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Environmental Impact Assessment Registration Document Sussex Flood Mitigation Project

Sussex, New Brunswick

GEMTEC Project: 101539.009

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Submitted to:

Environmental Impact Assessment Branch
Department of Environment and Local Government
Marysville Place
P. O. Box 6000
Fredericton, NB
E3B 5H1

Environmental Impact Assessment Registration Document Sussex Flood Mitigation Project

Sussex, New Brunswick

February 4, 2026
GEMTEC Project: 101539.009

experience • knowledge • integrity

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February 4, 2026

File: 101539.009 – Rev0

Environmental Impact Assessment Branch
Department of Environment and Local Government
Marysville Place
P. O. Box 6000
Fredericton, NB
E3B 5H1

Attention: Jillian Craig, P.Geo. – Environmental Impact Assessment Specialist

Re: Environmental Impact Assessment Registration Document - Sussex Flood Mitigation Project Sussex, New Brunswick

Please find enclosed the Environmental Impact Assessment (EIA) Registration for the Sussex Flood Mitigation Project. The Project represents the final phase of flood mitigation works under the broader Regional Flood Mitigation Plan and includes the construction of two diversion channels within Sussex, along with associated bridge raisings and ancillary works. The purpose of the Project is to redirect peak flood flows away from the downtown core through controlled conveyance systems. This EIA Registration has been prepared in accordance with the New Brunswick Environmental Impact Assessment Regulation to support Department of Environment and Local Government's review of the proposed works.

Jason Thorne
Chief Administrative Officer
Sussex

Paul Vanderlaan, P.Eng.
Environmental Reuglatory Specialist
GEMTEC

Enclosures
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LIST OF ABBREVIATIONS AND TERMINOLOGY

ACCDC – Atlantic Canada Conservation Data Centre
AIA – Archaeological Impact Assessment
ANB – Ambulance New Brunswick
AO – Aesthetic Objectives
ATV – All-Terrain Vehicle
BBS – Breeding Bird Survey
CAAQS – Canadian Ambient Air Quality Standards
CCME – Canadian Council of Ministers of the Environment
CEPA – Canadian Environmental Protection Act
CH_4 – Methane
CMD – Climatic Moisture Deficit
CMI – Climate Moisture Index
CMIP6 – Coupled Model Intercomparison Project Phase 6
CNWA – Canadian Navigable Waters Act
CO_2 – Carbon Dioxide
CO_2eq – Carbon Dioxide Equivalent
COSEWIC – Committee on the Status of Endangered Wildlife Canada
COSSAR – Committee on the Status of Species at Risk
CWFIS – Canadian Wildland Fire Information System
CWS – Canadian Wildlife Service
DELG – New Brunswick Department of Environment and Local Government
Dfb – Humid Continental Climate
DFO – Department of Fisheries and Oceans
DIA – Department of Indigenous Affairs
DMAF – Disaster Mitigation and Adaptation Fund
dBA – Decibels A-Weighted
DTI – New Brunswick Department of Transportation and Infrastructure
DTC – Duty to Consult
EBSA – Ecological and Biologically Significant Area
ECCC – Environment and Climate Change Canada
EIA – Environmental Impact Assessment
ELC – Ecological Land Classification
EMO – Emergency Measures Organization
EMP – Environmental Management Plan
ESA – Ecological Significant Area
ESC – Erosion and Sediment Control
FAA – Fisheries Act Authorization
FFP – Frost Free Period
FWI – Fire Weather Index

GEMTEC – GEMTEC Consulting Engineers and Scientists Limited
GHG – Greenhouse Gas
GNB – Government of New Brunswick
GPS – Global Positioning Device
HADD – Harmful Alteration, Disruption, or Destruction
HFCs – Hydrofluorocarbon
IA – Impact Assessment
IAAC – Impact Assessment Agency of Canada
IBA – Important Bird Area
IDW – Inverse Distance Weighting
IPD – Initial Project Description
LAA – Local Assessment Area
LOO – License of Occupation
MA – Managed Area
MAC – Maximum Acceptable Concentration
MAP – Mean Annual Precipitation
masl – Metres Above Sea Level
MAT – Mean Annual Temperature
MBBA – Maritime Breeding Bird Atlas
MBCA – Migratory Birds Convention Act
MBR – Migratory Bird Regulations
MN – Magnitude
MRIA – Mi'gmaq Rights Impact Assessment
MSP – Mean Summer Precipitation
MTI – Mi'gmawe'l Tplu'taqnn Incorporated
Mt – Megatonnes
m bgs – Metres Below Ground Surface
N_2O – Nitrous Oxide
NB – New Brunswick
NB Trails – New Brunswick Trail System
NBCC – National Building Code of Canada
NRED – New Brunswick Department of Natural Resources and Energy Development
NPA – Navigation Protection Act
OWLS – Online Well Log System
PAS – Precipitation as Snow
PDA – Project Development Area
PID – Parcel Identifier Number
PNA – Protected Natural Area
PSW – Provincially Significant Wetland
RAA – Regional Assessment Area
RCMP – Royal Canadian Mounted Police

RfR – Request for Review
RSC – Regional Service Commissions
SARA – Species at Risk Act
SF_6 – Sulphur hexafluoride
SOCC – Species of Conservation Concern
SSP – Shared Socioeconomic Pathway
TDGA – Transportation of Dangerous Goods Act
THC – New Brunswick Department of Tourism, Heritage and Culture
VC – Valued Components
WAWA – Wetland and Watercourse Alteration
WESP-AC – Wetland Ecosystem Services Protocol for Atlantic Canada
WNNB – Wolastoqey Nation of New Brunswick

LIST OF APPENDICES

1.0 INTRODUCTION

Extreme climate change-driven flooding in Sussex, New Brunswick has caused millions of dollars in damage over the past decade and threatens the long-term viability of the community. Sussex (formerly the Town of Sussex and the Village of Sussex Corner) commissioned several studies and developed a Regional Flood Risk Mitigation Plan to alleviate the recurring flooding issues. The proposed Project presented herein represents the final set of measures to be implemented under the broader Regional Flood Risk Mitigation Plan, focusing specifically on two diversion channels to divert flood flows from Parsons Brook and Trout Creek away from the downtown core into the Kennebecasis River. This approach was selected after consideration of other structural and non-structural flood mitigation options, including upstream dams, large-diameter piping, and downtown berms, which were found to be less feasible or less effective.

Table 1.1 Proponent Information

Item	Information
Name of Project	Sussex Flood Mitigation Project
Name of Proponent	Sussex
Mailing Address of Proponent	524 Main Street, P.O. Box 1057, Sussex NB, E4E 3E4
Principal Proponent Contact	Jason Thorne, Chief Administrative Officer jason.thorne@sussex.ca (506) 432-4553
Proponent's Contact Person for this EIA Registration	Jason Thorne, Chief Administrative Officer jason.thorne@sussex.ca (506) 432-4553
Environmental Consultant for this EIA Registration	Paul Vanderlaan, Senior Environmental Engineer GEMTEC Consulting Engineers and Scientists Limited paul.vanderlaan@gemtec.ca (506) 262-4477

1.1 Property Ownership

The Project is located on multiple properties owned by Sussex, departments within the Government of New Brunswick (GNB), private businesses, and individual landowners. The Project footprint has characteristics of a linear facility, traversing multiple parcels within the Sussex municipal limits. The properties intersecting with the proposed footprint are described in detail in Section 2.0 and illustrated on Figure 2.2.

2.0 PROJECT DESCRIPTION

2.1 Project Name

The Project is named the Sussex Flood Mitigation Project. It represents the final set of works to be implemented under the broader Regional Flood Mitigation Plan developed by Sussex to address recurring flood risks in the community. This EIA registration covers the construction of two diversion channels, one connecting Parsons Brook to Trout Creek, and a second diversion channel connecting Trout Creek to Kennebecasis River. In addition, works include the raising of Salmon Covered Bridge and the NB Route 890 bridge to accommodate elevated water levels anticipated from the diversion channels. Each diversion channel will be referenced individually and collectively throughout this document.

2.2 Project Overview

Sussex is proposing to construct flood mitigation infrastructure as the final works under the broader Regional Flood Risk Mitigation Project. The Project consists of two engineered diversion channels within the Sussex municipal limits in south-central New Brunswick (Figure 2.1).

The main components of the Project include:

- **Parsons Brook Diversion Channel** – a new engineered channel to divert flood flows from Parsons Brook into Trout Creek flood plain. Works will include the construction of a concrete intake structure, excavation and grading of the diversion alignment, channel lining, bank stabilization, and outfall works as required
- **Trout Creek Diversion Channel** – a new engineered channel to divert flood flows from Trout Creek to the Kennebecasis River floodplain. Works will include the construction of a concrete intake structure, excavation and grading, channel lining, bank stabilization, construction of a two new bridge/culvert structures on NB Route 1 where the diversion channel intersects the highway, the raising of Plant Road, and outfall works as required
- **Bridge raisings** – raising Salmon Covered Bridge and the NB Route 890 bridge to accommodate elevated water levels and maintain conveyance and clearance
- **Ancillary works** – temporary access and laydown areas, minor road adjustments, drainage improvements, erosion and sediment control (ESC) measures, site restoration, and utility adjustments where required

Together, these works are designed to redirect peak flood flows from Parsons Brook and Trout Creek away from the downtown core through controlled conveyance systems that discharge to the Kennebecasis River via an existing watercourse and associated floodplain which have the capacity to accommodate these flows.

2.3 Project Location

The Project is located within Kings County, in south-central New Brunswick (Figure 2.1). Sussex is located approximately 70 km northeast of Saint John, 75 km southwest of Moncton, and 85 km southeast of Fredericton. The Project footprint extends across municipally owned, provincially owned, and privately owned land, traversing 60 parcels in total.

From south to north, the Parsons Brook Diversion Channel will be located in the former Village of Sussex Corner, beginning near the Trinity Anglican Cemetery, crossing Dutch Valley Road, and continuing through the Sussex Corner Elementary School property before discharging into Herbs Pond, which is hydraulically connected to Trout Creek. The Trout Creek Diversion Channel will begin near the Sussex Walking Trail, approximately 750 m from its origin at Post Road, and will extend north along the existing transmission corridor. It will cross Leonard Drive and NB Route 1 before discharging into an existing watercourse in the Kennebecasis River floodplain.

Associated works include raising Salmon Covered Bridge and the NB Route 890 bridge along/on Smiths Creek Road, approximately 1 km north of Four Corners, to accommodate increased water levels from the diversion channels.

Detailed information on each diversion channel including coordinates, property ownership, and proximity to existing residences, is provided in Sections 2.3.1 and 2.3.2. Figure 2.1 illustrates the overall Project location, while Figure 2.4 and Figure 2.5 provide detailed layouts of the diversion channels, intake structures, and associated works.

Legend:

★ Approximate Project Location

Note:
1. Coordinate system: NB; Stereographic projection, NAD83 (CSRS) Datum.
2. Contains information licensed under the Open Government License - New Brunswick.
3. Service Layer Credits: Esri, NASA, NGA, USGS, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, USGS

Project: Sussex Flood Mitigation Project, Sussex, New Brunswick				Drawing: Project Location / Client: Sussex		GEMTEC Consulting Engineers and Scientists
Drawn by: CR	Checked by: KW	Date: February 2026	Project Number: 101539.009	Drawing Number: Figure 2.1	Revision No. 0	

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2.3.1 Parsons Brook Diversion Channel

The Parsons Brook Diversion Channel will extend from Parsons Brook in a north-easterly direction and discharge to Herbs Pond, a waterbody hydraulically connected to Trout Creek. The coordinates for the intake control structure and discharge point are provided in Table 2.1.

Table 2.1 Parsons Brook Diversion Channel Coordinates

Location	Latitude	Longitude
Intake Control Structure	45.70576	-65.47966
Discharge	45.70651	-65.47415

[1]Coordinates provided in decimal degrees

The properties intersected by the Project Development Area (PDA) for the Parsons Brook Diversion Channel are listed in Table 2.2.

Table 2.2 Legal Description of Land: Parsons Brook Diversion Channel

Property Identifier	Property Owner
00000003	Transportation and Infrastructure
00208785	Education and Early Childhood Development
30117246	Trinity Church
30181101	Private landowner
30190235	Sussex
30286520	Transportation and Infrastructure

Table Note: Property owner names are presented exactly as they appear in records obtained from Service New Brunswick. Where a parcel is registered to an individual rather than a corporate or government entity, the owner name has been generalized as "Private landowner."

The proposed alignment intersects recreational greenspace associated with Sussex Corner Elementary School and is within 100 m of the school building. The nearest residence is approximately 50 m from the intake structure at the intersection of Dutch Valley Road and New Line Road. Several residences along Dutch Valley Road, New Line Road, and Needle Street are within 200 m of the proposed channel.

2.3.2 Trout Creek Diversion Channel

The Trout Creek Diversion Channel will extend from Trout Creek in a northerly direction, discharging into an existing watercourse in the Kennebecasis River floodplain. The coordinates for the intake control structure and discharge point are provided in Table 2.3.

Table 2.3 Trout Creek Diversion Channel Coordinates

Location	Latitude	Longitude
Intake Control Structure	45.71916	-65.47785
Discharge	45.73265	-65.47642
Plant Road Raise	45.71248	-65.47876

[1]Coordinates provided in decimal degrees

The properties intersected by the PDA for the Trout Creek Diversion Channel are listed in Table 2.4.

Table 2.4 Legal Description of Land: Trout Creek Diversion Channel

Property Identifier	Property Owner
00056135	Blue Skies Above Inc.
00000003	Transportation and Infrastructure
00200683	Private landowner
00200741	J.D. Irving, Limited.
00203901	Alantra Leasing Inc. Locations Alantra Inc.
00204248	Blue Skies Above Inc.
30011001	Town of Sussex
30011019	YUKON PROPCO GP CORPORATION
30025902	Private landowner
30097588	511659 N.B. Ltd.
30137590	New Brunswick Highway Corporation
30137640	New Brunswick Highway Corporation
30192033	Town of Sussex
30192041	Town of Sussex
30207930	Sussex
30207971	YUKON PROPCO GP CORPORATION

Property Identifier	Property Owner
30208615	Alantra Leasing Inc. Locations Alantra Inc.
30217707	707357 NB Inc.
30217715	Private landowner
30252357	Alantra Leasing Inc. Locations Alantra Inc.
30259907	Master’s Touch Hard Surface Cleaning Ltd.
30264469	Private landowner
30285241	Transportation and Infrastructure
30285258	J.D. Irving, Limited.
30316434	Village of Sussex Corner
30347983	Brown’s Paving Ltd.
00209031	Private landowner
30021752	Brown’s Paving Ltd.
30106959	Sussex
30190433	Transportation and Infrastructure
30190441	Transportation and Infrastructure
30190789	Transportation and Infrastructure
30214365	Private landowner
30217723	707357 NB Inc.
30264444	Private landowner
30264451	Private landowner
30327613	Brown’s Paving Ltd.
30327621	Creek Side Homes Inc.

Table Note: Property owner names are presented exactly as they appear in records obtained from Service New Brunswick. Where a parcel is registered to an individual rather than a corporate or government entity, the owner name has been generalized as “Private landowner.”

Five residences located along the eastern side of Bryant Drive and Canterbury Court are within 200 m of the southernmost portion of the proposed Trout Creek diversion channel. At the intersection with Leonard Drive, the channel will be within 20 to 30 m of the residences located on either side of the road. The discharge location is within 20 to 30 m of a residence located on Adam Lane, which will be acquired as part of project implementation.

2.3.3 Bridge Deck Raising: Route 890 and Salmon Covered Bridge

The Project will include raising the bridge deck of the NB Route 890 bridge (Smith Creek Road) and the Salmon Covered Bridge to accommodate higher water levels and flows resulting from utilizing the diversion channels.

The NB Route 890 bridge is located approximately 1 km north of Four Corners, where the roadway crosses the Kennebecasis River. The Salmon Covered Bridge is located directly west (downstream) of the NB Route 890 bridge, spanning the Kennebecasis River approximately 34 m in length. Built in 1908, the covered bridge is closed to vehicular traffic but remains an important local heritage structure. The approximate coordinates, representing both structures, are provided in Table 2.5.

Table 2.5 Bridge Deck Raising Coordinates

Location	Latitude	Longitude
Salmon Covered Bridge and Route 890 Bridge	45.74523	-65.49792

The properties intersected by the PDA for the bridge deck raising at NB Route 890 bridge and the Salmon Covered Bridge are listed in Table 2.6.

