

4.2 Ecological Environment

The ecological environment considers organisms and their habitats.

For most ecological valued components, consistent spatial boundaries were used. A generalized “ecological LAA” and “ecological RAA” were established based on drainage basins (for the LAA) and nearby EcoSections from the province’s ecological land classification system (for the RAA). The regional assessment area for surface water resources, and fish and fish habitat, were based on watersheds rather than EcoSections. Section 3.2.3 provides a more detailed explanation of how these assessment areas were derived.

4.2.1 Ecological Land Classification (ELC)

The Ecological Land Classification (ELC) VC involves site-specific habitat delineation and characterization based on underlying landforms and geology, hydrology, and local climate.

4.2.1.1 Methodology

4.2.1.1.1 Spatial Boundaries

For the Ecological Land Classification, the PDA, LAA, and RAA described in Section 3.2.3 are applicable (see also Table 3.3).

4.2.1.1.2 Habitat Characterization

For this assessment, ELC was primarily an exercise of delineating and characterizing ecological habitat types within the PDA. These habitat types are comparable in scale to the ‘elements’ described in *Ecological Land Classification for Nova Scotia: A Guide* (Neily, Basquill, Quigley, & Keys, 2017).

The ELC polygon layer (2015) was downloaded in the fall of 2025 from the following Government of Nova Scotia webpage (Department of Natural Resources, 2021). The habitat types that intersect the PDA were refined based on aerial imagery and other available information to create a habitat mosaic. The boundaries of the habitat mosaic were then field verified and adjusted as needed to reflect current conditions (Figure 4.9).

The Nova Scotia Forest Inventory (Government of Nova Scotia, 2021) was used to characterize the ecological composition within the LAA and RAA, without modification of boundaries or ground verification. Forest stands were classified based on species and percent canopy. Non-Forest areas were categorized based on descriptions and codes within ‘NONFOR’.

The ELC VC also includes identifying the potential for unique habitat features that could be altered by the Project (e.g., springs, caves, dens, old growth forest).

4.2.1.2 Existing Conditions

4.2.1.2.1 Regional and Local Context

The Project RAA falls within the Eastern Interior EcoDistrict, which is the largest EcoDistrict in Nova Scotia. The Eastern Interior EcoDistrict is largely forested and characterized by a ridged topography with significant bedrock exposure and numerous freshwater lakes. Its forests are predominantly coniferous, with tolerant hardwoods like sugar maple and yellow birch found on drumlins and hilltops.

The Eastern Interior EcoDistrict is part of the Eastern EcoRegion. The EcoRegion is topographically diverse, with gentle slopes and rolling hills featuring small lakes and considerable wetland area. It has an interior lowland climate, mainly covered with softwood and mixedwood forests, and is relatively sheltered from most coastal influence.

Forest types within the Eastern Interior EcoDistrict are influenced by the soil depth, with hardwood forests of red maple (*Acer rubrum*) and white birch (*Betula papyrifera*) with scattered white pine (*Pinus strobus*) and black spruce (*Picea mariana*) on shallow soils, and red spruce (*Picea rubens*) forests on the deeper soils. On upper slopes featuring drumlins and hummocks with deep, well-drained soils, scattered individuals of beech (*Fagus grandifolia*) and hemlock (*Tsuga canadensis*) may occur. In low lying areas with poor drainage, black spruce dominates the forest cover (Neily, Peter D, Eugene Quigley, Lawrence Benjamin, Bruce Stewart, & Tony Duke, 2003).



Legend

- Quarry Property Boundary
- Phase 3 and 4 Boundaries
- Regional Assessment Area (RAA)

Notes

1. Coordinate system: NAD 83, Zone 20N, NAD83 (CSRS) Datum.
2. Geographic dataset source: GeoNova Data Catalogue.
3. Contains information licensed under the Open Government Licence - Nova Scotia.
4. This drawing is a schematic representation. Sizes, locations and dimensions are approximate.
5. Services provided by: Government of Nova Scotia, Government of Nova Scotia, Service Nova Scotia and Internal Services, Earthstar Geographics

Date	NOVEMBER 2025	Draw by	JC	Checked by	SG
Client	Scotian Materials				
Project	Goffs Quarry Expansion Environmental Assessment Resource Road, Goffs, Nova Scotia				
Drawing	Regional Assessment Area (RAA) for Wetlands and Terrestrial Valued Components.				

Scale: 1:81,000

0 500 1,000 2,000 3,000 4,000 Meters

Project No.	103269.002	Drawing No.	FIGURE 4.8	Rev.No.	0
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4.2.1.2.2 Habitat Types Within the PDA

The PDA for the Goffs Quarry Expansion (Phases 3 and 4) contains a variety of forested and non-forested habitats, including wetlands and riparian areas, which support several vegetation communities and ecological functions (Figure 4.9). The following are specific habitat types identified within the PDA.

MW1 — Red Spruce – Yellow Birch / Evergreen Wood Fern Mixedwood Forest

MW1 is a late successional mixedwood forest ecosystem habitat type. A detailed description of this habitat type is available from the NSDNR classification (Nova Scotia Department of Natural Resources, 2010). This forest community is found throughout the PDA and is primarily associated with stream valleys, slopes, and other areas where recent forest harvest practices have not occurred. Tree species composition varies, but overall, the canopy and sub-canopy is dominated by varying mixtures of red spruce, yellow birch (*Betula alleghaniensis*), and red maple, with associates such as balsam fir (*Abies balsamea*), white birch, and white ash (*Fraxinus americana*). The understory ranges from sparse to dense, with a diversity of species such as striped maple (*Acer pennsylvanica*), ferns, Canada mayflower (*Maianthemum canadense*), and starflower (*Trientalis borealis*). Downed woody debris is abundant throughout, and snags are occasional.

TH3 — Sugar Maple – White Ash / Christmas Fern Forest

Although TH3 was not included in the 2019 EA Registration, the riparian area encompassing Watercourse 6 (Stream 6) as this habitat type. TH3 is a late successional tolerant hardwood habitat type typically dominated by sugar maple, white ash, yellow birch with lesser components of red maple and other shade-tolerant species. The tolerant hardwood stand flanking Watercourse 6 is located between Phase 3 and 4 and has historically been left undisturbed because it is riparian. This area is one of the most intact older forest communities in the PDA and has the greatest diversity of lichens of all the forest stands in and around the PDA. A detailed description of this habitat type by NSDNR is available (Nova Scotia Department of Natural Resources, 2010). It should be noted that Christmas fern (*Polystichum acrostichoides*) was not found within this area; however, using the key to the tolerant hardwood forest group, it was found that the stand fit best within the TH3 type (Nova Scotia Department of Natural Resources, 2010).

Regenerating Forest (Regen.)

This habitat type is a mixture of seedling, sapling, and immature regenerating forest areas and was observed throughout much of the PDA. Regenerating forest is the dominant upland habitat type within the PDA. Most of these areas have undergone clearcutting and other forest harvesting practices in the last 10-20 years. Given the disturbance history and the seral stage, this community was not classified using the Forest Ecosystem Classification (FEC) system.

Dominant species vary throughout but include a mix of trees and shrubs such as balsam fir, red maple, red spruce, white birch, yellow birch, white pine, white ash, striped maple, pin cherry (*Prunus pennsylvanica*), grey birch (*Betula populifolia*) and red raspberry (*Rubus idaeus*). Density ranged from sparse and open to very dense. Along road edges, disturbed areas, and interspersed within the regenerating stands, patches of meadow and thicket vegetation occur that are too small to map. Downed woody debris, (mostly old slash from past harvesting operations) was abundant throughout, and snags were rare to absent.

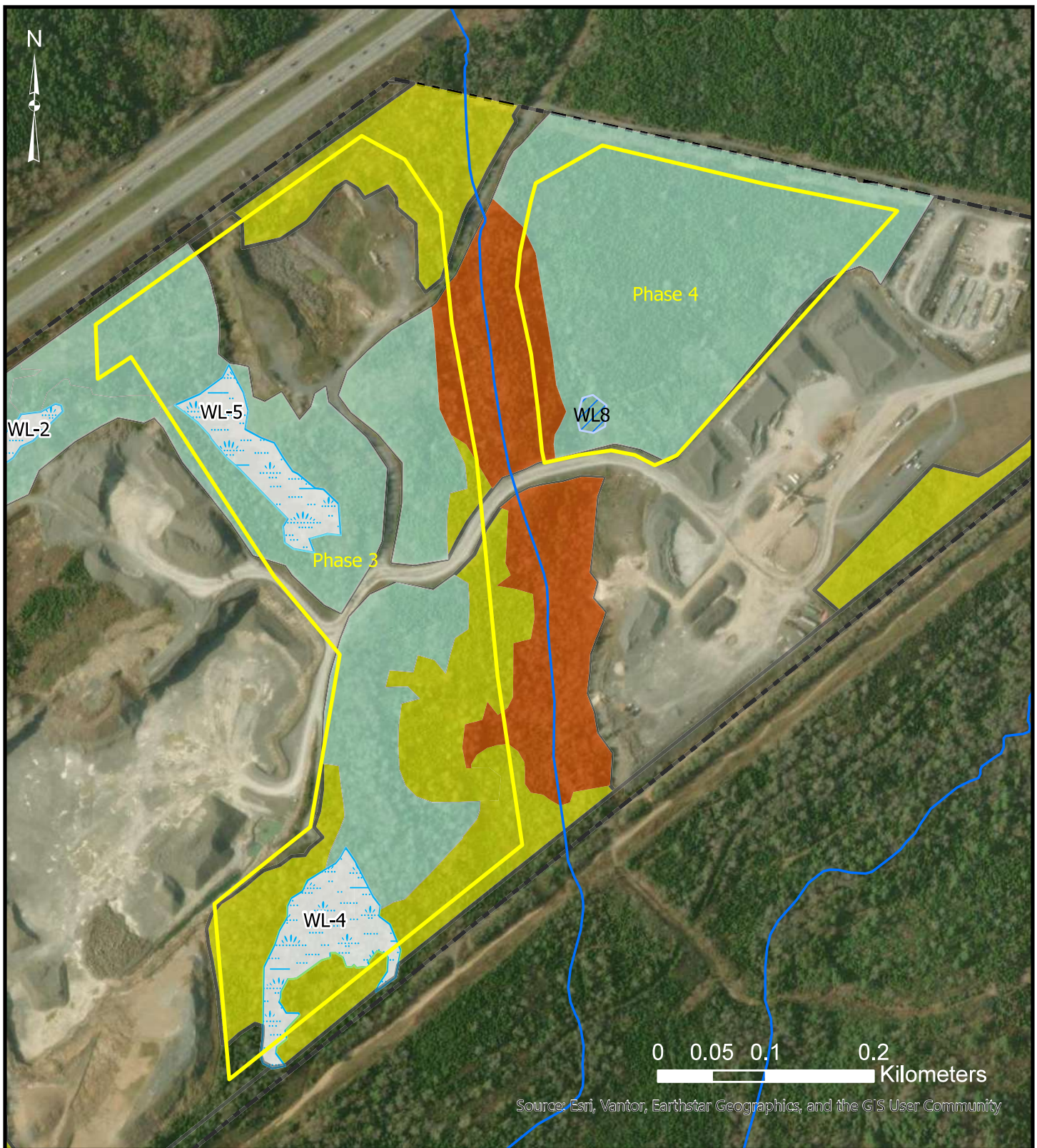
Anthropogenic Areas (Non-Forest)

Anthropogenic areas are characterized by visible disturbance resulting from human activities, including roadsides, quarry activity and gravel pits, transmission corridors, trails, and other cleared or previously developed spaces. These habitat types are typically dominated by common, disturbance-tolerant herbaceous species, and frequently support a higher proportion of introduced and non-native plants. Soils in anthropogenic zones may differ considerably from surrounding habitats, often due to past infilling, grading, or compaction related to construction or land-use modifications.

Goffs Quarry is an active extraction site characterized by significant anthropogenic disturbance. The area shows clear evidence of quarrying operations, including extensive soil stripping and removal of natural vegetation. Exposed substrates, such as gravel and bedrock, are visible throughout the site, along with stockpiles of aggregate material and access roads or equipment tracks. These disturbed conditions are indicative of ongoing industrial activity, with minimal natural habitat remaining in its immediate footprint.

Wetland (Marsh and Swamp)

Three wetlands were identified within the PDA. Wetland 4 and Wetland 8 feature forested swamp habitat, and Wetland 5 contains a mix of forested swamp and graminoid marsh. Due to the small extent of Wetland 8 (0.07 ha), this wetland was incorporated into the surrounding Regenerating Forest habitat type for the purposes of delineating major habitat units. Further details on delineation and functional assessment of all wetlands are included in Section 4.2.3.



Legend: <div> <div>Mixedwood (MW1)</div> <div>Non-Forest</div> <div>Regen.</div> </div> <div> <div>Tolerant Hardwood (TH3)*</div> <div>Wetlands</div> <div>Watercourses (NSHN)</div> </div> <div> <div>Project Development Area (PDA)</div> <div>Property Boundary</div> </div>				Note: 1. Coordinate system: NAD 1983 CSRS UTM Zone 20N 2. Aerial Imagery Retrieved from: ESRI World Imagery	
Project: Environmental Assessment Goffs Quarry, Phase 3 & 4 Expansion Goffs, Nova Scotia				Drawing: Ecological Land Classification within Project Development Area (PDA) Client: Scotian Materials Ltd.	
Drawn by: JC	Checked by: SG	Date: December 2025	Project Number: 103269.002	Drawing Number: Figure 4.9	Revision No. 0



Five habitat types were identified within the PDA (Figure 4.9; Table 4.29). Regenerating Forest was the most abundant habitat type, covering approximately 54.3% of the PDA, followed by MW1 (18.1%). Less common habitat types included Anthropogenic Areas (16.8%), Wetland (7.3%), and TH3 (3.4%).

4.2.1.2.3 Habitat Units Within the LAA and RAA

Twelve habitat types were identified within the LAA (Table 4.29). Softwood Forest was the most abundant habitat type, covering approximately 33.1% of the LAA. Less common habitat types included Intolerant Hardwood Forest (IH) (13.9%), Regenerating Forest (10.7%), MW1 (9.9%), Linear Corridor (9.2%), Hardwood Forest (HW) (5.8%), Wetland (5.6%), Gravel Pit (3.6%), Barren (3.3%), TH3 (1.9%), Urban (1.5%), and Open Water (1.4%).

Thirteen major habitat types were identified within the RAA (Table 4.29). Softwood forest was the most abundant habitat type, covering approximately 32.7% of the RAA, followed by MW1 (17.1%). Less common habitat types included Wetland (9.8%), Regenerating Forest (8.7%), Hardwood Forest (HW) (6.6%), Barren (6.4%), Open Water (4.9%), Urban (4.7%), TH3 (3.2%), Intolerant Hardwood Forest (IH) (3.1%), Linear Corridor (2.0%), Gravel Pit (0.3%), and Miscellaneous (0.2%).

The general habitat composition across all three spatial scales is summarized below in Table 4.29.

Table 4.29 Habitat Unit Composition within the PDA, LAA, and RAA.

Habitat Type	PDA Habitat Composition		LAA Habitat Composition		RAA Habitat Composition	
	Area (ha)	% of PDA	Area (ha)	% of LAA	Area (ha)	% of RAA
SW ¹	0.0	0.0	199.8	33.1	4443.1	32.7
HW ²	0.0	0.0	35.3	5.8	903.0	6.6
MW ³	4.2	18.1	59.7	9.9	2320.7	17.1
IH ⁴	0.0	0.0	84.4	13.9	417.9	3.1
TH ⁵	0.8	3.4	11.4	1.9	434.9	3.2
REGENERATION ⁶	12.6	54.3	64.5	10.7	1186.9	8.7
WETLAND ⁷	1.7	7.3	34.1	5.6	1342.0	9.8
OPEN WATER	0.0	0.0	8.4	1.4	673.1	4.9
BARREN	0.0	0.0	20.1	3.3	870.2	6.4
GRAVEL PIT	3.9	16.8	21.9	3.6	48.5	0.3
LINEAR CORRIDOR ⁸	0.0	0.0	55.4	9.2	271.9	2.0
URBAN	0.0	0.0	9.04	1.5	636.4	4.7
MISCELLANEOUS ⁹	0.0	0.0	0.0	0.0	31.1	0.2
Total Area	23.2		604.1		13579.9	

Table Notes:

¹ SW- contains softwood species within SP1 and SP2 and their respective canopy cover percentage combines to be =< 70%.

² HW - contains hardwood species within SP1 and SP2 and their respective canopy cover percentage combines to be =< 70%

³ MW - contains softwood and hardwood species within SP1, SP2, SP3 and/or SP4 where SP1 and SP2 do not contain the above criteria

⁴ IH – SP1 is IH (Intolerant Hardwood)

⁵ TH – SP1 is TH (Tolerant Hardwood)

⁶ REGENERATION - consists of forest stands with a first story height of <5m and 'FORNON' attributes #1-9 & #12-15. (i.e. Burn, wind throw, old fields, dead)

⁷ WETLANDS – “FORNON” attributes #70-75. i.e. 'Wetlands General', 'beaver flowage', 'Open bogs', 'Treed Bog' etc.

⁸ LINEAR CORRIDOR – contains Road, Rail, Powerline and Pipeline corridors.

⁹ MISCELLANEOUS – includes values listed as Miscellaneous, agriculture and thicket.

4.2.1.3 Effects Assessment

4.2.1.3.1 Impact Pathways

The potential effects of the Project are largely confined to the PDA and are primarily associated with direct disturbance for the construction of Project components. Other potential effects on habitats include sedimentation related to site runoff and erosion, changes to surface water hydrology in surrounding areas, and edge effects such as the introduction of invasive species (e.g., glossy buckthorn) and increased windthrow of trees.

4.2.1.3.2 Mitigation

All feasible avoidance strategies have been applied in the layout and design of the Project. No additional avoidance of direct impact ('footprint') is proposed. A buffer of approximately 30 m will be maintained around the main watercourse that flows between Phases 3 and 4 to prevent Project-related runoff and sedimentation impacts to the greatest extent possible. This will largely contain Project-related impacts to the quarry areas for the proposed expansion.

Standard erosion control measures (e.g., silt fences, grading) will be used as appropriate to mitigate potential runoff-related impacts on remaining vegetation communities. Standard mitigation to prevent the introduction of invasive species (mainly plants) will also be employed, which includes cleaning and inspecting heavy equipment before bringing it to site, and using non-invasive grass seed mixes for any revegetation along roadways.

4.2.1.3.3 Residual Effects

The potential residual impact area (m² of project 'footprint') by habitat type is summarized below (Table 4.30Table 4.31). This does not account for the potential restoration of the PDA to natural habitat post-decommissioning. Permanent direct habitat loss due to the Project is anticipated to be minimal, as the total project footprint is relatively small, and particularly sensitive habitats (i.e., the riparian corridor of Stream 6) will be mostly avoided. The major habitat impacts will be the direct removal of upland forest and wetland area. Most terrestrial habitat affected will be regenerating, mostly softwood forest, which has the lowest biodiversity of the habitats on site.

Table 4.30 Summary of Direct Project Impacts on Habitats within the PDA.

Habitat Type	Impact Area
Mixedwood (MW - <i>Red Spruce – Yellow Birch / Evergreen Wood Fern Mixedwood Forest</i>)	4.31 ha
Tolerant Hardwood (TH - <i>Sugar Maple – White Ash / Christmas Fern Forest</i>)	0.81 ha
Regenerating Forest (regen)	12.56 ha
Wetland	1.8 ha

The habitat types observed within the PDA are not considered unique or sensitive and there were only two observations of a rare plant species (black ash) within the PDA (Section 4.2.2). There are no residual hydrologic effects anticipated for surrounding wetland and watercourse habitat that will be retained on site, provided mitigation is applied correctly. Edge effects will be minimal, since much of the perimeter of the new phases borders existing developed quarry area or roads. Most runoff will be directed back into the open pit quarry areas, where it can be managed appropriately. There will also be vegetated buffers maintained inside of property boundaries. The greatest potential for edge effects is within the PDA, along the riparian corridor of the main watercourse that runs through the site. Some increased windthrow, runoff-related effects, and or other edge effects are possible along the outer edged of this riparian corridor, but they should be minimal.

Table 4.31 Assessment of potential residual effects identified for Ecological Land Classification.

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood
Wetland Habitat Alteration	High	Long Term	Sporadic	PDA	Irreversible	Almost Certain
Upland Forest Habitat Removal	Medium	Long Term	Once	PDA	Reversible	Certain
Edge Effects	Low	Medium Term	Regular	PDA	Reversible	Possible

4.2.2 Vegetation and Rare Plants

The Vegetation and Rare Plants VC includes the composition and distribution of existing plant communities within the PDA, with particular attention to rare, threatened, or sensitive species and their habitats.

4.2.2.1 Methodology

4.2.2.1.1 Spatial Boundaries

For the purposes of the Vegetation and Rare Plants VC, the PDA, LAA, and RAA described in Section 3.2.3 are applicable (see also Table 3.3).

4.2.2.1.2 Desktop Review

A review of known vegetation species historically present within the PDA was conducted using publicly available data sources. In addition, plant survey information from the 2018 EA (Golder Associates Ltd., 2018) was reviewed to support the desktop review.

A data report was also acquired from the ACCDC for a 5 km radius from a centre point within the PDA (Appendix A). The ACCDC report provides the location of historically observed flora and fauna SAR (i.e., listed under SARA or NSESA) or SOCC, the presence or absence of any location sensitive species, and the location and information of significant or managed natural areas. A copy of the ACCDC report is provided in Appendix A.

4.2.2.1.3 Field Studies

Vascular Plant Surveys

The assessment of project impacts on plant communities relied primarily on the botanical inventory included in the 2018 EA in addition to incidental plant observations made during other field surveys.

Lichen Surveys

A lichen inventory was conducted within the PDA to document species presence and assess potential sensitivity to environmental change (Appendix F). This survey employed a systematic approach to document the diversity and distribution of lichens within the PDA. Fieldwork followed standard lichenological methods, including visual identification, photography, and selective sample collection, and microscopy. Chemical spot tests were used on select samples. Data on substrate, coordinates, and environmental variables were recorded.

Lichen surveys were conducted on May 5 and 6, 2025. The location of at least one individual organism for each species observed was recorded using ArcGIS Field Maps. Field personnel aimed to collect at least one photograph of every lichen species observed within the PDA; photos were attached to individual species point records in Field Maps. All lichens were identified to species level where possible.

Representative field photographs of each lichen species recorded were also reviewed by botanical staff at the ACCDC, who were contracted for quality control. More information on the review by ACCDC is available in Appendix F.

4.2.2.2 Existing Conditions

4.2.2.2.1 Local Rare Plant Records

ACCDC data within a 5 km radius of the PDA, included vascular plant SAR and SOCC as well as lichen SAR and SOCC. Table 4.32 and Table 4.33 list the vascular plant and lichen SAR and SOCC that are known to occur within 5 km of the Project Area, based on data records from the ACCDC.

Table 4.32 ACCDC Records of Rare Vascular Flora within 5 km.

Scientific Name	Common Name	COSEWIC	SARA	NS ESA	Prov. Rarity Rank (S- Rank)	Distance (km)
<i>Betula michauxii</i>	Michaux's Dwarf Birch	-	-	-	S3	0.7 ± 0.48
<i>Carex pensylvanica</i>	Pennsylvania Sedge	-	-	-	S1?	3.6 ± 0.05
<i>Fagus grandifolia</i>	American Beech	-	-	-	S3S4	3.0 ± 0.2
<i>Liparis loeselii</i>	Loesel's Twayblade	-	-	-	S3S4	0.3 ± 5.0
<i>Neottia bifolia</i>	Southern Twayblade	-	-	-	S3	3.1 ± 0.05

Table 4.33 ACCDC Records of Rare Lichen within 5 km.

Scientific Name	Common Name	COSEWIC	SARA	NSESA	Prov Rarity Rank	Distance (km)
<i>Coccocarpia palmicola</i>	Salted Shell Lichen	-	-	-	S3S4	1.3 ± 0.2
<i>Collema nigrescens</i>	Blistered Tarpaper Lichen	-	-	-	S3	1.7 ± 0.2
<i>Leptogium corticola</i>	Blistered Jellyskin Lichen	-	-	-	S3S4	1.7 ± 0.2
<i>Pectenیا plumbea</i>	Blue Felt Lichen	Special Concern	Special Concern	Vulnerable	S3	1.3 ± 0.2
<i>Scytinium subtile</i>	Appressed Jellyskin Lichen	-	-	-	S3S4	0.8 ± 0.2
<i>Sticta fuliginosa</i>	Peppered Moon Lichen	-	-	-	S3S4	0.9 ± 0.5

According to the ACCDC data review, blistered tarpaper lichen (*Collema nigrescens*) and blue felt lichen (*Pectenیا plumbea*) have been historically observed within 5 km the PDA and are listed as SOCC (S1-S3) at the provincial level. Furthermore, blue felt lichen has a listing of 'Special Concern' according to the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) and the Species at Risk Act (SARA) and is considered 'Vulnerable' by the NSESA. Neither of these species was observed within the PDA.

4.2.2.2.2 Vascular Plants in the PDA

A list of plant species identified within the PDA during all field surveys is provided in Appendix E. A total of 275 plant taxa were identified across all survey years, including those reported in the 2018 EA (Golder Associates Ltd., 2018), and 47 vascular species recorded as incidental observations in 2025. Most of the plants identified within the PDA are common in the province and are not considered significant or at risk.

4.2.2.2.3 Lichens within the PDA

A variety of lichen taxa were observed across forested and riparian habitats in the PDA, with observations made on a range of substrates including deciduous trees, coniferous trees, and exposed rock. A total of 34 lichen taxa were identified within the PDA during field surveys. None were SARA-listed or locally uncommon (S1-S3). The table below lists the lichen species recorded within the PDA. A detailed description of the lichen survey is included in Appendix F.

Table 4.34 Lichen species observed within the PDA.

Family	Scientific Name	Common Name	Prov. Rarity Rank
Baeomycetaceae	<i>Baeomyces rufus</i>	Brown Beret Lichen	S4
Cladoniaceae	<i>Cladonia</i> sp.	Unknown epiphytic lichen	-
Cladoniaceae	<i>Cladonia fimbriata</i>	Trumpeting Lichen	S5
Cladoniaceae	<i>Cladonia rangiferina</i>	Gray Reindeer Lichen	S5
Cladoniaceae	<i>Cladonia crispata</i>	Organ-pipe Lichen	S5
Cladoniaceae	<i>Cladonia squamosa</i>	Dragon Lichen	S5
Cladoniaceae	<i>Cladonia cristatella</i>	British Soldiers Lichen	S5
Cladoniaceae	<i>Cladonia verticillata</i>	Ladder Lichen	S5
Cladoniaceae	<i>Cladonia stellaris</i>	Star-tipped Reindeer Lichen	S5
Cladoniaceae	<i>Cladonia coniocraea</i>	Common Pixie Powderhorn	S5
Collemataceae	<i>Collema subflaccidum</i>	Tree Jelly	S5
Collemataceae	<i>Leptogium</i> c.f. <i>cyanescens</i>	Blue Jellyskin Lichen	S5
Lobariaceae	<i>Lobaria scrobiculata</i>	Textured Lungwort Lichen	S5
Lobariaceae	<i>Lobaria pulmonaria</i>	Lungwort Lichen	S5
Nephromataceae	<i>Nephroma laevigatum</i>	Mustard Kidney Lichen	S5

<i>Pannariaceae</i>	<i>Parmeliella triptophylla</i>	Black-bordered Shingles Lichen	S5
<i>Parmeliaceae</i>	<i>Alectoria sarmentosa</i>	Common Witch's Hair Lichen	S4
<i>Parmeliaceae</i>	<i>Menegazzia subsimilis</i>	Tree Flute Lichen	S4S5
<i>Parmeliaceae</i>	<i>Parmotrema crinitum</i>	Salted Ruffle Lichen	S5
<i>Parmeliaceae</i>	<i>Usnea dasopoga</i>	Fishbone Beard Lichen	S5
<i>Parmeliaceae</i>	<i>Parmelia squarrosa</i>	Bottlebrush Shield Lichen	S5
<i>Parmeliaceae</i>	<i>Punctelia rudecta</i>	Rough Speckleback Lichen	S5
<i>Parmeliaceae</i>	<i>Platismatia tuckermanii</i>	Crumpled Rag Lichen	S5
<i>Peltigeraceae</i>	<i>Ricasolia quercizans</i>	Smooth Lung Lichen	S5
<i>Phlyctidaceae</i>	Possible <i>Phlyctis</i> sp.	Whitewash Lichens	SU
<i>Sarrameanaceae</i>	<i>Loxospora ochrophaea</i>	Eastern Ragged-rim Lichen	S5

4.2.2.3 Effects Assessment

The potential impacts of the Project on vegetation and rare plants are considered for each phase of the Project. The impact pathways are outlined below, along with proposed mitigation, followed by an assessment of potential residual impacts after mitigation is applied.

