of Survey	Survey Period	Field Surveys Completed by	Level of Effort (days)
Terrestrial and aquatic flora	Visual survey	June 8, August 12	Tom Neily	2
Herptofauna and Terrestrial mammals	Opportunistic visual surveys of individuals and signs	April to October	Mike Parker, Andy Sharpe	4
Wood turtle	Targeted visual survey in priority habitat	May 12, 17 & 21	Andy Sharpe, Mike Parker	1.5
Avian fauna	Area Surveys 10 min Point Counts	May & Sept. June & July	Wayne Neily	2 2
Surface water resources	Water quality & discharge measurements	May 5, June 8, 16, 23, Aug. 16, Oct. 7, 26	Andy Sharpe, Mike Parker	3
Fish and fish habitat	Quantitative Habitat Assessment, directed angling, visual surveys	May 5, 12, June 7	Mike Parker, Andy Sharpe	2
Wetlands	Visual survey, mapping of boundaries, evaluation of inputs and outflows	May to October	Mike Parker, Andy Sharpe, Tom Neily	2
Site assessments of proposed expansion areas and associated constraints	Visual survey	May to October	Mike Parker, Andy Sharpe	4
Archaeological Resource Impact Assessment	Onsite walk-over assessment	June	Shannon McDonnell, Laird Niven	2

To assess the potential environmental effects of the Project and to determine the significance of an effect, it is important to consider the magnitude, frequency, duration, geographical extent and reversibility of the potential effect. The study team has considered these elements for each VEC.

Species at Risk and Species of Conservation Concern

The 2011 field surveys were undertaken to both characterize the physical and biological features within the project site and ascertain the presence, or likelihood of presence, of species at risk (SAR). Published guidance was utilized to compile and examine data on SAR within the project footprint (Nova Scotia Environment, 2009b). Species information from the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), Species at Risk Act (SARA), Nova Scotia Endangered Species Act (NSESA) and Nova Scotia General Status of Wild Species was compiled. This information was combined with the results of a data search by the Atlantic Canada Conservation Data Centre (ACCDC) of flora and fauna occurrences within a 100 km radius of the project site. Additional data sources included the Nova Scotia Significant Species and Habitats database. This process allowed

the development of a short list of SAR that may occur within the project footprint (Appendix 3). This short list was then used to guide the development and implementation of the field surveys. The findings of the field surveys are contained in the following sections. Section 6.8 summarizes information on Species at Risk and species of conservation concern encountered, and proposed mitigation strategies to limit negative impact on these species.

6.2 Terrestrial Flora

Description of Existing Conditions

The vegetation survey was conducted by Thomas Neily. Mr. Neily is an experience field botanist, who has worked extensively throughout Atlantic Canada. His experience includes wetland classifications, vascular plant surveys, evaluation of rare and endangered flora, and identification of lichens.

Vegetation surveys were conducted at the site of the proposed Trimper pit expansion during the summer of 2011. Two visits were made to the site; an early season visit on June 8 and a late season visit on August 12. The purpose of the two surveys was to ensure that all species were captured based on their phenological characteristics. The survey method consisted of walking the site to identify the plant communities and maintaining a species list. When a plant community was encountered, images were taken and a running list of species maintained for each community. Aerial photographs and mapping were used to help identify habitats. Initial work on the site had previously identified wetlands. Wetland plants and habitats are discussed further within this document in Section 6.7 – Wetlands.

Six natural plant communities within two general habitats were surveyed within the Project Study Area. Plant communities are groups of plants that are supported by uniform habitat conditions that repeat across the landscape in predictable and quantifiable ways. The two general habitats observed within the Study Area were uplands and wetlands. Uplands consisted of three plant communities; mixed upland woods, hemlock ravine, and upland red pine forest. Wetlands consisted of an ericaceous shrub bog, a wet black spruce forest, and a brook side deciduous woods / alder thicket that was classified along portions of Bald Hill Brook.

In total, seven species of conservation concern were observed through the vegetation surveys, although none were Species at Risk. One such species has a Provincial S2 ranking, a designation given to species that are rare throughout the Province. Six other species observed in the Study Area have a ranking of S3 indicating they are provincially uncommon. Species-at-risk and species of conservation concern are discussed further in Section 6.8. No alien invasive species were observed during the survey.

Mixed Upland Woods

As a result of previous wood harvesting a large area of young mixed woods was found in the south east side of the site (Photograph Appendix 4.5). Red Maple *(Acer rubrum)*, White Pine *(Pinus strobus)*, Balsam Fir *(Abies balsamea)* and Large-toothed Poplar *(Populus grandidentata)* form the upper canopy. A shrub layer consisted of Wild Raisin *(Viburnum nudum)*, Lambkill *(Kalmia angustifolia)* and Velvetleaf Blueberry *(Vaccinium myrtilloides)*. Herbaceous species commonly observed in this community were Wild Sarsaparilla *(Aralia nudicaulis)*, Bunchberry *(Cornus canadensis)*, Starflower *(Trientalis borealis)*, Painted Trillium *(Trillium undulatum)*, Shinleaf *(Pyrola elliptica)* and Wild-lily-of-the-valley (*Maianthemum canadense)*. A few individuals of White Baneberry *(Actaea pachypoda)*

were observed which have an S rank of S4.

Ericaceous Shrub Bog
A small wetland dominated by ericaceous shrubs was found east of the road (Photograph Appendix 4.6). Ericaceous shrubs observed were Common Labrador Tea *(Ledum groenlandicum),* Leatherleaf *(Chamaedaphne calyculata),* Rhodora *(Rhododendron canadense),* and Late Lowbush Blueberry *(Vaccinium angustifolium).* Shrubs included Mountain Holly *(Nemopanthus mucronatus),* Black Chokeberry *(Photinia melanocarpa)* and Wild Raisin *(Viburnum nudum).* Tree species observed were Red Maple *(Acer rubrum),* Black spruce *(Picea mariana)* and Grey Birch *(Betula populifolia).*

Wet Black Spruce Forest
An area of black spruce forest was surveyed at the north eastern corner of the Study Area, but outside of the Project Area (Photograph Appendix 4.7). This forest contained a number of wetland species including Three-Leaf Solomon's-Plume *(Maianthemum trifolium),* Mountain Holly *(Nemopanthus mucronatus),* Common Labrador Tea *(Ledum groenlandicum)* and Three-Seed Sedge *(Carex trisperma).* The wet conditions provide suitable habitat for the rare Southern Twayblade *(Listera australis)* (S2), which was located in this area.

Brookside Deciduous Woods/Alder Thicket
Bald Hill Brook, flowing through the Project Area, follows a low lying area where it enters the project properties in the southwest, and in an area east of the road that divides the Project Site (Photograph Appendix 4.8). Dominant trees included Red Maple *(Acer rubrum),* Yellow Birch *(Betula allegheniensis)* and Paper Birch *(Betula papyrifera)* and Red Oak *(Quercus rubra).* Cinnamon fern *(Osmunda cinnamomea)* was abundant. Other species included Speckled Alder (Alnus incana), Wild Sarsaparilla *(Aralia nudicaulis),* Evergreen Woodfern *(Dryopteris intermedia),* New York Fern *(Thelypteris novaeboracensis),* White Wood-Sorrel *(Oxalis Montana)* and Bladder Sedge *(Carex intumescens).* Wetland species along the brook included Swamp Aster *(Symphyotrichum puniceum),* Three-Seed Sedge *(Carex trisperma),* Marsh Bedstraw *(Galium palustre),* Swamp Jack-In-The-Pulpit *(Arisaema triphyllum),* Crested Shield-Fern *(Dryopteris cristata)* and Woodland Agrimony *(Agrimonia striata).* Aquatic species in the downstream reach of Ball Hill Brook included Large Water-Starwort *(Callitriche heterophylla)* and Small Yellow Water-Crowfoot *(Ranunculus gmelinii).*This later species is Provincially uncommon (S3). It was located approximately 200 m outside and to the east of the project footprint and the closest area of proposed pit development.

Hemlock Ravine
A hemlock ravine is found along Bald Hill Brook on the west side of the road dividing the Project Area. In addition to Hemlock *(Tsuga canadensis),* other tree species in this community were Striped Maple *(Acer pensylvanicum*), Red Maple *(Acer rubrum),* Yellow Birch *(Betula allegheniensis),* Sugar Maple *(Acer saccharum)* and American Beech *(Fagus grandifolia)* (Photograph Appendix 4.9). Herbaceous vegetation was sparse but commonly observed were Bearded Short-Husk *(Brachyelytrum septentrionale)* and Finely-Nerved Sedge *(Carex leptonervia)* as well as the ferns Lady-Fern *(Athyrium filix-femina),* Sensitive Fern *(Onoclea sensibilis),* Northern Beech Fern *(Phegopteris connectilis),* Northern Oak Fern *(Gymnocarpium dryopteris)* and Christmas Fern *(Polystichum acrostichoides).* Large Purple-Fringe Orchid *(Platanthera grandiflora)* was observed in a wet depression along the stream flowing through the ravine. It has an S rank of S3, meaning it is uncommon throughout the province.

Upland Red Pine Forest

The southern boundary of the site has an area dominated by Red Pine *(Pinus resinosa),* Red Spruce *(Picea rubens),* and White Pine *(Pinus strobus*) (Photograph Appendix 4.10). These species appeared to be mature, creating an open understory of young Balsam fir *(Abies balsamea),* Red Maple *(Acer rubrum)* and Trembling Aspen *(Populus tremuloides).* Herbaceous species included Common Wintergreen *(Chimaphila umbellata),* Greenish-Flowered Wintergreen *(Pyrola chlorantha),* American Pinesap *(Monotropa hypopithys)* and Checkered Rattlesnake-Plantain *(Goodyera tesselata).* This later species has a Provincial rank of S3, or uncommon, and was found within the 30m setback from water courses.

Potential Effects, Proposed Mitigation and Follow-up

In total, 146 species were identified in the six plant communities of the Project Area. A complete inventory is presented in Appendix 7. Of those plants, none are listed Species at Risk, although one is rare and six are uncommon within the Province, and therefore considered species of conservation concern. See Section 6.8 for more information on these species.

The project has the potential to adversely affect the identified plant communities to varying degrees. The Mixed Uplands Woods and Upland Red Pine Forest will be subject to direct habitat loss associated with site preparation and gravel removal. These communities are common throughout southwestern Nova Scotia. Given the scope of the proposed Undertaking and the phased remediation approach, the short-term loss of these plant communities in the regional context is not felt to be significant. Reclamation efforts will strive to maintain existing topography and drainage conditions which will facilitate the post-remediation establishment of these forest communities.

It is proposed that a 30 m buffer be established along Bald Hill Brook and around all wetlands. This mitigation measure will ensure that the Ericaceous Shrub Bog, Brookside Deciduous Woods/Alder Thicket, and Hemlock Ravine will not be directly impacted by site preparation and gravel extraction. These communities may though be subject to indirect effects through alteration of habitat conditions, including changes to microclimatic conditions (shading, humidity, exposure) and altered hydrologic regimes.

Standard mitigation measures will be employed to minimize the adverse effects of the Project on plant communities, including watering of Project Site roads to suppress dust that may accumulate on roadside vegetation, use of native soils from grubbed piles in site reclamation works, and the use of seed mixes free of noxious weeds during site reclamation. Where ever possible, seed mixes containing native plants will be used in site reclamation. If not available, seed mixes containing naturalized species which are well established in Nova Scotia and are not aggressive weeds in wetland and forest communities will be utilized.

In conclusion, assuming the recommended mitigation measures are employed, significant Project-related adverse effects on terrestrial flora are unlikely to occur.

6.3 Terrestrial Fauna

Description of Existing Conditions

Terrestrial fauna field surveys were conducted within the Study Area and across the six major plant communities, wetlands, watercourses, all property boundaries, and areas of active excavation. Field surveys were completed by Mike Parker and Andy Sharpe of East Coast Aquatics Inc.

Large and Small Mammals

Incidental observations of mammalian species were documented during all field survey activities between April and October 2011. No species-at-risk or species of conservation concern were noted during the field studies. Table 3 outlines those species that were confirmed within the Project footprint either visually or by sign (i.e. scat, footprints).

Table 3: Confirmed Mammalian species during 2011 field surveys.

Species	Common Name	ACCDC Provincial Ranking	NSDNR General Status
Odocoileus virginianus	White Tailed Deer	S5	Green
Procyon lotor	Raccoon	S5	Green
Canis latrans	Coyote	S5	Green
Erithizon dorsatum	American Porcupine	S5	Green
Tamiasciursus hudsonicus	American Red Squirrel	S5	Green
Castor canadensis	North American Beaver	N/A	Green

Given the diversity of upland and wetland habitats present in the Study Area, it is highly likely to provide suitable habitat for a wide range of terrestrial mammals. The habitats present could be suitable for species of conservation concern including Mainland moose, American marten, Fisher, and Southern flying squirrel. These species are discussed further under Section 6.8.

Herptofauna

Herptofauna were inventoried within the Project footprint through both targeted searches of appropriate habitat and through incidental observations. Assessed habitat included aquatic habitats such as wetlands, streams and vernal pools. No herptofaunal Species-at-Risk or species of conservation concern were noted during the field studies. Table 4 outlines the species that were confirmed within the Project footprint either visually or by sign (i.e. egg masses).

Wood turtle

The Wood turtle (*Glyptemys insculpta*) is considered threatened by COSEWIC and SARA, vulnerable under the Nova Scotia Endangered Species Act, ranked S3 by the ACCDC and has been assigned a Yellow status (sensitive) by NSDNR. Wood turtles have been reported in 31 watersheds in Nova Scotia, occurring in western, central, northern and eastern portions of the province. Of these watersheds, only 18 have known and confirmed historical documentation of occupancy, with the

remainder being thought to be the result of human translocations.

These turtles are generally found in riparian areas and flood plains. The species has three key habitat components: streams and rivers, sandy nesting substrate and forested areas. Medium sized rivers and streams (2 to 30 m width) having a hard, gravel, or sandy substrate are considered ideal. Nesting occurs in sand or sand-gravel areas such as sand bars, sand points and riparian cutbanks. Particularly during the summer months, Wood turtles utilize shaded wet coniferous or deciduous flood plain forests and riparian areas for feeding and basking (MacGregor and Elderkin, 2003).

Table 4: Confirmed Herptofaunal species during 2011 field surveys

Species	Common Name	ACCDC Provincial Ranking	NSDNR General Status
Rana sylvatica	Wood frog	S5	Green
Rana palustris	Pickerel frog	S5	Green
Rana clamitan	Green frog	S5	Green
Bufo americanus americanus	American toad	S5	Green
Ambystoma maculatum	Yellow Spotted salamander	S5	Green

A review of the Nova Scotia Significant Habitat Mapping Database indicated species at risk polygons on the Black River to the east of the project footprint (Code #AP192) and as well as on the Annapolis River to the north and east of the project footprint (Code #AP99). A query of these codes indicated reports of Wood turtles. Given their spatial connection to the Project Area, specific searches were conducted for this species.

The Project footprint contains limited habitat suitable for Wood turtles. One small watercourse (Bald Hill Brook) passes through the project site, with a mean wetted width of 2.1 m and mean depth of 0.2 m. In the western upstream portion of the Project Area the watercourse has steep banks, a gradient of 1 to 3 %, and a cobble/bedrock substrate habitat that would not be typical of Wood turtle habitat. In the downstream eastern portion of the Project Area, Bald Hill Brook is bordered by a deciduous woods/alder thicket wetland that continues downstream beyond the eastern property boundary. This wetland has an area of approximately 5.83 ha. In this zone, the stream has a lower gradient with silt to muck substrate and meandering pattern. A field survey for Wood turtles was undertaken in this area, as it contained the most suitable habitat within the project footprint and greatest connectivity to the reported downstream occurrence of the species. Three geo-referenced visual search transects were established in this zone (Table 5).

Visual searches for Wood turtles were conducted on May 12th, 17th and 21st, 2011, on each of the three transects. During this period, leaves and ground-level vegetation had not yet fully emerged, allowing good visibility for the surveys. ECA utilized field staff with prior experience in Wood turtle visual surveys. Standard visual search methodology was employed. The total search time was 5 hours and 32 minutes, with 3687 linear meters of terrain covered. No Wood turtles were detected.

