

3048483 Nova Scotia Limited

Sand Pit Expansion

Class 1 Environmental Assessment Report

Date: October 14, 2014
Ref. N°: 18455



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REVISION AND PUBLICATION REGISTER		
Revision N°	Date	Modification And/Or Publication Details
00	2014-07-11	Draft Submittal to Client
01	2014-08-11	Final Draft Submitted to Client
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1 INTRODUCTION

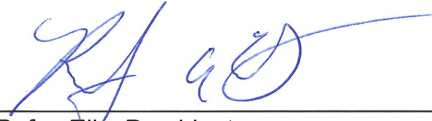
3048483 Nova Scotia Limited of Sheffield Mills, Nova Scotia (the proponent) is proposing an expansion of an existing small sand pit located on Lovett Road in Coldbrook, Nova Scotia to an operation that is greater than 4 hectares (ha) in area. To proceed with this project, a Class 1 Environmental Assessment (EA) is required, pursuant to the *Environment Act* as identified in Schedule A of the *Environmental Assessment Regulations*, Schedule "A", Undertaking B.2 Mining (2) "A pit or quarry that is larger than 4 ha in the area for extracting one of the following: a) ordinary stone; b) building or construction stone; c) sand; d) gravel; e) ordinary soil."

This project will allow 3048483 Nova Scotia to continue with its current sand extraction activities and sales.


1.1 Proponent Information

The proponent is 3048483 Nova Scotia Limited. The Nova Scotia (NS) Registry of Joint Stocks information is provided in Appendix 1. Contact information is provided below:

Name of Undertaking:	Coldbrook Sand Pit Expansion
Location of Undertaking:	Highway 101, Brooklyn Corner, NS
Proponent Contact:	3048483 Nova Scotia Limited Rufus Ells, President 1001 Bains Road Sheffield Mills, NS B0P 1H0
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 Rufus Ells, President
 3048483 Limited

14-October 2014
 Date


 Aven Cole, M.Sc.E., P.Eng.
 LVM / Maritime Testing Limited

14-October-2014
 Date

2 UNDERTAKING

2.1 Name of Undertaking

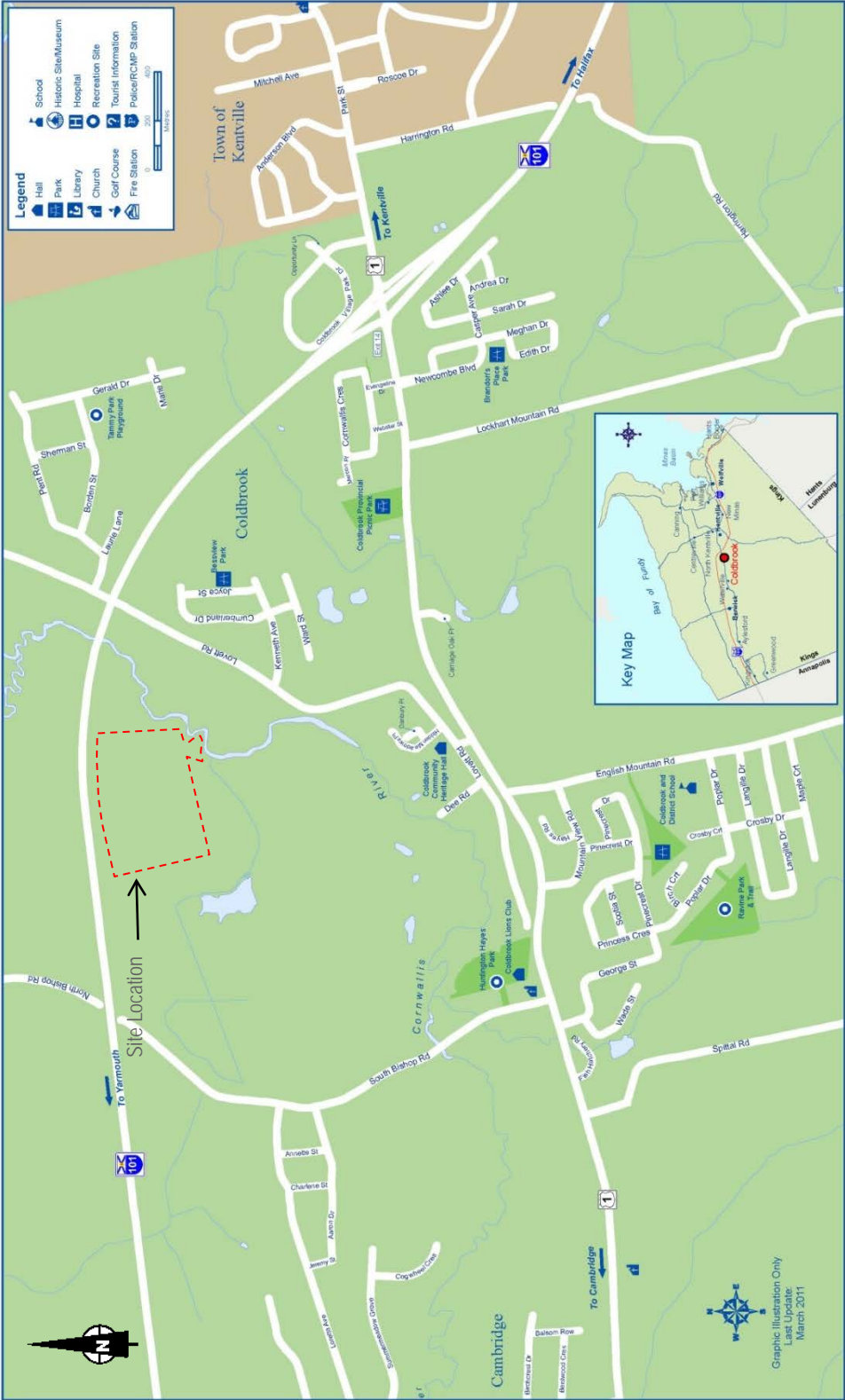
3048483 Nova Scotia Limited proposes to expand the area of a sand pit which is currently under operation. This project is referred to as the Coldbrook Sand Pit Expansion.

2.2 Location of Undertaking

The project site (PID No. 55433619) is located on the south side of Highway 101, between South Bishop Road and Lovett Road in Brooklyn Corner, Kings County, NS, as shown on Figure 2-1. The coordinates of the site are approximately 4992670N, 374965E (UTM 20 NAD83).

The site is located in a predominately un-inhabited area with neighbouring land uses for purposes other than residential development. The site is bound by the Harvest Highway (Highway 101) to the north, commercial/resource lands to the west and south, and undeveloped land to the east (including upland forest, wetland and agricultural pasture). Residential dwellings are present along Lovett Road (farther to the east) and the nearest residential dwelling is located approximately 180m from the property boundary (at civic no. 3027 Lovett Road). The site is separated from the residential area by the Cornwallis River, wetland and a forested buffer; the pit is not visible from properties on Lovett Road.

Figure 2-1. Site Location Map.



3 SCOPE

3.1 Purpose and Need of the Undertaking

The purpose of the proposed undertaking is to extend the existing approved sand pit. The proponent has operated a small sand pit (*Industrial Approval* for operation <4 ha) at this site since 2004. Approximately of 200,000 tonnes of sand had been removed from the pit in the last ten years. Prior to 2001 when the property was acquired by the proponent, other sand extraction activities had occurred over various locations at the 19-ha site, with an additional 365,000 tonnes having been removed. This *Industrial Approval* was recently renewed; however, current operations are approaching the 4-ha spatial extent. An extension of the existing pit is required to satisfy the existing commercial demand. The expanded pit will occupy a maximum of 15.7 ha of land above the groundwater table within the 19 ha property over the lifetime of the pit, with an expected operational life of 20 years.

The existing pit formerly operated under NSE *Industrial Approval* No. 2004-039351 (expired on June 8, 2014) and was recently renewed under with the Approval Number 2004-039351-R01. A copy of the 2014 Approval is provided in Appendix 2.

The project is an important component of the natural resource sector and provides raw materials to the local construction industry in the area and surrounding counties. The pit will support sand excavation activities above the groundwater table, and allow for continued sand extraction and sales of approximately 20,000 tonnes/year to an existing customer plus up to an additional 100,000 tonnes/year of sand extraction and sales to a potential new customer. A large component of the current material demand is for creation of a high quality, environmentally sustainable manufactured topsoil product. This manufactured topsoil reduces the demand for naturally produced topsoil. There is also a market for the coarse-grained sand for use in septic systems and concrete production in the area, and demand for extraction of sand from the site for these uses is anticipated to increase in the short term.

3.2 Scope of the Undertaking

The scope of the proposed pit expansion is similar to current (and past) activities at the site and includes:

- ▶ Site preparation
- ▶ Sand excavation and loading
- ▶ Transportation
- ▶ Rehabilitation, and
- ▶ Site closure

The current site boundaries and proposed pit boundaries are provided in Figures 1 and 2 (Appendix 3). The proposed pit expansion will total approximately 15.7 ha, including the existing permitted sand pit of 3.9 ha.

Most of the site has been disturbed through logging and sand excavation at some point in the recent past, therefore there will be minimal site preparation work such as tree-clearing and grubbing required. The working face of the current operation maintains an approximate 30m setback from wetland on the eastern portion of the site. Proposed working faces will extend north and west from the southern property line and will adhere to all requirements for setbacks identified in the NSE *Pit and Quarry Guidelines* (1999) and NSE *Industrial Approval* (2004-039351-R01) for the site.

Excavation of sand will occur from the existing elevations at the pit to approximately 1 metre above the local groundwater table. There will be no processing facilities or settling ponds on the site. Excavated sand will be loaded by front end loader directly to trucks and trailers for off-site sales and processing. No structures are required to support the pit activities, and there will be no blasting at the site. Off-site truck traffic is not expected to increase; the pit expansion will maintain the current traffic loading on the public roads, and will extend the operation life of the existing pit. The anticipated extraction rate is approximately 20,000 tonnes of sand per year for the existing customer, and up to an additional 100,000 tonnes per year for a new customer; the extractable reserves are estimated to be 1.5 million tonnes.

The proponent’s volume of sand sales to its existing customer, Kynock Resources, will be maintained, and this expansion will allow sales to be maintained at the existing extraction rate for up to 20 years. Thus the same volume of trucks will exit the site at Lovett Road. The proponent will be entering into a new sales contract to provide additional sand to a new customer, Shaw Resources. New sand sales will be trucked on internal roads to the adjacent Shaw site to the south, where Shaw processing already takes place. The market demand for sand has not increased; increased sand extraction at the proponent’s site would coincide with decreased extraction on nearby sites. Thus the existing volume of trucks that use the Shaw entrance on the South Bishop Road to the southwest will be maintained.

Figure 3-1. Eastern pit face and natural ridge.



Based on the local topography and subsurface conditions, the project site is not anticipated to generate surface water or runoff; surface water from precipitation events infiltrates the floor of the pit. In its current state, the disturbed areas of the site where sand extraction has already occurred reside at lower elevations than the surrounding undisturbed vegetated areas. Further, the coarse grained overburden is naturally conductive to infiltration.

Figure 3-2. Backslope of the natural ridge.



Pit expansion will continue this trend of lowering the site relative to its surroundings. The most ecologically sensitive area of the property is to the east of the project site, where there is a wetland that borders a river. There is a natural

ridge along the east side of the pit that is approximately 4 metres high and forms the limit of the eastern working face. The undisturbed (east) side of the ridge is forested and slopes downward towards the wetland and the Cornwallis River. This forested backslope creates an approximate 30m wide buffer between the eastern extent of the working face and the wetland. The disturbed side of the ridge (the eastern limit of the working face) slopes downward towards the pit floor. Any precipitation along disturbed areas of the working face is directed back into the pit rather than into the forested buffer and wetland; this will not change since no eastward expansion of the pit is proposed. Any new working faces at the project site will also slope downward towards the pit floor, while the backslopes will remain vegetated.