4.2.2.3.1 Impact Pathways

Direct impacts to vegetation are primarily anticipated during construction, although direct and indirect impacts are possible during operations.

During the construction phase, site preparation activities such as clearing, grubbing, excavation, and grading will result in the direct removal of vegetation. These activities can fragment habitats, reduce plant biodiversity, and disrupt soil structures required for future revegetation. Soil disturbance associated with heavy machinery and grading activities can damage root systems of retained vegetation, reduce plant vigor, and result in increased mortality, particularly in sensitive or mature plant communities, and along forest edges.

Construction and operation phases also present an elevated risk of introducing and spreading invasive plant species. These species may outcompete native flora and can lead to long-term shifts in vegetation community composition. Equipment entering the PDA may inadvertently carry invasive propagules, and disturbed soils often provide ideal conditions for their establishment.

There may also be localized, indirect effects to surrounding vegetation associated with dust generated during construction and operation, which can accumulate on plants and lichen substrates, reducing photosynthetic efficiency and contributing to physiological stress, especially in sensitive lichen-rich habitats.

Throughout the operational phase, ongoing site disturbance can result in the continued loss of plant cover and reduced opportunity for natural regeneration.

A variety of lichens were observed within the PDA, but the greatest lichen diversity was contained within the main riparian corridor of Stream 6. This riparian corridor will be retained during Project construction and operation, so impacts to this habitat will be minimal. While the lichens identified are not anticipated to be directly affected by the proposed Project activities, there is potential for indirect impacts. These may occur due to dust deposition, edge effects, and changes in microhabitat conditions such as moisture, light, and host tree availability.

Dust deposition may alter the pH of substrates such as the bark of host trees by increasing alkalinity. This, in turn, can lead to the bioaccumulation of metals in lichen tissues, potentially affecting lichen health and reducing species richness (Degtjarenko, 2016; Farmer, 1993).

None of the lichens identified within the PDA, or the riparian corridor associated with Stream 6, were rare (S1-S3) or listed Species at Risk.

4.2.2.3.2 Mitigation

Mitigation will be implemented during construction, operation, and decommissioning to minimize impacts on vegetation and rare plant species, reduce habitat loss, preserve biodiversity, and support restoration of native plant communities.

Vegetation clearing will be limited to areas required for Project activities, with rare plant surveys and protection zones established around species at risk (SAR) and high-diversity areas prior to disturbance. Retention of native vegetation where feasible will help maintain ecological function and reduce fragmentation.

Erosion and sediment controls, phased clearing, and progressive restoration will support vegetation recovery. Native soils and organic materials will be salvaged and reused where possible to promote natural regeneration and improve revegetation success. Soil disturbance near retained vegetation will be minimized, and invasive species management will include equipment cleaning and monitoring of disturbed areas. Dust suppression measures will also be implemented to protect sensitive vegetation and lichen-rich habitats.

During decommissioning, disturbed areas will be restored using native species, with restoration activities timed to maximize establishment success and minimize erosion risk.

A summary of the proposed mitigation strategies, organized by impact pathway, is provided in Table 4.35 below.

Table 4.35 Potential effects across Project phases and the proposed mitigative measures for vegetation and rare plants.

Effect	Phase	Mitigation
Vegetation, clearing, grubbing, and grading	Construction	<ul style="list-style-type: none"> • Limit clearing to essential areas only. • Implement erosion and sediment control measures. • Avoid unnecessary clearing.
Soil disturbance affecting vegetation root systems	Construction	<ul style="list-style-type: none"> • Minimize soil disturbance near retained vegetation. • Use low-impact machinery where feasible.
Introduction and spread of invasive species	Construction Operation	<ul style="list-style-type: none"> • Clean equipment before entering site. • Use native species in roadside stabilization and revegetation.
Dust deposition on vegetation and lichen substrates	Construction Operation	<ul style="list-style-type: none"> • Use dust suppression on disturbed surfaces. • Maintain vegetated buffers.
Loss of plant biodiversity	Construction Operation	<ul style="list-style-type: none"> • Preserve patches with high diversity (e.g., riparian areas). • Restore native plant communities during restoration.
Reduced lichen species richness due to indirect stressors	Construction Operation	<ul style="list-style-type: none"> • Avoid removal of lichen-rich habitat where feasible (e.g., stream 6 corridor).

4.2.2.3.3 Residual Effects

The potential residual effects on lichens, vegetation, and rare plants resulting from Project activities were assessed using predefined criteria (Table 4.36). This assessment assumes full implementation of proposed mitigation and restoration measures, including vegetation management, erosion control, dust suppression, and invasive species management across all Project phases.

With mitigation in place, most vegetation-related effects are expected to be minimized and contained to the PDA. Residual effects are anticipated to be Low to Medium in magnitude. Vegetation clearing, grubbing, excavation, and grading may result in Medium effects due to direct vegetation and soil disturbance, while effects such as dust deposition, invasive species introduction, and reduced lichen richness are expected to be Low and localized.

Residual effects may be Short to Long Term, depending on the extent of disturbance and recovery success. Temporary effects are expected to diminish following restoration, while some long-term changes to vegetation communities may persist in permanently disturbed areas. Effects are anticipated to occur sporadically to regularly during construction and operations and will generally be confined to the PDA, with limited indirect effects potentially extending into the LAA.

Some effects, including permanent vegetation removal, are considered irreversible within disturbed areas, while others, such as soil disturbance and invasive species introduction, are expected to be reversible through mitigation and restoration. The likelihood of residual effects ranges from Possible to Almost Certain, with vegetation clearing and grading considered unavoidable components of Project construction.

Table 4.36 Effects assessment of the impact pathways identified for the vegetation and rare plants.

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood
Vegetation clearing and grubbing	Medium	Long Term	Sporadic	PDA	Irreversible	Likely
Soil disturbance affecting vegetation root systems	Low	Short Term	Regular	PDA	Reversible	Possible
Introduction and spread of invasive species	Low	Long Term	Sporadic	PDA	Reversible	Possible
Dust deposition on vegetation and lichen substrates	Low	Medium Term	Regular	LAA	Reversible	Likely
Loss of plant biodiversity	Low	Long Term	Sporadic	PDA	Reversible	Possible
Reduced lichen species richness due to edge effects and dust	Low	Medium Term	Sporadic	LAA	Reversible	Possible

4.2.3 Wetlands

The Wetlands VC considers wetland extent, distribution, and functional attributes, with particular attention to hydrology, vegetation, and soil type.

4.2.3.1 Methodology

4.2.3.1.1 Spatial Boundaries

For the purposes of the Wetlands VC, the PDA, LAA, and RAA described in Section 3.2.3 are applicable.

4.2.3.1.2 Previously Assessed Wetlands

A desktop review of existing conditions was completed for Wetland 6, Wetland 8, and Wetland 9, as wetland delineations and functional assessments for these wetlands were previously conducted by McCallum Environmental Ltd. (McCallum; now Strum Consulting) in September 2020. Wetland 6 and most of Wetland 9 no longer exist and were not within the current PDA boundaries. Wetland 8 is a very small feature within the Phase 4 boundaries.

4.2.3.1.3 GEMTEC Wetland Assessments

Wetland Delineation

Wetland delineation was completed for Wetland 4 and Wetland 5 in September 2025. Wetland delineation for Wetland 8 was not conducted during the 2025 field season. There have been no recent impacts to the area surrounding Wetland 8, therefore, the size and shape of the wetland is expected to remain similar to the previous baseline wetland assessments.

The technical approach for wetland delineation is based on principles described in the *Corps of Engineers Wetlands Delineation Manual - Technical Report Y-87-1* (U.S. Army Corps of Engineers, 1987), and the *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region* (U.S. Army Corps of Engineers, 2012). This includes identifying the presence of three parameters: dominating hydrophytic vegetation, hydric soils, and any wetland hydrological indicators such as surface water, soil saturation, and drainage patterns. Paired data points (wetland and upland) were recorded at each wetland to show the changes in the three parameter determinations on either side of a wetland boundary. The data point information was recorded on the NSECC Wetland Delineation Data Forms for Nova Scotia. A handheld Global Positioning System (GPS) was used to record the coordinates of the wetland boundary and paired data points.

Wetland Functional Assessment

The wetlands delineated by GEMTEC in 2025 were assessed for ecosystem function using the Wetland Ecosystem Services Protocol for Atlantic Canada (WESP-AC). WESP-AC is a rapid assessment tool for determining function and value of tidal or non-tidal wetlands throughout temperate North America.

WESP-AC uses three multiple choice forms to generate scores from 0 to 10 and ratings of Lower, Moderate or Higher, for each wetland function and benefit. The function describes the

ecological process that a particular wetland conducts within the environment, and the higher rated wetland functions are discussed in this report. Wetlands with similar features were grouped in the WESP-AC review based on their shared functions and similar composition.

Not all “high-functioning” wetlands are healthy or intact, and no single wetland can rate highly in all functions, as many functions operate naturally in opposing directions. Data required to support wetland functional assessments were collected on September 9, 2025 using WESP-AC version 3.4.

4.2.3.2 Existing Conditions

Three wetlands were assessed within the PDA. Wetland 8 was assessed in 2020 by McCallum. Wetland 4 and Wetland 5 were assessed by GEMTEC in 2025. No wetlands of special significance were identified within the PDA.

The delineation and functional assessment findings of Wetland 8 as well as Wetland 4 and Wetland 5 are described in detail in Sections 4.2.3.2.1 and 4.2.3.2.2, respectively. Key attributes of all three wetlands are summarized in Table 4.38.

4.2.3.2.1 Previously Assessed Wetlands

The wetland delineation and functional assessment conducted by McCallum in 2020 describe Wetland 8 as a sloped swamp approximately 0.074 ha in size (Appendix G-1 and Appendix G-3), located in the southern portion of Phase 4. Dominant tree species include red spruce, red maple, grey birch, and balsam fir. Dominant herbaceous vegetation includes wool grass (*Scirpus cyperinus*), wrinkleleaf goldenrod (*Solidago rugosa*), and common rush (*Juncus effusus*). The presence of surface water was the main wetland hydrology indicator observed in Wetland 8, and the main hydric soil indicator was histosol soil.

Wetland 8 was assessed using the WESP-AC. WESP-AC score sheets are presented in Appendix G-3. Overall, Wetland 8 supports moderate function of most wetland attributes (Table 4.37).

Table 4.37 WESP-AC Results for Wetland 8.

Attribute	Function Score	Function Rating
Surface Water Storage	6.34	Moderate
Stream Flow Support	0.92	Lower
Streamwater Cooling	0	Lower
Sediment & Toxicant Retention & Stabilisation	10	Higher
Phosphorus Retention	3.45	Moderate
Nitrate Removal & Retention	10	Higher
Carbon Sequestration	4.72	Moderate
Organic Nutrient Export	5.79	Moderate
Anadromous Fish Habitat	0	Lower
Resident & Other Fish Habitat	0	Lower
Aquatic Invertebrate Habitat	2.52	Lower
Amphibian Habitat	5.21	Moderate
Waterbird Feeding Habitat	5.92	Moderate
Waterbird Nesting Habitat	6.44	Moderate
Songbird, Raptor, & Mammal Habitat	6.97	Moderate
Pollinator Habitat	9.01	Higher
Native Plant Habitat	4.82	Moderate
Summary Rating for Grouped Functions		
Hydrologic	6.34	Moderate
Water Purification	9.5	Higher
Aquatic Support	1.08	Lower
Aquatic Habitat	4.85	Moderate
Terrestrial Habitat	7.59	Higher

4.2.3.2.2 GEMTEC Wetland Assessments

On September 9, 2025, GEMTEC conducted a delineation of Wetland 4 and Wetland 5. The wetland delineations are shown on Figure 4.10; wetland data sheets are provided in Appendix G-1; and site photos are provided in Appendix G-2.

Wetland 4 is a forested swamp approximately 1.05 ha in size. Dominant tree and shrub species include balsam fir, yellow birch, and white spruce. Dominant herbaceous species include cinnamon fern (*Osmunda cinnamomea*) and New York fern (*Thelypteris noveboracensis*) (Photo 5, Appendix G-2).

Wetland hydrology indicators observed within Wetland 4 include surface water, oxidized rhizospheres on living roots, presence of reduced iron, and microtopographic relief. The soil profile consisted of an organic surface layer overlying silty clay (Photo 6, Appendix G-2). Hydric soil indicators were confirmed through the presence of a histic epipedon.

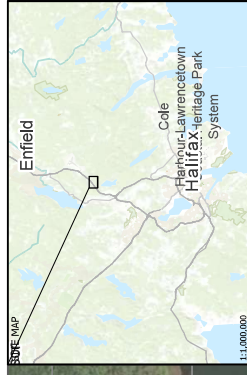
Wetland 5 is a marsh wetland approximately 0.77 ha in size. Tree and shrub cover is sparse, but includes red maple, balsam fir, black spruce, and yellow birch. Dominant herbaceous species include dwarf red raspberry, cinnamon fern, bunchberry (*Cornus canadensis*), creeping snowberry (*Gaultheria hispidula*), Canada goldenrod (*Solidago canadensis*), bog goldenrod (*Solidago uliginosa*), eastern marsh fern (*Thelypteris palustris*), broad-leaved cattail (*Typha latifolia*), and bog aster (*Oclemea nemoralis*) (Photo 9, Appendix G-2).

Wetland hydrology indicators observed in Wetland 5 include surface water, a high water table, and soil saturation. The soil profile consisted of organics (Photo 10, Appendix G-2). Hydric soil indicators were confirmed through the presence of a histosol.

Table 4.38 **Summary of Wetland Characteristics and Functions.**

Wetland ID	Size (ha)	Delineator Consultant	Existing	Proposed Development	Class	Form	Type	Landscape Position	Water Flow	Water Regime
4	1.05	GEMTEC	Partially Altered	Phase 3	Swamp	Sloped	Forested	Lotic	Throughflow	SS
5	0.77	GEMTEC	Yes	Phase 3	Marsh/Swamp	Basin	Graminoid/Shrub	Terrene Pond	Outflow	PS/TF
8	0.07	McCallum	Yes	Phase 4	Marsh	Flat	Graminoid	Terrene	Isolated	PS

Table note: PS- permanently saturated; SS- seasonally saturated; TF- temporarily flooded



-  Quarry Property Boundary
 Phase 3 and 4 Boundaries
 Existing Phases
 2025 GEMTEC Delineated Wetlands
 Previously Delineated Wetlands
 Wetland Data Points

SCALE

50 0 50 100 150 m

1:7,000

CREDITS/NOTES

1. COORDINATE SYSTEM: NAD 1983 CSRS New Brunswick Stereographic
2. Sources: Esri, Vantor, Arluis, DJS, USA, NCA, CGAR, N Robinson, NCEAS, NILS, OS,
WMA, Geodatasystem, Rijksdienst voor Luchtfoto's, Geo-Info, Internap, and the GIS user
community, Vantor, Province of Nova Scotia, Esri Canada, Esri, TomTom, Garmin, SafeGraph,
FAO, METI/WASA, USGS, NRCan, Parks Canada
3. Contains information licensed under the Open Government Licence - Canada.
4. Contains information licensed under the Open Government Licence - Nova Scotia.

PROJECT TITLE

GOFFS QUARRY

REPORT TITLE

GOFFS QUARRY
ENVIRONMENTAL ASSESSMENT

DRAFTING TITLE

WETLANDS DELINEATED WITHIN THE PDA

DATE	5/19/2026	DRAWN BY	ARS/JC	CHECKED BY
PROJECT NO.	103269,002	DRAWING NO.	FIGURE 4.10	REVISION NO.
				REV 1



Wetland Functional Assessment

Wetland 4 and Wetland 5 were assessed using WESP-AC version 3.4. WESP-AC score sheets are presented in Appendix G-3. Generally, the assessed wetlands provide a moderate level of wetland function, with function rating varying by ecosystem and wetland type (Table 4.39).

Individual functions are evaluated in groups and summarized, resulting in Function-Benefit Products (FBP). The FBP score categories provide an overview of the wetland's functional strengths.

Table 4.40 summarizes the scores of grouped functions with respect to habitat (HAB) and support (SUP) attributes of Wetland 4 and Wetland 5. The outcomes of the HAB and SUP attributes were used to determine if Wetland 4 and Wetland 5 meet the criteria for wetland of special significance (WSS) status. None of the wetlands meet the criteria for WSS status.

Table 4.39 WESP-AC Results for Wetland 4 and Wetland 5.

Wetland Functions or Other Attributes	Wetland 4		Wetlands 5	
	Function Score	Function Rating	Function Score	Function Rating
Surface Water Storage	0.34	Lower	1.73	Lower
Stream Flow & Temperature Support	8.61	Higher	7.7	Higher
Sediment & Toxicant Retention & Stabilization	3.68	Moderate	3.8	Moderate
Phosphorus Retention	3.75	Lower	5.78	Moderate
Nitrate Removal & Retention	3.13	Moderate	3.39	Moderate
Wildfire Resistance	2.61	Moderate	5.2	Moderate
Carbon Stock Preservation	3.58	Moderate	5.26	Moderate
Carbon Capture	5.09	Moderate	5.62	Moderate
Organic Nutrient Export	7.8	Higher	9.56	Higher
Aquatic Primary Productivity	3.53	Lower	7.1	Higher
Anadromous Fish Habitat	0	Lower	0	Lower
Resident & Other Fish Habitat	6.29	Higher	7.62	Higher
Amphibian Habitat	3.67	Moderate	4.06	Moderate
Waterbird Feeding Habitat	5.82	Moderate	9.38	Higher
Waterbird Nesting Habitat	0	Lower	8.9	Higher
Raptor & Wetland Songbird Habitat	8.32	Moderate	8.2	Moderate
Keystone Mammal Habitat	2.46	Lower	1.59	Lower
Native Plant Habitat	7.15	Higher	4.15	Moderate
Pollinator Habitat	9.98	Higher	9.51	Higher

Table 4.40 WESP-AC Grouped Function Results for Wetland 4, and Wetland 5.

Function-Benefit Products (FBP)		Wetland 4		Wetland 5	
		FBP Score	FBP Score Category	FBP Score	FBP Score Category
	SUP - Hydrologic	1.93	Low	7.96	Low
	SUP – Water Quality Support	16.6	Low	24.42	Low
	SUP – Aquatic Support	40.65	Low	56.79	Moderate
	HAB – Aquatic Habitat	17.17	Low	34.92	Low
	HAB – Transition Habitat	35.66	Low	31.53	Low
4					
5					
<u>Functional WSS Rule Definitions:</u>					
<i>Habitat Rule:</i> Two 'High' Scores OR One 'High' and one 'Moderate' score					
<i>Support Rule:</i> Three 'High' scores OR Two 'High' and one 'Moderate' score					
Habitat/Support Hybrid Rule: One 'High' HAB score AND two or three 'High' SUP scores					
<u>Functional WSS Determination:</u>		(Yes/No)		(Yes/No)	
Habitat Rule Satisfied		No		No	
Support Rule Satisfied		No		No	
Habitat/Support Hybrid Rule Satisfied		No		No	
CONCLUSION		Site is not a WSS		Site is not a WSS	

Wetland 4

Wetland components assessed within Wetland 4 received a 'moderate' functional rating (Table 4.39). The 'higher' ranking functions or values of this wetland include:

- Stream Flow and Temperature Support
- Organic Nutrient Support
- Resident & Other Fish Habitat
- Native Plant Habitat
- Pollinator Habitat

The stream flow and temperature support function is ranked 'higher' for Wetland 4, reflecting the wetland's ability to sustain stream flow into the summer months and regulate water temperatures. Wetland 4 may contribute water during the driest parts of the growing season, which plays a vital role in supporting fish and other aquatic species.

Organic nutrient support was ranked as 'higher' as a function, reflecting the wetland's ability to produce and export organic matter.

The high ranking for resident and other fish habitat indicates that the habitat structure, water quality, and hydrological connectivity of Wetland 4 have the potential to support favourable conditions for a variety of fish species. These conditions contribute to ecological stability and provide essential habitat for fish during various life stages.

The 'higher' ranking of native plant habitat represents the wetland's capacity to support diverse native hydrophytic vascular plant species communities and contribute to native plant diversity on a regional scale.

Lastly, the high-ranking pollinator habitat function indicates that Wetland 4 has the capacity to support a range of native hydrophytic vascular plant communities and the pollinating insects that rely on them. These interactions play an essential role in maintaining plant reproduction, supporting food chains, and contributing to biodiversity in the region.

The moderate-ranking functions of this wetland include:

- Sediment and Toxicant Retention and Stabilization
- Nitrate Removal and Retention
- Wildfire Resistance
- Carbon Stock Preservation
- Carbon Capture
- Amphibian Habitat
- Waterbird Feeding Habitat

- Raptor and Wetland Songbird Habitat

The lower-ranking functional component of this wetland include:

- Surface Water Storage
- Phosphorus Retention
- Aquatic Primary Productivity
- Anadromous Fish Habitat
- Waterbird Nesting Habitat
- Keystone Mammal Habitat

Wetland 5

Wetland components assessed within Wetland 5 received a 'moderate' functional rating (Table 4.39). The 'higher' ranking functions or values of this wetland include:

- Stream Flow and Temperature Support
- Organic Nutrient Support
- Aquatic Primary Productivity
- Resident & Other Fish Habitat
- Waterbird Feeding Habitat
- Waterbird Nesting Habitat
- Pollinator Habitat

Many higher-ranking functions overlap with Wetland 4 and are described above. Descriptions for higher-ranking functions that have not yet been mentioned are below.

The 'higher' ranking of aquatic primary productivity in Wetland 5 represents the wetland's ability to support a high production of benthic, epiphytic, and planktonic algae and other plants that are the base of the aquatic food web.

Waterbird feeding habitat reflects the wetland's capacity to support an abundance or diversity of waterbirds that winter or migrate in the region.

The high ranking for waterbird nesting habitat indicates that Wetland 5 has the potential to support breeding opportunities for a range of species. Nesting support is critical for maintaining regional bird populations, preserving biodiversity, and supporting associated ecological and cultural values.

The moderate-ranking functions of this wetland include:

- Sediment and Toxicant Retention and Stabilization
- Phosphorus Retention
- Nitrate Removal and Retention
- Wildfire Resistance
- Carbon Stock Preservation
- Carbon Capture
- Amphibian Habitat
- Raptor and Wetland songbird Habitat
- Native Plant Habitat

The lower-ranking functional component of this wetland include:

- Surface Water Storage
- Anadromous Fish Habitat
- Keystone Mammal Habitat

4.2.3.3 Effects Assessment

The potential for impacts to wetlands has been evaluated for each phase of the Project development. Impact pathways, informed by delineation and functional assessment data, are outlined below along with the corresponding mitigation measures. An assessment of any residual impacts following the implementation of these mitigation measures is also provided.

It should be noted that a wetland alteration Approval Document was issued by NSECC on July 3, 2020 (Approval Number 2020-2748147-00) for the complete removal of Wetland 3 and partial removal of Wetland 4. An agreement for further compensation for alteration to Wetland 4 was arranged with Ducks Unlimited in 2024. Another wetland alteration Approval Document was issued in February 2021 for the complete removal of Wetland 6 and Wetland 8, with the partial alteration of Wetland 9. This Approval Document remains active and expires on January 13, 2031. No alteration has been made to Wetland 8 to date.

4.2.3.3.1 Impact Pathways

Construction and operational activities including clearing, grading, excavation, constructing physical project components, stockpiling, stormwater control, and transportation will impact the wetland footprint within the PDA, and all have potential to affect wetland function. Cumulatively, development associated with the Project will intersect with 3.17 ha of wetland. Based on the physical Project components, the estimated extent of impact to wetlands within the PDA is summarized in Table 4.41.

Table 4.41 Estimated Extent of Project Impacts on Wetland Footprint.

Wetland ID	Anticipated Impact (ha)	Phase
Wetland 4	0.96	Phase 3
Wetland 5	0.77	Phase 3
Wetland 8	0.07	Phase 4

Wetland 4, Wetland 5, and Wetland 8 are located within the PDA and will be impacted during Project development. This will include the direct removal of Wetland 5 and Wetland 8. The extent of Wetland 4 within the PDA will be directly impacted through gravel infilling, and the portions of Wetland 4 outside of the PDA are expected to be altered by indirect impacts.

During the construction phase, site preparation activities such as vegetation clearing, grubbing, and grading will result in the direct loss and disturbance of wetland areas located within the Project footprint. These activities remove wetland vegetation, alter soil structure, and modify surface conditions, leading to reduced habitat availability and changes in wetland function. Disturbance can also affect hydrological pathways that sustain wetland ecosystems, particularly where grading or infrastructure installation alters natural water flow.

Operational activities, including the installation of drainage features such as ditches and culverts, may influence hydrological outputs to adjacent wetlands and watercourses. Changes in flow direction, magnitude, or timing can reduce water availability, affecting wetland vegetation, groundwater recharge, and ecological processes.

Both construction and operational activities also have the potential to indirectly disturb wetlands that remain within the Scotian Materials property, beyond the boundaries of the PDA. Vehicle movement, blasting, and ongoing site use may cause edge encroachment, dust deposition, and vibration, which can degrade wetland vegetation and soil conditions over time.

Disturbance during all phases can facilitate the introduction or spread of invasive plant species within wetlands. Soil movement, equipment transfer, and restoration activities provide pathways for invasive establishment, which can alter plant community composition and reduce habitat quality.

Sedimentation represents another key impact pathway. Exposed soils, earthworks, and stockpile areas may generate sediment-laden runoff that can accumulate in wetlands, altering water quality and substrate conditions.

4.2.3.3.2 Mitigation

A range of mitigation measures will be implemented throughout the construction, operation, and decommissioning phases of the Project to avoid, minimize, or offset potential impacts on wetlands. These measures focus on maintaining wetland extent, preserving hydrological function, reducing disturbance, limiting sedimentation, and preventing the introduction of invasive species. Collectively, these actions will support the long-term integrity of wetland ecosystems within and adjacent to the Project footprint.

Loss of wetland habitat whether through direct infilling, dewatering, or indirect alteration of wetland hydrology or hydrogeology requires approval from NSECC (Government of Nova Scotia, 2011). The approval process involves completing a functional assessment of the affected wetland and arranging for compensation to mitigate against the loss of wetland functions as a result of a proposed development. Alternatively, proponents may submit a Letter of Understanding (LOU) from a qualified wetland restoration professional to NSECC outlining the amount or value of compensation and the commitment to complete restoration and ongoing monitoring (Government of Nova Scotia, 2011).

A wetland alteration Approval Document will be obtained for all wetlands that will be impacted by the Project, and all conditions of the approval will be met, thereby addressing any potential adverse effects to wetlands. All necessary watercourse alteration permits will be obtained from the province will be secured if required.

Wetland loss and disturbance will be minimized by siting Project components to avoid wetland areas wherever possible and maintaining any buffer zones prescribed by NSECC during all Project phases. Vegetation clearing and grubbing will be restricted to essential areas within the PDA, and trees will be felled away from wetlands and watercourses to minimize unnecessary disturbance. All work affecting regulated wetlands will follow applicable permits and approvals, and any unavoidable loss will be compensated for in accordance with provincial requirements.

To protect wetland hydrological conditions, stormwater management features such as ditches and culverts will be designed and maintained to sustain natural flow pathways to receiving wetlands within the PDA. Culverts will be appropriately sized to prevent flow restriction or concentration, and drainage systems will be monitored during construction and operation to ensure they continue to function effectively.

Operational activities will incorporate measures to reduce ongoing disturbance to remaining wetlands within the Project footprint. Any prescribed wetland buffers will be maintained, and operational traffic will be confined to designated haul roads to avoid unnecessary encroachment. Regular monitoring will be conducted to identify any changes in wetland condition due to indirect impacts, allowing for adaptive management where needed. Dust suppression will be applied to limit particulate deposition on wetland vegetation, and blasting or

heavy equipment use near wetlands will respect established setback distances to reduce vibration impacts.

The risk of introducing invasive species will be minimized by inspecting and pressure-washing all construction equipment prior to arrival on site to ensure it is free of soil, seeds, and vegetative material. During restoration, only Canada Certified No. 1 or higher seed mixes will be used to prevent the establishment of non-native plant species and support the recovery of native vegetation communities.

Protection of native wetland plant communities, including SOCC, will be further supported by clearly identifying and flagging all known SOCC occurrences prior to construction. These areas will be avoided wherever possible during construction, operation, and restoration activities.

Sedimentation control will be managed across all Project phases through the installation and ongoing maintenance of erosion and sediment control measures prior to site disturbance. Disturbed soils will be stabilized as early as possible, and soil stockpiles will not be placed adjacent to wetlands unless adequate containment is in place.

A summary of the proposed mitigation strategies, organized by impact pathway, is provided in Table 4.42.

Table 4.42 Potential effects across Project phases and the proposed mitigative measures for wetlands.

