Environmental Assessment

Sand Pit Expansion,
Blair Road, Waterville, NS

Shaw Group
Final Report
Reference no. 1901066.028

May 18, 2023

Shaw Group
1901066.028

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NSE, 2009. Guide to Preparing an Environmental Assessment Registration Document for Pit and Quarry Developments in Nova Scotia.

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1 Introduction

1.1 Overview

The Shaw Group Limited (the proponent) is proposing an expansion of an existing small sand pit located at the end of Blair Road in Waterville, 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 the Shaw Group Limited (Shaw) to continue with current sand extraction activities and sales.

1.2 Proponent Information

The proponent is The Shaw Group Limited. Nova Scotia Sand and Gravel (owner of PID No 55071898) is owned by Shaw. The Nova Scotia (NS) Registry of Joint Stocks information is provided in Appendix A. Contact information is provided below:

Proponent:	The Shaw Group Limited
Proponent CEO:	Dean Robertson
Proponent Contact:	Stephen Warren, P.Geo.
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Signed this 18th day of May, 2023

Dean Robertson
CEO
The Shaw Group Limited

2 Undertaking

2.1 Name of Undertaking

The Shaw Group Limited proposes to expand the area of a sand pit which is currently under operation (NSE 2008-060956-02). This project is referred to as the Blair Road Pit Expansion.

2.2 Location and Adjacent Land Use

The project site is located on private lands, west of the Blair Road and south of Parker Condon South Branch Road in Waterville, Kings County, NS, as shown on Figure 2-1. The project site is comprised of two parcels owned by Shaw (PID Nos. 55071898 and 55492508) and approximately 15 hectares (ha) of leased lands (portions of PID Nos. 55377451 and 55377550) owned by the Visser family.

The properties are approximately 31.8 ha in combined land, and the there is approximately 19.28 ha of commercial sand. Portions are currently used as:

— An active sand pit (smaller than 4 hectares)

— agricultural fields (corn)

— previous sand pit activity (now partially revegetated)

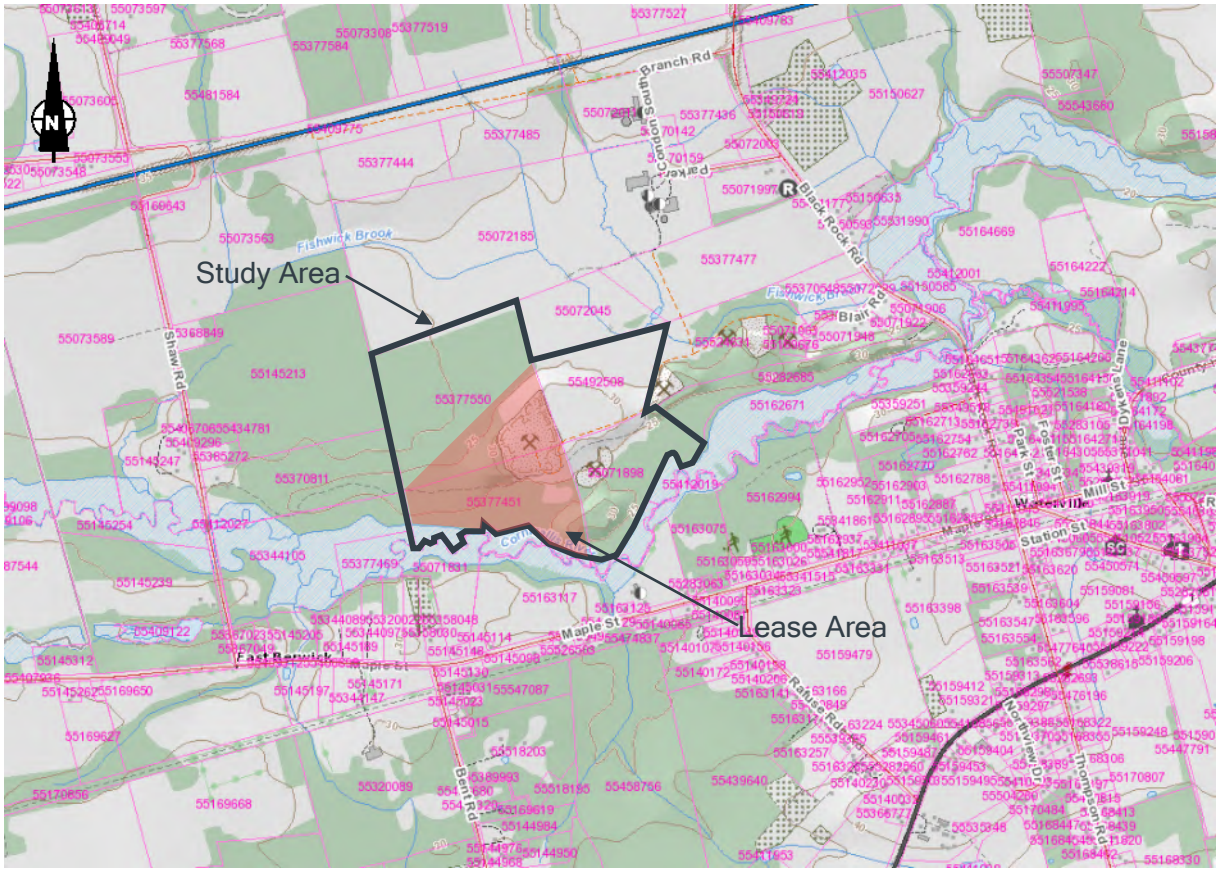
— forest

The coordinates of the project site are approximately 4990500N, 366570E (UTM 20 NAD83). The Project Footprint is accessed by private roads; through a deeded right of way over lands owned by Ledge Rock Construction (private road extending from Blair Road) or through private farm roads at the Visser's Farm.

Based on the local topographic contours (from Google Earth digital terrain mapping and NS Digital Topographic Map 1:10,000 series), the site is relatively flat and slopes downward to the north (towards Fishwick Brook) and to the south (towards Cornwallis River).

The site is located in a predominately un-inhabited area with neighbouring land uses for purposes other than residential development. Based on review of the Study Area on the Service Nova Scotia and Municipal Relations (SNSMR) website, the site and most of the surrounding properties, including the properties on the immediate south side of the Cornwallis River, are classified as farm and/or forest resource. Some properties on the Blair Road (farther to the east) and the Shaw Road (farther to the west), are classified as residential. The nearest residential dwelling is located approximately 500m from the project site (at Civic No. 2 Blair Road). The project site is separated from the residential areas by other commercial lands (Ledge Rock Construction), wetland and the Cornwallis River, agricultural lands and forested buffers; the pit is not visible from any residential property, nor any public road.

Figure 2-1 Site Location



3 Scope

3.1 Nature of the Undertaking

Shaw intends to continue to use the Project Site for the purpose of extracting commercial sand. No blasting nor extraction below the water table is proposed. For the purposes of this assessment, commercial sand is best described as medium- to coarse-grained sand with a gradation of particle sizes that maximizes the production yield of saleable products for use in the construction industry and other market sectors. The intent is to extract commercial sand and avoid areas that contain excessive amounts of fines (silt and clay sized particles).

Approximately of 195,000 tonnes of commercial sand had been removed from the pit since 2004. Shaw (formerly known as Nova Scotia Sand and Gravel) purchased a portion of the Project Site in 1989. Sand extraction began in the mid-1990s, and in 2008, Shaw purchased an additional portion of the Project Site from the Vissers to expand the original pit. Prior to acquisition, these lands had already been tree-cleared and farmed for the previous 25 years.

The existing pit has operated under Nova Scotia Environment and Climate Change (NSE) *Industrial Approval* No. 2008-060956-02 (expires February 28, 2030); a previous Approval was in force prior to 2008. A copy of the Approval is provided in Appendix B. As a term and condition of the current Approval, the current active area must not exceed 3.997 ha. Also, since the pit is nearing the limits of the existing Approval (pit smaller than 4 ha), as a term and condition of the Approval, Shaw must

either submit an application for Environmental Assessment Approval for expansion of the active area on PID No. 5507898 or submit a rehabilitation plan.

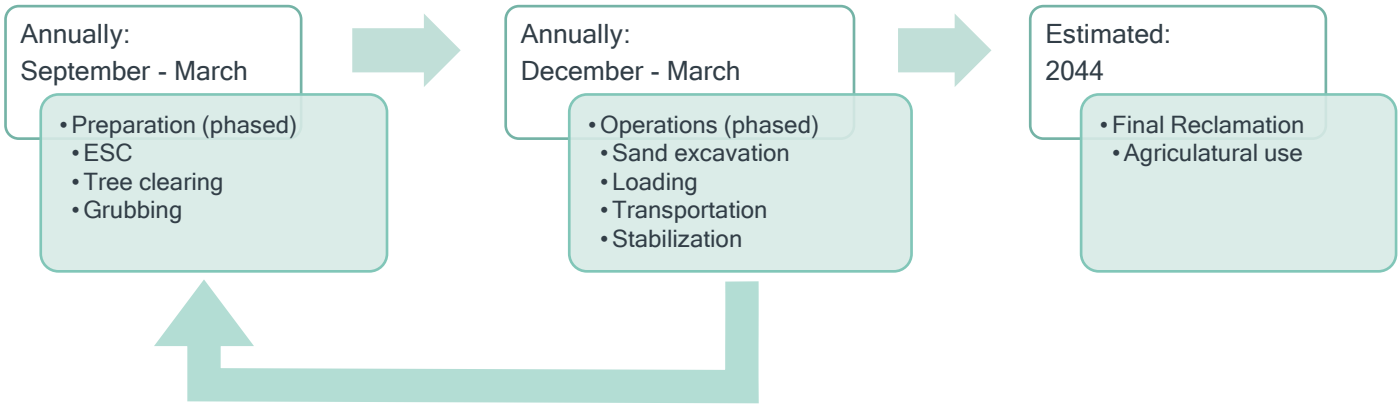
An extension of the existing pit is required to continue commercial sand extraction. Schedule A (Appendix B) illustrates the Study Area. The proposed area available for sand removal consists of approximately 16.8 ha over the Shaw lands (PID Nos. 55071898 and 55492508) and 15 ha over the leased Visser lands (PID Nos. 55377451 and 55377550); 31.8 ha total, although not all of the sand present in the 31.8 ha is characterized as commercial sand. Following baseline studies, the actual sand extraction area (Project Footprint) was adjusted to maximize extraction of commercial sand, minimize the disturbance of non-commercial sand and respect other environmental constraints. The Project Footprint is presented on Figure 1, Appendix C.

For the proposed Project it is anticipated that excavation will be to within 1 metre (m) above the water table. The proposed sand extraction amount is estimated to be between 30,000 and 75,000 (metric) tonnes per year. The expected lifespan of the project is approximately 20 years. At the end of the commercial sand extraction, the lands (including the Shaw lands) will be used by the Visser family for agricultural purposes.

There are no temporary nor permanent facilities proposed for the Project Site. Commercial sand would be excavated and loaded directly to trucks for transportation to the nearby Shaw Keddy facility in Coldbrook for processing at the wash plant. Some onsite sorting of material using a portable screener may occur, based on the insitu conditions. Stockpiles of overburden and non-commercial sand will be present and reserved for final reclamation. There will be no permanent on-site stockpiles of commercial sand and there will be no on-site processing of commercial sand. All sand processing (which consists of washing and classifying) occurs at the Shaw Keddy facility in Coldbrook, which has the appropriate Approvals in place for that activity.

The truck activities between the Project Area and the Shaw Keddy facility includes a transportation route of approximately 9.2 km along public roadways.

The project schedule is flexible, based on the timing of the various Environmental Approvals. It is expected that site preparation can commence in fall of 2023, with extraction activities occurring seasonally on an annual basis until the extraction target is met. All stages of the Project will be phased to limit the active disturbance areas. A generalized schedule of activities is presented below.



3.2 Purpose and Need of the Undertaking

The Project will contribute to the natural resource sector of the economy and provides essential raw materials to the province's construction industry.

By operating smaller satellite extraction-only sand pits, Shaw is able to reduce land use conflicts though smaller durations and footprints and reduce environmental effects related to operations by

centralizing sand processing (wash plants, etc.) at one location and not many. Accordingly, this undertaking is proposed to be extraction (and export) only.

The primary purpose of the proposed undertaking is to provide a source of high quality raw feed material required to make a variety of washed sand products at the Shaw Keddy facility (in Coldbrook). This includes sands for concrete, septic fields, golf courses and other uses in the construction and agriculture sectors in the local area, Halifax, and other parts of the province.

This project will support the Keddy facility and provides direct and indirect employment for its workers and suppliers, as well as for the transportation and construction industries. The current project is required to extend the reserves and production at the existing Keddy facility by approximately 4 years. The project will also support the local land owner (Visser) through royalty payments, with future plan to transfer the land to the Visser family for agricultural use. The current topography of the site is not completely suitable for agricultural use without some levelling and tree-clearing; the project will ultimately provide additional lands that are suitable to be used for agriculture. The Visser family could (at their own cost) tree-clear and level the lands now, without any regulatory approval, however this project will benefit both Shaw and the Visser family, and ensure that mitigation measures are implemented to best protect the environment.

The Keddy facility has made a significant contribution to the local economy with employment of approximately 15 people (full time and seasonal) on an annual basis and has paid over 2.5 million dollars in wages, royalties, fees and taxes over the last 5 years, and more previously. A large proportion of these local earnings are expected to go directly back into the economy of the area.

The Shaw Group Limited is one of Eastern Canada's leading community developers, residential builders and natural resource manufacturers. Shaw Resources, which operates the Keddy facility, is the leading supplier of industrial and specialized bulk and bagged aggregates with an expansive distribution network. Its products are widely used across Atlantic Canada and into Quebec.

3.3 Project Alternatives

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

The Project site is land-locked with an established right-of-way extending from the end of Blair Road. A secondary access is through the Visser's farm; there are no other access points to the site.

The undertaking methodology will involve sand excavation above the groundwater table only; there will be no washing, processing or permanent stockpiling of the commercial 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, which does not achieve the same outcome. 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 3.997 ha. The Vissers could then immediately prepare the area (clear and level) for agricultural use.

3.4 Other Undertakings in the Area

The Shaw Group is aware of approximately one other sand pit and no other industrial activities within a 1km radius of the Project Footprint:

– Blair Road, <1ha active area, operated by Ledge Rock Construction Ltd.

Based on review of available NSE Industrial Approvals (in Kings County) in January 2023, within 5km of the site, the following industrial activities were identified:

– Bond Road, pit >4ha, operated by Twin Mountain Construction Limited (NSE 2006-055194-02)
– Randolph Road, Tire Manufacturing, operated by Michelin North America (NSE 2009-065846-07)

Review of the *NSE Environmental Assessment Project Registry* in January 2023 has revealed no provincial projects (that require environmental assessment) registered near the Project Footprint.

Review of the *Canadian Impact Assessment Registry* in January 2023 has revealed no federal projects (that require environmental assessment) within 15km of the Project Footprint; there are federal projects at CFB Greenwood and Aldershot, more than 15km and 10km, respectively, away.

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

3.5 Land Ownership and Project Funding

The 31.8 ha project area is owned by the proponent (The Shaw Group Limited and/or its subsidiaries) and the Visser family; portions of the Visser land are leased (and will continue to be) to Shaw for sand extraction. The project will be privately funded by Shaw and will not include any outside funding from municipal, provincial or federal agencies.

3.6 Scope of the Environmental Assessment

This Environmental Assessment (EA) document has been prepared in conjunction with the Shaw Group, the Visser family, as well as review of the following:

— NSE *Environmental Assessment Regulations*
— 2018 *Nova Scotia Environment A Proponent's Guide to Environmental Assessment*
— 2009 *Guide to Preparing an EA Registration Document for Pit and Quarry Developments in Nova Scotia*
— 1999 *Nova Scotia Department of the Environment Pit Quarry Guidelines*
— 2011 *Nova Scotia Environment Guide to Considering Climate Change in Environmental Assessments in Nova Scotia*
— 2005 *Nova Scotia Environment Guide to Addressing Wildlife Species and Habitat in an EA Registration Document*
— 2021 *Nova Scotia Environment and Climate Change Contingency Planning Guidelines*

The Environmental Assessment 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 measures or best management practices that can be used or implemented to reduce the impacts
— Determining and characterizing the residual environmental effects and their significance
— Developing monitoring measures

The scope of the assessment has been determined based on the proposed Project components and activities, the existing environment, stakeholder/regulatory consultations and regulatory framework, and on the associated identification of, and evaluation of the potential for the Project to interact with the VECs following mitigation. Additional detail on each of these factors is provided in Section 7.2. Potential environmental effects were evaluated for each of the Project phases for VECs that include:

- Surficial and bedrock geology
- Surface Water resources
- Groundwater Resources
- Wetlands
- Species at Risk
- Flora, Birds and other Wildlife
- Fish and Fish Habitat
- Air quality and Noise
- Socio-economic considerations, including land use, transportation, and human health
- Culture and Heritage

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.

The spatial boundaries of the assessment examine both a regional and local Study Area based on potential nature of the VECs.

- The regional Study Area reflects the regional atmospheric area, transportation to the processing facility, and the communities connected to the proposed Project.
- The local Study Area focuses on the Study Area and Project Footprint associated buffers in relation to VECs on-site, as well as within the local watershed (for hydrogeologic considerations and sensitive downgradient receptors).

The temporal boundaries include a proposed 2023 Project initiation through to a potential long-term reclamation completion by 2044.

4 Mi'kmaq and Public Engagement

Public consultation for Class I Undertakings for Pit and Quarry developments is not a mandatory component, except for announcing the release of the EA report to the public and noting that the public may submit written comments to the provincial Administrator within 48 days following the date of publication of the notice. Notice shall be published in the Royal Gazette, in one newspaper having general circulation in the community of the Project and in one newspaper with province wide circulation. Notices can also be published in municipal buildings, post office or public buildings, in absence of a local newspaper.

Shaw will post notice in the Halifax Herald and Annapolis Valley Register, in accordance with the required timelines. Confirmation will be provided to NSE.

Shaw recognizes that public consultation for the project will proactively obtain valuable input from an engaged community and nearby First Nations. Shaw has operated in this area of Nova Scotia for more that 40 years and has forged relationships with many community stakeholders.

Shaw is committed to engaging with First Nation communities and organizations throughout the life of the Project and sharing findings of all cultural or other valued environmental components. During past projects, groundwater resources, noise and transportation have generated greater community discussion. Therefore, Shaw has proactively focussed on these VECs during the process, so results could be shared with the affected stakeholders. During the assessment process, Shaw has actively engaged neighbouring stakeholders to share information and to understand what other concerns may be important to the stakeholders. The goal was to proactively identify concerns regarding adverse effects or environmental effects; and, to identify means that Project concerns may be addressed, as applicable.

Therefore, in addition to the notice provided in the Halifax Herald and Annapolis Valley Register, the following activities were conducted with respect to involving the public:

- Regular meetings and information sharing with the Visser family
- Hand delivered Project Description to the neighbours immediately abutting the access road.
- Letter of Introduction and Project Description to the Annapolis Valley First Nation
- Letter of Introduction and Project Description to the Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO).
- Letter of Introduction and Project Description to the Confederacy of Mainland Mi'kmaq
- Discussion with local government agencies including:
  - NS Natural Resources and Renewables (NSNRR), NSE and NS Communities, Culture and Heritage.

Further details are provided in the following sections.

4.1 Mi'kmaq

On March 22, 2023, a letter of introduction and brief description of the project was sent to Band Chief Gerald B. Toney via Canada Post. The Lands Department of KMKNO and Ashley Childs, Director of Environment & Natural Resources at Confederacy of Mainland Mi'kmaq, were copied on the letter. No response has been received from the Annapolis Valley First Nation, KMKNO nor the Confederacy of Mainland Mi'kmaq.