Table 5: Wood turtle search transects

Transect	UTM Start	UTM End	Length (m)	Location
1	341872 4976671	342228 4977014	507	North of Bald Hill Brook, from the access road at the main crusher area to the eastern property boundary
2	341890 4976652	342253 4976979	520	South of Bald Hill Brook, from the access road at the main crusher area to the eastern property boundary
3	342258 4976978	342395 4977109	202	South of Bald Hill Brook, in an eastward direction from the eastern property boundary

Zone 20T NAD83

It is worth noting that during the same time period, ECA undertook visual surveys for Wood turtles in the Sackville River watershed, as part of a different project. The same methodology and field staff were employed as with the Trimper surveys, under similar climatic conditions. A total of nine turtles were detected as part of the Sackville River project. It is known that the timing of habitat occupation can vary across the province and be subject to factors independent of local weather conditions. However, a member of the ECA field survey team had prior experience with Wood turtle surveys in the Kingston area, seven kilometres from the study site. The successful Kingston surveys were undertaken during a similar calendar period to the Trimper surveys. This, together with the comparable results from Sackville River, would suggest that the timing of the Trimper Wood turtle surveys were appropriate, as were the methodologies employed. From this, it can be concluded that there is a low likelihood that Wood turtles are utilizing habitat within the project footprint.

Potential Effects, Proposed Mitigation, Proposed Monitoring and Follow-up

No mammalian or herptofaunal species-at-risk were detected within the project footprint. All of the herptofaunal species observed were identified in wetland, watercourse or riparian habitats. As is noted elsewhere in this report, sand and gravel activities will be limited to a 30 m buffer around all watercourses and wetlands. Based on this, significant adverse environmental effects on herptofaunal species are unlikely to occur.

The mammalian species observed exhibit high abundance in a diversity of habitats throughout Nova Scotia. While extraction of sand and gravel activities may result in displacement from existing habitats, this impact would be short to medium term, given the reclamation activities proposed. It is therefore unlikely that any significant adverse effects will occur on mammalian species as a result of the proposed activities. The riparian buffer along Bald Hill Brook will also serve as a migration corridor across the middle of the Project Area. This corridor, along with undisturbed areas both immediately north and south of the Project Area, will facilitate movement of terrestrial species through and around the working area of the operation. Providing weekend and evening operation closures and seasonal operational slow down further mitigate the potential negative effects to terrestrial wildlife in the Project Area.

6.4 Avian Fauna

Description of Existing Conditions

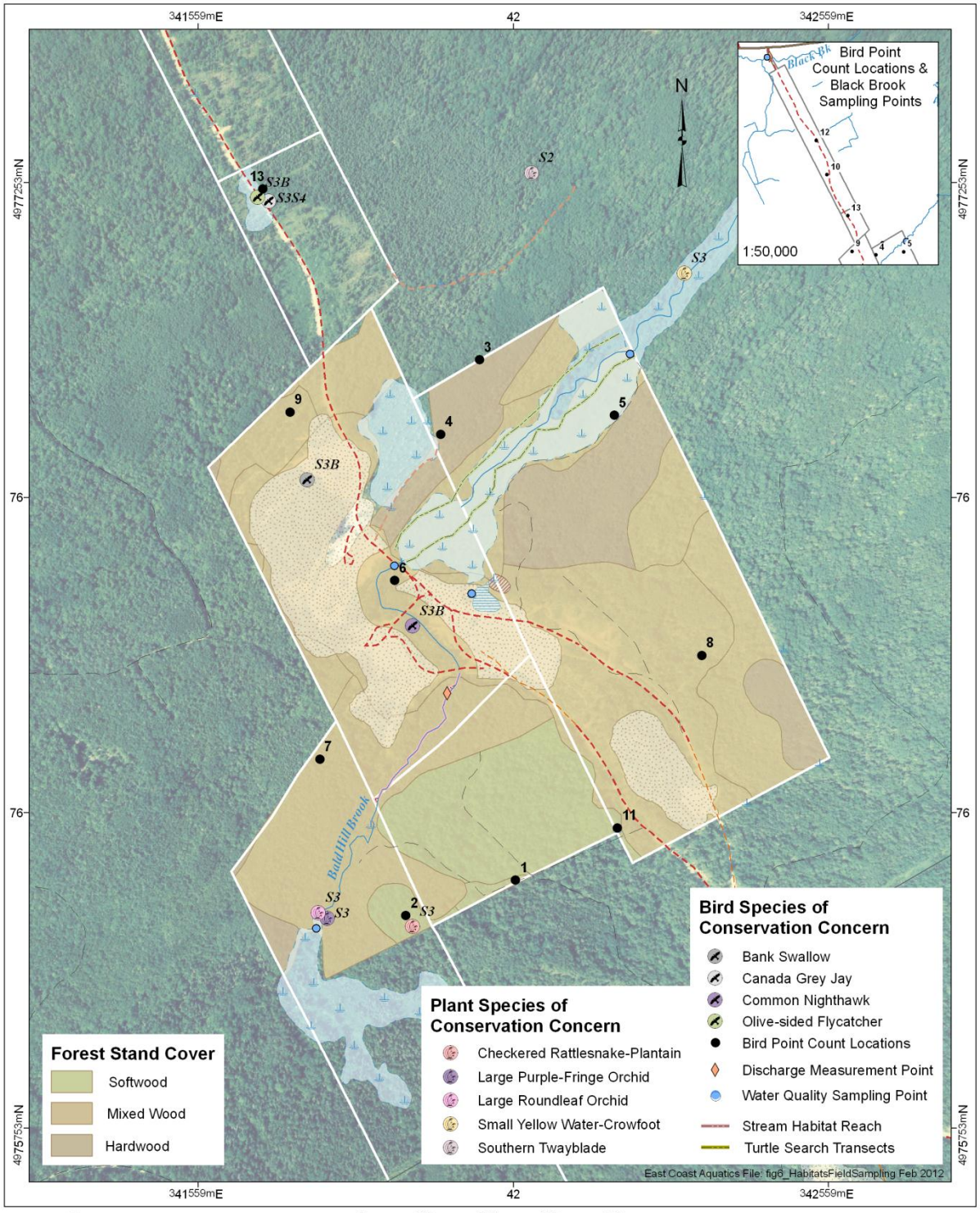
The survey methodology to evaluate avian utilization of the project site and its potential impacts on avian populations was developed based on a number of guidance documents (NSE 2009a, NSE 2009b, Maritime Breeding Bird Atlas (2011)) and discussions with Department of Natural Resources staff. The assessment included monitoring and evaluating bird presence in various forested and non-forested habitats and seasons. Figure 6 displays the location of Area Searches and 10- Minute Point Counts, as well as the various site habitats assessed during surveys.

Avian fauna studies were conducted by Wayne Neily, of Peregrine Heritage Services. Mr. Neily has extensive experience across Canada in the identification and documentation of avian species. In Nova Scotia, he has conducted migration and breeding bird inventories, and is an active participant in the Maritime Breeding Bird Atlas for sites surrounding the Project Area.

Area searches were conducted over two days in spring (May) and two days in autumn (September) 2011 to inventory the primary species of birds using the site during migration. The migratory period for southwestern Nova Scotia typically extends from March to early June, and from July to November. Within these periods, a variety of species can move through the area at different times, with most birds stopping in the area as migrants for as little as one to five days before moving on. Based on this, the above sampling program should be viewed as providing only a sampling of the migrants. Although most birds move through a variety of habitats in migration, an effort was made to sample all major habitats in the searches.

Point count surveys were utilized to detect the presence of avian species resident within the project footprint. A series of 10-minute point counts were completed in June and July 2011 at 13 different locations, with at least one survey point in each of the major habitats identified. Six point counts were repeated after a one-week break, to help detect species on territory. Point counts were typically completed between sunrise and 10:00 am, when bird song is greatest. One evening visit was also undertaken. The point count surveys were spread over six dates to maximize the opportunity of detecting individuals. Notes on evidence for breeding, as defined by the Maritimes Breeding Bird Atlas (2011), were completed for all field surveys.

Most of the habitat within the project footprint is mesic mixed forest of various species and sizes, depending mainly on soil, aspect, disturbance history, and age. Scarcer habitats present include a small area of mature red pine, a hemlock-covered slope, riparian mixed woods along Bald Hill Brook, and two areas of ericaceous shrub bog of different successional stages. More recently disturbed areas associated with the current pit operations form another habitat used by some species. Additional information on the seasonal results of Area Searches and Point County Surveys can be found in Appendix 5. A summary of the total species observed in or near the study area is contained in Table 6. In total, 66 avian species were identified within the project footprint.



East Coast Aquatics

Data Courtesy of:
The PROVINCE OF NOVA SCOTIA
Geonova 2011
Airphoto: NSGC 02326 92

0 100 200 300 400
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Universal Transverse Mercator (UTM) Projection, Zone 20
North American Datum (NAD83) 1983

Figure 6

Habitats and Field Sampling Sites

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Table 6: Inventory of avian species observed during 2011 Project Area point count and general area surveys.

English name	International (scientific) name	Status	Habitat	Highest breeding evidence
Canada Goose	*Branta canadensis*	C,M, LSR	10	FY
Ruffed Grouse	*Bonasa umbellus*	C, R	1, 7, 8	T
American Bittern	*Botaurus lentiginosus*	U, M	10	
Great Blue Heron	*Ardes herodias*	U, M	10	
Bald Eagle	*Haliaeetus leucocephalus*	U, M		
Sharp-shinned Hawk	*Accipiter striatus*	U, M	7, 9	
Broad-winged Hawk	*Buteo platypterus*	U, M, SR	7	H
Killdeer	*Charadrius vociferus*	U, LSR	9	DD (May)
Herring Gull	*Larus argentatus*	U, M		
Mourning Dove	*Zenauda macroura*	V, SR	1, 3, 4, 6, 7. 8. 9	T, FY
Common Nighthawk	*Chordeiles minor*	U, SR(?)	9	
Ruby-throated Hummingbird	*Archilochus colubris*	U, SR	4	H
Belted Kingfisher	*Megaceryle alcyon*	U, SR	9	V
Yellow-bellied Sapsucker	*Sphrapicus varius*	C, SR	6, 7	H
Hairy Woodpecker	*Picoides villosus*	C, R	2, 7	H
Northern Flicker	*Colaptes auratus*	V, SR	1, 4, 6, 7, 8	H
Pileated Woodpecker	*Dryocopus pileatus*	U, R	7, 9	H
Olive-sided Flycatcher	*Contopus cooperi*	U, SR	8	S
Eastern Wood=Pewee	*Contopus virens*	C, SR	1, 2,	S
Alder Flycatcher	*Empidonax alnorum*	U, M	9	
Least Flycatcher	*Empidonax minimus*	C, SR	1, 3, 6, 7	S
Blue-headed Vireo	*Vireo solitarius*	C, SR	1, 4, 6, 7, 8	A
Red-eyed Vireo	*Vireo olivaceus*	V, SR	1, 3, 6, 7	T
Canada (Grey) Jay	*Perisoreus canadensis*	U, R	8	H
Blue Jay	*Cyanocitta cristata*	C, R	6, 7	H
American Crow	*Corvus brachyrhynchos*	C, R	1	T
Common Raven	*Corvus corax*	C, R	1, 2	FY
Tree Swallow	*Tachycineta bicolor*	U, SR	10	H
Bank Swallow	*Riparia riparia*	V, SR, L	9	AE
Black-capped Chickadee	*Poecile atricapillus*	C, R	1, 8	T
Red-breasted Nuthatch	*Sitta canadensis*	C, R	7	H
White-breasted Nuthatch	*Sitta carolinensis*	U, R	1	A
Golden-crowned Kinglet	*Regulus satrapa*	M	6, 7	
Veery	*Catharus fuscescens*	C, SR	5, 7	S
Swainson's Thrush	*Catharus ustulatus*	C, SR	1, 2, 7	A
Hermit Thrush	*Catharus guttatus*	C, SR	3, 7, 8	S
American Robin	*Turdus migratorius*	V, SR	1, 4, 6, 7, 8	T
Grey Catbird	*Dumetella carolinensis*	U, SE, L	5	
Cedar Waxwing	*Bombycilla cedrirum*	C, SR	4, 7	H
Ovenbitd	*Seiurus aurocapillus*	V, SR	1, 2, 3, 6, 7, 8	T
Northern Waterthrush	*Parkesia noveboracensis*	U, SR, L	6	A
Black-and-White Warbler	*Mniotilta varia*	C, SR	1, 2, 3, 8	T

English name	International (scientific) name	Status	Habitat	Highest breeding evidence
Nashville Warbler	*Oreothlypis ruficapilla*	U, SR	7, 8	T
Common Yellowthroat	*Geothlypis trichas*	V, SR	1, 4, 5, 6, 7, 8	DD
American Redstart	*Setophaga ruticilla*	C, SR	1, 6, 7	S
Northern Parula	*Setophaga amerivana*	V, SR	1, 3, 4, 6, 7, 8	T
Magnolia Warbler	*Setophaga magnolia*	C, SR	1, 7	S
Yellow Warbler	*Setophaga petechia*	U, SR, L	4	S
Chestnut-sided Warbler	*Setophaga pensylvanica*	C, SR	1, 7, 8	S
Blackpoll Warbler	*Setophaga striata*	U, M	1	
Palm Warbler	*Setophaga palmarum*	U, M	9	
Yellow-rumped Warbler	*Setophaga coronata*	C, SR	7	A
Black-throated Green Warbler	*Setophaga virens*	C, SR	7	T
Scarlet Tanager	*Piranga olivacea*	U, SR	3	S
Song Sparrow	*Melospiza melodia*	C, SR	6, 8	S
Swamp Sparrow	*Melospiza georgiana*	U, SR	5	H
White-throated Sparrow	*Zonotrichia albicollis*	C. SR	1, 4, 7, 8	T
Dark-eyed Junco	*Junco hyemalis*	C, R	7	S
Rose-breasted Grosbeak	*Pheucticus ludovicianus*	U, SR	3, 6	S
Red-winged Blackbird	*Agelaius phoeniceus*	C, SR, L	10	T
Common Grackle	*Quiscalus quiscula*	C, SR, L	10	T
Purple Finch	*Carpodaceus purpureus*	C, R	4, 7	S
American Goldfinch	*Spinus tristis*	C, R	1, 7, 8	P
Evening Grosbeak	*Coccothraustes vespertinus*	U, R	1, 8	H

Notes

Status codes: C – common, L- local, M – migrant, R – resident (all year), SR – summer resident, U – uncommon, V – very common. Species listed as summer residents may be presumed to be present during parts of both migration periods, Some listed as migrants may be post-breeding wanderers.

Habitat Codes: 1 – Mixed Upland Forest; 2 – Upland Red Pine Stand; 3 – Mature Deciduous Stand; 4 – Sphagnum-Heath Bog (open); 5 – Riverine Swamp; 6- Mature Riparian Mixed Woods; 7 – Disturbed/Regenerating Mixed Woods; 8 – Ericaceous Bog; 9 – Recently disturbed areas (quarries, bare ground or weeds); 10 – Pond with marshy edges (on property but outside Study Area) –a result of earlier pit work, this is referred to hereafter as 'Trimper Pond'.

Breeding status codes follow those of the Maritimes Breeding Bird Atlas (Maritime Breeding Bird Atlas, 2011):

- H: Species observed in its breeding seasons in suitable nesting habitat
- S: Singing male(s) present, or breeding calls heard, in suitable nesting habitat in breeding season
- T: Permanent territory presumed through registration of territorial song, or the occurrence of an adult bird, at the same place, in breeding habitat, on at least two days a week or more apart, during its breeding season. Use discretion when using this code.
- V: Visiting probable nesting site
- A: Agitated behaviour or anxiety calls of adult
- P: Pair observed in suitable nesting habitat in nesting season
- DD: Distraction display or injury feigning
- FY: Recently fledged young (nidicolous species) or downy young (nidifugous species), including incapable of sustained flight.
- AE: Adult leaving or entering nest sites in circumstances indicating occupied nest
- M: Used for species likely present only as migrants

Surveys conducted during the spring migration identified a total of 162 birds from 47 species. The bird specie's most frequently observed during the spring migration period are presented in Illustration 1. Surveys conducted during the breeding season identified a total of 299 birds from 58 species. The most frequently observed species' during the breeding season are presented in Illustration 2. Surveys conducted during the autumn migration identified a total of 146 birds from 28 species. The most frequently observed bird species during the autumn migration period are presented in Illustration 3.