Impact Pathway	Phase	Mitigation
Loss or disturbance of wetland due to clearing, grubbing, and grading	Construction Operation	<ul style="list-style-type: none"> Where possible, project components have been sited to avoid wetlands and adhere to regulated buffers to avoid impacts to these features. Sediment and erosion control measures will be implemented and maintained throughout construction to prevent erosion, manage runoff, and minimize sediment entering wetlands. All work impacting regulated wetlands will adhere to the required permits and approvals. Vegetation clearing and grubbing will be limited to the essential areas within the PDA. Wetland loss will be compensated at a 2:1 ratio. Trees will be felled within designated zones and directed away from wetlands and watercourses. Grading activities within wetlands will be confined to areas necessary. Pre-disturbance water sources will be preserved during grading to maintain natural wetland hydrology.
Change in hydrological outputs to receiving wetlands and watercourses through stormwater management (i.e., ditching, culverts, etc.).	Construction Operation	<ul style="list-style-type: none"> Pre-disturbance water sources will be preserved where it is feasible to maintain natural wetland hydrology. Properly sized culverts will be used to maintain natural flow and avoid flow restriction or concentration.
Indirect disturbance of wetland.	Construction Operation	<ul style="list-style-type: none"> Maintain established wetland buffers and ensure all operational activities remain outside regulated boundaries unless permitted.

		<ul style="list-style-type: none"> Wetlands located within the Project footprint will be monitored throughout operation. Ensure operational traffic stays on designated haul roads to avoid accidental intrusion into wetland margins. Apply dust suppression measures to prevent excessive dust deposition on wetland vegetation. Blasting and heavy-equipment activity near wetland areas will follow approved setback distances.
Introduction of invasive plant species into wetlands	Construction Operation Decommissioning & Restoration	<ul style="list-style-type: none"> All construction equipment will be inspected and pressure washed upon arrival to site to confirm it is clean and free of any plant and soil material. Only Canada Certified No. 1 or higher seed mixes will be used for restoration to prevent the introduction of invasive species.
Changes in native plant species in effected wetland areas including distribution/abundance	Construction Operation Decommissioning & Restoration	<ul style="list-style-type: none"> All known occurrences of SOCC in wetlands will be marked on construction plans and identified SAR/SOCC plant locations will be clearly flagged before the start of site preparation and construction.
Sedimentation of wetlands	Construction Operation Decommissioning & Restoration	<ul style="list-style-type: none"> Install and maintain sediment and erosion control measures (e.g., silt fences, sediment basins, check dams). Avoid stockpiling soil adjacent to wetlands unless appropriate containment is in place. Stabilize exposed soils as soon as possible. Ensure environmental areas outside the prescribed controls visually free of project related sedimentation.
Contamination of wetlands due to runoff of	Operation	<ul style="list-style-type: none"> Avoid the overuse of salt and other harsh materials that may run off into wetland areas.

de-icing agents, or other chemicals, into wetlands.

Runoff from fuels and chemicals into wetland areas.	Construction Operation	<ul style="list-style-type: none">Fluids will be stored appropriately, and spill response equipment will be readily available on site. Equipment washing will be conducted at least 100 meters away from any wetlands to prevent contamination.
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4.2.3.3.3 Residual Effects

The potential residual effects of the Project on wetlands resulting from the identified impact pathways were assessed using predefined criteria (Table 4.43). The assessment assumes that proposed mitigation and restoration measures will be fully implemented, including avoiding wetland areas where possible, maintaining regulated buffer zones, installing sediment and erosion controls, and monitoring throughout all Project phases.

With mitigation measures in place, most effects on wetlands are expected to be minimized; however, some residual effects, particularly those associated with wetland loss, hydrological changes, and operational disturbance, may persist within the PDA after construction.

The magnitude of effects on wetlands ranges from Low to High. The removal and disturbance of wetlands during construction is assessed as a High magnitude effect due to the permanent loss of wetland habitat and associated ecological function following clearing, grubbing, and grading. Disturbance to wetlands during operation is considered Low magnitude, as indirect effects related to wind erosion, runoff, and minor hydrological alterations are anticipated. Changes in hydrological outputs due to stormwater management infrastructure are considered Low magnitude, assuming properly sized culverts are installed, and water preservation measures are implemented.

The duration of Project-related effects on wetlands is expected to be Long Term. Permanent wetland loss will persist beyond the life of the Project, and hydrological changes and operational disturbances will continue for the duration of construction and active operations.

In terms of frequency, effects to wetlands are expected to occur on a sporadic basis. Wetland clearing and grading are associated with construction events, while operational disturbances, as described in Table 4.42, including hydrological fluctuations will occur sporadically throughout the operational phase.

Generally, the extent of Project-related effects on wetlands will be limited to the PDA. Changes in hydrologic input from stormwater management infrastructure may extend into the LAA but are expected to be minimal.

The reversibility of Project-related effects on wetlands varies by impact pathway. Loss and disturbance of wetlands due to construction and operation is largely Irreversible. Hydrological changes are considered Reversible.

The likelihood of these residual effects on wetlands occurring depends on Project activities and the effectiveness of implemented mitigation measures, and ranges from Possible to Almost Certain. Direct loss of wetlands from clearing and grading is considered Almost Certain, as some wetland removal is unavoidable for the placement of project components. Operational disturbances are Likely, as these effects may not be fully eliminated during ongoing operations. Changes to wetland hydrology are Possible, since proper stormwater management measures reduce, but do not completely remove, the risk of localized impacts to wetlands.

Table 4.43 Effects assessment of the impact pathways identified for wetlands.

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood
Loss or disturbance of wetland due to clearing, grubbing, and grading	High	Long Term	Sporadic	PDA	Irreversible	Almost Certain
Change in wetland hydrology due to stormwater management infrastructure	Low	Long Term	Sporadic	LAA	Reversible	Possible
Loss and disturbance of wetland during operation	Medium	Long Term	Sporadic	PDA	Irreversible	Likely

4.2.4 Fish and Fish Habitat

The Fish and Fish Habitat VC was characterized by a qualitative assessment of fish assemblages and fish habitat within the PDA based on field surveys, supplemented by a broader desktop review of fish assemblages in the surrounding area. The Fish and Fish Habitat VC also included water quality, based on both *in situ* measurements and seasonal water chemistry sampling.

Watercourse flow conditions are described within the Surface Water Hydrology VC (Section 4.1.6).

4.2.4.1 Methodology

4.2.4.1.1 Spatial Boundaries

Spatial boundaries for the Fish and Fish Habitat VC were defined based on local and regional watershed context. The PDA includes the 23.2 ha area of Phases 3 and 4; separated by Stream 6 and the associated riparian corridor separating the two phases.

The LAA includes the upstream drainage area contributing to Soldier Lake, encompassing the quarry property and adjacent lands (Figure 3.2). The RAA corresponds to the Nova Scotia tertiary watershed 1DG-1-GG, a 43.5 km² sub-watershed of the Shubenacadie River basin.

4.2.4.1.2 Desktop Review

A desktop review was conducted to identify potential for fish and fish habitat within the PDA and surrounding area. The desktop review informed fieldwork by identifying priority areas for habitat assessment and confirming whether features that could support fish or regulated aquatic habitat were present. This review included the following sources:

- **Nova Scotia Hydrographic Network (NSHN):** reviewed to identify mapped watercourses and evaluate potential drainage patterns and connectivity;
- **Aerial Imagery:** current and historical imagery reviewed to identify unmapped or altered channels, and identify anthropogenic influence (e.g., culverts, channel modifications);
- **ACCDC:** a data report was acquired that included historical records of fish SAR and SOCC in the general area; and
- **DFO SAR Aquatic Species Mapping:** reviewed to identify known or potential occurrences of aquatic SAR within or near the PDA.

Drainage Delineation: Watersheds intersecting the PDA were delineated by GEMTEC hydrologists using the modelling software Personal Computer Storm Water Management Model (PCSWMM). This was also used to develop a single watershed containing the PDA, to be used as a generalized Local Assessment Area (LAA) for ecological components (see Section 3.2.3.2).

Stream 5 is within Phase 3. It is not considered fish habitat; rather is it an ephemeral drainage channel that drains water from Wetland 5, southward to Wetland 4. Downgradient of wetland 4, there is no perennial (permanent) connection to downstream watercourses, only a ditch along a dirt road (Perrin Drive) that would hold water seasonally, during spring freshet and major precipitation events. Golder Associates (Golder Associates Ltd., 2018) concluded that “... *the habitat potential for fish in Stream 5 is considered to be low*” and no fish were observed. They also identified multiple barriers to fish passage. For this reason, Stream 5 was not included in the 2025 field assessments for fish and fish habitat. For further information about Stream 5, refer to the 2018 EA (Golder Associates Ltd., 2018).

4.2.4.1.3 Fish Habitat Surveys

Fish habitat assessments were conducted along Stream 6, the primary watercourse separating Phase 3 and Phase 4. Three representative sampling locations were established within the study area, corresponding to upstream, mid-reach (within the PDA), and downstream conditions (Figure 4.11).

At each location, habitat characteristics were measures at a representative cross-section. Assessments were conducted by GEMTEC biologists on July 3, 2025, following standard methodologies (Hooper, W.C, McCabe, & Roberston, 1995; New Brunswick Department of Natural Resources, 2010). *In situ* measurements were collected with a YSI ProQuatro multimeter.

The following habitat information was collected:

- **Geomorphology:** channel width, wetted width, depth of water, bank stability, signs of erosion, riparian vegetation and cover, bank undercutting, substrate composition, and embeddedness;
- **In situ water quality:** temperature (°C), dissolved oxygen (% and mg/L), specific conductance (µS/cm), conductivity (µS/cm), pH, and oxidation-reduction potential (mV). Seasonal water chemistry sampling was completed as a separate field program (Section 4.2.4.1.5)

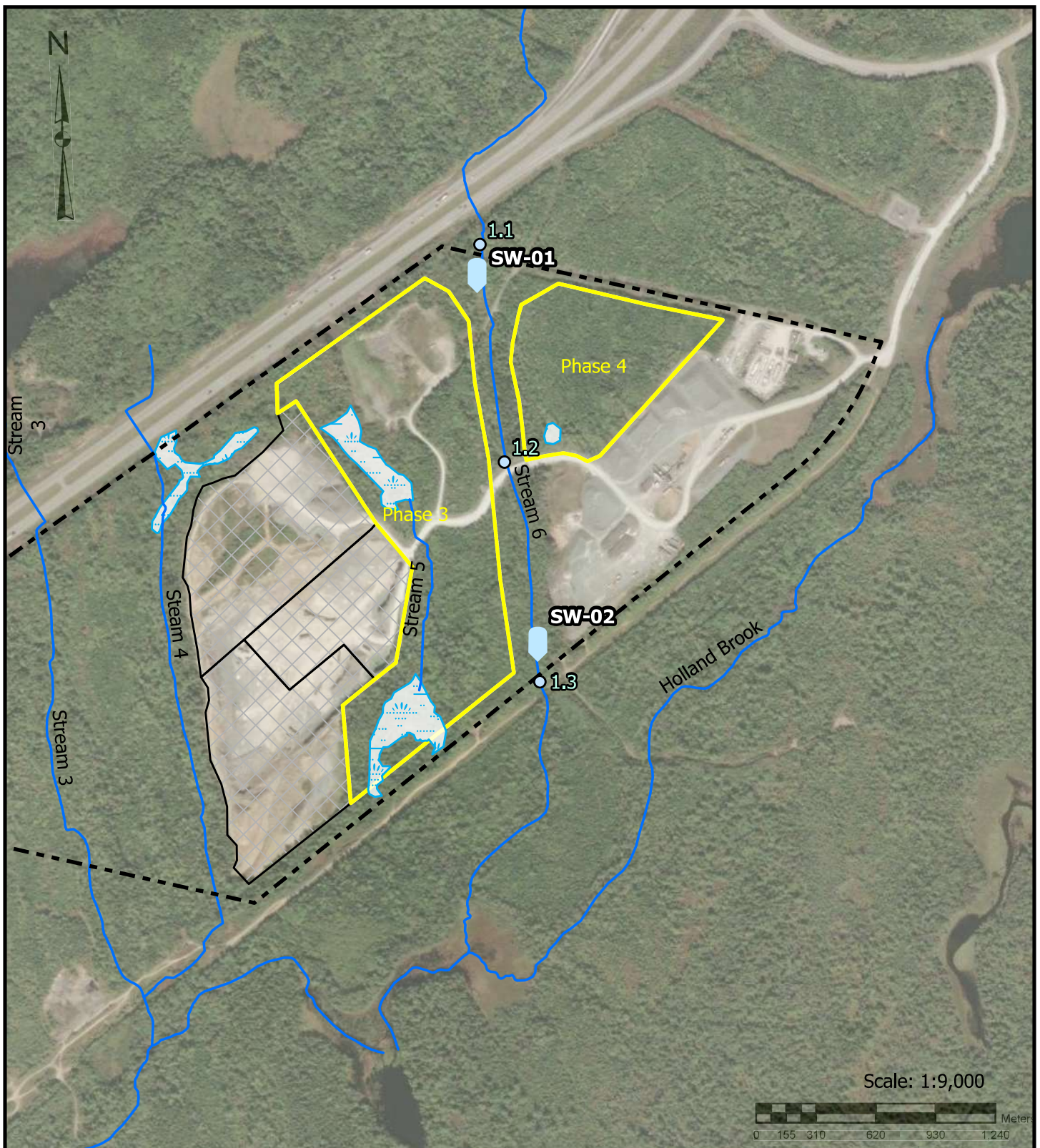
4.2.4.1.4 Qualitative Electrofishing

To determine fish presence and community composition, qualitative electrofishing was conducted at the three representative reaches of Stream 6 described above. Electrofishing was completed on July 3, 2025, using a Smith-Root LR-24 backpack electrofisher operated by GEMTEC biologists. At each location (3), a single-pass electrofishing survey was completed along an approximately 50 m stretch of the watercourse, roughly centred on the three transects shown in Figure 4.11.

All work was conducted under a DFO-issued Licence to Fish for Scientific Purposes pursuant to Section 52 of the *Fishery (General) Regulations* (Licence # 322377). Captured fish were identified to species and fork length was measured. Individuals were temporarily held in aerated containers during processing and were subsequently released alive at the point of capture.

4.2.4.1.5 Water Chemistry Sampling

Water chemistry samples were collected from the upstream and downstream extents of Stream 6 (SW01 and SW02) on Jun 6, 2025, and again on November 27, 2025. These sampling stations are shown on Figure 4.11. Field-filtered samples were analyzed for General Chemistry and Trace Metals (including total mercury) at AGAT Laboratories in Dartmouth. Summary tables and lab certificates are provided in Appendix H. Results of the sampling are discussed in Section 4.2.4.2.



Legend:		Existing Phases		Watercourses (NSHN)		Wetlands		Stream Transects
		Quarry Property		Sampling Station				
		Project Development Area (PDA)						

Note:
 1. Coordinate system: NAD83 CRS UTM Zone 20.
 2. Aerial Imagery Retrieved from: ESRI World Imagery

Project: <div>Goffs Quarry Phase 3 & 4 Expansion Goffs, Nova Scotia</div>				Drawing: Fish & fish habitat survey reaches and water sampling points along Stream 6.		 <div>GEMTEC CONSULTING ENGINEERS AND SCIENTISTS</div>
				Client: Scotian Materials Ltd.		
Drawn by:	Checked by:	Date:	Project Number:	Drawing Number:	Revision No.	
JC	SG	June 2026	103269.002	Figure 4.11	1	

4.2.4.2 Existing Conditions

Watercourses within and bordering the PDA were mapped previously within the Nova Scotia Hydrographic Network and were described during the 2018-2019 EA. The 2025 field program focused on Stream 6, which is situated between Phase 3 and Phase 4 of the Project. Stream 6 flows beneath Highway 102, passes through Wetland 7, and discharges into the main stem of Holland Brook approximately 500 m south of the quarry property boundary. Stream 5 is considered an ephemeral drainage and not considered fish habitat (for more information about Stream 5, refer to the previous EA registration (Golder Associates Ltd., 2018)).

Refer to Appendix H for field data sheets and laboratory results for water chemistry.

4.2.4.2.1 Fish Habitat

Habitat conditions were characterized at three sampling locations (transects) along Stream 6, representing upstream, midway, and downstream conditions. Habitat near each sampling location was dominated by shallow pools with low velocities (~0.10 m/s). In general, though, the portion of Stream 6 within the quarry property included a mix of riffle, pool, and run habitats typical of headwater streams in central Nova Scotia.

Bankfull widths at the transects ranged from 1.6 to 2.1 m, with wetted widths of 1.1 to 1.2 m, and average depths varying from 10 to 60 cm. Substrate was dominated by rubble (30–40%), with contributions from rock (approximately 20%), boulder (0–20%), gravel (5–15%), sand (5–10%), and limited bedrock (5–10%); fine materials were generally low or absent (0–10%). Embeddedness was low to moderate (<50%).

Riparian cover consisted of moderate overhanging vegetation (25–50% on each bank), dominated by herbaceous vegetation and trees. Banks exhibited low to moderate undercutting (5–25%).

Substrate composition and channel dimensions are summarized in Table 4.44.

Table 4.44 Substrate and basic geomorphology from transects within Stream 6.

Parameter	Transect		
	1.1	1.2	1.3
Substrate Composition (%)			
Fines	0.0	0.0	10.0
Sand	10.0	5.0	10.0
Gravel	10.0	5.0	15.0
Rubble	30.0	40.0	40.0
Rock	20.0	20.0	20.0
Boulder	20.0	20.0	0.0
Bedrock	10.0	10.0	5.0
Channel Dimensions			
Wetted Depth (m)	0.10	0.55	0.60
Wetted Width (m)	1.10	1.20	1.20
Bankfull Width (m)	1.6	2.10	1.80

Several partial obstructions to fish movement were observed, including accumulations of woody debris and cobble or boulder material partially blocking the channel. These features are likely passable during high-flow conditions and, due to their temporary nature, are not considered permanent barriers to fish passage.

In-situ Water Quality

In situ water quality measurements were compared to CCME *Water Quality Guidelines for the Protection of Freshwater Aquatic Life* (2017) as an assessment of freshwater quality. The applicable guideline thresholds are listed below:

- Dissolved oxygen: > 6 mg/L (Canadian Council of Ministers of the Environment, 1999)
- pH: 4.0 – 9.5 tolerance for brook trout (Fisheries and Oceans Canada, 2008); 6.5 – 8.0 optimal range for brook trout (Raleigh, 1982)

Many fish species have a distinct thermal optimum; therefore, water temperature is an important factor in determining the habitat quality for fish survival and reproduction. Most salmonids are sensitive to warm water and tend to avoid areas with temperatures greater than 20°C (Fisheries

and Oceans Canada, 2008). To classify the water temperature in streams assessed, the DFO classification system for brook trout (*Salvelinus fontinalis*) was used:

- Optimum: < 11°C to 14°C
- Lethal: < -0.7°C; > 21.0 - 26.6°C
- Spawning: 5 – 10°C.

Water quality measurements from Stream 6 indicate suitable habitat for freshwater fishes including salmonids. Temperatures varied based on vegetative cover and other stream morphology characteristics, which is typical of a small watercourse. Temperature measurements on July 3, 2026 ranged from 11.9°C to 13.8°C. This is within the preferred temperature range for salmonids; optimum temperature ranges for brook trout survival are between 11°C and 14°C (Fisheries and Oceans Canada, 2008). Dissolved oxygen (mg/L) ranged from 7.4 to 8.4, which is ideal for salmonids and other fishes of headwater streams in the region.

In-situ water quality data collected are presented in Table 4.45.

Table 4.45 In-situ water quality of Stream 6.

Parameter	Transect		
	1.1	1.2	1.3
Temperature (°C)	12.5	13.8	13.8
DO (%)	79.0	79.0	68.0
DO (mg/L)	8.4	8.1	7.4
SPC (µS/cm)	1415.0	899.0	644.5
COND (µS/cm)	1077.0	707.0	480.7
pH	8.29	8.46	8.44
ORP (mV)	145.2	138.3	131.8

Water Chemistry

Water chemistry sampling results for Stream 6 are provided in Appendix H.

Most parameters analyzed were within typical ranges for small headwater streams in southern Nova Scotia. Exceedances of the Canadian Water Quality Guidelines (WQGs) for the Protection of Aquatic Life (Canadian Council of Ministers of the Environment, 2017) are summarized below in Table 4.46. All but one of 6 exceedances were from samples collected in late November. Turbidity was also elevated slightly compared to the June samples, suggesting potential runoff

of eroded sediment or deposition of dust at that time. This could have carried the aluminum and nitrite detected, and other dissolved chemicals that affect acidity. pH is also sensitive to atmospheric deposition, so is commonly influenced by precipitation. Furthermore, a seasonal drop in pH can increase dissolution of metals like aluminum, and possibly nutrients like nitrite.

Regardless of sources and specific mechanisms driving exceedances, it is important to note the seasonal variation in surface water chemistry that preexists the expansion into Phase 3 and 4.

Table 4.46 Water quality exceedances detected in samples from Stream 6 during 2025 sampling program.

Parameter	Units	Station	Date	Concentration
Aluminum	µg/L	SW-01	November 27	153
Nitrite	mg/L	SW-01	June 6	0.11
		SW-01	November 27	0.68
		SW-02	November 27	0.57
pH	-	SW-01	November 27	5.59
		SW-02	November 27	5.59

4.2.4.2.2 Fish Community

The ACCDC report obtained for the Project identified no fish records within 5 km of the PDA. However, DFO SAR Aquatic Species Mapping—presented at a watershed scale and not based on site-specific observations—indicates that Atlantic salmon (*Salmo salar*) may occur within the reporting area.

To characterize the fish community within and near the project area, qualitative electrofishing was conducted within Stream 6 on July 3, 2025. Results are presented in Table 4.47.

Brook trout (*Salvelinus fontinalis*) were the only species captured during electrofishing. Brook trout were also observed incidentally at the downstream sampling station (1.3) during habitat assessments, and at the culvert under the access road by station 1.2 (Figure 4.11). This is a concrete culvert with baffles to facilitate fish passage.

Table 4.47 Summary of electrofishing results for Stream 6.

Common Name	Scientific Name	Number of Individuals	Minimum Fork Length (cm)	Average Fork Length (cm)	Maximum Fork Length (cm)
Brook trout	<i>Salvelinus fontinalis</i>	25	1.0	4.0	8.0

A total of 25 fish were captured from Stream 6 at three locations corresponding to the stream assessment points (upstream, mid-reach, and downstream). Electrofishing durations were 263 s (upstream), 100 s (mid-reach), and 954 s (downstream), for a total effort of 1,317 s. No fish were captured at the upstream site; 2 fish were captured at the mid-reach site; and 23 fish were captured at the downstream site. Brook trout was the only species captured, which is not uncommon for small headwater streams in NS. It is assumed that cyprinids (e.g., common shiner, creek chub) are occasionally present within Stream 6 or the downstream watercourse habitat.

4.2.4.3 Effects Assessment

The potential impacts of the Project on fish and fish habitat are considered for each phase of the Project. The impact pathways are outlined below, along with proposed mitigation measures, followed by an assessment of potential residual impacts after mitigation is applied.

4.2.4.3.1 Impact Pathways

Disturbance and potential effects on fish and fish habitat may occur during the construction and operational phases of the Project. The principal impact pathways identified include sediment input to watercourses, changes in hydrology, and vibration-related disturbance associated with construction and operational activities. Note, Stream 5 will be eliminated for Phase 3 of the project; however, this is not considered fish habitat.

During the construction phase, vegetation clearing, grading, and earthworks have the potential to increase sediment input to nearby watercourses like Stream 6. The removal of vegetation and the disturbance of soil may expose erodible surfaces, resulting in increased sedimentation and turbidity during rainfall events. Increased sediment load can degrade fish habitat by reducing water clarity, infilling benthic substrates, and damaging spawning or rearing areas. Similar effects may occur during the operational phase; wind-blown sediment deposition is a common issue associated with quarry operations.

Changes in hydrology may occur during both construction and operation due to altered drainage patterns, soil compaction, or changes in surface runoff. These changes may influence the timing, magnitude, or direction of water flows entering nearby watercourses or wetlands.

Vibration-related disturbance to fish and fish habitat may occur during construction and operation due to the use of heavy equipment and, where applicable, blasting activities. Vibration transmitted through the ground or water may temporarily disrupt fish behavior.

4.2.4.3.2 Mitigation

A range of mitigation measures will be implemented throughout the construction, operation, decommissioning, and restoration phases of the Project to minimize potential effects on fish and fish habitat.

Sediment input to watercourses will be minimized by implementing erosion and sediment control measures prior to the commencement of ground disturbance. These controls will be maintained and monitored throughout construction and operation until disturbed areas are fully stabilized. Vegetation clearing and soil disturbance will be restricted to areas essential for quarry development and operations, reducing the extent of exposed soils potential for sediment transport to nearby watercourses.

To minimize changes in hydrology, construction and operational activities will be conducted at a minimum distance of 30 m from watercourse 6. Site drainage and grading will be managed to maintain natural flow patterns where feasible and to prevent the concentration or redirection of runoff that could adversely affect aquatic habitats. Refer to Section 4.1.6 for further information on potential impacts to hydrology and associated mitigation.

Vibration-related disturbance to fish and fish habitat will be minimized by maintaining setback distances from watercourses and wetlands during construction and operation, unless otherwise authorized.

A summary of the proposed mitigation strategies, organized by impact pathway, is provided in Table 4.48 below.

Table 4.48 Potential effects of the project on fish and fish habitat, and proposed mitigation.

Impact Pathway	Phase	Mitigation
Sediment input to watercourses during vegetation clearing, grading, earthworks, and general quarry operation	Construction Operations	<ul style="list-style-type: none"> Erosion and sediment control measures will be installed prior to ground disturbance and maintained until site stabilization. Vegetation clearing will be limited to essential areas only. Vegetated buffers will be maintained along riparian corridors. Airborne particulate will be visually monitored and minimized using dust suppressants or water on roadways and work surfaces.
Change in hydrology	Construction Operations	<ul style="list-style-type: none"> Any construction works will occur at a minimum 30 m from Stream 6 unless authorized through a Wetland Alteration Approval.
Vibrational disturbance to fish and fish habitat	Construction Operations	<ul style="list-style-type: none"> Any construction works will occur at a minimum 30 m from a watercourse or wetland unless authorized through a Wetland Alteration Approval. Construction near watercourses or wetlands will be completed in a timely manner to avoid prolonged disturbance.

4.2.4.3.3 Residual Effects

The potential effects on Fish and Fish Habitat resulting from the identified impact pathways were assessed using predefined criteria (Section 3.5.2). This assessment assumes full implementation of proposed mitigation.

With mitigation most potential effects on fish and fish habitat are expected to be minimized; however, some residual effects may persist during active construction and operational phases. Potential residual effects are primarily associated with sediment input to watercourses and sensory disturbance (vibration).

The magnitude of residual effects on fish and fish habitat is assessed as Low. The duration of residual effects is anticipated to range from Short Term to Medium Term. Sediment-related

effects are expected to be Short Term, occurring sporadically during periods of active ground disturbance or following precipitation events. However, sediment deposition associated with airborne particulate could occur sporadically throughout the operation of the quarry. Vibration-related effects are expected to be Medium Term, occurring intermittently throughout construction and operational activities involving heavy equipment or blasting.

Residual effects are expected to occur on a Sporadic basis. Sediment input is likely to be episodic and linked to specific construction activities, while vibration and noise disturbances will occur intermittently during equipment operation or blasting events.

The spatial extent of residual effects is expected to be localized. Sediment-related effects are anticipated to be confined to the PDA, with limited potential for off-site transport. Sensory effects, including vibration and noise, may extend into the LAA but are expected to attenuate rapidly with distance from the source and are unlikely to affect fish habitat beyond the immediate vicinity of the Project.

All identified residual effects are considered reversible. Following stabilization of disturbed areas and the completion of construction activities, sediment inputs are expected to return to baseline conditions. Behavioral responses to vibration are also expected to cease once disturbance activities end, with no long-term effects on fish populations or habitat function.

The likelihood of residual effects is assessed as possible. While mitigation measures are expected to substantially reduce the potential for adverse effects, some level of residual sedimentation and sensory disturbance may occur during quarry construction and operation.

Table 4.49 Effects assessment of the impact pathways identified for the terrestrial wildlife.

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood
Sediment input to watercourses during construction.	Low	Short Term	Sporadic	PDA	Reversible	Possible
Sediment deposition associated with airborne particulate	Low	Long Term	Sporadic	PDA	Reversible	Possible
Vibrational disturbance to fish and fish habitat	Low	Medium Term	Sporadic	LAA	Reversible	Possible

4.2.5 Avifauna

The Avifauna VC encompasses migratory and resident bird species, their habitats, and avian SAR. The baseline Avifauna field studies for this project focused on (forest) breeding birds, nightjars, passage migrants, and avian Species at Risk and other Species of Conservation Concern.

An avifauna technical report was prepared to describe the baseline survey methodology used to characterize this Valued Component. Key findings from the report are summarized below, and the full report is provided in Appendix I.

The Avifauna VC relates to other Valued Components in this document, including Wetlands (Section 4.2.3), Vegetation and Ecological Land Classification VC (Sections 4.2.1 and 4.2.2), the Atmospheric Environment (Section 4.1.1), and the Acoustic Environment (Section 4.1.3), due to the sensitivity of many birds to habitat loss, fragmentation, air pollution, and acoustic disturbance.