Decommissioning of the proposed project site is not likely to occur for at least 20 years or more; however, rehabilitation of the pit will be progressive in nature to minimize the spatial extent of the active working area. Once a decommissioning date has been established, a final rehabilitation plan will be prepared for NSE approval in advance of site closure.

3.3 Project Alternatives

Alternatives are defined as different ways of attaining the same outcome.

The site is land-locked with an established right-of-way (Ells Road) extending from Lovett Road; there are no other viable access alternatives.

The undertaking methodology will involve sand excavation above the groundwater table only; there will be no washing, processing or permanent stockpiling of the sand. There is no viable alternative to the undertaking other than to not excavate any sand.

The alternative to the undertaking is the “do nothing” alternative. If nothing is done, the existing pit will be exhausted of available sand since the existing pit (with its operating approval) is close to its spatial limit of 3.9 ha. The remaining accessible sand present is that located between the existing pit floor elevation and approximately 1 metre above the local groundwater table.

3.4 Scope of the Environmental Assessment

This Environmental Assessment (EA) document has been prepared in conjunction with Nova Scotia Environment (NSE) and Mr. Ells (3048483 Nova Scotia Limited) to satisfy the information requirements for Environmental Assessment under the Environmental Assessment Regulations for a Class I Undertaking.

LVM Maritime determined the scope of the EA in consultation with 3048483 Nova Scotia Limited and NSE as well as review of:

- ▶ 2009 Guide to Preparing an EA Registration Document for Pit and Quarry Developments in Nova Scotia, and
- ▶ 1999 Nova Scotia Department of the Environment Pit Quarry Guidelines.

The EA is a planning tool used in which the environmental effects of a proposed undertaking are predicted and evaluated and are given consideration prior to the undertaking. The environmental assessment includes identifying and describing those components of the proposed setting within the area of the study boundaries that will or could be affected by the project. The process for an environmental assessment is a step-wise and transparent process. The steps in the process include:

- ▶ Determining the Valued Environmental Components (VECs)
- ▶ Determining the project activities that may interact with the VECs
- ▶ Determining the temporal and spatial assessment boundaries
- ▶ Determining the potential effects that could occur as a result of project activity interaction with the identified VECs
- ▶ Determining the mitigation measure or best management practices that can be used or implemented to reduce the impact
- ▶ Determining and characterizing the residual environmental effects and their significance
- ▶ Developing monitoring measures

The project includes both spatial and temporal boundaries in assessing the effects on the surrounding environments. The spatial boundaries include the area that the project has the potential to impact. The spatial boundaries are the area where potential project impacts occur, whether direct or indirect, and are dependent on the VEC and the potential effect of the project on a particular VEC. Temporal boundaries include the time period, or duration, over which the effect may occur and consist of site development and site operations until decommissioning.

4 PUBLIC INVOLVEMENT

Public consultation for Class I Undertakings for Pit and Quarry developments is not a mandatory component, except for official notification through newspaper circulation. However, Mr. Ells recognizes that public consultation for the project will proactively obtain valuable input from an engaged community resource.

The following activities were conducted by Mr. Ells with respect to involving the public:

- ▶ Notification of elected community representatives
- ▶ Letter of Introduction to the Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO) and Annapolis Valley First Nation
- ▶ Discussion with local government agencies (NS Natural Resources, NS Environment, NS Communities, Culture and Heritage)
- ▶ Public information session

Materials used as part of the public information session/open house activities are provided in Appendix 4.

4.1 Notification to Community Officials

Local municipal, provincial and federal elected representatives were contacted with respect to the project, provided an information handout (same as the Open House handout) about the project so they could actively respond to inquiries and comments related to the project, and were invited to the public information session. The following representatives were contacted:

- ▶ Bob Best (Warden, Municipality of the County of Kings)
- ▶ Keith Irving (Provincial MLA, Kings South)
- ▶ John Lohr (Provincial MLA, Kings North)
- ▶ Scott Brison (Federal MP, Kings-Hants)

No concerns were identified by the community officials.

4.2 First Nations

A letter of introduction and brief description of the project was sent to Twila Gaudet, Consultation Liaison Officer (KMKNO) and to Janette Peterson, Band Chief (Annapolis Valley First Nation) on March 19, 2014.

No response has been received from the Annapolis Valley First Nation. Ms. Gaudet (KMKNO) responded that the Mi'kmaq of Nova Scotia recommended a Mi'kmaq Knowledge Study (MEKS) and requested that the project archaeologist (Davis McIntyre) work with KMKNOs archaeologist and perform the Archaeological Resource Impact Assessment (ARIA) with subsurface testing. LVM Maritime forwarded a copy of the ARIA methodology to KMKNO and indicated that the ARIA was being conducted in accordance with NS Communities, Culture and Heritage (NS Heritage) requirements, and that the proponent would await direction from NS Heritage with respect to any further assessment requirements. LVM Maritime also indicated that once NS Heritage released the ARIA report, that a copy would be forwarded.

A copy of the correspondence with KMKNO is provided in Appendix 5.

4.3 Government Agency

Prior to preparing the EA document, LVM Maritime and the proponent met with NSE staff from the Environmental Assessments branch to discuss the project and regulatory requirements, identify stakeholders, identify possible obstacles that could not be mitigated through the EA process, and to confirm a preliminary EA scope and VECs.

LVM Maritime also contacted local representatives from NSE compliance branch (Kentville Office) and Nova Scotia Natural Resources (regional biologist and species at risk coordinator) to further discuss the project and identify environmental or biophysical VECs or stakeholders.

No significant concerns were identified during discussion with the government agencies.

4.4 Public Information Session

Mr. Ells and LVM Maritime hosted a public information session Open House on September 29, 2014 for the project. The Open House was advertised in the local post offices (Mader's Pharmacy and main post office) for 7 days before the event. The purpose of the Open House was to provide information to the public on the project and to obtain input from local residents, businesses and landowners.

Participants were asked to sign into the session. During the session, information was disseminated through a series of information panels and an information handout, with Mr. Ells and representatives from LVM Maritime on hand to provide additional information. Also present during the public information session were three representatives from Mr. Ells' customer/potential customer base. LVM was prepared to record comments and questions from the participants on a dry-erase board such that all visitors could see previously noted concerns. A copy of the names from the sign in sheet and Open House presentation materials are included in Appendix 4.

During the public consultation process, five members of the general public reviewed information about the project. One resident had a question related to whether the static level of the groundwater aquifer in the area would be affected by sand excavation at the site. LVM confirmed for this resident that the groundwater aquifer would not be affected since the excavation activities would terminate 1 metre above the groundwater table. There were no other questions.

Mr. Ells considered all feedback from the public consultation, and has addressed the concerns as described herein.

5 DESCRIPTION OF THE UNDERTAKING

5.1 Geographic Location

The project site is located on PID No. 55433619 on the south side of Highway 101, between South Bishop Road and Lovett Road in Brooklyn Corner, Kings County, NS, as shown on Figure 2-1. Brooklyn Corner is located near the larger community of Coldbrook. The coordinates of the site are approximately 4992670N, 374965E (UTM 20 NAD83).

The site is located in a predominately un-inhabited area with neighbouring land uses for purposes other than residential development. The site is bound by the Harvest Highway (Highway 101) to the north, commercial/resource lands to the west and south (existing pits), and agricultural (pasture) and undeveloped tree-covered land to the east. Residential dwellings are present along Lovett Road (farther to the east) and the nearest residential dwelling is located approximately 180m from the property boundary (at 3027 Lovett Road). The site is separated from the residential area by the Cornwallis River, a wetland (including some agricultural pasture) and a forested ridge. Site access is via Ells Road, from the Lovett Road. Ells Road crosses the Cornwallis River via a span bridge.

There is a topographic high located near the northwest corner of the property. Surficial topography slopes downward radially in all directions from this tree-covered topographic high. A ridge and vegetated buffer is present along the east side of the property; vegetated and undisturbed areas east of the ridge slope downward toward the wetland and Cornwallis River. The current and remnant working faces are located in the center of the site. The disturbed area including all working faces at the site slope downwards towards the pit floor.

5.2 Physical Components

The project is an expansion of the current pit. Annual extraction is currently approximately 20,000 tonnes of sand; however, this has fluctuated up to a high of 45,000 tonnes per year. The project will allow an extension of the similar production rate plus additional extraction for a new customer, that together could be up to 120,000 tonnes a year depending upon the market demand.

There is currently no permanent infrastructure at the site and no future infrastructure is planned. Sand is excavated from above the groundwater table only and transported off-site for sale or any further processing. There will be no permanent stockpiles, wash or production facilities, settling ponds, or weigh scales. Physical components of the project include the working faces, pit floor, eastern buffer and an access road that connects the site to Lovett Road. Internal access between the site and the adjacent property to the south also exists. The existing conditions and boundaries of the proposed undertaking are depicted on Figures 1 and 2 (Appendix 3).

There is currently no topsoil or grubbings being disturbed at the site since operations are close to the spatial extent of the NSE *Industrial Approval*. Previously disturbed topsoil and grubbings (as well as any future materials) are stockpiled for use in the progressive rehabilitation activities at the site.

The site is located in a predominately un-inhabited area within the community of Coldbrook, Municipality of the County of Kings (Municipality), approximately 2.5 kilometers (km) west of the Town of Kentville. Coldbrook has been designated as a growth centre by the Municipality. The site is currently zoned “M7” resource extraction. Lands to the south and immediate west are also zoned “M7”; lands farther to the west of Wood Lake and north of Highway 101 are zoned “R6” rural country. Areas bordering the Cornwallis River are zoned “O1” Environmental open space. A review of the area surrounding the site reveals the following potential residential dwellings; the site is not visible from any of these residential dwellings:

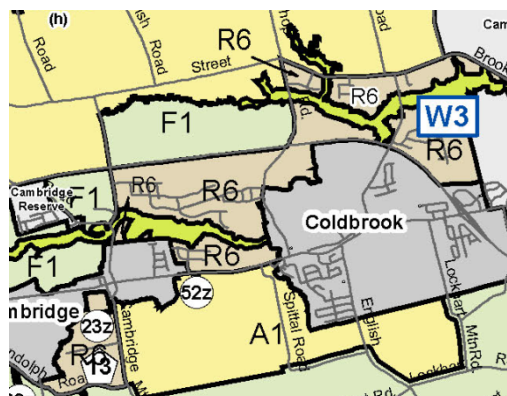


Table 5-1. Summary of surrounding properties.

Distance (km)	Number of Potential Residential Dwellings	Number of Potential Commercial Buildings
0.5	61	0
1	248	12
1.5	563	24
2	939	50

The proposed working area of the undertaking has been determined using setbacks in accordance with the existing *Industrial Approval*. No wetland setbacks were prescribed in the *Industrial Approval*; however, the proponent recognizes the importance of wetlands and therefore, a setback of 30m will be applied to wetlands at the site. There are select areas along the current eastern working face that previously slightly encroached upon this 30m wetland setback, although they satisfy the prescribed watercourse setback of 30m. At these locations, a 30m wetland buffer cannot be implemented; however, the existing ridge will be the limit of the eastern working face and there will be no additional expansion eastward. Setbacks are identified on Figure 2 (Appendix 3). Also, the proponent has an agreement in place with the Shaw operation to the south to waive any property line setback requirements. The site and access road are also used by the Shaw operation to the south when transporting sand from the Lafarge pit on the east side of the Lovett Road to the adjacent Shaw and Keddy operations, so that truck traffic on the Lovett Road, Park Street and South Bishop Road is reduced.