Table 2.6 Legal Description of Land: Bridge Deck Raising

Property Identifier	Property Owner
00000003	Transportation and Infrastructure
00074823	Maria Hoeve LTD
00089029	Transportation and Infrastructure
00113837	Private landowner
00120568	Private landowner
00202002	Kingsco Transport Ltd.
00204321	Private landowner
00207548	Private landowner
30055818	Transportation and Infrastructure
30055834	Transportation and Infrastructure
30175129	Private landowner
30183396	J.D. Irving, Limited.

Table Note: Property owner names are presented exactly as they appear in records obtained from Service New Brunswick. Where a parcel is registered to an individual rather than a corporate or government entity, the owner name has been generalized as “Private landowner.”

Residential and commercial properties are located in proximity to both bridges. Most residential buildings in the PDA are north of the Kennebecasis River, while large commercial parcels to the south of the river are associated with the J.D. Irving, Limited sawmill and Kingsco Transport Ltd.

Legend:

Project Development Areas (PDAs)

Property Lines

Note:
1. Coordinate system: NB; Stereographic projection, NAD83 (CSRS) Datum.
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3. Service Layer Credits: Vantor

Project: Sussex Flood Mitigation Project, Sussex, New Brunswick				Drawing: Project Location		GEMTEC Consulting Engineers and Scientists
				Client: Sussex		
Drawn by: CR	Checked by: KW	Date: February 2026	Project Number: 101539.009	Drawing Number: Figure 2.2	Revision No. 0	

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2.4 Purpose/Rationale/Need for the Undertaking

Extreme climate change-driven flooding in Sussex has caused millions of dollars in damage over the past decade and threatens the long-term viability of the community. The recurring flooding in Sussex along Trout Creek and Parsons Brook has resulted in over $60 million in damages from six flood events since 2014.

Following flooding during both April and December 2014, the municipality commissioned a study (R.V. Anderson, 2016) to quantify the probability and severity of future flood events and update the 1985 provincial flood risk mapping. The study indicated the expected effects of climate change will result in an increase in the probability and severity of future flood events from those presented in the 1985 provincial flood risk mapping. The updated flood risk mapping produced during this study and subsequently refined during the Property Damage Assessment (GEMTEC, 2022) identified significant increases in flooding in the downtown core along Trout Creek and Parsons Brook.

The Property Damage Assessment report (GEMTEC, 2022) estimated a year 2100 flood event with a 100-year return period under the current conditions would impact 465 buildings and result in damages between $28 million and $119 million. This same flood event after the implementation of the Project was estimated to impact 114 buildings and result in damages between $6.9 million and $28.9 million (75% reduction).

Most recent flooding in February 2024 recorded flood water level elevations above those experienced during the April and December 2014 flood events, which underscores the critical need for the implementation of the flood mitigation measures of the Project.

The primary objective of the Sussex Flood Mitigation Project is to reduce the impact of climate change-driven flood events on the community's infrastructure and economy. By implementing targeted flood mitigation measures, the Project aims to significantly decrease the frequency, severity, and extent of flooding along Trout Creek and Parsons Brook. The Project seeks to safeguard critical infrastructure, reduce property damage, and minimize disruption to the local population. These efforts are designed to enhance the long-term resilience of Sussex against future flood events.

2.4.1 Alternatives to the Project

During the early stages of flood mitigation planning, multiple flood control options were carefully evaluated to manage potential flood risks. One of the initial considerations was the construction of a dam to create a flood storage reservoir. However, this option was quickly deemed impractical due to the extensive land requirements, which made it unfeasible. Another option explored was the use of piping to channel flood flows. Yet, the volume of water to be managed resulted in the required piping being impractically large and costly. The use of flood berms along Trout Creek through the Sussex downtown core was evaluated but was found to have impractically large land requirements and provide far less flood protection than the flood diversion channels for a similar capital cost. Consequently, the focus shifted to the construction of diversion channels, which emerged as the preferred method for managing floodwaters effectively while overcoming the limitations of the previous options.

GEMTEC completed a Property Damage Assessment Report for Sussex in 2022 to assist in the selection of the preferred arrangement and size of flood diversion channels. As part of the assessment, hydraulic analysis was performed to estimate flood levels along Trout Creek, Parsons Brook, Wards Creek, and the Kennebecasis River resulting from a future (projected to the year 2100) 100-year return period design storm event. To identify effected/flooded properties, flood inundation maps were developed and overlain over property and building footprint mapping, and stage-damage curves were used to translate flooding depth into damage costs.

These analyses were performed for baseline conditions (i.e., flooding resulting from the future design storm during current conditions without flood diversion channels) and five diversion channel scenarios with various diversion channel arrangements and sizes. The damage analysis indicated 465 properties would be affected during the model flood event for baseline conditions. The “do-nothing” approach and the five alternative scenarios with the resulting flood analyses are summarized below:

Do-nothing: Without the implementation of the Sussex Flood Mitigation Project, the town would remain vulnerable to recurring and potentially catastrophic flooding events. This could lead to severe infrastructure and property damage, displacement of town residents, and disruption to the local economy. Essential infrastructure such as roads, bridges, and utilities may be compromised, making recovery efforts difficult and costly. A lack of mitigation measures could exacerbate environmental degradation, including soil erosion and water contamination, while increasing the risk of waterborne disease to public health. Over time, the financial burden on town residents, businesses, and local government may escalate as they repeatedly address the aftermath of flooding events instead of investing in a long-term solution.

Scenario 1: Construct a diversion channel from Trout Creek to the Kennebecasis River limiting the downstream Trout Creek flows to 10 m^3/s and no diversion channel from Parsons Brook to Trout Creek.

- In this scenario, the flow into Trout Creek is aggressively limited to the maximum of 10 m^3/s (less than 5% of it’s total flow). The number of affected properties would be reduced by 200, roughly a 57% decline from the easting conditions’ 465 properties. However, the necessary channel size to reduce the flows to such low levels is unrealistically large. Besides the much higher construction costs, the water levels at the next biggest area of concern (along Main Street and Skyline Avenue) remain high and unaffected by the diversion channel in this scenario.

Scenario 2: Construct a diversion channel from Trout Creek to the Kennebecasis River limiting the downstream Trout Creek flows to 60 m^3/s and construct a diversion channel from Parsons Brook to Trout Creek limiting the downstream Parsons Brook flows to 30 m^3/s.

- The flow diversion channels from Trout Creek and Parsons Brook would carry 160 m^3/s and 60 m^3/s respectively (73% of Trout Creek and 66% of Parsons Brook's flow during peak time). The number of affected properties would drop to 165, an approximate 65% decrease, and the channel specifications remain within a practical range. The drawback in this scenario is the aggravated flood levels in the area between the Parsons Brook's diversion outlet and Trout Creek's diversion inlet. The number of affected properties in this area would increase from 54 to 62.

Scenario 3: Construct a diversion channel from Trout Creek to the Kennebecasis River limiting the downstream Trout Creek flows to 40 m^3/s and construct a diversion channel from Parsons Brook to Trout Creek limiting the downstream Parsons Brook flows to 25 m^3/s.

- The two diversion channels from Trout Creek and Parsons Brook would carry 40 m^3/s and 25 m^3/s respectively (82% of Trout Creek and 72% of Parsons Brook's total flow during peak time). The number of affected properties would be reduced to 133, an approximate 71% decrease. The channel specifications are larger than the previous scenario by 10% to 15% but remain within a practical range. Like Scenario 2, the drawback in this scenario is the aggravated flood levels in the area between the Parsons Brook's diversion outlet and Trout Creek's diversion inlet. The number of affected properties in this area would increase from 54 to 63.

Scenario 4: Construct a 20 m wide diversion channel from Trout Creek to the Kennebecasis River without downstream Trout Creek flow limits and no diversion channel from Parsons Brook to Trout Creek.

- A 20 m wide channel can transfer up to 120 m^3/s (54% of Trout Creek's maximum flow) from Trout Creek to Kennebecasis River. The flows in Parsons Brook remain unchanged. This scenario would result in roughly 27% decrease in flood damages. While the channel size and construction costs in this case are very attractive, the reduction in flood damages is low and the return on investment is poor.

Scenario 5: Diversion channels as per Scenario 2 with additional low-cost flow control measures in ditches and storm sewers in downtown area.

- This scenario is a modified form of Scenario 2. A few low-cost flow control measures in downtown Sussex can reduce the inundation significantly and increase the return on investment in this scenario. The total number of damaged properties would be reduced to 114, about 75% decrease from existing conditions. Like Scenario 2 and 3, the disadvantage of this scenario is the aggravated flood levels in the area between the

Parsons Brook diversion outlet and Trout Creek diversion inlet. The number of affected properties in this area would increase from 54 to 62. The results of this study indicated that Scenario 5 may have the highest return on investment among other scenarios.

Based on the results of the study, the optimum combination of flood mitigation measures was identified as Scenario 5, the proposed Project presented herein. This Project includes very specific measures to reduce flood impacts on the downtown core of the municipality. The proposed alignment of the diversion channels takes advantage of the existing topography, and the eastern Trout Creek diversion channel is proposed to be in what is believed to have been one of the previous historic alignments of Trout Creek before meandering of the main channel would have resulted in its current alignment.

2.5 Approval of the Undertaking

2.5.1 Summary of Potential Permits/Authorizations

A list of the potential permits and/or authorizations (federal and provincial) that may be required for implementation of the Project is summarized below:

- New Brunswick Department of Natural Resources and Energy Development (NRED) Licence of Occupation (LOO)
- New Brunswick Department of Environment and Local Government (DELG) Wetland and Watercourse Alteration (WAWA) Permit
- Department of Fisheries and Oceans (DFO) Fisheries Act Authorization
- Navigation Protection Act (NPA) Notice of Works Form to Transport Canada
- DELG Environmental Impact Assessment (EIA) Certificate of Determination
- New Brunswick Department of Transportation and Infrastructure (DTI) Highway Occupancy Permit
- NB Highway Corporation Highway Occupancy Permit

In addition to the necessary permits and approvals outlined above, an Environmental Management Plan (EMP) will be developed to ensure the Project complies with key environmental regulations, such as the Canadian Environmental Protection Act (CEPA), Species at Risk Act (SARA), Migratory Birds Convention Act (MBCA), and Fisheries Act. The EMP will detail the mitigative measures to be implemented during both the construction and operational phases of the Project. This plan will include spill response protocols, procedures for in-water works, an ESC plan, and procedures for handling encounters with species at risk, ensuring all environmental obligations are met throughout the Project's lifecycle.

2.5.2 Federal

The Project was submitted to the Impact Assessment Agency of Canada in the form of an Initial Project Description (IPD) under sections 10-15 of the *Impact Assessment Act*. Following the planning phase review, the Agency determined on May 6, 2025, the Project does not require a federal impact assessment.

Regardless of this determination, the Project will comply with applicable federal statutes and regulations, as described in the subsections below.

2.5.2.1 Fisheries Act

The *Fisheries Act* (R.S.C., 1985, c. F-14) is the primary federal legislation governing the protection of fish and fish habitat in Canada. Of particular relevance to this Project is Section 34.4, which prohibits carrying on any work, undertaking, or activity that results in the harmful alteration, disruption, or destruction (HADD) of fish habitat, unless authorized by the Minister of Fisheries and Oceans. Alterations to flow regime, such as those resulting from the construction and operation of diversion channels, can constitute a HADD if they impair the physical, chemical, or biological attributes of fish habitat.

In addition, Section 35 prohibits causing the death of fish by means other than fishing, and Section 36(3) prohibits the deposit of a deleterious substance into water frequented by fish, unless authorized by regulation.

Any in-water works associated with the diversion channels or bridge raisings will be reviewed to determine if they require authorization under the *Authorizations Concerning Fish and Fish Habitat Protection Regulations*.

2.5.2.2 Species at Risk Act (SARA)

The *Species at Risk Act* (S.C. 2002, c. 29) is the primary federal legislation for the protection of wildlife species at risk and their critical habitat in Canada. Of particular relevance to this Project are Section 32, which prohibits the killing, harming, harassing, capturing, or taking of an individual of a wildlife species listed on Schedule 1 as Extirpated, Endangered, or Threatened, and Section 33, which prohibits the damage or destruction of the residence of such species. In addition, Section 58 prohibits the destruction of any part of the critical habitat of an Extirpated, Endangered, or Threatened species where it has been identified in a recovery strategy or action plan and is protected under SARA.

Project activities, including vegetation clearing, earthworks, and in-water works, have the potential to interact with SARA-listed species or their critical habitat. If interactions cannot be avoided, the Project will seek authorization under the *Permits Authorizing an Activity Affecting Listed Wildlife Species Regulations*.

2.5.2.3 Migratory Birds Convention Act (MBCA)

The *Migratory Birds Convention Act* (S.C. 1994, c. 22) is the primary federal legislation for the protection of migratory birds in Canada, including their nests and eggs. Of particular relevance to this Project, the Act prohibits the disturbance, destruction, or taking of a migratory bird, its nest, or eggs, as well as the deposit of harmful substances in areas frequented by migratory birds. Most migratory species native to Canada are protected under the Act.

The *Migratory Birds Regulations,* (SOR, 2022-105) clarify and update protections under the Act, including the establishment of a Schedule 1 list of species whose nests receive year-round protection unless determined to be abandoned. For all other protected species, nests are protected when they contain a live bird or viable egg, but not outside the active nesting period.

2.5.2.4 Canadian Navigable Waters Act (CNWA)

The *Canadian Navigable Waters Act* (R.S.C., 1985, c. N-22), administered by Transport Canada, regulates works built in, on, over, under, through, or across navigable waters in Canada. “Navigable waters” are defined broadly and may include waterways capable of being traversed by canoe, kayak, or other small craft.

The Project includes raising the Salmon Covered Bridge and NB Route 890 bridge over the Kennebecasis River to accommodate changes in water levels associated with the diversion channels. The Project may require review by Transport Canada and the filing of a Notice of Works under the *Minor Works Order*. All works will be planned and executed to ensure compliance with the CNWA, as applicable.

2.5.2.5 Canadian Environmental Protection Act (CEPA)

The *Canadian Environmental Protection Act* (R.S.C., 1999, c. 33) provides the legislative framework for preventing pollution and protecting the environment and human health from toxic substances. While the Project is located on non-federal land and no CEPA-specific permits are anticipated, relevant provisions regarding the handling, storage, and spill response for fuels and other hazardous materials will be addressed through the EMP, as applicable.

2.5.2.6 Transportation of Dangerous Goods Act (TDGA)

The *Transportation of Dangerous Goods Act* (R.S.C., 1992, c. 34) regulates the transport of hazardous materials within Canada. Small quantities of fuels and lubricants will be transported to the site for construction activities, and all such movements will comply with applicable TDGA requirements, including contractor certification and safe handling practices.

2.5.3 Provincial

Several provincial statutes and regulations are applicable to the planning, construction, and operation of the Project. These laws provide the framework for environmental assessment, protection of watercourses and wetlands, conservation of species and habitats, management of Crown lands, and the preservation of heritage resources. Compliance with these requirements will be achieved through the applicable permitting processes, environmental protection measures, and coordination with relevant regulatory authorities. Key provincial legislation relevant to the Project is summarised below.

2.5.3.1 Clean Environment Act – Environmental Impact Assessment Regulation

The *Clean Environment Act* is the primary provincial environmental legislation in New Brunswick. The *Environmental Impact Assessment Regulation* (EIA Regulation 87-83) under the *Clean Environment Act* governs the EIA process. The Project is considered an undertaking in Schedule A, item (r): "*all projects involving the transfer of water between drainage basins*." Based on the Project's design, a registration is required under Section 5(1) of the EIA Regulation and will undergo, at minimum, a Determination Review.

2.5.3.2 Clean Water Act – Watercourse and Wetland Alteration Regulation

The *Clean Water Act* protects water quality, aquatic habitats, and wetland functions in New Brunswick. The *Watercourse and Wetland Alteration* (WAWA) *Regulation* requires permits for activities conducted in or within 30 m of a watercourse or wetland. As the Project involves the construction of diversion channels, in-water works, and bridge modifications, WAWA permits will be required prior to construction.

2.5.3.3 New Brunswick Species at Risk Act

The New Brunswick *Species at Risk Act* (S.N.B. 2012, c.6) establishes a framework for the designation and protection of species at risk within the province. Under the *List of Species at Risk Regulation* (NB Reg. 2013-38), the Minister formally designates species as Extirpated, Endangered, Threatened, or of Special Concern based on assessments by the Committee on the Status of Species at Risk (COSSAR). This regulation functions as the official provincial record of recognized species at risk.

Legal prohibitions under Section 28 of the Act – such as restrictions on killing, harming, harassing, possessing, or trading individuals, and damaging or destroying their survival or recovery habitat – apply only to species listed in Schedule A of the *Prohibition Regulation* (NB Reg. 2013-39). Many species in the 2013-38 list are not included in Schedule A and therefore do not receive these automatic protections, although they remain provincially recognised as species at risk and are eligible for recovery planning, monitoring, and conservation measures.