4.2.5.1 Methodology

4.2.5.1.1 Spatial Boundaries

The PDA, LAA, and RAA described in Section 3.2.3 are applicable to the Avifauna VC. A generalized LAA for ecological VC (“Ecological LAA”) was established for the Project based on the drainage area upstream of the inlet to Soldier Lake, which also encompasses the PDA. The RAA for ecological components including Avifauna was established based on EcoSections overlapping or near the PDA. The RAA encompasses an area of approximately 13,590 ha (136 km²). Refer to section 3.2.3 for a detailed description of the LAA and RAA.

4.2.5.1.2 Desktop Review

A preliminary desktop review of existing information on avifauna within the terrestrial LAA was conducted prior to the completion of field studies. The desktop review and field studies were intended to characterize of baseline conditions for bird assemblages and habitat types that could be impacted by the Project. The desktop analysis was informed by the following sources:

- ACCDC Report
- Maritimes Breeding Bird Atlas (MBBA)

The desktop review considered findings from the MBBA, focusing on surveys conducted within Square 20MQ56, located in the Chebucto–Musquodoboit region. This dataset highlights observations of avian SAR including species presence, breeding evidence, and conservation status.

4.2.5.1.3 Field Studies

Breeding Bird Point Counts

Breeding bird surveys were conducted in accordance with Canadian Wildlife Service (CWS) guidance and generally follow the Breeding Bird Survey (BBS) protocol used by Birds Canada. Six individual point count locations were randomly distributed throughout the PDA to reduce habitat bias and were spaced at least 200 m apart to maintain sampling independence.

A 10-minute point count protocol was used at each survey location partitioned into two 5-minute intervals (Birds Canada, 2023). Birds were recorded based on an estimated position within concentric 50 and 100 m radii. The objective was to assess the abundance and diversity of bird species during the breeding season and evaluate the suitability of habitats within the PDA for supporting breeding migratory birds.

Point count surveys were conducted in the morning on June 6 (Round 1) and July 4 (Round 2) of 2025, dates that fall within the core nesting period and for breeding birds in the region. The timing of the surveys also coincides with peak breeding activity for most regional species. Surveys were conducted under favourable weather conditions timing of the survey was selected to coincide with peak breeding activity for most regional species.

All birds observed visually or audibly were recorded, along with breeding evidence such as nests, territorial displays, alarm calls, flushed individuals, mating, and territorial defense. Data was collected on paper field sheets and locations, habitat, and weather information was recorded using ESRI Field Maps. Photographs of each point were collected systematically, facing north, east, south, and west. Species were marked on the field sheets using MBBA 4-letter band codes, unless otherwise noted on field sheets. Weather parameters were also recorded for each point, including temperature, Beaufort wind scale value, cloud cover, and precipitation.

Nightjar Surveys

Nightjar surveys were conducted in accordance with the *Canadian Nightjar Survey Protocol 2024* (Birds Canada, 2024), which establishes a standardized methodology for monitoring populations of common nighthawk (*Chordeiles minor*) and eastern whip-poor-will (*Antrostomus vociferus*). This protocol was developed in collaboration with ECCC and serves as a framework for detecting nightjars through acoustic monitoring during the breeding season.

Given the crepuscular and nocturnal activity patterns of these species, auditory point count surveys are considered the most effective detection method. Surveys were completed on July 3, 2025, during the peak breeding period.

The survey followed a passive point count design. While survey guidelines recommend a minimum spacing of 1.6 km between points, the six nightjar survey locations were spaced at

distances less than 1.6 km. This was done intentionally to ensure thorough coverage of the available habitat within the PDA and to increase the likelihood of detecting the species.

Passage Migration Surveys

Passage migration surveys were conducted during the Spring and Fall migration periods. Passage migration surveys monitor birds actively flying through an area during diurnal migration, capturing data on flight activity, timing, altitude, and movement patterns.

Passage migration surveys were conducted on June 5, October 14, and October 28 of 2025. Surveys were conducted under favorable weather conditions, with a Beaufort Wind Scale rating < 2, clear skies, and no precipitation. Counts began shortly before sunrise and concluded before 4:00 PM, in accordance with standard passage migration survey protocols (Environment and Climate Change Canada, 2023). Each survey point was observed for a 1-hour period, during which the species, number of individuals, behaviour, and estimated distance or location of each bird relative to the survey point were recorded.

Stopover Migration Surveys

Stopover migration surveys were completed to observe bird usage of habitat within the PDA by migratory birds during spring and fall migration. These assessments target individuals of migratory species that are not in active flight and are exhibiting low-activity behaviours such as foraging for food, resting, or sheltering from adverse weather conditions. By documenting patterns of occurrence, activity type, and habitat interaction, the surveys provide evidence of the suitability of the PDA to support migratory birds during spring and fall migratory periods. The observations aid in determining whether the PDA provides consistent, high-quality stopover habitat.

Stopover migration surveys were conducted on October 15 and October 28, 2025. Surveys were conducted under favorable weather conditions, including a Beaufort Wind Scale rating < 2, clear skies, and no precipitation. Stopover migration survey times varied to capture data across many times of day to avoid bias. In total, four survey transects were completed within the PDA (Figure 4.12). At each transect, species, number of individuals, behaviour, general comments, and time of observation was recorded.

4.2.5.2 Existing Conditions

4.2.5.2.1 Desktop Review

The ACCDC report listed 127 records of rare or protected avian species within a 100 km radius of the Project site. This includes 44 bird species listed by COSEWIC, 31 listed by SARA, and 16 listed by the NSESA.

Closer to the immediate project area, The ACCDC report listed 30 records of rare or protected avian species within a 5 km radius of a centre point within the PDA. This includes 8 bird species listed under COSEWIC, SARA, and NSESA. A description of avifauna SAR listed in the ACCDC report is provided in Section 4.2.7.2, and a copy of the ACCDC report is included in Appendix A. Rare Species listed in Table 4.50.

Table 4.50 ACCDC Rare Species Recorded within 5 km on the PDA.

Common Name	Scientific Name	NS ESA Status	SARA Status	COSEWIC Status	Provincial S-Rank
Common Tern	<i>Sterna hirundo</i>	-	-	Not At Risk	S3B
Warbling Vireo	<i>Vireo gilvus</i>				S1B,SUM
Vesper Sparrow	<i>Pooecetes gramineus</i>				S1S2B,SUM
Brown-headed Cowbird	<i>Molothrus ater</i>				S3B
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>				S3S4B
Turkey Vulture	<i>Cathartes aura</i>				S4B
Canada Jay	<i>Perisoreus canadensis</i>				S3
Boreal Chickadee	<i>Poecile hudsonicus</i>				S3
Pine Siskin	<i>Spinus pinus</i>				S4
Killdeer	<i>Charadrius vociferus</i>				S3B
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>				S3B
Eastern Kingbird	<i>Tyrannus tyrannus</i>				S3?B
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>				S3S4B
Wilson's Snipe	<i>Gallinago delicata</i>				S3B,S4M
Wilson's Warbler	<i>Cardellina pusilla</i>				S3B,S4M
Pine Grosbeak	<i>Pinicola enucleator</i>				S2S3B,S5N
Red Crossbill	<i>Loxia curvirostra</i>				S4

Bay-breasted Warbler	<i>Setophaga castanea</i>	S4B
Spotted Sandpiper	<i>Actitis macularius</i>	S4B
Tennessee Warbler	<i>Leiothlypis peregrina</i>	S3B,S5M
Bufflehead	<i>Bucephala albeola</i>	S3S4N
Horned Lark	<i>Eremophila alpestris</i>	SHB,S5M,S4N

Data from the MBBA indicate a total of 9 species recorded from Square 20MQ56 have a provincial conservation rank (S-rank) of S1 to S3, meaning they are considered vulnerable, imperiled, or critically imperiled in Nova Scotia (Table 4.51).

Table 4.51 MBBA Records – Avian SAR within the Chebucto – Musquodoboit region, Square 20MQ56.

Common Name	Scientific Name	NS ESA Status	SARA Status	COSEWIC Status	Provincial S-Rank	Code
Vesper Sparrow	<i>Poocetes gramineus</i>	-	-	-	S1S2B,SUM	H
Cliff Swallow	<i>Petrochelidon pyrrhonota</i>	-	-	-	S3S4B	NY
Common Tern	<i>Sterna hirundo</i>	-	-	Not At Risk	S3B	FY
Black-billed Cuckoo	<i>Coccyzus erythrophthalmus</i>	-	-	-	S3B	S
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Threatened	Special Concern	Special Concern	S3B	S
Barn Swallow	<i>Hirundo rustica</i>	Endangered	Threatened	Special Concern	S3B	NY
Rose-breasted Grosbeak	<i>Pheucticus ludovicianus</i>	-	-	-	S3S4B	H
Boreal Chickadee	<i>Poecile hudsonicus</i>	-	-	-	S3	S
Canada Jay	<i>Perisoreus canadensis</i>	-	-	-	S3	H

Table Note: Common names marked by an asterisk indicate those species found within the 20MQ56 square encompassing the LAA. The following codes represent the indicated conservation status: SC is Special Concern, THR is Threatened, and END is Endangered. Sub-nation (S-Rank) are as follows: S1 is Critically Imperiled in the province, S2 is Imperiled in the province, S3 is Vulnerable in the province, S#S# is to indicate a range of uncertainty about the status of the species in the province. A breeding status qualifier is included in the ranking where: B is the breeding population of the species in the province; M is the species are considered a migrant and only make transient occurrences in the province. Breeding Evidence Code: H is Species observed in its breeding season in suitable nesting habitat, S is Singing male(s) present, or breeding calls heard, in suitable nesting habitat in breeding season, FY is Recently fledged young (nidicolous species) or downy young (nidifugous species), including incapable of sustained flight, NY is Nest with young seen or heard.

4.2.5.2.2 Breeding Birds

Breeding status was assessed using evidence codes adapted from *the Ontario Breeding Bird Atlas* (2026). The following codes were recorded during the survey:

- **Possible (H):** Species observed in suitable nesting habitat during the breeding season
- **Possible (S):** Singing male observed (audibly) in suitable habitat

A summary of the 2025 breeding bird survey results is presented in Table 4.52. In total, 144 individual birds were recorded, representing 30 species, all of which are considered possible, probable, or confirmed breeders. Detections of individual birds were distributed across hardwood, mixedwood, and softwood habitats (Figure 4.12). Most of these species are considered common in Nova Scotia, with S-Ranks of S4 or higher.

The three most abundant species detected, in descending order, were:

- Black-throated green warbler (*Setophaga virens*): 21 individuals
- Ovenbird (*Seiurus aurocapilla*): 12 individuals
- American redstart (*Setophaga ruticilla*): 10 individuals

Table 4.52 Breeding Bird Survey Results.

Common Name	Scientific Name	S-Rank	Breeding Behavior	# Individuals	Round
American Crow	<i>Corvus brachyrhynchos</i>	S5	V	3	1
American Goldfinch	<i>Spinus tristis</i>	S5	S	3	2
			V	4	1
			S	4	1
American Redstart	<i>Setophaga ruticilla</i>	S5B	S	8	2
			S	2	1
American Robin	<i>Turdus migratorius</i>	S5B,S5N	S	6	2
			S	4	1
Bay-breasted Warbler	<i>Setophaga castanea</i>	S4B	S	1	2
Black-and-white Warbler	<i>Mniotilta varia</i>	S5B	S	2	2
			S	7	1
Blackburnian Warbler	<i>Setophaga fusca</i>	S5B	S	1	2
Black-throated Green Warbler	<i>Setophaga virens</i>	S4B	S	9	2
			S	12	1
Blue Jay	<i>Cyanocitta cristata</i>	S5	S	1	1
Cedar Waxwing	<i>Bombycilla cedrorum</i>	S5B	S	1	2
Chipping Sparrow	<i>Spizella passerina</i>	S4B	S	2	1

Common Yellowthroat	<i>Geothlypis trichas</i>	S5B	S S	5 4	2 1
Dark-eyed Junco	<i>Junco hyemalis</i>	S5	S S	2 4	2 1
Hairy Woodpecker	<i>Dryobates villosus</i>	S5	S	3	1
Hermit Thrush	<i>Catharus guttatus</i>	S5B	S S	6 2	2 1
Magnolia Warbler	<i>Setophaga magnolia</i>	S4S5B	S S	2 5	2 1
Northern Flicker	<i>Colaptes auratus</i>	S5B	S	1	2
Northern Parula	<i>Setophaga americana</i>	S5B	S	1	2
Ovenbird	<i>Seiurus aurocapilla</i>	S5B	S S	4 8	2 1
Purple Finch	<i>Haemorhous purpureus</i>	S5B,S4N	S	1	1
Red-breasted Nuthatch	<i>Sitta canadensis</i>	S5	S	1	2
Red-eyed Vireo	<i>Vireo olivaceus</i>	S5B	S S	2 5	2 1
Red-winged Blackbird	<i>Agelaius phoeniceus</i>	S4S5B,SUN	S	1	1
Ruby-crowned Kinglet	<i>Corthylio calendula</i>	S4B, S5M	S	2	2
Song Sparrow	<i>Melospiza melodia</i>	S5B	S S	5 1	2 1
Swamp Sparrow	<i>Melospiza georgiana</i>	S5B	S	1	2
Veery	<i>Catharus fuscescens</i>	S4S5B	S	1	2
White-throated Sparrow	<i>Zonotrichia albicollis</i>	S4S5B,S5M	S S	2 1	2 1
Winter Wren	<i>Troglodytes hiemalis</i>	S5B	S	2	2
Yellow-rumped Warbler	<i>Setophaga coronata</i>	S5B	S	2	1

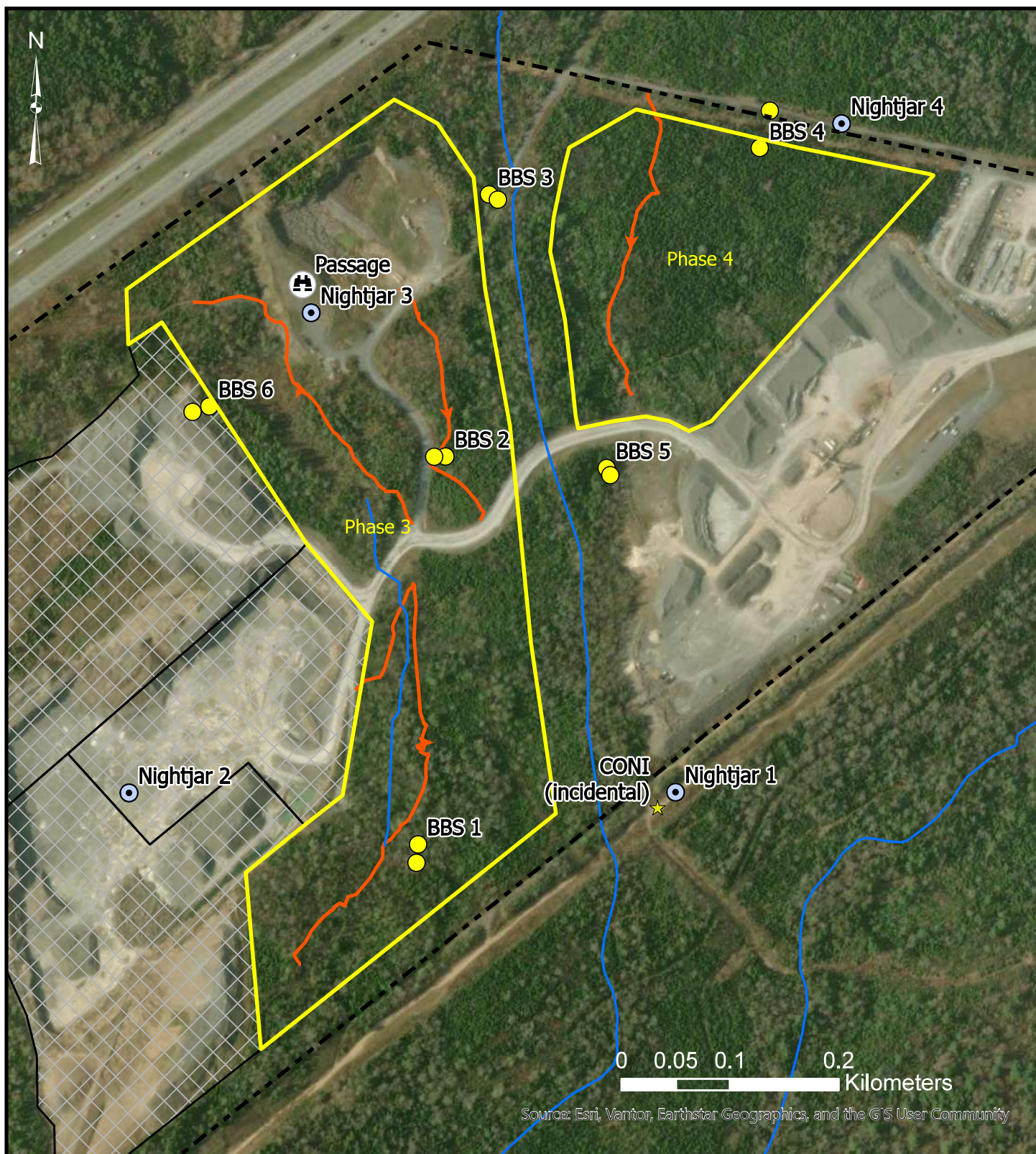
Distribution within PDA

Within the PDA, warblers and other forest-dependent songbirds were primarily observed in younger, dense mixedwood stands with well-developed understory and mid-canopy structure. Species such as black-throated green warbler (*Setophaga virens*), ovenbird (*Seiurus aurocapilla*), black-and-white warbler (*Mniotilta varia*), and magnolia warbler (*Setophaga magnolia*) were most frequently detected.

In tolerant hardwood stands, thrushes, vireos, and passerines were common. Species such as hermit thrush (*Catharus guttatus*), red-eyed vireo (*Vireo olivaceus*), and American robin (*Turdus migratorius*) were frequently observed, indicating these forests provide key foraging and nesting opportunities.

Thrushes, vireos, and other mid-canopy species were most often found in regenerating forest patches, which provide structural complexity and abundant foraging for birds such as hermit thrush (*Catharus guttatus*), veery (*Catharus fuscescens*), and red-eyed vireo (*Vireo olivaceus*).

Edge habitat and disturbance-tolerant species, including American robin (*Turdus migratorius*), song sparrow (*Melospiza melodia*), American goldfinch (*Spinus tristis*), common yellowthroat (*Geothlypis trichas*), and American redstart (*Setophaga ruticilla*), were most often observed in anthropogenic and non-forest areas (fields, roadsides, and cleared patches), reflecting the use of open and disturbed habitats by generalist birds.



Legend:				Note:	
	Point Count		Nightjar		Project Development Area (PDA)
	Incidental		Passage Migration		Watercourses (NSHN)
			Stopover Tracks		
Project: Goffs Quarry Expansion Environmental Assessment Resource Road, Goffs, Nova Scotia				Drawing: Bird Survey Locations	
				Client: Scotian Materials Ltd.	
Drawn by: JC		Checked by: SG		Date: April 2026	
Project Number: 103269.002		Drawing Number: Figure 4.12		Revision No. 1	



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4.2.5.2.3 Nightjars

The nightjar survey area is located adjacent to a developed quarry and transportation corridor, which may impact habitat suitability for nightjars and hinder detectability due to ambient noise, artificial lightning, and fragmented open space – factors that can reduce with nightjar presence and vocal activity.

In total, 4 individual common nighthawk (*Chordeiles minor*) were recorded. Two males were calling and performing “wing-booms” at two separate point count stations (Figure 4.12). The observation of calling and “wing-booming” males indicates territorial behaviour, suggesting that the individuals were likely established on breeding territories within or adjacent to the PDA and LAA.

The common nighthawk is listed as “Special Concern” by COSEWIC, SARA, and as “Threatened” under the Nova Scotia *Endangered Species Act*. Additionally, is protected under the federal Migratory Birds Convention Act (MBCA). A summary of the 2025 nightjar survey results is presented in Table 4.53 and further information is provided in Section 4.2.7.2.1.

Table 4.53 Nightjar Surveys Results.

Scientific Name	Common Name	S-Rank	Behavior	# Individuals
<i>Chordeiles minor</i>	Common Nighthawk	S3S4B	C/W/V	2
			C/W/V	2

4.2.5.2.4 Passage Migration

The 2025 passage migration survey results are presented in Table 4.54. In total, 202 individual birds of 19 species were recorded. Detections of individual birds were completed from one location, however, the vantagepoint offered a full viewscape of the PDA (Figure 4.12). All of these species are considered common in Nova Scotia, with S-Ranks of S4 or higher.

The three most abundant species detected, in descending order, were:

- American goldfinch (*Spinus tristis*): 96 individuals, average flying height was 18 meters
- Cedar waxwing (*Bombycilla cedrorum*): 39 individuals, average flying height was 30 meters
- American robin (*Turdus migratorius*): 18 individuals, average flying height was 20 meters

Table 4.54 Bird species observed during 2025 passage migration surveys.

Scientific Name	Common Name	S-Rank	# Individuals
<i>Accipiter atricapillus</i>	American Goshawk	S3S4	1
<i>Agelaius phoeniceus</i>	Red-winged Blackbird	S4S5B,SUN	2
<i>Bombycilla cedrorum</i>	Cedar Waxwing	S5B	39
<i>Buteo jamaicensis</i>	Red-tailed Hawk	S4	4
<i>Colaptes auratus</i>	Northern Flicker	S5B	1
<i>Corvus brachyrhynchos</i>	American Crow	S5	2
<i>Corvus corax</i>	Common Raven	S4	3
<i>Cyanocitta cristata</i>	Blue Jay	S5	6
<i>Dryobates pubescens</i>	Downy Woodpecker	S5	1
<i>Falco columbarius</i>	Merlin	S4S5B	3
<i>Haemorhous purpureus</i>	Purple Finch	S5B,S4N	2
<i>Junco hyemalis</i>	Dark-eyed Junco	S5	4
<i>Larus marinus</i>	Great Black-backed Gull	S4	4
<i>Melospiza melodia</i>	Song Sparrow	S5B	5
<i>Mergus merganser</i>	Common Merganser	S5B,S4N	2
<i>Seiurus aurocapilla</i>	Ovenbird	S5B	3
<i>Setophaga virens</i>	Black-throated Green Warbler	S4B	4
<i>Spinus tristis</i>	American Goldfinch	S5	96
<i>Turdus migratorius</i>	American Robin	S5B,S5N	18
<i>Vireo olivaceus</i>	Red-eyed Vireo	S5B	2

4.2.5.2.1 Stopover Migration

A summary of the 2025 stopover migration survey results is presented in Table 4.55. In total, 41 individual birds were recorded, representing 6 species. Detections of individual birds were distributed across hardwood, mixedwood, and softwood habitats (Figure 4.12). All observed species are considered common in Nova Scotia, with S-Ranks of S5 or S5B.

The three most abundant species detected, in descending order, were:

- Dark-eyed junco (*Junco hyemalis*): 15 individuals
- Golden-crowned kinglet (*Regulus satrapa*): 10 individuals
- Black-capped chickadee (*Poecile atricapillus*): 9 individuals

Table 4.55 Bird species observed during 2025 stopover migration surveys.

Scientific Name	Common Name	S-rank	# Individuals
<i>Corvus brachyrhynchos</i>	American Crow	S5	3
<i>Turdus migratorius</i>	American Robin	S5B,S5N	2
<i>Poecile atricapillus</i>	Black-capped Chickadee	S5	9
<i>Junco hyemalis</i>	Dark-eyed Junco	S5	15
<i>Regulus satrapa</i>	Golden-crowned Kinglet	S5	10
<i>Zonotrichia albicollis</i>	White-throated Sparrow	S4S5B,S5M	2

Within the province of Nova Scotia, the American robin, dark-eyed junco, golden-crowned kinglet, and white-throated sparrow are considered active migrants during the survey period, whereas the American crow and black-capped chickadee are generally regarded as resident or locally overwintering species. As such, the species observed largely reflects year-round regional occupancy rather than migratory movement.

4.2.5.3 Effects Assessment

The potential impacts of the Project on avifauna are considered for each phase of the Project. The impact pathways are outlined below, along with proposed mitigation measures, followed by an assessment of potential residual impacts after mitigation is applied.

4.2.5.3.1 Impact Pathways

Disturbance and potential impacts to avifauna are anticipated across all phases of the Project, including construction, operation, and decommissioning. The primary pathways through which

the Project may affect bird species include the removal and alteration of habitat, noise and light disturbance, and direct interactions with human activities.

During the construction and operation phases, site preparation activities such as vegetation clearing, grubbing, and earthworks will result in the removal of nesting and foraging habitat. This habitat loss can lead to reduced prey availability, displacement of individuals, and fragmentation of local bird populations. The timing of clearing activities is a key factor influencing the magnitude of impacts, as work conducted during the peak breeding season may directly damage nests or cause abandonment due to disturbance.

Noise and artificial light associated with construction, operation, and decommissioning activities may further influence avian behavior and habitat use. Elevated noise levels from blasting, heavy machinery, and vehicle movement can interfere with bird communication, particularly during the breeding season, potentially reducing mating success. Artificial lighting from construction sites and equipment may disrupt nocturnal species, alter migratory behavior, and increase predation risk for some species.

Direct interactions between birds and humans can also lead to disturbance and mortality risks throughout the Project lifecycle. Birds may be inadvertently disturbed by worker presence, vehicle traffic, or attracted to waste materials, increasing their exposure to hazards such as collisions or predation.

4.2.5.3.2 Mitigation

A range of mitigation measures will be implemented throughout the construction, operation, decommissioning, and restoration phases of the Project to minimize potential impacts on avifauna. These measures aim to reduce habitat loss, disturbance, and direct mortality while supporting the long-term restoration of bird habitats and ecological function following Project closure.

Monitoring during all Project phases will support the protection of birds and their habitat within the PDA. Particularly during the breeding season, on-site personnel will be encouraged to remain aware of bird activity to help reduce the likelihood of incidental harm to individuals or active nests. All waste and food materials will be stored in wildlife-proof containers with secure lids, and regular site inspections will be conducted to ensure compliance.

Habitat loss will be minimized by limiting vegetation clearing to areas essential for Project infrastructure and quarry activities. Prior to any land disturbance, nesting bird surveys will be conducted during the breeding season to identify and protect active nests.

Where nests are located, appropriate buffer zones will be established in consultation with a qualified biologist to prevent disturbance until nesting is complete. Major clearing and grubbing activities will be scheduled outside of the peak breeding period to the extent practicable, thereby avoiding direct impacts to nesting birds and their young. Retention of existing vegetation

patches and buffer zones around wetlands, riparian areas, and other high-value habitats will help maintain foraging and shelter opportunities for resident and migratory species.

To reduce sensory disturbance, noise and light management practices will be integrated into all project phases. Construction and operational equipment will be fitted with effective noise suppression devices such as mufflers, and blasting activities will be restricted to daylight hours and scheduled to avoid sensitive periods, particularly from May 15 - July 15, when many species are actively breeding and vocalizing. Where feasible, non-essential lighting will be turned off outside of active work hours.

During decommissioning and restoration, progressive restoration of disturbed areas will be undertaken using native plant species that provide diverse foraging and nesting resources for local avifauna. The use of native shrubs, grasses, and trees will enhance structural diversity and promote the gradual recovery of habitat quality. Restoration will be staged to ensure that suitable habitat becomes available as disturbed areas are closed, supporting the re-establishment of displaced bird populations and migratory stopover use.

A summary of the proposed mitigation strategies, organized by impact pathway, is provided in Table 4.56 below.

Table 4.56 Potential effects across Project phases and the proposed mitigative measures for avifauna.

Impact Pathway	Phase	Mitigation
Removal of habitat to accommodate construction of project components and loss of foraging habitat and reduced prey availability	Construction Operation	<ul style="list-style-type: none"> Major clearing work should occur outside of peak breeding season (generally April 1 to August 31). Nesting surveys should be completed prior to any clearing or grubbing activities during the breeding season (generally April 1 to August 31). Minimize clearing to the extent necessary to maintain a high-quality nesting habitat on site. Progressively reclaim disturbed areas with native plant species to restore habitat diversity and food sources.
Noise and light from construction equipment	Construction Operation	<ul style="list-style-type: none"> Complete highly disruptive work outside of bird breeding season (generally April 1 to August 31).

	Decommissioning & Restoration	<ul style="list-style-type: none"> • Implement noise and vibration controls (e.g., equipment mufflers, restricted blasting times). • Limit disturbance and noise levels during early mornings and evenings during peak breeding season, from approximately May 15-July 15 (i.e., when breeding birds are singing).
Direct interactions with humans	Construction Operation Decommissioning & Restoration	<ul style="list-style-type: none"> • Include breeding bird awareness and protocols in worker orientation. • Contact a biologist if birds are encountered. • Establish buffer zones around occupied nests (do not flag nests). • Properly store and dispose of waste to prevent attracting scavengers.