Illustration 1: Most frequently observed avian species during spring migration area search surveys.

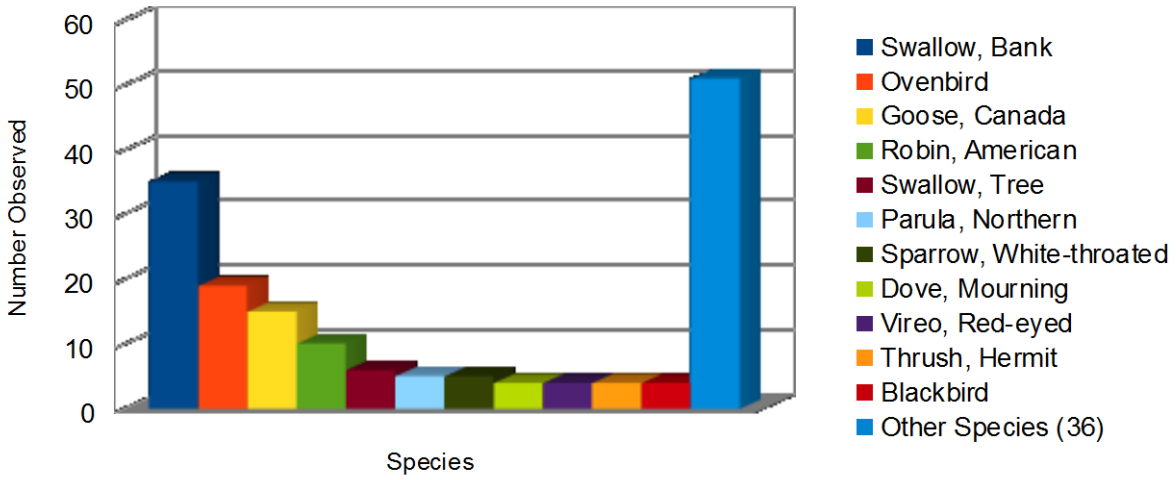

Illustration 2: Most frequently observed avian species during breeding season point count surveys.

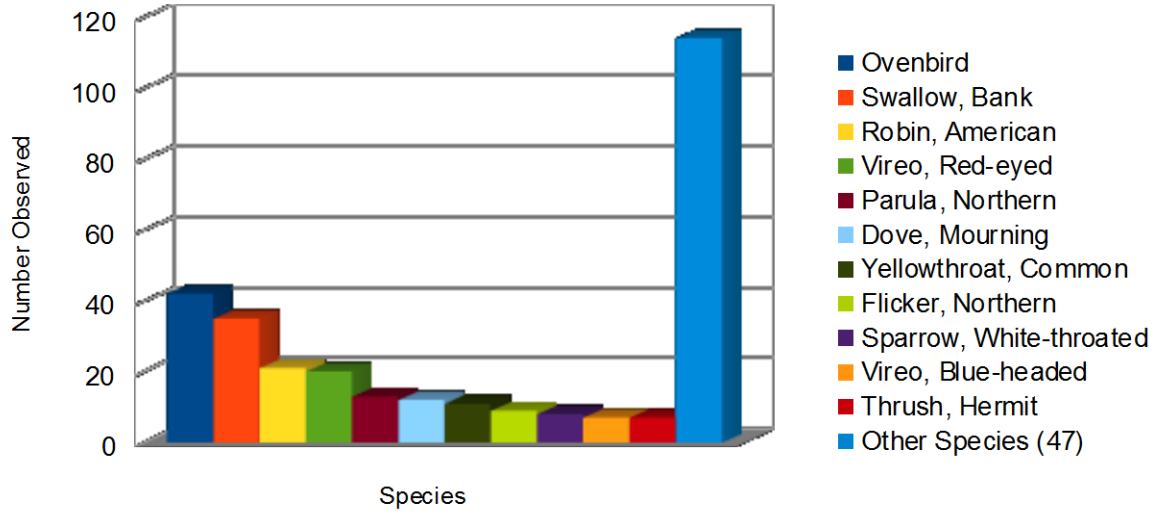

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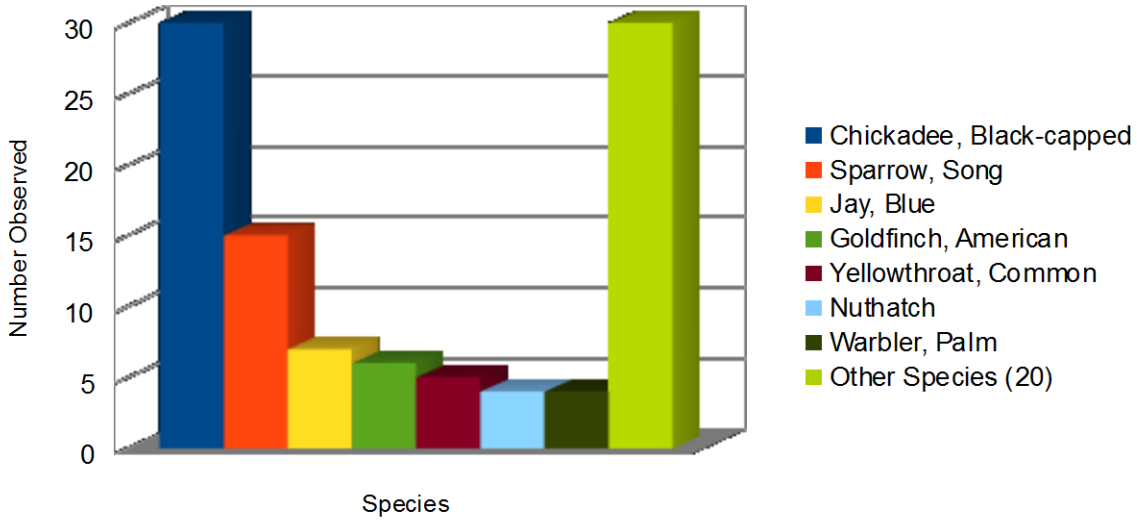
Illustration 3: Most frequently observed avian species during autumn migration area searches.



The results of the 10 minute Point Count surveys are compiled in Table 7. The locations of the individual Point Counts is shown in Figure 6. There was a significant range in the species diversity at the 13 locations, ranging from 5 to 19 species observed. The larch – spruce – heath bog (Location 13), located just outside and to the north of the Project Area along the access road to Highway 201, had the highest species diversity. Point Count Location 6, situated in a mixed wood riparian forest, is located in the middle of the current pit operation. Given the limited size of the habitat and adjacent operational disturbances in the form of noise, dust and heavy vehicle movements, it is encouraging to note the 11 species observed. This would suggest that the species present are able to accommodate nearby human activities. Avian species observed within each of the six major vegetation communities during the breeding season are summarized in Table 8.

Table 7: Summary of 10 minute point count observations (Locations shown on Figure 7)

Point Count Location	Habitat Type	Birds Observed (10 min Point Count – Average)	Unique Species Observed
1	Mature mixed forest	13	10
2	Mature Red Pine stand	10	6
3	Mature Deciduous Stand	9	8
4	Disturbed/Regenerating Mixed Woods	9.5	15
5	Disturbed/Regenerating Mixed Woods	5	5
6	Mature riparian mixed woods	8	11
7	Disturbed/Regenerating Mixed Woods	7	6
8	Disturbed/Regenerating Mixed Woods	11	10
9	Disturbed/Regenerating Mixed Woods	21	14
10	Disturbed/Regenerating Mixed Woods	10	6
11	Mature mixed forest	12.5	13
12	Mature mixed forest	10.3	17
13	Larch – Spruce – Heath Bog	9.3	19

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Table 8: Summary of breeding avian species observed in the six major vegetation communities.

Major Plant Community	Avian Species Observed During Breeding Season
Mixed Upland Woods	Ruffed grouse, Mourning dove, Least flycatcher, Red-eyed vireo, Hermit thrush, Ovenbird, Black-and-White Warbler, Northern parula, Pileated flycatcher, Common raven, Bank swallow, American robin, American redstart, Chestnut-sided warbler, White-throated sparrow, Dark-eyed junco, Purple finch, Nashville warbler, Northern flicker, Eastern wood pewee, Blue-header vireo, American crow, Black capped chickadee, White-breasted nuthatch, Magnolia warbler, Common yellowthroat, American goldfinch
Ericaceous Shrub Bog	Mourning Dove, Ruby-throated hummingbird, Northern flicker, Eastern wood pewee, Blue-headed vireo, Red-eyed vireo, American robin, Cedar waxwing, Ovenbird, Common yellowthroat, Northern parula, Magnolia warbler, Yellow warbler, White-throated sparrow, Purple finch, Canada (Grey) jay, Hermit thrush, Black-and-white warbler, Nashville warbler, American redstart, Ruffed grouse, Olive-sided flycatcher, Black capped chickadee, Chestnut-sided warbler, Song sparrow, American goldfinch, Evening grosbeak
Wet Spruce Forest	Yellow-bellied sapsucker, Norther flicker, Red-eyed vireo, Blue jay, Veery, American robin, Ovenbird, Common yellowthroat, American redstart, Northern parula,
Brookside Deciduous Woods and Alder Thicket	Mourning Dove, Yellow-bellied sapsucker, Norther flicker, Least flycatcher, Red-eyed vireo, Veery, American robin, Ovenbird, Northern waterthrush, Common yellowthroat, American redstart, Northern parula, Black-throated green warbler, Song sparrow,
Hemlock Ravine	Red-eyed vireo, Hermit thrush, American robin, Ovenbird, Black-throated green warbler, Dark-eyed junco
Upland Red Pine Forest	Blue-headed vireo, Red-eyed vireo, American crow, Common raven, Black-capped chickadee, American robin, Ovenbird, Northern parula, Hairy Woodpecker, Eastern wood pewee, Swainson's thrush, Black-and-white warbler, Mourning dove, Northern flicker, White-breasted nuthatch, Magnolia warbler, Chestnut-sided warbler

The colonial nesting Bank Swallow (*Riparia riparia)*, although not officially listed in Nova Scotia, has been declining sharply over the past decade. This trend has been observed with most other swallow species. The colony nesting in the active excavation of the Trimper pit northwestern working area is the largest known in this Maritime Breeding Bird Atlas square. Thanks to the cooperation of the property owner in avoiding disturbance of the faces of the sand pits used by the swallows during the breeding season, the species has successfully nested here for some years. Availability of suitable habitat is likely a limiting factor for the species, so the pit activity has a positive impact for them as long as the colony site and the vegetation above it are left undisturbed during June and July.

No birds of special concern were observed in the red pine stand community that had the low avian diversity typical of pine stands. These observations were probably accentuated by its small area. The stand did contain the only raven's nest, and with the adjacent mature white pine-mixed woods habitat, formed a habitat that could support a Northern Goshawk.

Two threatened avian species were the only bird Species at Risk observed in the study area during the 2011 season. A Common nighthawk (*Chordeiles minor*) was observed over the active pit on May 26.

An Olive-sided flycatcher (*Contopus cooperi*) was observed singing at point count 12 on July 5. A Canada (Grey) jay (*Perisoreus canadensis)* (NS General Status Yellow) is a species of conservation concern that was calling on the morning of May 26 at point count location 13. By definition, rare species are less likely to be encountered during brief surveys than more common species. It is therefore possible that additional rare species may occur within the project footprint, which could be detected with additional survey effort. Additional information on avian Species at Risk and species of conservation concern is presented in Section 6.8.

Potential Effects, Proposed Mitigation, Proposed Monitoring and Follow-up

The major impact of the proposed expansion to avian fauna is the direct loss of habitat. The importance of this has to be considered not only for the absolute loss but as a part of the cumulative impact of many small developments and clear-cuts reducing the available habitats of the region. The seriousness of such losses will depend on several factors, including a) the regional scarcity of the habitats in question, b) its importance to bird species present, c) the extent to which habitat can regenerate following pit operations, and d) the successional stage of the ecosystem. These losses, of course, need to be weighed against the value to birds of new habitats created by the proposed Undertaking.

Migration in the project area appears to be typical of that for the Annapolis Valley in general, and impacts would be proportional to regional habitat loss (or gain), since migrants over woodlands will stop in whatever feeding areas are available.

The removal of forest and soil cover, by whatever method, will have the most direct negative impact on all resident bird species. The exception may be for Bank Swallow and Belted Kingfisher, both of which dig nest holes in sandy soil or clay of cliff faces. Killdeer may also benefit from additional access to disturbed gravel and sand substrates during nesting periods. Timing habitat disturbance to avoid the breeding season of most birds observed at the site (late May to late July) will minimize the direct impacts on nesting birds, nearly all of which are protected by the Migratory Birds Convention Act. Therefore, grubbing and clearing of expansion areas will occur outside of the breeding season (May 1 to August 31). Although the direct impacts of habitat loss can not be fully mitigated, long-term recovery through terrain reclamation and natural regeneration will help, as will ensuring the progressive reclamation of areas where resources extraction has been concluded.

Mitigation measures will be employed to sustain the existing colony of Bank Swallows within the project footprint. Sand will be extracted and stockpiled each year in advance of the late May to late July nesting season. The stockpiled sand will be graded such that it does not provide suitable nesting habitat. This will provide Trimper Construction with a continuous supply of sand, without the need to disturb the nesting swallows. During the remainder of the year, normal sand extraction will occur, ensuring that there is suitable habitat available for the next season's nesting.

Protection of the strip of riparian habitat along the stream is important and may well be even more so as the operation expands. The proposed 30 m buffer strip allows for the survival not only of locally scarce plants, including mature hemlocks and ash, but of bird species found only in that zone, notably the Northern Waterthrush. It is noteworthy that point count 6, which is located in a riparian buffer strip and nearly surrounded by active pit operations, including rock-crushing and loading of trucks, had a good variety of birds, including a family of waterthrush that appeared to have been successfully raised there.

Although not quantifiable, it is possible that such "forested islands" within active operations provide habitats with reduced predator presence for some forest bird species.

This observation also indicates that the impacts of regular operations, including noise, dust, and disturbance, can be quite localized where there is a good vegetation buffer. The dust produced by the heavy truck traffic spreading into semi-open forest and bog habitats along the road is likely the most serious of these, and attention will be given to dust abatement to reduce this impact, especially during June and early July, when most young birds are in the nest.

Based on field observations, the most important area to consider for avian conservation would appear to be the late-successional bog on both sides of the road at Point Count location 13. The bog represents a scarce and slow-developing habitat, and hosted a good diversity of birds (19 species observed), including two of the three avian species of special concern (Olive-sided Flycatcher and Canada Jay). The habitat is potentially important for two other species of concern, the Rusty Blackbird and Boreal Chickadee, which were not observed during the 2011 surveys. There are no plans to alter the late-successional bog at Bird Point 13, as it falls outside that footprint for sand and gravel extraction, but it is on land owned by Ivan H. Trimper Ltd., being adjacent to the access road between the pit and Highway 201. In accordance with provincial policy, a 30 m buffer would be applied to the bog. Given the scarcity of the habitat and the biodiversity supported, it is suggested that the bog be classified as a conservation set-aside, with no further development occurring within its boundary.

Based on the implementation of the above mitigation measures, it is not anticipated that the proposed development will result in any significant adverse environment impacts to observed avian fauna species.

6.5 Surface Water Resources

Description of Existing Conditions

In order to establish a baseline, surface water quality and discharge observations were recorded at a variety of locations across the project site (Figure 6). Sample locations were chosen so as to document water quality in Bald Hill Brook where it enters the site at the western property boundary (Photograph Appendix 4.11), where Bald Hill Brook leaves the site at the eastern property boundary (Photograph Appendix 4.12), at two locations within the middle of existing pit operations (Wash Pond at Crusher, Bald Hill Brook at Weigh Bridge) and where the access road to Highway 201 crosses the Black River. Water quality measurements were recorded on six occasions during the May to October 2011 period. Surface water quality measurements were recorded using a Hach 2100 Turbidity meter, a Hydrolab Quanta multimeter, and a YSI ProPlus multimeter. A summary of water quality data for the five locations is shown in Table 9.