As well, as part of the Heritage Research Permit(s) required for the Archaeological Screening, the archaeological consultant (Davis MacIntyre) sent an information request for the Project Site to the KMKNO.

A copy of all correspondence is provided in Appendix M.

4.2 Neighbouring Land Owners

The Visser family has been engaged throughout the entire process; many of the family members reside along Parker Condon South Branch Road and the farm operates from the Parker Condon South Branch Road. Regular meetings sharing the results of the assessment have occurred between family representatives, the Proponent and the Environmental Consultant.

A letter of introduction and brief description of the project was hand delivered to the residents along Blair Road, since they would be most affected by the transportation route. The Shaw Group operations manager, Proponent Contact personally made the deliveries, and discussed the Project with homeowners who were at home at the time of the March 22, 2023, delivery. This engagement was not

conducted along the entire transportation route (Black Rock Road, Highway 1 and South Bishop Road) since these routes already exhibit some level of commercial traffic and the traffic analysis identified no net change. Contact information for questions was provided in the introduction letter.

To date, there has been no contact other than verbal communications with select residents on March 22, 2023.

A copy of the information provided, and a summary of the neighbouring properties contacted is provided in Appendix M.

4.3 Government Agency

During preparation of the EA document, Englobe and Shaw contacted representatives from the EA branch to inform the EA branch of the project and request a meeting to formally introduce the project to NSE and other provincial government stakeholders. Follow-up meetings were held with both the NSE EA officer, NSE EA branch manager, as well as a larger stakeholder group including the NSE regional compliance branch (Kentville), NSE regional hydrogeologist, Office of L'nu Affairs (OLA) consultation adviser and NSE business relationship manager to discuss the EA findings.

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

During the Archaeological Assessment, Davis MacIntyre (on behalf of the Proponent) sent copies of all Archaeological reports to NS Communities, Culture and Heritage for review. No concerns were identified, and the reports and associated archaeological mitigation measures were accepted. Prior to registration of the EA document, Englobe contacted NS Communities, Culture and Heritage to verify the content of the Archaeological Reports that should be included in the EA document.

A summary of contact for the project is presented in Table 4-1.

Table 4-1 Summary of contact

Office	Name	Role
NSE, EA Branch	Bridget Tutty	Manager, EA Branch
NSE, EA Branch	Helen McPhail	Supervisor, EA Branch
NSE, EA Branch	Jeremy Higgins	EA Officer
NSE, EA Branch	Mark McInnes	EA Officer
NSE, Compliance Branch	Michael Haverstock	District Engineer
NSE, Compliance Branch	Krista Ogletree	Compliance Officer
NSE	Lanying Zhao	Regional Hydrogeologist
NSE, Regional Integration of Compliance and Operations	Lynda Weatherby	Business Relationship Manager
CCH	John Cormier	Coordinator, Special Places
NSNRR, Wildlife Division	Donna Hurlburt	Manager of Biodiversity
NSNRR, Wildlife Division	Sarah Spencer	Species at Risk Biologist
OLA	Kendra Gorveatt	Consultation Advisor

5 Description of the Undertaking

5.1 Geographic Location

The Project Footprint is located on PID Nos. 55492508 and 55071898 (Shaw) and portions of PID Nos. 55377550 and 55377451 (Visser) on the south side of Highway 101, between Black Rock Road and Shaw Road in Waterville, Kings County, NS, as shown on Figure 2-1. The community of Waterville is located between the larger communities of Berwick and Coldbrook. The coordinates of the site are approximately 4990500N, 366570E (UTM 20 NAD83).

The Project Footprint will occur on Shaw Lands and the leased portions of the Visser Lands. Site plans are provided in Appendix C, and larger regional scale maps (in support of the VEC assessment) are provided in Appendix D. The Project Footprint is accessed by private roads; through a deeded right of way over lands owned by Ledge Rock Construction (private road extending from Blair Road) or through private farm roads at the Visser's Farm.

As noted in Section 2.2, the site is located in a predominately un-inhabited area with neighbouring land uses for purposes other than residential development. The community of Berwick is supplied municipal water, although areas outside the service area rely on private potable water wells.

5.2 Climate Setting

The proposed Project site is located in the Valley and Central Lowlands ecoregion (600) and Annapolis Valley ecodistrict (610). It is sheltered from direct coastal influences, promoting warmer summer temperatures which are more favourable for agriculture. Climate in the Valley ecoregion is characterized by early springs and hotter summers and a long growing season, making it favourable for agriculture. Total annual precipitation is 1100 to 1300 mm (Neily et al, 2017).

Records from the Waterville Cambridge Airport, 3 km to the southeast of the Study Area for climate normals (1980-2010) are summarized in Table 5-1. This weather station is in the same ecoregion and ecodistrict as the Study Area.

Table 5-1 Canadian Climate Normals 1981-2010 Station Data, Waterville Cambridge Station

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct	Nov	Dec	Annual
Temperature Normals													
Daily Average, °C	-5.6	-4.9	-0.9	5.2	11.1	16.2	19.6	19.1	14.9	9.0	4.0	-2.0	7.1
Daily Maximum, °C	-1.2	-0.2	3.7	9.9	17.0	22.2	25.6	25.1	20.5	13.9	7.8	2.0	12.2
Daily Minimum, °C	-10.1	-9.5	-5.4	0.3	5.3	10.1	13.6	13.1	9.2	4.1	0.1	-5.9	2.1
Precipitation Normals													
Rainfall, mm	46.3	43.0	67.4	80.2	97.3	76.6	77.6	75.2	102.0	109.3	105.6	66.6	947.0
Snow fall, cm	64.7	43.6	36.4	12.5	0.7	0.0	0.0	0.0	0.0	0.0	13.5	47.6	219.0
Total, mm	111.0	86.6	103.8	92.7	98.0	76.6	77.6	75.2	102.0	109.3	119.1	114.2	1166.0

5.3 Physical Components

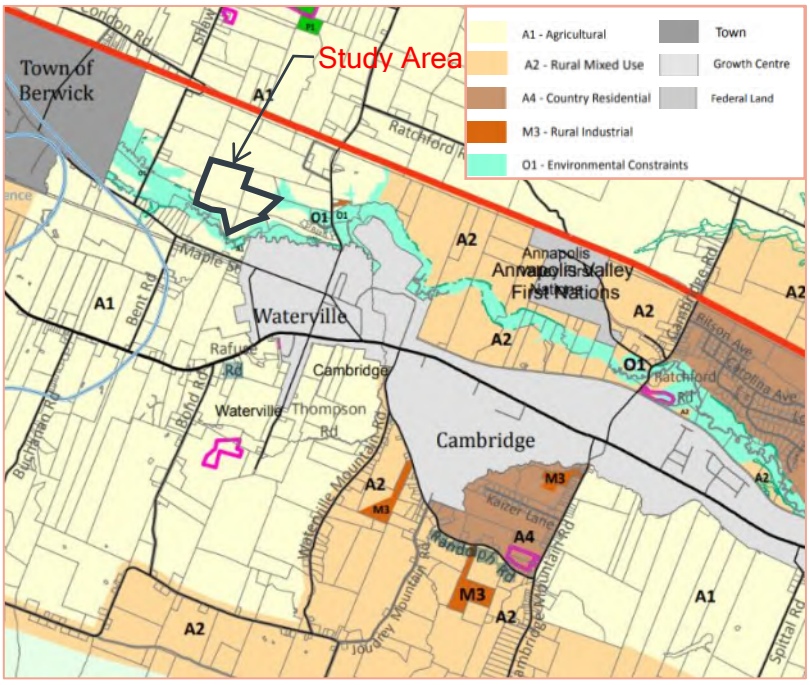
The Project will involve excavation of commercial sand. Extensive exploratory drilling and test pitting have occurred over the past 20 years at the Study Area, so that the boundaries of the glacial deposit considered "commercial sand" could be delineated with confidence.

The current Study Area, site boundaries and proposed Project Footprint are provided in Figure 1 (Appendix C). The proposed pit expansion will total approximately 17.5 ha, including the existing permitted sand pit of 3.9 ha. These boundaries were determined using the exploratory investigation information as well as the current *Industrial Approval* and the *Nova Scotia Pit and Quarry Guidelines*. Setbacks to relevant features have been applied where required, such as wetlands, watercourses and property lines. There are no nearby common roadways or structures. Through the course of the field evaluations, these buffers have been adjusted as needed. These setbacks are depicted on Figure 1 (Appendix C).

The undertaking will include the following activities, which are described further below:

- Site preparation
- Operations (and Maintenance)
  - Sand excavation and loading
  - Transportation
- Decommissioning and Reclamation

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



There is currently no topsoil or grubbings being disturbed at the Project Footprint 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 Study Area is located in a predominately un-inhabited area north of the community of Waterville, Municipality of the County of Kings (Municipality), approximately 2.5 kilometres (km) east of the Town of Berwick and 4km west of Cambridge. The Town of Coldbrook (where the Keddy facility is located) is 7.5 km to the east.

Based on the March 2020 Land Use Bylaw (Municipality, 2020), Waterville has been designated as a growth centre by the Municipality, with various commercial, institutional and residential land uses. The Study area is in a rural area located north of the Waterville growth area. The Project Footprint and most of the Study Area is currently zoned "A1"

Agricultural. Lands associated with Fishwick Brook and the Cornwallis River are zoned as “O1” Environmental Constraints and there is one other M3 (rural industrial) land use nearby on Black Rock Road.

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 5-2 Summary of surrounding properties

Distance (km)	Number of Potential Residential Dwellings	Number of Potential Commercial Buildings	Number of Agricultural Uses
0.5	0	0	3
1	59	1	11
1.5	159	14	25
2	270	23	49

As previously noted, the proposed Project Footprint has been determined using setbacks in accordance with the existing Industrial Approval, as well as avoidance of environmental constraints identified in the baseline environmental studies. Setbacks are identified on Figure 1 (Appendix C). Also, the proponent has an agreement in place with the Visser family to waive any property line setback requirements. The proponent has deeded access to the private road (that connects to Blair Road). Also, the proponent has an agreement with the Vissers to alternatively use the Farm Road for access to the Project Footprint.

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

5.4 Site Preparation

The scope of the proposed pit expansion is similar to current (and past) activities at the site. The general Project components will include the following:

— Implementation of a project specific Erosion and Sediment Control (ESC) Plan
— Clearing and grubbing of the Project Footprint
— Stockpiling of approved cover material
— Commissioning of any longer-term ESC Plan measures

The site access road is already in place; no upgrades are required.

The central portion of the Project Footprint has been disturbed through sand excavation at some point in the recent past, therefore there will be minimal site preparation work such as tree-clearing and grubbing required in these areas. A large portion of the Project Footprint is existing agricultural use (corn field). The areas requiring tree-clearing are only 30% of the total Project Footprint.

Figure 5-1 Generalized phasing of extraction

The working face of the current operation will likely be advanced first to the north and east into the corn field area (Phase 1). Proposed working faces will then extend south (Phase 2) and west (Phase 3) into the treed areas. The last area to be excavated will be in the partially disturbed area (Phase 4). Clearing and grubbing activities will follow this phased work progression plan, such that no significant tree clearing is expected to occur for several years since the initial areas to be excavated are

already disturbed. In vegetated areas, annual tree-clearing and grubbing will occur between September and March, outside of wildlife breeding seasons. This activity will be phased to minimize active pit disturbance, such that only the areas required for the annual sand extraction will be cleared. This progressive manner of grubbing, cover material removal and sand removal will minimize the extent of the disturbed area. All working faces will adhere to all requirements for setbacks identified in the NSE *Pit and Quarry Guidelines* (1999) and NSE *Industrial Approval* (2008-060956-02) for the site.

Prior to any tree removal and grubbing work, ESC measures (as well as any other mitigation measures) will be implemented. Given the coarse-grained nature of the insitu soils and the general project plan to create a depressed pit, there is limited opportunity for sediment to escape the Project extents. During initial preparation and while the sand deposit (in each Project phase) is at an elevation higher than the projected pit extents, there is potential for surface water to leave the project area. Therefore, ESC measures during preparation activities will consist of installing silt fence around the extents of each active phase of the project.

The tree-clearing will be contracted to a third-party tree-removal service, and all merchantable lumber will be harvested. Remaining vegetation and topsoil will be removed to the top of the commercial sand layer; this material will be stockpiled in a designated location for re-use in reclamation. As the pit working face advances on an annual basis, any additional ESC measures and Site preparation will be carried out shortly in advance of the extraction.

The timber will be harvested, through a combination of mechanical equipment and by hand with power saws. All grubbing activities will be carried out with heavy equipment such as dozers or front end loaders. There will be no storage of petroleum for re-fueling; all re-fueling will be by mobile truck, in a designated area, away from the pit floor (and any wetlands or watercourses). Any accidental petroleum releases will be addressed immediately in accordance with applicable regulations.

5.5 Operation and Maintenance

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 in the Project Footprint. Excavated sand will be removed by front end loader and placed directly in trucks and/or trailers for off-site processing, although some sand may first be dry screened on site to remove organics or non-commercial sand. There will be no permanent stockpiles of commercial sand in the Project Footprint, although stockpiles of other materials (topsoil, grubbing and non-commercial sand) will be reserved for final reclamation. No structures are required to support the pit activities, and there will be no permanent fuel storage. Blasting is not required. The pit will be progressively reclaimed or stabilized as the pit floor reaches its design depth and the excavated areas are no longer required for access to the working face. Off-site truck traffic has been variable over the last 20 years; there may be more truck traffic than during the last few working years at the pit, but it would not exceed the amounts of truck traffic earlier in the pit life cycle since the daily maximum extraction amounts would not change. The anticipated extraction rate is approximately 40,000 tonne per year (may range between 30,000 and 75,000 tonne per year); the extractable reserves lasting an estimated 20 years. The market demand for sand remains relatively constant; increased sand extraction at the current site would complement the mix of raw feeds from other sites going to the Keddy facility. Thus, the existing volume of trucks that use the Shaw Keddy facility entrance on the South Bishop Road to the southwest will be maintained.

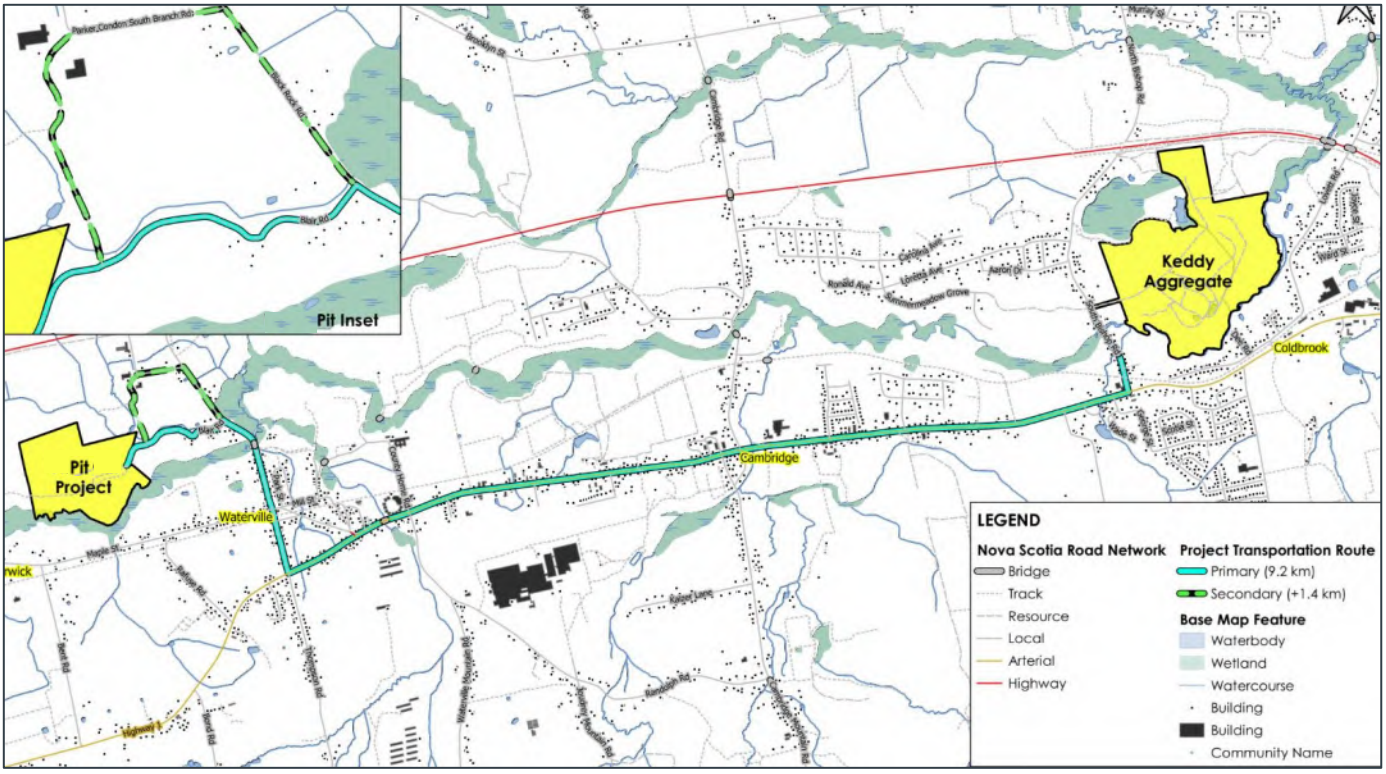
Based on the local topography and subsurface conditions, the Project Footprint is not anticipated to generate surface water or runoff during operations; surface water from precipitation events will infiltrate the floor of the pit and there will be perimeter ESC devices in place until the pit is excavated below the elevation of the projected pit extents. In its current state, the disturbed areas of the Project Footprint where sand extraction has already occurred reside at lower elevations than the surrounding undisturbed vegetated areas. The natural condition of the sand deposit is fairly loose; stable angles of repose would be approximately 45 degrees (1H:1V) for active areas. Further, 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 “bowl nature” of the pit will reduce the likelihood for surface water to enter the forested/vegetated uplands, wetlands, or Cornwallis River during extreme precipitation events. Pit expansion will continue this trend of lowering the site relative to its surroundings. Any precipitation along current disturbed areas of the working face is directed back into the pit rather than into any of the forested buffer and wetlands. Any new working faces in the Project Footprint will also slope downward and inward towards the pit floor, while the backslopes will remain vegetated. Vegetation will not be removed in advance of excavation so that bank settlement will be minimized. If areas of fine-grained impermeable sand are encountered during excavation, internal ditching that drains towards other areas of the pit floor with be installed. Surface water runoff along the private road and Blair Road is already controlled via vegetated ditches.

The most ecologically sensitive area of the property is to the south of the Project Footprint, where there is a wetland that borders the Cornwallis River. There is a natural terrace along the south side of the Project Footprint that will form the limit of the southern working face near the Cornwallis River and its associated flood plain wetland; there is a minimum of 30 m buffer between the proposed edge of the Project Footprint and this adjacent wetland. There are other wetlands in the Study Area (to the northwest and southwest) and the Project Footprint has been adjusted to avoid these wetlands and there has been a minimum 30 m buffer applied. The remaining Project Footprint extents have been established based on the extent of the commercial sand deposit and 30 m buffers from adjacent property boundaries. Approval 2008-060956-02 waives the set-back requirement for the internal property boundaries.

All sand extracted from the Project Footprint is expected to be transported to the Keddy facility in Coldbrook, where it will be part of the raw feed going to the plant to be washed, classified to make different saleable products, and stockpiled. Trucking from the Project site will be by a mix of tandems, twin steer dump trucks and large trailers (Semi Quad or Tri Axle). The generalized truck route is illustrated in Figure 5-2.