Other relevant features in the surrounding area are depicted on the sheets (01 through 06) provided in Appendix 6.

5.3 Site Preparation

The proponent has leased a portion of the site to Kynock Resources since 2004 for sand excavation. Prior to this (and ownership by the proponent), logging and other sand excavation activities have occurred across much of the site by other enterprises. Only small portions of the site (eastern) retain any of the original mature tree cover; the eastern side of the site will not be disturbed during any expansion of the pit.

The site access road is already in place, including the open span bridge; no upgrades are required since the volume of traffic leaving the site from the Lovett Road entrance will not increase.

Excavation of sand will occur northward and westward from the southern property boundary in a progressive manner; vegetation in these areas is currently minimal. Any required topsoil removal and grubbing will be completed with bulldozers and excavators, and this material will be stockpiled and reserved for future rehabilitation activities. Trees on the northwestern area of the site will not be removed until spatial extents of the working face must be extended to this location; however, no disturbance of trees is anticipated for several years. At that time, that area will be harvested for merchantable timber prior to grubbing and topsoil removal. All tree

and vegetation removal will occur in periods outside the nesting bird period (i.e. April 1st to August 31st). This progressive manner of sand removal will minimize the extent of the disturbed area.

Given the pit development plan and the nature of the sand deposits at the site, surface water runoff is not anticipated. Working faces do and will continue to slope towards the pit floor; therefore, precipitation will infiltrate through the pit floor. The ridge along the eastern side of the project site, between the working area and the environmental receptors to the east, will prevent any precipitation water that falls on the disturbed area of the site during extreme precipitation events from leaving the site.

No storage of equipment or petroleum products will occur at the site; all equipment will be removed at the end of each working day. Equipment will not be re-fuelled in the pit; refuelling will occur off-site by a mobile fuelling truck. Any accidental petroleum releases will be addressed immediately in accordance with applicable regulations.

5.4 Operation and Maintenance

Front end loaders will excavate sand from the working faces and place it in tandem trucks or trailers for off-site sale and processing. There will be no blasting. There will be no permanent stockpiles at the site, other than reserved topsoil and grubbing. Sand excavation will not be below the water table; the final pit floor elevation will be approximately 1 metre above the groundwater table. The pit will be progressively reclaimed as the pit floor reaches its design depth and the excavated areas are no longer required for access to the working face.

Currently, approximately 15 trucks per week leave the site to the northeast via the private Ells Road and enter the public Lovett Road. Under the expansion plan, the existing traffic load will continue to leave the site northeastward via Ells Road to Lovett Road. The number of trucks leaving the site at the Lovett Road entrance is not anticipated to increase from current volumes since this aspect of the project is extending the existing operation life of the site.

Currently, Ells Road (from Lovett Road) and the site are also used for thoroughfare by neighboring operations that transport sand from the Lafarge operation on the east side of Lovett Road to the Shaw and Keddy operations south and west of the project site. This private thoroughfare allows truck traffic on Lovett Road, Park Street and South Bishop Road to be minimized. Each winter for a five- to six-week period, there are approximately 120 truck trips per day that transport sand from the Lafarge operation through the project site.

Under the expansion plan, any increased sand extraction to satisfy new customer demand will be trucked via internal roadways to neighbouring properties to the south and west for processing and transport to market. Increased extraction at the project site is not expected to increase traffic loading on public roads, since it will coincide with, decreased sand extraction and decreased associated thoroughfare from nearby sites.

Weight restrictions along public roadways will be respected, and anticipated capacities leaving the site are 16 tonnes (tandem) and 25 tonnes (trailers). Access ramps to the pit floor will be

maintained at safe grades that do not exceed the design capacity of the loader and trucks. Speed limits are posted on the Ells access road. The only maintenance that may occur onsite is occasional minor service to the equipment (loader and trucks) if a break down occurs on-site. Routine equipment maintenance and repair will occur at off-site locations.

The natural condition of the sand deposit is fairly loose; stable angles of repose would be approximately 45 degrees (1H:1V) for active areas. Vegetation will not be removed in advance of excavation so that bank settlement will be minimized. The sand is not highly erodible and its coarse-grained nature will permit free drainage so that sediment transport is not a concern. All surface water runoff from extreme precipitation events will be directed to the pit floor; the natural ridge along the eastern property boundary will prevent any surface water from entering the forested upland, wetland or Cornwallis River during extreme precipitation events. If areas of fine-grained impermeable sand are encountered during excavation, internal ditching that drains towards other areas of the pit floor will be installed. Surface water runoff along Ells Road is already controlled via vegetated ditches.

There will be no solid waste, hazardous waste or liquid effluent generated at the site. No chemicals or petroleum products will be used at the site other than for dust control as discussed below.

No equipment or storage of petroleum products will occur at the site; all equipment will be removed at the end of each working day. Equipment will not be re-fuelled in the pit; refuelling will occur off-site by a mobile fuelling truck. All equipment will be equipped with a spill kit and the operators will be trained in their use in case of accidental releases. Any accidental petroleum releases will be addressed immediately in accordance with applicable regulations.

Air emissions may be generated by equipment emissions and fugitive dust. Equipment emissions will be managed through reduced-idle practices, regular maintenance and clean burning fuels. Dust will be controlled through the application of water (brought by water truck from off-site) and/or approved dust suppression products; neither oil nor calcium chloride will be used. Noise may be generated by equipment operating at the site, however, will be managed within the recommended limits for pit operations as prescribed by NSE.

The hours of operation for the sand pit are 7 am to 8 pm, weekdays, except statutory holidays. The expansion of the pit will begin upon the receipt of the regulatory approvals. At this time the expansion is expected to begin during spring of 2015.

5.5 Decommissioning and Reclamation

During operations (including current operations), progressive rehabilitation will be carried out as areas of the pit floor reach the design grade (1m above the water table) and the excavated areas are no longer required for access to the working face. The pit walls will be graded to approximately 30 degrees (2H:1V), capped with the reserved topsoil and stabilized with a mixture of native grasses and plants.

The project is expected to continue for approximately 20 years before the sand reserves above the water table are exhausted. At the completion of the project, the total disturbed area is anticipated to be 15.7 hectares, including the currently permitted 3.9 hectares. Given the long life expectancy of the undertaking, the site closure reclamation plan has not been designed; the final decommissioning objective for the site is either agricultural or residential land use, depending upon market, community and municipal interest at that time. This will be achieved primarily through site grading so that the final condition of the site is stable and sustainable prior to agricultural activities or development into a residential subdivision. Once the site is decommissioned, reclamation will be complete within 2 years.

6 VALUED ENVIRONMENTAL COMPONENTS AND EFFECTS MANAGEMENT

6.1 Determination of Valued Environmental Components (VECs)

A list of potential VECs was determined using a standard environmental assessment methodology. Potential VECs were assessed to determine if they may be present within the study area. Based on this information a determination was made as to which of the VECs would be included in the assessment of this project.

The identification of the project activities that may interact with the VECs is completed by identifying the various project components that may have a potential effect pathway to the receiving environment or component. The components are categorized to whether they occur during preparation, operation or decommissioning phases of the project. Project activities are compared to the list of VECs and the potential interactions are identified for further consideration in the impact assessment process.

Once the project and VEC interaction have been identified, potential impacts can be identified. Information about the VECs and the knowledge of the project activities are combined to determine and review potential adverse effects of the project.

Mitigation measures, which can be used to reduce the potential impacts of the project on the VECs, are identified. Mitigation measures can include both project design, construction practices or project specific measures and are implemented by the proponent to reduce the identified impacts.

The VECs for this project were identified based on the existing biophysical environment, the nature of the undertaking and input from stakeholders and include:

- ▶ Surficial and Bedrock Geology
- ▶ Surface Water Resources (wetlands, watercourses)
- ▶ Groundwater Resources
- ▶ Flora and Fauna

- ▶ Atmospheric Conditions/Air Quality and Noise
- ▶ Social Economic and Land Use
- ▶ Cultural and Heritage Resources

6.1.1 Residual Environmental Effects Determination and Characterization

Residual environmental effects are those effects that remain following the application of mitigation measures. They can be characterized based on their geographic extent, duration, frequency, reversibility and magnitude as outlined in Table 6-1.

Table 6-1. Residual Impacts Rating Criteria.

CRITERIA	RATING TERM	DEFINITION
Magnitude	Negligible	No measurable impacts.
	Small	Impact likely to result in less than 1% change in regional resource.
	Medium	Impact likely to result in 1% to 10 % change in regional resource.
	Large	Impact likely to result in more than 10% change in regional resource.
Geographic Extent	Local	Effect is limited to the footprint of the project site and immediate surrounding area.
	Regional	Effect is limited to the Regional Study Area of the VEC.
Frequency	Rarely	Less than once per year.
	Intermittent	Less than once per week.
	Daily	Greater than once a day.
Duration	Short-Term	Effects only occur during construction, decommissioning, or as an isolated event during the operation and maintenance phase.
	Medium-Term	Effect lasts for the duration of the project, or during operation.
	Long-Term	Effect occurs for an undetermined time beyond project decommissioning.
Reversibility	Reversible	Effect is reversed after the activity ceases.
	Partially-Reversible	Effect is partially reversed after the activity ceases.
	Non-Reversible	Effect will not be reversed when activity ceases.

6.1.2 Significance of Residual Environmental Effects

Assigning residual impact significance is required to determine if a project has the potential to result in an adverse impact after implementing mitigation measures. A clear determination is made regarding whether or not the residual environmental effect is significant.

A rating system for describing the significance of adverse environmental effects was chosen, as presented in Table 6-2.

Table 6-2 Rating System for the Significance of Identified Adverse Environmental Effects

RATING TERM	DEFINITION
High	Potential impact could threaten sustainability of the resources and should be considered a management concern. Research, monitoring and / or recovery initiative should be considered.
Medium	Potential impact could result in a decline in resource to lower-than-baseline, but stable levels in a study area after project closure and into the foreseeable future. Regional management actions such as research, monitoring, monitoring and/or recovery initiatives may be required.
Low	Potential impact may result in slight decline in resource in study area during the life of the project. Research, monitoring and /or recovery initiatives would not normally be required.
Minimal	Potential impact may result in slight decline in resource in study are during the construction and decommissioning phase, but the resource should return to baseline levels.

6.2 Project–Environment Interactions and Valued Environmental Components (VECs)

Project pathways are determined by the assessor, based on experience and a firm understanding of the proposed project. Understanding the pathways allows identification of possible impacts on environmental receptors (VECs). Interactions are described in the following sections for pathways which occur in the construction and operations phases.

6.2.1 Site Preparation Phase

The site preparation / construction phase can potentially affect a broad range of VECs. While the construction phase of the project is generally short term in duration, impacts to VECs can be long term. The potential project – VEC interactions are shown in Table 6-3.

Table 6-3 Summary of Valued Environmental Components and Interactions

PROJECT ACTIVITIES	VECs																
	BIO-PHYSICAL									SOCIO-ECONOMIC					CULTURE AND HERITAGE		
	SURFICIAL GEOLOGY	BEDROCK	SURFACE WATER	GROUNWATER	WETLANDS	VEGETATION	BIRDS AND OTHER WILDLIFE	FISH AND FISH HABITAT	SPECIES AT RISK	AIR QUALITY	NOISE	ECONOMY	LAND USE	TRANSPORTATION		RECREATION AND TOURISM	HUMAN HEALTH
Site Preparation Phase																	
Clearing and Grubbing	X		X			X	X			X	X					X	X
Accidents	X		X	X			X	X		X	X					X	
Operations Phase																	
Sand Extraction	X		X				X			X	X	X	X	X	X	X	X
Accidents	X		X	X			X	X		X	X					X	

6.2.2 Operations Phase

Once the site preparation / construction phase of the project is complete, the operations phase will begin. Impacts in this phase are typically longer in duration than in the construction phase. The potential project – VEC interactions are shown in Table 6-3.