4.2.5.3.3 Residual Effects

The potential effects on avifauna resulting from the identified impact pathways were assessed using predefined criteria (Table 4.57). This assessment assumes appropriate implementation of proposed mitigation.

With mitigation measures in place, most avifauna-related effects are expected to be minimized; however, some residual effects, particularly those associated with habitat loss and sensory disturbance, may persist within the PDA during active operations. If unexpected issues arise, consultation with NSECC and CWS may be required.

The magnitude of effects on avifauna ranges from Low to Medium. The removal of vegetation and associated habitat to accommodate project components is assessed as a Medium magnitude effect, as it results in temporary loss of nesting and foraging areas and reduced prey availability. Effects related to noise, light, and human interactions are considered Low magnitude, given their localized nature and the implementation of mitigation measures.

The duration of effects is anticipated to range from Short to Long term. Habitat removal and associated changes in prey availability will persist throughout construction and much of the operational phase, until restoration efforts become established thus classified as Long term. In contrast, effects from noise, light, and human presence are considered Short to Medium term, as they occur only during active work periods and are expected to diminish rapidly once operations cease.

In terms of frequency, effects will occur on a Sporadic to Regular basis. Vegetation clearing and associated habitat loss will occur Sporadically, primarily during specific construction events or quarry expansion activities. Noise and light disturbance will occur more Regularly during construction and operations, particularly during active quarrying and transport. Direct interactions between birds and humans are expected to be Sporadic, limited to instances where birds nest or forage near active work areas.

The spatial extent of effects is expected to be primarily confined to the PDA, where direct physical disturbance will occur. Noise and light disturbance may extend slightly into the LAA.

All identified effects are considered Reversible over time. Avifauna populations are expected to recover following restoration and habitat restoration, particularly as native vegetation is re-established and prey species return to restored areas.

The likelihood of residual effects ranges from Possible to Likely, depending on the activity and species sensitivity. Habitat removal and the displacement of birds are Likely, as they are unavoidable during initial site development. Noise, light, and human disturbance effects are also Likely, though expected to be minor and short-lived. Direct interactions with birds, such as nest disturbance, are Possible, but can be effectively avoided through pre-construction surveys, worker training, and adherence to established buffer zones.

Table 4.57 Effects assessment of the impact pathways identified for the avifauna.

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood
Removal of habitat to accommodate construction of project components and loss of foraging habitat and reduced prey availability	Medium	Long Term	Sporadic	PDA	Reversible	Likely
Noise and light from construction equipment	Low	Medium Term	Regular	LAA	Reversible	Likely
Direct interactions with humans	Low	Short Term	Sporadic	PDA	Reversible	Possible

4.2.6 Terrestrial Wildlife (Non-Avian)

The Wildlife VC includes the presence, distribution, abundance, and habitat use of terrestrial fauna, with particular emphasis on species of conservation concern. The observed baseline conditions of this VC are described in detail, along with an assessment of anticipated Project-related impacts on wildlife.

4.2.6.1 Methodology

4.2.6.1.1 Spatial Boundaries

The PDA, LAA, and RAA described in Section 3.2.3 are applicable to the Wildlife VC.

4.2.6.1.2 Desktop Review

A report was acquired from the ACCDC for a 5 km and 100 km radius around the Project site (Appendix A). The ACCDC report includes the location of historically recorded flora and fauna SAR or SOCC, the presence or absence of any location sensitive species, and the location and information on significant or managed natural areas. The full ACCDC report is provided in Appendix A.

4.2.6.2 Existing Conditions

The ACCDC report provides records of 7 fauna species within a 5 km radius from a central point within the PDA; two (2) of which are considered SAR (i.e. listed under SARA or NSESA) (Table 4.58).

Table 4.58 ACCDC Records of Fauna within 5 km.

Scientific Name	Common Name	COSEWIC	SARA	NS ESA	Prov. Rarity Rank (S-Rank)	Distance (km)
<i>Chelydra serpentina</i>	Snapping Turtle	SC	SC	VUL	S3	1.3 ± 10.0
<i>Hemidactylium scutatum</i>	Four-toed Salamander	Not At Risk	-	-	S3	2.7 ± 0.2
<i>Danaus plexippus</i>	Monarch	END	END	END	S2?B,S3M	0.9 ± 0.01
<i>Nymphalis l-album j-album</i>	Compton Tortoiseshell	-	-	-	S2S3	4.6 ± 2.5
<i>Polygonia interrogationis</i>	Question Mark	-	-	-	S3B	4.6 ± 2.5
<i>Amblyscirtes hegou</i>	Pepper and Salt Skipper	-	-	-	S3S4	4.6 ± 2.5
<i>Polygonia faunus</i>	Green Comma	-	-	-	S3S4	4.6 ± 2.5

Table Note: The following codes represent the indicated conservation status: SC is Special Concern, THR is Threatened, VUL is Vulnerable and END is Endangered. Sub-nation (S-Rank) are as follows: S1 is Critically Imperiled in the province, S2 is Imperiled in the province, S3 is Vulnerable in the province, S#S# is to indicate a range of uncertainty about the status of the species in the province.

The actual presence of the ACCDC-reported species within the PDA has not been confirmed. Should any of the identified species be observed, a further assessment will be undertaken to evaluate potential Project-related impacts to the populations and their habitats. If the Project poses a risk, appropriate mitigation measures or avoidance strategies will be implemented to minimize any potential harm.

4.2.6.3 Effects Assessment

The potential impacts of the Project on terrestrial wildlife are considered for each Project phase. The impact pathways are outlined below, along with proposed mitigation measures, followed by an assessment of potential residual impacts after mitigation is applied.

4.2.6.3.1 Impact Pathways

Disturbance and potential impacts to terrestrial wildlife are anticipated across all phases of the Project, including construction, operation, decommissioning, and restoration. The principal pathways through which the Project may affect terrestrial wildlife include habitat loss and alteration, wildlife movement obstruction, disturbance from noise and dust, direct mortality or

disturbance from waste and road activities, and the destruction of nests or dens during vegetation clearing.

During the construction phase, site preparation activities (e.g., vegetation clearing, grubbing, and grading) will result in the loss and fragmentation of terrestrial habitat. This disturbance may displace terrestrial wildlife while also reducing habitat connectivity. The removal of vegetative cover can temporarily degrade local habitat quality and decrease the availability of forage and shelter.

Wildlife movement obstruction or entrapment may occur during both construction and operation due to temporary fencing, berms, or other infrastructure that restricts natural movement corridors.

Disturbance or destruction of nests and dens represents a potential risk, particularly during breeding and rearing periods. Vegetation clearing and soil disturbance may directly impact nesting sites or lead to abandonment due to noise and vibration.

Noise and dust emissions generated from blasting, heavy equipment, and truck traffic may temporarily influence wildlife behavior and habitat quality. Elevated noise levels can cause avoidant behavior or stress responses in some species, while dust deposition on vegetation may reduce forage quality.

Waste management and road maintenance activities may indirectly attract wildlife and increase mortality risks. Improperly stored garbage and food waste can attract animals to the site, increasing the likelihood of habituation and collisions with vehicles. Furthermore, the use of road de-icing agents may introduce contaminants harmful to terrestrial species.

4.2.6.3.2 Mitigation

A range of mitigation measures will be implemented throughout the construction, operation, decommissioning, and restoration phases of the Project to minimize potential impacts on terrestrial wildlife. These measures are intended to reduce habitat loss, sensory disturbance, and direct mortality while promoting the long-term recovery of terrestrial habitats and ecological function following Project closure.

Habitat loss will be minimized by restricting vegetation clearing and site disturbance to areas essential for quarry development and safe operations. Where feasible, natural vegetation buffers will be maintained around the site perimeter, wetlands, and other sensitive habitats to preserve foraging and shelter opportunities. Progressive restoration will be undertaken as areas become inactive, restoring disturbed lands with native vegetation to promote habitat recovery and reconnect fragmented landscapes.

To prevent wildlife movement obstruction or entrapment, fencing will be limited to essential safety areas and designed to allow wildlife passage where possible.

Potential disturbance or destruction of nests and dens will be avoided through pre-construction wildlife sweeps conducted by qualified personnel during sensitive breeding and rearing periods. If active nests or dens are identified, exclusion buffers will be established in consultation with a qualified biologist and maintained until the nests or dens are naturally vacated. Major vegetation clearing and grubbing will be scheduled outside key breeding periods, where practicable, to reduce the likelihood of direct impacts.

To reduce sensory disturbance, noise and dust management practices will be implemented across all Project phases. High-noise activities such as blasting and heavy equipment operation will be scheduled during daylight hours and avoided during sensitive wildlife periods where feasible. Equipment will be maintained in good working condition to minimize unnecessary noise and emissions. Dust suppression measures, including the application of water or dust suppressants on unpaved roads during dry conditions, will help maintain vegetation quality and reduce airborne particulates in adjacent habitats.

Strict waste management and road maintenance practices will be enforced to prevent wildlife attraction and potential mortality. All waste and food materials will be stored in wildlife-proof containers with secure lids, and regular site inspections will be conducted to ensure compliance. Road de-icing will be limited to conditions necessary for safety, using low-toxicity agents to reduce potential contamination risks to terrestrial species and their habitats.

A summary of the proposed mitigation strategies, organized by impact pathway, is provided in Table 4.59 below.

Table 4.59 Potential effects across Project phases and the proposed mitigative measures for terrestrial wildlife.

Impact Pathway	Phase	Mitigation
Wildlife movement obstruction or entrapment	Construction Operation	<ul style="list-style-type: none"> • Avoid unnecessary fencing; where fencing is required, design it to allow wildlife passage (e.g., elevated bottom wires). • Maintain clear wildlife movement corridors around the site.

Dust and air emissions affecting wildlife habitat quality	Construction Operation Decommissioning & Restoration	<ul style="list-style-type: none"> • Apply water or dust suppressants on unpaved roads and active areas during dry, windy conditions. • Maintain vegetation buffers between disturbed areas and adjacent habitats. • Maintain equipment to minimize exhaust emissions.
Loss of terrestrial habitat	Construction Operation Decommissioning & Restoration	<ul style="list-style-type: none"> • Limit vegetation clearing to the minimum area required for safe and efficient operations. • Retain natural buffers and undisturbed vegetation where feasible. • Implement progressive restoration to re-establish native vegetation.
Mortality or disruption to terrestrial wildlife due to garbage, food waste, and road de-icing	Construction Operation Decommissioning & Restoration	<ul style="list-style-type: none"> • Include risks and avoidance of wildlife interactions into personnel training and site orientation. • Minimize waste and inspect site regularly for garbage. • Ensure any garbage contained on site is properly equipped with a lid that can restrict wildlife from entering. • Road de-icing will only be done when road conditions require it for safe travel, using low toxicity de-icing agents.
Disruption or destruction to nests and dens	Construction Operation Decommissioning & Restoration	<ul style="list-style-type: none"> • Conduct pre-construction wildlife sweeps for active nests or dens during sensitive breeding or rearing periods. • Establish exclusion buffers around active nests or dens until they are naturally vacated. • Schedule vegetation clearing and earthworks outside key breeding periods where possible.

Disruption to terrestrial wildlife related to noise	Construction Operation Decommissioning & Restoration	<ul style="list-style-type: none"> • Schedule high-noise activities (e.g., blasting, heavy equipment operation) during daylight hours to minimize disturbance. • Retain natural vegetation buffers and use terrain features to dampen noise where feasible. • Maintain equipment in good condition to reduce unnecessary noise output.
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4.2.6.3.3 Residual Effects

The potential effects on terrestrial wildlife resulting from the identified impact pathways were assessed using predefined criteria (Section 3.5.2). This assessment assumes full implementation of proposed mitigation and restoration measures.

With mitigation measures in place, most terrestrial wildlife-related effects are expected to be minimized; however, some residual effects, particularly those associated with habitat loss and sensory disturbance, may persist within the PDA and adjacent LAA during active construction and operation phases.

The magnitude of effects on terrestrial wildlife ranges from Low to Medium. The loss of terrestrial habitat is assessed as a Medium-magnitude effect, as it will result in localized and temporary removal of foraging, shelter, and movement areas for resident species. Effects associated with dust, air emissions, and noise are considered Low in magnitude, as they are primarily short-term, localized, and mitigable through standard control measures. Similarly, nest and den disturbance is expected to be Low in magnitude, given the application of timing restrictions and pre-construction surveys.

The duration of effects is anticipated to range from Short to Long Term. Habitat loss will persist through construction and much of the operational phase, until restoration activities are completed and vegetation becomes re-established, and is therefore considered Long Term. Effects related to noise, dust, and emissions are expected to be Medium Term, occurring during active quarry operations. Disturbance to nests and dens is expected to be Short Term.

In terms of frequency, effects are expected to occur on a Sporadic to Regular basis. Habitat loss and nest or den disturbance will occur Sporadically, associated with specific construction or expansion events. In contrast, noise and dust emissions are expected to occur Regularly during active operation, particularly during blasting, material hauling, and equipment use.

The spatial extent of effects is expected to be largely confined to the PDA, where direct physical disturbance will occur. Sensory effects such as noise and dust deposition may extend slightly into the LAA, though they are expected to diminish rapidly with distance from the source.

All identified effects are considered Reversible over time. Following project completion, progressive restoration and habitat restoration using native plant species will facilitate the recovery of terrestrial habitats and the gradual return of displaced wildlife populations.

The likelihood of residual effects ranges from Possible to Likely, depending on the specific activity and species sensitivity. Noise and dust disturbance are considered Likely, as these impacts are inherent to quarry development and operation even with mitigation measures in place. Habitat loss and nest or den disturbance is assessed as Possible, though the overall risk is expected to be low.

Table 4.60 Effects assessment of the impact pathways identified for the terrestrial wildlife.

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood
Dust and air emissions affecting wildlife habitat quality	Low	Medium Term	Regular	LAA	Reversible	Likely
Loss of terrestrial habitat	Medium	Long Term	Sporadic	PDA	Reversible	Possible
Disruption or destruction to nests and dens	Low	Short Term	Sporadic	PDA	Reversible	Possible
Disruption to terrestrial wildlife related to noise	Low	Medium Term	Regular	LAA	Reversible	Likely

4.2.7 Species At Risk (SAR)

The Species at Risk VC includes the occurrence, distribution, habitat requirements, and conservation status of species listed under SARA or NSESA. For a discussion of critical, core, and significant wildlife habitat, see Section 4.2.8.

4.2.7.1 Methodology

4.2.7.1.1 Spatial Boundaries

For the purposes of the Species at Risk VC, the PDA, LAA, and RAA described in Section 3.2.3 are applicable. For the purposes of this VC, only SAR with a moderate to high potential of occurring within the PDA and LAA are discussed.

4.2.7.1.2 Desktop Review

A review of Species at Risk was completed using findings from field studies, technical reports, and the Project ACDC report.

4.2.7.2 Existing Conditions

Within 5 km from a centre point within the PDA, the ACCDC report listed 130 records of rare or protected species, including 5 vascular plant species, 9 non-vascular flora (e.g., lichens), 32 vertebrate species, and 5 invertebrate species. All protected species listed in Table 4.61. This excludes 'location-sensitive' species, of which there were records of black ash (*Fraxinus nigra*) and bat hibernaculum or bat species occurrence.

Of the vertebrates reported, most were avifauna, with one turtle species and one salamander species. Butterflies make up the historically observed invertebrate species.

Table 4.61 ACCDC Protected Species Recorded within 5 km on the PDA.

Common Name	Scientific Name	NS ESA Status	SARA Status	COSEWIC Status	Provincial S-Rank
Rusty Blackbird	<i>Euphagus carolinus</i>	Endangered	Special Concern	Special Concern	S2B
Snapping Turtle	<i>Chelydra serpentina</i>	Vulnerable	Special Concern	Special Concern	S3
Barn Swallow	<i>Hirundo rustica</i>	Endangered	Threatened	Special Concern	S3B
Canada Warbler	<i>Cardellina canadensis</i>	Endangered	Threatened	Special Concern	S3B
Common Nighthawk	<i>Chordeiles minor</i>	Threatened	Special Concern	Special Concern	S3B
Olive-sided Flycatcher	<i>Contopus cooperi</i>	Threatened	Special Concern	Special Concern	S3B
Bobolink	<i>Dolichonyx oryzivorus</i>	Vulnerable	Threatened	Special Concern	S3B
Evening Grosbeak	<i>Coccothraustes vespertinus</i>	Vulnerable	Special Concern	Special Concern	S3B,S3N,S3M
Eastern Wood-Pewee	<i>Contopus virens</i>	Vulnerable	Special Concern	Special Concern	S3S4B
Monarch	<i>Danaus plexippus</i>	Endangered	Endangered	Endangered	S2?B,S3M

4.2.7.2.1 Common Nighthawk

Across the entire avifauna field survey effort, the only SAR species observed was common nighthawk. This observation is notable given the regional decline of this species (Environment and Climate Change Canada, 2023), and the limited breeding bird survey window. The common nighthawk was observed during the 2025 Nightjar Surveys, with four singing males recorded at two separate point count stations. The observation of singing males suggests territorial behaviour, suggesting individuals were likely established on breeding territories within or adjacent to the PDA and LAA.

The common nighthawk is listed as “Special Concern” by COSEWIC and SARA and is considered “Threatened” provincially under the NS *Endangered Species Act*, underscoring the species' need for conservation attention due to observed population declines.

According to ECCC, the common nighthawk has experienced a significant population decline in Canada, with a 68% decrease over the past 50 years (Environment and Climate Change Canada, 2023). In Nova Scotia, the annual rate of decline between 2002 and 2012 was 3.52%. These reductions are attributed to various factors, including habitat loss, changes in land use, and potential declines in insect prey availability.

Observations across multiple habitat types suggest that the PDA and LAA contain a variety of suitable habitats for the common nighthawk, particularly areas that are open and sparsely vegetated. The presence of multiple singing males distributed across the PDA and LAA supports the likelihood of breeding activity within the local landscape. Although this species is relatively widespread in Nova Scotia, its ongoing population decline and provincial listing highlight the importance of monitoring and conserving appropriate habitat features during Project development.

4.2.7.2.2 Little Brown Myotis (*Myotis lucifugus*), Long-eared Myotis (*Myotis septentrionalis*), Tri-colored Bat (*Perimyotis subflavus*)

Three bat species listed under federal and provincial legislation may occur within the region: little brown myotis (*Myotis lucifugus*), long-eared myotis (*Myotis septentrionalis*), and tri-colored bat (*Perimyotis subflavus*). All three species are currently designated as Endangered under both the SARA and the NSESA.

Although these species are likely to occur within the RAA, targeted acoustic or roost surveys for bats were not conducted as part of this assessment.

Population declines for these bat species continue across Canada. According to ECCC (Environment and Climate Change Canada, 2018), little brown myotis and long-eared myotis populations have been reduced by over 90% in some regions since the emergence of White-nose Syndrome (*Pseudogymnoascus destructans*) in eastern North America. The tri-colored bat has experienced similar trends, though the lower population of this species in Atlantic Canada leads to more limited data. These declines highlight the importance of identifying and conserving potential roosting or foraging habitats wherever feasible.

4.2.7.2.3 Black Ash

Black ash (*Fraxinus nigra*) is not currently SARA-listed but has been assessed as *Threatened* by COSEWIC. It is also listed as Threatened under the NS *Endangered Species Act*. The primary threat to the species across its range is the invasive emerald ash borer (*Agrilus planipennis*), which has decimated ash populations in parts of Ontario and Quebec. The emerald ash borer has been confirmed in Nova Scotia (Environment and Climate Change

Canada, 2018) and the presence of the insect in the province places the provincial black ash population at significant risk.

Black ash is a deciduous tree species native to eastern Canada and the northeastern United States. In Nova Scotia, it typically occurs in wet, nutrient-rich forested wetlands, riparian zones, and swales. It is a slow-growing, shade-tolerant species that plays an important ecological role in maintaining wetland integrity and providing habitat for various wildlife species. Within the PDA, black ash is most likely to occur in Wetland 4, Wetland 5, and Wetland 8 or near the banks of Stream 5 and Stream 6. No black ash individuals were identified during the 2025 field studies. Black ash was found during the previous EA, within Wetland 7, which is outside of the Phase 3 and 4 boundaries, associated with the upstream portion of Stream 6.

4.2.7.3 Effects Assessment

The potential impacts of the Project on SAR are considered for each Project phase. The impact pathways are outlined below, along with proposed mitigation measures, followed by an assessment of potential residual impacts after mitigation is applied.

4.2.7.3.1 Impact Pathways

Disturbance and impacts to SAR are anticipated across all phases of the Project, including construction, operation, decommissioning, and restoration. The primary pathways through which the Project may affect SAR include the removal and alteration of habitat, noise and light disturbance, introduction or spread of invasive species, and direct interactions with human activities.

During the construction and operation phases, activities such as vegetation clearing, grubbing, and earthworks have the potential to remove nesting, foraging, and roosting habitat for migratory birds, bat species, and other SAR. Habitat loss may lead to reduced prey availability, displacement of individuals, and fragmentation of local populations. Timing of vegetation clearing is a critical factor influencing impact magnitude, as activities conducted during the migratory bird or bat breeding season may result in nest or roost abandonment, reduced reproductive success, or direct mortality.

Noise, vibration, and artificial lighting associated with Project activities can further influence SAR behavior and habitat use. Elevated noise from blasting, heavy equipment, and vehicle traffic can interfere with communication and foraging in birds and bats, particularly during sensitive life stages such as breeding. Lighting during night-time operations may disrupt nocturnal species, including common nighthawk and bat species, altering movement, foraging, or reproductive behavior.

The introduction or spread of invasive species represents an additional potential impact pathway, particularly where disturbed areas could facilitate establishment of non-native plants that degrade SAR habitat.

4.2.7.3.2 Mitigation

A range of mitigation measures will be implemented throughout the construction, operation, decommissioning, and restoration phases of the Project to minimize potential impacts on SAR. These measures are designed to reduce habitat loss, sensory disturbance, and direct mortality, while promoting the long-term conservation of SAR populations and the restoration of ecological function post-Project closure.

Habitat loss will be minimized by restricting vegetation clearing to areas required for quarry infrastructure and operational activities. Prior to any clearing or grubbing, qualified biologists will conduct surveys to identify nesting birds, bat roosts, and other critical SAR habitat features. Where active nests or roosts are identified, protective buffer zones will be established in consultation with wildlife authorities to prevent disturbance until the life stage is complete. Major clearing activities will be scheduled outside of sensitive breeding or roosting periods, including the migratory bird breeding season (April 1 - August 31) and the active bat season (May 1 - September 30), wherever feasible. Existing mature trees, snags, and vegetation patches will be retained where safe and practicable to maintain habitat connectivity, foraging opportunities, and roosting sites.

Noise, vibration, and artificial lighting can disrupt SAR behaviour. To mitigate these effects, construction and operational equipment will be fitted with functional noise suppression devices such as mufflers. High-noise activities, including blasting and heavy equipment operation, will be conducted during daylight hours and scheduled to avoid peak breeding periods. Non-essential lighting will be minimized outside of active work hours and directed downward to reduce disturbance to nocturnal species, including bats and night-roosting birds.

To prevent the introduction or spread of invasive species, equipment will be cleaned prior to entering the site, and disturbed areas will be monitored regularly. Post-construction and during decommissioning, disturbed areas will be progressively restored using native plant species, including grasses, shrubs, and trees, to provide foraging and nesting opportunities for SAR.

A summary of the proposed mitigation strategies, organized by impact pathway, is provided in Table 4.62 below.

Table 4.62 Potential effects across Project phases and the proposed mitigative measures for Species at Risk.

Impact Pathway	Phase	Mitigation
Vegetation clearing and habitat alteration affecting migratory birds or bats	Construction	<ul style="list-style-type: none"> • Avoid vegetation clearing, tree removal, and grubbing during the migratory bird breeding season (generally April 1 to August 31). • Limit the extent of clearing to the minimum required for safe operations. • Retain snags and mature trees where safe and practicable to preserve potential roosting habitat.
Introduction or spread of invasive species affecting SAR habitats	Construction Operation	<ul style="list-style-type: none"> • Implement invasive species management measures, including equipment cleaning and monitoring disturbed areas. • Re-vegetate disturbed areas using native species.
Disturbance and potential loss of breeding habitat for Common Nighthawk	Construction Operation Decommissioning & Restoration	<ul style="list-style-type: none"> • Avoid disturbance of open, sparsely vegetated habitats during the common nighthawk breeding period. • Establish no-disturbance buffers around confirmed breeding territories. • Monitor habitat conditions during operations.
Noise, vibration, and lighting disturbance affecting breeding birds	Construction Operation Decommissioning & Restoration	<ul style="list-style-type: none"> • Schedule high-noise activities during daylight hours. • Minimize night-time lighting to reduce disturbance to nocturnal and crepuscular species, including common nighthawk.

4.2.7.3.3 Residual Effects

The potential effects on SAR resulting from the identified impact pathways were assessed using predefined criteria (Section 3.5.2). This assessment assumes full implementation of proposed mitigation and restoration measures.

With mitigation measures in place, most SAR related effects are expected to be minimized; however, some residual effects, particularly those associated with habitat loss and sensory disturbance, may persist during active operations.

The magnitude of all residual effects on SAR is expected to be Low in magnitude.

The duration of residual effects is anticipated to be Medium Term. Habitat-related effects will persist through construction and portions of the operational phase until restoration activities are undertaken, and vegetation becomes re-established. Sensory disturbance from noise, vibration, and lighting will occur intermittently during active construction and operational periods and will diminish once activities cease or move away from sensitive habitats.

In terms of frequency, residual effects are expected to occur on a Sporadic basis. Vegetation clearing and associated habitat alteration will be limited to specific construction or expansion activities, while noise and lighting disturbance will occur intermittently during periods of active quarry operations.

The spatial extent of residual effects will be primarily confined to the PDA, where direct habitat alteration will occur. Noise, vibration, and lighting effects may extend into the LAA, but are expected to attenuate rapidly with distance from active work areas.

All identified residual effects are considered Reversible. Avifauna, bat populations, and black ash populations are expected to recover over time following decommissioning and restoration, particularly as native vegetation is re-established and habitat structure and ecological function are restored.

The likelihood of residual effects is assessed as Possible for all identified impact pathways.

Table 4.63 Effects assessment of the impact pathways identified for the Species at Risk.

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood
Vegetation clearing and habitat alteration affecting migratory birds, bats, and black ash	Low	Medium Term	Sporadic	PDA	Reversible	Possible
Disturbance and potential loss of breeding habitat for common nighthawk	Low	Medium Term	Sporadic	PDA	Reversible	Possible
Noise, vibration, and lighting disturbance affecting breeding birds	Low	Medium Term	Sporadic	LAA	Reversible	Possible

4.2.8 Managed and Significant Areas

The Managed and Significant Areas VC includes any type of protected area, conservation area, managed area, or any other area with recognized ecological significance.

The following types of managed and significant areas were considered in this VC:

- Designated drinking water supply areas
- Protected areas, including:
 - Protected Natural Areas (PNAs)
 - Nature Legacy Protected Areas
 - Other Effective area-based Conservation Measures (OECMs)
 - Indigenous Protected and Conserved Areas (IPCAs)
- Federal, Provincial, and Municipal Parks
- Wetlands of Special Significance and Ramsar wetlands

- Lands protected by land trusts or via conservation easements (e.g., Nova Scotia Nature Trust, Nature Conservancy of Canada, Crown Share Land Legacy Trust)
- UNESCO Biosphere Reserve in southwestern Nova Scotia, part of the Southwest Nova Biosphere Reserve that includes protected and rare habitats
- Important Bird Areas (IBAs)
- “Significant or Managed Natural Areas” reported in the ACCDC data report for the Project.
- Critical, Core, and Significant Habitat for Species at Risk and other SOCC.

4.2.8.1 Methodology

4.2.8.1.1 Spatial Boundaries

For the purposes of the Managed and Significant Areas, the PDA, LAA, and RAA described in Section 3.2.3 are applicable.

4.2.8.1.2 Desktop Review

A desktop review of Managed and Significant Areas was completed, which included a data request to the ACCDC for a 5 km search around a central point within the PDA, available web-based sources such as the Waverley Game Sanctuary (Department of Natural Resources, 2013), Recreation (Department of Environment and Climate Change), Waverley - Salmon River Long Lake Wilderness Area (Department of Environment and Climate Change), Bennery Lake Nature Reserve (Department of Environment and Climate Change). Additionally, relevant information from the previous 2018 EA (Golder Associates Ltd., 2018) was also reviewed.

To assess potential interactions with Critical, Core, and Significant habitats, several sources were reviewed including the Nova Scotia [Significant Species and Habitats Database](#) (Nova Scotia Department of Natural Resources, accessed March 2026), the [Core Habitat Identified for Species at Risk in Nova Scotia](#) dashboard, the [Critical Habitat for Species at Risk National Dataset](#) (Government of Canada, accessed March 2026), and the Canadian [Aquatic Species at Risk Map](#) (Fisheries and Oceans Canada, accessed March 2026).