Figure 5-2 Generalized truck route



During past sand extraction activities, approximately 15 trucks per week would leave the Project site to the northeast via Blair Road (over the extraction and trucking window). Under the expansion plan, the existing traffic load will continue to leave the Project site via Blair Road. There are expected to be 12 trips in the morning peak hour, and 12 trips during the afternoon peak hour. The number of trucks leaving the Project site at the Blair Road entrance is likely to be similar to the range of past truck volumes (during previous sand extraction activities) since this aspect of the project is extending the existing operation life of the site. As noted, the increase in trips from this Project site to the Shaw Keddy facility would coincide with decreased trips from other satellite pits. The proposed transportation route does not have any unusual weight restrictions for the trucks that would be used. Weight restrictions along public roadways will be respected, and anticipated capacities leaving the site are 16 tonnes (tandem) and 30 to 35 tonnes (trailers). During the planned operations schedule, there would be no spring weight restrictions in place. Access ramps to the pit floor will be maintained at safe grades that do not exceed the design capacity of the loader and trucks.

There will be no solid waste, hazardous waste or liquid effluent generated at the site.

No chemicals or petroleum products will be stored at the site or used in the Project Footprint. Equipment refuelling will occur outside the Project Footprint in a dedicated area 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 (i.e., greenhouse gases (GHGs)) and fugitive dust. Equipment emissions will be managed through reduced-idle practices, regular maintenance and clean burning fuels. If needed, dust will be controlled through the application of water (brought by water truck from off-site); 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 only maintenance activity associated with the Project is occasional grading or addition of gravel to the private access road. Road salting nor dust suppression is anticipated in the winter. There may be 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.

Sand extraction will occur annually, primarily in December through February. All commercial sand will be directly loaded into trucks although some dry screening may occur. Any stockpiles (topsoil, grubbing, non-commercial sand) would be stabilized and reserved until needed for reclamation. There will be no sand excavation through wildlife nesting seasons, nor during periods where there would be excessive dust generation. The operating schedule will be from 8am to 5pm, Monday to Friday. The expansion of the pit will begin upon the receipt of the regulatory approvals. At this time the expansion (in the form of preparation) is expected to begin during Fall of 2023.

Throughout the Project life, Shaw will carry out operations in accordance with industry “best practices” and mitigation measures will be employed to prevent and/or reduce any environmental impacts. These include:

- Maintaining forested buffers for ecological receptors (wetlands, wildlife, watercourses)
- Maintaining forested buffers for reduction of noise and dust
- Timing of work to reduce wildlife disruptions and generation of dust
- Employing ESC measures to prevent sedimentation of local water ways
- Avoiding sensitive ecological features (such as watercourses and wetlands)
- Phasing areas of work and employing progressive reclamation practices to minimize disturbed areas
- Employing remote re-fueling at designated areas that respect buffers from the pit floor and water features
- Developing a Contingency Plan (including spill response) to address any accidents

5.6 Decommissioning and Reclamation

Decommissioning of the proposed Project Footprint is not likely to occur for approximately 20 years; 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 reclamation plan will be prepared for NSE approval in advance of site closure.

Progressive reclamation will consist of grading to stable slopes and erosion and sediment control to stabilize areas where Project activity is complete. 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 25 degrees (4H:1V), capped with the reserved topsoil and stabilized with a mixture of native grasses and other plant material that might regenerate naturally.

At the completion of the project, the total disturbed area is anticipated to be 17.5 hectares, including the currently permitted 3.997 hectares. The site closure reclamation plan is to return the Project Footprint to the Vissers for agricultural use. Although the final design plans are not complete, preparation for final land use will be achieved primarily through site grading so that the final condition of the site is stable and sustainable prior to agricultural activities. Once the site is decommissioned, reclamation will be complete within 2 years.

6 Regulatory Framework

6.1 Federal

No work associated with the Project will involve Federal lands or federal funding. The is a private company. No federal approvals or permits are expected to be required for the proposed Project.

Table 6-1 Summary of Federal Legislation

Legislation	Requirement	Permit
Impact Assessment Act - IAA	Project not on federal land. Proponent is a private company. Project does not meet the criteria of a 'Designated Project' under item 18 or 19 of the *Physical Activities Regulations*.	No
Fisheries Act - DFO	There are no watercourses in the Project Footprint, and there will be no water discharges from the Project Footprint.	No
Canadian Navigable Waters Act - TC		
Species at Risk Act - ECCC	There may be SAR fauna species (birds, turtles, invertebrates) present at the site. Mitigation measures will be implemented to ensure that birds and turtles will not be killed or disturbed and that obligate plant food sources are transplanted.	No
Migratory Birds Convention Act - ECCC	There may be migratory birds present at the site, but tree clearing will occur outside of nesting periods.	No
Transportation of Dangerous Goods Act - TC	There will be no storage or transportation of dangerous goods or chemicals.	No

Legislation	Requirement	Permit
Canadian Environmental Protection Act - ECCC	There will be no storage or transportation of dangerous goods or chemicals.	No

[1] IAA - Impact Assessment Agency of Canada

[2] DFO - Fisheries and Oceans Canada

[3] TC - Transport Canada

[4] ECCC - Environment and Climate Change Canada

6.2 Provincial

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*, Section B (Mining) (2), "*A pit or quarry, other than a pit or quarry exempted under Section 4 of the regulations for the Department of Transportation and Infrastructure Renewal, that is larger than 4 ha in area for extracting one of the following: (c) sand.*"

In addition, the Proponent also requires an NSE *Industrial Approval* for its current operations. Shaw currently operates its sand pit under NSE 2008-060956-02. A request to amend NSE 2008-060956-02 will be made once the Project has satisfied the requirements of the NSE *Environmental Assessment* Act.

Heritage Research Permits (under the *Special Places Protection* Act) were acquired for the purposes of the baseline studies for this Environmental Assessment.

No other permits or approvals are expected to be required from the Province for the Undertaking. If it is determined that additional permits or approvals are required, the Proponent commits to obtaining all requisite approvals prior to work.

Table 6-2 Summary of Provincial Legislation

Legislation	Requirement	Permit
Nova Scotia Environment Act - NSE		
Environmental Assessment Regulations	Pit >4 ha in size.	Yes
Activities Designation Regulations - Construction	Sand Pit is a designated activity.	Yes
Activities Designation Regulations - Wetlands	There are five wetlands in the Study area, but none within the Project Footprint.	No
Activities Designation Regulations - Watercourses	There are no watercourses in the Project Footprint and there will be no water discharges (or removals) from the site.	No
Contaminated Sites Regulations	There is no expected contamination.	No
Sulphide Bearing Materials Disposal Regulations	There is no expected bedrock disturbance, and no sulphide bearing bedrock is present.	No
Petroleum Management Regulations	There will be no petroleum storage.	No
Nova Scotia Endangered Species Act - NSLF	There may be SAR fauna species (birds, turtles, invertebrates) present at the site. Mitigation measures will be implemented to ensure that birds and turtles will not be killed or disturbed and that obligate plant food sources are transplanted.	No
Wildlife Act - NSLF	There may be turtles or bird nests nearby, but mitigations will be used to prevent disturbance. There may be mammal dens (coyote) nearby, but mitigations will be used to prevent disturbance.	No

Legislation	Requirement	Permit
Special Places Protection Act - CCTH	Multiple Heritage research permits were acquired for the baseline archaeology studies.	Yes
Nova Scotia Public Highways Act - NSDPW	Additional roadway signage (related to trucks) may be required.	Maybe
Dangerous Goods Transportation Act and Regulations - NSDPW	There will be no transportation of dangerous goods or chemicals	No
Occupational Health and Safety Act and Regulations - NSLSI	Workplace health and safety requirements.	Activity specific

[1] NSE - Nova Scotia Environment and Climate Change

[2] NSLF - Nova Scotia Lands and Forests

[3] CCTH - Communities, Culture, Tourism and Heritage

[4] NSDPW - Nova Scotia Department of Public Works

[5] NSLSI - Nova Scotia Department of Labour, Skills and Immigration

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*.

6.3 Municipal

The Project is located within the Municipality of the County of Kings. The Project Footprint is zoned "A1" (agricultural) there are some lands in the Study Area zoned "O1" (Environment constraints), but these are associated with Fishwick Brook and the Cornwallis River, and are outside any proposed disturbance areas of the Project Footprint. The Project Footprint is also outside the Waterville Growth Centre boundaries.

Portions of the Project Footprint have been used for sand extraction for the past 20 years, and although sand extraction is not explicitly permitted under the Land Use By-law (Municipality, 2020a) for agricultural use (A1), aggregate related industry (N2) is permitted within throughout the municipality in any designation (Municipality, 2020b). The Municipality (Municipality, 2020b) acknowledges that the provincial government controls extraction of aggregate (through permits), but the Municipality controls related uses and the use of the area after aggregate extraction has ceased.

At the conclusion of the Project the Project Footprint will be in a condition that it can be used for agricultural purposes with little further site preparation work, which will result in a net increase of available (and active) agricultural lands. No topsoil (or grubbings) will be removed from the Project Footprint during the work; it will all be reserved on-site to prepare the Project Footprint for its final use as agricultural fields once the sand extraction is complete.

The Project, including its final intended land use, embodies the goal and objectives of maintaining a healthy rural land use, as defined in the Municipal Planning Strategy (Municipality, 2020b). Shaw recognizes the importance of maintaining natural and sensitive environmental features, as such, the Project Footprint has been designed to avoid sensitive environmental features (wetlands and watercourses) through buffers and non-disturbance.

No municipal permits are required for the Project. No work associated with the Project will involve municipal funding.

7 Valued Environmental Components and Effects Management

7.1 Determination of Valued Environmental Components

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
- Human Health and Safety

7.1.1 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 7-1.

Table 7-1 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.

7.1.2 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 7-2.

Table 7-2 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.

7.2 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.

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. 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 7-3.

Table 7-3 Summary of Valued Environmental Components and Interactions

PROJECT ACTIVITIES	VECS																
	BIO-PHYSICAL									SOCIO-ECONOMIC							
	Surficial Geology	Bedrock	Surface Water	Groundwater	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	Culture and Heritage
Site Preparation Phase																	
Clearing and Grubbing	X		X			X	X		X	X	X					X	X
Accidents	X		X	X			X	X	X	X	X					X	
Operations Phase																	
Sand Extraction	X		X				X		X	X	X	X	X	X	X	X	X
Vehicle Transport										X	X	X		X		X	
Accidents	X		X	X			X	X	X	X	X					X	
Reclamation Phase																	
Final Grading	X		X							X	X					X	

7.3 Biophysical Environment

7.3.1 Surficial and Geology

7.3.1.1 Existing Conditions

Surficial geology mapping indicates that the native soils in this area are identified as Glaciofluvial Deposits identified as Ice contact sediments; these sediments consist of sand and gravel, boulders, and may contain some diamicton layers. These deposits can be up to 30m thick and form eskers, kames and morainic accumulations with a hummocky surface that may be punctuated with kettles and marked by abrupt slopes along esker sides. According to the mapping, the project site lies close to the contact between the above-noted Ice contact deposits, an area of modern Fluvial deposits (along Cornwallis River, Fishwick Brook and a tributary to Fishwick Brook) and other Glaciolacustrine deposits (Littoral, prelittoral and deep water sediments, which contain more silt and clay). Surficial geology mapping is presented in Sheet 04 (Appendix D).

Geological bedrock mapping indicates that the middle to late Triassic bedrock of 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-lacustrine 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 several formations of the Halifax Group, some of which are well known for their acid producing potential. Acid producing bedrock at the project site is not anticipated.

The surficial geology mapping of the area as well as the limits of the sand esker were confirmed during preliminary investigation by Shaw and during installation of monitoring wells for baseline groundwater monitoring (by Englobe). Between 1989 and 2020, test pits were excavated and boreholes advanced at various locations on the project site and neighbouring lands to optimize the location for potential sand extraction. The boundaries of the sand esker were inferred from the percentage of fines present in grain size analyses. Further, a preliminary depth to the water table was identified during this work (so the esker could be quantified), and in late 2021 four monitoring wells were installed around the sand esker to further quantify the esker and determine the location of the local water table.

Based on the conditions observed at the project 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 (Appendix D).

7.3.1.2 Predicted Environmental Effects, Proposed Mitigation and Monitoring

Large areas of the project site have been disturbed in the past for sand extraction; only a small area in the southwest corner and a small area in the southern part of the site have never been previously disturbed. There is potential for erosion and sedimentation to occur during the life of the Project. There is potential for pre-contact first nations artifacts to be present in some shallow soils of this undisturbed areas. Therefore, these areas are 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.

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

To minimize any potential impacts from surficial geology, the following mitigation measures will be implemented during all life stages of the Undertaking:

- Implement a site-specific ESC plan in accordance with practices outlined in the latest version of the NSE *Erosion and Sedimentation Control Handbook for Construction Sites*. The ESC Plan will be adjusted as required, throughout the life of the Undertaking.
- Stockpiled cover material (e.g., topsoil and grubbing) will be stored in an area with ESC measures to prevent mobilization of sediment laden surface water.
- Undertake regular maintenance of any ditches and other ESC measures to minimize sediment build-up.
- Employ progressive reclamation practices to minimize and stabilize disturbed areas.
- Should the Project Footprint be modified to expand beyond the currently known range, a qualified archaeologist should be consulted to conduct the recommended shovel testing and evaluate whether additional archaeological mitigation may be required.
- All work activities in the area shall be stopped if an artifact/archaeological resource is encountered, and further mitigation measures presented in 7.5.6 be followed.

With the mitigation measures, any impact is anticipated to be negligible.

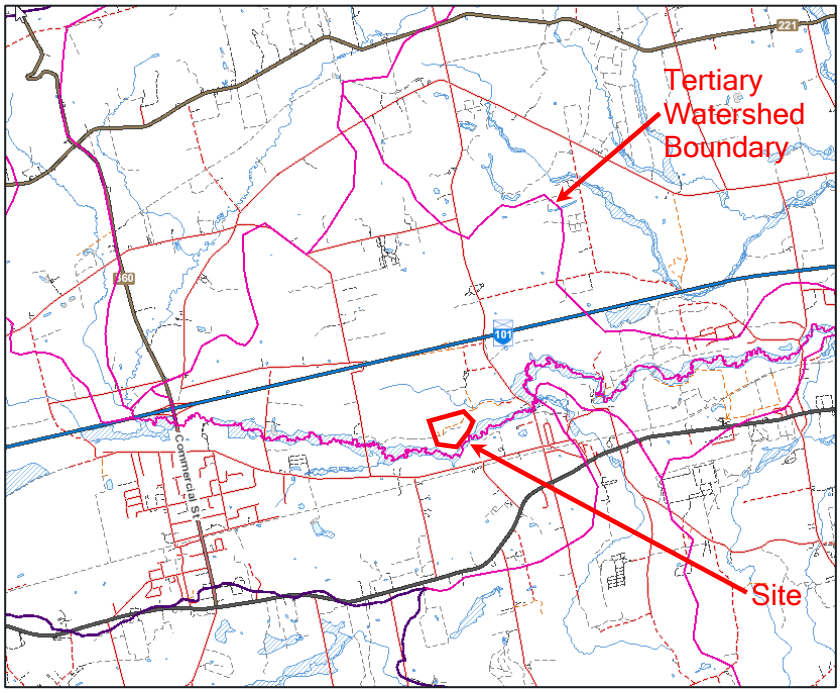
Magnitude	Geographic Extent	Frequency	Duration	Reversibility
Negligible	Local	Intermittent	Medium-term	N/A

7.3.2 Surface Water

7.3.2.1 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) and is located towards the bottom of the tertiary watershed (IDD-2-C), which is bound by the Cornwallis River on the south side. In general, there are minimal surface water flows present at the Project site, although the Cornwallis River is present to the south and Fishwick Brook is present to the north (as well as a tributary to Fishwick Brook that extends to the rear of the Visser's Farm). The naturally occurring sand deposits in the area with their high infiltration capacity generally minimize any storm related surface water flows that may occur.

Figure 7-1 Watershed boundaries



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.

No surface water features are present in the Project Footprint, although the Cornwallis River flows south of the Project Footprint and Fishwick Brook is present north of the Project Footprint. The Cornwallis River extends adjacent to a portion of south property boundary (of PID Nos. 55377451 and 55071898) and flows in an easterly direction to ultimately empty into the Bay of Fundy. Fishwick Brook crosses part of the Visser's agricultural lands and flows in an easterly direction; it discharges in the Cornwallis River on the east side of Black Rock Road. A tributary to Fishwick Brook flows in a southerly direction (west of the Visser's Farm) and appears to originate north of Highway 101. None of these water features are in the Project Footprint, nor are crossed while accessing the Project Footprint via Blair Road (see Sheet 03, Appendix D).

The current *Industrial Approval* prescribes a 30m setback from watercourses. The working face currently satisfies this requirement, and the proposed Project Footprint has been designed to also satisfy the 30m setback requirement from all watercourses (and wetlands).

As part of a baseline evaluation, two surface water sampling locations (21-SW1 and 21-SW2) were established in the Cornwallis River to document baseline water quality, upgradient and downgradient of the Project Footprint. The surface water sampling locations were sampled quarterly for one year. These locations were chosen early during the assessment since the proposed Project Footprint was at one time established much closer to the Cornwallis River. Since that time, the Project Footprint has been adjusted (to account for other VECs), and there is now a minimum of 40m between the Project Footprint and the Cornwallis River. Nearby Fishwick Brook has always been more than 75m from the edge of the Project Footprint and based on the local topography and inferred groundwater flow direction is upgradient of the Project Footprint, therefore, not considered susceptible to overland (nor subsurface) flows. The surface water sampling locations are presented on Sheet 03 (Appendix D).

During the monitoring events, Englobe personnel measured the surface water locations for temperature, pH, conductivity and dissolved oxygen using the YSI multimeter field instrument. Where

sufficient shallow water was present, surface water samples were collected directly into the bottles, or with dedicated syringes and transferred to laboratory supplied bottles, to minimize debris and organics disturbed by sampling activities. Samples were collected in laboratory-supplied bottles that were pre-preserved (where appropriate) for the analyses being conducted. The surface water samples were placed in cool storage and transported to Bureau Veritas Laboratory (BV) in Bedford, Nova Scotia for detailed analysis. Laboratory testing parameters included analysis of total metals, mercury, general chemistry and total suspended solids (TSS).

The applicable guidelines would be the 2021 NSE Tier 2 Pathway Specific Standards (PSS) for surface water. In surface water, the NSE Tier 2 PSS are based on the Atlantic RBCA Tier II PSS. Atlantic RBCA does not develop groundwater and surface water guidelines, except for petroleum hydrocarbons and some chlorinated volatile organic compounds (VOCs). Rather, the guidelines are generally chosen from Canadian Council of Ministers of the Environment (CCME) Freshwater Aquatic Life guidelines, although other jurisdictions such as Federal Environmental Quality Guidelines (FEQG), BC Ministry of Environment (BCMOE) and Ontario Ministry of Environment (OMOE) are sometimes the guideline source. Where pH, hardness and/or DOC is used to determine the groundwater or surface water guideline, the lowest calculated value (or assumed values such as hardness of 100 mg/L) was chosen for display in the NSE Tier 2 PSS. Therefore, it is appropriate to modify the guideline based on the site-specific field data and the source document methodology, where the guideline differs from the published NSE Tier 2 PSS. Specifically, this applies to aluminum, ammonia, cadmium, cobalt, copper, lead, manganese, nickel, zinc, and sulphate.