Species designated as Special Concern under NB SARA may appear in Schedule A and, if so, are afforded the same prohibitions as other listed categories. Species that are recognized under NB Reg. 2013-38 but not in Schedule A may still be considered during project planning – particularly in the context of an EIA – where regulatory review can result in mitigation measures to support conservation objectives.

2.5.3.4 Fish and Wildlife Act

The New Brunswick *Fish and Wildlife Act* (S.N.B. 1980, c. F-14.1) governs the conservation and management of fish and wildlife species in the province. The Act prohibits the disturbance, destruction, or taking of the nest or eggs of any bird, except as otherwise authorized by the Minister. It also regulates activities that may affect wild mammals, reptiles, and amphibians.

2.5.3.5 Heritage Conservation Act

The New Brunswick *Heritage Conservation Act* (S.N.B. 2010, c. H-4.05) provides for the protection of archaeological, paleontological, and built heritage resources in the province. The Act requires permits for archaeological field research and prohibits unauthorized disturbance of registered heritage sites. Administration of the Act falls under the New Brunswick Department of Tourism, Heritage and Culture (THC).

2.5.3.6 Community Planning Act

The New Brunswick Community Planning Act (S.N.B. 2017, c.19) governs land use planning, zoning, and subdivision control within the province. The Act confers authority to regional service commissions (RSCs) and municipalities to administer regional plans, municipal plans, and zoning by-laws. Undertakings subject to the provincial EIA process that fall within an area with an approved plan must obtain confirmation from the relevant planning authority that the Project conforms to applicable land use designations and zoning requirements. The Project is located within Sussex and the Kings Rural District, both of which are subject to planning oversight by the Fundy Regional Service Commission. A letter of conformity with applicable plans and by-laws will be obtained as part of the EIA process.

2.5.4 Municipal

The Project will primarily fall within the boundary of Sussex, with a portion extending into Butternut Valley and Kings Rural District local governance. All local governances are responsible for the administration of the *Regional Service Delivery Act*. Zoning requirements will be confirmed as the Project advances.

As the proponent, Sussex will ensure that the Project complies with all relevant municipal by-laws. Key by-laws that map apply include:

- **Municipal Plan By-law** and **Rural Plan By-law** – provide overarching land use direction and policies guiding development within municipal and rural areas
- **Zoning By-law** – regulates permitted land uses, building forms, and development standards within specific zones
- **Subdivision By-law** – governs the division of land, provision of services, and standards for new lots of rights-of-way
- **Building By-law** – establishes standards for the construction, alteration, or demolition of structures
- **Traffic and Street By-laws –** regulates temporary road closures, detours, or traffic control during construction
- **Noise and Nuisance By-laws** – restrict construction-related disturbance, particularly in residential areas
- **Waste Disposal and Solid Waste By-laws** – regulate the collection, storage, and disposal of construction and demolition materials

- **Water, Sanitary, and Storm Sewer By-laws** – set requirements for any temporary or permanent connections to municipal servicing systems

The Town will comply with all terms and conditions of an EIA Determination or Approval, should a favourable decision be issued, and will apply for any additional permits or authorizations required under applicable by-laws.

For the portions of the Project located within Butternut Valley and the Kings Rural District, the Project will comply with the *Studholm Parish Planning Area Rural Plan Regulation* to ensure consistency with applicable rural land use policies and development standards.

2.6 Siting Considerations

In support of selection between the five scenarios described in Section 2.4.1, the following considerations were made during the planning process of the Project. These factors included physical and technical constraints, environmental sensitivities, existing and planned land uses, and broader community planning frameworks. Together these considerations informed the identification of a preferred scenario by balancing engineering feasibility with environmental protection and land use compatibility. The subsections below outline how these siting considerations were evaluated and applied to the Project.

2.6.1 Physical and Technical Constraints

Physical and technical characteristics of the PDA influenced the siting and design of Project components. Factors such as topography, surface water drainage, and hydrological conditions were reviewed to ensure the Project could be implemented safely and effectively within the local landscape.

2.6.1.1 Topography and Hydrology

Sussex is situated within a river valley surrounded by gently rolling hills. The downtown core lies at an elevation of approximately 20 metres above sea level (masl), while the surrounding hills rise to elevations of up to 200 masl. The valley setting and elevation gradient influence Project planning by constraining potential alignment to areas where slope stability, cut-and-fill balance, and flood exposure could be reasonably managed.

The Kennebecasis River is one of the primary rivers in southern New Brunswick. Originating in the foothills of the Caledonia Highlands, it flows generally southwest before joining the Saint John River in the City of Saint John, approximately 70 km downstream of Sussex. Within the Sussex area, the Kennebecasis River is a moderately sized, slow-flowing watercourse that meanders along the northwestern municipal boundary. The presence of this large river system was a primary factor in evaluating potential channel connections and outflows.

Several tributaries of the Kennebecasis River pass through the Sussex community, including Trout Creek, Parsons Brook, and Ward Creek. Trout Creek is comparatively steeper and faster flowing than the Kennebecasis River, with flows strongly influence by seasonal precipitation and snowmelt. It joins the Kennebecasis River north of the Bensen Athletic Complex on Blazers Way at Kingswood University. Parsons Creek, a smaller tributary, flows into Trout Creek northeast of the Sussex Lions Club on Main Street. Ward Creek is characterized by steeper slopes and rapid, flashy flood response, and coarse gravelly bed with evidence of active erosion. It discharges to Trout Creek approximately 375 m downstream of the Parsons Brook confluence. These tributaries are known to contribute to local flooding during spring freshet and high-rainfall events, which directly informed the need for the alignment of diversion infrastructure.

Together, these watercourses form part of the larger Kennebecasis watershed, which has a total drainage area of 2,100 km^2. The drainage areas of the sub-watersheds relevant to Sussex are presented in Table 2.7. A detailed hydrologic analysis of the Kennebecasis River watershed and its tributaries was conducted (GEMTEC, 2025) to understand the flood dynamics of these watercourses and support siting decision by identifying which watercourses contribute most significantly to flood risk in the community (Appendix A).

Table 2.7 Drainage Areas by Watershed in and Near Sussex

Watershed	Drainage Area (km^2)
Kennebecasis River at Dobson Brook	770
Trout Creek at Kennebecasis River	220
Trout Creek at Wards Creek	167
Trout Creek at Parsons Brook	155
Smiths Creek	207
Wards Creek	50
Parsons Brook	12

2.6.1.2 Wetland Drainage Features

Wetland drainage features occur throughout the floodplain areas of Trout Creek and the Kennebecasis River, particularly adjacent to low-lying fields and riparian benches. These wetlands play an important role in attenuating flows during flood events and were a key consideration in siting diversion infrastructure. In particular, wetland areas extending inland from the Kennebecasis River encompass much of the open field adjacent to the planned outflow area of the Trout Creek Diversion Channel. These areas provide natural storage and conveyance capacity and were identified as suitable for receiving overland flows during high-water conditions before they discharge to the Kennebecasis River.

Additional drainage constraints were identified north of Route 1, where a drainage ditch influences local floodplain conditions, and in the low-lying area behind Sussex Corner Elementary School, which forms part of the catchment ultimately directing flows toward Trout Creek. While a detailed description of the Project components is provided in Section 2.7, these drainage features were considered at a high-level during site selection to ensure diversion alignments would function effectively within the existing watershed hydrology.

2.6.1.3 Land Availability, Access, and Utilities

Land availability and secure access were important considerations in identifying suitable locations for the Project. At this stage of planning, proposed access routes are preliminary and may be revised once contractors are engaged, as final logistics will depend on equipment, sequencing, and construction methods. The PDA has therefore been delineated broadly enough to allow flexibility should alternate access arrangements be required.

For the Parsons Brook Diversion Channel, the proposed alignment primarily crosses property owned by the Department of Education and Early Childhood Development (Parcel Identifier Number (PID) 00208785, Sussex Corner Elementary School) before connecting with Herbs Pond on adjacent private property (PID 30181101). Easements will be required for the use of private parcels, and discussions with affected landowners will be undertaken prior to construction.

For the Trout Creek Diversion Channel, proposed access is anticipated from the east side of the PDA, where minimal clearing would be required. This includes PID 00204248 (Blue Skies Above Inc.) and PID 30208615 (Alantra Leasing Inc.), both of which have been consulted during previous stages of project planning. The Cougle Road property, currently used as a storage yard by Alantra Leasing, could provide a logical construction access point. The Trout Creek Diversion Channel alignment itself traverses multiple properties, as outlined in Section 2.3.2, and easements will be secured as required. Coordination with the DTI will also be necessary to install bridge/culvert structures on NB Route 1. A high-voltage transmission corridor runs along the western edge of the Trout Creek Diversion Channel PDA; while the parcel is not registered to NB Power, it is likely subject to an easement. Therefore, construction access to this location has been planned from the east side of the PDA to avoid potential conflicts with the transmission line.

For the bridge deck raising activities, construction will occur on DTI-owned properties (PIDs 00089029 and 30055834). Temporary laydown or staging areas will be required, and PID 00207548 has been identified as a potential option. Based on aerial imagery, this parcel appears to have been previously used for equipment or material storage during bridge-related work, suggesting it may be suitable for temporary construction support. Some parcels associated with these works may extend into the Kings Rural District, and coordination with the planning department of the Kings Regional Service Commission will occur where applicable.

While the specific access routes are still subject to refinement, the siting process has ensured the PDA encompasses sufficient options to allow safe and practical access to each component. Utilities and municipal services (e.g., water, sewer, stormwater) are available within Sussex, but major construction activities will rely on temporary contractor-suppled services (e.g., fuel, power, sanitary facilities) rather than long-term utility tie-ins. If negotiations with landowners are unsuccessful, Sussex may pursue alternate access routes within the PDA, or, as a last resort, consider statutory tools such as land expropriation under the *Expropriation Act (Chapter E-14)* to enable project implementation.

2.6.2 Environmental and Cultural Considerations

Environmental and cultural factors were taken into account during project siting to minimize potential adverse effects on sensitive resources. The location and alignment of project components were refined to avoid, where feasible, significant ecological features, while also recognizing the cultural context of the Sussex Valley.

From an environmental perspective, siting decisions considered the presence of mapped wetlands, riparian zones, and floodplains that are integral to natural drainage and habitat functions. Particular attention was given to maintain connectivity with existing hydrologic systems and avoiding direct alteration of wetlands and watercourses where possible. Where interactions could not be avoided, alignments were selected to minimize disturbance and remain consistent with applicable buffer and setback requirements (see Section 5.7). Consideration was also given to potential habitat values along Trout Creek, Parsons Brook, and the Kennebecasis River, with routing intended to limit the need for in-channel works.

From a cultural perspective, project planning recognized the presence of known and potential archaeological resources along the Kennebecasis River corridor and considered the risk that changes in floodplain hydraulics could indirectly affect those resources. This consideration helped shape the hydrological monitoring and modelling approach summarized in the Hydrotechnical Report (Appendix A). Within the PDA, the Salmon Covered Bridge is a historic structure; project planning will protect its character and fabric while accommodating the required deck raising. Alignments and construction workspaces were refined to limit changes to floodplain behaviour in areas where sensitive cultural resources may occur. Consultation with the THC (Archaeological Services/Heritage Branch) will be undertaken to confirm requirements and appropriate protection measures; procedures will be in place for chance finds during construction (see Section 5.10).

Together, these considerations guided the refinement of project alignments, access routes, and construction footprints. More detailed descriptions of environmental and cultural features are provided in Section 4.0 of this document, and mitigation measures will be outlined in Section 5.0.

2.6.3 Land Use Considerations

Land use considerations for the Project were evaluated to confirm compatibility with existing zoning designations, land ownership, and surrounding land uses. Zoning considerations were evaluated for the PDAs associated with the Trout Creek and Parsons Brook Diversion Channels, which are summarized in Table 2.8. The Route 890 Bridge Raising activities located beyond the Sussex municipal boundary fall within the Studholm Parish planning area and extend across the boundary between the Kings Rural District and Butternut Valley Rural Community, where land use is governed by the Studholm Parish Rural Plan Regulation. Zoning designations were not available on the Kings Rural District website; however, planning officials confirmed that no designated zoning applies to the land, within the Kings Rural District, where the Route 890 Bridge Raising is proposed.

Table 2.8 Zoning Designations Intersected by PDAs

Zoning Designation	Trout Creek Diversion Channel PDA	Parsons Brook Diversion Channel PDA
Industrial – Medium (MI)	✓	–
Industrial (I)	✓	–
Industrial – Light (LI)	✓	–
Environmental Protection (EP)	✓	✓
Neighbourhood Residential (R1)	✓	✓
Neighbourhood Residential (R2)	✓	–
Neighbourhood Residential (RM)	✓	–
Rural and Agricultural (RU)	✓	✓
Institutional (INST)	–	✓
Park (P)	–	✓
Road	✓	✓

The zoning context reflects the linear nature of the Project, with the Trout Creek and Parsons Brook PDAs intersecting a mix of industrial, residential, rural, environmental protection, institutional, park, and transportation-related lands. This pattern is typical of municipal stormwater and watercourse infrastructure, which commonly follows existing drainage corridors, right-of-way, and low-lying areas rather than discrete development parcels.

Sufficient space exists within the identified zoning designations to accommodate diversion channels appropriately sized to meet the Project's flood-mitigation and surface-water conveyance objectives. The selected alignments minimize encroachment into developed residential and industrial areas, limit permanent changes to existing land uses, and reduce land fragmentation where practicable. Notwithstanding these measures, portions of the Project necessarily traverse areas zoned for residential and industrial uses, and limited land acquisition or easements may be required to accommodate construction and long-term operation. Construction access and ongoing maintenance would be facilitated primarily using existing municipal roads and rights-of-way.

Land ownership within the Project footprint includes municipal lands, public rights-of-way, and privately owned parcels. Where the Project intersects private lands, works would be confined to the minimum footprint required to achieve hydraulic functionality and public safety objectives.

From a zoning perspective, the Trout Creek and Parsons Brook Diversion Channels represent municipal infrastructure intended to manage surface water and reduce flood risk. The *Town of Sussex Zoning By-Law* permits Land for Public Purpose and Stormwater Management Systems in all zones, allowing these components of the Project to proceed within the identified zoning designations without requiring rezoning or amendments to the By-law.

2.6.4 Planning Considerations

Planning considerations for the Project were evaluated to ensure the proposed siting is compatible with municipal, regional, and provincial frameworks, and that it supports broader community objectives related to resilience, land use, and infrastructure.

At the municipal level, the Project falls within Sussex, Butternut Valley, and the Kings Rural District, where land use is governed by the *Town of Sussex Municipal Plan By-law* and the *Studholm Parish Rural Plan Regulation*. The Project will be implemented in a manner consistent with these planning documents, with applicable development controls confirmed through consultation with municipal planning authorities. Where applicable, Town Council and/or the Planning Advisory Committee will provide input, and applicable development approvals and permits will be obtained prior to construction, as required by municipal and provincial authorities.

Regionally, the Project is situated within the jurisdiction of the *Regional Service Delivery Act*, overseen by the Kings Regional Service Commission, which guides collaboration between Sussex, Butternut Valley, and the surrounding Kings Rural District. The diversion channels and bridge modifications align with regional objectives of improving climate resilience, reducing flood risk, and protecting critical infrastructure, thereby supporting long-term community sustainability.

At the provincial level, the Project aligns with commitments set out in New Brunswick's *Climate Change Action Plan* 2022-2027, which emphasizes infrastructure resilience and community adaptation to extreme weather. The Action Plan identifies the need for a Long-Term Flood Mitigation Plan and a Large Culvert Assessment Study to prioritize upgrades in areas at risk of flooding, as well as the development of a provincial climate change risk assessment and adaptation plan. By reducing recurring flood risks in Sussex, the Project will advance these objectives by safeguarding transportation and municipal infrastructure, reducing community vulnerability, and demonstrating proactive adaptation to climate-related hazards.

Integration with existing municipal infrastructure planning was also an important siting consideration. The diversion channels and bridge deck raising activities have been designated to complement the existing transportation network, including NB Route 1, Route 890, and the Salmon Covered Bridge, and to interface effectively with municipal stormwater and flood management systems.

Finally, siting decisions accounted for both current and anticipated future land use patterns to avoid creating conflicts with expected community growth and development. Consultation with municipal planners, the Planning Advisory Committee, and provincial agencies formed part of the planning process, and this dialogue will continue into the detailed design stage to ensure the Project remains aligned with all applicable planning frameworks.