Surface water quality values observed at the project site are typical of those observed at other sites in the region. All values were within the Canadian Council of Ministers of the Environment (CCME) Canadian Water Quality Guidelines for the Protection of Aquatic Life (CCME, 2007). Dissolved oxygen values for the Wash Pond at the Crusher were elevated over what is typically observed in small ponds with little through flow. The Wash Pond is spring-fed, clear and cold. Photosynthetic activity in bright sunshine from large mats of blue-green algae was the likely source of the elevated dissolved oxygen values.

The cold, spring-fed water arising at the Wash Pond, together with other possible groundwater seeps in the area, are the likely cause of the lower water temperatures observed at eastern property boundary, downstream of the active pit area. The dense riparian canopy would be effective in conserving water temperatures. Turbidity levels were similar throughout the Study Area, with lower levels being observed at the spring-fed Wash Pond. Fields surveys documented a recreational ATV trail passing through Bald Hill Brook upstream of the active pit area, near the western property boundary. Use of this stream crossing may result in periodic elevated turbidity levels.

Table 9: Mean water quality results for surface water resources.

Location	Turbidity (NTU)	Water Temp. (°C)	pH	TDS (mg/L)	Specific Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	DO sat (% sat)
Bald Hill Brook at Western Property boundary (upstream)	3.96	13.7	6.9	0.07	67.0	9.36	85.7
Bald Hill Brook at Weigh Bridge	3.37	13.8	6.8	0.02	65.0	9.68	88.1
Wash Pond at Crusher	1.70	10.5	6.5	0.01	74.9	11.30	100.9
Bald Hill Brook at Eastern Property boundary (down stream)	2.18	11.1	6.5	0.01	71.6	9.26	82.0
Black River at Hwy 201 Access Road	2.54	14.7	6.7	0.10	105.5	9.40	87.1

Many watersheds in Nova Scotia have been adversely impacted due to decades of acid rain, with depressed pH values being observed in surface waters. Bald Hill Brook, like many sub-catchments in the Annapolis River watershed, has good pH values between 6.5 and 7.0. This is due to natural buffering provided by surficial and bedrock geology, including the Torbrook geological formation (Postma, 2011).

Overall, temperature, pH and dissolved oxygen at all the sample locations were in the range to support cold-water aquatic biota. Turbidity levels were relatively low and consistent across the project site.

Discharge measurements were recorded at two locations (Bald Hill Brook entering the site at the western property boundary, and Black Brook where it crosses the pit access road to Highway 201) on three occasions during the May to October 2011 period. A summary of these results are presented in Table 10.

Table 10: Minimum, maximum and mean discharge observations.

Location	Discharge (m^3/sec)		
	minimum	maximum	mean
Bald Hill Brook at Western Property boundary (upstream)	0.003	0.031	0.157
Black River at Hwy 201 Access Road	0.083	0.711	0.382

Potential Effects, Proposed Mitigation, Proposed Monitoring and Follow-up

The watercourse passing through the project site exhibited clear, flowing water and stream habitat capable of supporting aquatic life, when it was observed on several occasions in 2011. Bald Hill Brook is not known to interact with drinking water supplies of other protected surface waters. Potential impacts on surface water resources include diminished flow, and reduction in water quality due to introduction of contaminants, and sedimentation.

In order to mitigate potential impacts on surface water resources, a number of measures will be employed. A 30 m buffer between watercourses and gravel extraction areas will be utilized to limit the introduction of sediment and other contaminants. The maintenance of a vegetated riparian buffer will also provide shading to maintain low water temperatures. In accordance with the Pit and Quarry Guidelines, gravel extraction activities will not occur within one meter of the elevation of local groundwater, so as to limit impacts on base flow rates. There will be no equipment maintenance at the proposed site and no discharges of liquid effluents to water courses. All equipment refuelling will be carried out a minimum of 30 meters away from known watercourse features. An emergency spill response kit will be maintained on site during any refuelling operations. Industry-standard erosion and sediment control measures will be employed to limit the introduction of sediments to watercourses. The settling pond will periodically be cleaned in order to minimize the risk of sediment laden water being accidentally discharged to Bald Hill Brook. Based on these proposed mitigation measures, it is anticipated that there will be no significant adverse environmental effects to surface water resources as a result of proposed activities.

To ensure that there are no unforeseen impacts, a surface water monitoring program will be developed in conjunction with NSE. The principal water quality parameters of dissolved oxygen, temperature, conductivity, pH and turbidity will monitored on a regular basis. It is anticipated that the sample locations will continue to be upstream and downstream of the areas to be excavated. Samples will also need to be collected at the discharge from the settling pond. These discharges must comply with the effluent discharge limits set out in the Pit and Quarry Guidelines. Additional sample locations and parameters will be added as necessary to accompany development of the pit.

6.6 Fish and Fish Habitat

Description of Existing Conditions

Fish habitat resources within the project footprint are confined to a single first order watercourse (Bald Hill Brook), which originates in a wetland to the southwest of the project area and crosses the project area in an approximate southwest to northeast direction. Within the 41 ha project footprint, the linear length of the watercourse is approximately 1800 m. Bald Hill Brook flows into the Black River, which is a tributary of the Annapolis River.

The meandering upper reaches of Bald Hill Brook lie within an alder shrub wetland, are of low gradient, with wetted widths of 0.5 m to 0.7 m and sand/mud substrate. The mid-section of the brook passes through a hemlock ravine, with higher gradient and cobble to boulder/bedrock substrate. The lower section of the brook extends from an existing culvert crossing of the main access road to the eastern property boundary. This portion of the brook is of low gradient, passing through a deciduous woods/alder thicket wetland with depths of approximately 0.5 – 1 m and bankfull width of 1.5 m. Substrates are typically mud and organics through this lower reach.

No full barriers to fish passage were observed along the brook within the project footprint. The brook passes under three roads within the existing pit area via culverts. These may provide a partial barrier to fish passage under low flow conditions. Several spring seeps were observed within the pit area at the base of glacial sand and gravel deposits. In addition to receiving base flow from the headwater wetland, the watercourse also likely receives groundwater contributions via the course sand and gravel substrate in the area. These may be particularly important in maintaining base flow and temperature during summer months.

A quantitative aquatic habitat assessment was conducted on the mid section of Bald Hill Brook as shown in Figure 6. This stream reach is through the hemlock ravine (Photograph Appendix 4.13). Approximately 250 m of the watercourse was quantitatively surveyed on May 12, 2011, using the methodology described in East Coast Aquatics (2006). A summary of the results are presented below in Table 11. Air temperature on the day of the survey was 12 °C, with a water temperature of 7 °C. Riparian habitat in the reach surveyed was 77 % coniferous and 17 % mixed, being composed predominantly of mature forest. The average stream gradient through the reach was 2.6 %.

Table 11: Results of quantitative stream habitat assessment – Bald Hill Brook

Metric	Results from field assessment	Result Expected for Un-impacted Watercourses
Total length surveyed	248.4 m	N/A
Average bankfull depth	0.48 m	N/A
Average wetted depth	0.20 m	N/A
Average bankfull width	3.3 m	N/A
Average wetted width	2.1 m	N/A
Average residual pool depth	0.4 m	>0.8 m
Riffle/pool ratio	1.5:1	3:1
Average pool spacing	62 m	19.7 m (6 x bankfull width)
Percent total riffle length	68%	<50%
Total large woody debris	1.13 pieces/ bankfull width	>2 pieces/ bankfull width
Total large woody debris (10-30 cm)	0.75 pieces/ bankfull width	N/A
Total large woody debris (>30 cm)	0.38 pieces/ bankfull width	N/A

To aid in the characterization of the Bald Hill Brook, Table 8 also presents metric values which would be expected for un-impacted forested watercourses in Nova Scotia's Bay of Fundy region (East Coast Aquatics, 2006). From this comparison, it is evident that the mid-section of the brook passing through the Project footprint is not consistent with metrics expected for an un-disturbed watercourse. The

results are most consistent with streams that have experience some level of alteration in the past, most likely through logging activities. Upstream of the survey reach was evidence of both current and historic logging, and recreational ATV impacts. A section of bedrock controlled stream channel within the surveyed reach is expected to have influenced measures such as pool spacing and residual pool depth.

Downstream of the quantitative habitat survey reach, a small pond was identified approximately 100 m upstream of where Bald Hill Brook passes beneath the main access road at the weigh bridge. The pond has approximate dimensions of 18 m x 12 m and is in direct hydraulic connection with the watercourse (Photograph Appendix 4.14). Fish presence in the pond was assessed on June 7, 2011 by directed angling. Two Brook trout (*Salvelinus fontinalis*), with fork lengths of 22 cm and 15 cm, respectively, were caught and released in 15 minutes of angling (Photograph Appendix 4.15). One additional Brook trout was hooked but lost. Given the local surficial geology, groundwater flows likely create a cold-water refuge in the pond during summer months.

On May 5, 2011, a possible Brook trout, with an approximate length of seven centimetres, was visually observed on Bald Hill Brook upstream of the Hemlock ravine and quantitative habitat assessment reach. The gradient of the stream in this section flattens significantly, with a substrate of sand and silt and wetted width of 1.3 to 1.5 m. A 15 m section of this reach was also observed to have moderate impacts from All Terrain Vehicles (ATVs) passing through the stream corridor (Photograph Appendix 4.16).

A possible Stickleback was observed on May 5, 2011 in the small pond known as the Wash Pond. The pond has no surface inputs, but continuous discharge via a concrete spillway indicates that the pond is groundwater-fed. At the time of this observation, water pH was 6.0 and water temperature 10 °C.

Potential Effects, Proposed Mitigation, Proposed Monitoring and Follow-up

The quantitative aquatic habitat assessment of Bald Hill Brook indicates that some of the characteristics of an un-impacted watercourse are not present. Residual pool depths and pool frequencies are less than predicted and there is a lower amount of large woody debris within the stream channel. These findings are consistent with watercourses that have received some level of alternation, most likely through past logging activities. From the section of brook surveyed, plus observations made above and below the surveyed section, it can be concluded that Bald Hill Brook as it passed through the Project footprint is a moderately healthy aquatic system, although not in pristine condition. In many respects, the watercourse is similar to many other streams in Nova Scotia that have had some level of anthropogenic influence.

Potential effects from the proposed Undertaking on fish and fish habitat include sedimentation impacts from adjacent excavations, altered stream discharge due to alteration of groundwater inputs, restricted migratory passage through culverts, and alteration of aquatic habitat through the encroachment of excavations into the riparian zone.

In order to avoid these potential effects, a number of mitigation strategies are proposed.

- No additional stream crossings are planned for the proposed Undertaking. The three existing watercourse crossings are felt to be sufficient to proceed with the pit expansion.

- During any future maintenance replacement of culverts, fish passage will be maintained.
- No excavation activities will occur within the 30 m vegetated buffer along the watercourse. This will provide protection from sedimentation impacts and alteration of riparian habitat.
- Excavations will occur no lower than one metre above the local water table, so as to limit impacts on groundwater flows.
- No water abstraction wells are envisioned for the proposed expansion. Wash water will continue to be drawn, as needed, from the existing spring-fed wash pond.
- Aggregate excavations will be constructed so as to direct surface flows away from Bald Hill Brook and encourage natural infiltration.
- Industry-standard sediment and erosion control measures will be employed to control onsite runoff.
- The sediment settling pond associated with the wash area will be periodically cleaned to maintain adequate settling capacity.

Based on the above analysis, it is unlikely that there will be any significant adverse environmental effects arising from the proposed Undertaking on fish and fish habitat.

6.7 Wetlands

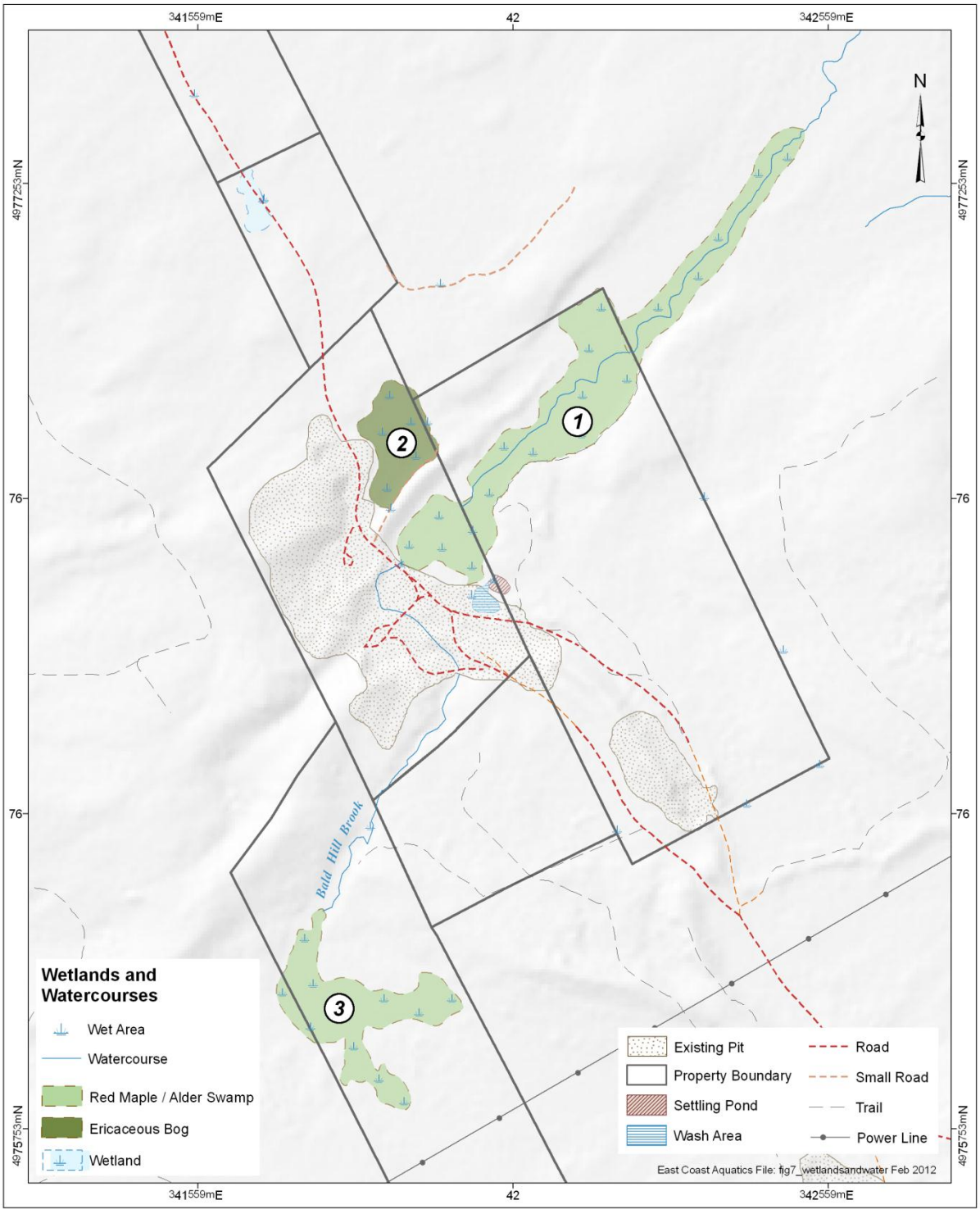
Description of Existing Conditions

Three wetlands were identified and mapped within the footprint of the proposed Undertaking, as were a number of smaller wet areas (Figure 7). Wet areas are those locations that exhibited some, but not all, of the characteristics of a wetland (dominant hydrophytic community, hydric soils, wetland hydrology). The wetlands were characterized according to the Canadian Wetland Classification System (Warner and Rubec, 1997). The three wetlands were depicted in the NSDNR Wetland Mapping Atlas, although the field verified boundaries varied moderately. The wetlands were surveyed in the summer of 2011 by ECA staff, with a preliminary delineation of the wetland boundaries on the proponent's properties being mapped with hand held GPS based on vegetation changes (Table 12) (Figure 7).