Field measurements and lab results obtained for the surface water sampling stations are presented in Tables 3 and 4 in Appendix E. During the baseline water sampling, the water quality has had guideline exceedances for nitrite, ammonia, aluminum, cobalt, copper, iron and zinc. Total Suspended Solids (TSS) has been elevated and pH occasionally depressed. Water quality at both locations was fairly similar, with the only notable changes at 21-SW2 (December 2021), when TSS was notably higher than at 21-SW1; concentrations of aluminum, cobalt, copper and iron were also higher at 21-SW2, likely the direct result of the elevated sediment load.

7.3.2.2 Predicted Environmental Effects, Proposed Mitigation and Monitoring

The undertaking will not alter the regional surface water flow pattern; all work will occur in the same tertiary watershed. Precipitation now falling on the disturbed areas of the Project 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 Project Footprint expands.

Given the coarse-grained nature of the sand deposits and the concave feature that will result from sand excavation, surface water runoff from rainfall events leaving the Project Footprint (and 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 concave nature of pit will act as a water detention area and will prevent surface water (and associated sediment) from leaving the Project Footprint before it infiltrates through the pit floor. Erosion and sediment control measures will be employed along the perimeter of the Project Footprint and localized internal ditching that drains towards of the pit floor will be utilized if lenses of fine-grained impermeable sand are encountered during excavation. There is potential for accidental spills to occur in the pit.

None of the project activities will cross or span a watercourse within the Project Footprint or along the Blair Road truck route; all existing bridge and/or culvert infrastructure is located on publicly maintained roads (Black Rock Road) and the transportation plan will respect all public roadway weight restrictions. Surface water runoff along the private access road and Blair Road 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. The road network along the remainder of the transportation route is paved, and sediment transport related to trucking from the Project Footprint to the Keddy pit would be considered negligible. However, accidental spills may occur along the transportation route.

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

- Slope all working faces towards the pit floor.
- 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.
- Employ progressive reclamation practices to minimize disturbed areas.
- If any effluent leaves the site, conduct total suspended solids (TSS) monitoring.
- Develop a Spill Response and Contingency plan to address any accidental spills (see Appendix L).

With the mitigation measures any impact is anticipated to be negligible.

Magnitude	Geographic Extent	Frequency	Duration	Reversibility
Negligible	Local	Rarely	Medium-term	N/A

7.3.3 Groundwater

7.3.3.1 Existing Conditions

7.3.3.1.1 Desktop Analysis

Drinking water in Waterville is supplied by private potable drinking water wells. Also, nearby Berwick has a well field protection area present to protect the supply of potable water (see Sheet 06, Appendix D). The closest municipal pumping well is more than 10 km from the site. The nearest mapped private groundwater wells are likely inaccurate coordinates since, based on the coordinates, the wells seem to be located on the subject property, within a sand pit/cornfield and this land use does not have any buildings. Therefore, the closest residential drinking water wells are believed to be approximately 300m east of the proposed Project Footprint (see Sheet 03, Appendix D), along Blair 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.

According to the provincial groundwater Atlas, a surficial aquifer (surficial aquifer ID 129), is located approximately 700 metres east of the Project Footprint.

The nearest active groundwater monitoring station belonging to NSE, Coldbrook 081, is located at the provincial park on Park Street, in Coldbrook, NS. 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. Based on the data collected from Coldbrook 081 between 2009 and 2021, groundwater elevations have fluctuated between 8.4 and 10.8 m above sea level.

The NSE well database identified 37 wells constructed within a 1km radius of the site and 325 within 2km of the site. Of the 325 wells, all appear to be drilled (with none dug); depths range from 7.92 to 127.89 metres. All the drilled wells are bottomed in bedrock, which is mapped as the Wolfville HU. A summary of these wells and their characteristics is provided in Table 7-4. It should be noted that the

potable well (Well Log Record 861452) that was reported in the center of the Project Footprint is a source map inaccuracy. Review of the Well Log Record suggests this well appears to be a domestic well for a nearby housing development and is not present in the center of the Project Footprint. This is also the case with two other nearby wells (Well Log Record 820725 and 640975) since they are located in the middle of agricultural fields. Well 640975 has been confirmed to be the potable water well that supplies the nearby Visser's Farm. There are no potable water wells within 100m of the Project Footprint.

Table 7-4 Summary of Well Construction Data

HU	Well Depth	Casing Depth	Static Water Level	Estimated Yield
Wolfville n = 325	32.9 m	18.4 m	6.1 m	65.5 Lpm

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 76 metres were required to stabilize the wells and this provides an indication of the depths of overburden.

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. All three of these records are for wells constructed in the Wolfville HU and in relatively close proximity to the site. The average values of these data are included in Table 7-5.

Table 7-5 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

7.3.3.1.2 Baseline Groundwater Evaluation

As part of a baseline evaluation, groundwater monitoring wells were constructed in December 2021 around the perimeter of the Project Area to monitor baseline water levels in the area immediately surrounding the site. The final placement of the monitoring well locations was determined from both a desktop review of the area and potential concerns noted in the field, subject to the clearance of underground utilities and site obstructions. Automated level loggers were installed in the monitoring wells and manual measurements were taken to establish the seasonal variability in the groundwater levels of the surficial aquifer. The groundwater monitoring wells are presented in Sheet 03, Appendix D. It should be noted that the monitoring wells are outside the commercial sand deposit, and at a lower elevation (8 m or more) than the proposed Project Footprint.

Englobe completed the intrusive drilling investigation on December 15, 16 and 17, 2021. At that time, four boreholes, identified as 21-MW1 through 21-MW4, were advanced using a track-mounted drill rig supplied and operated by Nova Drilling Inc. of Mount Uniacke, NS. The boreholes were advanced to depths ranging between 5.2 m and 8.8 m below existing site grades and converted to monitoring wells.

The field investigation, including soil and groundwater sampling and testing was supervised and completed by qualified Englobe field personnel. Standard Penetration Testing and soil sampling were performed, where possible, in the overburden using a 50-mm OD split-spoon sampler. Soil samples were logged continuously at depth intervals of 0.6 m. The monitoring wells consisted of 50-mm OD polyvinyl chloride (PVC) threaded Schedule 40 casing and 20 slot screen. The screened intervals of the wells were positioned to intersect the groundwater table with the annular space around the screen

filled with clean silica sand. The installations were sealed with a bentonite plug (0.3 to 0.9 m thickness) near the surface and above the sand pack to prevent any migration of surface water flow into the wells. The wells were capped with J-plugs and finished with stick-up well covers. The groundwater monitoring wells were surveyed at ground surface using a Leica GS14 GPS.

A summary of encountered geologic conditions is provided in the borehole and groundwater monitoring well logs in Appendix F. An explanation of terms and symbols used in the report and borehole and monitoring well logs is also provided in Appendix F. It should be noted that the stratigraphic boundaries on the borehole logs typically represents a transition of one soil type to another and does not necessarily indicate an abrupt geologic change. Subsurface conditions may vary between and beyond the borehole locations.

During the exploration program, four representative soil samples (one from the screened portion of each of the groundwater monitoring wells) were obtained to determine the particle-size distribution as per ASTM D6913 Standard Test Methods for Particle-Size Distribution of Soil Using Sieve Analysis. The test results confirm the material characteristics detailed in the attached Well Log Records.

Automated data transducers were installed at each of the groundwater monitoring wells to monitor real time variations in the static groundwater table between December 2021 and September 2022. Englobe also visited the site four times and collected manual groundwater measurements to supplement the automated measurements. Over the 9-month monitoring period, groundwater levels at 21-MW1, 21-MW3 and 21-MW4 were at their peak in late winter (January-February 2022) before dropping to their lowest point in the Fall (September 2022). At 21-MW2 the groundwater level peaked in Spring (March 2022) and was at the lowest in Fall (September 2022).

The data collected from all groundwater monitoring wells indicates that groundwater levels varied by a minimum of 1.658 metres (at 21-MW4) and a maximum of 2.058 metres (at 21-MW2). The largest fluctuations are observed at the wells closer to the Cornwallis River. Based on the 9-month monitoring period, the minimum and maximum elevation of groundwater at the location of the four groundwater monitoring wells is presented in Table 7-6.

Table 7-6 Maximum Groundwater Elevation based on 9-month monitoring

Location	Maximum Elevation (masl)	Minimum Elevation
21-MW1	19.583	17.696
21-MW2	21.628	19.570
21-MW3	22.254	20.409
21-MW4	23.505	21.847

Based on the groundwater survey from 2021 to 2022, the inferred localized shallow groundwater flow direction at the site is interpreted to be from the northeast towards the southwest, toward the Cornwallis River; the Cornwallis River flows from west to east, on the south side of the Subject Area.

Slug tests were completed at all four groundwater monitoring wells on December 29, 2021, to determine the hydraulic conductivity of the soils screened at depth. The electronic transducers were set to 1-second sampling intervals and an initial water level measured. The rising head test was completed using a HDPE water bailer or Waterra tubing to instantaneously remove a known volume of water from the water column at each well location. Groundwater levels were then allowed to recover completely. The results of the rising head tests were used to estimate the hydraulic conductivity of the screened unit.

The data from the slug tests was analyzed using Aquifer Test 8.0 and the results are presented in Table 7-7.

Table 7-7 Hydraulic Conductivity Results at Blair Road, Waterville, NS

Well Location	Test	Screened Material	Hydraulic Conductivity K (m/s)	Average Hydraulic Conductivity K (m/s)
21-MW1	Rising Head Test	Fine to coarse SAND, trace silt, loose to dense	5.30×10^{-6}	6.33×10^{-6}
			5.52×10^{-6}	
			5.40×10^{-6}	
			9.10×10^{-6}	
21-MW2		Medium to coarse SAND, trace silt, loose to dense	3.11×10^{-5}	3.47×10^{-5}
			3.39×10^{-5}	
			3.90×10^{-5}	
21-MW3		Medium to coarse SAND, trace silt, very loose to compact	2.58×10^{-5}	1.67×10^{-5}
			1.08×10^{-5}	
			2.52×10^{-5}	
			4.84×10^{-6}	
21-MW4		Medium to coarse SAND and SILT, loose to compact	2.40×10^{-5}	1.81×10^{-5}
			1.79×10^{-5}	
			1.71×10^{-5}	
			1.32×10^{-5}	

7.3.3.1.3 Groundwater Chemical Quality

Groundwater monitoring is not currently required under the existing NSE Approval for the pit operations. However, as part of a baseline evaluation, groundwater samples were collected from the monitoring wells (21-MW1 through 21-MW4) to document baseline groundwater quality, upgradient and downgradient of the Project Footprint. The monitoring wells were sampled quarterly for a year.

During the monitoring events, Englobe personnel measured the groundwater for temperature, pH, conductivity and dissolved oxygen using the YSI multimeter field instrument. Groundwater samples were filtered and collected in laboratory-supplied bottles that were pre-preserved (where appropriate) for the analyses being conducted. Any sample filtration that was required (for analysis of dissolved fraction) was performed in the field, where possible, but in some cases the samples were too turbid for field filtering. When lab filtering was requested, samples were collected in un-preserved bottle. The groundwater samples were placed in cool storage and transported to BV in Bedford, Nova Scotia for detailed analysis. Laboratory testing parameters included analysis of dissolved metals, dissolved mercury, general chemistry and TSS.

The applicable guidelines would be the 2021 NSE Tier 2 PSS for groundwater; specifically, for potable drinking water and groundwater discharging to surface water (>10m from surface water body). In groundwater, the NSE Tier 2 PSS are based on the Atlantic RBCA Tier II PSS. As noted previously, Atlantic RBCA does not develop groundwater and surface water guidelines. Rather, the guidelines are generally chosen from the Canadian Drinking Water Quality Guidelines (for potable water) and CCME Freshwater Aquatic Life guidelines (for groundwater discharging to surface water), although other jurisdictions such as FEQG, BCMOE and OMOE are sometimes the guideline source. Where pH, hardness and/or DOC is used to determine the groundwater or surface water guideline, the lowest calculated value (or assumed values such as hardness of 100 mg/L) was chosen for display in the NSE Tier 2 PSS. Therefore, it is appropriate to modify the guideline based on the site-specific field data and the source document methodology, where the guideline differs from the published NSE Tier 2 PSS. Specifically, this applies to aluminum, ammonia, cadmium, cobalt, copper, lead, manganese, nickel, zinc, and sulphate for ecological receptors.

Field measurements and lab results obtained for the groundwater samples are presented in Tables 1 and 2 in Appendix E. During the baseline water sampling, in some locations the groundwater quality had drinking water guideline exceedances for iron and manganese, and pH was often depressed

(although depressed pH is generally an operational consideration). Also, at some locations the baseline groundwater quality had ecological guideline exceedances for aluminum, and pH was often depressed.

It is important to note, that these results serve to document existing, baseline conditions related to groundwater quality. Further, drinking water in the area is likely supplied by deeper groundwater resources than what these on-site monitoring wells assess, although this shallower groundwater would serve to recharge deeper groundwater. Also, groundwater discharging to surface water guidelines are based on a predicted manner of groundwater migrating to surface water, actual surface water results are always more representative.

7.3.3.2 Predicted Environmental Effects, Proposed Mitigation and Monitoring

The undertaking is not expected to adversely affect 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 pumping to dewater the pit nor 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 which could present a risk to water quality in the surrounding area.

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 L).

With the mitigation measures any impact is anticipated to be negligible.

Magnitude	Geographic Extent	Frequency	Duration	Reversibility
Negligible	Local	Intermittent	Medium-term	N/A

7.3.4 Wetlands

7.3.4.1 Existing Conditions

A provincially mapped wetland (associated with Cornwallis River and its flood plain) is present south of the Project Footprint. Also, provincially mapped wetland (associated with Fishwick Brook) is present to the northeast of the Project Footprint. Englobe conducted field visits (November 2021 and August 2022) to verify the wetland boundaries and to determine if there were any unmapped wetlands present in or near the Project Footprint; areas around Fishwick Brook were not evaluated since there was no planned disturbance within 75m of the watercourse (see Sheet 03, Appendix D). In addition to the provincially mapped wetland adjacent to the Cornwallis River, Englobe encountered and delineated five additional wetlands within the Study Area. 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 wetlands were identified in November 2021 with a follow up visit in August 2022 to confirm the boundaries and vegetation.

The provincially mapped wetland on the site is a floodplain marsh adjacent to the Cornwallis River, and is mapped as 23 ha in size, although it is contiguous with other mapped wetlands that are present adjacent to the Cornwallis River and is likely larger than 23 ha. The upland boundary of this wetland (northern extent) was predominately a steep natural forested escarpment. The remaining five wetlands are swamps and range in size from a very small vernal pool (<100m^2) to approximately 1,200 m^2. The upland topography surrounding the wetlands is generally characterized by ridges of forest upland that mark the boundary between the wetland and the upland. Vegetation in the wetlands was

not overly diverse, and dominant species consist of red maple, black spruce, ferns (cinnamon) and sphagnum moss.

No rare species were identified in the wetlands.

7.3.4.2 Predicted Environmental Effects, Proposed Mitigation and Monitoring

Although none of the wetlands were located in the original area proposed for sand extraction, several were within 30 m. Therefore, the Project Footprint was revised to provide a 30 m buffer between all wetlands and the Project Footprint.

Setbacks are identified on Figure 1 (Appendix C).

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

- The Project Footprint areas to be cleared and grubbed should be clearly marked and no work will be conducted outside the Project Footprint.
- Slope all working faces towards the pit floor.
- 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.
- Employ progressive reclamation practices to minimize disturbed areas.
- If any effluent leaves the site, conduct total suspended solids (TSS) monitoring.
- Develop a Spill Response and Contingency plan to address any accidental spills (see Appendix L).

With the mitigation measures any impact is anticipated to be negligible.

Magnitude	Geographic Extent	Frequency	Duration	Reversibility
Negligible	Local	Rarely	Medium-term	N/A

7.3.5 Flora, Habitat and Species at Risk

7.3.5.1 Existing Conditions

A botanical assessment was undertaken by Marbicon, with a desktop assessment and supplementary field visits on November 3, 2021 and June 19, July 14, August 2, and November 18, 2022. Findings, details and methodology of the study can be found in (Appendix G).

The Study Area included some agricultural areas and farm roads, and this contributed to the number of non-native/exotic weedy species listed. The sampled forested sections included some wetlands, but the general composition of the area is upland secondary coniferous and mixed forest. The Cornwallis River is immediately to the south, and occasionally formed the southern boundary of the Study Area.

The forested areas are secondary (or possibly tertiary) growth with several localized habitats. Although no old growth forest was identified, a small Eastern Hemlock (*Tsuga canadensis*) stand is present on site. The most common conifer species are Red Spruce (*Picea rubens*) and Balsam Fir (*Abies balsamea*) with White Pine (*Pinus strobus*) also common throughout. Some Scotch Pine (*Pinus sylvestris*) is established in the disturbed sandy areas. Eastern Hemlock is mostly restricted to the one stand. The most common hardwood species throughout is Large-toothed Aspen (*Populus grandidentata*), but other hardwoods are also common, such as Northern Red Oak (*Quercus rubra*), Paper Birch (*Betula papyrifera*), Trembling Aspen (*Populus tremuloides*) and Sugar Maple (*Acer saccharum*), Red Maple (*Acer rubra*) and American Beech (*Fagus grandifolia*).

The understory layer is also somewhat variable. Where conifers are dominant, there are usually fewer plants established in the shade. Where a little more light is available, there are typically an abundance of woodland mosses and occasional grasses and forbs such as Rough Goldenrod (*Solidago rugosa*), Wild Lily-of-the-Valley (*Maianthemum canadense*), Northern Starflower (*Lysimachia borealis*), and Eastern Tea-berry (*Gaultheria procumbens*). Open woods with yet more sunshine include common

shrubs such as Northern Bush Honeysuckle (*Diervilla lonicera*), Sheep Laurel (*Kalmia angustifolia*) and Blueberries (*Vaccinium angustifolium* and *V. myrtilloides*). Wooded wetlands in the Study Area tended to have shrubs such as Green Alder (*Alnus alnobetula*) present. Herbaceous cover in shaded wetlands often included abundant Cinnamon Fern (*Osmunda cinnamomea*) with small carpets of *Sphagnum* spp. Sensitive Fern (*Onoclea sensibilis*) is also present in the wooded wetlands and the river floodplain. Open wetlands such as the riparian zone along the Cornwallis River tend to be marsh-like, dominated by grasses and sedges such as Reed Canary Grass (*Phalaris arundinacea*), Bluejoint Reed Grass (*Calamagrostis canadensis*), and Common Woolly Bulrush (*Scirpus cyperinus*). Occasional patches of Broadleaf Cattail (*Typha latifolia*) and White Meadowsweet (*Spiraea alba*) are common along the upper parts of the river floodplain. The most xeric habitats are the roadsides and especially the disturbed sand pit. These habitats are commonly dominated by weedy species such as Goldenrods (*Solidago spp.*) and Clovers (*Trifolium spp.*) and several species of common grasses. Milkweed (*Asclepias syriaca*) is also present in the disturbed habitats, such as along edges of access roads and fields.

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

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 I. There were no plants that had federal or provincial status, although some plants were identified as being regionally rare or uncommon. No other rare or sensitive plants (not reported by ACCDC) were identified during the field surveys. The ACCDC information is summarized in Table 7-8.