2.7 Physical Components and Dimensions of the Project

The proposed Project involves the construction of two diversion channels designed to redirect flood flows from Parsons Brook and Trout Creek away from the Sussex downtown core and into the Kennebecasis River. Each channel will be configured to operate only during high-flow events, generally those exceeding a 1-20-year return period. Under normal conditions, non-flood flows will remain within the existing stream alignments, thereby maintaining ecological functions such as baseflow contributions, sediment transport, and aquatic habitat.

In addition to the diversion channels, the Project includes bridge deck raising on NB Route 890 and the Salmon Covered Bridge to reduce roadway overtopping during flood events, as well as the construction of two new bridge/culvert structures on NB Route 1 where the Trout Creek Diversion Channel intersects the highway. The physical components are described in detail in the following subsections.

2.7.1 Parsons Brook Diversion Channel

The Parsons Brook Diversion Channel will be designed to accommodate flows of up to 50 m^3/s. The channel will extend approximately 370 m in a northeasterly direction from Parsons Brook, near the intersection of New Line Road and Dutch Valley Road by Sussex Corner Elementary School, to its discharge point at Herbs Pond, which ultimately connects to Trout Creek (Figure 2.3). The outflow will be stabilized with a riprap-lined apron to dissipate energy and facilitate safe conveyance of flows into the pond. The discharge location is approximately 3 km upstream of the natural confluence of Parsons Brook and Trout Creek measured along Trout Creek (or approximately 2.5 km in direct distance).

The diversion channel will occupy an approximately 50 m wide corridor with a bottom width of approximately 10 m, a minimum depth of 2 m, and side slopes of 2H:1V. An access road will be constructed adjacent to the channel. The channel will be excavated from in-situ material and stabilized with grassed vegetation. Flow regulation will be provided by a passive concrete intake control structure (i.e., no movable gates), which will divert flows from Parsons Brook into the diversion channel only during high-flow events.

During construction, the entire alignment of the diversion channel will be cleared and grubbed. Excavation spoils will be used to construct the adjacent access road where suitable, or transported off-site. A laydown area will be established within the Project footprint to support channel construction. Construction of the intake control structure will be combined with a culvert under Dutch Valley Road. A temporary laydown area of several hundred square metres will be required for this structure and is anticipated to be located nearby (e.g., parking or park space on the north side of Dutch Valley Road). Temporary works will include water management measures and ESC along Parsons Brook during intake construction and within the wetland area along the southern bank of Trout Creek during channel tie-in.

All disturbed areas will be revegetated with native vegetation to provide long-term erosion protection. Construction of the diversion channel and associated intake structure is expected to require approximately 12 months if completed sequentially.

Utilization of the Parsons Brook Diversion Channel will be limited to flood events, with flows diverted on average once every five years. The duration of individual diversion events is anticipated to be up to 12 hours.

The diversion channel is intended as a permanent flood mitigation feature and will not be decommissioned. Refurbishment needs are anticipated to be minimal; limited to periodical vegetation control and replacement or reconstruction of the intake control structure potentially required on an interval of approximately 80 years.

Legend:

- Bottom Edges
- Centerline
- Toe of the Berms
- Top of the Berms

Note:
1. Coordinate system: NB; Stereographic projection, NAD83 (CSRS) Datum.
2. Contains information licensed under the Open Government License - New Brunswick.
3. Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Project: Sussex Flood Mitigation Project, Sussex, New Brunswick	Drawing: Parsons Brook- Channel Alignment	GEMTEC Consulting Engineers and Scientists
	Client: Sussex	

Drawn by:	Checked by:	Date:	Project Number:	Drawing Number:	Revision No.
CR	KW	February 2026	101539.009	Figure 2.3	0

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2.7.2 Trout Creek Diversion Channel

The proposed Trout Creek diversion channel will be designed to accommodate flows of up to 340 m^3/s. The channel will be approximately 1,600 m long, extending northerly from the sharp bend on Trout Creek near Brown's Paving Ltd. to the Kennebecasis River floodplain east of Aiton Road, north of NB Route 1, discharging east of Adam Lane (Figure 2.4). The discharge point will be located approximately 8.8 km upstream of the Trout Creek-Kennebecasis River confluence as measured along the Kennebecasis River, or 4.3 km in a direct line.

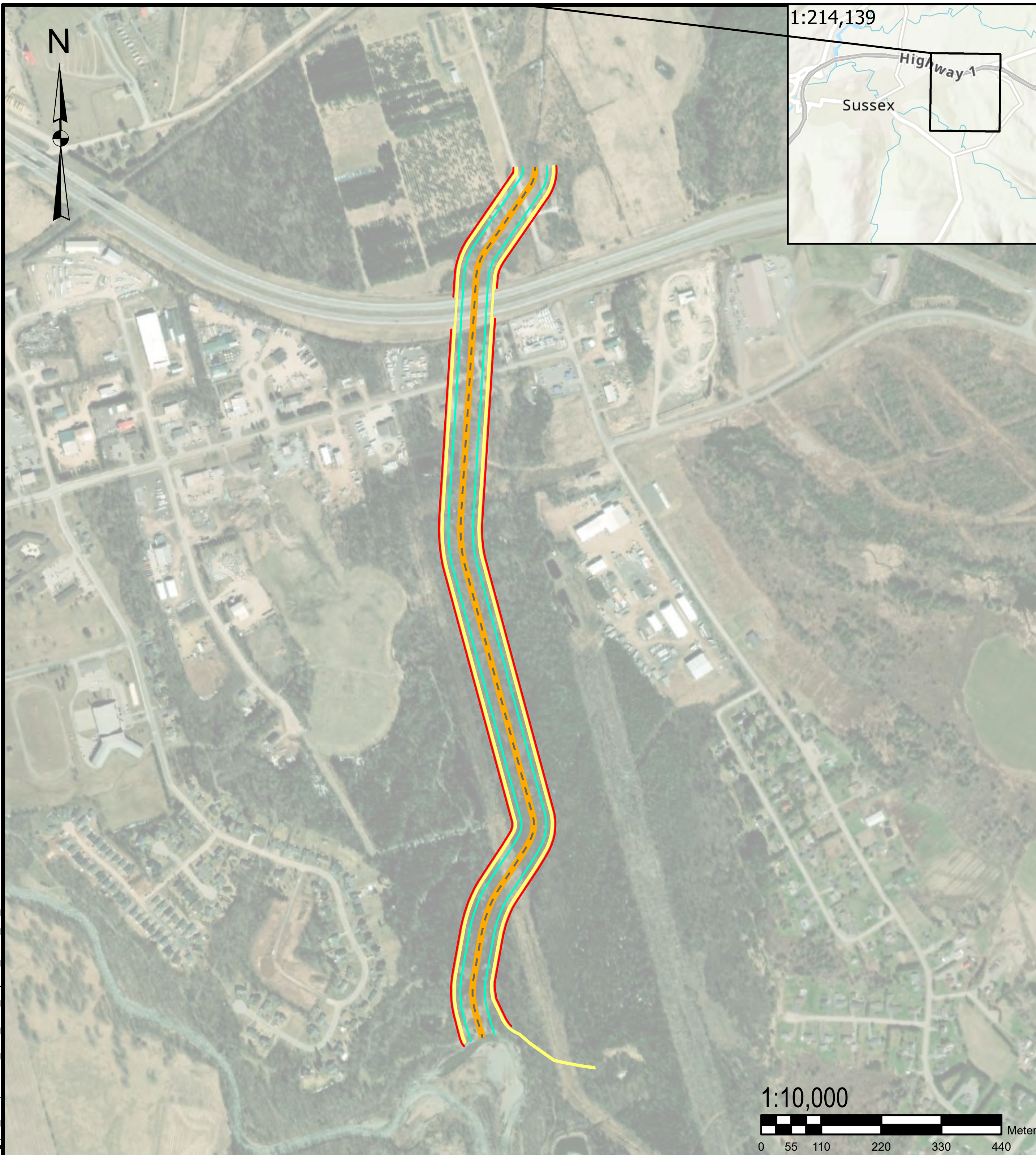
The diversion channel will be situated within an approximately 80 m wide corridor, with a base width of approximately 50 m, a depth of 2 m, and side slopes of 3H:1V. An access road will be constructed along the length of the channel. Construction will be completed using in-situ material, with the final channel lined with grass vegetation for stability. The Plant Road embankment west of Trout Creek will be raised to prevent flow through floodplain and to direct floodwaters into the Trout Creek diversion channel inlet. Additional details on the Plant Road raise are provided in Subsection 2.7.2.2.

A passive concrete intake control structure will be constructed on the right bank of Trout Creek to regulate flow, ensuring diversion occurs only during flood events. The diversion channel will discharge into the existing drainage ditch system north of NB Route 1, which ultimately conveys flows to the Kennebecasis River. The outlet configuration will be designed to integrate with this ditch network to ensure stable conveyance of floodwaters and minimize erosion potential. An existing residential property (PID 30025902) and associated land (PID 00200683) is located near the downstream extent of the drainage ditch system at the end of Adam Lane; accordingly, the final alignment and outlet design will consider property constraints, and acquisition of the affected residence and associated lands may be required to accommodate construction and long-term operation.

During construction, the channel alignment will be cleared and grubbed, followed by excavation. Spoils will be used for access road construction or placed in designated disposal areas located east of the channel. The precise locations of disposal areas are not yet determined but will avoid environmentally sensitive or high-value lands. Laydown areas will include the channel footprint, access road corridor, and temporary staging areas near the intake structure.

Temporary works will include water control measures during construction of the intake and ESC measures along Trout Creek and within the Kennebecasis River floodplain. The estimated construction duration of the diversion channel and intake structure is 24 months (if performed sequentially).

During the operation phase of the Project, flood flows will be diverted from Trout Creek to the Kennebecasis River floodplain only during major flood events. Diversion events are anticipated to occur, on average, once every five years, with each event lasting up to 14 hours.



Legend:

- Bottom Edges
- Centre Line
- Toe of Berms
- Top of Berms

Note:
1. Coordinate system: NB; Stereographic projection, NAD83 (CSRS) Datum.
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3. Vantor, Esri, NASA, NGA, USGS, Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community

Project:	Drawing:
Sussex Flood Mitigation Project, Sussex, New Brunswick	Trout Creek - Channel Alignment
	Client: Sussex

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

Drawn by:	Checked by:	Date:	Project Number:	Drawing Number:	Revision No.
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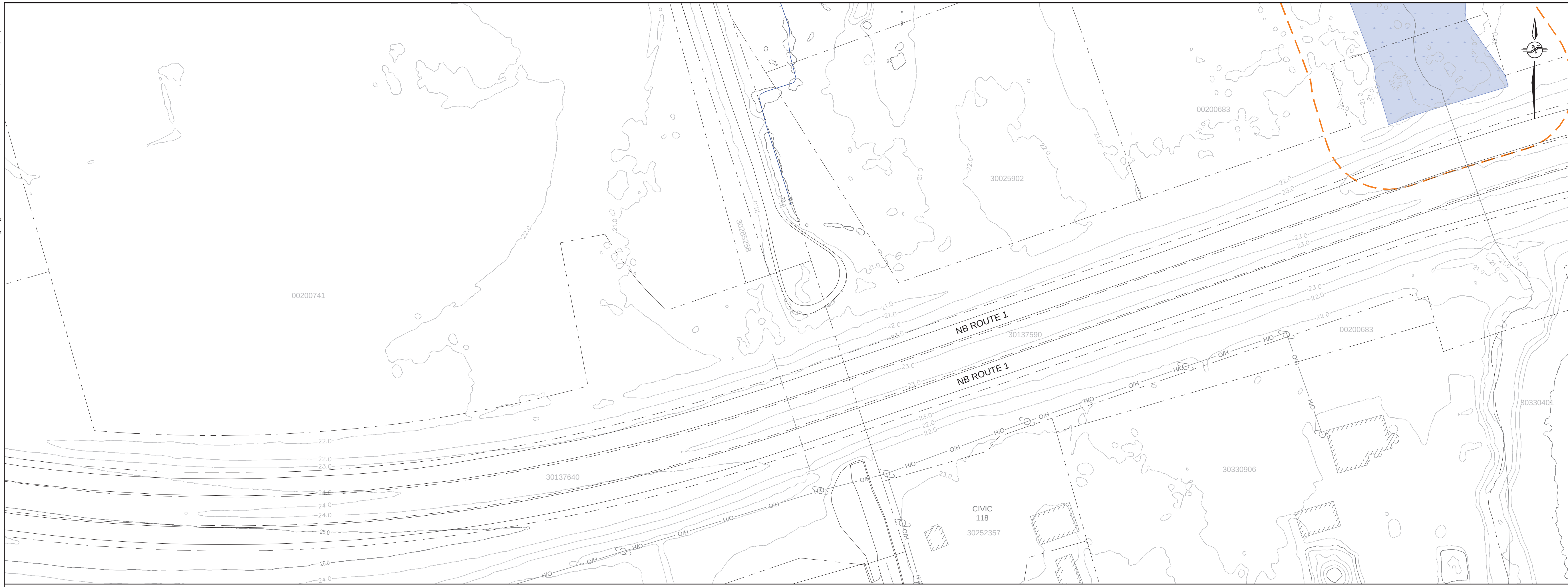
2.7.2.1 New Brunswick Route 1 Structures

The Trout Creek Diversion Channel intersects with both NB Route 1 and Leonard Drive, requiring the construction of new crossing structures at each location. For Route 1, two structures (one eastbound and one westbound) will be constructed where the divided highway crosses the channel (Figure 2.5). At Leonard Drive, a new culvert or small-span bridge will be installed to maintain roadway connectivity across the channel.

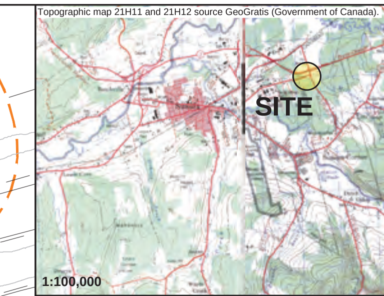
Construction will involve excavation of the existing roadway embankments, installation of culverts or bridge structures, and backfilling around abutments. Excavation spoils will be used for access road construction, backfilling, or hauled off-site. Laydown areas for the Route 1 and Leonard Drive works are anticipated to cover approximately 10,000 m^2 in total and will be located adjacent to the construction footprint.

To maintain traffic during construction, temporary crossovers are expected to be installed in the highway median at Route 1, allowing traffic to be diverted between lanes. At Leonard Drive, temporary traffic closures and detours are anticipated while the culvert or bridge is constructed. All works are anticipated to occur in the dry, with excavation dewatering managed in accordance with applicable environmental regulations.

Disturbed areas will be stabilized using native vegetation and a DTI – approved hydroseed mix. The construction duration for the Route 1 structures is estimated at approximately 36 months, while the Leonard Drive crossing is anticipated to require approximately 9 months (if performed sequentially).