Table 12: Summary of wetlands on proponent properties and within proposed area of expansion

Wetland Number	Class - Form	Vegetation Type	ECA 2011 Field Survey Area* (ha)	Type	Vegetation Type	NSDNR Wetland Database Area (ha)
1	Riverine swamp	Red Maple - Alder	4.87+	Swamp	Treed – graminoid	11.48
2	Basin Bog	Ericaceous shrubs	1.46	Bog	Treed – aquatic vegetation	1.87
3	Riverine swamp	Red Maple - Alder	2.91+	Swamp	Treed	3.69

*only area within the proponent properties was mapped



East Coast Aquatics

Data Courtesy of:
The PROVINCE OF NOVA SCOTIA
Nova Scotia Department of Natural Resources
Mineral Resources Branch 2006
Geonova 2011

0 100 200 300 400
Metres

1:8,000

Universal Transverse Mercator (UTM) Projection, Zone 20
North American Datum (NAD83) 1983

Figure 7

Wetlands and Watercourses

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Wetlands 1 and 3 occur along the Bald Hill Brook, at the eastern and southwestern project boundaries, respectively. They have been previously described in this report as a brook side deciduous/alder thick community. Dominate trees included Red Maple *(Acer rubrum)*, Yellow Birch *(Betula allegheniensis)* and Paper Birch *(Betula papyrifera)* and Red Oak *(Quercus rubra).* Cinnamon fern *(Osmunda cinnamomea)* is abundant (Photograph Appendix 4.17 and 4.18). Other species included Speckled Alder (Alnus incana), Wild Sarsaparilla *(Aralia nudicaulis),* Evergreen Woodfern *(Dryopteris intermedia),* New York Fern *(Thelypteris novaeboracensis),* White Wood-Sorrel *(Oxalis Montana)* and Bladder Sedge *(Carex intumescens).* Wetland species along the brook included Swamp Aster *(Symphyotrichum puniceum),* Three-Seed Sedge *(Carex trisperma),* Marsh Bedstraw *(Galium palustre),* Swamp Jack-In-The-Pulpit *(Arisaema triphyllum),* Crested Shield-Fern *(Dryopteris cristata)* and Woodland Agrimony *(Agrimonia striata).* Aquatic species in the brook included Large Water-Starwort *(Callitriche heterophylla)* and Small Yellow Water-Crowfoot *(Ranunculus gmelinii).* This later species has an S rank of S3 and was located approximately 200 m outside and to the east of the project footprint, along Bald Hill Brook.

Wetland 2 is a small wetland dominated by ericaceous shrubs and located east of the main road running through the pit area (Photograph Appendix 4.19). Ericaceous shrubs observed were Common Labrador Tea *(Ledum groenlandicum),* Leatherleaf *(Chamaedaphne calyculata),* Rhodora *(Rhododendron canadense),* and Late Lowbush Blueberry *(Vaccinium angustifolium).* Shrubs included Mountain Holly *(Nemopanthus mucronatus),* Black Chokeberry *(Photinia melanocarpa)* and Wild Raisin *(Viburnum nudum).* Tree species observed were Red Maple *(Acer rubrum),* Black spruce *(Picea mariana)* and Grey Birch *(Betula populifolia).*

Field surveys identified a constructed ditch originating at the north east corner of the bog, approximately 2 m deep and 90 m long. The ditch appeared to have been in place for at least ten to twenty years, based on the vegetation re-growth on the banks. The ditch passes in an east - southeast direction through mixed woodland. The ditch was dry when observed on June 8th, 2011 (Photograph Appendix 4.20), and is classified as a drainage given the lack of exposed mineral channel or hydrophytic plant community. The drainage ditch may have resulted in the lowering of water levels in the bog, although this could not be confirmed at the time of the survey. Because of the relatively steep topographical transition from wetland to upland at this location, it is not believed that the total area of the wetland has been impacted by any potential drawdown in water levels associated with the constructed ditch. However, the plant community present may have been influenced by a hydrological change. It is recommended that the constructed ditch be filled to restore the former hydroperiod to the bog area.

The boundary of an ericaceous bog was preliminarily delineated and mapped with a handheld GPS unit approximately 200m north of the Project Area within the Study Area. This 0.29 ha bog did not undergo vegetation study, but was a Point Count study site for the 2011 avian monitoring. The project avian biologist indicated that of larch, spruce, and heath shrubs were dominant components of the plant community in this late successional bog. This slow developing habitat hosted a good diversity of avian fauna.

<u>Potential Effects, Proposed Mitigation, Proposed Monitoring and Follow-up</u>

Potential effects from the proposed Undertaking on wetlands include sedimentation impacts from adjacent excavations, alteration of hydrological functions because of alteration of groundwater/surface water inputs, and alteration of aquatic habitat through the encroachment of excavations into the

wetlands.

In order to avoid these potential effects, a number of mitigation strategies are proposed.

- No wetland alterations are planned for the proposed Undertaking.
- No excavation activities will occur within the 30 m vegetated buffer around the wetlands. This will provide protection from sedimentation impacts and habitat alteration.
- Excavations will occur no lower than one metre above the local water table, so as to limit impacts on groundwater flows.
- Aggregate excavations will be constructed so as to direct surface flows away from any adjacent wetlands and encourage natural infiltration.
- Industry-standard sediment and erosion control measures will be employed to control onsite runoff.

Based on the above analysis, it is unlikely that there will be any significant adverse environmental effects arising from the proposed Undertaking on wetland habitats.

6.8 Species at Risk and Species of Conservation Concern

Table 13: Species at Risk reported within 5 km of Project Site.

Common Name	Scientific Name	COSEWIC Status	SARA Status	NSESA Status	NS General Status	Prov. Rarity	Confirmed During Field Surveys
Eastern White Cedar	*Thuja occidentalis*	N/A	N/A	Vulnerable	N/A	S1S2	No
Common Nighthawk	*Chordeiles minor*	Threatened	Threatened	Threatened	Yellow	N/A	Yes
Olive-sided Flycatcher	*Contopus cooperi*	Threatened	Threatened	N/A	Yellow	N/A	Yes
Canada Warbler	*Wilsonia canadensis*	Threatened	Threatened	N/A	Yellow	N/A	No
Rusty Blackbird	*Euphagus carolinus*	Special Concern	Special Concern	N/A	Yellow	S3B	No
Bobolink	*Dolichonyx oryzivorus*	Threatened	N/A	N/A	Yellow	S3S4B	No
Perigrine Falcon	*Falco peregrinus anatum*	N/A	Threatened	Vulnerable	Red	S1B	No
Wood turtle	*Glyptemys insculpta*	Threatened	Threatened	Vulnerable	Yellow	S3	No

Description of Existing Conditions

Species at Risk

Within the context of this report, the term Species at Risk (SAR) is used to denote species that have

received some level of formal protection, typically through the Federal Species at Risk Act (SARA) or the Nova Scotia Endangered Species Act (NSESA). As was methodologically described in Section 6.1, a summary list of Species at Risk that may occur within the Study Area was prepared as part of the environmental assessment (Appendix 3). This summary was based on provincial (NS Endangered Species Act and General Status Listings) and federal (Species at Risk Act and COSEWIC) rankings, together with the results of search of the Atlantic Conservation Data Centre records (Appendix 3). This summary list was used to guide biological field surveys undertaken between April and October 2011, which are reported in the preceding sections. Those SAR reported as occurring within 5 km (including the ACCDC error range) of the Project Site are summarised within Table 13, together with an indication of those species confirmed within the Study Area during 2011 field surveys.

No Eastern White Cedar was encountered during either the terrestrial vegetation assessment or the other field surveys conducted in 2011. Given the extensive nature of these surveys, there is a high degree of confidence in the conclusion that Eastern White Cedar does not occur within the Project Area, although it is not uncommon on the north facing slopes of the south mountain in Annapolis County.

One Common Nighthawk (*Chordeiles minor)* was observed on the evening of May 26, over the active pit area, giving both its 'dzeet' call and the booming flight display at dusk. The species is most active at that time of day, and was not heard on the other evening visit of July 1. It is a late migrant, so, although the observed bird was trying its territorial display, it may have still been in migration. This species is one which favours nesting on open gravel ridges, so aggregate extraction activities may have positive impacts given operational considerations.

An Olive-sided Flycatcher (*Contopus cooperi)* was heard singing at point count 13, the *Picea-Larix* bog north of the Project Area, on the morning of July 5 in suitable breeding habitat. This species favours open areas with isolated trees or clumps of trees, as are found in late-succession bogs or regenerating burns.

Canada Warbler (*Wilsonia canadensi*s), was not seen, but might be expected to occur along the riparian habitat of the stream from time to time. The unobserved Rusty Blackbird (*Euphagus carolinus*), favours habitat like the bog at point count 13, but may require a larger extent of this habitat type to encourage regular use.

The Bobolink (*Dolichonyx oryzivorus*) nests in open grassy areas, such as fields and agricultural areas. Very little, if any, of this habitat type exists in the Project Area, and therefore the Boblink's presence was not anticipated or observed. Within 5 km of the Project Area are extensive agricultural areas in the central Annapolis Valley, which would provide suitable habitat.

The Perigrine Falcon (*Falco peregrinus anatum*) is thought to nest on the steep ledges and cliffs along the Bay of Fundy shore. Perigrine falcons may utilize habitat over the Project Area for hunting and cruising, although no observations of this species were made during the 2011 field surveys.

As the Nova Scotia Significant Habitat Mapping Database indicated the possible presence of Wood turtles on the Black River, a dedicated search was conducted. No Wood turtles were observed. For additional information on the search methodology employed, see Section 6.3 above.

Species of Conservation Concern

Within the context of this report, the term species of conservation concern is used to denote species that, while not having received formal legislative protection through SARA or the NSESA, are recognized by government agencies or the scientific community as requiring close observation as they may become at risk. Species identified by the Committee on the Status of Wildlife in Canada (COSEWIC) and the Nova Scotia General Status as "Red" or "Yellow" are included in this definition. Those species of conservation concern reported as occurring within 5 km (including the ACCDC error range) of the Project Site are summarised within Table 14, together with an indication of which species were confirmed in the Study Area through the field surveys. ECA, through the course of the field surveys, identified a number of species which due to their rarity or potential vulnerability are also included in this list.

Table 14: Species of conservation concern reported within 5 km of Project Site

Common Name	Scientific Name	NS General Status	Prov. Rarity	Confirmed During Field Surveys
Southern Twayblade	*Listera australis*	Red	S2	Yes
Large Purple-Fringe Orchid	*Platanthera grandiflora*	Green	S3	Yes
Small Yellow Water-Crowfoot	*Ranunculus gmelinii*	Green	S3	Yes
Large Roundleaf Orchid	*Platanthera orbiculata*	Green	S3	Yes
Checkered Rattlesnake-Plantain	*Goodyera tesselata*	Green	S3	Yes
Early Coralroot	*Corallorhiza trifida*	Green	S3	Yes
Ill-Scent Trillium	*Trillium erectum*	Green	S3	Yes
Downy Rattlesnake Plantain	*Goodyera pubescens*	Red	S1	No
Sleepy Catchfly	*Silene antirrhina*	Red	S1	No
Wild Leek	*Allium tricoccum*	Red	S2	No
Wood Anemone	*Anemone quinquefolia*	Yellow	S2	No
Pinebarren Golden Heather	*Hunsonia ericoldes*	Yellow	S2	No
Blue Cohosh	*Caulpphyllum thalictroides*	Red	S2	No
Cut Leaved Coneflower	*Rudbeckia laciniata v. Gaspereauensis*	Yellow	S2	No
Narrow Leaved Panic Grass	*Dichanthelium linearifolium*	Yellow	S2?	No
Dudley's Rush	*Juncus dudleyi*	Yellow	S2?	No
Swan's Sedge	*Carex swani*	Yellow	S2S3	No
Canada (Grey) Jay	*Perisoreus canadensis*	Yellow	N/A	Yes
Northern Goshawk	*Accipiter gentilis*	Yellow	S3S4	No
Boreal Chickadee	*Poecile hudsonicus*	Yellow	N/A	No
Purple Sandpiper	*Calidris maritima*	Yellow	S3M, S3N	No
Vesper Sparrow	*Pooecetes gramineus*	Yellow	S2B	No

Common Name	Scientific Name	NS General Status	Prov. Rarity	Confirmed During Field Surveys
Eastern Bluebird	*Saialia sialis*	Yellow	S3B	No
Bank Swallow	*Riparia riparia*	N/A	N/A	Yes
Fisher	*Martes pennanti*	Yellow	S2	No

A population of Southern Twayblade was located in the northeast corner of the Study Area. *Listera australis* is listed as S2 (rare) and typically occurs in bogs and semi-open areas. The population occurs some 200 m outside the Project Area, on a neighbouring property.

The populations of Large Purple-Fringe Orchid (S3/Green) and Large Roundleaf Orchid (S3/Green) occur in the southwestern corner of the project footprint. Both were located along the deciduous wood/alder thicket wetland - Bald Hill Brook watercourse corridor within the 30m setback.

The population of Small Yellow Water-Crowfoot (S3/Green) occurs outside and to the east of the Project Area, along Bald Hill Brook. Given the physical separation of this population from the areas to excavated, it is unlikely to be adversely impacted.

The population of Checkered Rattlesnake-Plantain (S3/Green) occurs near the southern property boundary in an area of red spruce upland forest that falls within the 30m property boundary setback.

A Canada (Grey) Jay was heard calling at point count 13 on the morning of May 26, from both the semi-open area of treed bog on the west side of the road and the denser *Picea-Larix* woods on the east side. This area is slightly north of the Project Area (>250m). This is a species more typical of the extensive, mainly coniferous, forests that once covered much of the interior of Nova Scotia, and it has likely always been scarce in the Annapolis Valley. Now that much of that forest type has been cut, bogs with larger larch and spruce that can not easily be harvested remain as reservoirs for such species. This jay is largely non-migratory, and likely did nest in this area. It is a very early nester, however, and the young should have been flying by late May, which might explain its absence on later visits to that site.

At least two of the other NS yellow-listed species, Northern Goshawk and Boreal Chickadee, might be expected to occur here occasionally, but the habitats across the Project Area are not likely to be important for them.

The colonial nesting Bank Swallow, although not officially listed in Nova Scotia, has been declining sharply over the past decade. This trend has been observed with most other swallow species. The colony nesting in the active excavation of the Trimper pit north western working area is the largest known in this Maritime Breeding Bird Atlas square. The pit operators have been aware of the nesting and avoiding disturbance of the faces of the sand pits used by them during the breeding season. They are known to have successfully nested here for some years. Availability of suitable habitat is likely a limiting factor for the species, so the pit activity has a positive impact for them, as long as the colony site and the vegetation above it are left undisturbed during June and July.

Potential Effects, Proposed Mitigation, Proposed Monitoring and Follow-up

In total, two species at risk and nine species of conservation concern have been documented as occurring in the Study Area. Both species-specific and general mitigation measures are proposed to minimize the impacts to these species.

The population of Southern Twayblade occurs outside the Project Area, on a neighbouring property. While development activities on adjacent properties is beyond the scope of Ivan H. Trimper Construction Ltd., pit development activities will be set back 30 m from this property boundary to further minimizing potential impacts on this species.

Populations of Large Purple-Fringe Orchid and Large Roundleaf Orchid occur in the southwestern corner of the project footprint. Both species were located along the wetland/watercourse corridor. The 30 m buffer applied to both watercourses and wetlands should ensure limited changes to the habitats for these species.

The population of Small Yellow Water-Crowfoot occurs >150 m outside and to the east of the Project Area, along Bald Hill Brook. While development activities on adjacent properties are beyond the control of Ivan H. Trimper Construction Ltd., pit development activities will be set back 30 m from this property boundary and from Bald Hill Brook as it flows through the Project Area. Given the physical separation of this plant population from the areas to excavated, it is unlikely to be adversely impacted.