Table 7-8 Summary of ACCDC flora species

Species		Conservation Status			Habitat Preference	Present
Common Name	Scientific Name	Federal Status		Provincial Status*		
		SARA	COSEWIC			
Wild Leek	*Allium tricoccum*			S2		Yes - outside Project Footprint
American Beech	*Fagus grandifolia*			S3S4		Yes - various locations in Project Footprint and Study Area
Blue Vervain	*Verbena hastata*			S3S4		Yes - outside Study Area
Large Tick-trefoil	*Hylodesmum glutinosum*			S2	Rich shady deciduous woods and intervales.	Possible, but not observed
Cut-Leaved Coneflower	*Rudbeckia laciniata*			S2	Swales, swamp edges or in gullies.	Possible, but not observed
Canada Lily	*Lilium canadense*			S2	Riverside meadows and moist open deciduous forests.	Possible in Study Area, but unlikely in Project Footprint
Eastern White Cedar	*Thuja occidentalis*			S2S3 (V)	Wet forests, being particularly abundant in coniferous swamps	Possible in Study Area, but unlikely in Project Footprint

Species		Conservation Status			Habitat Preference	Present
Common Name	Scientific Name	Federal Status		Provincial Status*		
		SARA	COSEWIC			
Blue Cohosh	*Caulophyllum thalictroides*			S2S3	Rich deciduous forests and intervales.	Possible, but not observed
False Mermaidweed	*Floerkea proserpinacoides*		NAR	S2S3	Deciduous ravine slopes. River margins and intervale forests.	Possible in Study Area, but unlikely in Project Footprint
Smooth Sweet Cicely	*Osmorhiza longistylis*			S2S3	Semi-shady sites in moist rich deciduous or mixed woodlands.	Possible, but not observed
Running Serviceberry	*Amelanchier spicata*			S3S4	Anthropogenic, cliffs, balds, or ledges, forest edges, grassland, meadows and fields, woodlands.	Possible, but not observed
Bog Willow	*Salix pedicellaris*			S3	Sphagnum bogs, fens, black spruce treed bogs	Possible in Study Area, but unlikely in Project Footprint

* - Note ACCDC S-Ranks were updated in 2022 and may differ from ACCDC report.

NAR - Not at Risk

V - Vulnerable

S1 - Provincially critically imperiled

S2 - Provincially imperiled.

S3 - Provincially vulnerable

S4 - Provincially apparently secure

Three ACCDC species of concern (S-rankings of S1 to S3S4) were identified on or immediately beside the Project Footprint/Study Area; these rare flora locations are identified on Sheet 02 (Appendix D). Wild Leek (*Allium tricoccum*) was confirmed at a site listed in the 2021 ACCDC report. The S-rank of Wild Leek changed in 2022 from S1 to S2. American Beech (*Fagus grandifolia*) was found throughout the forested areas. The S-rank of American Beech has recently been changed from S5 to S3S4, due to significant known and ongoing declines due to introduced pathogens. Although not directly in the Study Area, a healthy population of Blue Vervain (*Verbena hastata*) was found bordering the site on the Cornwallis River floodplain along the trail leading to the ATV/Snowmobile bridge. The S-rank of Blue Vervain changed in 2022 from S3 to S3S4.

The Common Scouring Rush (*Equisetum hyemale*) was confirmed at a site listed in the 2021 ACCDC report. A couple Meadow Willow (*Salix petiolaris*) shrubs were found along the access road through the centre of the site on the way to the central sand pit. Common Scouring Rush and Meadow Willow both changed from S3S4 to S4.

Milkweed was observed during several of the field surveys. Milkweed is on the NS noxious weed list and had been controlled by herbicides for decades until recently. It is now becoming ubiquitous in Kings County. Although the plant itself is not listed as sensitive, it is the host plant to a sensitive insect (Monarch).

During the field surveys, an attempt was made to check the appropriate habitats for the remaining plants identified by ACCDC as species of concern. Although the appropriate habitats were present and these species may be present, none were observed.

7.3.5.2 Predicted Environmental Effects, Proposed Mitigation and Monitoring

The clearing of vegetation will be required for sand excavation in the western and southern extents of the Project Footprint; there is only minimal vegetation (or agricultural in nature) in other areas of the Project Footprint. No federally or provincially listed rare plants are present at the site, although American beech is present in both the Project Footprint and Study Area, and is considered regionally vulnerable to secure. Outside the Project Footprint (but within the Study Area) one regionally rare (imperiled) plant was present in several locations.

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:

- The Project Footprint areas to be cleared and grubbed should be clearly marked and no work will be conducted outside the Project Footprint.
- Minimize the active extent of disturbance for Project, through phasing.
- Transplant Milkweed to reclaimed and/or areas outside the Project Footprint to maintain Monarch habitat.
- Employ progressive reclamation using native vegetation and seed mixes as soon as possible to re-establish vegetation growth in advance of future decommissioning activities.
- All vegetation clearing will be scheduled outside of the bird breeding season (April 1st to August 30th).

With the mitigation measures any impact is anticipated to be small, and partially reversible (i.e. Project Footprint will be re-vegetated with agricultural plants and/or trees rather than native plants).

Magnitude	Geographic Extent	Frequency	Duration	Reversibility
Small	Local	Rarely	Medium-term	Partially Reversible

7.3.6 Fauna, Habitat and Species at Risk

7.3.6.1 Existing Conditions

A fauna assessment was undertaken by Jacob Walker, with a desktop assessment and supplementary field visits on May 23, June 27, July 14 and August 30, 2022. The survey dates were chosen to maximize the potential for bird and turtle activity at the Project Footprint and Study Area. The field surveys were supplemented with evening and nighttime acoustic recordings from May 23 to 30 and June 27 to July 14. Findings, details and methodology of the study can be found in (Appendix H). All notable fauna observations are presented on Sheet 02 (Appendix D).

The Study Area consists of several habitat types, including an existing sand pit and surrounding disturbed/edge habitat, mature mixed forest on sandy soil, riparian floodplain along the Cornwallis River, and cultivated fields (corn). There are no human-made structures in the Study Area other than a small wooden bridge over the Cornwallis River and beehives (outside the Project Footprint). There are no bird sanctuaries, wildlife management areas, nature reserves, etc. present in or near the Study Area.

In total, 81 species of birds were detected on the Study Area between the nocturnal surveys and the acoustic recordings. Of these species, 52 were likely breeding on the property, 6 were possibly breeding on the property, 11 were likely breeding locally but there was no suitable habitat on the property, and 12 were detected as migrants. The list of species observed is presented in the Fauna Report (Appendix H).

The forest is typical of mature mixed hardwoods in the Annapolis Valley, and is large enough to support both nesting Great Horned Owls and Barred Owls (fledglings were seen of both species), Red-tailed Hawk, and a diverse suite of forest-nesting species of migratory birds. The existing pit and regenerating areas attract edge specialists such as Chestnut-sided Warblers, Rose-breasted Grosbeaks, Gray Catbirds, Chipping Sparrows, Veerys, and Vesper Sparrows. During the July and August surveys, many birds were observed using the regenerating edge of the sand pit and forest

edge for foraging, while the forest interior was much quieter. Several nesting burrows were seen in the existing sand pit, and all appeared to be from Belted Kingfisher. One active Kingfisher nest was found in the bank. The acoustic recordings detected 41 species of birds, including three species not observed during the surveys: Common Nighthawk, Great Blue Heron, and Killdeer. None of these three were detected frequently enough to be considered as breeders on the property.

Common Muskrat (*Ondatra zibethicus*) was observed in the Cornwallis River, and tracks of River Otter (*Lontra canadensis*), White-tailed Deer (*Odocoileus virginianus*), Raccoon (*Procyon lotor*), and Coyote (*Canis latrans*) were seen along the bank. Deer and Coyote prints were throughout the existing sand pit and a Coyote pup was observed near the northwest corner of the Study Area on July 14. There were many burrows in the sandy soil in the forest and some larger apparent dens; these burrows and dens are used by Coyote.

The only evidence of reptiles was a single Eastern Painted Turtle (*Chrysemys picta picta*) in the Cornwallis River and a common garter snake (*Thamnophis sirtalis*). There were several scrapes (possible nest sites) along the crest of the flood plain bank, although subsequent inspections revealed no change in appearance.

Spring Peepers (*Pseudacris crucifer*), American Toads (*Anaxyrus americanus*), and Green Frogs (*Lithobates clamitans*) were heard on multiple surveys and on the Audiomoth recordings, and two Wood Frogs (*Lithobates sylvaticus*) were observed on August 30. Medium-sized tadpoles were seen in the Cornwallis River, perhaps Green Frog. Red-backed Salamanders (*Plethodon cinereus*) and Spotted Salamanders (*Ambystoma maculatum*) likely inhabit the woods but were not observed. No egg masses were observed in the pools (that were checked) in the forested swamp on the west side of the Project Footprint. The forested wetlands were cursorily evaluated, and although no fauna was observed, the larger of these wetlands were considered suitable breeding habitats for amphibians and some birds.

The only notable invertebrates observed during the field surveys were Monarch (*Danaus plexippus*) butterflies and caterpillars, that were using stands of Common Milkweed (*Asclepias syriaca*) growing in the disturbed area around the existing sand pit. Three larger stands of Milkweed were observed, and Monarch caterpillars were found in all three. Other smaller patches of Milkweed were also around the pit but were not noteworthy compared to the larger stands. Englobe and Marbicon also noted stands of Milkweed with Monarch caterpillars.

The ACCDC provided information on recorded significant fauna species and habitats found within a 5 km radius of the property; a copy of the ACCDC report is provided in Appendix I. Other rare or sensitive fauna species that were observed in the Project Footprint or Study Area, but not identified in the ACCDC report have also been summarized in Table 7-9.

Table 7-9 Summary of ACCDC fauna species

Species		Conservation Status			Habitat Preference	Present
Common Name	Scientific Name	Federal Status		Provincial Status		
		SARA	COSEWIC			
Birds						
Warbling Vireo	*Vireo gilvus*			S1B SUM	Open deciduous and mixed deciduous-coniferous woodland, riparian forest and thickets, pine-oak association, orchards, and parks.	Suitable habitat present in the Study Area, but not observed.
Northern Mockingbird	*Mimus polyglottos*			S1B	Various open and partly open situations from areas of scattered brush or trees to forest edge and semi-desert (absent in forest interior), especially in scrub, thickets, gardens, towns, and around cultivated areas. Nests in dense shrubbery, tree branches, vines, often near houses.	Suitable habitat present in the Study Area, but not observed.
Brown Thrasher	*Toxostoma rufum*			S1B	Thickets and bushy areas in deciduous forest clearings and forest edge, shrubby areas and gardens. During breeding, it nests on ground under small bush or as high as about 4 m in tree, shrub, vine	Observed during fly over, but not nesting.
Vesper Sparrow	*Pooecetes gramineus*			S1S2B SUM	Plains, dry shrublands, weedy pastures, fields, arid scrub, and woodland clearings.	Observed (only in May) both in Project Footprint and in the Study Area.
Scarlet Tanager	*Piranga olivacea*			S2B SUM	Breed in deciduous forest and mature deciduous woodland, often where oaks predominate, sometimes in wooded parks, orchards, and large shade trees of suburbs, less often in mixed deciduous-coniferous forest.	Suitable habitat present in the Study Area, but not observed.
Willow Flycatcher	*Empidonax traillii*			S2B	During breeding strongly tied to brushy areas of willow and similar shrubs. Found in thickets, open second growth with brush, swamps, wetlands, stream sides, and open woodland. The presence of water (running water, pools, or saturated soils) and willow, alder, or other deciduous riparian shrubs are essential habitat elements.	Suitable habitat present in the Study Area, but not observed.
Bank Swallow	*Riparia riparia*	T	T	S2B (E)	Breeds in a wide variety of natural and artificial sites with vertical banks, including riverbanks, lake and ocean bluffs, aggregate pits, road cuts and stockpiles of soil. Sand-silt substrates are preferred for excavating nest burrows. Breeding sites are often situated near open terrestrial	Suitable habitat present in the Project Footprint, although no nesting birds, nor evidence of nesting burrows from previous seasons. Some observations over cultivated

Species		Conservation Status			Habitat Preference	Present
Common Name	Scientific Name	Federal Status		Provincial Status		
		SARA	COSEWIC			
					habitat used for aerial foraging (e.g., grasslands, meadows, pastures and agricultural cropland).	fields in the Study Area (likely feeding). Active nests were noted at adjacent an adjacent property (outside the Study Area).
Brown-headed Cowbird	*Molothrus ater*			S2B	Breeding habitat includes woodland, forest (primarily deciduous), forest edge, city parks, suburban gardens, farms, and ranches. Cowbirds often are associated with forest-field edge habitat and clearings in forests.	Suitable habitat present in the Study Area, but not observed.
Chimney Swift	*Chaetura pelagica*	T	T	S2S3B S1M (E)	Prefers anthropogenic habitats such as rural and urban environments for roosting/ nesting sites. Nests are commonly in chimneys but can also be found within walls of anthropogenic structures.	No habitat in the Study Area.
Cliff Swallow	*Petrochelidon pyrrhonota*			S2S3B	Open to semi-open wooded habitat, cliffs, canyons, and farm country, generally near meadows, marshes, and water. They build bottle-shaped mud nest in colonies on cliffs, under eaves of buildings, under bridges, and similar sites sheltered by an overhang. Many return to same nesting area in successive years, but colonies tend to switch nesting sites between seasons, evidently due to a buildup of insect parasites in the nests. Cliff swallow commonly repair and use old nests.	Suitable habitat present in the Study Area, but not observed.
Turkey Vulture	*Cathartes aura*			S2S3B S4S5M	Forested and more commonly open situations, from lowlands to mountains. May roost in large flocks at night in trees; roosts often near or over water. While they often feed near humans, Turkey Vultures prefer to nest far away from civilization.	No habitat in the Study Area.
Baltimore Oriole	*Icterus galbula*			S2S3B SUM	Open woodland, deciduous forest edge, riparian woodland, partly open situations with scattered trees, orchards, and groves of shade trees.	Only one observation (in the Study Area) that was likely a migrant.
Barn Swallow	*Hirundo rustica*	T	SC	S3B (E)	Nest in or on an artificial structure, including barns and other outbuildings, garages, houses, bridges and road culverts. Barn swallows prefer various types of open habitats for foraging, including grassy fields, pastures, various kinds of agricultural crops	No habitat in the Study Area; seen feeding over the northeast corner of the Study Area.
Canada Warbler	*Cardellina canadensis*	T	SC	S3B (E)	Breeding habitat includes moist thickets of woodland undergrowth (especially aspen-	Habitat present in the Study Area, but none observed to be nesting. Only one

Species		Conservation Status			Habitat Preference	Present
Common Name	Scientific Name	Federal Status		Provincial Status		
		SARA	COSEWIC			
					poplar), bogs, tall shrubbery along streams or near swamps, and deciduous second growth.	observation (in the Study Area) that was likely a migrant.
Bobolink	*Dolichonyx oryzivorus*	T	SC	S3B (V)	Breeding habitat includes moderate to tall vegetation, moderate to dense vegetation, and moderately deep litter, lacking woody vegetation.	No habitat in the Study Area; observed as a migrant.
Evening Grosbeak	*Coccothraustes vespertinus*	SC	SC	S3B S3N S3M (V)	Coniferous (primarily spruce and fir) and mixed coniferous- deciduous woodland, second growth, and occasionally parks; in migration and winter in a variety of forest and woodland habitats, and around human habitation.	Suitable habitat present in the Study Area, but not observed.
Eastern Wood-Pewee	*Contopus virens*	SC	SC	S3S4B (V)	Wide variety of wooded upland and lowland habitats including deciduous, coniferous, or mixed forests. Occurs most frequently in forests with some degree of openness, whether it be the result of forest structure, natural disturbance, or human alteration.	Observed to be nesting in the Project Footprint and in the Study Area.
Peregrine Falcon	*Falco peregrinus pop. 1*	SC	NAR	S1B SUM (V)	Various open situations where there are suitable nesting cliffs. When not breeding, occurs in areas where prey concentrate, including farmlands, marshes, lakeshores, river mouths, tidal flats, dunes and beaches, broad river valleys, cities, and airports. Often nests on ledge or hole on face of rocky cliff or crag. River banks, tundra mounds, open bogs, large stick nests of other species, tree hollows, and man-made structures.	No habitat in the Study Area; observed downstream along Cornwallis River, apparently hunting waterfowl.
Rusty Blackbird	*Euphagus carolinus*	SC	SC	S2B (E)	Moist woodland (primarily coniferous), bushy bogs and fens, and wooded edges of water courses and beaver ponds.	No habitat in the Study Area; observed as a migrant.
Common Nighthawk	*Chordeiles minor*	SC	T	S3B (T)	Nests in both rural and urban habitats including coastal sand dunes and beaches, logged forest, recently burned forest, woodland clearings, prairies, plains, grasslands, open forests, and rock outcrops. They also nest on flat gravel rooftops.	*Habitat present in the Study Area, but none observed during any field studies other than an isolated acoustic reading on one date.*
American Bittern	*Botaurus lentiginosus*			S3S4B S4S5M	During breeding primarily large freshwater and (less often) brackish marshes, including lake and pond edges where cattails, sedges, or bulrushes are plentiful and marshes where there are patches of open water and aquatic-bed vegetation. Occurs also in other areas with	No habitat in the Study Area.

Species		Conservation Status			Habitat Preference	Present
Common Name	Scientific Name	Federal Status		Provincial Status		
		SARA	COSEWIC			
					dense herbaceous cover, such as shrubby marshes, bogs, wet meadows, and, rarely, hayfields. Wetlands of 2.5 ha or more may support nesting; smaller wetlands may serve as alternate foraging sites.	
Spotted Sandpiper	*Actitis macularius*			S3S4B S5M	Scrub-shrub wetland, tidal flat/shore, herbaceous wetland, seacoasts and shores of lakes, ponds, and streams, sometimes in marshes; prefers shores with rocks, wood, or debris. Nests near freshwater in both open and wooded areas, less frequently in open grassy areas away from water.	No habitat in the Study Area.
Black-billed Cuckoo	*Coccyzus erythropthalmus*			S3B	Forest edge and open woodland, both deciduous and coniferous, with dense deciduous thickets. Found in extensive tracts of dry upland woods where it uses the midstory canopy and the overstory canopy for most activities. It nests in groves of trees, forest edges, moist thickets, overgrown pastures; in deciduous or evergreen tree or shrub.	Suitable habitat present in the Study Area, but not observed.
Eastern Kingbird	*Tyrannus tyrannus*			S3B	Forest edge, open situations with scattered trees and shrubs, cultivated lands with bushes and fencerows, and parks.	Suitable habitat present in the Study Area, but not observed.
Red Crossbill	*Loxia curvirostra*			S3S4	Coniferous and mixed coniferous-deciduous forests; also pine savanna and pine-oak habitat. In migration and winter may also occur in deciduous forest, and more open scrubby areas.	No habitat in the Study Area.
Killdeer	*Charadrius vociferus*			S3B	Various open areas such as fields, meadows, lawns, pastures, mudflats, and shores of lakes, ponds, rivers, and seacoasts. Nests are on the ground in open dry or gravelly situations, sometimes in similar situations on roofs, driveways, etc.	Suitable habitat present in the Study Area, but not observed.
Wilson's Snipe	*Gallinago delicata*			S3B S5M	During non-breeding wet meadows, flooded fields, bogs, swamps, moorlands, and marshy banks of rivers and lakes. During Breeding nests in tussock of vegetation in or at edge of marsh, wet meadow, or bog.	No habitat in the Study Area.
American Kestrel	*Falco sparverius*			S3B S4S5M	Migratory raptor. During breeding, it prefers open or partly open habitat; prairies, deserts, wooded streams, burned forest, cultivated lands and farmland with scattered trees, open	Suitable habitat present in the Study Area, but not observed.