Topographic map 21H11 and 21H12 source GeoGratis (Government of Canada)



NOTES:

1. This drawing is a schematic representation. Sizes, locations and dimensions are approximate.
2. Coordinate system: NB Stereographic projection, NAD83 (CSRS) Datum.
3. Geographic dataset source: GeoNB Data catalogue.
4. Lidar from 2018. Source GeoNB LiDAR.
5. Aerial photograph from 2017. Source: GeoNB Imagery.
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PLAN

ROUTE 1 EXISTING CONDITIONS

1:1000

GENERAL CONSTRUCTION NOTES

1. ALL WORK TO BE PERFORMED IN ACCORDANCE WITH THE CONTRACT SPECIFICATIONS.
2. DRAWINGS TO BE READ IN CONJUNCTION WITH CONTRACT SPECIFICATIONS. FOR DETAILS NOT GIVEN ON THE CONTRACT DRAWINGS, REFERENCE SHALL BE MADE TO THE NEW BRUNSWICK DEPARTMENT OF TRANSPORTATION STANDARD SPECIFICATIONS FOR HIGHWAY CONSTRUCTION AND/OR THE APPROPRIATE DRAWING OR SPECIFICATION REFERENCED IN THE CONTRACT DOCUMENT.
3. ALL WORK TO BE PERFORMED IN ACCORDANCE WITH THE NEW BRUNSWICK DEPARTMENT OF ENVIRONMENT AND LOCAL GOVERNMENT GUIDELINES.
4. CONTRACTOR TO ENSURE WORK IS CARRIED OUT IN ACCORDANCE WITH NB OCCUPATIONAL HEALTH AND SAFETY ACT.
5. CONTRACTOR TO OBTAIN AND POSSESS ON SITE ALL NECESSARY PERMITS PRIOR TO COMMENCING WORK. CONTRACTOR TO COMPLY WITH ALL REQUIREMENTS AND CONDITIONS OF PERMITS.
6. THE CONTRACTOR'S ATTENTION IS DRAWN TO THE LIMITS OF THE WORK AREA. CONSTRUCTION ACTIVITY SHALL BE CONFINED TO THESE LIMITS AND/OR EXISTING EASEMENTS UNLESS OTHERWISE DIRECTED OR DETAILED IN THE CONTRACT DOCUMENTS.
7. ALL AREAS DISTURBED BY CONSTRUCTION OPERATIONS SHALL BE RESTORED AS SOON AS POSSIBLE TO ORIGINAL CONDITION OR BETTER TO THE SATISFACTION OF THE MUNICIPALITY REPRESENTATIVE.
8. CONTRACTOR TO PROVIDE THE MUNICIPALITY REPRESENTATIVE WITH A PROPOSED CONSTRUCTION SCHEDULE PRIOR TO COMMENCING WORK.
9. A PRE-CONSTRUCTION MEETING WITH THE MUNICIPALITY REPRESENTATIVE AND CONTRACTOR SHALL BE HELD PRIOR TO CONSTRUCTION START.
10. CONTOUR LINES SHOWN ON THE CONTRACT DRAWINGS WERE GENERATED FROM LIDAR INFORMATION PROVIDED FROM THE SERVICE NB GEONB WEBSITE. THESE CONTOURS ARE APPROXIMATE ONLY AND SHOULD NOT BE USED WHERE ACCURACY IS CRITICAL.
11. CONTRACTOR TO CONFIRM HORIZONTAL LOCATION AND VERTICAL ELEVATION OF ALL EXISTING SERVICES PRIOR TO COMMENCING WORK. CONTRACTOR TO IMMEDIATELY REPORT ANY DISCREPANCIES TO THE MUNICIPALITY REPRESENTATIVE.
12. REINSTATE THE ENTIRE AREA AFFECTED BY THE CONSTRUCTION ACTIVITIES, OTHER THAN CONCRETE, ASPHALT AND GRAVEL AREAS BY GRADING TO THE SHOWN NEW GRADES, 150mm TOPSOIL AND HYDROSEED. THE GRADING WILL BE INSPECTED BY THE MUNICIPALITY REPRESENTATIVE PRIOR TO TOPSOIL PLACEMENT.
13. ALL DIMENSIONS TO BE FIELD VERIFIED BY CONTRACTOR.
14. CONTRACTOR MAY NOT SUBSTITUTE ANY MATERIALS UNLESS APPROVED BY THE MUNICIPALITY REPRESENTATIVE.
15. CONTRACTOR TO PROVIDE NECESSARY GRADING AND DUST CONTROL FOR ROADWAYS AND CONSTRUCTION SITE AS REQUIRED.
16. THE CONTRACTOR IS RESPONSIBLE TO PROTECT NATURAL WATERCOURSES FROM DAMAGE DUE TO SILTATION RUNOFF FROM THE CONSTRUCTION SITE.
17. DITCHES, SWALES AND PONDS ARE TO BE STABILIZED AS SOON AS IS PRACTICAL AFTER CONSTRUCTION. PERMANENT STABILIZATION SHALL BE COMPLETED WITHIN 30 DAYS OF CONSTRUCTION AND SHALL CONSIST OF: RIPRAP WHERE SPECIFIED ON THE PLANS OR HYDROSEED TO SPECIFICATIONS, UNLESS NOTED OTHERWISE.
18. LOCATIONS AND EXTENT OF UNSUITABLE MATERIAL ARE UNKNOWN. DEFINITION OF UNSUITABLE MATERIAL TO BE DEFINED BY THE GEOTECHNICAL ENGINEER. CONTRACTOR IS RESPONSIBLE TO REVIEW SITE CONDITIONS IN A MANNER DEEMED RELIABLE TO IDENTIFY LOCATIONS AND EXTENT OF UNSUITABLE MATERIAL. CONTRACTOR IS RESPONSIBLE FOR REMOVAL AND DISPOSAL OF UNSUITABLE MATERIAL AND REPLACEMENT WITH MATERIAL APPROVED BY THE GEOTECHNICAL ENGINEER WHERE REQUIRED.
19. REMOVE AND DISPOSE OFF-SITE ALL EXCESS AND/OR UNSUITABLE MATERIALS.
20. CLEARING OF ANY EXISTING VEGETATION OTHER THAN DETAILED ON THE CONTRACT DRAWINGS, SHALL NOT BE UNDERTAKEN WITHOUT SPECIFIC WRITTEN DIRECTION BY THE MUNICIPALITY REPRESENTATIVE. VERTICAL TRENCHING, HAND TRENCHING, AUGURING AND IMMEDIATE BACKFILLING OF ANY TRENCH SHALL BE UNDERTAKEN BY THE CONTRACTOR AS NECESSARY TO ENSURE ALL REASONABLE PRECAUTIONS ARE TAKEN TO PROMOTE THE SURVIVAL OF ANY EXISTING VEGETATION.
21. INSTALL SEDIMENTATION SILTATION CONTROLS AROUND ALL AREAS DISTURBED BY THE CONSTRUCTION. REMOVE ALL SILTATION CONTROLS AND RESTORE ALL EXISTING UTILITIES, PAVED AREAS, DRIVEWAYS, SODDED/SEEDED AREAS, FENCES, ETC., TO ORIGINAL CONDITION UPON COMPLETION OF CONSTRUCTION.
22. TRAFFIC CONTROL: PROVIDE TRAFFIC CONTROL PLAN FOR MUNICIPALITY REPRESENTATIVE TO REVIEW.
23. EXISTING STREET NAME AND TRAFFIC CONTROL SIGNS SHALL BE MAINTAINED THROUGHOUT THE COURSE OF CONSTRUCTION AND RE-INSTATED OR RELOCATED IMMEDIATELY UPON COMPLETION OF BASE ASPHALT INSTALLATION.
24. ALL EXISTING PARKING LOTS DISTURBED BY CONSTRUCTION ACTIVITIES TO BE RE-INSTATED TO MATCH EXISTING CONDITIONS. CONTRACTOR IS RESPONSIBLE FOR DOCUMENTING EXISTING AND POST CONSTRUCTION CONDITIONS OF EXISTING PARKING LOTS IMPACTED BY THE PROJECT.
25. CONTRACTOR SHALL COORDINATE ITS ACTIVITIES WITH OTHER CONTRACTORS WORKING ON THE SITE, IF APPLICABLE.
26. ALL TRAFFIC SIGNAGE SHALL CONFORM TO THE TRANSPORTATION ASSOCIATION OF CANADA'S MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES. (M.U.T.C.D.)
27. CONTRACTOR TO VERIFY EXISTING GRADES, INCLUDING SURROUNDING GRADES PRIOR TO GRADING WORK. ANY DISCREPANCIES TO BE REPORTED TO THE MUNICIPALITY REPRESENTATIVE IMMEDIATELY.

SCOPE OF WORK

LEGEND

PROPOSED LINE TYPE / SYMBOL	DESCRIPTION	EXISTING LINE TYPE / SYMBOL
	PROPERTY LINE (R.O.W.)	
	EASEMENT	
	WETLAND	
	WETLAND 30m BUFFER	
	FLOW ARROW	
	UTILITY POLE	
	SINGLE TREE	
	FLOW DIRECTION	
	GRAVEL / EDGE OF ASPHALT	
	GUIDERAIL	
	FENCE	
	WATERCOURSE	
	DITCH / SWALE	
	TOP SLOPE	
	BOTTOM SLOPE	
	SILT FENCE	
	OVERHEAD LINES	O/H — H/O
	BUILDING	
	RIPRAP	
	GROUND WATER TABLE (PROFILE)	
× 90.00	SPOT ELEVATION	× 90.00
	MAJOR CONTOURS	100.0
	MINOR CONTOURS	100.5
	CONSTRUCTION LIMITS	
LIMIT OF CONTRACT	LIMIT OF CONTRACT	

NUMBER	ISSUE	DATE (2026/02/04)

ENGINEER'S STAMP

DRAWN BY | CHECKED BY

CALCULATIONS BY | CHECKED BY

PROJECT

MUNICIPALITY OF SUSSEX
ROUTE 1 BRIDGES
SUSSEX, NB

DRAWING

EXISTING CONDITIONS, NOTES AND LEGEND

SCALE

AS NOTED

FILE NO.

101539.009

SHEET NO.

C01

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

2.7.2.2 Plant Road Raise

Plant Road is located along the west side of Trout Creek, extending north from Post Road and generally following the creek downstream. If the Trout Creek Diversion Channel were implemented without additional containment, floodwaters would overtop the west bank of Trout Creek in this reach and bypass the diversion channel inlet by flowing across adjacent lands. This bypass flow would reduce the effectiveness of the diversion channel during extreme flood events.

To address this issue, the Project includes raising the Plant Road embankment along the west side of Trout Creek. The embankment raise will prevent floodwaters from bypassing the diversion channel inlet, retain flows within the channel corridor, and direct floodwaters into the Trout Creek diversion channel during major flood events. The need for and extent of the Plant Road embankment raise are based on flood modelling results and are described in the Hydrotechnical Report (Appendix A).

The Plant Road raise will function passively and will not affect normal flow conditions in Trout Creek. The works are intended to operate only during extreme flood events and are an integral component of the overall diversion channel system.

GEMTEC Consulting Engineers & Scientists Limited - 124 Greenview Drive, Hanwell, N.B. (506) 453-1025

NUMBER	ISSUE	DATE (2026/02/04)

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CALCULATIONS BY		CHECKED BY	

PROJECT

PLANT ROAD
&
NATURE TRAIL
RAISE OPTIONS

DRAWING

PLAN

SCALE

1:1500

0 30 60 90m

FILE NO.	SHEET NO.
1015390009	C1

GEMTEC
CONSULTING ENGINEERS AND SCIENTISTS

2.7.3 Bridge Deck Raising: Route 890 and Salmon Covered Bridge

The proposed diversion channels are expected to cause minor, temporary increases in water levels in the Kennebecasis River between the discharge point of the Trout Creek Diversion Channel and the natural confluence of Trout Creek and the Kennebecasis River. To accommodate these changes, the bridge deck elevations at Route 890 and the adjacent Salmon Covered Bridge will be raised. At this stage of planning, detailed design drawings are not available; however, a deck elevation increase of approximately 0.6 m is anticipated for both structures.

During construction, minimal clearing and grubbing will be required, and excavation will be limited. Excavation spoils will be used as backfill against the raised approaches. Laydown areas will be several thousand square metres in size and are expected to be confined to the bridge approaches. Temporary in-water works may include traffic by-pass trestles. Disturbed areas will be stabilized using native vegetation and a DTI – approved hydroseed mix.

Construction to raise both bridges is estimated to require approximately 14 months (if performed sequentially). The operation of the raised bridges will remain unchanged from current practices. Refurbishment or replacement will occur in line with DTI infrastructure renewal policies, with the current service life of both bridges estimated at approximately 60 years.

2.8 Construction Details

The Project is anticipated to be completed within three to five years, pending receipt of all necessary regulatory approvals. Design work is currently underway to refine project details (e.g., channel sizing, alignment, and bridge design) and is expected to be completed during 2026. Construction is anticipated to begin in 2026, with full commissioning by 2031.

Construction activities will be staged, with the major activities and their anticipated timelines outlined below:

- Access preparation, clearing, and grubbing (2026, one season)
- Excavation of diversion channels and placement of staging/laydown areas (2026-2027, two seasons)
- Construction of intake control structures (2026)
- Construction of culverts/bridge structures at Leonard Drive (2026-2027)
- Construction of twin structures at Route 1 (2026-2027, two seasons)
- Raising of Plant Road embankment (2026)
- Raising of bridge decks at Route 890 and the Salmon Covered Bridge (2027)

Construction will generally occur during daylight hours (7:00 a.m. to 6:00 p.m., Monday to Saturday), subject to permitting requirements. The workforce is expected to range from 30 to 50 personnel during peak construction periods.

Major equipment will include excavators, bulldozers, backhoes, graders, dump trucks, concrete mixers, cranes, and hydroseeders. Cofferdams and dewatering systems will be used at intake sites, while standard earthmoving equipment will be used for channel excavation and grading.

Construction activities will generate potential pollutants including noise, dust, sediment-laden water, solid construction wastes, and minor volumes of fuel-oil residues from machinery. Excavation spoils will be reused on site where possible or transported to approved disposal sites. Topsoil will be stockpiled and reused for reclamation, while merchantable timber will be salvaged.

Fill materials (e.g., granular base, rock fill, topsoil) will be obtained from licensed local suppliers or reused from on-site excavation. Several hundred several thousand truckloads of material are anticipated over the construction period; a transportation and traffic management plan will be prepared in consultation with Sussex and DTI to minimize disruption.

Access to construction sites will follow proposed alignments described in Section 2.6.1.3, with temporary detours required during bridge construction at Route 1 and Leonard Drive. Laydown areas will be situated along the channel footprint and in designated upland locations.

Construction near sensitive features such as Parsons Brook, Trout Creek, and the Kennebecasis River floodplain will follow applicable provincial and federal permitting requirements. Temporary works such as cofferdams and water diversion will be installed in compliance with regulatory approvals.

2.9 Operation and Maintenance Details

The Project lifecycle is anticipated to span 80 to 100 years, representing the period during which the diversion channels are expected to function effectively in managing floodwaters and reducing flood risk in Sussex. Over this lifecycle, the channels will require only limited routine maintenance, such as annual mowing, snow clearing, and clearing of debris, to ensure their continued efficiency. The design emphasizes passive operation, with no pumping, mechanical gates, or continuous staff presence required. Refurbishment is anticipated to be limited to reconstruction of the intake control structures approximately once every 80 years.

2.9.1 Residual Flood Areas

The diversion channels are designed to convey flood flows from Parsons Brook and Trout Creek into the Kennebecasis River floodplain during events exceeding the 1:20-year return period. During such events, floodwaters will temporarily inundate the defined floodplain areas adjacent to the Kennebecasis River, as well as the reach of Trout Creek along Plant Road where the embankment is raised to retain flow within the Trout Creek channel and floodplain.

Implementation of the Plant Road embankment raise along the west side of Trout Creek will influence the distribution of residual flooding during extreme flood events. By preventing floodwaters from overtopping the west bank of Trout Creek and bypassing the Trout Creek Diversion Channel inlet, the embankment raise will retain flows within the channel corridor and direct the intended proportion of floodwaters to into the diversion system. As a result, floodwaters that would otherwise spread westward toward the downtown area are expected to be redirected into the Trout Creek Diversion Channel, with potential increases in flood extent and peak flood depths east of Trout Creek, particularly near Nature Trail Street and Brookview Avenue.

The location, extent, and relative magnitude of residual flood under these conditions have been evaluated through hydrotechnical modelling (Appendix A). Potential impact pathways associated with residual flooding, including those affecting residential properties east of Trout Creek, will be identified and assessed in the Effects Assessment (Section 5.0), and appropriate mitigation measures will be described where required. Outside of flood events exceeding the design threshold, no operational water diversion will occur, and existing flow regimes within Parsons Brook and Trout Creek will remain unchanged.

2.9.2 Site Access

Access to the Project features during operation will be via the access roads constructed parallel to each diversion channel. These will allow maintenance crews to reach the intake control structures, embankments, and outflows as required.

- **Parsons Brook Diversion Channel**: Access to the intake will be from Dutch Valley Road and New Line Road near Sussex Corner Elementary School. The outflow will be accessible from behind the school property, adjacent to Herbs Pond
- **Trout Creek Diversion Channel**: Access to the intake will be from Cougle Road, provided that this access route, as described in Section 2.6.1.3, is confirmed prior to construction

Routine access is expected to be limited to light-duty vehicles (e.g., pickup trucks), with only occasional use of heavier equipment for dredging or structure repair.

2.9.3 Project Safety Signs

Permanent signage will be installed at intake structure, bridge crossings, and channel access points to clearly identify restricted areas, project ownership, and emergency contacts.

2.9.4 Routine Maintenance

Routine operation and maintenance activities will include:

- Snow clearing to maintain access to intake control structure in winter
- Vegetation management, including mowing every 1-2 years to prevent overgrowth on embankments
- Annual inspections of channel integrity, banks, and access roads

- Clearing of debris after significant flow events
- Periodic repairs to intake control structures and other infrastructure
- Occasional dredging at intake outflows if sedimentation accumulates following large flood events

No daily operations, raw material inputs, or waste streams are associated with the Project. Waste generated from maintenance (e.g., vegetative debris, sediment) will be disposed of through municipal or contractor facilities in compliance with applicable regulations.

2.9.5 Staffing and Utilities

The Project will not require permanent on-site staff. Municipal or contractor crews will conduct periodic inspections and maintenance. No permanent energy supply is required; maintenance activities will use standard fuel-powered equipment.