6.3 Biophysical Environment

6.3.1 Geology

6.3.1.1 Existing Conditions

Surficial geology mapping indicates that the native soils in this area are identified as Kame Fields and Esker Systems, which consist of gravel, sand and silt in poorly to well-bedded, horizontal to angular beds that can be up to 30m thick. Kames and eskers are glaciofluvial deposits. Their topography consists of mounds, hummocks, terraces or ridges that were formed as glacier melt water deposited material into holes in the ice, between the glacier and valleys, in water, and in tunnels in the ice. According to the mapping, the subject site lies close to the contact between the above-noted deposits and an area of alluvial deposits, which consist of bedded gravel, sand, and mud that is coarse at the base and finer at the top that was deposited by streams and rivers after retreat of the last glaciers, forming a flat or gently sloping topography. Site observations confirm that the site (and neighbouring properties) is underlain by deep deposits (eskers) of sand. Surficial geology mapping is presented in Sheet 04 of 06 (Appendix 6).

Geological bedrock mapping indicates that the Fundy Group underlies the site. Specifically, the site is underlain by the Wolfville Formation which consists of fluvial sandstone and conglomerate, aeolian sandstone and minor deltaic-laustrine deposits. This bedrock unit does not have any acid producing potential. To the southeast of the site (>3km), there is a contact between the Wolfville Formation and the Cunard Formation (of the Halifax Group). The Cunard Formation slate is well known for its acid producing potential; however, is not anticipated to be present at the site.

Based on the conditions observed at the site (and neighbouring property) no bedrock will be encountered during sand excavation since the undertaking will only extend into sand to a depth 1m above the groundwater table. Bedrock geology mapping is presented in Sheet 05 of 06 (Appendix 6).

6.3.1.2 Predicted Environmental Effects, Proposed Mitigation and Monitoring

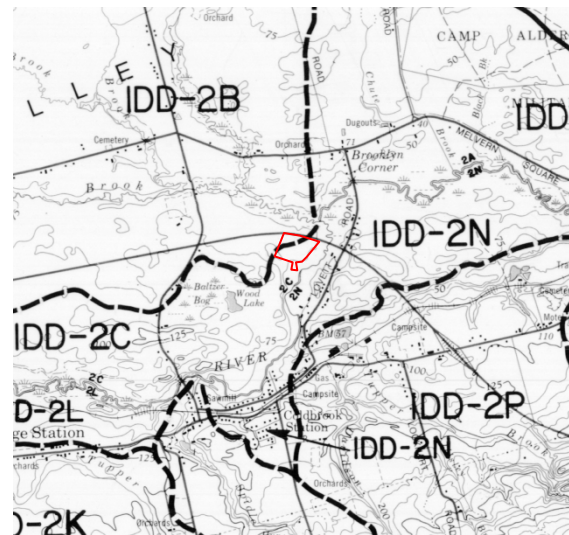
Large areas of the site have been disturbed in the past for sand extraction; only a small area in the southeast corner has never been disturbed. There is potential for pre-contact first nations artifacts to be present in the shallow soils of this undisturbed area. Therefore, this area will be excluded from the pit expansion (see Sheet 06 of 06, Appendix 6). If future expansion into this area is contemplated, intrusive archaeological assessment will be conducted to verify that no artifacts are present. If any artifacts are encountered during sand excavation activities in other areas, the proponent will stop work and contact NS Heritage.

We anticipate that bedrock will not be encountered during the undertaking; mapping identifies the bedrock as non-acid producing.

6.3.2 Surface Water

6.3.2.1 Existing Conditions

Regionally, surface water flows (where they do not infiltrate directly into the ground) follow the general topography of the area, with tertiary watercourses and tributaries flowing into larger second and first order watercourses. The site is located in the Cornwallis River watershed (1DD-2), with a tertiary watershed divide extending through the localized topographic high in the northwest side of the site. The northwest corner of the site is in tertiary watershed IDD-2B which generally drains toward Coleman Brook and ultimately discharges into the Cornwallis River, near the site, north of Highway 101. Most of the site is in tertiary watershed IDD-2C which generally drains into the



Cornwallis River (and ultimately the Bay of Fundy). In general, there are minimal surface water flows present at and around the site. The naturally occurring sand deposits in the area with their high infiltration capacity generally minimize any storm related surface water flows that may occur. The upper northwest corner of the site is currently vegetated, at a higher elevation than the pit and not impacted by pit activities; any precipitation in this area that may exit the site is undisturbed clear flow.

In the existing pit, the disturbed faces slope into the centre of the pit to create a bowl effect; there are no slopes in disturbed areas that drain away from the centre of the existing pit. At the time of the site assessment, it was observed that a naturally lower portion of the ridge had been previously breached. However, Mr. Ells has since repaired the low spot of the ridge, stabilized it with organics and topsoil, and seeded it with grasses. The forested upland along the east side of the property (the backslope of the ridge) has never been disturbed and now that the ridge has been repaired and stabilized in the naturally low spot, no portion of the site drains in this direction; any precipitation in this area would be trapped by the vegetation.

No surface water features are present on the project site, although the Cornwallis River flows beneath Ells Road and is crossed via a spanned bridge. Formerly, a man made drainage ditch from Wood Lake extended across the southern property to the Cornwallis River; however, this was subsequently decommissioned and the available topography mapping is not representative of the site conditions. The Cornwallis River extends adjacent to a portion of

southeastern property boundary, and flows in a northerly direction to ultimately empty into the Bay of Fundy (see Sheet 03 of 06, Appendix 6).

The current *Industrial Approval* prescribes a 30m setback from watercourses. The working face along the eastern side of the property currently satisfies this requirement, and there is a natural ridge (forested on the east side) present along the eastern side of the pit that prevents any surface water that may be generated from extreme precipitation events from leaving the pit. This natural ridge will not be disturbed during any future extension activities.

6.3.2.2 *Predicted Environmental Effects, Proposed Mitigation and Monitoring*

The undertaking will not alter the regional surface water flow pattern. Precipitation now falling on the site is directed through the pit floor, and ultimately into the Cornwallis River via shallow groundwater that discharges into the Cornwallis River. This flow pattern will be maintained as the pit extends northward and westward. The small corner of the site that could drain toward Coleman Brook and ultimately the Cornwallis River may be redirected towards the Cornwallis River as the sand deposits are excavated in the area. However, this area is close to where tertiary watershed IDD-2B discharges to the Cornwallis River and the effect of any altered surface water flow pattern is expected to be minimal, since drainage ditches along Highway 101 likely already redirect this small area of surface water drainage directly to the Cornwallis River.

The bridge spanning the Cornwallis River is already in place and does not require any upgrades, since truck traffic volume will not significantly change. Surface water runoff is controlled via established and vegetated ditches and ditch water quickly infiltrates the ground surface due to the coarse-grain nature of the underlying soils, therefore, sediment transport is not anticipated. However, accidental spills may occur along Ells Road.

In the pit, given the coarse-grained nature of the sand deposits, surface water runoff from rainfall events leaving the property is not anticipated; precipitation will infiltrate the pit floor. In the event of extreme precipitation events, in which rainfall exceeds the free-draining capacity of the sand, the ridge along the eastern perimeter of the pit will prevent surface water (and associated sediment) from leaving the site before it infiltrates through the pit floor. Localized internal ditching that drains towards of the pit floor will be utilized if lenses of fine-grained impermeable sand are encountered during excavation. However, accidental spills may occur in the pit.

To minimize any potential impacts to surface water, the following mitigation measures will be implemented:

- ▶ Slope all working faces towards the pit floor.
- ▶ Maintain the natural ridge along the eastern property boundary and immediately repair any breaches.
- ▶ Employ progressive reclamation practices to minimize disturbed areas.

- ▶ If any effluent leaves the site, conduct total suspended solids (TSS) monitoring.
- ▶ Follow practices outlined in the latest version of the NSE *Erosion and Sedimentation Control Handbook for Construction Sites* and adjust surface water, erosion and sediment control measures accordingly if conditions change.
- ▶ Develop a Spill Response and Contingency plan to address any accidental spills (see Appendix 7).

6.3.3 Groundwater

6.3.3.1 Existing Conditions

Drinking water in Coldbrook is supplied by potable drinking water wells (see Sheet 03 of 06, Appendix 6). Also, nearby Kentville is serviced by a municipal system, and a well field protection area is present to protect the supply well for the municipal system (see Sheet 06 of 06, Appendix 6). The nearest of the pumping wells are more than 2km from the site and are also presented on Sheet 03 and 06. The nearest mapped groundwater wells are likely inaccurate coordinates since the adjacent property to the south and west are sand pits and do not have any buildings. Therefore, the closest residential drinking water well is believed to be approximately 300m south of the proposed project footprint (see Sheet 03 of 06, Appendix 6), along Lovett Road.

Groundwater quality and quantity has been studied extensively in the region. A hydrostratigraphic unit (HU) is defined as a group of geologic materials which have similar water storage and transmitting properties. The major hydrostratigraphic units within the area are the Wolfville Hydrostatic Unit (Wolfville HU) and Glaciofluvial HU. The most important aquifers in the Western Annapolis Valley are the clean sandstones and conglomerates in the Wolfville Formation. Intergranular porosity in these rocks is still available for groundwater storage and transmission because the rocks are only partly cemented and result in large safe yields. Glaciofluvial deposits are more permeable and store more water per unit volume than any other hydrostratigraphic unit in the study area. The permeability of these deposits, for example, is from ten to one hundred times greater than that of the best aquifers in the Wolfville Formation, and the storage coefficient of sand and gravel deposits often approaches their specific yield.

NSE has a long term groundwater observation well (Coldbrook 081) in Coldbrook, at the provincial park on Park Street. This well has been in use since 1961, although only monitored since 2009. Prior to this, groundwater was monitored at a now decommissioned well (Coldbrook 001) which was monitored between 1965 and 1981. Coldbrook 081 is a 70.7m deep well drilled through overburden materials (sands and gravels) and into sandstone of the Wolfville HU. The average depth of water in 2011 was 12.57m above sea level. This well has been monitored since 2009 and water levels appear to have remained relatively consistent.

The NSE well database identified 73 wells constructed within a 1km radius of the site and 594 within 2km of the site. Of the 594 wells, all but 2 of the wells are drilled; depths range from 12

to 140 metres. All the drilled wells are bottomed in bedrock, which is mapped as the Wolfville HU. Of the 594 wells, 2 of the wells are dug; there is no recorded information other than elevation above sea level. A summary of these wells and their characteristics is provided in Table 6-4

Table 6-4. Summary of Well Construction Data.

HU	Well Depth	Casing Depth	Static Water Level	Estimated Yield
Wolfville n = 592	40 m	28.2 m	10.4 m	46.4 Lpm
Glaciofluvial n = 2	NA	NA	NA	NA

One of the most important characteristics of the hydrogeology of the site obtained from water well records is indicated by the depth of casing required in well construction. Casing lengths up to 28 metres were required to stabilize the wells. This indicates thicknesses of the unconsolidated glaciofluvial deposits may be as much as approximately 28 metres.