The population of Checkered Rattlesnake-Plantain occurs near the southern property boundary in an area of red spruce upland forest. In order to mitigate the potential impacts to this species, a 30 m buffer is proposed around the know location of this species to prevent disturbance of the plants and their adjacent habitat.

The Olive-sided Flycatcher and Canada (Grey) Jay were identified in a bog outside the Project Area, adjacent to the main access between the pit and Highway 201. This bog will not be subject to development activities. Given the avian fauna community identified at this location, it is proposed that the bog be identified as a conservation set-aside.

Mitigation measures will be employed to sustain the existing colony of nesting Bank Swallows within the project footprint. Sand will be extracted and stockpiled each year in advance of the late May to late July nesting season. The stockpiled sand will be graded such that it does not provide suitable nesting habitat. This will provide Trimper Construction a continuous supply of sand, without the need to disturb the nesting swallows. During the remainder of the year, normal sand extraction will occur, ensuring that there is suitable habitat available for the next season's nesting.

Protection of the strip of riparian habitats along the stream is important both for Species at Risk and species of conservation concern that are present, for its influence on Bald Hill Brook stream habitat, and as a wildlife movement corridor. It is acknowledged that the significance of the functions provided by these habitats may increase as the operation expands. The proposed 30 m buffer strip will mitigate functional impacts and allow for the survival not only of locally scarce plants, but of bird species found only in that zone; notably the Northern Waterthrush.

Two additional mitigation measures to be employed that will minimize impacts on species of conservation concern include restricting the clearing and grubbing of new pit area to outside of the

avian breeding season (May 1 to August 31) and the phased site reclamation of previously mined areas that will limit exposed habitats and positively influence the rate at which disturbed areas will return to naturally functioning habitats.

Based on the implementation of the above mitigation measures, it is not anticipated that the proposed development will result in any significant adverse environment impacts to species at risk and species of conservation concern.

6.9 Groundwater and Geological Resources

Description of Existing Conditions

Within the context of this Environmental Assessment, the groundwater resource has been identified as a VEC because it provides potable water supply to approximately half of the total population of Nova Scotia, and to almost all of the un-serviced rural residences, including those in the vicinity of the Project Area.

In establishing the spatial boundaries for the assessment of groundwater resources, a number of factors were considered, including aquifer hydraulic properties, expected groundwater flow directions, and the distance between the proposed sand and gravel pit and wells that may be affected by pit activities. For example, a low yield domestic water well, typical of a rural residence, may have a capture zone of less than a 100 m radius. Within this zone, the area of greatest influence is that located hydraulically up-gradient of the well. Within this capture zone, the accidental spill of a contaminant, such as hydrocarbons from machinery, could affect well water quality.

The following discussion of the local groundwater resources, geology and hydrogeology is based on available data on the study area and did not include any water well or groundwater sampling and analysis, or groundwater depth measurements at specific wells.

The project site, being situated within the Annapolis Valley, experiences a climate that can be described as humid and temperate. Proximity to the Atlantic Ocean and Bay of Fundy prevents extreme temperatures. Given the climatic protection offered by the North and South mountains and moderating oceanic effect, the Annapolis Valley experiences the warmest temperatures and second lowest annual precipitation totals for the province. For the period 1971 to 2000, the annual precipitation for the project area was 910.4 mm/year, recorded at the nearby Greenwood climate station. Most of the annual precipitation in the area occurs between May and November, with the driest months being December to April (Environment Canada, 2011). Rivard *et al* (2007) estimated mean annual runoff for the project area to be 290 to 300 mm/yr. The maximum daily rainfall for Greenwood was recorded as 113.3 mm/day in August 1950. The minimum and maximum temperatures reported by Environment Canada (2011) for the 1971 to 2000 period are -35.5 °C and 37.2 °C.

As shown in Figure 8, the Study Area spans two ecodistricts, the Annapolis Valley and Valley Slope. The Annapolis Valley (610) ecodistrict is a linear feature approximately 130 km long and 3 to 11 km wide. Being sheltered from direct coastal influences by the North Mountain, the ecodistrict enjoys earlier springs, hotter summers and milder winters. Given these conditions, much of the land area has been utilized for agriculture, leaving little of the original forest. The Valley Slope (710) is characterized by a series of hills and slopes with a northwesterly aspect, bounded by the Annapolis

Valley and South Mountain ecodistricts. Soils tend to be coarse to moderately coarse, well drained and commonly gravelly (Neily *et al*, 2003).

Surfical Geology

The surficial geology of the Project Area (Figure 9) is characterized by kame and esker glaciofluvial deposits (Stea, 1992). The local topography is characterized by steep-sided mounds and hummocks, pitted terraces and sinous, steep sided esker ridges. The thickness of the material generally ranges from 4 to 6 m, although kame features can have depths up to 30 m, with eskers having depths of approximately 5 m. Rivard *et al* (2007) estimated surficial sediments in the vicinity of the project area to be approximately 20 m thick.

Approximately 700 m to the north of the Project Area, the surficial geology transitions to glaciafluvial outwash and fans that dominate much of the central Annapolis valley. Approximately 700 m to the south of the Project Area, the surficial geology transitions to a silty till plain.

Soils in the project area are described by Holmstrom and Thompson (1989) as belonging to the Herbert 86 group, these being rapid to well drained loose sandy gravelly to sandy-skeletal glaciofluvial sediments. Depths can exceed 80 cm, with this soil type being found with slopes ranging from 2 to 15%.

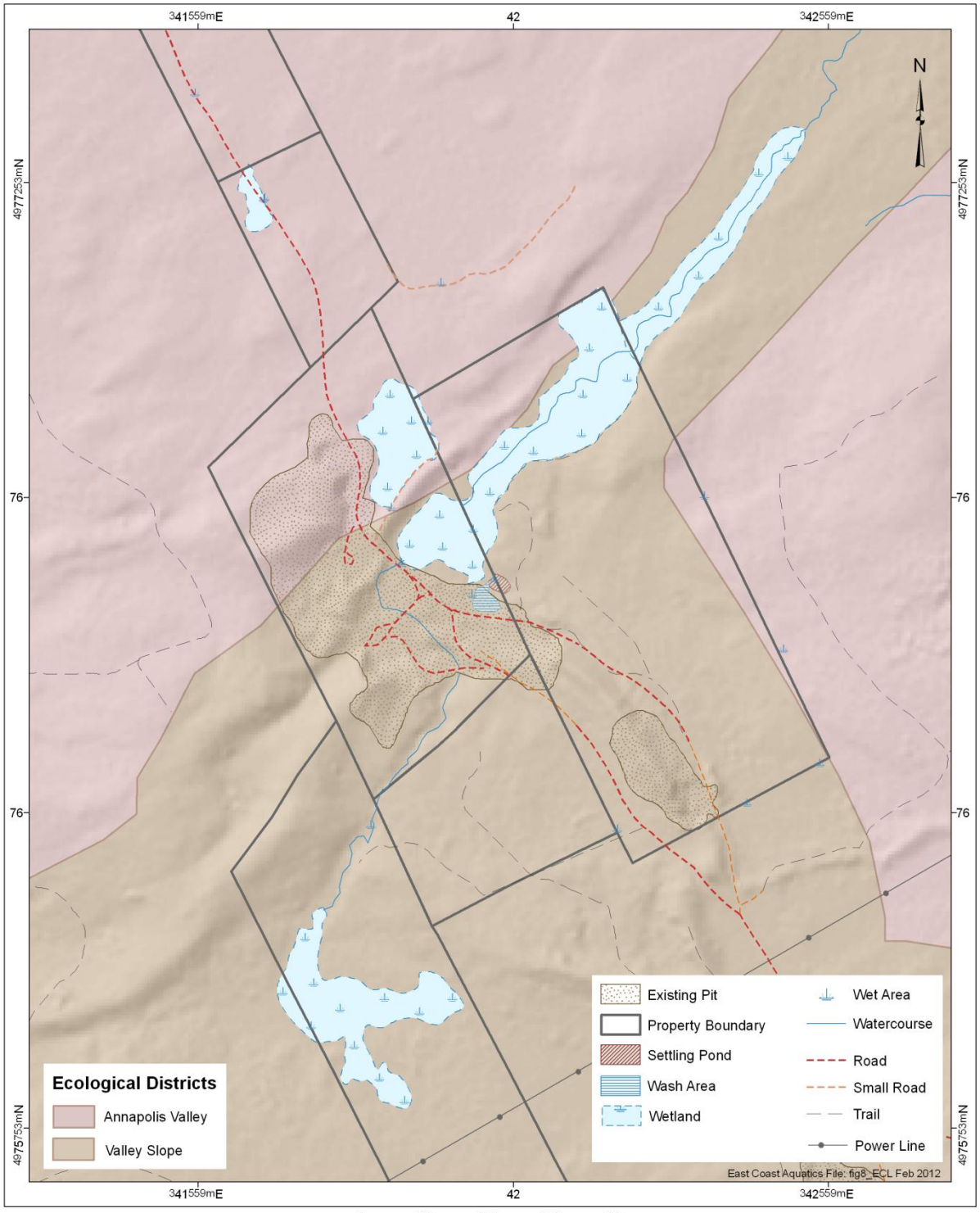
Acid rock drainage is the result of exposure of sulphide rich rocks to an oxidizing environment such as rain water, with the production of sulphuric acid. In the province of Nova Scotia, acid rock drainage is most commonly associated with slates originating from the Halifax Formation of the Meguma Group. The bedrock underlying the Trimper pit consists of Wolfville formation sandstones and the granitic South Mountain Batholith. The potential for the production of acid rock drainage from this area is low.

Bedrock Geology

The bedrock geology of the Project Area (Figure 10) is characterized by the Kentville Formation to the south and the Annapolis Formation to the North, with the northeast to southwest transition passing through the Project Area. The White Rock Formation is recorded as occurring at the junction of the Annapolis and Kentville Formations, in a southwesterly direction from the Project Area.

Abandoned mines/shafts

A review was conducted of the Nova Scotia Abandoned Mine Openings Database (NSDNR, 2009) as part of the research for the preparation of the environmental assessment. While there are no abandoned mine openings recorded as occurring within the project footprint, approximately 15 to 20 openings are recorded approximately 1 to 1.5 km to the southeast of the project site. The historic openings appear to occur on the boundary of the Kentville and Torbrook geological formations and were associated with iron ore mining in that area.



East Coast Aquatics

Data Courtesy of:
The PROVINCE OF NOVA SCOTIA
Nova Scotia Department of Natural Resources
Ecological Land Classification 2005
Geonova 2011

0 100 200 300 400
Metres

1:8,000

Universal Transverse Mercator (UTM) Projection, Zone 20
North American Datum (NAD83) 1983

Figure 8
Ecological Land Classification

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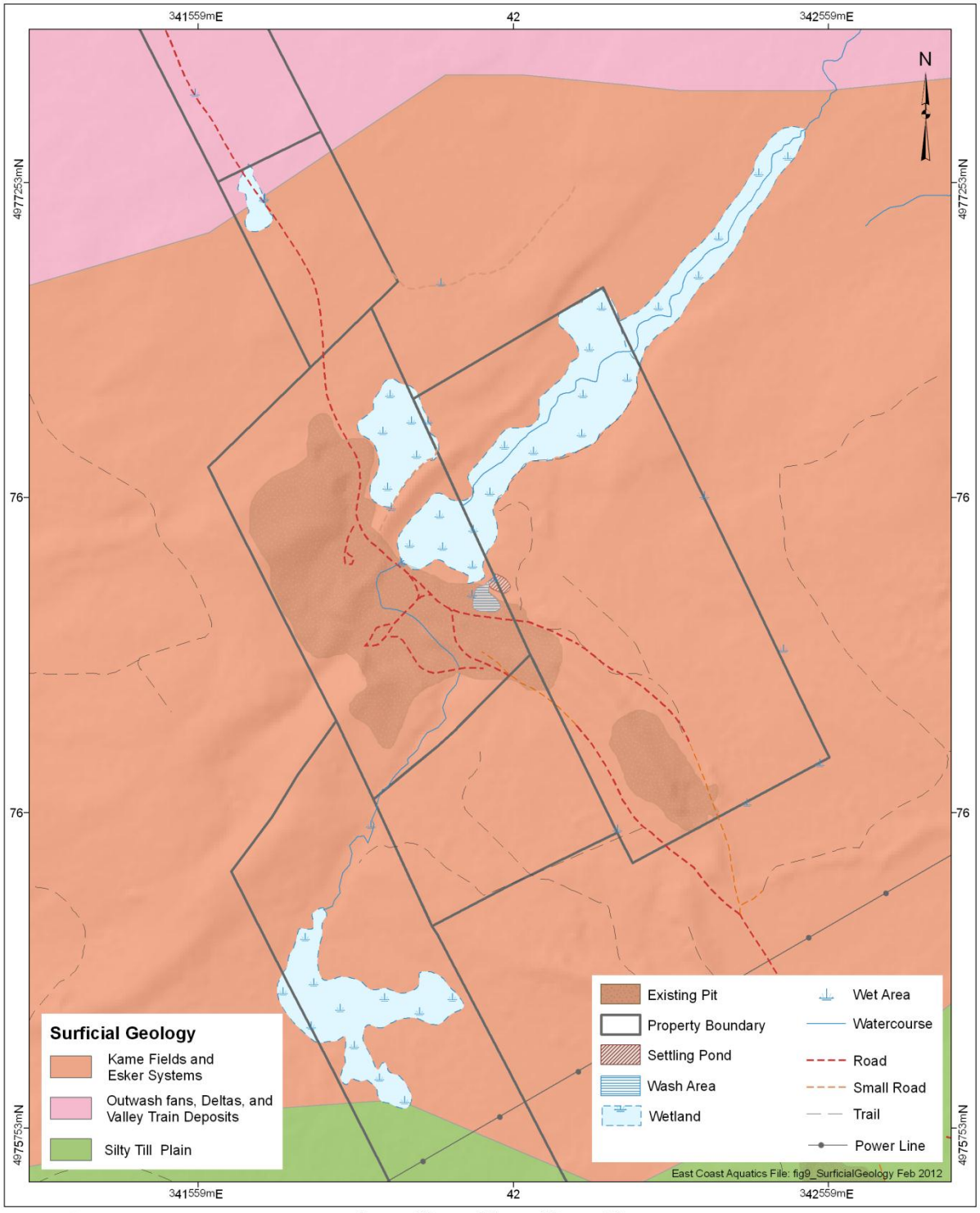

East Coast Aquatics

Data Courtesy of:
The PROVINCE OF NOVA SCOTIA
Nova Scotia Department of Natural Resources
Mineral Resources Branch 2006
Geonova 2011

Universal Transverse Mercator (UTM) Projection, Zone 20
North American Datum (NAD83) 1983