Species		Conservation Status			Habitat Preference	Present
Common Name	Scientific Name	Federal Status		Provincial Status		
		SARA	COSEWIC			
					woodland, along roads, sometimes in cities. Nests in natural holes in trees.	
Boreal Chickadee	*Poecile hudsonicus*			S3	Boreal coniferous and mixed forests, muskeg bogs, vicinity of white cedar and hemlock swamps, birches and streamside willows. Nests in natural cavities or abandoned woodpecker holes, or in cavity dug in rotten tree stub.	Suitable habitat present in the Study Area, but not observed.
Rose-breasted Grosbeak	*Pheucticus ludovicianus*			S3B	Second-growth woods, mature forest edge, borders of swamps and wooded streams, dense growths of small trees, gardens and parks, old orchards. In migration and winter in various forest, woodland, and scrub habitats; avoids interior of closed forest.	Yes, breeding along river and edge of sand pit
Mammals						
Little Brown Myotis	*Myotis lucifugus*	E	E	S1 (E)	Dwell in dark, enclosed spaces such as caves, mines, tunnels, human habitations, and sometimes trees.	No habitat in the Study Area.
bat species	*Vespertilionidae sp.*			S1S2	Dwell in dark, enclosed spaces such as caves, mines, tunnels, human habitations, and sometimes trees.	No habitat in the Study Area.
Reptiles						
Wood Turtle	*Glyptemys insculpta*	T	T	S2 (T)	Found in and around riverine habitat within forested and agricultural landscapes throughout Nova Scotia. Rivers and streams are important for foraging, mating and overwintering; and during the late spring and summer riparian and upland habitats are required for basking, nesting, and foraging. Frequently associated with mixed forests that have a well developed shrub canopy and open areas. Nesting sites include sandy gravel banks on a bend in the river. They also nest in artificial sites, such as gravel road banks, gravel pits, and gardens.	Suitable habitat present in the Study Area, but not observed.
Snapping Turtle	*Chelydra serpentina*	SC	SC	S3 (V)	Prefer slow-moving waterways with a soft mud or sand bottom and abundant aquatic vegetation. Occupied water bodies are typically shallow, but can also be found along the edges of deep lakes. Typical water bodies include fens, bogs, swamps, marshes, permanent or temporary ponds, and shallow bays of lakes and rivers. Nest in open-canopy habitats with high sun exposure, such as in forest clearings, meadows,	Suitable habitat present in the Study Area, but not observed.

Species		Conservation Status			Habitat Preference	Present
Common Name	Scientific Name	Federal Status		Provincial Status		
		SARA	COSEWIC			
					shorelines, rock outcrops, agricultural fields and the shoulders of roads. The nest sites are typically within a few hundred metres of a wetland or water body.	
Eastern Painted Turtle	*Chrysemys picta picta*	SC	SC	S4	Inhabit shallow aquatic habitats with slow-moving water, soft bottoms, aquatic vegetation, and abundant basking sites. They occur in a diversity of habitat types, including swamps, marshes, permanent or temporary ponds, creeks, rivers and lakes. Females nest in sandy or gravelly soils in open-canopy habitats with high sun exposure, such as in forest clearings, meadows, shorelines, fields, and the shoulders of roads. The nest sites are typically within 200 m of a water body.	Suitable habitat present in the Study Area, only one observation (in the Study Area) that was in the Cornwallis River.
Invertebrates						
Milbert's Tortoiseshell	*Aglais milberti*			S2S3	Wet areas near woodlands, moist pastures, marshes.	Suitable habitat present in the Study Area, but not observed.
Monarch	*Danaus plexippus*	SC	E	S2?B S3M (E)	Habitat is a complex issue for this species. In general, breeding areas are virtually all patches of milkweed in North America and some other regions. The critical conservation feature for North American populations is the overwintering habitats (Mexico and California). Adult feeding is nectar from all milkweeds and early and late in the season, Monarchs visit a variety of flowers. Caterpillar hosts are exclusively milkweed.	Yes, associated with Milkweed.

* - Note ACCDC S-Ranks were updated in 2022 and may differ from ACCDC report.

NAR - Not at Risk

E - Endangered

T - Threatened

V - Vulnerable

SC - Special Concern

S1 - Provincially critically imperiled

S2 - Provincially imperiled.

S3 - Provincially vulnerable

S4 - Provincially apparently secure

SU - Unrankable

The Eastern Wood-Pewee is the only bird species observed to be nesting at the Project Footprint (2 locations and the remaining nesting sites are in the forest of the Study Area) that has a SAR listing (federal and provincial). The remaining observed birds with SAR status were considered migratory (or feeding). Vesper sparrows were the only provincially sensitive birds observed that appeared to be nesting in the Project Footprint or Study Area. There is an established Bald Eagle (*Haliaeetus leucocephalus*) nest to the northeast of the Study Area, and there is provincially significant habitat (other habitat) associated with this nest (NSNRR personal communication, 2022).

There was potential for bat hibernaculum or bat species to be present within 5km of the site based on the location sensitive species information provided by ACCDC. During all field surveys, particular attention was paid for any evidence of caves, open wells, cavities in mature trees, rock outcrops or other potential hibernacula or maternity roosting habitats, or any incidental observations of bats themselves. There was no evidence of bat hibernaculum or bat roosting sites during any of the assessments. No other mammalian SAR are likely to inhabit the project area.

While no turtle nesting activity or turtles (other than one Eastern Painted Turtle in the Cornwallis River) were observed during the surveys, review of the ACCDC report, NSNRR information and local knowledge suggests that both Wood Turtles (*Glyptemys insculpta*) and Snapping Turtles (*Chelydra serpentine*) could inhabit and potentially nest in the Study Area. A portion of the Study Area has also been identified as critical habitat for Wood Turtles (NSNRR, personal communication).

As noted, Monarch butterflies and caterpillars were observed at the site, associated with the stands of Milkweed.

7.3.6.2 Predicted Environmental Effects, Proposed Mitigation and Monitoring

Clearing of the mature mixed forest that borders the existing sand pit would impact most of the bird species breeding on the site and create a net loss of mature mixed-forest. However, some breeding birds observed prefer edge habitats and future expansion would eventually create similar habitat around the new edge. The expansion could also create new nesting habitat for some avian SAR, such as Bank Swallows or Common Nighthawk; the permanent amount of this new habitat will depend on the grading plans for final reclamation (agricultural). Any impacts to birds are only expected to be on a small scale and not expected to impact birds at a regional scale. As noted in 7.3.5, the clearing of vegetation will be required for sand excavation in the western and southern extents of the Project Footprint; there is only minimal vegetation (or agricultural in nature) in other areas of the Project Footprint.

Non-avian fauna that are provincially listed and could potentially be impacted by the Project include bats, turtles and Monarch. No suitable hibernacula were found on the property, however, bat species would likely use the mature forest on the property at other times of year if they were still present in the area. It is likely that the forested areas (and perhaps the exposed sand deposits) are used by both Wood Turtles and Snapping Turtles, even though none were observed. There were no water features that would support turtle overwintering and no alder riparian swamp habitat in the Project Footprint.

There are some mammal dens (Coyote) around the perimeter of the Project Footprint.

Disturbed soils also promote the growth of Common Milkweed, which is a host for Monarchs. Any patches of Milkweed that are removed (and not replaced) would result in a net loss of habitat for Monarchs.

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

- The Project Footprint areas to be cleared and grubbed should be clearly marked and no work will be conducted outside the Project Footprint.
- Minimize the active extent of disturbance for Project, through phasing.
- All vegetation clearing will be scheduled outside of the bird breeding season (April 1st to August 30th) and turtle nesting season (March 1st to September 30th).

– In areas where mammal dens are present, they will be checked before any tree-clearing occurs and before any pit faces are excavated, and avoided if still occupied.
– Sand extraction will primarily occur in winter months when disturbance to birds and other wildlife will be minimal, and encounters with SAR (avian and turtles) will not occur.
– If required, drift fencing will be installed along select portions of the Project Footprint; although based on the current site preparations and operations timelines, encounters with turtles are not expected.
– If required, exposed banks and the pit floor will be diligently checked for nesting Bank Swallows or Common Nighthawks before work occurs; although based on the current site preparations and operations timelines, encounters with nesting birds are not expected.
– Transplant Milkweed to reclaimed areas and/or areas outside the Project Footprint to maintain or increase Monarch habitat.
– Employ progressive reclamation using native vegetation and seed mixes as soon as possible to re-establish vegetation growth in advance of future decommissioning activities.
– If possible, during final decommissioning (and preparation for future agriculture) leave some pit walls in a condition that would encourage future nesting of Bank Swallows.

With the mitigation measures, any impact is anticipated to be small and partially reversible.

Magnitude	Geographic Extent	Frequency	Duration	Reversibility
Small	Local	Rarely	Medium-term	Partially-reversible

7.3.7 Fish, Fish Habitat and Species at Risk

7.3.7.1 Existing Conditions

The endangered Atlantic Salmon, Inner Bay of Fundy population is recorded in the Cornwallis River and there is no reason to not expect fish to be present in Fishwick Brook; however, no fish habitat is present in the Project Footprint. Neither of these water features are crossed while accessing the Project Footprint along the private access road and Blair Road; permanent crossings (maintained by NSDPW) are present on Black Rock Road.

As previously noted, the Project Footprint has been adjusted (to account for other VECs), and there is now a minimum of 40m between the Project Footprint and the Cornwallis River. Nearby Fishwick Brook has always been more than 75m from the edge of the Project Footprint and based on the local topography and inferred groundwater flow direction is upgradient of the Project Footprint, therefore, not considered susceptible to overland (nor subsurface) flows.

7.3.7.2 Predicted Environmental Effects, Proposed Mitigation and Monitoring

There is no fish habitat in the Project Footprint.

The permanent structures spanning the Cornwallis River and Fishwick Brook are already in place and are maintained by NSDPW as part of the public roadway system; no bridge upgrades are required as part of this project.

None of the project activities will cross or span a watercourse within the Project Footprint or along the private access road; all existing bridge and/or culvert infrastructure is located on publicly maintained roads (Black Rock Road) and the transportation plan will respect all public roadway weight restrictions. Surface water runoff along the private access road and Blair Road 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. The road network along the remainder of the transportation route is paved, and sediment transport related to trucking from the Project Footprint to the Keddy pit would be considered negligible. However, accidental spills may occur along the transportation route.

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

- The Project Footprint areas to be cleared and grubbed should be clearly marked and no work will be conducted outside the Project Footprint. Slope all working faces towards the pit floor.
- 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.
- Employ progressive reclamation practices to minimize disturbed areas.
- If any effluent leaves the site, conduct total suspended solids (TSS) monitoring.
- Develop a Spill Response and Contingency plan to address any accidental spills (see Appendix L).

With the mitigation measures any impact is anticipated to be negligible.

Magnitude	Geographic Extent	Frequency	Duration	Reversibility
Negligible	Local	Rarely	Medium-term	N/A

7.3.8 Atmospheric Conditions/Air Quality

7.3.8.1 Existing Conditions

The site is currently operating under an *Industrial Approval* for sand extraction at a pit smaller than 4 ha. Although there is limited activity since the pit is currently approaching its spatial extent, dust is being generated by operations and emissions are being generated by on site trucks and heavy equipment. Dust is currently managed by vegetated buffers and application of water where required. Emissions are being managed by properly operating equipment.

The site is surrounded by forested buffer on the east, west and south sides, and agricultural lands to the north. There are no other residential dwellings nor structures within 500 m on the north side of the Cornwallis River.

The Study Area is located approximately 20 km west of Kentville, where the nearest Ambient Air Quality monitoring station (031101) is located. The station is operated by the Nation Air Pollution Surveillance (NAPS) program and measures various ambient air nitrogen oxides (NO_x), nitric oxide (NO), Nitrogen dioxide (NO_2), ozone (O_3) and particulate matter less than or equal to 2.5 ($PM_{2.5}$). Available data from Station 031101 are summarized in Table 7-10, for April to May 2023, and annually (May 2022 to May 2023).

Table 7-10 Summary of Air Quality Data for the NAPS station in Kentville, NS (031101)

Kentville (031101)	NO_x ppb	NO ppb	NO_2 ppb	O_3 ppb	$PM_{2.5}$ ug/m^3
Monthly Minimum	0.0	-0.1	0.0	0.3	9.4
Monthly Maximum	27.8	16.7	11.0	12.1	66.0
Monthly Average	0.8	0.2	0.5	4.6	39.6
Annual Average	1.2	0.3	0.8	4.7	29.5

7.3.8.2 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.

Vehicle and equipment exhaust emissions could affect air quality on the Project Footprint during site preparation and operations (dust and particulate) and result in GHG emissions with potential climate effects. These impacts will be very limited and of short term duration, potentially occurring on a continuous basis during working hours of sand excavation and transportation.

Dust has the potential to negatively impact air quality with subsequent potential impacts to human health and flora (dust deposition). Excessive dust generation is not expected to occur based on the timing of sand extraction (i.e., winter). The disturbed area will be kept to a minimum as much as possible with progressive reclamation to reduce dust impacts. The Project Footprint is in a rural location more than 500 m from the nearest neighbouring human receptor, although the transportation route does use public roads that extend through populated areas.

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

- Minimize the active extent of disturbance for Project, through phasing.
- Manage dust generation through timing of extraction (i.e., focussed winter activities).
- Use water and/or other approved dust suppressants to reduce and manage dust levels when required. Oil or calcium chloride will not be used for dust suppression.
- Maintain and upgrade access roads as required.
- Control vehicle speed on the Project Footprint and the private access road to control dust.
- Control vehicle speed on the transportation route to improve fuel efficiency (and reduce GHG emissions); dust is not a concern on paved roadways.
- Maintain the equipment in good working condition to reduce emissions.
- 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.
- Shaw will conduct particulate monitoring on an “as required” basis through high volume sampling when requested by NSE.
- Post a sign indicating proponent contact information in case of concern or complaint.

With the mitigation measures any impact is anticipated to be negligible.

Magnitude	Geographic Extent	Frequency	Duration	Reversibility
Small	Local	Daily (during operations)	Medium-term	Reversible

7.3.9 Noise

7.3.9.1 Existing Conditions

The site is currently operating under an *Industrial Approval* for sand extraction at a pit smaller than 4 ha, and there have not been any noise complaints. Noise from current operations would be from heavy equipment and on- and off-site truck transportation. Portions of the Project Footprint are actively farmed by the Visser’s and the private access road (and remainder of Blair Road) is also used by Ledge Rock Construction. Therefore, neighbouring property use will also contribute to existing noise in the area from activities such as road traffic and agricultural.

Large portions of the Project Footprint are (and will continue to be) surrounded by undeveloped forest and agricultural fields. The only residential dwellings not screened by undeveloped forest are the dwellings at the Visser’s Farm (more than 500 m away). Vegetation, if it is high enough, wide enough, and dense enough that it cannot be seen through, is an effective measure to decrease noise.

Low density residential housing is present farther to the east (approximately 500m or more away) and consists of approximately 7 dwellings along the transportation route (Blair Road); the dwellings are approximately 20m from Blair Road. Other residential housing and commercial businesses are present along the transportation route between the Blair Road and the Keddy facility in Coldbrook.

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 7-11 lists some normal outdoor sounds.

Table 7-11 Normal outdoor and construction sounds

Routine Background Activity	Noise Level (dBA)
Threshold of hearing	0
Rural Ambient background (7am-7pm)	45
Normal conversation (1m)	60
Vacuum	75
Automobile (60 km/h, at 20m)	65
Tractor	85
Lawn mower (at 1m)	110
Jet plane (at 30m)	130

Project Related Activity	Noise Level (dBA)
Front End Loader (at 15m)	80
Diesel truck (50 km/hr at 20m)	85

The Project Footprint is surrounded by active agricultural land use and Highway 101 to the north, a vegetated buffer to the west, south and east, with tree-covered lands and low density residential housing farther to the east (approximately 500 m away). Low density residential (near the Project Footprint), and moderate density residential and commercial land use are present along the overall transportation route.

7.3.9.2 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 and breeding periods to reduce impacts to birds and wildlife. Truck loading patterns will be optimized to reduce backing up.

The site is surrounded by forested buffer on the east, west and south sides, and agricultural lands to the north. There are no other residential dwellings nor structures within 500 m on the north side of the Cornwallis River. Operations with similar levels of noise are already occurring at the adjacent sites to the north; no additional noise impacts are anticipated.

Operations at the Project Footprint (and transportation route) will be limited to the daylight working hours (8am to 5pm). Reducing speed limits on roadways and increasing enforcement of speed limits is often the most effective and cost efficient means of reducing noise; speed limits will be posted (and enforced) on the Blair Road. All Shaw trucks are equipped with a GPS transponder that is capable of determining truck speed.

The anticipated additional noise due to is not expected to be greater than that already experienced. The operations will not exceed the sound level exposure limits presented in the *NSE Guidelines for Pits and Quarries*, as presented in Table 7-12.

Table 7-12 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

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

– The Project Footprint areas to be cleared and grubbed should be clearly marked and no work will be conducted outside the Project Footprint to maintain vegetated buffers.

– All vegetation clearing will be scheduled outside of the bird breeding season (April 1st to August 30th) and turtle nesting season (March 1st to September 30th).
– Sand extraction will primarily occur in winter months when disturbance to birds and other wildlife will be minimal, and encounters with SAR (avian and turtles) will not occur.
– Control vehicle speed on the Project Footprint and the private access road to reduce noise.
– Control vehicle speed on the transportation route to reduce noise.
– Maintain the equipment in good working condition.
– Use properly sized and maintained equipment; idling of equipment and vehicles will be kept to a minimum.
– Shaw will conduct noise monitoring on an "as required" basis when requested by NSE.
– Post a sign indicating proponent contact information in case of concern or complaint.

With the mitigation measures the impact will not increase over the current level of noise, and is anticipated to be negligible.

Magnitude	Geographic Extent	Frequency	Duration	Reversibility
Negligible	Local	Rarely	Medium-term	N/A

7.4 Socio-Economic Environment

7.4.1 Economy

The Study Area is located in a predominately un-inhabited area north of the community of Waterville, Municipality of the County of Kings. Waterville has been designated as a growth centre by the Municipality, with various commercial, institutional and residential land uses. 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. Waterville lies between the larger Town of Berwick and community of Cambridge Growth Centre.

Since the early 2000s, sand has been extracted from the Project Site by previous owners as well as Shaw. Current and historic agricultural uses have also taken place.

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. As noted, this project will support the Keddy facility and provides direct and indirect employment for its workers and suppliers, as well as for the transportation and construction industries. The current project is required to extend production at the existing Keddy facility beyond the next 4 years. The project will also support the local land owner (Visser family) through lease and royalty payments, with future plan to transfer the land to the Vissers for agricultural use.

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

7.4.2 Land Use

Portions of the land are currently used as a sand pit and cultivated agricultural fields. The Project Footprint is zoned "A1" (agricultural); the land use or municipal zoning will not be changing. The end use of the Project Footprint (once sand extraction concludes) is agricultural. A well-established buffer is already in place along the eastern, southern and western sides of the Project Footprint; operations will not disturb these buffers. There are no sight lines between the Project Footprint and any of the neighbouring lands due to the forested buffers.

Local hunters and other residents do occasionally use the lands of the Study Area. Although there is no formal land use agreement in place to provide access, access is also not restricted.

No land use impacts are anticipated. Signage is already posted indicating proponent contact information in case of concern or complaint.

7.4.3 Transportation

Currently, there are few trucks that leave the site since the pit is approaching its spatial extent. During previous sand excavation activities, approximately 15 trucks per week would leave the site via the private access road and Blair Road, and enter Black Rock Road before continuing on to the Keddy facility in Coldbrook. Under the expansion plan, a similar level of activity will continue. A Truck Analysis was conducted to evaluate Site operations and how truck traffic would impact traffic flow through the community of Waterville. A copy of the Truck Analysis report is provided in Appendix J.