The pumping test database for large capacity wells and public water supplies was initiated in the 1960's. The latest version of this database was reviewed and all data sets for the Glaciofluvial HU and Wolfville HU near the site were interpreted and summarized. Five of these records are for wells constructed in the Wolfville HU and 3 were constructed in Glaciofluvial HU tested in close proximity to the site; this includes NS observation well Coldbrook 081. The average values of these data are included in Table 6-5.

Table 6-5. Summary of Pumping Data.

HU	Well Depth	Static Water Level	Pumping Test Rate	Apparent Transmissivity	Safe Yield
Wolfville n = 5	99.6m	4.2m	1248 m ³ /d	183 m ² /d	964 Lpm
Glaciofluvial/Alluvial n = 3	29.3m	3.5m	4669 m ³ /d	423 m ² /d	1748 Lpm

Water quality from the Wolfville and Glaciofluvial HUs is generally excellent. Water quality monitoring from the Coldbrook 081 observation well indicated that all parameters satisfied the Canadian Drinking Water Quality guidelines.

6.3.3.2 Predicted Environmental Effects, Proposed Mitigation and Monitoring

The undertaking will not alter or impact the groundwater resources (including any domestic wells) since operations will not extend into the groundwater table; sand excavation will extend to approximately 1 metre above the water table. Further, there will be no blasting at the site. Any additional inputs to the groundwater resource via recharge from surface water through the pit floor are expected to be minimal since the Cornwallis River is a local discharge point. However, accidental spills may occur in the pit.

To minimize any potential impacts to groundwater, the following mitigation measures will be implemented:

- ▶ All excavation will terminate approximately 1 metre above the local groundwater table.
- ▶ Employ progressive reclamation practices to minimize disturbed areas.
- ▶ Develop a Spill Response and Contingency plan to address any accidental spills (see Appendix 7).

6.3.4 Wetlands

6.3.4.1 Existing Conditions

A provincially mapped wetland is located on the eastern portion of the site. LVM Maritime conducted a site inspection to verify the wetland boundaries, and concluded that the actual wetland is larger than what appears on the provincial mapping (see Sheet 03 of 06, Appendix 6). The wetland boundaries were assessed and delineated in accordance with NSE protocols, and soil, hydrology and vegetation were assessed to determine the spatial extent of the wetland.

The wetland on the site is a treed swamp and floodplain adjacent to the Cornwallis River. The upland boundary of the wetland (western extent) was predominately a steep (>15% slope) natural forested escarpment that forms the back side of the ridge bounding the eastern side of the pit. At the time of the site assessment, one small naturally lower section of this ridge was breached. However, the Mr. Ells has since repaired the ridge, stabilized it with organics and topsoil, and seeded it with grasses.

No rare species were identified in the wetland.

6.3.4.2 Predicted Environmental Effects, Proposed Mitigation and Monitoring

The pit extension will not be in an eastward direction; the current ridge will be the extent of the pit working area on the eastern side of the site. Although no wetland setbacks were prescribed in the *Industrial Approval*, Mr. Ells recognizes the importance of wetlands and therefore, a setback of 30m will be maintained from the wetlands at the site. There are select areas along the current limit of the eastern working face that previously encroached slightly upon this 30m wetland setback, although they satisfy the prescribed watercourse set-back of 30m. At these locations, a 30m wetland buffer cannot be implemented. However, there will be no additional expansion eastward and the existing ridge will be the limit of the working face. Setbacks are identified on Figure 2 (Appendix 3).

6.3.5 Flora, Habitat and Species at Risk

6.3.5.1 Existing Conditions

A Botanical field survey was undertaken by Marbicon on June 3, 2014 (Appendix 8).

The property is situated within the 90,056 ha Natural Landscape 2: Annapolis Valley, characterized by lowlands that are near sea level. The property is also included in the 928 km²

Annapolis Valley Ecodistrict 610 which is described as an area of glaciofluvial outwash resulting in well drained sandy soil (NSDNR). The property itself is located on very deep deposits of pure sand, described ecologically as “sand barrens” which have sparse vegetation and little accumulated organic soil (DNR Ecodistrict Land Classification).

The current sand pit area is a 3.9-ha section of the 19-ha property, which is surrounded on the north by young regenerating forest consisting of red maple (*Acer rubrum*), gray birch (*Betula populifolia*), American beech (*Fagus grandifolia*), poplar (*Populus sp.*) as well as mature and seedling red pine (*Pinus resinosa*) and eastern white pine (*Pinus strobus*). The more recently cut areas included a significant dominance of gray birch. The southeast side of the property included a steep slope dominated by Eastern White Pine (*Pinus strobus*), Balsam Fir (*Abies balsamea*), Red Spruce (*Picea rubens*) and Eastern Hemlock (*Tsuga canadensis*). Yellow Birch (*Betula allegheniensis*) was occasional throughout the property. The understory was quite variable, depending on the shading and stand type. Typical herbaceous vegetation included common woodland plants such as Wild Lily-of-the-Valley (*Maianthemum canadense*), Wild Sarsaparilla (*Aralia nudicaulis*) and Northern Star-Flower (*Trientalis borealis*). The exotic weedy species (such as sweet fern (*Myrica aspleniifolia*)) were mostly along the access road and around the edge of the sand pit.

Much of the site has been heavily disturbed in the past, only small portions of the site (eastern) retain any of the original mature tree cover; the eastern side of the site (consisting of the wetland and vegetated buffer) will not be disturbed during any extension of the pit.

A complete listing of the floral species observed during the field survey is included in the botanical report (Appendix 8).

The Atlantic Canada Conservation Data Centre (ACCDC) provided information on recorded significant plant species and habitats found within a 5 km radius of the property; a copy of the ACCDC report is provided in Appendix 9. Most of the nearby species records were for riparian or wetland (or at least damp) sites adjacent to the Cornwallis River, and/or rich hardwoods. Review of the ACCDC list, indicates that the most likely species to be found on the subject site might include Pinebarren Golden Heather (*Hudsonia ericoides*), possibly in the sand barrens south of the sand pit). This species is reported to be abundant in the centre of the Annapolis Valley, but none were seen on site.

In summary, no rare or unusual species or habitats were identified during this survey.

6.3.5.2 Predicted Environmental Effects, Proposed Mitigation and Monitoring

The clearing of vegetation will be required for sand excavation in the northern portion of the site; there is only minimal vegetation in other areas of the proposed extension. The southeastern area will not be developed. No rare plants are present at the site.

To minimize the impacts to vegetation and to protect the adjacent vegetation and habitat features from being impacted from construction activities, the following mitigation measures will be implemented:

- ▶ Areas to be cleared and grubbed should be clearly marked to minimize the extent to be impacted.
- ▶ Employ progressive reclamation using native vegetation and seed mixes as soon as possible to re-establish vegetation growth in advance of future decommissioning activities.
- ▶ Minimize the active extent of disturbance for project.
- ▶ Vegetation clearing will be scheduled outside of the bird breeding season (April 1st to August 31st).

6.3.6 Fauna, Habitat and Species at Risk

6.3.6.1 Existing Conditions

A Wildlife Fauna and Habitat field survey was undertaken by Mr. John Wile on 21 May 2014 and 22 May 2014 (Appendix 10). The ACCDC provided information on recorded significant species and habitats found within a 5 km radius of the property. The Maritime Breeding Bird Atlas (MBBA) was also consulted for historical breeding bird information. Two separate site visits were conducted, one on the evening of May 21, 2014 and the other early the following morning. The field visits were focused on breeding birds, but observation of other fauna species and habitats were noted.

Most of the field work was directed at conducting breeding bird surveys, with observations of other wildlife fauna made simultaneously. A two hour evening survey was conducted focused mainly on Common Nighthawks or swallow species that might use the property or the airspace above it. Five 10-minute breeding bird point count sites were selected to represent all habitat types present. Breeding bird point count surveys were conducted in the early morning of May 22, 2014 within 3 hours after sunrise during light wind conditions and no precipitation. The 5 point counts were spaced far enough apart to avoid double counting of birds. A species list of birds and numbers of individuals observed is presented in Table 6-6. The bird count locations are provided on Sheet 02 of 06 (Appendix 6).

The property is situated relatively close to areas that are known to contain significant fauna species. The 5 km ACCDC search of historical records lists 30 vertebrate (1 fish, 29 birds) and 10 invertebrate fauna species considered to be rare or significant. While some of these are associated only with freshwater floodplain habitats, others could find the subject property's habitats suitable. The following is a discussion of observed and potential species associated with the property, by major groups.

Table 6-6. Breeding Bird Survey Point Count sites - Coldbrook Sand Pit, May 22, 2014.

Point Count #	Coordinates (NAD83 UTM20)		Location and Habitat Description
	Easting	Northing	
1	375170	4992789	North East corner of property, mixed forest, some mature pine
2	374958	4992790	North of existing pit, mature pine, second growth hardwood Regenerating mixed forest
3	374793	4992667	North West corner of property, young maple, birch and poplar stand
4	374742	4992517	South west corner of property, young deciduous trees, open shrub barren
5	375020	4992521	South East corner of property, mixed young forest and mature poplar, hemlock on slope to river

Birds

The bird species observed during the evening and early morning breeding bird survey are listed in the Fauna survey report (Appendix 10). There were 47 individual birds (from 20 species) observed. None of the observed species are currently considered significant or at risk.


There were 29 bird species that are considered significant that ACCDC records have reported within 5km of the property. Table 6-7 assesses the preferred habitat conditions for the ACCDC listed species, to determine the likelihood of them being present in the proposed expansion part of the property. The area east of the ridge was not considered during this habitat assessment since it will not be included in the project footprint.

Table 6-7. Habitat suitability for significant species of birds listed by ACCDC within 5km of the Site.

Common Name	Required or preferred Habitats ¹	Habitats present
American Bittern	freshwater Wetlands	No
Baltimore Oriole	mature deciduous and urban forests	No
Bank Swallow	eroding shorelines and cliffs	possibly in pit faces; no burrows observed
Barn Swallow	open areas near water	No
Bay-breasted Warbler	old mixed wood forest	No
Bobolink	Grasslands	No
Brown Thrasher	dense shrub and mixed forest edges	Yes
Brown-headed Cowbird	pastures and fields	No
Canada Warbler	mixed species forests with understory	Yes
Cliff Swallow	open fields and pastures near water	No
Common Nighthawk	pine barrens, clear cuts, burned over areas	Yes

Common Name	Required or preferred Habitats ¹	Habitats present
Eastern Bluebird	open fields and woodland edges	No
Eastern Kingbird	shrub forests near water	No
Eastern Phoebe	Urban forests and edges	No
Eastern Wood-Pewee	mature deciduous forest	No
Gray Catbird	dense undergrowth and second growth forests, hedge rows	Yes
Killdeer	breeds on land with cobble stone	No
Northern Cardinal	dense urban forest and vines	No
Northern Goshawk	more abundant in larger forest tracts	No
Olive-sided Flycatcher	cut over forest edges, open areas in forests	Yes
Pine Siskin	mixed forest near weedy fields	No
Red-breasted Merganser	tidal and fresh water	No
Rose-breasted Grosbeak	regenerating woodlands and edges	Yes
Scarlet Tanager	large undisturbed mixed forest	No
Spotted Sandpiper	shorelines of fresh and salt water	No
Tennessee Warbler	boreal forest	No
Vesper Sparrow	fields and low shrub areas	Yes (marginal)
Wilson's Snipe	wet fields and pastures	No
Yellow-bellied Flycatcher	boreal forest and bogs	No

¹ Cornell University <http://www.allaboutbirds.org/guide/search>

 Potential Habitat present

Note that the Peregrine Falcon is excluded from the list, but is included in the ACCDC report as a bird species that may be present. The property would not support breeding Peregrines, but they may be seen there by chance as they migrate or forage in the area.