4.2.8.2 Existing Conditions

4.2.8.2.1 Significant or Managed Areas

In addition to rare and endangered flora and fauna, the ACCDC report provides the location and information of significant or managed areas. A Managed Area here is defined as a designated area with some level of protection ecological values or drinking water within the boundaries. Significant Areas are areas with known ecological interest or sensitivity, and include Protected Areas included in the Canadian Protected and Conserved Areas Database (CPCAD). However,

the absence of a Significant Area does not indicate an absence of ecologically significant properties.

The 2025 ACCDC report identifies ten managed areas within a 5 km radius of the PDA (Appendix A).

The PDA is located within a managed area known as the East Hants Regional Municipal Water Supply. This managed area extends northward and is approximately 35,000 ha in size.

The next closest managed area, a 5,220-ha game sanctuary known as the Waverly Game Sanctuary, is located approximately 1 km east of the Property. Approximately 64% of the sanctuary is also considered a Wilderness Area (known as the Waverley-Salmon River Long Lake Wilderness Area), which is protected under the Wilderness Areas Protection Act. Potential impacts on the sanctuary and wilderness area are managed by NSDNR through restriction of activities within the sanctuary and wilderness area boundaries (e.g., hunting, resource development, agriculture) (Department of Natural Resources, 2013).

Drinking Water Supply Areas

The quarry property is within the NS Tertiary Watershed 1DG-1-GG, which is part of the larger Shubenacadie River primary watershed (Figure 4.4). Surface water drainage from the PDA flows toward Holland Brook, which drains into Soldier Lake. Soldier Lake drains via Tillmann Brook to Miller Lake, which ultimately drains toward Lake Thomas. Lake Thomas is part of the Shubenacadie Canal system and drains toward Fletcher Lake and, subsequently, Shubenacadie Grand Lake.

This places the project area in the headwaters of the Grand Lake Source Water Protection Area, which is the source-water protection area associated with the East Hants Regional Water Utility's surface-water supply, as well as an area containing numerous private water supplies. It is not a provincially Designated Protected Water Area under the NS Environment Act; rather, it is governed according to the [Shubenacadie Lakes Municipal Planning Strategy and Land Use By-law](#), in addition to the East Hants Source Water Protection Plan. The East Hants Regional Water Utility obtains surface water from the Shubenacadie River, which is conveyed to the Enfield Water Treatment Plant. During low-flow conditions, water can also be pumped from Grand Lake into the Shubenacadie River upstream of the intake to maintain raw-water supply.

The broader Shubenacadie Lakes watershed also includes several smaller Halifax Water supply areas, including the BoMont Water Supply Area and the Collins Park (Lake Fletcher) watershed. The Collins Park Water Supply Plant draws from Lake Fletcher and serves Wellington, while the separate BoMont system draws from the Shubenacadie River. Both are distinct from the East Hants Grand Lake source-water protection area, although all lie within the interconnected Shubenacadie Lakes–Shubenacadie River watershed system.

Nature Reserves

Nature Reserves are the most strictly protected areas in Nova Scotia. Designated under the *Special Places Protection Act*, they are set aside primarily for scientific research and education. Public access to these areas is generally limited, and recreational activities are typically restricted to preserve sensitive ecosystems, rare species, and unique natural features.

The nearest Nature Reserve to the PDA is the Bennery Lake Nature Reserve Protected Area, located approximately 3 km to the northeast. This 279 ha Reserve protects mixed mature forest ecosystems and several wetlands and harbors the rare Michaux's dwarf birch (*Betula michauxii*). The Bennery Lake Nature Reserve Protected Area overlaps substantially with the Bennery Lake Watershed Protected Water Area, ensuring dual protection for critical water supply zones. Activities such as swimming, fishing, and vehicle use are tightly controlled. About half of the Nature Reserve overlaps with the water supply for Halifax Stanfield International Airport and Aerotech Business Park (Department of Environment and Climate Change).

Wilderness Areas

Wilderness Areas allow for low-impact recreational and traditional uses, including activities such as hiking, hunting, fishing, and trapping. These Areas are managed to maintain natural conditions while supporting both conservation and appropriate public use.

The Waverley–Salmon River Long Lake Wilderness Area is the nearest Wilderness Area to the PDA, located approximately 1 km east of Goffs Quarry. This extensive Wilderness Area encompasses a diverse mix of forests, lakes, wetlands, and rugged terrain, and plays a key role in conserving regional wildlife habitats and water resources. It is popular for activities such as canoeing, hiking, and wildlife viewing, and provides traditional land-use opportunities for local communities (Department of Environment and Climate Change).

Provincial Parks and Reserves

Provincial parks and reserves provide additional recreational and conservation functions and may include facilities for camping, day use, and interpretation.

Laurie Provincial Park is the closest provincial park to the PAD, located approximately 5 km to the northeast. Situated on the shores of Grand Lake, Laurie Provincial Park contributes to the network of protected recreational areas in the region.

Important Bird Areas

The nearest IBAs to the PDA include:

- NS014: Musquodoboit, located approximately 40 km southeast of the PDA, which spans the Atlantic Coastal and Eastern Interior Uplands EcoRegions and is notable for its extensive salt marshes and mudflats.
- NS026: Grassy Island Complex, located about 40 km southwest of the PDA within the Northumberland–Bras d’Or EcoRegion.
- NS020: Southern Bight, Minas Basin, located approximately 47 km northwest of the PDA within the Fundy Coast EcoRegion.

4.2.8.2.2 Critical, Core, and Significant Habitat

The identification, management, and protection for some SAR habitat falls under the federal Species at Risk Act, referred to as “Critical Habitat”, and the Nova Scotia Endangered Species Act, referred to as “Core Habitat”. Additionally, the Nova Scotia Department of Natural Resources identifies “Significant Habitats”, which are a combination of unique habitats, rare species habitats, and areas with large concentrations of wildlife.

There was no SAR Critical Habitat identified within the immediate project area. The nearest federally designated Critical Habitat is approximately 10 km north of the quarry property – a Critical Habitat area for three bat SAR, and a riparian area of Critical Habitat for bank swallow.

The PDA, LAA, and RAA do not intersect with any Core Habitat identified for species listed in the NS ESA.

The PDA does not intersect any Significant Habitats identified by NSDNR.

4.2.8.3 Effects Assessment

The Project is not expected to interact with any managed or significant areas, federally designated Critical Habitat, provincial Endangered Species Core Habitat, or Significant Habitat areas identified by NSDNR.

4.2.8.3.1 Impact Pathways

This section considers the potential for impacts to nearby Managed and Significant Areas; specifically, the Waverley–Salmon River Long Lake Wilderness Area, the Waverley Game Sanctuary, and the Bennery Lake Nature Reserve, all of which are located within the LAA and in proximity to the PDA.

All Project phases were considered in the assessment of potential impacts to these areas. The only direct impact pathways identified were in relation to potential effects on downstream surface water supplies, including municipal and private users of the Grand Lake Source Water Protection Area (described above in Section 4.2.8.2.1). While significant changes to surface water quality at the quarry site could theoretically affect downstream receptors, the risk to drinking water supplies is heavily mitigated by distance and dilution. Given the extensive transit

path to downstream water intakes and the negligible volume of site runoff relative to the broader watershed, a measurable impact on drinking water quality would require a catastrophic or prolonged contamination event. Minor, localized fluctuations in total suspended solids (TSS) or occasional trace metal concentrations at the property boundary are highly unlikely to propagate through the lake system in concentrations that affect municipal or private water supplies.

Impacts to quantity of downstream drinking water is not considered a realistic scenario.

The potential for indirect impacts was also considered. Noise generated from activities such as blasting, rock crushing, material handling, and truck transport could temporarily disturb wildlife species that utilize habitat within the adjacent Managed and Significant Areas. That stated, these effects are described in previous sections.

While these protected and managed areas support diverse habitats, including wetlands, mature forest, and rare species, the Project footprint does not overlap with any designated boundaries. Therefore, no direct loss or alteration of habitat within protected areas will occur, and no direct access or encroachment into these lands is planned.

4.2.8.3.2 Mitigation

No specific mitigation is proposed for impacts Managed or Significant Areas, except for measures to limit impacts to downstream surface water quality, as it relates to the Grand Lake Source Water Protection Area. These mitigation measures are described within the Surface Water Hydrology and Fish and Fish Habitat sections; specifically, Section 4.1.6.3.2 and Section 4.2.4.3.2. Generally, they include standard erosion and sedimentation control measures, surface water management details, sedimentation ponds, vegetative buffers around watercourses, and monitoring.

4.2.8.3.3 Residual Effects

No residual effects are anticipated for Managed or Significant Areas, including drinking water supplies.

4.3 Socio-Economic Conditions

4.3.1 Archaeology and Heritage Resources

The Archaeology and Heritage Resources VC includes archaeological sites; historic sites, structures, and cultural landscapes; and areas with elevated potential for archaeological resources (e.g., some riparian areas or paleoshorelines). Archaeological resources are protected under the *Specials Places Protection Act*, administered by the Heritage Stewardship Section of the Department of Communities, Culture, Tourism and Heritage. The Act also protects palaeontological (fossil) resources, but paleontology was not included in the scope of this EA.

Historical heritage sites, buildings, and monuments are largely regulated under the Heritage Property Act, and the Cemeteries and Monuments Protection Act.

4.3.1.1 Methodology

4.3.1.1.1 Spatial Boundaries

For the purposes of the Cultural and Heritage Resources, the PDA and LAA described in Section 3.2.3 are applicable.

An RAA for this VC was defined as the Nova Scotia Theme Region known as the Halifax Quartzite Barrens (region #413a), discussed in Section 3.2.3.

4.3.1.1.2 Information Sources

An Archaeological Resource Impact Assessment (ARIA) was completed previously by Davis MacIntyre and Associates Limited (DMA), under Category C Heritage Research Permit A2012NS153 October 2012, within the Property Boundary. The ARIA consisted of a detailed review of historical maps, manuscripts, and published literature as well as the Maritime Archaeological Resource Inventory (MARI) database. A field reconnaissance survey (i.e., walkover) followed the desktop review to further evaluate the potential for archaeological resources within the PDA.

4.3.1.2 Existing Conditions

The property is located within the Nova Scotia Theme Region (Davis & Browne, 1996) known as the Halifax Quartzite Barrens (region #413a).

According to the MARI database, there are 44 documented precontact sites within ~10 km of the property, dating from the early–middle Archaic to the Ceramic period, mostly tied to land use along the Shubenacadie. The nearest of these is a single early–middle Archaic gouge on the west shore of Soldier Lake.

Although the Old Guysborough Road settlement dates to the early 19th century, there was no evidence of settlement or archaeological remains within or adjacent to the PDA.

The history of the area of Goffs prior to the 18th century is scarcely documented. This is attributed to the absence of roads until the early 19th century and the inland location and distance from major waterways. The settlement of Goffs was named after Thomas Goff who received a land grant in 1830. The first road into the area (Lookout Road) was built by the British Army between 1810 and 1812 as a transport link between Porters Lake and Musquodoboit. In 1815, this road was connected to Old Post Road in Fall River following trails along Miller Lake. Today the road is known as the Old Guysborough Road. The land within the ARIA Study Area was granted to Elizabeth Ritchie and Richard Chapman in the early 19th century, although it does not appear to have been settled.

The field reconnaissance survey completed in 2012 by Davis MacIntyre & Associates Ltd. did not identify any pre-contact period sites or archaeological features within the quarry property. The study area is therefore considered to have low archaeological potential.

4.3.1.3 Effects Assessment

Generally, there are no project impacts anticipated on archaeological and heritage resources.

4.3.1.3.1 Impact Pathways

If there were historic features or archaeological sites present within the PDA, ground disturbance for the purposes of construction could destroy the site and any artifacts within. However, the ARIA completed in 2012 concluded that the study area (including Phases 3 & 4) was of low archaeological potential. Furthermore, the main riparian corridor that bisects the PDA will be avoided during Phase 3 & 4 development. Therefore, the potential for project impacts to archaeological and heritage resources is considered low to negligible.

4.3.1.3.2 Mitigation

Given the low potential for adverse effects on archaeological and heritage resources, no additional mitigation or monitoring efforts are recommended for the Phase 3 & 4 expansion.

However, if archaeological or cultural materials (e.g., suspected artifacts, human remains, or historical structures) are discovered during construction, all work in the immediate area shall be paused. Then the discovery should be reported immediately to the Special Places Program, at the Department of Communities, Culture, Tourism and Heritage. Under the Special Places Protection Act, any archaeological or palaeontological site is protected; the discovery of an archaeological resource may lead to further investigation, documentation, or protective measures, which require provincial authorization. Archaeologists with the Special Places Program can advise on next steps regarding the incidental discovery.

4.3.1.3.3 Residual Effects

No residual effects on cultural and heritage resources are anticipated.

4.3.2 Community and Local Economy

The Community and Local Economy VC includes population demographics, employment and labour supply, community services and housing, local businesses, and economic activity.

4.3.2.1 Methodology

4.3.2.1.1 Spatial Boundaries

For the Community and Local Economy VC, the PDA described in Section 3.2.3 is applicable. An LAA was generally defined as a 500 m radius around the centre of the project site. The RAA for this VC is defined as the Halifax Regional Municipality (HRM), discussed in Section 4.3.2.2.

4.3.2.1.2 Information Sources

To characterize the community and local economic conditions within and around the Project area, data were gathered from sources such as Statistics Canada, municipal and regional planning documents, and economic development reports.

4.3.2.2 Existing Conditions

Communities and Demographics

The HRM consists of nine distinct regions: the Airport Area, Bedford–Sackville, Dartmouth–Cole Harbour, Downtown Halifax, the Eastern Shore, Musquodoboit Valley, North End Halifax, the Peggy’s Cove Coastal Region, and West End Halifax. The project is located within the Airport Area.

According to the 2021 Census by Statistics Canada, there were 439,820 residents of the HRM. The population in HRM has increased by 9.1% between 2016 and 2021. The median age of HRM residents is 41 years, close to the provincial median of 45.5 years. With a land area of 5,475.57 km² (2,114.13 sq mi), it had a population density of 80.3/km² (208.0/sq mi) in 2021. Figure 4.13 below illustrates the population of the HRM, partitioned into five-year age categories (Statistics Canada, 2024).

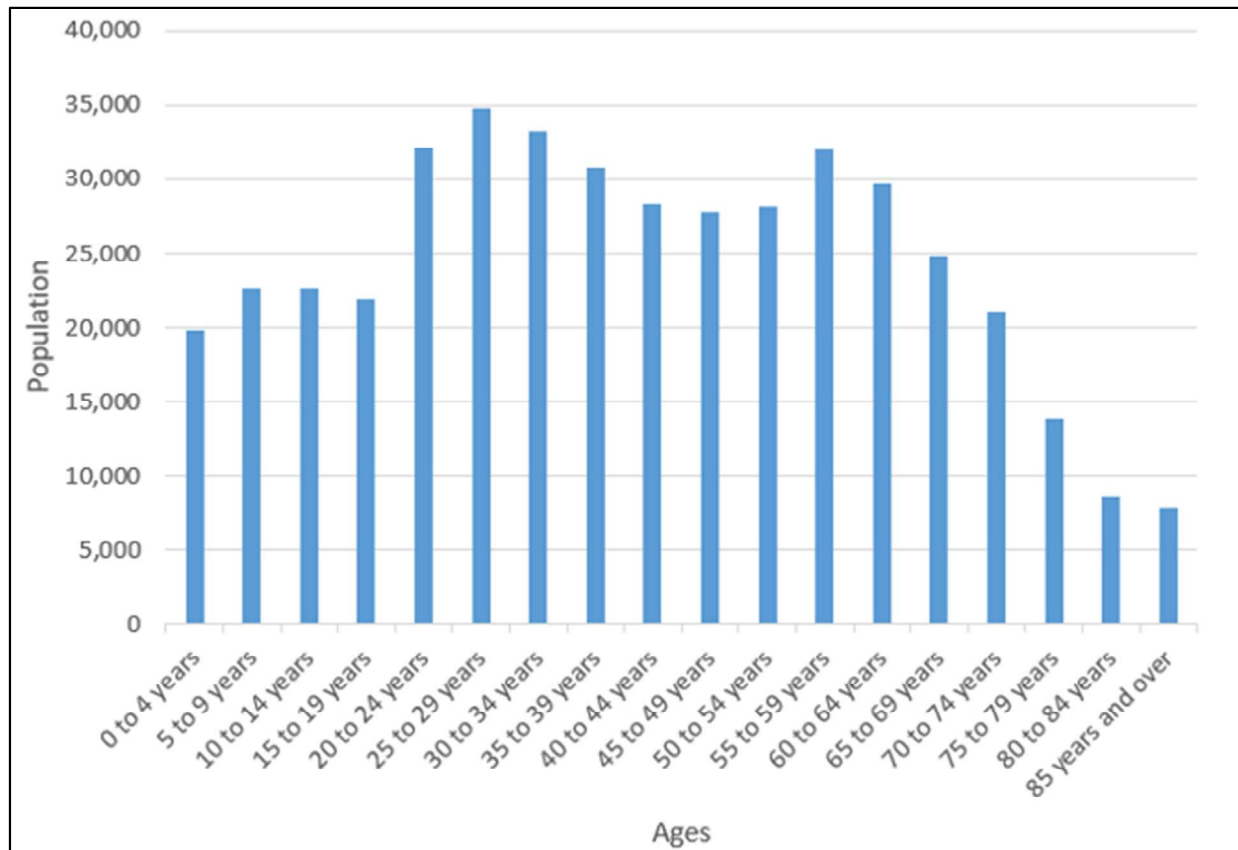


Figure 4.13 Resident age class distribution of Halifax Regional Municipality (2021).

The most recent Census data from 2021 indicates that in Halifax Census Metropolitan Area (CMA), the employment rate for individuals aged 15 and over is 58.0%, with an unemployment rate of 11.4%. Among the employed labour force, the largest proportion were in sales and service occupations (approximately 25.8%); business, finance, and administration occupations (around 18.0%); and education, law and social, and community and government services (about 14.8%). The sectors with the fewest individuals employed are natural resources, agriculture, and related production occupations (roughly 1.3%), and manufacturing and utilities (around 2.0%). It is important to note, however, that the 2021 census reflects the immediate impacts of the COVID-19 pandemic on local employment trends, with a spike in general unemployment. The current unemployment rate in the HRM has apparently since decreased to approximately 6.1% (Halifax Partnership, 2026).

The area around Goffs Quarry continues to be an important employment hub, centred around the Halifax Stanfield International Airport and the adjacent Aerotech Business Park.

The nearest residential areas are the suburban communities of Miller Lake West (approximately 1.5 km southwest) and Fletchers Lake (approximately 2 km west). The nearest residential structure is approximately 1.1 km southwest of the Project. There are currently approximately 49

residences identified within 2 km of the Project. Figure 4.3 in the Acoustic Environment VC shows residences and other structures within 5 km of the project site.

First Nations

Nova Scotia is situated on the traditional territory of the Mi'kmaq, who entered into Peace and Friendship Treaties with the British Crown between 1726 and 1779, allowing colonial settlement while affirming Mi'kmaq rights to traditional fishing, hunting, and planting areas. As settlement expanded, Mi'kmaq communities petitioned for treaty protections and reserves were established across the province beginning in the 19th century (CIRNAC, 2016).

Sipekne'katik First Nation (formerly "Indian Brook") is roughly 20 km north of Goffs; however, Sipekne'katik is now a collective of five communities (reserves) across central Nova Scotia, including Indian Brook No. 14 (main community), New Ross No. 20, Pennal No. 19, Shubenacadie No. 13, and Wallace Hills No. 14A Mi'kmaq (CIRNAC, 2016). It is part of the Confederacy of Mainland Mi'kmaq, which supports governance, cultural preservation, and economic development. As of January 2026, the community had a registered population of 3,117 members. Established as a reserve in 1820, the area is described in Mi'kmaq oral history as a long-used place for ceremony preparation and harvesting activities (Sipekne'katik, 2023).

4.3.2.3 Effects Assessment

The potential impacts of the Project on the community and local economy are considered for each phase of the Project. The impact pathways are outlined below, along with proposed mitigation measures, followed by an assessment of potential residual impacts after mitigation is applied.

4.3.2.3.1 Impact Pathways

Potential impacts to the community and local economy were considered for all phases of the Project, including construction, operation, and decommissioning and restoration. The primary pathways through which the Project may affect community and local economy include potential disturbances related to noise, dust, and vibration.

The expansion project is not expected to result in increased employment opportunities or local economic activity. Quarry operations, and volumes of products produced, will remain relatively constant. The expansion is largely to ensure continued supply of aggregate for the existing operations. Therefore, the use of local infrastructure (roads and highways) is also not anticipated to increase significantly during construction or operations.

Noise, dust, and vibration generated by construction activities, quarry operations, and equipment use represent additional pathways through which the Project may affect nearby residences. These effects may be most pronounced during daytime operational activities. However, these effects are not anticipated to exceed current levels generated from the existing operation.

4.3.2.3.2 Mitigation

No additional mitigation for impacts to the community and local economy are proposed. There are already measures and operational practices in place to minimize impacts to local infrastructure, and disturbances related to noise, dust, and vibration. These include restricting quarry operation activities to daylight hours on weekdays, which minimizes disturbance from noise, dust, and vibration on local residential areas. This schedule may be modified in the event a significant aggregate supply contract is awarded. Equipment will continue to be regularly maintained to minimize noise and vibration levels. Water or other dust suppressants will be used as needed on quarry roads and other work areas during construction, operation, and eventual decommissioning and restoration activities. Refer also to Sections 4.1.1 and 4.1.3 for more information on dust and noise.

Progressive restoration will be implemented throughout the life of the Project. During decommissioning and restoration, disturbed areas will be restored using native vegetation to facilitate landscape recovery and improve visual integration with the surrounding environment.

4.3.2.3.3 Residual Effects

With mitigation applied appropriately, there are no residual impacts on the community and local economy anticipated beyond present levels.

4.3.3 Public Health and Safety

The Public Health and Safety VC consider potential impacts of the Project on community health and well-being, as well as potential strain on the capacity and responsiveness of emergency services, including police, fire, and emergency health services.

4.3.3.1 Methodology

4.3.3.1.1 Spatial Boundaries

For the purposes of the Public Health and Safety VC, the PDA described in Section 3.2.3 is applicable. An LAA was defined as a 500 m radius around the centre of the project site. The RAA for this VC is defined as the Halifax Regional Municipality.

4.3.3.1.2 Information Sources

To characterize existing public health and safety conditions within and around the Project area, information was collected from publicly available sources, such as the Nova Scotia RCMP web page (Royal Canadian Mounted Police, 2025), the HRM Web page on Fire Stations (Halifax Regional Municipality, 2025), and the Nova Scotia Emergency Health Services web page (Government of Nova Scotia, 2025).

4.3.3.2 Existing Conditions

Public Health

Public health is a general term that refers to the human health at the community scale. The health and well-being of humans within a defined geographical area is influenced by many factors. Within the EA context, consideration of public health typically focuses on the potential for projects to impact drinking water quality, air quality, noise, and other measures of environmental health (e.g., sanitation, food safety).

Many of these public health indicators are covered in previous sections related to local air quality (Section 4.1.1), noise (Section 4.1.3), and water resources (Sections 4.1.5 and 4.1.6). Within the LAA and broader HRM, air quality and drinking water quality are generally good. Likewise, noise levels within residential areas are generally low to moderate, depending on proximity to highways, railways, industrial areas, and airports. Within the area immediately surrounding the quarry property, baseline noise and particulate (dust) levels are elevated periodically due to existing industrial activity, the airport, and the Route 102 highway. The nearest residential areas are approximately 1.5 - 2 km from the Quarry; in these areas it is assumed that ambient atmospheric particulate and noise levels are generally low most of the time, consistent with regional trends.

Police

The Halifax District Royal Canadian Mounted Police (RCMP) Detachment, serving Goffs and other nearby rural communities, plays a critical role in maintaining public safety and law enforcement in the area. Located within the HRM, the detachment provides policing coverage to communities not served by Halifax Regional Police, including the Goffs Quarry area along Old Guysborough Road.

Although the detachment itself is not physically located in Goffs, it operates as part of the broader RCMP network responsible for delivering frontline policing services, emergency response, and crime prevention throughout the region.

Fire

Halifax Regional Fire Station 47, located at 2040 Old Guysborough Road in Goffs, Nova Scotia, is staffed by both volunteer and career personnel. Station 47 continues its legacy of providing emergency response, fire suppression, rescue services, and community-focused programs. As part of Halifax Regional Fire, the station actively contributes to public education and fire prevention initiatives. The station is situated approximately 7 km from Goffs Quarry.

Medical

Nova Scotia Emergency Health Services (EHS) delivers comprehensive ground and air ambulance services across the province. These services are operated by Emergency Medical Care Inc. (EMC) under a provincial contract, with a fleet of ambulances and specialized aircraft managed through a central dispatch center located in Dartmouth.

Near Goffs, the EHS LifeFlight air ambulance base, located at 637 Barnes Drive, provides rapid air transport for critical medical cases. The station is situated approximately 4.5 km from Goffs Quarry.

The closest hospital with a full-time emergency department is Dartmouth General Hospital, located at 325 Pleasant Street, Dartmouth. This facility offers 24-hour emergency services, including surgery, diagnostic imaging, critical care, and a range of outpatient services. It is approximately 22 km from Goffs Quarry.

4.3.3.3 Effects Assessment

The potential impacts of the Project on public health and safety were considered for each phase of the Project. The impact pathways are outlined below, along with proposed mitigation measures, followed by an assessment of potential residual impacts after mitigation is applied.

4.3.3.3.1 Impact Pathways

The primary pathways through which the quarry could affect public health and safety include noise and vibration, airborne particulate emissions, increased vehicle traffic, blasting hazards, and accidental events (e.g., fires, chemical spills, or equipment leaks). However, because total production is not expected to increase significantly, the Phase 3 and 4 expansions are not anticipated to result in a measurable increase in public health or safety effects.

Nevertheless, the Phase 3 and 4 expansion will increase the total area of exposed soil; therefore, a precautionary approach is warranted, assuming an increased potential for dust generation. Aside from airborne particulate emissions, no net change is expected for the other public health and safety pathways.

4.3.3.3.2 Mitigation

Dust and air emissions will be controlled through dust suppression measures such as water spraying on exposed surfaces and unpaved roads. Vegetation buffers will be maintained around sensitive areas and along the site perimeter where feasible to reduce dust spread.

4.3.3.3.3 Residual Effects

With mitigation in place, most public health and safety effects are expected to remain within the range of the existing operation, with no measurable (net) increase. However, as noted above, the increase in total exposed surface area could result in increased fugitive dust beyond the

property boundary. However, with dust suppression and vegetative buffers in place, the residual impact on airborne particulate is expected to be low to negligible and not detectable beyond the LAA.

4.3.4 Transportation and Infrastructure

The Transportation and Infrastructure VC considers potential effects of the project on the condition of public transportation infrastructure, including local roads and provincial highways, and potential impacts to traffic patterns and volumes.

4.3.4.1 Methodology

4.3.4.1.1 Spatial Boundaries

For the Transportation and Infrastructure VC, the PDA described in Section 3.2.3 is applicable. An LAA was defined as a 500 m radius around the centre of the project site. The RAA for this VC is defined as the Halifax Regional Municipality.

4.3.4.2 Existing Conditions

The proposed quarry is situated immediately adjacent to the Aerotech Business Park and approximately 2.86 km southwest of the Halifax Stanfield International Airport. Access to the Project is from the north via Highway 102 Exit 5A to Aerotech Drive then south to an existing private road off Perrin Drive.

Highway 102 bounds the Project to the west. It functions as the primary north–south freeway from Halifax to Truro and is among the busiest highways in Atlantic Canada. The route is a divided four-lane freeway except for a five-lane section (three northbound lanes) between the Highway 118 interchange at Miller Lake and near Enfield; this configuration is a legacy remnant of its former undivided three-lane layout.

Aggregate products from the proposed quarry would be transported via tandem and tractor-trailer trucks along an existing internal access road to Aerotech Drive, and onto Highway 102 via Exit 5A. Daily truck traffic could reach approximately 75 trucks, assuming a typical operational schedule (five days per week over eight months), though fluctuations may occur depending on market demand or contract size.

4.3.4.3 Effects Assessment

4.3.4.3.1 Impact Pathways

The Project is not meant to facilitate an increase in production; rather, the proposed expansion will simply extend the life of the quarry. Therefore, no significant increase in truck traffic, passenger vehicles, and associated impacts are anticipated relative to the current state of the undertaking.

4.3.4.3.2 Mitigation

The current practice of hauling products from the quarry only during weekdays will continue, and there is no increase in product volume anticipated because of this expansion. Furthermore, quarry traffic will continue to access the site from the north off Aerotech Drive and Highway 102. Traffic will not travel through the Miller Lake West subdivision or other residential developments.

Therefore, no additional mitigation for transportation impacts is proposed.

4.3.4.3.3 Residual Effects

There are no residual effects on transportation and infrastructure anticipated because of the proposed expansion. Transportation impacts will not increase beyond the current state.