2.10 Future Modifications, Extensions, or Abandonment

The Project is designed as a permanent flood mitigation measure for Sussex, with an anticipated service life of 80-100 years. No future modifications, extensions, or abandonment plans are currently proposed or known at this stage of planning.

Should modifications or extensions be required in the future (e.g., to accommodate changes in hydrologic conditions, infrastructure upgrades, or new regulatory requirements), these would be subject to separate review and approval under the EIA process.

Similarly, while the Project is not expected to be decommissioned, any potential future abandonment or decommissioning would require preparation of a detailed decommissioning or site rehabilitation plan, to be submitted for approval by the EIA Branch prior to implementation.

2.11 Project Schedule

The Project schedule outlines the anticipated sequence of key milestones from design through construction and commissioning. Table 2.9 presents the tentative timelines, organized by year and quarter. The schedule is preliminary and subject to refinement as detailed engineering, regulatory review, permitting, and procurement activities progress. Adjustments may also be required to account for seasonal constraints, site conditions, or other unforeseen factors. The schedule may be updated as the Project advances to reflect revised timelines and confirmed activities.

Table 2.9 Project Development Timeline Milestones

Milestone	Task	2023				2024				2025				2026				2027				2028-2031			
Design	Preliminary Design / Concept Development	■	■	■	■	■	■	■	■																
	Hydrologic & Hydraulic Modeling Updates	■	■	■	■	■	■	■	■	■	■	■	■												
	Detailed Design & Engineering					■	■	■	■	■	■	■	■												
EIA	Baseline Field Work					■	■	■	■	■	■	■	■												
	EIA Report Preparation					■	■	■	■	■	■	■	■	■											
	Permit Submission & Approval														■	■									
Engineering & Procurement	Geotechnical Drilling & Investigation									■	■	■	■												
	Procurement of Contractors / Tendering											■	■	■	■										
	Construction Permits														■	■									
Construction – Early Works	Clearing and Grubbing																■	■							
	Excavation and Grading																■	■	■	■					
	Seeding, Hydro-Seeding, and Sodding																			■	■	■			
	Construction of Temporary Facilities																■	■	■	■	■	■			
Construction - Structures	Construction of Access Roads																■	■	■	■	■	■			
	Intake Control Structure																■	■	■	■	■	■			
	Construction of Culverts																	■	■	■	■	■			
	NB Route 1 Structures																	■	■	■	■	■			
Commissioning & Operation	Final Site Stabilization / Revegetation																					■	■	■	
	Commissioning / Testing																					■	■	■	
	Operation Start																								■

2.12 Documents Related to the Undertaking

Several documents have been prepared to support the development and regulatory review of the Project to date. These include technical studies, planning reports, and federal review documentation associated with the *Impact Assessment Act*. Key documents are listed below:

- *Sussex Region Flood Risk Mitigation Plan* (R.V. Anderson Associates Limited, June 28, 2019)
- *Town of Sussex Property Damage Assessment* (GEMTEC, February 1, 2022)
- *Initial Project Description – Sussex Flood Mitigation Proposal* (GEMTEC, November 19, 2024)
- *Conformity Review of the Initial Project Description for the Sussex Flood Mitigation Project* (Impact Assessment Agency of Canada (IAAC), December 2, 2024)
- *Initial Project Description – Sussex Flood Mitigation Proposal* (revised submission, GEMTEC, January 2, 2025)
- *Summary of the Initial Project Description of a Designated Project* (IAAC, January 9, 2025)
- *Summary of Issues* (IAAC, February 20, 2025)
- *Notice of Impact Assessment Decision with Reasons* (IAAC, May 6, 2025)
- *Notice of Impact Assessment Decision with Reasons* (IAAC, May 6, 2025)
- *Sussex Flood Mitigation Hydrotechnical Report* (GEMTEC, November 2025)

Additional correspondence with municipal, provincial, and federal government agencies will be appended to the EIA Registration Document as it becomes available. Concurrent regulatory applications, such as WAWA Permits, will also be documented and cross-referenced once submitted.

3.0 ENVIRONMENTAL IMPACT ASSESSMENT APPROACH AND METHODOLOGY

3.1 Environmental Impact Assessment in New Brunswick

This EIA Registration document has been prepared to meet the requirements of the New Brunswick *Environmental Impact Assessment Regulation 87-83 – Clean Environment Act* (DELG, 2023).

The purpose of the EIA Registration document is to:

- Describe the existing conditions of the PDA
- Provide a detailed description of the proposed Project
- Assess potential effects of the Project (positive or negative) on the existing environment
- Outline proposed mitigation to avoid potential interactions or to reduce anticipated interactions to acceptable levels

The following provincial guidance documents were reviewed to ensure the EIA was prepared to meet the recommended information requirements:

- *A Guide to Environmental Impact Assessment in New Brunswick* (DELG, 2023)

3.2 Scope of the Assessment

The scope of the assessment includes key phases and activities of the Project, as well as the spatial and temporal boundaries for the assessment and the identification of primary environmental components and interactions.

3.2.1 Key Project Phases

A description of the proposed Project, including physical project components and specific activities, is included in Section 2.0. The key phases of The Project that are relevant to the assessment and evaluation of its potential environmental effects include the following.

3.2.1.1 Construction

Project activities expected during the construction phase include:

- Modifications to existing utilities and services (e.g., syphon sewer lines, lower watermain)
- Placement of staging areas
- Vegetation clearing and grubbing
- Excavation of earth
- Grading
- Seeding, hydro-seeding, and sodding (i.e., soil reinforcement)

- Construction of access roads to run parallel with both diversion channels
- Installation of temporary cofferdams
- Dewatering at intake structure
- Construction of intake control structure
- Construction of culverts (bridge or multi-barrel culvert at Leonard Drive)
- Construction of a two bridge/culvert structures on NB Route 1
- Raising of bridge decks at Route 890 and Salmon Covered Bridge

3.2.1.2 Operations and Maintenance

Project activities expected during the operations and maintenance phase includes:

- Snow clearing for access to intake control structures
- Vegetation management (occasional mowing every 1-2 years to prevent overgrowth)
- Infrastructure maintenance (e.g., intake repairs)
- Potential dredging to remove sedimentation deposited during large flood events in areas directly downstream of inlets

Each of these Project phases and the various components and activities associated with each (as listed above) are considered in the environmental effects assessment (Section 5.0) and are reflected in the assessment structure and approach that follows.

3.2.1.3 Closure and Decommissioning

The Project does not have a planned closure and decommissioning phase. The anticipated operational life of 80-100 years reflects the timeframe for infrastructure upgrades rather than an end-of-life horizon. The diversion channel and associated infrastructure are intended to remain in operation beyond this period, with ongoing maintenance and renewal as required. As such, a closure and decommissioning plan is not applicable to this Project.

3.2.2 Identification of Valued Components

The identification of Valued Components (VC) is a critical step in the EIA process, as it helps to focus the assessment on key physical, biophysical, and socioeconomic elements that are likely to interact with the Project. The methodology outlined below describes the systematic approach used to determine VCs.

A preliminary list of potential VCs based on the Project characteristics, location, and regulatory requirements was created as part of the initial VC scoping exercise. Determination of final VCs was determined by industry experts through a review of the Project Description (including scale, location, and description of activities), applicable policies, regulations, and guidelines (including provincial EIA guidelines), regulatory and stakeholder consultation, and review of similar projects. Spatial boundaries were applied to each determined VC to inform baseline study design as well as for the assessment of impact pathways.

Based on these scoping activities the following VCs were identified and are considered in this assessment.

1. Physiography and Geography
2. Surficial and Bedrock Geology
3. Hydrogeology
4. Hydrology
5. Atmospheric Environment
6. Acoustic Environment
7. Wetlands
8. Fish and Fish Habitat
9. Avifauna
10. Vegetation and Rare Flora
11. Terrestrial Wildlife
12. Protected Areas
13. Archaeological and Heritage Resources
14. Public Health and Safety
15. Community and Local Economy
16. Transportation and Infrastructure
17. Land and Resource Use
18. Cultural Features

A summary of physical, biophysical, and socioeconomic VCs and their potential interaction with Project activities is presented in Table 3.1.

Table 3.1 Anticipated VC Interactions with Project

	Physical VCs						Biophysical VCs					Socioeconomic VCs					
	Physiography and Geography	Surficial and Bedrock Geology	Hydrogeology	Hydrology	Atmospheric Environment	Acoustic Environment	Wetlands	Fish and Fish Habitat	Avifauna	Vegetation and Rare Flora	Terrestrial Wildlife	Archaeological and Heritage Resources	Public Health and Safety	Community and Local Economy	Transportation and Infrastructure	Land and Resource Use	Cultural Features
Construction																	
Modifications to existing utilities and services	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Placement of staging areas	✓	✓	✓		✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓
Vegetation clearing and grubbing				✓	✓	✓	✓	✓	✓	✓	✓						
Excavation of earth	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Grading	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Seeding, hydro-seeding, and sodding							✓	✓		✓	✓						
Construction of access roads	✓	✓	✓		✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Installation of temporary cofferdams			✓	✓	✓	✓	✓	✓									
Dewatering at intake structure			✓		✓	✓	✓	✓				✓					
Construction of intake control structure	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Construction of culverts	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Construction of two bridge/culvert structures	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Raising of bridge decks	✓	✓			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Raising Plant Road embankment	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Operations and Maintenance																	
Operation during flood events			✓	✓				✓					✓	✓	✓	✓	✓
Snow clearing					✓	✓		✓									
Vegetation management					✓	✓			✓	✓	✓						
Infrastructure maintenance				✓				✓									
Potential dredging	✓	✓	✓	✓	✓	✓		✓									
Potential Accidental Events																	
Unforeseen resultant flooding				✓			✓	✓				✓				✓	✓
Spills	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓		✓				
Fire					✓		✓		✓	✓	✓		✓	✓	✓	✓	✓

3.2.3 Spatial Boundaries

3.2.3.1 Project Development Area (PDA)

The PDA represents the immediate footprint of all planned Project activities, including construction areas, access roads, and laydown areas. It encompasses the portions of land expected to be directly disturbed during the Construction Phase. The PDA boundaries were delineated using a combination of project-specific buffers and existing property lines to provide a reasonable footprint that maintains flexibility for design and construction while limiting the extent of land acquisition. For the purposes of this assessment, the PDA has been subdivided into three components located within Sussex, Butternut Valley, and Kings Rural District: the Parsons Brook Diversion Channel PDA, the Trout Creek Diversion Channel PDA, and the Bridge Raising Activities PDA.

Parsons Brook Diversion Channel PDA

The Parsons Brook Diversion Channel PDA encompasses an area of approximately 8.56 ha and extends for about 370 metres in a northeasterly direction from Parsons Brook at New Line Road near Sussex Corner Elementary School to its discharge at Herbs Pond. The PDA generally follows the proposed channel alignment, with a 30 m buffer applied along most of its length to capture feasible excavation areas, the footprint of the 50 m wide corridor, and associated works such as the adjacent access road. At the downstream end, the PDA broadens to approximately 90-100 m on either side of the alignment to accommodate construction of the riprap-lined outflow structure and associated grading within the wetland surrounding Herbs Pond. The boundaries were drawn to follow property lines where possible, resulting in a reasonable footprint that provides flexibility for design and construction while limiting the extent of land acquisition.

Trout Creek Diversion Channel PDA

The Trout Creek Diversion Channel PDA encompasses an area of approximately 103 hectares. The PDA begins near the intersection of Post Road and Plant Road and extends approximately 600 m north, encompassing the footprint of the Plant Road embankment raises located south of the proposed Trout Creek Diversion Channel intake structure. The PDA then extends north to include the proposed intake structure on Trout Creek, located near the Sussex walking trail, southeast of Bryant Drive and west of the transmission corridor. The PDA also extends east to include site access routes, potential laydown areas, and ancillary work requirements. The PDA ultimately encompasses the northern extent of the diversion channel alignment, including the discharge location within the Kennebecasis River floodplain north of NB Route 1.

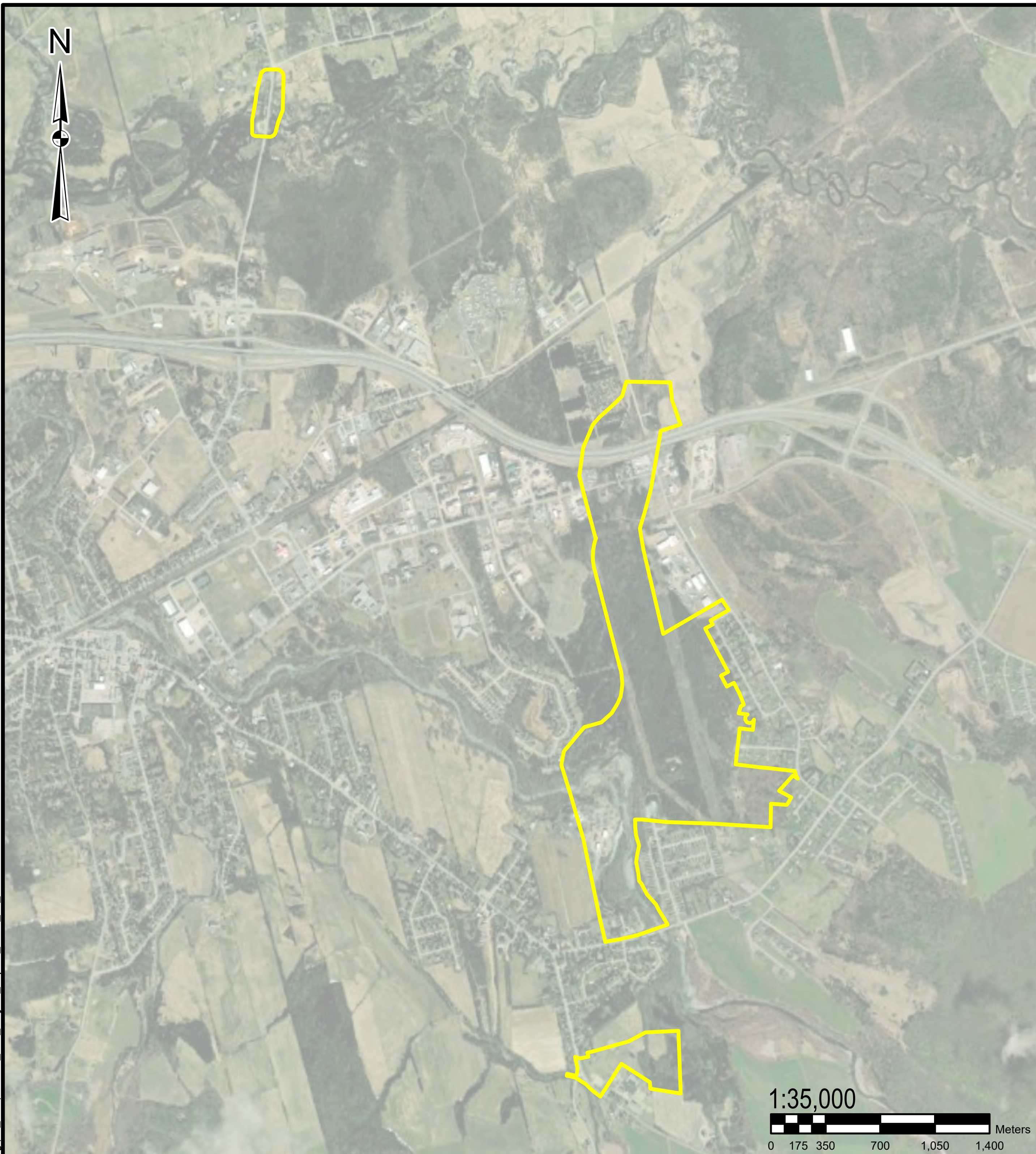
The PDA includes a 250 m buffer around the intake area to capture properties used to access construction footprints. Along most of the alignment, the PDA extends approximately 30 m from the west bank of the channel and up to approximately 500 m to the east, allowing for site access and construction activities within enter from the previously disturbed areas associated with the industrial area along Cougle Road.

The PDA follows the 1,600 m channel alignment and encompasses areas required for the construction of the adjacent access road, excavation footprint, and associated laydown areas. It also incorporates the locations of two bridge raises at Leonard Drive and NB Route 1, where new crossing structures will be required to accommodate the channel. At its downstream end, the PDA includes the drainage ditch system north of Route 1, where the diversion channel will discharge to the Kennebecasis River floodplain. Boundaries were defined using a combination of buffers and property lines to provide a reasonable footprint that captures all essential works while maintaining flexibility for design and construction.