Under the expansion plan, there will be additional sand extraction from the Project Footprint. Increased extraction at this 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 other nearby Shaw sites.

If the Project is estimated to produce 32,000 tonnes of sand per season. The sand would be directly loaded, and transported to the Keddy facility during a 1-month period in the winter. The mostly likely transportation will be via a Light Single Unit truck (tri-axle truck), although depending upon availability, larger trucks (53' Tractor Semi-Trail (Quad or Tri Axle)) may be used. Based on the traffic analysis, this level of production will require 47 daily (one-way) truck runs. This will require 12 trucks to steadily run through a standard 8-hour workday. These traffic projections would all be less with larger trucks.

The Project site traffic route distributions are shown below in Table 7-13. These distributions were devised to help alleviate truck traffic on Black Rock Road and Trunk 1 by providing different inbound and outbound routes to the Keddy facility. Outbound trucks shall head south on Black Rock Road until Trunk 1 where they will turn left toward the Keddy facility. Inbound trucks headed to Project Site shall head west on Trunk 1, turn right onto Maple Street, and turn right onto Black Rock Road to the site. This will set a precedence for truck route operations through the community of Waterville for the month (each year) the site is operable.

Table 7-13 Development Trip Distribution

Direction	Inbound Distribution	Outbound Distribution
TO KEDDY AGGREGATE FACILITY		
South (via Black Rock Road)	0%	100%
East (via Trunk 1)	0%	100%
FROM KEDDY AGGREGATE FACILITY		
West (via Trunk 1/Maple St)	100%	0%
North (via Black Rock Road)	100%	0%

As part of the traffic analysis, sight distances were reviewed to determine if there was safe truck access from Blair Road to Black Rock Road. At Blair Road, the existing sight distance to the north is measured at approximately +250 m and exceeds the minimum turning sight distance for left turns of 240 m and the minimum stopping sight distance of 160 m. The sight distance to the south is approximately 230 m which does not meet the minimum turning sight distance for left turns by 10 m. It does however, meet the stopping sight distance of 160 m. This is due to the horizontal alignment of Black Rock Road. Left hand turns (by trucks) onto Black Rock Road are not expected. The secondary access at Parker Condon South Road was also reviewed. At Parker Condon South Branch Road, the existing sight distance to the north is 160 m which does not meet the required minimum turning sight distance for right turns by 55 m. This is due to the horizontal alignment of Black Rock Road. The sight distance to the south is greater than 240 m and exceeds the minimum turning sight distance for left turns. The stopping sight distance is met in both directions.

Turning movements at the access roadways and intersections were assessed using AutoCAD's Vehicle Tracking Simulator with a 53' Tractor Semi-Trailer (both using a Quad and Tri Axle options) to ensure that the driveways and intersections provide adequate access for the expected vehicle types. After simulating a Quad and Tri-Axle Semi-trailer's wheel path onto Black Rock Road from Blair Road

and Parker Condon South Branch Road, it was determined that the entrance at Parker Condon South Branch Road is better suited to accommodate this type of semi-trailer. This intersection is wider and provides more area for the truck to turn without off-tracking onto the shoulder. At Blair Road the truck turning movements indicate that the rear wheels of the semi-trailer would track well onto the shoulder, making right turns onto Black Rock Road challenging. No issues were identified at Black Road Road/Mill Street, Black Road Road/Trunk 1, and Maple/Trunk 1 and it is expected that a Quad or Tri-Axle Semi-trailer would be able to move freely through these intersections.

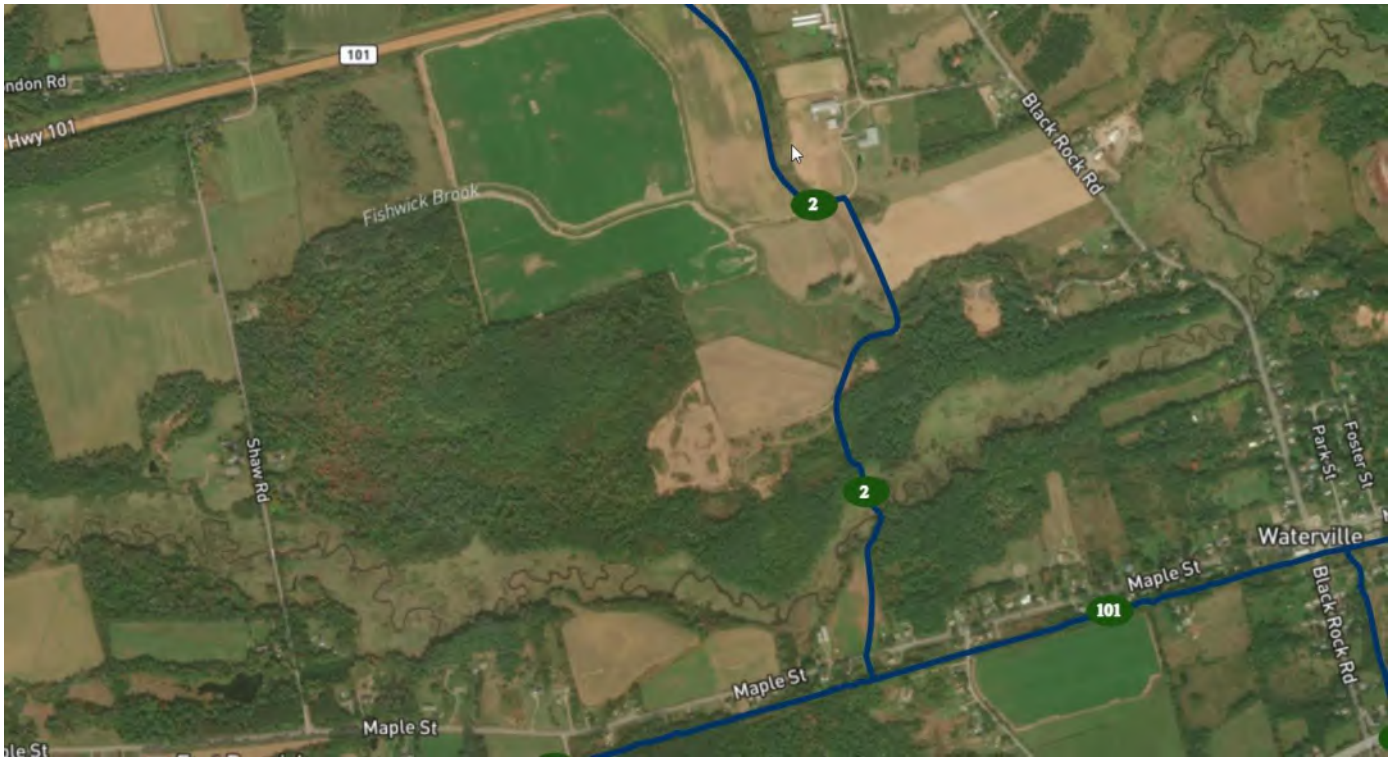
The increase in traffic from the Project will be minimal and stopping sight distance is met at the primary access roadway, which is considered a minimum requirement. However, a WC-8L Truck Entrance sign should be considered on Black Rock Road in the northbound direction at a minimum of 160 m south of Blair Road. In the southbound direction, a WC-8R sign should be considered on Black Rock Road a minimum of 160 m north of Parker Condon South Road. The Truck Entrance signs would serve as a warning to vehicles not expecting slow moving truck traffic entering/exiting Black Rock Road. If large trucks (53' Tractor Semi-Trailer) then the secondary access at Parker Condon South Road should be used for outbound traffic. There are no turning restrictions for smaller trucks (Light Single Unit truck).

7.4.4 Recreation and Tourism

There are no parks or formal recreation activities conducted in the immediate surrounding area.

There is a Snowmobilers Association of Nova Scotia (SANS) trail that extends from north of Highway 101, through a portion of the Project Footprint before crossing the Cornwallis River and connecting to trails on the south side of Maple Street. Permission for the trail to be used is based on yearly approval by the Visser family; there is no formal or long term agreement and permission can be withdrawn at any time by the Visser family. The status of this trail was indicated as "closed" in 2023 due to lack of snow cover. Moving forward, the Visser family will continue to review the request for access on a yearly basis, and if the trail interferes with sand extraction, Shaw will construct a marked crossing to prevent unsafe interaction between snowmobiles and truck traffic.

Figure 7-2 Mapped trail from SANS



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

7.4.5 Human Health

Future operations will be continuing from the existing operations; no new operations or technologies will be employed.

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.

During the course of site preparation and sand extraction activities, dust, exhaust emissions and noise will be generated by the heavy machinery. The current conditions are described in Sections 7.3.8 and 7.3.9. The disturbed area will be kept to a minimum as much as possible with progressive reclamation to reduce dust impacts during the fall. The Project Footprint is in a rural location more than 500 m from the nearest neighbouring human receptor, although the transportation route does use public roads that extend through populated areas.

7.4.6 Predicted Environmental Effects, Proposed Mitigation and Monitoring

As noted, there are no predicted impacts from changes to economy, land use and tourism.

To minimize any impacts from to transportation and recreation activities, the following mitigation measures will be implemented:

- Maintain and upgrade access roads as required.
- Control vehicle speed on the transportation route.
- Require 53' Tractor Trailer size trucks to use the secondary access route for outbound trips; all smaller trucks can use Blair Road.
- Request that NSDPW review the requirement for Truck Entrance warning signs to be posted on Black Rock Road.
- Review request for SANS access on an annual basis.
- Reroute the SANS trail (if required).

The proposed mitigation measures to protect human health to surrounding occupants are the same as those for both Air Quality (Section 7.3.8) and Noise (Section 7.3.9). In addition, the following mitigation measures will be implemented:

- Use water and/or other approved dust suppressants to reduce and manage dust levels when required. Oil or calcium chloride will not be used for dust suppression.
- Maintain and upgrade access roads as required.
- Control vehicle speed on the Project Footprint and the private access road to control dust.
- Control vehicle speed on the transportation route to improve fuel efficiency (and reduce GHG emissions); dust is not a concern on paved roadways.
- Maintain the equipment in good working condition to reduce emissions.
- 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.
- Shaw will conduct particulate monitoring on an "as required" basis through high volume sampling when requested by NSE.
- Post a sign indicating proponent contact information in case of concern or complaint.
- Develop a Spill Response and Contingency plan to address any accidents.
- All workers will be trained to meet the requirements of the NS Occupational Health and Safety regulations.

With the mitigation measures any impact is anticipated to be negligible.

Magnitude	Geographic Extent	Frequency	Duration	Reversibility
Negligible	Local	Daily (during operations)	Medium-term	N/A

7.5 Culture and Heritage

Davis MacIntyre & Associates Limited (Davis MacIntyre) conducted an archaeological resource impact assessment (ARIA) of the project site in 2021. The assessment consisted of a background study and a reconnaissance of the Study Area. This assessment was completed under Category C Heritage Research Permit A2021NS158 issued by the Department of Communities, Culture and Heritage (CCH). The ARIA conforms to the standards required by the CCH 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 LiDAR and aerial photos and other online resources. The Maritime Archaeological Resource Inventory was searched in an effort to understand prior archaeological research and known archaeological resources neighbouring the Study Area. Staff at the Archaeology Research Division of Kwilmu'kw Maw-klusuaqn (KMKNO-ARD) were contacted as part of this assessment in order to elicit information regarding past and traditional land use in the Study Area. A field reconnaissance of the entire property was conducted by Laura de Boer, Christian Thériault, and Russell Dignam on December 13, 2021.

The Study Area is located in the Valley region of the Triassic Lowlands (Natural Theme Region #610). 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.

No recorded archaeological sites are located within a five-kilometre radius of the Study Area. The nearest known sites are two general activity sites related to the precontact period (BgDd-03 and BgDd-04), which both were found on a terrace above a floodplain of the Cornwallis River, encountered during a shovel test program. These sites are located approximately 9.5 kilometres east of the Study Area at Coldbrook. Further downstream at Kentville, BgDd-01 represent historic Mi'kmaw burials encountered during the construction of a shopping centre in front of the Cornwallis Inn. A probable cellar depression dating to the mid- to late nineteenth century is also located just under 10km from the Study Area along the Cornwallis River (BgDd-02). The most prominent archaeological sites in general proximity to the Study Area are the extensive L'nuk site complexes along the Gaspereau and Aylesford Lake system and the Annapolis River system. These inland sites represent a long and dense pattern of occupation and landscape use since time immemorial. The absence of known archaeological sites nearer to the Study Area is likely due to a lack of previous archaeological research being conducted in the area and is not necessarily reflective of a lack of archaeological sites.

The KMKNO-ARD was contacted in November 2021 to inquire whether traditional Mi'kmaw land use is known in or near the Study Area. A response was received on 6 December 2021. While the traditional use information provided is confidential, it has been taken into consideration during this assessment. They also noted several entries in their historical database near the Study Area, related to families living at the Cambridge reserve (IR32) in 1883. This information is similar to that available through other records (i.e., Cambridge reserve occupied in some manner between 1878 and 1907).

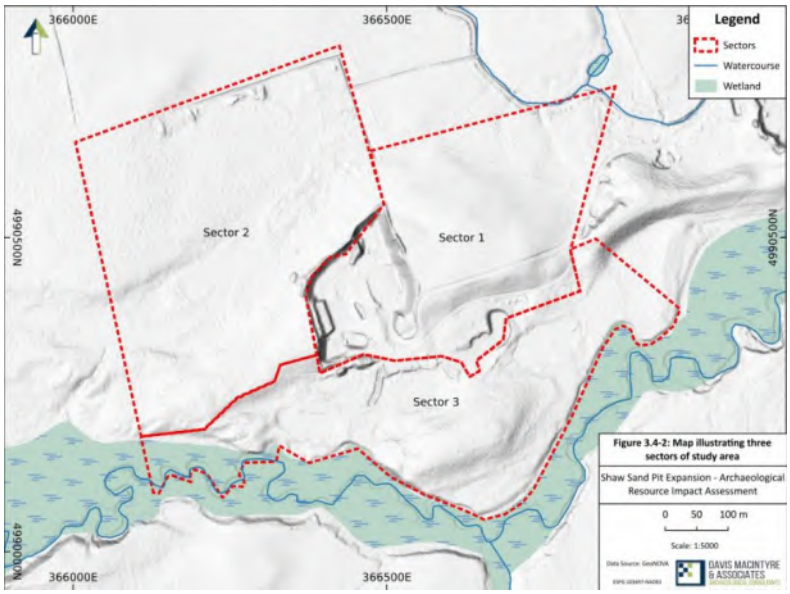
There is little documentation about the village of Waterville in the 19th century. A review of A. F. Church's 1872 Topographic map of Kings County depicts many of the main roads in the area as well established at this time. 51 homes are focused near these roads and some of these may still be presently occupied. A large portion of the Study Area is likely farmlands behind these homesteads. Based on aerial photography, portions of the Study Area and Project area were used as pasture field and orchard in the past.

Examination of modern LiDAR, surficial geology and water body mapping reveals a landscape of hills, ridges and low-lying wetland along the Cornwallis River and its tributaries. Of note is an elevated terrace upon which the existing sand quarry dug into, as well as a ridge that could be a western remnant of the esker located just east of the project area. Several ground anomalies have been noted within the Study Area boundaries as well and warranted further investigation in the field. Other signs of cultural activity include logging and access roads and push-outs near the old field and quarry.

Predicting the occurrence of L'nuk heritage resources is a difficult task. The full review methodology is presented in the Davis MacIntyre report. With known data, a potential model can be created for encountering L'nuk cultural resources for the Cambridge Study Area, within the Cornwallis River system, based upon the Annapolis River model. Within the Cornwallis River system, based upon the Annapolis River model. Within 50 metres of modern floodplains should be considered as High potential for encountering L'nuk cultural resources. Between 50 and 110 metres from modern water levels should be considered as Moderate potential for encountering Mi'kmaq cultural resources. Moderate potential areas should also include areas within the High potential buffers that have factors that lessen their desktop elevated potential. This may include areas of significant slope, boulder fields, significantly wet areas and unsheltered areas with poor shoreline access. Similar on the ground limiting factors should be considered within the Moderate potential buffer when assessing an area's overall cultural resource potential. Glaciofluvial features that roughly follow the course of the Cornwallis River should also be included as areas of Moderate potential. Nevertheless, in areas of frequent cultivation disturbance, artifacts can be redeposited outside of these highlighted areas. Therefore, isolated finds beyond the potential buffers may still be encountered.

The reconnaissance consisted of transects that were spaced approximately 20m apart, with particular attention paid to areas most likely to contain elevated potential such as stream banks, glaciofluvial features, areas of known historic resources and plowed fields with exposed soils. In some areas, steep slopes, safety impasses, and open wetlands were avoided. These limiting factors account for a few gaps in the track log mapping. The areas assessed were divided into three sectors in order to better describe them individually.

Figure 7-3 Boundaries of sector areas



7.5.1 Sector 1 Farm Field

The lower part of this field on the northeast corner of the Study Area consists mainly of a hay field with a drainage channel flowing north into Fishwick Brook which partly drains into the project area at its northeast most corner. The upper area of this field is covered by a corn field up to a road on the edge of the ridge to the south and to the edge of the quarry to the west.

The southern section of this sector consists of an access road with cleared areas on both sides where few trees are present. The southernmost part of this area appears to have been cleared recently, likely in association with logging activity as illustrated by the presence of a logging trail leading into this area (likely when access trails were cut for geotechnical bore holes). This area is mostly cleared of mature trees, with small planted pine trees, alders and a few larger remaining trees such as birch, poplar and spruce.

On the eastern part of this sector is the sand pit that has been excavated at 3 to 5 metres in depth to harvest the glaciofluvial deposits of sand and gravel. Small trees have started to grow into this quarry

since it was last intensively used. A berm of one or two metres is usually present on the edges that were excavated, especially on the eastern edge of the sand pit.

There was a moderate potential area (MP03) for L'nuk resources in this sector, as select portions would most likely have been an attractive landscape feature for human settlement during the Saqiwe'k L'nuk period. The exact area of MP03 is provided in the Davis MacIntyre report (Davis MacIntyre, 2022a).

7.5.2 Sector 2 Upper Ridge

This sector consists of the forested area on the upper terrace located on the western half of the project area. The eastern edge of this sector along the farmer's field was difficult to access due to the presence of an irrigation channel that is one or two metres wide. Small dirt mounds and trenches can be found on the other side of that channel along the edge of the woods. These small mounds are associated with the excavation of the drainage ditch. The area on that side of the forest is mostly young oak, maple, poplar and fir with long marsh grass with sporadic blackberry and hawthorn bushes. This hummocky area, which was part of a farmer's field until the middle of the 20th century, contains numerous areas of standing water, which can in part be attributed to poor drainage (likely due to modern disturbances to the landscape) as well as recent snow and rain falls that occurred shortly before the reconnaissance. On the eastern side of this sector, just to the northwest of the corn field, is a twentieth century disposal area with various types of modern garbage such as old vehicle parts, metal milk crates, plastic containers and various pieces of residential furniture.

On the northern edge of this sector, a linear series of large dirt mounds can be seen on the edge of what was once two separate fields. These large mounds are located next to an existing drainage channel, and can easily be seen in the available LiDAR imagery of the area. An active logging trail goes north-south on the western side of the project area, where a more mature hardwood stand is present. As illustrated by the intact presence of a sandy podzol under exposed tree-throws, this area, and most particularly along and south of the upper terrace, has been less impacted by agricultural and forestry activities than the northern half of this sector. There is however, a significant area of standing water below the ridge and west of the sand pit. This wetland area drains west into a channel that in turn drains south into the Cornwallis River floodplain just 60 metres west of the project area.