4.3.5 Land and Resource Use

The Land and Resource Use VC considered land use and natural resources in the area around the Project. This VC also considers potential impacts to existing structures (e.g., buildings, wells) caused by blasting.

This section does not include traditional indigenous land use. A Mi'kmaq Ecological Knowledge Study (MEKS) was commissioned in 2019 for the previous EA registration for all 4 phases (Membertou Geomatics Solutions, 2019). It found that there was no Mi'kmaq use reported within the project site (quarry property) and immediate vicinity. The larger study area (5 km radius around property) and broader region have been used extensively by Mi'kmaq people, both historically and currently.

4.3.5.1 Methodology

4.3.5.1.1 Spatial Boundaries

For the Land and Resource Use VC, the PDA described in Section 3.2.3 is applicable. An LAA was defined as a 500 m radius around the centre of the project site. The RAA for this VC is defined as the Halifax Regional Municipality.

4.3.5.2 Existing Conditions

The proposed Project expansion is located on undeveloped lands within the property owned by Scotian Materials, which is bordered by NSDNR (Crown) lands, Highway 102, and several private parcels. Immediately east of the Project is Perrin Drive, which remains largely impassable, and the Maritimes and Northeast Pipeline Halifax Lateral, beyond which most land is undeveloped Crown land. Much of the nearby Crown land is made up of large wilderness and protected areas. Land use in the surrounding area is largely commercial and industrial, or associated with the airport and highways.

For blasting, the Pit and Quarry Guidelines (Nova Scotia Environment and Labour, 1999) require a minimum setback of 800 m from the foundation or base of a structure located off-site. As described in the Guidelines, the definition of a “structure” includes residential buildings, schools, churches, commercial buildings, municipal or provincial facilities, hospitals, or other industrial buildings. The distance is measured from the working face and point of blast to the foundation or base of the structure, and can be reduced with written consent from all individuals owning structures within 800 m.

Except for the office trailers and storage yards for the Maritime Fence operation, which is under the same ownership as Scotian Materials, there are no buildings located within 800 m of the proposed Project.

To the west and southwest of the Project, on either side of Highway 102, are several residential subdivisions, including Oaken Hills Subdivision and Kendalmark Estates in Wellington, as well as the Schwarzwald and Miller Lake West Subdivisions in Fall River. The nearest residential community to the Project remains the Miller Lake West Subdivision, located approximately 1.5 km to the southwest.

Other nearby residential communities include Wellington, approximately 3 km to the west, and Enfield, located about 10 km to the north. While updated figures are not available, previous assessments identified approximately 49 residences within 2 km of the Project.

Current quarry operations require blasting approximately four to six times per year. Notices are sent to the members of the Community Liaison Committee at least 24 hours prior to blasting and to Maritimes and Northeast Pipeline 48 hours prior to blasting. The natural gas pipeline is within 800 m of the project and is the nearest structure. Scotian Materials provides them with the blast designs and blasting results for their review and approval when blasting within 300 m. Immediately prior to blasting the HIAA Control Tower is contacted to ensure no air traffic is in the area and seek clearance to blast. Blasting is monitored for both air concussion and ground vibration in accordance with a blast plan developed as per Condition 4.13 of the 2019 Environmental Assessment Approval.

4.3.5.3 Effects Assessment

The potential impacts of the Project on land and resource use are considered for each phase of the Project, and the potential impacts of blasting are also assessed. The impact pathways are outlined below, along with proposed mitigation measures, followed by an assessment of potential residual impacts after mitigation is applied.

4.3.5.3.1 Impact Pathways

The Project is located on privately owned lands within the PDA and does not directly intersect any recreational, commercial, or public land-use areas. Land use within the PDA will be

converted from natural vegetation to open pit quarry areas. These effects will be limited to the quarry property.

During initial vegetation clearing and construction there may be a short-term increase in localized dust generation.

Regular quarry operation will generate moderate noise levels, limited to daytime hours and mostly weekdays (Monday to Friday), with weekend operation on occasion. Noise levels are anticipated to remain below noise limits specified in the *Pit and Quarry Guidelines* (Nova Scotia Environment and Labour, 1999), resulting in little to no impact to neighbouring land users. Refer to Section 4.1.3 for more details on anticipated noise levels.

Blasting activities will result in intermittent noise and vibration. These effects are expected to be temporary and localized, occurring only during active equipment use or blasting events.

4.3.5.3.2 Mitigation

Quarry operations will adhere to the *Pit and Quarry Guidelines* (Nova Scotia Environment and Labour, 1999), as well as the project-specific blasting procedures, *Safe Operating Procedures for Drilling, Loading & Blasting* plan (Scotian Materials Ltd. and Dyno Nobel Canada Inc., 2018), the *Blasting Safety Regulations* under the *Occupational Health and Safety Act*, and the Emergency Response Plan for Goffs Quarry (Dyno Nobel Canada Inc., 2015).

A range of mitigation measures will be implemented during the construction and operation phases of the Project to minimize potential effects on land and resource use. These measures are intended to limit the spatial extent and magnitude of potential disturbance.

Land disturbance will be minimized through careful site planning and strict adherence to approved Project boundaries. All construction and operational activities, apart from hauling material off site, will be confined to the PDA. Public notification in advance of major construction activities, including blasting events, will be provided through the Community Liaison Committee (CLC).

Dust generated during construction and operations will be managed through the implementation of appropriate dust suppression measures. Progressive restoration and re-vegetation of disturbed areas will be carried out throughout the life of the Project to shorten the duration of land disturbance and support the recovery of vegetation and natural land function.

Noise and vibration associated with quarry excavation and blasting will be mitigated through controlled blasting techniques and operational controls. Blasting activities will be restricted to daytime hours, and advance notification will be provided to the CLC members prior to each blasting event (see details in Section 4.3.5.2). Blasting will continue to be monitored for both air concussion and ground vibration.

A summary of the proposed mitigation strategies, organized by impact pathway, is provided in Table 4.64 below.

Table 4.64 Potential effects across Project phases and the proposed mitigative measures for land and resource use.

Impact Pathway	Phase	Mitigation
Alteration of existing landscape within the PDA.	Construction Operation	<ul style="list-style-type: none"> • Limit disturbance to the PDA. • Clearly delineate work areas. • Notify the Community Liaison Committee (CLC) members in advance. • Maintain vegetated buffers around site. • Restore disturbed areas following construction.
Disruption of nearby activities due to regular operational noise.	Construction, Operation	<ul style="list-style-type: none"> • Limit construction and operation to daytime hours. • Minimize engine braking in residential areas. • Maintain equipment with proper mufflers. • Minimize idling of machinery. • Dampen tailgates to prevent banging.
Disruption of nearby activity and residents due to fugitive dust.	Construction, Operation	<ul style="list-style-type: none"> • Maintain vegetated buffers. • Visually monitor dust levels around site regularly. • Use dust suppressants or water on roadways as needed.
Disruption of nearby activities due specially to blasting.	Operation	<ul style="list-style-type: none"> • Schedule blasting during daytime hours. • Provide advance notice of blasting activities to public via the Community Liaison Committee (CLC). • Use blast design techniques to minimize air overpressure and ground vibration.
Damage to nearby structures due to blast vibration	Operation	<ul style="list-style-type: none"> • Implement controlled blasting practices. • Conduct pre-blast surveys for all structures within 800 m of blasting area. • Monitor vibration levels during blasting to ensure compliance with provincial limits.

4.3.5.3.3 Residual Effects

The potential effects on land and resource use resulting from the identified impact pathways were assessed using predefined criteria (Section 3.5.2). This assessment assumes full implementation of proposed mitigation.

The spatial extent of direct land-use change associated with the project is limited to the PDA. No direct effects on land and resource use beyond the PDA are anticipated.

Most potential impacts to surrounding land and resource use, including those associated with blasting, are not anticipated to be greater than those generated by the present operation. In other words, there would be no residual effects (net increase) associated with noise, vibration, traffic, etc. However, as discussed in earlier sections, the increase in total exposed surface area could increase potential for fugitive dust beyond the property boundary. However, with dust suppression and vegetative buffers in place, the residual impact on airborne particulate is expected to be low to negligible, and not detectable beyond the LAA.

Table 4.65 Effects assessment of the impact pathways identified for land and resource use.

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood
Impacts to neighbouring residents and land use associated with increased fugitive dust.	Low	Long Term	Sporadic	LAA	Reversible	Possible

4.3.6 Recreation and Tourism

The Recreation and Tourism VC assessed the potential for the Project to impact of recreational activities and tourism opportunities in the surrounding area. Potential impacts to landscape aesthetics and viewsapes were also considered as part of this VC.

4.3.6.1 Methodology

4.3.6.1.1 Spatial Boundaries

For the Recreation and Tourism VC, the PDA described in Section 3.2.3 is applicable. An LAA was defined as a 500 m radius around the project site. The RAA for this VC is defined as the Halifax Regional Municipality.

4.3.6.2 Existing Conditions

Recreation and tourism in Nova Scotia is largely centred on the natural environment, with outdoor activities and eco-tourism supported by outfitters and organizations such as the provincial Department of Economic and Rural Development and Tourism, Explore Nova Scotia, and Destination Halifax. The Waverley Game Sanctuary, is approximately 5,229 ha (including 1,056 ha of private land). Over half of it intersects the Waverley–Salmon River–Long Lake

Wilderness Area (Department of Natural Resources, 2013), an 8,908 ha wilderness area protected under provincial legislation to conserve landscapes and biodiversity while supporting recreation and nature tourism (e.g., hiking, canoeing/kayaking, and sportfishing) in a rugged terrain of lakes, granite ridges, and extensive canoe routes. The Johnson River Falls trail is approximately 320 m south of the quarry property, 600 m from the phase 3 boundary, and extends from Perrin drive south to the Johnson River.

The wilderness area is over 1 km east of the Project area. There are other smaller protected areas to the east and north of the Project area; these are all over 2 km away from the PDA boundaries. In addition to the protected/wilderness areas, there is limited recreational land use within the immediate surroundings of the Project site.

4.3.6.3 Effects Assessment

The potential impacts of the Project on recreation and tourism were considered for each phase of the Project. The impact pathways are outlined below, along with proposed mitigation measures, followed by an assessment of potential residual impacts after mitigation is applied.

4.3.6.3.1 Impact Pathways

The Project is not located in the immediate vicinity of any major municipal or provincial recreation facilities or commercial recreation areas; therefore, no significant impact on tourism and recreation is anticipated. The Project footprint is located on privately owned lands with limited recreational value. The proposed quarry area is approximately 300 m from the Waverley Game Sanctuary and roughly 1.2 km from the Waverley–Salmon River Long Lake Wilderness Area. Given this separation distance, no direct interaction with designated recreational or wilderness areas is anticipated.

Potential effects on recreation and tourism are primarily limited to temporary and localized disturbances that could arise from quarry construction and operation activities, including noise, dust, and visual changes to the landscape. However, the existing separation distances between the quarry property and potential recreational areas (e.g., parks and wilderness areas) greatly limit the potential impacts on those activities.

4.3.6.3.2 Mitigation

Several mitigation measures implemented during construction and operation of the Project will minimize potential effects on recreation and tourism. These include measures to reduce noise, dust, traffic, and visual disturbances associated with quarrying activities.

Noise and dust generation will be managed through careful planning and operational controls. High-noise activities, including blasting and crushing, will be scheduled during daylight hours only to minimize disturbance to nearby land users and recreational visitors. All equipment and vehicles will be maintained in good working condition, with functional mufflers and noise

suppression devices installed to reduce noise and exhaust emissions. Dust will be controlled through regular water application on haul roads and exposed surfaces, as well as through the use of other suppression techniques where necessary to minimize off-site dust transport.

Visual disturbance from quarrying activities will be mitigated through the maintenance of existing vegetation buffers around the quarry perimeter. These buffers will help screen active work areas and reduce visual intrusion from nearby viewpoints. Progressive restoration and re-vegetation of disturbed areas will be undertaken throughout the life of the Project to restore natural vegetation and improve the visual quality of the site over time. Lighting will be limited to areas necessary for safe operation, and all fixtures will be directional and shielded to minimize light spill beyond the quarry boundary. Furthermore, quarry operations will be limited to daytime hours, so lighting will generally only be required at dawn and dusk during seasons with shorter daylight periods.

Quarry-related off-site traffic will not travel southward on Perrin Drive, where there may be more recreational activity associated with trails, lakes, and protected areas.

A summary of the proposed mitigation strategies, organized by impact pathway, is provided in Table 4.66 below.

Table 4.66 Potential effects across Project phases and the proposed mitigative measures for recreation and tourism.

Impact Pathway	Phase	Mitigation
Noise and dust generation	Construction Operation	<ul style="list-style-type: none"> Schedule noisy activities (e.g., blasting, crushing) during daylight hours only. Maintain equipment and vehicles to minimize noise and exhaust emissions. Implement dust suppression (e.g., water application on haul roads).
Visual disturbance from quarrying activities	Construction Operation	<ul style="list-style-type: none"> Maintain existing vegetation buffers around the quarry perimeter. Implement progressive restoration and re-vegetation of disturbed areas. Limit lighting at night and use directional, shielded fixtures to reduce light spill.
Traffic impacts on local recreational activity	Construction Operation	<ul style="list-style-type: none"> Quarry construction and operation will be limited to daytime hours, mostly on weekdays. Quarry traffic will not travel south on Perrin Drive. The expansion will not result in significant net increase in traffic.

4.3.6.3.3 Residual Effects

The Project is situated away from any major municipal or provincial recreation facilities or commercial recreation areas; therefore, no significant residual effects on recreation or tourism are anticipated. Consequently, the Project is not expected to interfere with recreational use or visitor experience within nearby protected areas.

4.4 Malfunctions and Unplanned Events

4.4.1 Fires

Effective fire prevention strategies for the Project will focus on minimizing ignition sources and establishing rapid response measures to reduce fire risks. Most cleared vegetation will be removed from site prior to topsoil removal in the early stages of quarry construction. Machinery will be equipped with spark arrestors if available, and idling will be avoided. Fuel storage will be confined to a designated area and properly sized fire suppression equipment and spill kits will be present at the fuel storage area and on individual vehicles and machinery. Furthermore, fire prevention and response protocols will be incorporated into on site and will be included in the orientation for all personnel.

The fire risk of an aggregate quarry is generally low and would be mainly associated with equipment malfunction. The lack of natural fuels in and around a quarry act as a natural fire break between equipment and the surrounding environment.

4.4.2 Spills

The construction and operations phases will involve the use of heavy equipment such as excavators and loaders, along with passenger vehicles, trucks, and various other motorized equipment. These activities introduce potential environmental risks of spills or leaks of fuels, lubricants, and chemicals used in the equipment.

Spills of fuels, lubricants, and chemicals during construction and operational activities can lead to contamination of soil, groundwater, and surface water features. Additionally, spills can create fire hazards if not properly managed, and human health risks may arise from exposure to hazardous substances.

These risks are managed following existing emergency response plan. Additionally, standard erosion and sedimentation control measures will continue to be used including silt fences and sedimentation ponds to prevent contaminants from spreading into water bodies. Spill containment measures will involve placing appropriately sized spill kits on-site and providing them to workers during orientations, equipping all heavy equipment with smaller spill kits, and ensuring that site supervisors carry spill response supplies like absorbent pads, tarps, and shovels. Fire extinguishers will be installed in all equipment to address potential fire hazards. Refueling operations will take place in a designated area, set at a safe distance from watercourses, wetlands, or property boundaries, to reduce contamination risks.

Any spill that occurs will be reported to the NSECC office for the HRM, East Hants area (1-902-424-7773), in accordance with the *Environmental Emergency Regulations* (NS Reg. 16/2013). If a spill is not immediately contained and leaves the site, it will also be reported to the Canadian Coast Guard (1-800-565-1633) outside of NSECC regular working hours (8:30 a.m. – 4:30 p.m.).

4.5 Effects of the Environment on the Project

This section is differentiated from Section 4.4 (Malfunctions and Unplanned Events), in that it focuses on natural external factors that could affect the project.

These effects may result from physical conditions, landforms and general site characteristics that may act on the Project such that Project components, schedule and/or costs could be substantively and adversely changed.

For quarries, the effects of the environment on the Project are generally limited to weather events and the exacerbating influence of climate change. However, due to the recent increase in prevalence of out-of-control wildfires in Nova Scotia, the potential for fires to affect the quarry expansion project were also considered. Geological and groundwater conditions, which could affect project development and operations, are discussed in Section 4; however, groundwater seepage is not anticipated to be a significant issue for the Goffs Quarry.

The following environmental forces have been considered for their potential to adversely affect the Project:

- Climate Change and Severe Weather Events
- Seismic and Earthquake Activity
- Wildfires

4.5.1 Climate Change and Severe Weather Events

4.5.1.1 Existing and Projected Conditions

The report *Weathering What's Ahead: Climate Change Risk and Nova Scotia's Well-being* (Department of Environment and Climate Change, 2022) illustrates that Nova Scotia is already experiencing measurable climate change, with temperatures projected to increase by approximately 2.6°C by mid-century and about 4.5°C by the end of the century under a high-emissions scenario. Winters are expected to warm the fastest, with far fewer extreme-cold days and significantly shorter snow-cover duration. Annual precipitation is projected to rise, especially in winter and spring, and more of this moisture will fall as rain rather than snow. Rainfall events are anticipated to become more intense, contributing to heightened risks of flooding, erosion, and stormwater challenges. The assessment notes that the most pressing climate hazards will evolve over time: heavy-rainfall flooding presents the highest risk in the 2030s, wildfire risk increases notably by the 2050s, and extreme heat becomes the dominant risk by the 2080s.

Climate conditions for the Project area are based on Environment Canada's Climate Normals data, recorded at the HALIFAX STANFIELD INT'L A weather station (44°525200°, -63°303100°), located approximately 5 km northeast of the Project site. These data are considered representative of the climate within the Project area.

Temperature

The mean annual temperature (MAT) for the Project area between 2012 and 2025 was 6.9°C, based on data from the HALIFAX STANFIELD INT'L A climate station, located approximately 5 km northeast of the site (Environment Canada, 2025). The extreme maximum temperature recorded during this period was 34.3°C (June 20, 2024), while the extreme minimum was -25.9°C (February 4, 2023). Seasonal variation is pronounced, with average daily temperatures ranging from -5.7°C in January to 19.2°C in July.

Based on historical data from the HALIFAX STANFIELD INT'L A station, the Project area currently experiences an average of 2 to 3 days/year above 30°C (2012-2025).

Precipitation

The mean annual precipitation (MAP) for the Project area between 2012 and 2025 was 1,393.3 mm, based on data from the HALIFAX STANFIELD INT'L A climate station, located approximately 5 km northeast of the site (Environment Canada, 2025). The most extreme daily precipitation event during that period occurred on July 21-22, 2023, with 172 mm of rainfall recorded in a single day.

The HALIFAX STANFIELD INT'L A station received an average of 221.2 cm of snowfall per year between 2012 and 2025. Using a standard 10:1 snow-to-liquid ratio, this corresponds to an estimated PAS (precipitation as snow) of approximately 221 mm.

4.5.1.2 Effects Assessment and Mitigation

The Goffs Quarry project is generally considered resilient to the potential impacts of climate change and extreme weather events. Rising temperatures may result in longer frost-free periods, reduced snow cover, and more frequent heatwaves, which could influence several aspects of the Project. Extended periods of high temperatures may affect construction scheduling and worker health and safety, particularly during the summer months.

Although projected increases in mean annual temperature are not expected to compromise the overall viability of the Project, they highlight the importance of implementing adaptive management strategies during construction and operation to ensure resilience under future climate conditions.

The watercourses within and near the property will remain hydrologically isolated from the quarry areas and associated infrastructure, meaning that major precipitation events will not result in significant erosion of sediment from the site into watercourses and fish habitat. Stormwater from the quarry infrastructure will be captured in a drainage network designed to channel all site runoff into the quarry bottom(s), where there will be more than adequate storage capacity for large storms. This will allow all runoff to be attenuated until suspended sediment is

removed prior to discharge of clean water into surrounding terrestrial areas. This stormwater management strategy will ensure quarry infrastructure and operations are not significantly impacted by large weather events. Wind is also not a concern for the Project, unless high winds occur in the absence of precipitation. In this case, management of dust will become a top priority to prevent impacts to both worker health and safety at the site and fugitive dust leaving the site. See further details on management of dust in Section 4.1.1.3.

4.5.2 Seismic and Earthquake Activity

4.5.2.1 Existing and Projected Conditions

Seismic activity is caused by the movement of tectonic plates and can result in vibration of the ground (i.e., earthquakes). Natural Resources Canada data (Natural Resources Canada, 2021) were reviewed in consideration of historical seismic activity within the Goffs area. The potential earthquake related damage is determined by how the ground moves and how the Project components within the affected region are constructed.

Figure 4.14 illustrates the relative hazard range for seismic activity within the Province of Nova Scotia. The Project is located within an area of low seismic risk.

Historical seismic data from 1984 to 2025 within 100 km of the Project area were reviewed. The data were filtered to include only seismic events with a magnitude greater than or equal to 2 Magnitude (MN). Table 4.67 summarizes the number of such events recorded within the 100 km radius since 1984.

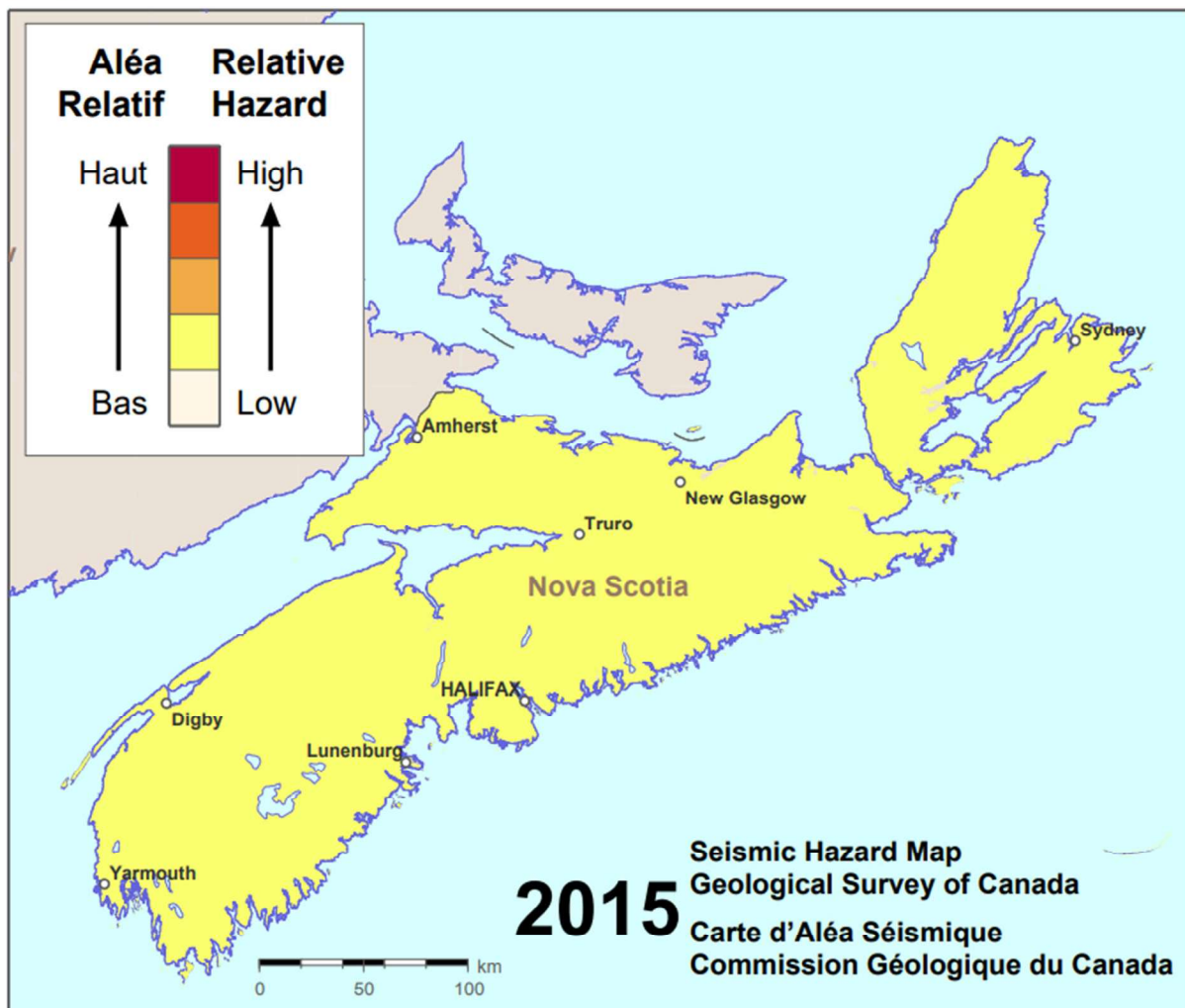


Figure Note: Sourced from (Natural Resources Canada, 2021)

Figure 4.14 Simplified Seismic Hazard Map of Nova Scotia.

Table 4.67 Summary of seismic events since 1984 within 100 km of the Project area.

Date/Time (UTC)	Latitude (°)	Longitude (°)	Depth (km)	Magnitude (MN)	Description
2024-07-29	44.562	-63.155	18.0	2 MN	27 km SE of Lake Echo, NS
2022-10-01	44.655	-64.638	2.0	2.6 MN	14 km NNE of New Germany, NS
2022-09-20	45.498	-63.736	5.0	2 MN	23 km WNW of Masstown, NS
2022-07-20	44.693	-64.614	5.0	2 MN	19 km NNE of New Germany, NS
2022-06-21	44.643	-64.712	2.0	2 MN	11 km N of New Germany, NS
2020-09-19	44.821	-64.769	5.0	2.1 MN	23 km SE from Kingston, NS
2020-05-17	45.549	-63.630	5.0	2.1 MN	28 km SE from Oxford, NS
2020-03-03	44.678	-63.510	2.0	2.6 MN	8 km NE from Halifax, NS. Felt
2020-03-02	44.672	-63.528	2.0	2.4 MN	6 km NE from Halifax, NS. Felt
2019-12-12	44.170	-63.611	5.0	2.6 MN	53 km S from Halifax, NS
2018-09-05	44.748	-63.943	18.0	2.5 MN	17 km W from Hammonds Plains Road, NS
2017-01-12	44.635	-63.347	18.0	2.1 MN	20 km E from Halifax, NS. Aftershock. Felt
2017-01-12	44.630	-63.316	18.0	2.7 MN	23 km E from Halifax, NS. Felt
2015-08-04	45.336	-63.370	5.0	2.2 MN	9 km SW from Truro, NS
2011-06-28	45.431	-63.369	18.0	2.7 MN	11 km NW from Truro, NS
2008-10-18	45.508	-63.956	5.0	2.2 MN	17 km SE from Springhill, NS
2006-10-01	44.930	-64.649	5.0	2.3 MN	15 km SE from Berwick, NS
1999-04-02	45.199	-62.852	18.0	2.7 MN	36 km SE from TRURO, N.S.
1987-04-15	44.243	-62.749	18.0	3.2 MN	NEAR HALIFAX, N.S. Felt

Table Note: Data sourced from (Natural Resources Canada, 2021)

4.5.2.2 Effects Assessment and Mitigation

Overall, the potential for earthquakes to affect the Project is considered very low because Nova Scotia is a low-hazard region for natural seismic activity, and the Project components are not particularly vulnerable to seismic activity. There are no physical components with concrete foundations, as buildings and crushing equipment are portable, so there is minimal structural risk from seismic activity. Geotechnical stability of the quarry itself would be the primary concern should a significant seismic event occur. Slope stability and quarry face design details will be incorporated in the quarry plan to maintain the structural integrity of quarry faces and reduce the potential for rockfalls and landslides. No additional mitigation for natural seismic activity is proposed.

4.5.3 Wildfires

4.5.3.1 Existing and Projected Conditions

The Fire Weather Index (FWI) is a core component of the Canadian Forest Fire Weather Index System (CWFIS), designed to quantify fire intensity and assess the overall danger of wildfire activity in Canada's forested regions (Natural Resources Canada, 2024). The FWI is calculated from key parameters – the Initial Spread Index (ISI) and the Buildup Index (BUI) – which are themselves derived from meteorological parameters such as air temperature, relative humidity, wind speed, and precipitation. The FWI is expressed on a numerical scale with lower values indicating minimal fire danger and higher values signifying increasingly hazardous conditions. Generally, FWI values below 5 suggest low-intensity fire conditions, whereas values exceeding 15-20 indicate a heightened risk of severe fires.

For the project area Goffs area, more recent historical data indicate an increased level of fire risk in 2025. The estimated monthly FWI values for 2025 are as follows:

June: Approximately 6-15

July: Approximately 6-15

August: Approximately 6-15

These results indicate that fire conditions at the project area in 2025 remained consistently elevated throughout the summer months, with June through August showing FWI values generally within the moderate wildfire risk range.