Bridge Deck Raising Activities PDA

The Bridge Deck Raising Activities PDA encompasses an area of approximately 3.38 hectares at the northern boundary of Sussex, adjacent to the rural community of Butternut Valley. It includes a 50 m buffer around the planned bridge-raising works to capture the construction footprint, access requirements, and laydown areas. The PDA includes Smiths Creek Road (NB Route 890) and the Salmon Covered Bridge along the shoreline of the Kennebecasis River, located roughly 1 km north of the Four Corners exit from NB Route 1.

The PDA has been delineated to encompass the area needed for temporary works associated with raising the bridge decks by approximately 0.6 m, including minor clearing and grubbing, limited excavation and backfilling at approaches, and temporary traffic management measures. Boundaries were drawn to provide a reasonable footprint that accommodates these activities while minimizing encroachment beyond the immediate construction zone.



Legend:

Project Development Area (PDA)

Note:
1. Coordinate system: NB; Stereographic projection, NAD83 (CSRS) Datum.
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Project:	Drawing:	
Sussex Flood Mitigation Project, Sussex, New Brunswick	Project Development Area	GEMTEC Consulting Engineers and Scientists
	Client: Sussex	

Drawn by:	Checked by:	Date:	Project Number:	Drawing Number:	Revision No.
CR	KW	February 2026	101539.009	Figure 3.1	0

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3.2.3.2 Local Assessment Area (LAA)

The Local Assessment Area (LAA) represents the geographic extent within which potential Project-related effects are expected to be measurable or reasonably predicted. The LAA was delineated using a hydrology-based approach, reflecting the Project's primary interaction with surface water systems and associated floodplain processes, and provides a consistent spatial framework for assessing biophysical and socioeconomic valued components, including terrestrial lands surrounding Sussex and areas within the municipal boundary.

The LAA encompasses the connected aquatic systems and floodplain areas potentially influenced by the proposed works, including the Kennebecasis River, Trout Creek, Parsons Brook, and Wards Creek, as well as the diversion channel components and adjacent lands. The LAA also includes areas within the municipal boundaries of Sussex where indirect effects related to changes in hydrology, flooding, access, or land use may occur (Figure 3.2).

Upstream and downstream boundaries of the LAA were defined based on hydrologic and hydraulic modelling, extending to locations where the proposed Project is not predicted to result in measurable changes to flow conditions, water levels, or flood extents under existing or design flood scenarios. In addition, a variable buffer was applied beyond the modeled floodplain and diversion infrastructure to capture areas that could experience indirect or secondary effects associated with Project construction or operation, such as localized drainage changes or access modifications.

This hydrology-based LAA provides a conservative and defensible spatial boundary for evaluating potential Project effects across all valued components, including hydrotechnical conditions, wetlands, fish and fish habitat, terrestrial ecosystems, land and resource use, and socioeconomic receptors.

Legend:
Local Assessment Area (LAA)

Note:
1. Coordinate system: NB; Stereographic projection, NAD83 (CSRS) Datum.
2. Contains information licensed under the Open Government License - New Brunswick.
3.Service Layer Credits: Earthstar Geographics

Project: Sussex Flood Mitigation Project, Sussex, New Brunswick			Drawing: Local Assessment Areas (LAA)		GEMTEC Consulting Engineers and Scientists
			Client: Sussex		
Drawn by: CR	Checked by: KW	Date: February 2026	Project Number: 101539.009	Drawing Number: Figure 3.2	Revision No. 0

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3.2.3.3 Regional Assessment Area (RAA)

The Regional Assessment Area (RAA) defines the broader spatial context within which potential cumulative and Project-related effects are considered. For this Project, the RAA has been delineated as the Kennebecasis River Watershed (Figure 3.3). For VCs where the watershed boundary is not an appropriate spatial context, an alternate RAA will be defined.

The Kennebecasis River Watershed provides an ecologically and hydrologically relevant unit for evaluating potential effects that extend beyond the PDA and LAA. This watershed-based approach is appropriate given the Project’s focus on hydrological modifications and flood management. The general boundary of the Kennebecasis River Watershed also broadly corresponds with the Kingston Ecodistrict (5-11), thereby providing a suitable spatial framework for assessing terrestrial VCs, including landscapes and ecological communities that may experience indirect Project effects.

Using the watershed boundary as the RAA ensures that potential changes in surface water, groundwater, aquatic habitats, and terrestrial ecosystems are assessed within a meaningful natural unit, while also capturing the broader context for socioeconomic VCs, including community infrastructure and land use within Sussex, Butternut Valley, and Kings Rural District.

Legend:
Regional Assessment Area (RAA)
Approximate Project Location

Note:
1. Coordinate system: NB; Stereographic projection, NAD83 (CSRS) Datum.
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Project: Sussex Flood Mitigation Project, Sussex, New Brunswick	Drawing: Regional Assessment Area	GEMTEC Consulting Engineers and Scientists
	Client: Sussex	

Drawn by:	Checked by:	Date:	Project Number:	Drawing Number:	Revision No.
CR	KW	February 2026	101539.009	Figure 3.3	0

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3.2.4 Temporal Boundaries

3.3 Identification of Impact Pathways and Determination of Significance

3.3.1 Identification of Impact Pathways

This methodology outlines the approach used to identify potential interactions between the proposed project activities and the selected VCs. Identifying these pathways supports the evaluation of potential impacts. For the purposes of this EIA, impact pathways are categorized as direct and indirect impacts.

Direct impacts refer to the immediate and measurable effects of project activities on the environment, occurring as a direct result of the Project's actions. These impacts are typically predictable and occur at the same time and place as the activity. For example, installation of cofferdams can directly alter water flow patterns, potentially impacting aquatic organisms and sediment transport within the immediate construction area. Generally, direct impacts are confined to the PDA but may extend into the LAA in cases of accidental events such as fires, spills, or erosion.

Indirect impacts are the secondary effects that result from direct impacts and may develop over time or across a broader area. These impacts are not always immediately apparent. For example, a potential change in hydrology from the diversion channel construction could alter natural groundwater recharge patterns, potentially affecting nearby wetlands or water sources over time. Indirect impacts can occur at various scales but are typically associated with the LAA and RAA.

3.3.2 Effects Assessment Criteria

Once impact pathways have been identified, criteria (including magnitude, duration, frequency, extent, likelihood, etc.) were determined and applied to evaluate significance of impacts. Impact pathways for each VC have been qualitatively evaluated using the criteria defined below to determine significance. (Table 3.2).

Table 3.2 Effects Assessment Criteria

Criteria	Definition	Rating
Magnitude	The intensity or degree of change caused by the impact pathway relative to the baseline condition, ranging from negligible to high severity.	This will vary across VCs. **Negligible** - no detectable effect that would result in changes from current conditions **Low** – minor but detectable effects on the environment, often reversible and easily managed with standard mitigation measures. **Medium** – Moderate impacts that are more noticeable and extend over a larger area or time, requiring specific mitigation strategies but typically manageable. **High**- Significant, widespread, and often irreversible impacts causing long-term environmental damage, potentially requiring extensive or complex mitigation efforts.
Duration	The length of time over which the impact is expected to occur, categorized as short-term, medium-term, or long-term.	**Short Term** – residual effect restricted to no more than the duration of the construction phase **Medium Term** – residual effect extends through the operation and maintenance phase **Long Term** - residual effect extends beyond the decommissioning phase
Frequency	How often an environmental effect will likely occur.	**Once** – Occurs once during the Project **Sporadic** – Occurs sporadically during the Project **Regular** – Occurs on a regular basis throughout the Project **Continuous** – Occurs repeatedly throughout the Project
Extent	The geographical area affected by the impact, ranging from direct (PDA) to localized (LAA) or regional (RAA).	**PDA** – residual effects are restricted to the PDA **LAA** – residual effects extend into the local assessment area **RAA** – residual effects interact with those of projects in the regional assessment area
Reversibility	The potential for the affected environment to return to its pre-impact condition after the impact has occurred, classified as reversible or irreversible.	**Reversible** – the impact from project activities is likely to be reversed after the activity is completed **Irreversible** – impact from project activities is unlikely to be reversed
Likelihood	The degree of probability that a predicted effect will materialize, given the current understanding of the Project, conditions, and influencing factors	**Unlikely** – Impact is improbable **Possible** – moderate chance of occurrence **Likely** – Strong probability of occurrence **Almost Certain** - Impact is expected to occur

If based on the criteria in Table 3.2, a residual effect is identified, its significance is evaluated based on the significance definitions provided below.

3.3.3 Determination of Significance

Significant Residual Effects are defined as those residual effects that could result in a change in the VC that will alter its condition or integrity beyond an acceptable and sustainable level following implementation of recommended mitigation strategies. Significant effects may result in a moderate to high change to baseline levels and additional monitoring, mitigation, and recovery initiatives may be required.

A residual effect determined to be Not Significant is defined as a potential effect that may result in low to negligible change in the VC where conditions should return to baseline levels in the short term. For Not Significant effects, further mitigation or monitoring are not recommended.

The overall sensitivity of a VC to environmental change, which may be the result of a complex mix of factors, was considered when evaluating significance of individual project-related effects as well as cumulative effects. For instance, loss of an individual organism may not be significant for a species with a stable population but may be significant for a species at risk.

3.4 Mitigation and Monitoring

Mitigation and monitoring recommendations are proposed as needed to minimize potential environmental impacts and assess whether EIA predictions are accurate. These measures also help evaluate the effectiveness of mitigation strategies and determine if additional actions are required.

Mitigation strategies are developed to avoid, reduce, or compensate for identified impact pathways. They may be necessary to meet regulatory requirements, ensure compliance with environmental standards, or address uncertainties in the EIA process.

Monitoring may be recommended to verify predicted environmental effects and assess the effectiveness of implemented mitigation measures. This helps address uncertainties and ensures that environmental commitments are met.

3.5 Cumulative Effects Assessment

The IAAC defines cumulative effects as "*…the combined effects from past, present, and reasonably foreseeable future activities and natural processes*" (2024). For this project, the potential for cumulative effects was assessed for each identified VC at the RAA scale. The RAA for each VC was defined based on the spatial scale at which cumulative effects could reasonable be anticipated.

For each VC, impact pathways were identified, and an effects assessment was conducted to determine whether residual effects would remain after mitigation measures were applied. The cumulative effects assessment then considered these residual effects in relation to other activities and land uses that could generate similar impacts.

The goal of the cumulative effects assessment for this project is to identify past (i.e., residual effects of historical stressors), present, and future environmental stressors and evaluate whether the Project could amplify or contribute to their effects.

The interaction of multiple stressors can result in cumulative effects that are either additive (incremental) or synergistic, where the combined impact is greater than the sum of individual effects (IAAC, 2024). Conversely, depending on factors such as the magnitude of an additional stressor and the specific mechanisms of impact, the cumulative effect may be no greater than the existing effects of other stressors (e.g., land uses).

In some cases, masking can occur, where the effects of other activities (e.g., land uses) are so substantial that the additional effects of the Project become negligible or undetectable. However, it should be noted that a masked effect may become significant if the original stressor is removed. In other situations, the interaction of multiple physical activities can produce a compensatory effect, where individual impacts offset each other, resulting in no measurable change, or even a net positive environmental outcome.

Naturally occurring factors that influence VCs (e.g., predation, wildfire, weather) were generally not considered in the cumulative effects assessment.

The cumulative effects assessment (Section 5.15) for the Project is a primarily qualitative, desktop-based analysis focused on stressor mechanisms (i.e., impact pathways). The assessment considers activities that have the potential to contribute to cumulative environmental change through shared mechanisms, such as activities that alter hydrologic conditions, regardless of project type or sector. This approach allows cumulative effects to be evaluated in relation to how environmental change may occur within the receiving environment.

4.0 DESCRIPTION OF THE EXISTING ENVIRONMENT

4.1 Physical Features

4.1.1 Physiography and Geography

The PDA lies within the Kingston Ecodistrict of the Valley Lowlands Ecoregion (Zelazny, 2007). This region is characterized by broad, low-relief river valleys and gently rolling uplands shaped by glacial and post-glacial processes.

Regionally, ground elevations range from approximately 12 masl in the river corridors to over 307 masl on adjacent upland ridges (GNB, 2026). The landscape generally slopes northwesterly, directing surface drainage toward the Kennebecasis River and its tributaries, including Trout Creek and Parsons Brook.

Within the PDA, elevations range from approximately 13.2 masl at the Kennebecasis River, where bridge raising activities are proposed, to 37.2 masl on higher ground surrounding the proposed Parsons Brook Diversion Channel. The PDA exhibits a gentle topographic gradient with slopes typically less than 10%. However, localized areas of steeper terrain (>20%) are present along sections of Parsons Brook where incised banks occur. Surface drainage within the PDA flows northward into Trout Creek and Parsons Brook, which ultimately contributes to the larger Saint John River Basin and discharges into the Bay of Fundy.

The physiographic characteristics of the PDA are typical of the Kennebecasis River valley, with low-lying riparian zones adjacent to watercourses and its associated floodplains that may be subject to seasonal flooding.

As illustrated in Figure 4.1, the contours within the LAA show a gradual rise in elevation from the Kennebcasis River floodplain in the northwest to rolling uplands in the southeast. Closely spaced contour lines along Parsons Brook and its tributaries indicate localized areas of steeper slopes and incised valleys, while more widely spaced contours across the upland areas reflect gentle to moderate slopes. These topographic variations define the physical character of the LAA and influence the flow paths of surface water toward the Kennebcasis River.

Legend:

Project Development Areas (PDAs)

Contours (10 m)

Note:
1. Coordinate system: NB; Stereographic projection, NAD83 (CSRS) Datum.
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Project: Sussex Flood Mitigation Project, Sussex, New Brunswick				Drawing: Topography Client: Sussex	
Drawn by: CR	Checked by: KW	Date: February 2026	Project Number: 101539.009	Drawing Number: Figure 4.1	Revision No. 0

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4.1.2 Surficial and Bedrock Geology

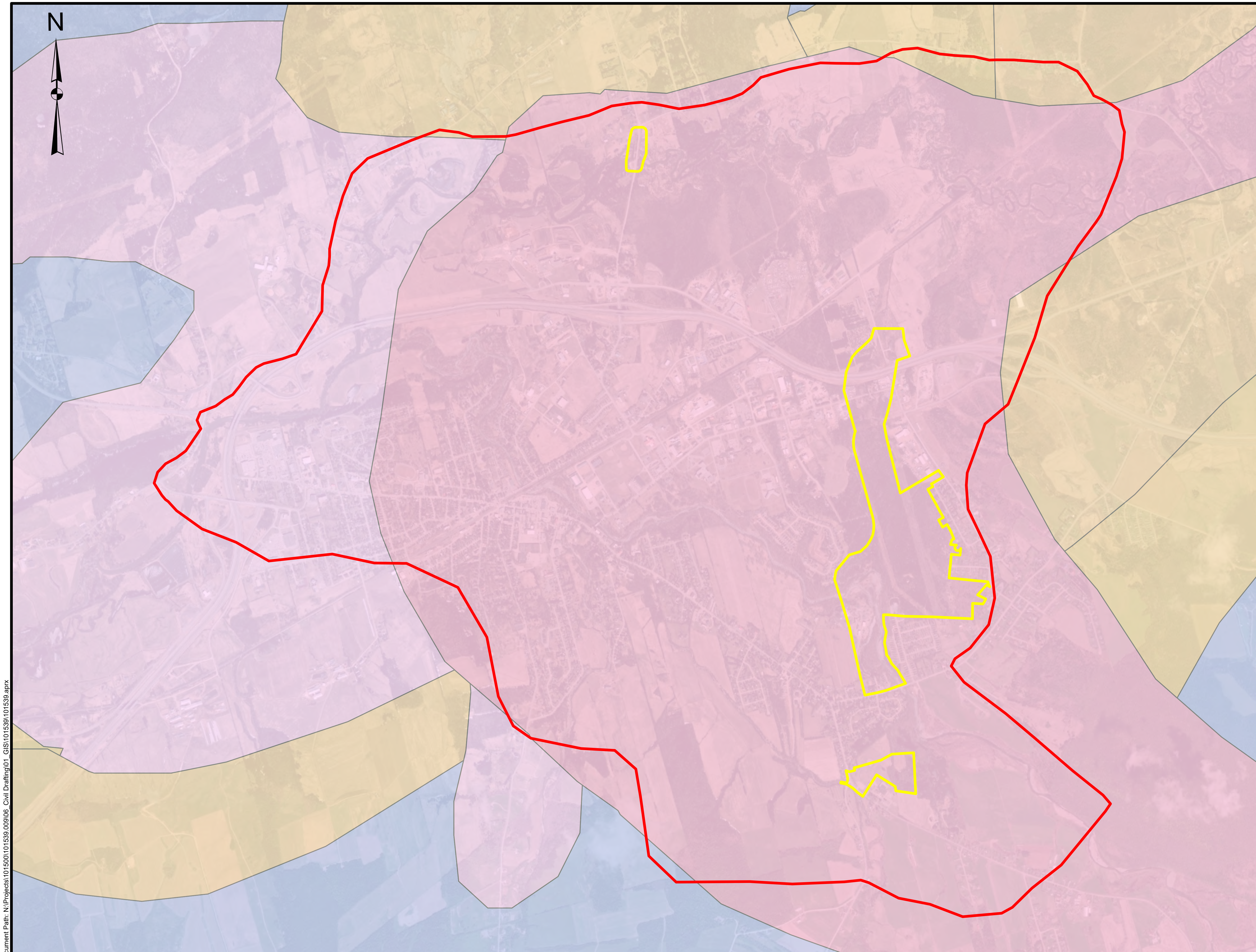
Surficial Geology

The surficial unit mapped across the PDA is classified as undifferentiated alluvial sediments of Holocene age. These deposits were laid down after the last glaciers retreated, by the Kennebecasis River and its tributary channels as they re-established meanders, overbank-flooded, and reworked older glacial materials. Consequently, the sediment is unconsolidated to very weakly compacted layers of sand and silt with local lenses of gravel or cobbles, minor clay in slack-water zones, and occasional thin organic horizons in abandoned channels or oxbows (Rampton, 1980; 1984). The texture and bedding vary laterally over short distances – typical of flood-plain environments – and thickness can range from a discontinuous veneer (< 1 m) on levee crests to several metres in channel belts or infilled scour hollows. Because the material is young and porous, it supports a shallow, responsive groundwater table and is prone to periodic saturation during high-flow events.