Mammals

While no significant mammal species were recorded in the ACCDC 5km search, the property seems to be suitable habitat for some of the province's common terrestrial mammal species including: White-tailed Deer (*Odocoileus virginianus*), Porcupine (*Erithizon dorsatum*), Raccoon (*Procyon lotor*), Snowshoe Hare (*Lepus americanus*), Red Squirrel (*Tamiasciurus hudsonicus*), Eastern Chipmunk (*Tamias striatus*), Red Fox (*Vulpes vulpes*), Eastern Coyote (*Canis latrans*), Black Bear (*Ursus americanus*), and Red-backed Vole (*Myodes rutilus*). None of these mammal species would be totally dependent upon the habitats found on the property for all their life cycle requirements. The aquatic or semi aquatic mammals would only be found on the floodplain section of the property.

Reptiles

No significant reptile species are recorded in the ACCDC data search and no reptiles were observed during the survey periods. However it should be noted that the temperatures at that

time were only about 5 C, which probably limits cold blooded reptile activity to a great degree. Turtles may be present on the floodplain section of the property, but not likely to be found on the upland habitats. The ACCDC report suggests that Wood Turtles may be present within 5km of the property, but could not disclose the location, although reportedly, NSNR has observed wood turtles in this area. Again this would most likely be on the floodplain and not on the proposed project footprint. Turtles do prefer sandy soil sites near water as egg laying areas and those conditions do exist on the south eastern edge of this property.

Amphibians

It is not likely that the upland habitats (sandy well drained soil and young forest stands with little organic material) would be attractive to amphibians, although some of the forest dwelling species such as Wood Frogs and salamanders may find parts of the steep sloped and moister habitats next to the floodplain somewhat attractive. No frog or toad calls were heard during the evening survey, although temperatures were low. It is highly possible that Spring Peepers and American Toads both would use the floodplain wetland habitats on the property as breeding habitat. No significant amphibian species are listed on the ACCDC search.

Invertebrates

No invertebrate fauna were observed on the property during the May 2014 survey period. Cool temperatures along with the evening and early morning timing of the surveys would reduce the opportunity to observe these species, consisting mainly of butterflies and dragonflies in their adult flying form. The ACCDC search does identify 10 species of invertebrates within 5km of the property. Some of these are associated only with wetlands and flowing water habitats which are not present on the project footprint. However a few species of butterflies that would spend at least a part of their adult lifecycle in open or forested habitats could be found occasionally on the property. Of these, the Mustard White (*Pieris oleracea*) has been observed close to the property and could potentially be seen there under the right conditions. The lack of flowering shrubs and herbaceous plants would reduce the potential for the more common butterfly species from being present.

6.3.6.2 Predicted Environmental Effects, Proposed Mitigation and Monitoring

Habitat for significant mammal, amphibian, reptile, fish and invertebrate fauna does not seem to be present to any great degree on the proposed project footprint.

Wood Turtles (or snapping turtles) could potentially be found in the wetland, but could also be found using the adjacent forested ridge as a basking area, given its southern exposure. It is doubtful that wood turtles would intentionally use the sand pit itself for any reason.

The site preparation will remove existing young regenerating forest and open low shrub habitats; this associated habitat loss would force breeding bird and common mammal species to re-locate to nearby similar habitats. The mature forest at the site (east of the ridge) will not be disturbed.

These habitats are currently being used by common breeding bird species. These birds were heard singing on territory in late May indicating the strong possibility that nearby nesting will occur. Based on habitat preference, and since they have been observed with 5km of the property, there is the possibility that significant bird species (identified in Table 6-7) could use the property, although none were seen during the field survey period. Bank Swallows sometimes nest in the face of sand cliffs, both natural and manmade; however, no bank burrows were seen at this site during the survey period and may not use the site possibly due to disturbance. Common Nighthawks nest in open barren areas, but may avoid the area due to human activity. Other birds that prefer a young regenerating deciduous forest with thick undergrowth, such as the Brown Thrasher and Gray Catbird would find this suitable habitat.

It is not likely that this undertaking would have any landscape level impacts, since it does not appear to be a part of any travel corridor for wider ranging mammal species. The human activity and disturbance associated with a pit of any kind can impact wildlife use. Given that there is a much larger sand operation adjacent to the south and Highway 101 present to the north, human disturbance is already a factor.

To minimize the impact on nesting birds during site preparation, tree removal will not take place during the prime nesting and fledgling period, April 1st to August 31st. Where possible, pit faces in active areas will be left at angles of 70° or flatter. Any observed nests or colonies will not be disturbed until the fledglings have left the nests. There will be no storage and handling of fuels onsite. Equipment operators will be trained to recognize and avoid migratory birds that may occupy the site and made aware of possible interactions with wildlife, including birds. A copy of the training material is provided in Appendix 12.

The forested upland buffer (east side of the ridge) and wetland to the east of the pit are not a component of the project footprint; the area will be avoided and the forested ridge will remain in place. This forested buffer will mitigate impacts to fauna that use the wetland. Drift fence will be installed along the ridge, where there are less than 150m of separation between the Cornwallis River and eastern pit face, to discourage fauna from entering the pit. Equipment operators will be trained to recognize and avoid turtles that may lay eggs at the site and to relocate turtles that are traversing through the site. A copy of the training material is provided in Appendix 12.

6.3.7 Fish, Fish Habitat and Species at Risk

6.3.7.1 Existing Conditions

The endangered Atlantic Salmon, Inner Bay of Fundy population is recorded in the Cornwallis River; however, no fish habitat is present in the project footprint. Where the property abuts the Cornwallis River, is not part of the project footprint; the existing ridge along the eastern working face will be maintained as a buffer to the wetland and Cornwallis River.

The Cornwallis River flows beneath Ells Road and is crossed via a spanned bridge.

6.3.7.2 *Predicted Environmental Effects, Proposed Mitigation and Monitoring*

There is no fish habitat in the project footprint.

The bridge spanning the Cornwallis River is already in place and does not require any upgrades, since truck traffic volume will not significantly change. Surface water runoff is controlled via established and vegetated ditches and ditch water quickly infiltrates the ground surface due to the coarse-grain nature of the underlying soils, therefore, sediment transport is not anticipated. However, accidental spills may occur along Ells Road.

To minimize any potential impacts to fish habitat, the following mitigation measures will be implemented:

- ▶ Maintain the ridge along the eastern property boundary and immediately repair any breaches.
- ▶ Follow practices outlined in the latest version of the NSE *Erosion and Sedimentation Control Handbook for Construction Sites* and adjust surface water, erosion and sediment control measures accordingly if conditions change.
- ▶ Develop a Spill Response and Contingency plan to address any accidental spills (see Appendix 7).
- ▶ If any future upgrades to the bridge are required, consult with NSE and Fisheries and Oceans Canada for any required mitigation measures to protect the Cornwallis River water quality.

6.3.8 **Atmospheric Conditions/Air Quality**

6.3.8.1 *Existing Conditions*

The site is currently operating under an *Industrial Approval* for sand extraction on a 3.9 ha site. Dust is being generated by operations and emissions are being generated by on site trucks and heavy equipment. Dust is currently being managed by a combination of water application and vegetated buffers. Emissions are being managed by properly operating equipment.

The site is surrounded by other pit operations on the west and south sides, a forested buffer and Highway 101 to the north, and a forested ridge to the east, with tree-covered lands and low density residential housing farther to the east (approximately 180m from the project site).

6.3.8.2 *Predicted Environmental Effects, Proposed Mitigation and Monitoring*

Potential impacts to air quality may be caused due to airborne dust and engine emissions during site preparation and operations. There will be no blasting. Dust has the potential to negatively impact air quality with subsequent potential impacts to human health and flora (dust deposition). The disturbed area will be kept to a minimum as much as possible with progressive reclamation; impacts to air quality due to airborne dust and particulates will be negative, negligible in magnitude, occurring intermittently on a local scale.

Impacts to groundwater (and surface water along the Ells Road) may be affected by the application of dust suppressants.

There exists potential for negative air quality impacts due to emissions from equipment operating on-site during site preparation and operations. Vehicle and equipment exhaust emissions are anticipated to result in a potentially minor decrease in air quality on the site and a negligible decrease in air quality off the site. The site is in a rural location approximately 180m from the nearest neighbouring human receptor. Therefore the impacts to human receptors are expected to be minimal. These negative impacts will be of short term duration, potentially occurring on a continuous basis during working hours of sand excavation and transportation.

To minimize the impacts from site preparation and operations activities, the following mitigation measures will be implemented:

- ▶ Use water and/or other approved dust suppressants to reduce and manage dust levels. Oil or calcium chloride will not be used for dust suppression;
- ▶ Maintain and upgrade access roads (Ells Road) as required;
- ▶ Control vehicle speed on the site to control dust;
- ▶ Maintain the equipment in good working condition;
- ▶ Use properly sized and maintained equipment; idling of equipment and vehicles will be kept to a minimum;
- ▶ Re-vegetate exposed areas as soon as practical; and
- ▶ Post a sign indicating proponent contact information in case of concern or complaint.

With the mitigation measures the impact is anticipated to be negligible. Mr. Ells will conduct particulate monitoring on an “as required” basis through high volume sampling when requested by NSE.

6.3.9 Noise

6.3.9.1 Existing Conditions

The site is currently operating under an *Industrial Approval* for sand extraction on a 3.9-ha site. Noise is being generated by on site heavy equipment and on- and off-site truck transportation. Currently trucks, front end loaders and the occasional bull dozer are used at the site. The site and access road are also used by the operation to the south when transporting sand from the Lafarge pit on the east side of the Lovett Road to the adjacent Shaw and Keddy operations, so that truck traffic on the Lovett Road, Park Street and South Bishop Road is reduced.

Sound is expressed as a logarithmic basis, so the result of increasing a sound intensity by 2 (or doubling) is raising its level by 3 dBA and increasing sound intensity by a factor of 10 raises its level by 10 dB. Table 6-8 lists some normal outdoor sounds.

Table 6-8. Normal outdoor and construction sounds.

Activity	Noise Level (dBA)
Threshold of hearing	0
Normal conversation (1m)	60
Front End Loader (at 15m)	80
Automobile (60 km/h, at 20m)	80
Diesel truck (50 km/hr at 20m)	85
Lawn mower (at 1m)	110
Jet plane (at 30m)	130

The site is surrounded by other pit operations on the west and south sides, a vegetated buffer and Highway 101 to the north, and a forested ridge to the east, with tree-covered lands and low density residential housing farther to the east (approximately 180m away). The neighbouring property use will also contribute to existing noise in the area from activities such as road traffic (both local and highway traffic) and pit operations (extraction as well as processing).

6.3.9.2 Predicted Environmental Effects, Proposed Mitigation and Monitoring

Noise will be generated during site preparation and operations by the movement of vehicles and heavy equipment used on site. It may affect both wildlife and surrounding land users.

To minimize the impact to the wildlife during site preparation and operations, the construction and transportation equipment will be kept in good operating condition. Clearing and grubbing will occur outside nesting periods for birds.

The vegetated buffer to the north includes both lands of the site and the Highway 101 right-of-way. Property boundary set-backs (15m) will be implemented to the north, therefore, the vegetated buffer will serve to reduce noise along the highway corridor. Extension operations will not proceed any farther eastward. The forested ridge (and tree-covered lands farther east) already in place serves to reduce and mitigate any noise that may affect the residences along Lovett Road. Similar operations are already occurring at the adjacent sites to the west and south; no additional noise impacts are anticipated.