Figure 9
Surficial Geology

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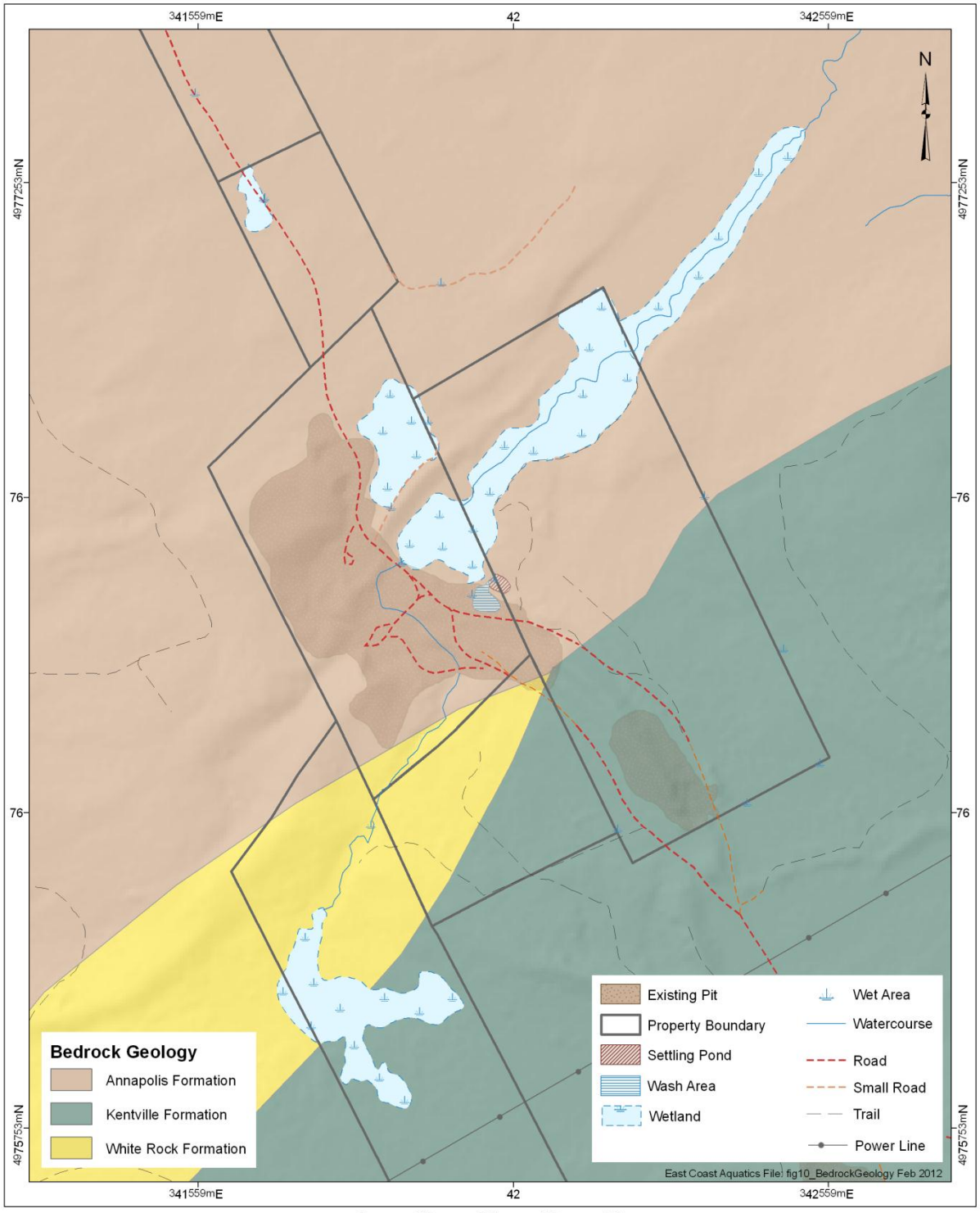

Figure 10
Bedrock Geology

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Hydrogeology

In general, groundwater flow patterns reflect surface topography. With the project site being located on the flank of the South Mountain, groundwater flow would be anticipated to be in a northerly direction, towards the Annapolis River. During 2006 and 2007, the Geological Survey of Canada (GSC) conducted survey and analysis work on the hydrogeological characteristics of the Annapolis Valley. Following a survey of wells, plus data from NSE well pump tests, Rivard *et al* (2007) concluded that the groundwater flow direction in the project area was to the north and northeast.

The GSC study examined the hydraulic properties of 157 wells in the Annapolis Valley to compile information on the distribution of hydraulic conductivities. Given the limited dataset available, the authors were not able to drawn extensive conclusions on the spatial pattern of conductivities. Bedrock hydraulic conductivities in the Middleton area were found to range from $<10^{-6}$ m/s to $>10^{-5}$ m/s. The highest K values were found in gravel and sand deposits (Rivard *et al*, 2007). Given the physical proximity of the Project Site to Middleton, the scale of the Rivard (2007) study and consistent geology between the two locations, it is likely that these values would be applicable to the Project Area.

A review of the Nova Scotia Natural Resources – Groundwater Maps and Database (DNR, 2011) indicated that there were no wells recorded as occurring within the Project Area. Three domestic wells were recorded as occurring within 800 m of the Project Area boundaries, with construction dates of June 17, 1999 (ID#990843), June 24, 1991 (ID#910922) and August 3, 1991 (ID#910928). The location of these wells was viewed as suspect, given that they are shown to occur in areas of continuous forest cover, with no residential development or roads in the vicinity. Furthermore, the stated UTM coordinates for the wells are quoted to the nearest 500, suggesting that the locations were determined manually from a map grid. Field surveys of the three locations found no evidence of wells. From this, it is concluded that an error exists in the UTM coordinates for the wells and that there are no wells within 800 m of the Project Area boundary. When the search radius was extended to 2000 m, 20 groundwater wells were identified. The depth to bedrock for these wells ranged from 1.52 to 58.7 m below the surface, with the mean depth to static water level being 13.8 m (minimum 3.04 m, maximum 39.58 m).

Town of Middleton Wellfield Catchment

The three groundwater wells which provide drinking water to the Town of Middleton are located approximately 4.5 km to the northwest of the Project Area. During 2007/8, the Town of Middleton developed a source water protection plan, which included the preparation of a hydrologic assessment of the local and regional groundwater conditions (CBCL, 2007, 2008). Four capture zones were delineated for the wellfield using a conservative hydraulic scenario. The outer most level, Zone 4, established the boundary at which a contaminant release would take at least 25 years to reach the wellfield. Zone 4 extends to the southeast of the wells approximately 1.0 km. The physical separation between the Project Area and the boundary of the Zone 4 is approximately an additional 3.5 km.

In assessing the potential impact of the proposed Undertaking on the Town of Middleton Wellfield, several factors must be considered. The authors of the Well Head Protection Plan acknowledge the conservative approach taken in establishing the boundaries of the capture zones (CBCL, 2007), with actual particle travel times being likely significantly greater than the suggested 25 years for Zone 4. The Protection Plan identifies those land uses which are not compatible with the various protection zones. Incompatible land uses for Zone 4 include landfills, dry cleaning facilities, metal shops,

automobile service shops, sewage disposal facilities, bulk salt storage, bulk storage of fuels and chemical, including pesticides and fertilizers (CBCL, 2008). The Plan indicates no limitations on pit extraction of surficial aggregates in Zones 3 or 4. The proposed Undertaking is located 3.5 km outside the boundary of Zone 4. No hazardous materials or hydrocarbon fuels will be stored on the site. The Town of Middleton wellfield draws principally from the Wolfville formation, at depths of 33 to 80 meters below ground level. In this area, the Wolfville formation is overlain by low permeability silt, clay and glacial till, providing confining conditions and isolating the aquifer from surface conditions. The proposed pit expansion will be limited to removal of surficial sand and gravels and will not intersect local groundwater. Based on the above factors, the likelihood of the proposed pit expansion having an impact on the Town of Middleton wellfield is very low.

Potential Effects, Proposed Mitigation and Follow-up

The potential environmental effects on groundwater resources from the proposed pit expansion include lowering of groundwater levels and degradation of water quality through an accidental release of deleterious substances such as hydrocarbons from pit operations. Aggregate extraction activities have been undertaken at the Ivan Trimper pit for approximately 20 years. During this period, there have been no known adverse effects reported on neighbouring wells or groundwater resources.

Vibration impacts diminish with increasing distance. Given that the Undertaking will be operated as a pit, with no explosives used, the expected vibration from on-site excavation machinery is expected to be minimal. Given the isolated setting of the pit, the physical separation to potential receptors would allow for the natural attenuation of any impacts. As there are no domestic groundwater wells within 800 m of the project site, the likelihood of there being a significant adverse effect on such a receptor is low.

A number of mitigation measures are proposed to further reduce the probability of adverse impacts on groundwater resources. Excavation of aggregate material will occur no lower than one metre above the local water table. No hydrocarbon fuels will be stored on site and a hydrocarbon spill response kit will be maintained on-site during operations.

Furthermore, at the request of NSE, a minimum of three groundwater monitoring wells will be established on-site to allow for depth to groundwater evaluation and to provide a means for retrieving groundwater samples for analysis.

In summary, given that large volumes of hydrocarbon fuels will not be held on-site, excavations will not intersect the local groundwater table and the significant physical separation between the site and neighbouring receptors, significant project-related effects on groundwater resources are not likely to occur.

6.10 Archaeology and Heritage Resources

Description of Existing Conditions

In May 2011, In Situ - Cultural Heritage Management Group (In Situ) was retained by East Coast Aquatics on behalf of Ivan Trimper to undertake a Phase I Archaeological Impact Assessment of the proposed Trimper Pit expansion. Representing In Situ, Shannon McDonnell (Heritage Research Permit

holder) performed this assessment in conjunction with the overall environmental testing for the proposed pit expansion. The fieldwork was conducted during the third week in June 2011 by the permit holder and was supervised by Laird Niven, owner of In Situ. The Archaeological Impact Assessment report is produced separately.

The Archaeological Impact Assessment was conducted according to the terms of Heritage Research Permit A2011NS50 (Category 'C'), issued by the Heritage Division - Nova Scotia Museum (HD NSM). The goal of the assessment was to evaluate archaeological potential within the proposed expansion area by conducting archival research and performing an on-site walkover assessment.

No heritage resources were identified during the archaeological investigation of the proposed Trimper Pit expansion area. While there is a small watercourse located within the study area, no evidence of First Nations settlement was found. A visual inspection confirmed that there are no areas in or around the vicinity of the watercourse that are typical of First Nations settlement patterns. This generally includes land that is relatively flat which contains a thin, younger forest. The Nictaux River is a larger watercourse located approximately 2.5 km to the West (Northwest and Southwest) of the Trimper Pit. As a navigable watercourse, the Nictaux River would have been a more probable First Nations or historic settlement area. There is also a lack of usable lithic material such chert, quartz and quartzite in or around the study area which is often an essential part of identifying a First Nations settlement site. For the reasons presented in this Phase I study report there is very low potential for this development area to contain any cultural heritage resources.

The Archaeological Impact Assessment report has been reviewed by Nova Scotia Communities, Culture & Heritage Division and found to be acceptable as submitted (Appendix 6). The review supported the recommendations arising from the assessment.

Potential Effects, Proposed Mitigation, Proposed Monitoring and Follow-up

Based on the Archaeological Resource Impact assessment the following recommendations have been applied to the expansion of the Trimper Pit: The continued expansion of the pit can be undertaken without archaeological monitoring due to the lack of evidence suggesting First Nations settlement or historical development. No cultural heritage resources were identified within the study area. The expansion of the Trimper Pit will not impact known archaeological sites outside of the study area. The proposed expansion can be done without further investigation or archaeological mitigation. The Nova Scotia Heritage Division agrees with the above recommendations with respect to the proposed Undertaking (Appendix 6).

6.11 Air Quality

Description of Existing Conditions

Air quality has been identified as a VEC due to its potential to adversely affect receptors, principally humans, in the project area.

Ambient air quality is monitored across a network of 13 locations in Nova Scotia, through a partnership of Nova Scotia Environment and Environment Canada. The principal air pollutants monitored include sulphur dioxide(SO_2), total particulate matter (TPM), particulate matter less than 2.5 microns in

diameter ($PM_{2.5}$), particulate matter less than 10 microns in diameter (PM_{10}), carbon monoxide (CO), ground-level ozone (O_3), nitrogen dioxide (NO_2), hydrogen sulphide (H_2S) and total reduced sulphur (TRS). The closest monitoring stations to the project site are Aylesford Mountain and Kejimkujik National Park (NSE, 2010).

Nova Scotia Environment Pit and Quarry Guidelines has established suspended particulate levels for air quality beyond the property boundary of pits (Maximum limit – 70 $\mu g/m^3$ annual geometric mean and 120 $\mu g/m^3$ average concentration over a 24 hour period) (NSE, 1999).

During pit operations, a number of internal combustion engines will be used to power equipment within the pit area. These include rock crushers, front end loaders, excavators, dump trucks, screeners and conveyors belts. All major pieces of equipment utilized diesel as the fuel source. Five to eight diesel engines would typically be operating simultaneously during typical pit operations.

Potential Effects, Proposed Mitigation, Proposed Monitoring and Follow-up

Extraction and transportation activities at aggregate pits have the potential to generate dust and airborne particulate emissions which could be transported offsite. Operations at the Trimper pit will comply with the NSE suspended particulate level limits described above. Dust emissions will be minimized through the use of course aggregate on road surfaces. Dust will further be controlled through the application of water, obtained from the on-site wash pond, to roads. Stockpiled overburden and topsoil will be seeded and/or covered with mulch to minimize dust generation. Exposed mineral areas will be reclamated based on a progressive schedule.

The operation of heavy equipment and vehicles at the project site will also generate combustion emissions. Given the scale of the proposed operations, these emissions are anticipated to be minimal and localized to the project footprint.

The Undertaking is located in a rural setting, with little industrial or residential development within 1200 m and a significant wooded buffer surrounding the site. The potential for project activities to give rise to an adverse air quality effect is considered to be low.

Monitoring of airborne dust emissions will be conducted at the request of NSE and in accordance with the Pit and Quarry Guidelines.

6.12 Noise

Description of Existing Conditions

Noise generated as a result of the project has been identified as VEC due to its potential impact on neighbouring receptors. The principal receptors of interest are terrestrial and avian fauna, as well as adjacent residences.

The Nova Scotia Environment Pit and Quarry Guidelines establish sound level limits that must be observed at the property boundaries of the pit (NSE, 1999) (Table 15).

Table 15: Leq sound level limits*

"Night"	"Evening"	"Day"
(23.00 to 07.00 hours, all day Sunday and Statutory Holidays)	19.00 to 23.00 hours	07.00 to 19.00 hours
55 dBA	60 dBA	65 dBA

Note: The equivalent sound level is measured in terms of dBA. The equivalent sound level, then, takes into account the major factors influencing the effect of noise on main, magnitude, frequency range, and time variation.

Potential Effects, Proposed Mitigation, Proposed Monitoring and Follow-up

A number of approaches will be employed to mitigate noise emissions from project activities. Operations at the Trimper pit will comply with the NSE noise-level limits described above. No blasting will occur as part of the proposed project. Typical hours of operation for the pit will be from 07:30 to 17:00, Monday to Friday. Occasionally, aggregate delivery will occur on Saturdays. Crushing of rock will occur Monday to Friday from 07:30 to 17:00. A treed buffer will be maintained around the project site. All engines used on site will be fitted with mufflers. Wherever possible, turning circles for truck movements will be employed, to minimize reversing and associated backup safety alarms (beepers). Rock crushing is likely the most significant noise source, and crushing will be limited to weekday daytime periods of operation. Currently, crushing occurs on an estimated 160 days a year, and this level of activity is not anticipated to fluctuate significantly.

The development and operations at the pit will produce noise as a result of equipment operation. As has been previously described, the project is sited in an area of mature forest, with a minimum of a 1200 m buffer existing to the closest residence. Sand and gravel activities have occurred at the site for approximately 20 years, with no noise-related impacts being recorded. When these factors are considered, the potential for project-related noise to have a significant effect on receptors is considered very low.

Sound level monitoring at the site will be conducted at the request of NSE.

6.13 Socio-Economic Environment

Description of Existing Conditions

Economy

The Ivan Trimper pit is located in the community of Torbrook, Annapolis County (Figure 1). The project site is located in Census Subdivision D of Annapolis County. Between 2001 and 2006, the subdivision's population decreased by 0.9% to 3,007 residents (Statistics Canada, 2006). The employment rate in the region is 50.8% and the unemployment rate is 14.6%. The comparable figures for the province of Nova Scotia are 57.2% and 9.1%, respectively. Predominant occupation categories within the region's labour force include: sales and service (30%), trades, transport and equipment operators (23%), and business, finance and administration (12%) (Statistics Canada, 2006).

The existing Trimper pit employs approximately11 to 12 individuals. Between 7 and 8 individuals work on a seasonal basis (May to December) in the pit area, with 3 to 4 operating the crusher and

loaders, and the balance driving dump trucks for the delivery of aggregate. The remaining individuals are employed on a continuous basis in the off-site maintenance shop (3) and general office (1). The proposed expansion of the Ivan Trimper pit will result in no change to employment levels. Aggregate excavation will continue at the existing rate and require a very similar workforce size and make-up. The proposed project will therefore secure long-term employment in a region with elevated unemployment rates. It is anticipated that the above employment levels will remain approximately constant during the pit development, operations and decommissioning phases.