Climate change is projected to further elevate wildfire risk in Canada by increasing average temperatures, altering precipitation patterns, and extending the duration of fire season (Bush & Lemmen, 2019). These climatic shifts are likely to lead to higher FWI values over time. Recognizing this emerging threat, both the Government of Canada and provincial authorities in Nova Scotia have undertaken initiatives to enhance forest fire preparedness and adapt to a warming climate. For example, Natural Resources Canada's FireSmart program promotes community-level actions to reduce fire risk (Canadian Interagency Forest Fire Centre, 2026),

while the CWFIS provides real-time fire danger information and historical data trends (Natural Resources Canada, 2026). In addition, provincial emergency management agencies continue to update and refine their preparedness and response strategies to address the evolving challenges posed by climate change (Halifax Regional Municipality, 2026). These proactive measures are essential to safeguard communities and natural resources as the impacts of climate change on wildfire dynamics become more pronounced.

4.5.3.2 Effects Assessment and Mitigation

Regarding wildfire, the quarry resource itself is not flammable and provides a natural fire break around equipment and infrastructure. As such, the primary potential impact of wildfire on the Project would be temporary closures or operational restrictions imposed by the Province of Nova Scotia in the event of a large wildfire near the site. Such occurrences are considered unlikely and would likely result only in short-term delays to construction or quarry operations.

Currently, the Project area is not classified as a high wildfire hazard zone. However, climate change is contributing to a notable increase in wildfire risk across Canada. Recent years have seen record-breaking fire seasons, with wildfires becoming more frequent, intense, and longer-lasting, even in regions previously considered low-risk.

To address this evolving risk, the Project will implement wildfire mitigation measures throughout all phases of planning, construction, and operation. These measures include minimizing flammable materials near critical infrastructure, maintaining defensible space around project components, using fire-resistant construction materials, and complying with the Forest Fire Protection Regulations (under Section 40 of the Forests Act, Nova Scotia) as well as guidance from NSECC and the NSDNR regarding wildfire prevention and response.

5.0 SUMMARY OF MITIGATION AND RESIDUAL EFFECTS

The potential effect pathways identified, and proposed mitigation to minimize adverse project impacts on VCs of the existing environment, are summarized in Table 5.1

Of the potential residual effects identified, local air quality impacts due to fugitive dust were considered the most concerning because the potential impact is to human health. However, the drivers of fugitive dust are well understood, and there are effective mitigation measures available, so the likelihood of significant effects on local air quality is considered low. It is acknowledged, however, that assumption of low risk is also tied to the diligent application of those mitigation measures, and it will be the responsibility of the quarry operators to ensure proposed mitigation is implemented appropriately.

The removal of forest and wetland areas will result in a loss of a small amount of carbon sequestration. However, the impact area has been minimized to the extent possible, and much of the area is planned for future restoration, which will create a naturalized landscape that will eventually sequester carbon again. Greenhouse gas emissions are not anticipated to increase beyond present operational levels.

Noise and vibration from construction activities, blasting, and material transport are expected to generate some residual off-site noise. With the implementation of mitigation measures, the likelihood of disturbances is considered low.

Residual effects on geology are expected to be localized to the site, and the implementation of mitigation measures will help minimize their magnitude. Likewise, localized impacts to groundwater levels and flow patterns are considered unavoidable but should be contained to a small zone of influence with no impacts to off-site wells.

Impacts to surface water hydrology and water quality will be minimal, with some small changes to streamflow associated with changes to catchments and runoff patterns. There could be occasional increases in suspended sediment within watercourses downstream of the site, although this should be effectively minimized with standard erosion control measures and surface water management within the quarry. The expansion is not expected to result in substantive changes to fish habitat or downstream drinking water supplies.

Direct and indirect impacts to vegetation, including lichens, are anticipated. With the implementation of mitigation measures residual effects are expected to be localized to the Project footprint. Indirect effects to vegetation will be very localized to the immediate surrounding vegetation, and driven primarily by edge effect (i.e., increased wind and sun exposure), and dust deposition.

Although direct wetland impacts will be avoided where possible, the area (footprint) and function of retained wetlands may differ from present conditions. Post-construction wetland monitoring will continue to be used to confirm the impacts to wetlands.

Potential impacts to birds and non-avian wildlife, including species at risk, are considered minimal to negligible and are primarily associated with the removal of a small amount of forest and wetland habitats. Direct disruption should be minimized, and harm to birds and other wildlife should be avoided wherever possible. Where feasible, tree and vegetation clearing will be completed prior to the breeding bird season to prevent disturbance or harm to actively breeding birds.

Several potential socioeconomic impacts were identified; however, most will not exceed current levels (i.e., no *net* residual effect). The only socioeconomic impacts with the potential to exceed current conditions are those associated with fugitive dust. Because the total area of exposed soil will increase, the operation could generate more fugitive dust than is presently occurring. However, with planned mitigation implemented appropriately, the magnitude of this impact is considered low to negligible.

Environmental monitoring is proposed as required by the Wetland Alteration Approval (post-construction wetland monitoring). Slope stability within open pit areas will also be actively monitored. Dust, noise, and blast monitoring will be carried out in accordance with the NS *Pit and Quarry Guidelines* (Nova Scotia Environment and Labour, 1999) and the approved blasting plan.

Table 5.1 Summary of Proposed Mitigation and Residual Effects.

Valued Component	Impact Pathways	Mitigation	Residual Effects	Monitoring & Other Recommendations
Local Atmospheric Environment (Air Quality)	Fugitive dust from vehicle movement and soil disturbance on site. Dust generated from blasting, crushing, and stockpiling activities.	Use of dust control devices, dust suppressants, or water on site during dry periods. Maintain vegetated buffer zones between the quarry and property boundaries. Adhere to site speed limits to reduce dust from truck traffic. Regularly inspect and maintain vehicles to ensure effective dust control. Blasting and crushing will be scheduled intermittently and during daytime hours only. Conduct operations in accordance with the Guidelines, including required setback distances.	Although mitigation should minimize fugitive dust leaving the site, there is still potential for residual dust.	In accordance with the <i>NS Pit and Quarry Guidelines</i> (Nova Scotia Environment and Labour, 1999), and Condition 6.1 of the 2019 EA Approval, dust (particulate matter) monitoring will be implemented if requested by NSECC. Visual inspection of work areas, roadways, and visible dust levels in the air will continue as part of regular operations.
Global Climate (GHG Emissions)	Vehicle emissions during construction, and operation.	Limit idling of vehicles where possible. Construction equipment and vehicles will be kept in good working order to reduce inefficiencies. All vehicles and machinery will comply with current emission standards and will be used efficiently, minimizing distances travelled whenever possible.	Very minimal emissions related to construction and operations.	None recommended, impact minimized.
Global Climate (Carbon Sinks)	Lost GHG sequestration by removal of forest and wetland area	Impact area minimized in layout of project components, particularly in wetlands. Implement wetland and forest compensation measures in accordance with the approved wetland compensation. Restore temporarily disturbed areas using native vegetation.	Approximate loss of up to 17 t/year CO ₂ e sequestration function is possible from removal of both forest and wetland area.	None recommended. Impacts to VC relatively minor.
Acoustic Environment (noise, vibration)	Noise and vibration generated by earthmoving with heavy equipment, material transport to and from the PDA, blasting operations, and rock crushing activities.	Restrict construction to daytime hours. Equipment and machinery should be maintained in accordance with manufacturers specifications. Blasting will be performed by a qualified contractor in accordance with provincial Pit and Quarry Guidelines, including prescribed setback distances. Blasting and crushing will occur intermittently and only during daytime hours. Notify CLC in advance of scheduled blasting activities.	None anticipated beyond current levels.	Noise/blast monitoring will be carried out in accordance with the <i>NS Pit and Quarry Guidelines</i> (Nova Scotia Environment and Labour, 1999).

Geology	Loss of topsoil and organic material, degradation of geological features and bedrock, alteration of landform and topography, and increased risk of soil instability or slope failure.	Salvage topsoil and organic soil for future restoration. Avoid or minimize disturbance to geologically significant formations. Limit excavation to approved areas. Monitor and manage slope stability. Design stable slopes and monitor for signs of instability.	Residual effects are anticipated and will be localized to the site.	Monitoring of slope stability.
Groundwater	Groundwater drawdown and alteration of flow patterns in immediate zone of influence.	No specific mitigation for this impact. Some decrease in water level around the open pit(s) is considered inevitable, but should be contained to the immediate zone of influence.	Localized impacts considered unavoidable but should not result in harm to nearby water resources.	Continued routine monitoring of on-site monitoring wells.
Groundwater	Off-site decrease in groundwater availability (water level) in nearby wells.	Continued groundwater monitoring.	This impact pathway is considered unlikely, so no residual effects anticipated.	Continued groundwater monitoring on site. No additional monitoring off-site proposed.
Surface Water Resources.	Runoff and sedimentation during the construction and operation phase.	Standard erosion control measures and visual monitoring for overland flow and erosion issues, especially during rain events.	Minor changes to runoff and streamflow, with no residual effects to fish and fish habitat anticipated.	Visual monitoring of site and watercourses to ensure sedimentation is avoided.
Fish & Fish Habitat	Changes to water quantity in watercourses within and downstream of the site, and associated impacts to downstream surface water users (drinking water supplies).	Construction near watercourses completed in a timely manner to avoid prolonged disturbance. Riparian buffers maintained, and Stream 6 monitored for changes to hydrology.	No residual impacts on downstream drinking water supplies anticipated.	Ongoing monitoring of water levels to ensure no changes to hydrology.
Vegetation Communities	Direct and indirect impacts to vegetation, including lichen, from clearing and grubbing, excavation and grading, and soil disturbance to root systems.	Limit clearing to essential areas only. Implement phased clearing and progressive restoration. Minimize soil disturbance near retained vegetation.	Approximately 17.6 ha of forest will be removed for the Project.	None recommended
Wetlands	Loss and disturbance of wetland due to clearing, grubbing, and grading. Changes in hydrogeological inputs/outputs to receiving wetlands and watercourses through stormwater management (i.e., ditching, culverts, etc.)	Sediment and erosion controls will be maintained, clearing and grading confined to essential areas, trees directed away from wetlands, natural hydrology and connectivity preserved through protection of water sources and use of appropriate culvert designs, and all work will adhere to applicable permits.	Approximately 1.7 ha of direct impact (removal) to wetlands within PDA. Mitigation should eliminate indirect impacts to wetland retained on site.	Post-construction wetland monitoring for retained wetlands. Wetland Compensation for permanent impacts.
Birds	Vegetation clearing will remove some forest and wetland habitat from the PDA and could displace some birds locally.	Complete clearing outside of breeding bird season where feasible. Minimize clearing to extent necessary.	None anticipated	None recommended

Noise from construction activities may temporarily disrupt wildlife and birds. Attraction to stockpile areas may result in impacts to ground nesting birds.

Complete construction work during regular workday to avoid interacting with migrating birds (i.e., lighting), while minimizing noise impacts to breeding (since the dawn chorus will commence before the workday begins).

Disturbance to wildlife from operational noise, dust, and air emissions, including loss of terrestrial habitat and disruption or destruction of nests and dens.

Maintain equipment to minimize exhaust emissions. Limit vegetation clearing to the minimum area required for safe and efficient operations. Implement progressive restoration to re-establish native vegetation. Conduct pre-construction wildlife sweeps for active nests or dens during sensitive breeding or rearing periods. Schedule high-noise activities (e.g., blasting, heavy equipment operation) during daylight hours to minimize disturbance.

None Recommended

None Anticipated

Species at Risk

Possible indirect impacts to black ash (*Fraxinus nigra*).

Disturbance and potential loss of Common Nighthawk breeding habitat due to noise, vibration, and lighting effects on breeding birds.

Avoid vegetation clearing, tree removal, and grubbing during the migratory bird breeding season. Limit the extent of clearing to the minimum required for safe operations. Retain snags and mature trees where safe and practicable to preserve potential roosting habitat. Schedule high-noise activities during daylight hours. Minimize night-time lighting to reduce disturbance to nocturnal and crepuscular species, including common nighthawk.

None Recommended

None Anticipated

Socioeconomic Conditions

Potential impacts to residents related to fugitive dust.

Restrict high-noise activities to daylight hours. Maintain equipment to minimize noise and vibration. Apply dust suppression to exposed surfaces as needed. Maintain vegetated buffers around edge of quarry to reduce wind and capture particulate.

None recommended, unless there are dust complaints from nearby residents or a monitoring program is requested from NSECC.

None anticipated

6.0 CUMULATIVE EFFECTS

Cumulative effects are changes to the environment resulting from a project's residual effects combined with the effects of other projects or physical activities within the local area or region (Impact Assessment Agency of Canada, 2023). Cumulative effects are changes to the environment resulting from a project's residual effects combined with the effects of other projects or physical activities within the local area or region (Impact Assessment Agency of Canada, 2023). Sources of other stressors in the local or regional area could be similar undertakings (e.g., other quarries) or any other activities that interact similarly with the environment (e.g., other industries that impact habitats, organisms, local socio-economic conditions, etc.).

It is acknowledged that some practitioners may not consider incremental, additive impacts to constitute "cumulative effects" where no direct mechanistic interaction (e.g., synergism) is present. However, the inclusion of additive effects—such as a project's incremental contribution to habitat reduction within a local or regional area—is consistent with established Canadian EA methodologies, including the federal cumulative effects assessment policy framework (Impact Assessment Agency of Canada, 2023), which does not require nonlinear or synergistic stressor interactions.

Potential residual effects following mitigation are identified in the previous section (Section 5.0). For any impact pathway with a possible residual effect anticipated, the potential for cumulative effects is described. Because the proposed expansion is not expected to significantly increase production (i.e., the amount of material extracted or transported off site), most effects are expected to represent a continuation of existing conditions. This cumulative effects assessment considered only those residual effects with the potential to exceed current levels.

6.1 Cumulative Effects Assessment

The following table summarizes the potential residual off-site effects identified for each VC, identifies other sources of similar effects within the region, and then provides an evaluation of the potential for cumulative effects (Table 6.1). The type of interaction anticipated (e.g., additive, synergistic, masking, or compensatory) is also provided (see definitions of stressor interaction types in Section 3.5.5).

There were essentially 6 potential residual effects identified across all VCs, all of which were considered minimal (Table 6.1). Geological impacts are anticipated to be contained within the PDA and property boundary, so were not considered in this cumulative effects assessment. The residual effects identified are related primarily to fugitive dust, localized groundwater drawdown, and the incremental increase in habitat removal (wetlands, forests, etc.) and the associated incremental loss of carbon sinks. These all have the potential to generate cumulative effects because they can contribute to existing impacts of other sources of particulate, loss of carbon sinks, and habitat loss in the local and regional area. The nature of these interactions is

assumed to largely be additive; however, because particulate (PM_{2.5}) can have significant health effects, the possibility of synergistic effects is considered.

Other effects of the project, like greenhouse gas emissions, noise, and transportation impacts are not anticipated to increase beyond current operational levels, so the potential for cumulative effects for these impacts were not assessed.

Although the potential for cumulative effects exists, they will generally be of low magnitude and represent small incremental additions to existing conditions (e.g., the project's contribution to the loss of carbon sinks in the region). Ecological effects of this project are anticipated to be minimal, and generally not result in significant cumulative effects on individual organisms, populations, or habitat supply.

As mentioned above, air quality directly affects human health, so it is considered particularly important to manage dust from the site during construction. Health impacts of fugitive dust is considered the only project effect that could generate synergistic effects. Fugitive dust may only contribute additively to existing particulate levels within the region, but the potential for synergism is identified because incremental increases in airborne particulate can exceed established thresholds for air quality, the consequences of which can be non-linear (Cork, Mork, & Dominici, 2025). Particulate matter can also interact synergistically with *other* air pollutants and even heat (Anenberg, Haines, Wang, Nassikas, & Kinney, 2020; Liu, 2023). However, given the distance to sensitive receptors, existing vegetation buffers, and robust operational controls for dust, the likelihood of cumulative effects is considered very low.

Table 6.1 Assessment of Cumulative Effects for project-related residual effects identified.

Valued Component	Residual Effects	Other Stressors	Potential Cumulative Effect	Anticipated Interaction Type
Local Atmospheric Environment (Air Quality)	Increase in fugitive dust generated during construction and operation.	Emissions and dust from nearby industrial activities, road traffic.	Project-related dust contributes marginally to existing regional dust and particulate levels. Effects are expected to be localized and temporary.	Additive or Synergistic
Global Climate (Carbon Sinks)	Loss of carbon sequestration resulting from forest clearing and wetland infilling associated with the project.	Other loss of carbon sinks from regional land development, forestry activity, and wetland conversion.	Loss of carbon sinks contributes to decreased carbon removal in the region.	Additive
Groundwater	Some very localized decrease in groundwater levels and flow patterns which could extend slightly beyond PDA and property boundary.	None currently within the zone of influence identified.	Should there be future water users in the immediate area around the property, or large excavations into bedrock, there would be a slight possibility of cumulative effects on groundwater in the local area. This is considered unlikely.	Additive
Vegetation Communities	Localized clearing or alteration of vegetation.	Additional habitat disturbance from surrounding industrial, residential, and infrastructure development.	Incremental reduction in regional vegetation cover, though effects are localized and not expected to significantly affect broader ecosystem function.	Additive

Wetlands	Direct and indirect impacts to wetland habitat and its associated ecological functions.	Clearing or degradation of wetland habitat by others in region (LAA and RAA).	Wetland impacts should be minimized; however, any loss of wetland area or function due to the Project will contribute marginally to overall loss of wetland in the region.	Additive
Avifauna and Wildlife habitat	Reduction and loss of bird habitat (forest and wetland)	Other development in region, and forest clearing.	<p>The Project will contribute marginally to the overall loss of bird habitat in the region due to other ongoing developments and activities. However, the habitats affected are widely available in nearby areas within the LAA and are common throughout the region. As such, the Project is not expected to result in a significant impact on regional habitat availability or supply.</p>	Additive

7.0 INDIGENOUS AND PUBLIC INVOLVEMENT

7.1 Regulatory Engagement

GEMTEC and Scotian Materials engaged with regulators including NSECC and NSDNR during the early stages of EA preparation for the Phase 3 & 4 expansion, and periodically throughout the EA process. A summary of regulator engagement is presented in Table 7.1.

Table 7.1 Regulatory engagement for Phase 3 & 4.

Government Departments, Agencies, Regulators	Participants	Details
NS ECC	Jeremy Higgins, NS ECC Paula Francis, NS ECC Robert Macpherson, Scotian Justin Chase, GEMTEC Stewart Gibson, GEMTEC	July 16, 2025 – Delivered a project introduction presentation covering survey programs, Indigenous engagement, and public engagement plans.
NS DNR	Tara Crewe, NS DNR Mark McGarrigle, NS DNR Justin Chase, GEMTEC Stewart Gibson, GEMTEC	August 27, 2025 – Delivered a project introduction presentation, including an overview of field studies.
Office of L'nu Affairs (OLA)	Kendra Gorgeatt, Consultation Advisor, OLA	September 21 – 29, 2026 – Email correspondence between Justin Chase (GEMTEC) and Kendra Gorgeatt and others (OLA), updating OLA on Indigenous engagement efforts for the Project.
NS ECC	Jeremy Higgins, NS ECC	October 5 – 8, 2026 – Email correspondence between Justin Chase (GEMTEC) and Jeremy Higgins (NSECC) on registration steps and submission requirements.

7.2 Indigenous Involvement

Indigenous engagement for the Project was conducted in adherence to the *Proponents' Guide: The Role of Proponents in Crown Consultation with the Mi'kmaq of Nova Scotia* (Office of Aboriginal Affairs, 2012). Under the Proponents' Guide the Nova Scotia Environmental Assessment Regulations require proponents to identify concerns of the Mi'kmaq of Nova Scotia

regarding potential project effects and to describe measures taken or proposed to address those concerns. While certain aspects of consultation may be delegated to project proponents, the Crown retains ultimate responsibility for the duty to consult and for decision-making authority.

The following sections summarize the previous and recent Indigenous engagement for the Goffs Quarry. A detailed engagement log for the Phase 3 & 4 expansion, and a copy of the Indigenous notification letter, are provided in Appendix K.

7.2.1 Previous Engagement and MEKS

Previous Indigenous engagement was completed for the original EA Registration, including an email notification of the project and EA summary sent in June 2018 to the Office of Aboriginal Affairs, Sipekne'katik First Nation, Millbrook First Nation, and Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO). Scotian Materials also offered to meet with communities to present findings of the EA (at the time of the 2018 registration, there had been no requests for meetings and no questions about the project received). In 2019, a Mi'kmaq Ecological Knowledge Study (MEKS) was completed by Membertou Geomatics Solutions. The 2019 EA Approval included a condition requiring the proponent to develop a Mi'kmaq Communication Plan. This plan was submitted to NSECC and approved in December 2019. The objective of this Plan is to provide Project information to the Mi'kmaq community, facilitate engagement, and identify and address concerns related to the Project. Scotian provided Project updates and engaged with the Mi'kmaq community on matters of interest, including black ash and wetland/watercourse monitoring and alteration. Updates were provided based on Project activities. The black ash identified on the property is located outside the Project footprint.

7.2.2 Recent Engagement for Phases 3 and 4

For the Phase 3 and 4 expansion, engagement with the Mi'kmaq has included the following:

- A notification letter describing the planned phase 3 & 4 expansion, and providing highlights of the EA studies, was sent as an email attachment to the following recipients on August 25th, 2026 (Table 7.2). A copy of this notification letter is provided in Appendix K.

Table 7.2 Indigenous contacts and relevant government departments that were provided with a project notification letter in August 2026.

Individual or Organization	Email address(es)
Sipekne'katik First Nation	Chief Michelle Glasgow (michelleglasgow@sipeknekatik.ca), and Roger Lewis, Director of Consultation (rogerlewis@sipeknekatik.ca), copied Vera Marr, Consultation Clerk (consultationclerk@sipeknekatik.ca)
Millbrook First Nation	talk2council@millbrookfn.ca and Chief Robert Gloade (chief@millbrookband.com); copied Kaitlyn Denny, administrative assistant (kdenny@millbrookfn.ca)
Native Council of Nova Scotia	Chief Lorraine Augustine (chiefaugustine@ncns.ca), copied NCNS Political Aide (politicalaide@ncns.ca)
Kwilmu'kw Maw-klusuaqn Negotiation Office (KMKNO, i.e., Mi'kmaq Rights Initiative)	info@mikmaqrights.com
Assembly of Nova Scotia Mi'kmaw Chiefs	Twila Gaudet, Director of Consultation (tgaudet@mikmaqrights.com)
NS Office of L'nu Affairs	Gillian DesRoche, senior consultation advisor (gillian.desroche@novascotia.ca), Candace Quinn, consultation advisor (candace.quinn@novascotia.ca), and Kendra Gorgeatt, Consultation Advisor (Kendra.Gorgeatt@novascotia.ca)
Environmental Assessment Branch at NSECC	ea@gov.ns.ca ; Jeremy Higgins (Jeremy.Higgins@novascotia.ca), and Paula Francis (Paula.Francis@novascotia.ca)

- Engagement with Mi'kmaq organizations and communities included correspondence by email and telephone, as well as a virtual meeting. On September 17, 2026, Scotian Materials and GEMTEC held a Microsoft Teams meeting with staff from the Maritime Aboriginal Aquatic Resources Secretariate, who were representing the Native Council of

Nova Scotia, to provide an overview of the proposed Goffs Quarry expansion and discuss the Project and anticipated impacts in greater detail.

- Sipekne'katik First Nation also requested additional technical information through their own environmental consultant (Hive Engineering). Scotian and GEMTEC provided the requested information and remains available to provide additional Project information and meet with Sipekne'katik First Nation, either virtually or in person, to discuss the proposed expansion and EA update. The information provided included copies of several existing permitting records (previous EA Conditions, Industrial Approval, and Wetland Alteration Approval), information on anticipated impacts of the expansion on Fish and Fish Habitat, a copy of the 2019 MEKS, and some high-level information on the predicted groundwater impacts of the Phase 3 and 4 expansion. They later asked for a copy of the previous Mi'kmaq Engagement Log associated with the first EA, which was provided by the proponent on September 10, 2026.

The consultant representing Sipekne'katik also provided information about the *Sipekne'katik Governance Initiative* (SGI) process on behalf of the Director of Consultation with Sipekne'katik.

7.3 Public and Stakeholder Involvement

7.3.1 Previous Public Involvement

Considerable public engagement was completed prior to the 2018 EA Registration, and continued into the early stages of project development. Engagement for the previous EA Registration included public notices, a project website, open houses, stakeholder and community liaison meetings, direct engagement with government and local organizations, and various opportunities for public questions and feedback.

More details on previous public involvement are available online in Appendix I of the 2018 Registration document:

https://novascotia.ca/nse/ea/Goffs.Quarry.Expansion.Project/Appendix_I.pdf

Scotian Materials developed a website to complement newspaper and online public notice distributions. The site (<https://www.scotianmaterials.info/eia.html>) had served as a primary engagement tool for the original EA, providing information on the proposed project and its status.

7.3.2 Public Engagement for the Phase 3 & 4 Expansion

For the Phase 3 & 4 expansion, the following public and stakeholder engagement steps were completed:

- A meeting was held with the project Community Liaison Committee on September 10 to provide an overview of the expansion and EA studies (slides presented to the CLC, and used as posters at the open house are provided in Appendix L).
- A notice of the EA and open house details was published in the September 28 edition of the Chronicle Herald (Appendix L). This was then shared on social media by the MLA for Waverley-Fall River-Beaver Bank.
- An open house was held on October 1st, at the Holiday Inn Express & Suites, 180 Pratt and Whitney Drive. The open house was an informal drop-in format where participants could review poster boards on the project and EA results, while discussing with representatives from Scotian Materials and GEMTEC. The open house was attended by approximately ten people.

It is also understood that a digital copy of this EA Registration document will be posted publicly on the Department of Environment and Climate Change website:

<https://novascotia.ca/nse/ea/projects.asp>. And a physical copy will be made available at the Nova Scotia Environment and Climate Change regional office in Bedford.

The EA Registration document will also be made available at the Gordon Snow Community Centre in Fall River, and at the reception desk at the Holiday Inn Express & Suites on Pratt and

Whitney Drive, near the Halifax Stanfield International Airport. These copies will remain available for the entire 40-day public comment period following EA registration.

To date, there has been limited public response to the proposed Phase 3 and 4 expansion, with most comments received during the October 1 open house. Additional public comments are anticipated following EA Registration, either directly to the Proponent or to NSECC. Scotian will provide NSECC with an update at the end of the 40-day public comment period summarizing any additional public engagement during that period. During the September 10th CLC meeting and the October 1st open house there was no strong opposition to the project expressed, and attitudes were generally positive. There were various technical questions raised at both events, which were responded to in person by Scotian Materials and GEMTEC staff.

A table summarizing questions and concerns raised during public and stakeholder engagement, and proponent responses, is provided in Appendix L.

8.0 ADDITIONAL INFORMATION

8.1 Approval of the Project

After the receipt of an EA Approval, it is understood that the following approvals and permits will be required (Table 8.1).

Table 8.1 Permits and Approvals required for Goffs Quarry Phase 3 and 4 expansion.

Permits & Approvals	Details
Industrial Approval	The existing Industrial Approval under Part V of the Environment Act will require amendment to include Phases 3 and 4.
Wetland Alteration Approval	Wetlands will be directly impacted for the quarry expansion, so a Wetland Alteration Approval under the <i>Environment Act</i> will be required.
Watercourse Alteration Approval	A Watercourse Alteration Approval under the <i>Environment Act</i> may be required for any work that alters the bed or bank of a watercourse.

Federal Approvals: it is not anticipated that any Federal permits or approvals will be required for this project (e.g., Fisheries Act authorizations).

Municipal Approvals: a municipal *Development Permit* may be required for the Phase 3 & 4 expansion; however, this may be covered under previous *Development Permit(s)*. The Proponent will confirm the specific municipal approval requirements with Halifax Regional Municipality (HRM) following completion of the EA process. It should also be noted that the entire quarry property is within the AE-4 Zone under the applicable HRM Land Use By-law; therefore, no rezoning is anticipated.

8.2 Funding

The Project will be funded solely by the Proponent.

9.0 CLOSURE

This EA Registration document was prepared by GEMTEC Consulting Engineers and Scientists on behalf of Scotian Materials Limited to fulfil the requirements of the *Environmental Assessment Regulations* made under Section 49 of the *Environment Act*.

Any use that a third party makes of this report, or any reliance or decisions made based on it, is the responsibility of such third parties. GEMTEC Consulting Engineers and Scientist Limited accepts no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions based on this report.

For any questions or comments about the content of this report, please contact Stewart Gibson, Ecological and Permitting Services Lead at GEMTEC. Stewart can be reached by email at Stewart.Gibson@gemtec.ca or by phone at 506-453-1025.

9.1 Proponent Signature

Scotian Materials Limited agrees with the contents of this document and acknowledges that it will be submitted in support of a provincial Environmental Assessment registration with the Nova Scotia Department of Environment and Climate Change (NSECC).



Marc Joncas
Director
Scotian Materials Limited

10 - 22 - 2026

Date