Operations at the project site will be limited to the daylight working hours (7:00 am – 8:00 pm); the anticipated additional noise due to is not expected to be greater than that already experienced site. The operations will not exceed the sound level exposure limits presented in the *NSE Guidelines for Pits and Quarries*, as presented below:

Table 6-9. NSE Sound Level Limits.

Time of Day	Time Period	Leq. Sound Level
Night*	23:00 to 07:00	55 dBA
Evening	19:00 to 23:00	60 dBA
Day	07:00 to 19:00	65 dBA

*Includes all day Sunday and Statutory Holidays

With the mitigation measures the impact will not increase over the current level of noise, and is anticipated to be negligible. Mr. Ells will conduct noise monitoring on an “as required” basis when requested by NSE. A sign will be posted indicating proponent contact information in case of concern or complaint.

6.4 Socio-Economic Environment

6.4.1 Existing Conditions

The project is located in Coldbrook, a Growth Centre community in the Municipality of the County of Kings (Municipality). Growth Centres were created as a planning designation in the 1979 Municipal Planning Strategy. They were intended to accommodate the majority of urban uses in the Municipality and were zoned accordingly. The vast majority of residential, commercial and industrial uses occur within the Growth Centres. Coldbrook lies between the larger Town of Kentville and Cambridge Growth Centre. Smaller hamlets (Lakeville) and rural areas are also present. The population of the Coldbrook area as reported by the Municipality of the County of Kings is presented in Table 6-10.

Table 6-10. Coldbrook Growth Centre population.

Year	Population	Percent change	
1986	1168		99.3%
1991	1838		
1996	2026		
2001	2189	4.2%	
2006	2234		
2011	2328		

Information obtained from Statistics Canada (2011 Census data) reveals that approximately 20% of the population is under 14 years of age, 68% between 15 and 65 years of age, and 12% older than 65 years of age. English is spoken by 95% of the population, French, aboriginal and non-aboriginal languages comprise the remaining 5%. The average family income for the area is \$68,976 (2006 Census date) per annum, this has increased from \$59,012 in 2001 and \$49,033 in 1996.

Since prior to 2000, sand has been extracted from the project site by previous owners and enterprises. Historic tree harvesting and minor agricultural uses have also taken place.

The project site currently leases a 3.9-ha area to Kynock Resources for sand excavation activity. This project will allow the lease to continue in the future, and will allow the same rate of sand extraction to continue for an extended period. This aspect of the project will maintain the current traffic loading northeast of the project site. Currently, approximately 15 trucks per week leave the site to the northeast via the private Ells Road and enter the public Lovett Road. Under the expansion plan, this level of activity will continue.

Currently, Ells Road (from Lovett Road) and the site are also used for thoroughfare by neighboring operations that transport sand from the Lafarge operation on the east side of Lovett Road to the Shaw and Keddy operations south and west of the project site. This private thoroughfare allows truck traffic on Lovett Road, Park Street and South Bishop Road to be minimized. Each winter for a five- to six-week period, there are approximately 120 truck trips per day that transport sand from the Lafarge operation through the project site to the adjacent sites.

Under the expansion plan, there will be additional sand extraction on the property, and any increased sand extraction to satisfy new customer demand will be trucked via internal roadways to neighbouring properties to the south and west for processing and transport to market as a construction material. Increased extraction at the project site is not expected to increase traffic loading on public roads, since it will coincide with decreased sand extraction and decreased associated thoroughfare from nearby sites.

There are no parks or formal recreation activities conducted in the immediate surrounding area. Local ATV or snowmobilers do use the Ells Road to cross the Cornwallis River. There is no formal land use agreement in place to provide access, although access is not restricted to these groups.

6.4.2 Predicted Environmental Effects, Proposed Mitigation and Monitoring

Economy

The socio-economic impacts of the pit will be limited due to its small scale of operations. Since the proposed expansion will extend the operation life of the pit, no new job creation is anticipated; however, existing jobs will be maintained, which would otherwise be lost if the extension did not occur and the pit was decommissioned.

The project is an important component of the natural resource sector and provides raw materials to the local construction industry in the area and surrounding counties.

Land Use

The land is currently used as a sand pit and the entire parcel is zone “resource extraction”; the land use or municipal zoning will not be changing. A well-established buffer is already in place along the eastern pit face; operations will not disturb this buffer or extend any further to the east. Properties to the south and west are also used as sand pits. There are no sight lines between the pit and both Highway 101 and the residential dwellings along Lovett Road due to the forested buffer on the north and east sides of the site; these forested buffers will be maintained. No land use impacts are anticipated. A sign will be posted indicating proponent contact information in case of concern or complaint.

Transportation

The volume of traffic on public streets is not anticipated to significantly increase from current conditions. No transportation impacts are anticipated.

Recreation and Tourism

Since the operational life of the pit is simply being extended, there are no anticipated recreation and tourism impacts.

Human Health

Future operations will be continuing from the existing operations; no new operations or technologies will be employed. There is potential for human health impacts to the onsite workers and to occupants of surrounding properties.

The proposed activities at the site are not hazardous in nature; however, there is potential for accidents. All workers will be trained to meet the requirements of the NS Occupational Health and Safety regulations.

The proposed mitigation measures to protect human health to surrounding occupants are the same as those for both Air Quality (Section 6.3.8) and Noise (Section 6.3.9).

6.5 Culture and Heritage

6.5.1 Existing Conditions

Davis MacIntyre and Associates Limited (Davis MacIntyre) conducted an archaeological resource impact assessment (ARIA) of the project site in 2014. A copy of the complete Davis report is included in Appendix 11. The assessment consisted of a background study and a reconnaissance of the study area. This assessment was completed under Category C Heritage Research Permit A2014NS011 issued by the Nova Scotia Culture and Heritage Development Division (NS Heritage). The ARIA conforms to the standards required by the Department of Communities, Culture and Heritage as specified under the guidelines of the Special Places Protection Act (*R.S., c.438, s.1.*).

A historic background study was conducted to understand the area's history and topography. This included consultation of historic maps and manuscripts at the Nova Scotia Archives as well as online resources. A field reconnaissance of the entire property was conducted by Stephen Davis and Laura de Boer on June 3, 2014.

The study area is located in the Valley region of the Triassic Lowlands (Natural Theme Region #610) (Figure 2.0L3). The Annapolis Valley extends from the eastern edge of St. Mary's Bay in the west to the mouth of the Cornwallis River in the east. The palaeo-geology here was comprised mainly of sandstones and basalts.

Two First Nations sites are known near the study area. The first, Mijiktook 1 (BgDdN03) is on a terrace above the Cornwallis River floodplain, and was identified when archaeological testing in 2009 yielded quartz and quartzite flakes resulting from lithic manufacture. No diagnostic artifacts were recovered during testing. The second site, Mijiktook 2 (BgDdN04) was also located during testing in 2009 and 2010. It is located on a slightly higher terrace, and is further inland from the Cornwallis River than would normally be expected for a First Nations

encampment site. Chert flakes and a possible ground slate tool fragment were recovered, but the lack of artifact density suggests that this was a single use site. Again, no diagnostic artifacts were recovered during testing. Test units were not excavated beyond 50cm in depth, and it appears that all artifactual material came from a maximum depth of 30cm. Historical maps and aerial photographs indicate that the study area, although surrounded by settlements and farms, saw little human activity in the nineteenth and twentieth centuries.

The reconnaissance began by relocating the three loci of known archaeological sites. All three loci were found to be distant from the rough pasture fence that currently delineates the eastern edge of the sand pit property. At this time there are no plans to impact the partially overgrown pasture portion of the property during the pit extension.

The sand pit is entered from an access road on its north side, curving south and leaving a small buffer of forested land between the pit and the fenced pasture. This small strip of forest shows signs of bulldozer or other heavy equipment activity prior to regrowth, as it undulates heavily and unnaturally through most of its north end. This area becomes more level to the south, where it passes a formerly proposed realigned right-of-way (ROW) subjected to the 2009 archaeological testing as marked by ROW stakes. The testing in this area did not yield any archaeological material.

The existing sand pit takes up a very large portion of the centre of the property, extending nearly to the edge of the Cornwallis River wetlands and floodplain in the southeast and up to the existing Shaw sand pit to the south. Near the southeast corner of the property, the existing pit does not reach as close to the wetland. A small remnant terrace, approximately 50m east-west by 70m north-south, appears to have remained relatively untouched between the sand pit and the wetland. An overgrown road forms the western boundary of this undisturbed area. Most of the western edge of the property, although covered in shrubs and small trees, had already been heavily impacted by the removal of the top layers of sand before regrowth occurred.

A combination of previous heavy disturbance and a significant amount of exposed soils has resulted in the identification of only one area of elevated archaeological potential within the study area. This oblong remnant of a terrace above the Cornwallis River wetland is approximately 50m by 70m, and is centred approximately at coordinates 20 T 375065 4992515. This area is depicted on Sheet 06 of 06 (Appendix 6).

The remainder of the property was either already heavily disturbed, or (in the case of the west corner) significantly distant from the Cornwallis River or any other navigable watercourse or historic roadway, and as such was not considered to be of elevated archaeological potential.

6.5.2 Predicted Environmental Effects, Proposed Mitigation and Monitoring

The identified area of moderate archaeological potential near the southeast corner of the property is located outside the project footprint. This area will be flagged in the field so that it can be avoided by all heavy equipment. If for any reason this area will be disturbed, it will be

subjected to archaeological shovel testing in accordance with provincial standards for areas of moderate potential. Shovel test units will be placed on a grid spaced ten metres apart across the entire area of undisturbed terrace.

During the course of the site preparation and operations, artifacts and archaeological resources may be encountered. The archaeological assessment of the project footprint indicated that there is a low potential for both archaeological and First Nations resources.

In the event that any archaeological material is encountered during activities, the following mitigation measures shall be implemented:

- ▶ All work activities in the area shall be stopped if an artifact/archaeological resource is encountered.
- ▶ The potential area of the find shall be marked to prevent any further disturbance.
- ▶ Contact the Coordinator of Special Places, Mr. Sean Weseloh-McKeane (902-424-6475), notify of the discovery and establish a suitable mitigation method.
- ▶ No further work at the site will be permitted until approval to proceed has been given by the NS Heritage.

6.6 Other Undertakings in the Area

Mr. Ells is aware of approximately 9 other pits within a 5 km radius of the site, of which 4 are active.

Significant cumulative project related effects in conjunction with other undertakings in the area are not likely to occur, given the nature of the project and implementation of mitigative measures that are outlined here-in.

7 EFFECTS OF THE UNDERTAKING ON THE ENVIRONMENT

The current site has operated as a sand pit under NSE *Industrial Approval* since 2004, and the spatial extents of the resource are nearly exhausted. Activities associated with the proposed pit extension and operation will be conducted in accordance with terms and conditions of this EA, an amended NSE *Industrial Approval*, and adherence to the NSE *Pit and Quarry Guidelines* and specific mitigative measures described in this assessment and all other applicable legislation, policies, and guidelines.

Assuming the mitigative, monitoring, and progressive rehabilitation measures specified in this report are implemented, and the pit is operated according to existing provincial guidelines and approvals, no significant adverse residual environmental or socioeconomic effects are likely.

Effects are expected to be of small magnitude, low frequency, short duration, and/or limited geographical extent. Continued operation of the pit will result in economic benefits, including

employment and an economic source of quality construction materials to local demand markets.

Environmental effects will include the loss of habitat within the proposed pit expansion area. The expansion area has been the subject of past logging and extraction activities.

A summary of the potential for significant adverse effects and the required mitigative measures is provided in Table 7-1.