Land Use and Value

The pit and proposed expansion are located in a rural area of Annapolis County. The population density for Annapolis County Census Subdivision D is 1.5 individuals per square kilometer (Statistics Canada, 2006). The predominant land cover in the area is mature Acadian forest, with the principal land use being timber extraction. The surrounding forested properties are privately held by both individuals and Bowater Mersey. There are no buildings or structures within 1000 m of the project site. The closest residence is approximately 1200m from the site. An electrical transmission line (Nova Scotia Power) is located 600 m to the southwest of the project-site.

Sand and gravel extraction has occurred at the site for approximately 20 years. The gradual increase in size of the pit has recently triggered the need for the project to be registered for an Environmental Assessment. Extraction activities at the pit will be consistent with previous efforts, that of a continued excavation of material followed by progressive remediation. No abrupt changes in land use are therefore anticipated.

A predominant land use on adjacent properties is timber harvesting. Properties to the west (Vienot PID 05059480), northwest (Thompson PID 05059688 and 05058334) and northwest (Todd PID 05210059) have all be subject to recent partial cutting. There was evidence of historic timber harvesting in the Study Area. Timber management practices, such as the establishment of Red pine cultivation, were also observed.

A small gravel pit exists in on an adjacent property to the south of the Project Area, operated by Lafarge (PID 05059514). The access road from the proposed Undertaking to Torbrook Road passes through the Lafarge pit.

The project site is located within the Municipality of Annapolis County's East End Municipal Planning Area. The property is currently zoned Agricultural (AG). The Future Land Use designation for this property is Agricultural (Municipality of Annapolis County, 2004).

Transportation

There are two principal means for accessing the project site: north on a gravel-surfaced track from Torbrook Road and south on a gravel-surfaced track from Highway 201. Both access roads are privately held by the project proponent. The access road via Highway 201 will be the principal route used for trucking of excavated material. The number of vehicles per day hauling material from the pit will be dependent on market condition. This usage though will be consistent with existing truck traffic levels from the pit. No significant increase in truck traffic on public roads is anticipated as a result of this project. These roads are subject to seasonal weight restrictions that potentially limit trucking of

product from the Trimper operation.

Recreation and Tourism
The project site is located in a rural area of Annapolis County. Recreation use of the area is generally limited to all terrain vehicle (ATV) use, hunting, and fishing. Usage of the project site for these activities is consistent with background levels of usage through much of rural Nova Scotia. A number of former woods roads and trails intersect the property. There are no known tourism destinations or parks in the vicinity of the project site.

Human Health
Human health effects of the proposed project are addressed under the Air Quality heading (Section 6.11).

Potential Effects, Proposed Mitigation, Proposed Monitoring and Follow-up

Economy
The expansion of the Trimper pit will support the continuation of 11 to 12 jobs as well as number of indirect jobs and their contribution to the local economy. Without the proposed expansion, it is likely that these jobs would be lost or reduced with the eventual closure of the pit. The securement of these positions is especially relevant in the Torbrook area given the elevated unemployment rate in the region.

The expansion of the Trimper pit will allow for the production of sand and gravel aggregates that support development, construction of infrastructure and the growth of the regional economy. The continued availability of a local supply of sand and gravel should encourage stable prices, allowing for a greater degree of predictability in pricing local construction project. There are no adverse impacts anticipated as a result of the proposed project.

Land Use and Value
There has been a long history of aggregate extraction at the project site, with no know land use conflicts. Given extensive forested buffer around the project site and the fact that no abrupt changes are anticipated in the rate of aggregate extraction, impacts on existing and future adjacent land uses are not anticipated.

Given the current Municipal Planning Strategy and Land Use By-Law for Annapolis County, it appears that the proposed project is inconsistent with the current and future land use designation as agricultural land. In Nova Scotia, municipal governments do not have the authority under the Municipal Government Act to control the locations of quarries and pits. Municipalities do though have the authority to control supporting structures, such as buildings, lay-down yards etc. (A. Dunphy, pers. com.). The zoning of the property is therefore not a barrier to proposed pit expansion. The project proponent will consult with the Municipality of Annapolis County with respect to any infrastructure necessary for the operation of the pit. All activities at the proposed expansion will be in accordance

with the Nova Scotia Pit and Quarry Guidelines, including the observation of all setback distances.

Transportation
Development of the proposed project is not anticipated to result in a significant increase in truck traffic on public roads, as trucking levels are expected to remain similar to current practice.

Recreation and Tourism
Given the rural setting for the proposed project, the limited recreational use in the area and separation distance between the site and principal recreation/tourism destinations, no adverse effects are anticipated on recreational or tourism resources. With the lack of streams and lakes in the project area, the proposed project is not expected to have an adverse effect on angling. While hunting is possible in the project area, the Project is situated on private land, with hunters requiring the permission of the land owner. Given the existing pit operations at the site, the proposed expansion is not anticipated to have an adverse impact on hunting.

Human Health
The proposed project may result in above background air-borne dust emissions, however, these impacts will be of short temporal duration and limited spatial scope. The project is not anticipated to significantly increase road traffic in the project area. A significant separation distance exists between the project site and neighbouring residences. Based on these considerations, the project is not anticipated to have any significant adverse effects to human health.

The Trimper aggregate pit has been in operation for approximately 20 years, with very few, if any, issues or complaints raised by neighbours. No issues were noted either through public consultation or by NSE staff. This is due to the relatively small scope of the operation, its physical separation from adjacent residences (>1200m) and the overall management of the pit. Given that the production rate and methods will remain essentially constant under the proposed Undertaking, it is unlikely that issues concerning water, dust, noise or light emissions from the site will arise.

6.14 Other Undertakings in the Area

The Proponent is aware several other pit and quarry operations licenced to operate within a 10 km radius of the Project. These are operated by: Dexter Construction, Nova Scotia Transportation and Infrastructure Renewal, Lafarge, and D.J. Lowe. The Proponent also operates a quarry on Bloomington Road. The Torbrook Construction and Demolition Disposal Site is located approximately 2.9 km to the southeast of the proposed Undertaking. Lafarge maintains an adjacent gravel pit operation along the southern boundary of the Trimper project site.

6.15 Summary of Proposed Mitigation Measures and VEC Impacts

Table 16 provides a summary of the proposed mitigation measures for the Undertaking, with respect to each of the Valued Environmental Components.

Table 16: Summary of mitigation measures

Valued Environmental Component	Mitigation Measures Proposed
Terrestrial Vegetation	⅄ Maintain a 30 m setback from property boundaries in the vicinity of known location of Southern Twayblade (*Listeria australis*). ⅄ Creation of a 30 m buffer around the known location of Checkered Rattlesnake Plantain (*Goodyear tesselata*). ⅄ Maintenance of a 30 m buffer between watercourses and areas cleared for aggregate extraction. ⅄ Maintenance of a 30 m buffer between wetlands and areas cleared for aggregate extraction. ⅄ Use of seed mixes free of noxious weeds during site reclamation. Native soils from grubbed piles will be used in site reclamation. Where ever possible, seed mixes containing native plants will be used in site reclamation. If not available, seed mixes containing naturalized species which are well established in Nova Scotia and are not aggressive weeds in wetland and forest communities will be utilized.
Terrestrial Fauna	⅄ Maintenance of a 30 m buffer between watercourses and areas cleared for aggregate extraction that will serve as a movement corridor across the project site. ⅄ Maintenance of a 30 m buffer between wetlands and areas cleared for aggregate extraction.
Avian Fauna	⅄ Site clearing will not occur during the late May to late July breeding and nesting period. ⅄ Sand from potential Bank Swallow (*Riparia riparia*) nesting areas will be extracted and stockpiled each year in advance of the late May to late July nesting season. The stockpiled sand will be graded such that it does not provide suitable nesting habitat. During the remainder of the year, normal sand extraction will occur, ensuring that there is suitable habitat available for the next season's nesting. ⅄ Maintenance of a 30 m buffer between watercourses and areas cleared for aggregate extraction. ⅄ Maintenance of a 30 m buffer between wetlands and areas cleared for aggregate extraction. ⅄ Creation of a conservation set-aside of the *Larix-Picea-Sphagnum* bog on the access road to the Highway 201.
Surface Water Resources	⅄ Maintenance of a 30 m buffer between watercourses and areas cleared for aggregate extraction. ⅄ Maintenance of a 30 m buffer between wetlands and areas cleared for aggregate extraction. ⅄ Gravel extraction activities will occur no lower than one meter above the elevation of the local groundwater table. ⅄ There will be no equipment maintenance at the proposed site and no discharges of liquid effluents to water courses. ⅄ Industry-standard erosion and sediment control measures will be employed to limit the introduction of sediments to watercourses.

Valued Environmental Component	Mitigation Measures Proposed
Fish and Fish Habitat	⅄ No additional stream crossings are planned for the proposed Undertaking. ⅄ No extraction activities will occur within the 30 m vegetated buffer along the watercourse. This will provide protection from sedimentation impacts and alteration of riparian habitat. ⅄ Excavations will occur no lower than one metre above the local water table, so as to limit impacts on groundwater flows. ⅄ No water abstraction wells are envisioned for the proposed expansion. Wash water will continue to be drawn, as needed, from the existing spring-fed wash pond. ⅄ Aggregate excavations will be constructed so as to direct surface flows away from Bald Hill Brook and encourage natural infiltration. ⅄ Industry-standard sediment and erosion control measures will be employed to control onsite runoff.
Wetlands	⅄ No wetland alterations are planned for the proposed Undertaking. ⅄ No excavation activities will occur within the 30 m vegetated buffer around the wetlands. This will provide protection from sedimentation impacts and habitat alteration. ⅄ Excavations will occur no lower than one metre above the local water table, so as to limit impacts on groundwater flows. ⅄ Aggregate excavations will be constructed so as to direct surface flows away from any adjacent wetlands and encourage natural infiltration. ⅄ Industry-standard sediment and erosion control measures will be employed to control onsite runoff.
Groundwater and Geological Resources	⅄ Excavation of aggregate material will occur no lower than one meter from the local water table. ⅄ Large volumes of hydrocarbon fuels will not be stored on site and a hydrocarbon spill response kit will be maintained on-site during operations. ⅄ No blasting will occur at the site.
Air Quality	⅄ Dust emissions will be minimized through the use of course aggregate on road surfaces. Dust will further be controlled through the application of water, obtained from the on-site settling pond, to roads. ⅄ Stockpiled overburden and topsoil will be seeded and/or covered with mulch to minimize dust generation.
Noise	⅄ A 30 m buffer will be maintained between the property boundary and extraction areas. ⅄ No blasting will occur. ⅄ Typical hours of operation for the pit will be from 07:30 to 17:00, Monday to Friday. Occasionally, aggregate delivery will occur on Saturdays. ⅄ A treed buffer will be maintained around the project site. ⅄ All engines used on site will be fitted with mufflers.

The proposed Undertaking will give rise to a number of potential impacts on VECs. These are summarized in Table 17. The impacts presented here account for pit development proceeding in a progressive manner that is coordinated with site reclamation. It is further assumed the mitigation

measures discussed above are implemented.

Table 17: Summary of Anticipated Residual Impacts

Valued Environmental Component	Anticipated Residual Impact (+) positive impact (-) negative impact	Temporal Scope of Impact	Spatial Scope of Impact
Terrestrial Vegetation	(-) Loss of forest cover until remediated	5 to 10 years	20 ha
Terrestrial Fauna	(-) Displacement from habitats until remediated	5 to 10 years	20 ha
Avian Fauna	(-) Loss of habitat for forest birds until remediated (+) Provision of nesting habitat for Belted Kingfisher, Common Nighthawk and Killdeer in exposed gravel areas	5 to 10 years Ongoing	20 ha 1 to 5 ha
Surface Water Resources	(-) Potential for sedimentation impacts during extreme precipitation events	< 1 week	<500 m linear stream length
Fish and Fish Habitat	No anticipated impacts	N/A	N/A
Wetlands	No anticipated impacts	N/A	N/A
Species at Risk and Species of Conservation Concern	(+) Provision of nesting habitat for Bank swallows in sand banks	Ongoing	1 ha
Groundwater and Geological Resources	(+) Supply of sand and gravel for local and regional construction projects	Ongoing	Regional
Archaeological and Heritage Resources	No anticipated impacts	N/A	N/A
Air Quality	(-) Dust emissions	Dry periods during summer months	<500 m from project boundary
Noise	(-) Equipment noise	07:30 to 17:00 Monday to Friday	<500 m from project boundary
Socio-Economic	(+) Securing of employment (11 positions)	Ongoing	Regional

The preceding sections have presented baseline conditions for VECs within the Study Area and have considered the spatial and temporal scope of project activities. A number of mitigation measures have been proposed to address potential impacts. It is expected that there will be both positive and negative residual impacts arising from the proposed Undertaking. The negative residual impacts have been considered within their temporal and spatial scope, together with the ecological setting. Based on this, it is concluded that the pit expansion, as proposed and with the implementation of the mitigation measures, will not result in any significant adverse environmental effects

In conjunction with the above-noted mitigation measures, it is recognized that a number of additional measures will be required to ensure no significant adverse effects will arise from the project. A range of monitoring and management activities are envisioned, which will be described in further detail in the

Pit Management Plan. These may include:

- Monitoring of groundwater water and surficial flows through the establishment of monitoring wells. The placement and number of monitoring wells will be established in the Pit Management Plan and through the development of the Industrial Approval, in consultation with NSE and DNR.

- Procedures for the monitoring and management of invasive alien plants will be described in further detail in the Pit Management Plan.

- A detailed phased reclamation and decommissioning plan for the site will be developed through the Pit Management Plan.

- The Pit Management Plan will document measures to be taken should wood turtles be identified on the site.

7. Effects of the Project on the Environment

The activities proposed for the expansion of the Trimper aggregate pit will be conducted in accordance with the terms and conditions of the current Industrial Approval, any subsequent amendments to the Approval and the Pit and Quarry Guidelines.

The environmental effects of the pit expansion will include the loss of terrestrial habitat. Biological surveys have indicated that the assessed properties support a number of flora and fauna Species at Risk and species of conservation concern. Additional information on the specific assessment and mitigation measures for these species is presented in Section 6 of this report. Although no Species at Risk were found directly within areas of proposed expansion, several were found immediately adjacent to proposed expansion areas, and mobile Species at Risk (such as birds and mammals) may occasionally be found within the proposed areas of expansion. While expansion of the pit area may result in habitat loss and displacement for some species, others, such as the Bank Swallow, may well benefit from the Undertaking with the implementation of appropriate mitigation measures.

No excavations in the proposed expansion will occur below one metre above the local water table. This, together with the significant physical separation between the pit and the nearest water wells, suggests that there is a low likelihood of any impacts on domestic water supply wells.

Assuming that the proposed expansion is operated in accordance with existing provincial guidelines and approvals, and the mitigation measures recommended in this report are implemented, it is unlikely that any significant adverse residual environmental effects will occur.

8. Effects of the Environment on the Project

The environment may affect the Undertaking primarily through changes in climatic conditions. Significant precipitation events and the associated runoff may delay the preparation, excavation and reclamation of land within the active area. Similarly, heavy snow conditions may result in the earlier suspension of autumn activities and a delay resuming activities in the spring. These events may also

delay the delivery of aggregate products to market. If these delays should occur, activities at the pit will be suspended until conditions improve.

Mitigation measures, such as construction of durable roads and the installation of erosion and sediment control measures, have allowed for the successful operation of the pit in a variety of conditions over the past 20 years. Similar measures will be employed with the proposed expansion. Therefore, climatic and meteorological conditions are not anticipated to significantly affect the operation of the pit over its proposed lifetime.

9. Other Approvals Required

As was indicated above, the Proponent is required to register this Project as a Class I Undertaking pursuant to the Nova Scotia Environment Act and Environmental Assessment Regulations.

The expansion of the pit will require an amendment to the existing Industrial Approval from NSE, pursuant to the Activities Designation Regulations. The Undertaking will also be required to comply with the Pit and Quarry Guidelines (NSDOE, 1999).

No other approvals are anticipated.

10. Funding

The proposed Undertaking will be 100% privately funded.

11. Additional Information

No additional information is provided to support this application.

12. References

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