South of this area is a logging road running east-west with a gate on the western edge of the project area/ PID. This sector is mainly covered with spruce, pine, fir and oak trees. Another trail leads south to the edge of the Cornwallis River floodplain/wetland. At the edge of this trail, on the edge of the floodplain, the team encountered a small pile of old railway ties as well as old and modern barbwire and wood fencing. Just east of this access trail to the river is the western edge of the upper terrace, which was altered by the construction of the sand pit.

Two areas of moderate archaeological potential, MP01 and MP02, were identified in this sector. MP01 could have been a good encampment location during the Early Holocene when water levels would still have been receding. MP02 is the continuation of MP03, which was altered by the construction of the sand pit. The exact areas of MP01 and MP02 are provided in the Davis MacIntyre report (Davis MacIntyre, 2022a).

7.5.3 Sector 3 South/Lower Side

The last sector of this archaeological reconnaissance was the lower terraces located next to the Cornwallis River floodplain, south of the project area. The southwestcorner of the project area consists of a wetland area that is part of the Cornwallis River floodplain, having formed as the river meanders. Within this low, silty floodplain, archaeological materials are likely to be sparse. A series of flat terraces are present.

The terraces are vegetated with pine, poplar, oak, maple and some small spruce. There is a steep edge forming the south border of this area overlooking an anchored bend of the river, which does not

appear to have meandered much over the last century. Along some of the terraces barbwire fencing is present on its edges, indicating that this would have been used as a pasture in the past. There is no sign of this area being cleared over the past 100 years, but this fencing could be associated withthe fields located on the south side of the river. These terraces could be an ideal location for winter camp and some features would have been a great vista point in the past and is thus considered to be of moderate archaeological potential.

An old road leads to the edge of the floodplain at the western extent of the orchard where old wood and barbwire fencing is present. Two modern road signs are attached to a large tree near the edge of the floodplain, beyond which the remnant of abridge or dock can be seen at the modern riverbank. The area, especially nearthe edge of the floodplain and road, is vegetated with numerous hawthorn trees, a common occurrence in old fields and orchards.

Finally, a good portion of the northern part of this sector consists of highly disturbed or wet areas not suitable for testing. Among the disturbed areas are a deep trench just south of the quarry area, likely excavated to clear standing water from the quarry and the road leading to it. A wetland has formed on the east side of this benched drainage and flows down into the floodplain.

7.5.4 Field Reconnaissance Summary

A field reconnaissance of the Study Area has revealed four areas of high archaeological potential for encountering L'nuk resources, HP01 through to HP04. The field reconnaissance also resulted in the identification of four areas of moderate archaeological potential for encountering L'nuk resources, MP01 through to MP04.

Table 7-14 Inventory of archaeological potential areas documented during field reconnaissance

Resource Code	Type	General Location
HP01	L'nuk	Small terrace on north bank of Cornwallis River
HP02	L'nuk	Small terrace on north bank of Cornwallis River
HP03	L'nuk	Small terrace on north bank of Cornwallis River
HO04	L'nuk	Long and low terrace on north bank of Cornwallis River
MP01	L'nuk	Upper ridge terrace on north bank of Cornwallis River
MP02	L'nuk	Upper ridge terrace on north bank of Cornwallis River
MP03	L'nuk	Upper ridge terrace on north bank of Cornwallis River
MP04	L'nuk	Small ridge/potential esker remnant on north bank of Cornwallis River

If these areas are expected to be disturbed, additional testing is recommended. Specifically, areas of high L'nuk archaeological potential (HP01, HP02, HP03 and HP04) be subjected to shovel testing at 5-metre intervals and areas of moderate L'nuk archaeological potential (MP01, MP02, MP03 and MP04) be subjected to shovel testing at 10- metre intervals to determine the presence or absence of archaeological resources.

The February 2022 ARIA report was submitted to CCH and accepted on September 20, 2022, a copy of the acceptance letter is provided in Appendix K.

7.5.5 Shovel Testing

Since the Project Footprint was expected to disturb areas of potential archaeological resources, Davis MacIntyre conducted archaeological testing in three areas of moderate archaeological potential: MP02, MP03 and MP04. The assessment was conducted under Category C (ARIA) Heritage Research Permits A2022NS049 and A2022NS101, issued by the CCH.

As recommended in the February 2022 report, areas MP02, MP03 and MP04 were assessed at 10-metre intervals. Between April 5 and 8, 2022, 164 archaeological shovel test pits were excavated in

areas MP02 and MP03 in order to assess if archaeological material was present. Between July 4 and 5, 2022, 47 additional archaeological shovel test pits were excavated in area MP04 in order to assess if archaeological material was present. The shovel test pits consisted of 40cm by 40cm units, which were placed at 10-metre intervals throughout the areas of moderate potential. In some locations, the shovel test pits were placed at 5-metre intervals. Testing proceeded to the depth of glacial till or sterile subsoil (to a minimum of 10 cm into the sterile lot). Select units were excavated to 1.2 metres and then hand-augered to characterize the underlying strata.

Although testing at MP02, MP03 and MP04 did attest that these elevated ridge terraces are indeed well-drained sandy terraces formed by glacio-fluvial events, and MP04 had elements of aeolian soils near the surface, no sign of L'nuk archaeological remains were found within these three areas of archaeological potential. A few pieces of historic/modern ceramic and glass sherds were found in the plough zone layer of the corn field and along the edge of the access road (MP03), indicating recent discard activities rather than an actual habitation site in the area.

Following this archaeological testing of the areas of moderate archaeological potential MP02, MP03 and MP04, it is recommended that these areas be cleared for development since no signs of L'nuk archaeological material or any other significant archaeological finds were found at these locations. At the remaining moderate potential and high potential areas, if disturbance is planned, additional shovel testing is recommended. Specifically, areas of high L'nuk archaeological potential (HP01, HP02, HP03 and HP04) be subjected to shovel testing at 5-metre intervals and areas of moderate L'nuk archaeological potential (MP01) be subjected to shovel testing at 10-metre intervals to determine the presence or absence of archaeological resources.

The reports for the shovel testing were submitted to CCH and accepted on September 15 and February 7, 2023, copies of the CCH acceptance letters are provided in Appendix K.

7.5.6 Predicted Environmental Effects, Proposed Mitigation and Monitoring

The Project Footprint has been modified to avoid the remaining area of moderate archaeological potential (MP01) and areas of high archaeological potential (HP01, HP02, HP02 and HP04).

During the course of the site preparation and operations, although unlikely, artifacts and L'nuk 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 archaeological resources are encountered at any time during activities, the following mitigation measures shall be implemented:

- The Project Footprint areas to be cleared and grubbed should be clearly marked and no work will be conducted outside the Project Footprint.
- All work activities in the area shall be stopped if an artifact/archaeological resource is encountered.
- Contact the Coordinator of Special Places (902-424-6475), notify of the discovery and establish a suitable mitigation method.
- Should the Project Footprint be modified to expand beyond the currently know range, a qualified archaeologist should be consulted to conduct the recommended shovel testing and evaluate whether additional archaeological mitigation may be required.

With the mitigation measures any impact is anticipated to be negligible.

Magnitude	Geographic Extent	Frequency	Duration	Reversibility
Negligible	Local	Rarely	Medium-term	N/A

8 Effects of the Project on the Mi'kmaq

Engagement has been completed with the Annapolis Valley First Nation, KMKNO and Confederacy of Mainland Mi'kmaq during the EA process. The ARIA reports concluded that there is low potential for First Nations archaeological resources on site, and areas with high or moderate potential for artefacts have been avoided. Shaw is committed to continued engagement with Mi'kmaq communities and organizations throughout the life of the Project.

No Project related adverse effects on the Mi'kmaq of Nova Scotia are anticipated.

9 Effects of The Environment on the Project

Considering the effects of the environment, including climate change and sustainability, can help prepare the Project for future changes and build climate adaptability and resiliency into the Project at the design stages. For this Project, the environment can have an impact during both the site preparation and operational phases of the project through climate change and meteorological events.

There is no permanent infrastructure planned for this Project, therefore maintenance or physical impacts from the environment on Project infrastructure are not anticipated.

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 the Cornwallis River is present south of the Project Footprint, there will be 3 to 4m of elevation change from the current water level of the Cornwallis River to the edge of the pit. Rising water levels in Fishwick Brook may temporarily inundate portions of the Project Footprint during storm events, although given the proposed Project and future agricultural land use, inundation resulting from storm events is not likely to cause any long term effects.

Short duration rain precipitation (or snow) events may temporarily halt sand excavation activities. However, given the coarse-grained nature of the sand and that excavated surfaces will direct any surface water back towards the pit floor, erosion and sediment transport from heavy precipitation events is not anticipated to impact the Project. Heavy wind events can also mobilize fugitive dust; however, the vegetated buffers are present that would mitigate transport off-site.

10 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-negligible magnitude, local extent, rare to intermittent frequency, medium-term duration. Continued operation of the pit will result in economic benefits, including employment and an economic source of quality construction materials to local demand markets, and following the completion of sand excavation, the area will revert to agricultural land use.

Environmental effects will include the loss of habitat within the proposed pit expansion area. The expansion area has been the subject of past extraction activities and agricultural uses, and only a small area of vegetation removal is required to complete the Project.

A summary of the potential for significant adverse effects and the required mitigative measures is provided in Table 10-1.

Table 10-1 Summary of EA Potential Effects, Mitigation and Significance

VEC	Project Activity	Potential Impact	Mitigation	Significance after Mitigation
Surficial geology	Preparation Operations Decommissioning	Erosion and sedimentation	– Implement a site-specific ESC plan in accordance with practices outlined in the latest version of the NSE Erosion and Sedimentation Control Handbook for Construction Sites. The ESC Plan will be adjusted as required, throughout the life of the Undertaking. – Stockpiled cover material (e.g., topsoil and grubbing) will be stored in an area with ESC measures to prevent mobilization of sediment laden surface water. – Undertake regular maintenance of any ditches and other ESC measures to minimize sediment build-up. – Employ progressive reclamation practices to minimize and stabilize disturbed areas. – Should the Project Footprint be modified to expand beyond the currently known range, a qualified archaeologist should be consulted to conduct the recommended shovel testing and evaluate whether additional archaeological mitigation may be required.	Minimal
	Preparation Operations	Pre-contact first nations artefacts present	– All work activities in the area shall be stopped if an artifact/archaeological resource is encountered. – Contact the Coordinator of Special Places (902-424-6475), notify of the discovery and establish a suitable mitigation method. – Should the Project Footprint be modified to expand beyond the currently know range, a qualified archaeologist should be consulted to conduct the recommended shovel testing and evaluate whether additional archaeological mitigation may be required.	Minimal
Bedrock	N/A	N/A	N/A	N/A
Surface Water	Preparation Operations	Erosion and sedimentation	– Slope all working faces towards the pit floor. – 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. – Employ progressive reclamation practices to minimize disturbed areas. – If any effluent leaves the site, conduct total suspended solids (TSS) monitoring.	Minimal

VEC	Project Activity	Potential Impact	Mitigation	Significance after Mitigation
	Preparation Operations Decommissioning	Accidental Spills	– Develop a Spill Response and Contingency plan to address any accidental spills.	Minimal
Groundwater	Preparation Operations Decommissioning	Accidental Spills	– 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
Wetlands	Preparation Operations Decommissioning	Disturbance and/or unintentional alteration	– The Project Footprint areas to be cleared and grubbed should be clearly marked and no work will be conducted outside the Project Footprint. – Slope all working faces towards the pit floor. – 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. – Employ progressive reclamation practices to minimize disturbed areas. – If any effluent leaves the site, conduct total suspended solids (TSS) monitoring.	Minimal
	Preparation Operations Decommissioning	Accidental Spills	– Develop a Spill Response and Contingency plan to address any accidental spills.	Minimal
Flora, Habitat and Species at Risk	Preparation	Disturbance and/or vegetation removal	– The Project Footprint areas to be cleared and grubbed should be clearly marked and no work will be conducted outside the Project Footprint. – Minimize the active extent of disturbance for Project, through phasing. – Employ progressive reclamation using native vegetation and seed mixes as soon as possible to re-establish vegetation growth in advance of future decommissioning activities.	Low
	Preparation	Disturbance of nesting birds	– All vegetation clearing will be scheduled outside of the bird breeding season (April 1st to August 30th).	Minimal
	Preparation	Disturbance of Milkweed	– Transplant Milkweed to reclaimed and/or areas outside the Project Footprint to maintain Monarch habitat.	Minimal

VEC	Project Activity	Potential Impact	Mitigation	Significance after Mitigation
Fauna, Habitat and Species at Risk	Preparation	Disturbance of habitat	– The Project Footprint areas to be cleared and grubbed should be clearly marked and no work will be conducted outside the Project Footprint. – Minimize the active extent of disturbance for Project, through phasing. – All vegetation clearing will be scheduled outside of the bird breeding season (April 1st to August 30th) and turtle nesting season (March 1st to September 30th). – In areas where mammal dens are present, they will be checked before any tree-clearing occurs and before any pit faces are excavated, and avoided if still occupied. – Sand extraction will primarily occur in winter months when disturbance to birds and other wildlife will be minimal, and encounters with SAR (avian and turtles) will not occur. – If required, drift fencing will be installed along select portions of the Project Footprint; although based on the current site preparations and operations timelines, encounters with turtles are not expected. – Transplant Milkweed to reclaimed areas and/or areas outside the Project Footprint to maintain or increase Monarch habitat.	Minimal
	Operations	Disturbance of wildlife.	– In areas where mammal dens are present, they will be checked before any tree-clearing occurs and before any pit faces are excavated and avoided if still occupied. – If required, drift fencing will be installed along select portions of the Project Footprint; although based on the current site preparations and operations timelines, encounters with turtles are not expected. – If required, exposed banks and the pit floor will be diligently checked for nesting Bank Swallows or Common Nighthawks before work occurs; although based on the current site preparations and operations timelines, encounters with nesting birds are not expected.	Minimal
	Decommissioning	Disturbance of wildlife.	– Employ progressive reclamation using native vegetation and seed mixes as soon as possible to re-establish vegetation growth in advance of future decommissioning activities. – If possible, during final decommissioning (and preparation for future agriculture) leave some pit walls in a condition that would encourage future nesting of Bank Swallows.	Minimal

VEC	Project Activity	Potential Impact	Mitigation	Significance after Mitigation
Fish, Fish Habitat and Species at Risk	Preparation Operations Decommissioning	Erosion and sedimentation	– The Project Footprint areas to be cleared and grubbed should be clearly marked and no work will be conducted outside the Project Footprint. Slope all working faces towards the pit floor. – 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. – Employ progressive reclamation practices to minimize disturbed areas.	Minimal
		Accidential Spills	– If any effluent leaves the site, conduct total suspended solids (TSS) monitoring. – Develop a Spill Response and Contingency plan to address any accidental spills.	Minimal
Atmospheric Conditions/Air Quality	Preparation Operations Decommissioning	Dust Generation impacting wildlife and/or human health	– Minimize the active extent of disturbance for Project, through phasing. – Manage dust generation through timing of extraction (i.e., focussed winter activities). – Use water and/or other approved dust suppressants to reduce and manage dust levels when required. Oil or calcium chloride will not be used for dust suppression. – Maintain and upgrade access roads as required. – Control vehicle speed on the Project Footprint and the private access road to control dust; dust is not a concern on paved roadways. – Re-vegetate exposed areas as soon as practical. – Shaw will conduct particulate monitoring on an “as required” basis through high volume sampling when requested by NSE. – Post a sign indicating proponent contact information in case of concern or complaint.	Minimal
	Preparation Operations Decommissioning	GHG Emissions impacting wildlife and/or human health	– Control vehicle speed on the transportation route to improve fuel efficiency (and reduce GHG emissions). – Use properly sized and maintained equipment; idling of equipment and vehicles will be kept to a minimum. – Maintain the equipment in good working condition to reduce emissions. – Post a sign indicating proponent contact information in case of concern or complaint.	Minimal

VEC	Project Activity	Potential Impact	Mitigation	Significance after Mitigation
Noise	Preparation Operations Decommissioning	Noise Generation impacting wildlife and/or human health	– The Project Footprint areas to be cleared and grubbed should be clearly marked and no work will be conducted outside the Project Footprint to maintain vegetated buffers. – All vegetation clearing will be scheduled outside of the bird breeding season (April 1st to August 30th) and turtle nesting season (March 1st to September 30th). – Sand extraction will primarily occur in winter months when disturbance to birds and other wildlife will be minimal, and encounters with SAR (avian and turtles) will not occur. – Control vehicle speed on the Project Footprint and the private access road to reduce noise. – Control vehicle speed on the transportation route to reduce noise. – Maintain the equipment in good working condition. – Use properly sized and maintained equipment; idling of equipment and vehicles will be kept to a minimum. – Shaw will conduct noise monitoring on an “as required” basis when requested by NSE. – Post a sign indicating proponent contact information in case of concern or complaint.	Minimal
Socio-Economic; Transportation	Operations	Interaction with Project activities and transportation network	– Maintain and upgrade access roads as required. – Control vehicle speed on the transportation route. – Require 53’ Tractor Trailer size trucks to use the secondary access route for outbound trips; all smaller trucks can use Blair Road. – Request that NSDPW review the requirement for Truck Entrance warning signs to be posted on Black Rock Road.	Minimal
Socio-Economic; Recreation	Preparation Operations Decommissioning	Interaction with Project activities and recreational use on SANS trail	– Review request for SANS access on an annual basis. – Reroute the SANS trail (if required).	Minimal

VEC	Project Activity	Potential Impact	Mitigation	Significance after Mitigation
Socio-Economic; Human Health	Preparation Operations Decommissioning	Interaction of Project activities and Human Health	– The Project Footprint areas to be cleared and grubbed should be clearly marked and no work will be conducted outside the Project Footprint to maintain vegetated buffers. – Minimize the active extent of disturbance for Project, through phasing. – Manage dust generation through timing of extraction (i.e., focussed winter activities). – Use water and/or other approved dust suppressants to reduce and manage dust levels when required. Oil or calcium chloride will not be used for dust suppression. – Maintain and upgrade access roads as required. – Control vehicle speed on the Project Footprint and the private access road to control dust; dust is not a concern on paved roadways. – Control vehicle speed on the transportation route to improve fuel efficiency (and reduce GHG emissions). – Control vehicle speed on the Project Footprint and the private access road to reduce noise. – Control vehicle speed on the transportation route to reduce noise. – Maintain the equipment in good working condition to reduce noise and emissions. – 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. – Shaw will conduct particulate monitoring on an “as required” basis through high volume sampling when requested by NSE. – Shaw will conduct particulate monitoring on an “as required” basis through high volume sampling when requested by NSE. – Shaw will conduct noise monitoring on an “as required” basis when requested by NSE. – Post a sign indicating proponent contact information in case of concern or complaint. – Develop a Spill Response and Contingency plan to address any accidents. – All workers will be trained to meet the requirements of the NS Occupational Health and Safety regulations.	Minimal

VEC	Project Activity	Potential Impact	Mitigation	Significance after Mitigation
Culture and Heritage	Preparation Operations	Encounter artifacts and L'nuk archaeological resources	– The Project Footprint areas to be cleared and grubbed should be clearly marked and no work will be conducted outside the Project Footprint. – All work activities in the area shall be stopped if an artifact/archaeological resource is encountered. – Contact the Coordinator of Special Places (902-424-6475), notify of the discovery and establish a suitable mitigation method. – Should the Project Footprint be modified to expand beyond the currently know range, a qualified archaeologist should be consulted to conduct the recommended shovel testing and evaluate whether additional archaeological mitigation may be required.	Minimal

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