Table 7-1 Summary of Impacts and Mitigation on Valued Environmental Components

VEC	PROJECT ACTIVITY	POTENTIAL IMPACT	MITIGATION	SIGNIFICANCE AFTER MITIGATION
Geology				
Surficial Geology Bedrock Geology	<ul style="list-style-type: none"> ▶ Clearing and Grubbing ▶ Site Operations 	<ul style="list-style-type: none"> ▶ Pre-contact first nations artifacts may be present in the shallow soils within the area of moderate archaeological potential 	<ul style="list-style-type: none"> ▶ The area of moderate archaeological potential will be excluded from the pit expansion. ▶ If future expansion into this area is contemplated, intrusive archaeological assessment will be conducted to verify that no artifacts are present. ▶ If any artifacts are encountered during sand excavation activities in other areas, the proponent will stop work and contact NS Heritage. 	Minimal, Not Significant
Surface Water				
	<ul style="list-style-type: none"> ▶ Clearing and Grubbing ▶ Site Operations 	<ul style="list-style-type: none"> ▶ Surface water (and associated sediment) may leave the site before it infiltrates through the pit floor ▶ Accidental spills may occur along Ells Road ▶ Accidental spills may occur in the pit 	<ul style="list-style-type: none"> ▶ Slope all working faces towards the pit floor. ▶ Maintain the natural ridge along the eastern property boundary and immediately repair any breaches. ▶ Employ progressive reclamation practices to minimize disturbed areas. ▶ If any effluent leaves the site, conduct total suspended solids (TSS) monitoring. ▶ Follow practices outlined in the latest version of the NSE <i>Erosion and Sedimentation Control Handbook for Construction Sites</i> and adjust surface water, erosion and sediment control measures accordingly if conditions change. ▶ Develop a Spill Response and Contingency plan to address any accidental spills. 	Minimal, Not Significant
Groundwater				
	<ul style="list-style-type: none"> ▶ Site Operations 	<ul style="list-style-type: none"> ▶ Accidental spills may occur along Ells Road ▶ Accidental spills may occur in the pit 	<ul style="list-style-type: none"> ▶ All excavation will terminate approximately 1 metre above the local groundwater table. ▶ Employ progressive reclamation practices to minimize disturbed areas. ▶ Develop a Spill Response and Contingency plan to address any accidental spills. 	Minimal, Not Significant

VEC	PROJECT ACTIVITY	POTENTIAL IMPACT	MITIGATION	SIGNIFICANCE AFTER MITIGATION
Wetlands	<ul style="list-style-type: none"> ▶ Clearing and Grubbing ▶ Site Operations 	<ul style="list-style-type: none"> ▶ None 	<ul style="list-style-type: none"> ▶ Setback of 30m will be maintained from the wetland at the site. There are select areas along the current limit of the eastern working face that previously encroached slightly upon this 30m wetland setback, although they satisfy the prescribed watercourse setback of 30m. At these locations, a 30m wetland buffer cannot be implemented. However, there will be no additional expansion eastward and the existing ridge will be the limit of the working face. 	Minimal, Not Significant
Flora				
Habitat Species at Risk	<ul style="list-style-type: none"> ▶ Clearing and Grubbing 	<ul style="list-style-type: none"> ▶ Vegetation will be removed 	<ul style="list-style-type: none"> ▶ Areas to be cleared and grubbed should be clearly marked to minimize the extent to be impacted. ▶ Employ progressive reclamation using native vegetation and seed mixes as soon as possible to re-establish vegetation growth in advance of future decommissioning activities. ▶ Minimize the active extent of disturbance for project. ▶ Vegetation clearing will be scheduled outside of the bird breeding season (April 1st to August 31st). 	Low, Not Significant
Fauna				
Habitat Species at Risk	<ul style="list-style-type: none"> ▶ Clearing and Grubbing ▶ Site Operations 	<ul style="list-style-type: none"> ▶ Habitat (vegetation) will be removed; this associated habitat loss would force breeding bird and common mammal species to re-locate to nearby similar habitats ▶ Disturbance 	<ul style="list-style-type: none"> ▶ To minimize the impact on nesting birds during tree clearing, tree removal will not take place during the prime nesting and fledgling period, April 1st to August 31st. ▶ Where possible, pit faces in active areas will be left at angles of 70° or flatter. Any observed nests or colonies will not be disturbed until the fledglings have left the nests. ▶ Equipment operators will be trained to recognize and avoid migratory birds that may occupy the site. ▶ The forested upland buffer (east side of the ridge) and wetland to the east of the pit are not a component of the project footprint; the area will be avoided and the vegetated ridge will remain in place. This forested buffer will mitigate impacts to fauna that use the wetland. Drift fence will be installed along the 	Minimal, Not Significant

VEC	PROJECT ACTIVITY	POTENTIAL IMPACT	MITIGATION	SIGNIFICANCE AFTER MITIGATION
			<p>ridge, where there are less than 150m of separation between the Cornwallis River and eastern pit face, to discourage fauna from entering the pit.</p> <ul style="list-style-type: none"> ▶ Equipment operators will be trained to recognize and avoid turtles that may lay eggs the site and to relocate turtles that are traversing through the site. ▶ There will be no storage and handling of fuels on-site. Equipment operators will be made aware of possible interactions with wildlife, including birds. 	
Fish Habitat Species at Risk	<ul style="list-style-type: none"> ▶ Site Operations 	<ul style="list-style-type: none"> ▶ Surface water (and associated sediment) may leave the site before it infiltrates through the pit floor ▶ Accidental spills may occur along Ells Road 	<ul style="list-style-type: none"> ▶ Maintain the ridge along the eastern property boundary and immediately repair any breaches. ▶ Follow practices outlined in the latest version of the NSE <i>Erosion and Sedimentation Control Handbook for Construction Sites</i> and adjust surface water, erosion and sediment control measures accordingly if conditions change. Develop a Spill Response and Contingency plan to address any accidental spills. 	Minimal, Not Significant
Air Quality	<ul style="list-style-type: none"> ▶ Clearing and grubbing ▶ Site Operations 	<ul style="list-style-type: none"> ▶ Generation of dust disturbing the natural environment and local land users ▶ Impacts to groundwater (and surface water along Ells Road) from the application of dust suppressants ▶ Negative air quality impacts due to emissions from equipment operating on-site and trucks transporting on- and off-site 	<ul style="list-style-type: none"> ▶ Use water and/or approved dust suppressant to reduce and manage dust levels. Oil or calcium chloride will not be used for dust suppression; ▶ Maintain and upgrade access roads (Ells Road) as required. ▶ Control vehicle speed on the site to control dust. ▶ Maintain the equipment in good working condition. ▶ Use properly sized and maintained equipment; idling of equipment and vehicles will be kept to a minimum. ▶ Re-vegetate exposed areas as soon as practical to minimize dust potential. ▶ Post a sign indicating proponent contact information in case of concern or complaint. 	Minimal, Not Significant

VEC	PROJECT ACTIVITY	POTENTIAL IMPACT	MITIGATION	SIGNIFICANCE AFTER MITIGATION
Noise	<ul style="list-style-type: none"> ▶ Clearing and grubbing ▶ Site Operations 	<ul style="list-style-type: none"> ▶ Noise will be generated during site preparation and operations by the movement of vehicles and heavy equipment used on-site and transporting on- and off-site. It may affect both wildlife and surrounding land users. 	<ul style="list-style-type: none"> ▶ Construction and transportation equipment will be kept in good operating condition. ▶ Clearing and grubbing will occur outside nesting periods for birds. ▶ Operations at the project site will be limited to the daylight working hours (7:00 am – 8:00 pm). ▶ Operations will not exceed the sound level exposure limits presented in the <i>NSE Guidelines for Pits and Quarries</i>. ▶ A sign will be posted indicating proponent contact information in case of concern or complaint. 	Minimal, Not Significant
Socio-Economic				
Human Health	<ul style="list-style-type: none"> ▶ Clearing and grubbing ▶ Site Operations 	<ul style="list-style-type: none"> ▶ Accidents ▶ Noise (discussed above) ▶ Air quality (discussed above) 	<ul style="list-style-type: none"> ▶ All workers will be trained to meet the requirements of the NS Occupational Health and Safety regulations. ▶ A sign will be posted indicating proponent contact information in case of concern or complaint. 	Minimal, Not Significant
Culture and Heritage	<ul style="list-style-type: none"> ▶ Clearing and grubbing ▶ Site Operations 	<ul style="list-style-type: none"> ▶ Artifacts and archaeological resources may be encountered ▶ Area of Moderate archaeological potential is located east of the project site 	<ul style="list-style-type: none"> ▶ All work activities in the area shall be stopped if an artifact/archaeological resource is encountered. ▶ The potential area of the find shall be marked to prevent any further disturbance. ▶ Contact the Coordinator of Special Places, Mr. Sean Weseloh-McKeane (902-424-6475), notify of the discovery and establish a suitable mitigation method. ▶ No further work at the site will be permitted until approval to proceed has been given by the NS Heritage. ▶ Area of moderate potential will be flagged in the field so that it can be avoided by all heavy equipment. If for any reason this area will be disturbed, it will be subjected to archaeological shovel testing in accordance with provincial standards for areas of moderate potential. Shovel test units will be placed on a grid spaced ten metres apart across the entire area of undisturbed terrace. 	Low, Not Significant

8 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

The environment can have an impact during both the site preparation and operational phases of the project through climate change and meteorological events.

Given the spatial and temporal boundaries of the undertaking, climate change through increased severity of precipitation events is not anticipated to be a concern since there are no permanent constructed features and no water features within the project footprint that would be subject to flooding from increased water levels. Although Ells Road does span the Cornwallis River, there are several metres of clearance between the existing water level and the bottom of the bridge deck. Should water levels in the Cornwallis River significantly rise, bridge upgrades will be undertaken.

Short duration rain precipitation events may temporarily halt sand excavation activities; however, no winter excavation activities are anticipated and therefore the project will not be affected by blizzards. Given the coarse-grained nature of the sand and the ridges that direct any surface water back towards the pit floor, erosion and sediment control from heavy precipitation events is not anticipated to impact the project. Heavy wind events can also mobilize fugitive dust; however, the vegetated buffers in place would mitigate transport off-site.

9 REGULATORY FRAMEWORK

The development of the site requires the following regulatory approvals:

- ▶ NSE Industrial Approval to Construct and Operate under the *Activities Designation Regulations* (Section 66 of Environment Act) ; and
- ▶ NSE Class I Environmental Assessment under the *Environmental Assessment Regulations* (Section 49 Environment Act).

As previously noted, Mr. Ells already has an operating NSE *Industrial Approval* for a pit less than 4 hectares in area. The local NSE office has advised the proponent that the *Approval* can be amended to include a larger working area once the project has satisfied the requirements of the *Environmental Assessment Act*.

There are no watercourses on the proposed working area of the site, and there will be no water discharges from the site. Therefore, no permits are required from Fisheries and Oceans Canada. There are no other habitats or land use constraints at the site that would require Federal regulatory approvals.

The undertaking will also operate following the most recent versions of NSE *Pit and Quarry Guidelines*, *Guidelines for Environmental Noise Measurement and Assessment*, and *Erosion and Sedimentation Control Handbook for Construction Sites*.

10 LAND OWNERSHIP AND PROJECT FUNDING

The 19 ha (47 acre) property is owned by the proponent (Rufus Ells, 3048483 Nova Scotia Limited); a portion is currently (and will continue to be) leased to Kynock Resources for sand extraction. The project will be privately funded by Mr. Ells and will not include any outside funding from either provincial or federal agencies.

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