Beyond the Trout Creek floodplain, the uplands encircling Sussex are mantled by Late-Wisconsinan glacial and glaciofluvial units. The dominant cover is thin veneer of lodgement till (Tv) – a compact, matrix-supported mix of silt, sand, gravel, and scattered boulders deposited beneath moving ice. Locally this veneer thickens or grades into:

- **Th – hummocky ablation till**, a boulder-rich melt-out till forming irregular mounds where stagnant ice melted in place
- **GFc – ice-contact (kame/morraine) sand-and-gravel complexes**, ridged or hummocky features laid against the wasting ice margin
- **GFp – outwash-plain sand-and-gravel**, stratified sheets that blanket valley shoulders where meltwater streams spread beyond the ice front
- **Tb – bouldery or deformation till** in pockets where basal ice shearing concentrated coarse clasts

Isolated bedrock outcrops (R) appear on steep slopes or knolls where the glacial mantle is thin or eroded. Taken together, this assemblage records the transition from glacial deposition on the plateau to post-glacial fluvial reworking in the valley bottom, providing the broader geomorphic context for the Holocene alluvium that underlies the PDA (Figure 4.2).



Legend

Local Assessment Area (LAA)

Project Development Areas (PDAs)

Generalized Surficial Geology

- A: Alluvial sediments - undifferentiated
- GFc: Glaciofluvial sediments - ice contact moraine or kame
- GFp: Glaciofluvial sediments - outwash plain sediments
- Tb: Till - blanket (deposited by active flowing ice)
- Th: Till - hummocky melt-out till (deposited by stagnating remnant ice)
- Tv: Till - undifferentiated veneer

Notes
1. Coordinate system: New Brunswick Stereographic, NAD83 (CSRS) Datum.
2. Geographic dataset source: GeoNB Data Catalogue.
3. Contains information licensed under the Open Government Licence - New Brunswick.
4. This drawing is a schematic representation. Sizes, locations and dimensions are approximate.
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Date	Draw by	Checked by
FEBRUARY 2026	CR	KW

Client: Sussex

Project: Sussex Flood Mitigation Project, Sussex, New Brunswick

Drawing: Surficial Geology

Scale: Scale: 1:25,814

0 162.5 325 650 975 1,300 Meters

Project No.	Drawing No.	Rev.No.
101539.009	FIGURE 4.2	0

GEMTEC Consulting Engineers and Scientists

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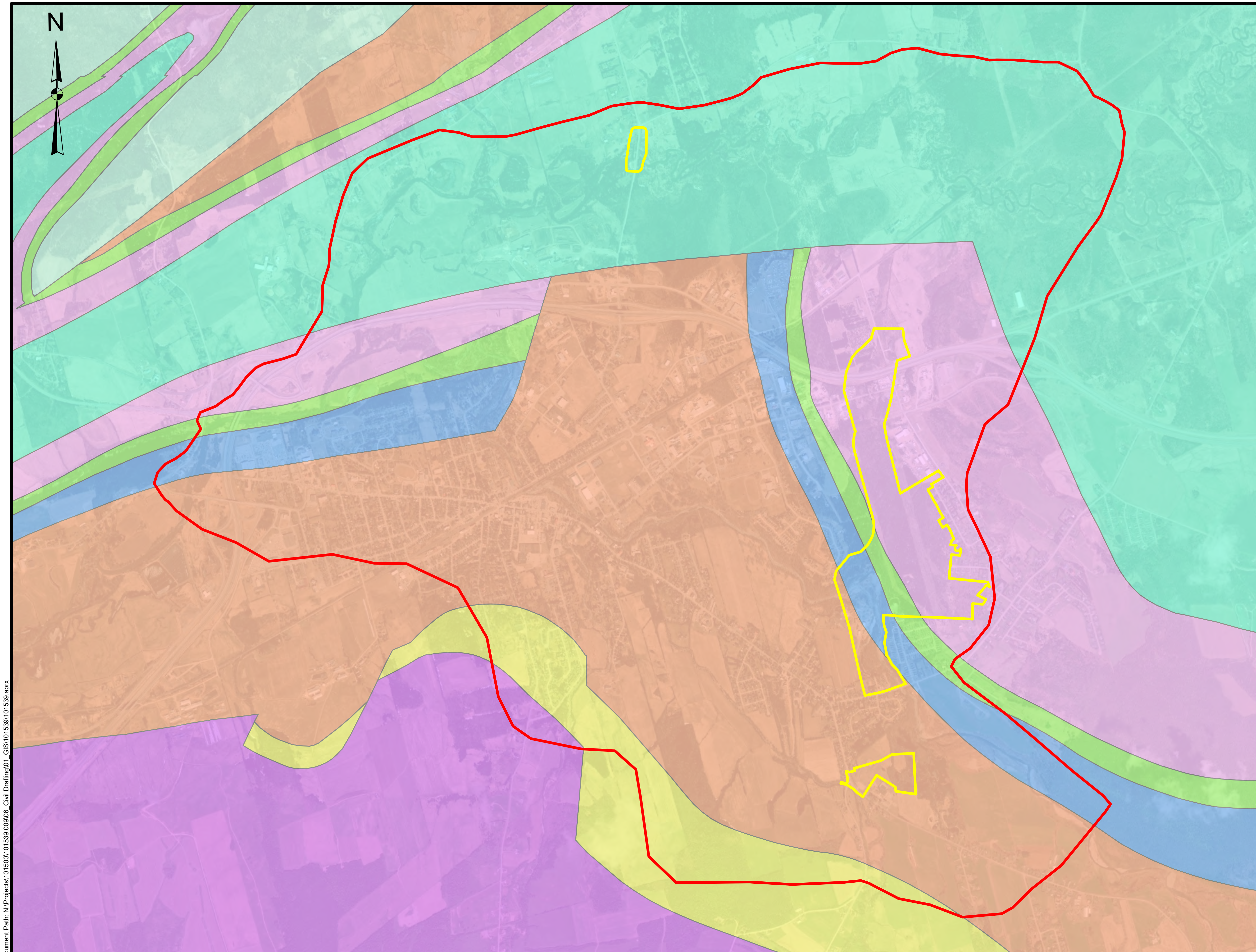
Bedrock Geology

The PDA lies within the Moncton Sub-basin of the Maritimes Basin and is underlain by Early- to Middle-Carboniferous sedimentary rocks recording a transition from high-energy continental redbeds, through shallow-marine carbonates and evaporites, back to continental fluvial deposits. Five mapped bedrock units occur within, or immediately beneath, the PDA (Figure 4.3) and are summarized below.

- **Weldon Formation (WLN-fc – late Tournaisian to early Visean)** – dark-red sandstone and mudstone that pass upward into coarse, pebbly sandstone and polymictic conglomerate, locally containing thin green tuff beds. These deposits represent proximal alluvial-fan and braided-river systems laid down early in basin filling. The Parsons Brook Diversion Channel footprint crosses the upper part of this formation where it abuts the Hillsborough redbeds.
- **Hillsborough Formation (HLS-cc – late Tournaisian to early Visean)** – reddish-brown, coarse-grained lithic sandstone, sandy conglomerate and pebble beds formed by high-energy fluvial channels on an aggrading flood-plain. Steeper banks along Trout Creek expose these resistant sandstones, and the Trout Creek Diversion Channel footprint is predominantly underlain by this unit.
- **Macumber Formation (MCM-ls – early Visean, Windsor Group)** – olive- to dark-grey micritic and pelletal limestone/dolostone, thinly laminated and locally fossiliferous, representing the first marine flooding event in the basin. Narrow tongues of this carbonate crop out along the Trout Creek valley flood beneath the Hillsborough sandstones.
- **Upperton Formation (UPP-e – middle Visean, Windsor Group)** – stratabound anhydrite-gypsum bodies interbedded with greenish mudstone and fine sandstone, deposited in a restricted-marine sabkha to salina setting. Surface exposures are uncommon; subsurface evaporites are expected beneath portions of the Trout Creek floodplain where the Macumber carbonate grades upward into the Upperton sequence.
- **Mabou Group – coarse-grained clastics (MB-cc – late Visean to early Namurian)** – red siltstone and sandstone that coarsen upward into conglomerate and pebble beds, deposited by meandering rivers and alluvial fans that on-lapped the Windsor evaporites. Bridge raising activities at Route 890 and Salmon Covered Bridge over the Kennebecasis River sits on this unit, which forms the broad upland plateau around Sussex.

In map view, the diversion-channel footprints straddle the contact between the Weldon–Hillsborough redbeds and the Windsor carbonate–evaporite sequence, whereas the Route 890 and Salmon Covered Bridge PDA lies entirely on younger Mabou redbeds. Bedrock exposure is generally limited to steep cut-banks and channel margins, with till or Holocene alluvium elsewhere.



Legend

Local Assessment Area (LAA)

Project Development Areas (PDAs)

NB Bedrock Geology

Albert Formation - clastic sedimentary rocks

Hillsborough Formation - coarse-grained clastic sedimentary rocks

Mabou Group - coarse-grained clastic sedimentary rocks

Macumber Formation - limestone

Mill Brook Formation - coarse-grained clastic sedimentary rocks

Ridge Brook Formation - coarse-grained clastic sedimentary rocks

Upperton Formation - evaporites

Weldon Formation - fine-grained clastic sedimentary rocks

Notes

1. Coordinate system: New Brunswick Stereographic, NAD83 (CSRS) Datum.
2. Geographic dataset source: GeoNB Data Catalogue.
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Date	Draw by	Checked by
FEBRUARY 2026	CR	KW

Client: Sussex

Project: Sussex Flood Mitigation Project, Sussex, New Brunswick

Drawing: Bedrock Geology

Scale: 1:25,814

0 162.5 325 650 975 1,300 Meters

Project No.	Drawing No.	Rev.No.
101539.009	FIGURE 4.3	0

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4.1.3 Hydrogeology

The New Brunswick Online Well Log System (OWLS) database was searched for groundwater wells within the study area (combined 3 km buffers around the three PDA components). A total of 152 wells were identified. They were categorized as follows:

- Drinking Water:
  - Domestic: 144
- Non-Drinking Water:
  - Heat Pump: 1
  - Industrial: 4
  - Observation: 3

Of the 152 wells, 126 (82.9%) recorded a bedrock depth > 0 m. Among those, Sandstone (41.3%), and Shale (27.8%) were most common, with smaller proportions of Conglomerate (4.8%) and other lithologies (each < 3%). “Hard bedrock” (Sandstone, Shale, Granite, Slate, or Rock) accounted for 116 of the 126 wells to hit bedrock (92.1%), representing 76.3% of all wells.

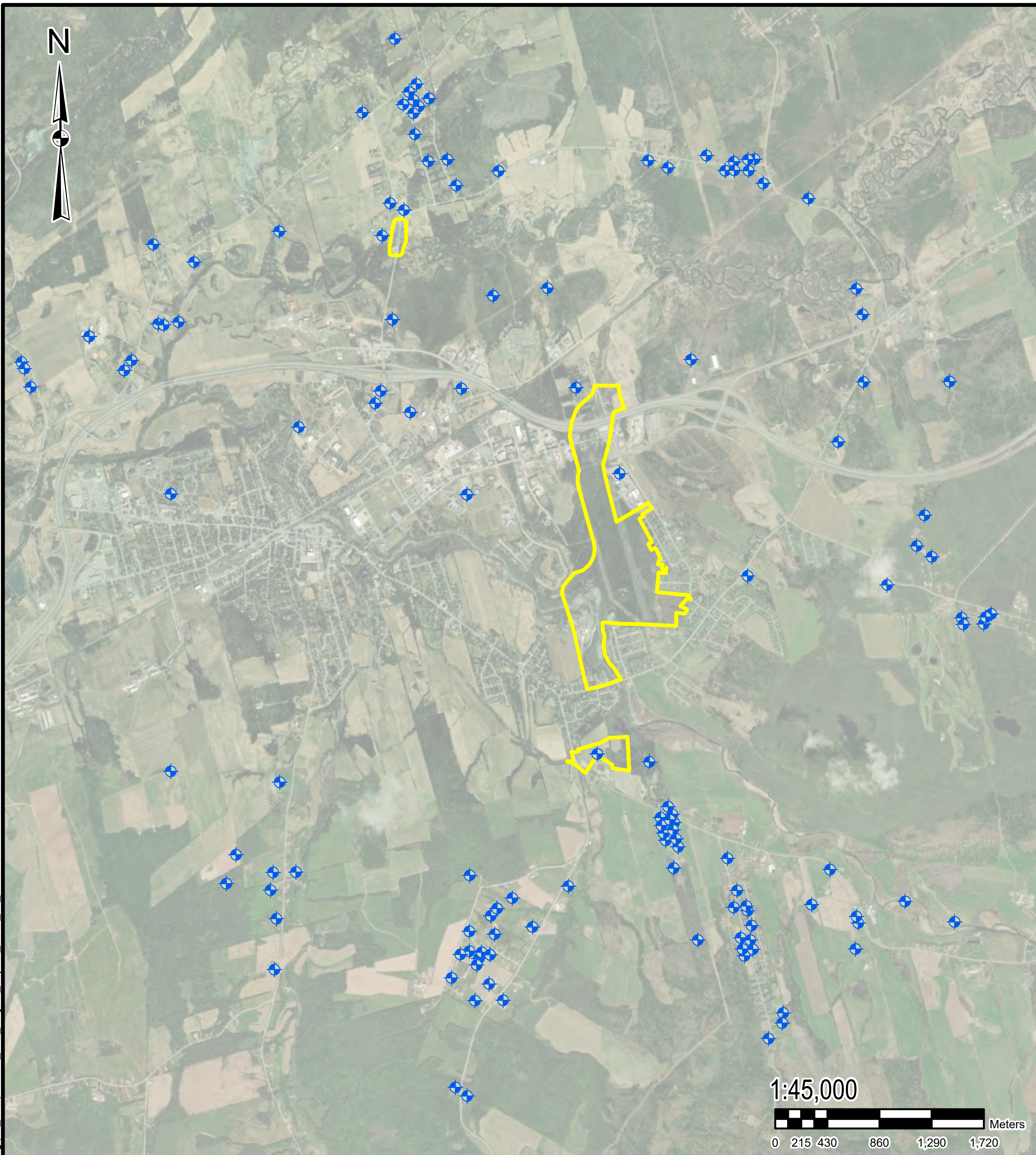
A single well (Report No. 7589) was identified in the Parsons Brook Diversion Channel portion of the PDA. The well use is Non-Drinking Water and the subcategory is Observation. The well was drilled to 22.25 metres below ground surface (mbgs) and recorded a bedrock level of 0 m. The driller estimated a safe yield of 46 L/min, with a water-bearing fracture zone at 22.25 mbgs producing 45.5 L/min. Lithology consisted of brown silty sand and clay from 0–8.23 mbgs, brown clay from 8.23–18.29 mbgs, and brown sand and gravel from 18.29–22.25 mbgs.

Sussex Ward 2 (formerly the Village of Sussex Corner) has three production wells, one of which falls within the Trout Creek PDA. The single well identified is likely an observation well from the drilling of Well #3 in 2003 (Neill and Gunter Limited, 2004).

Given their proximity, the aquifers and hydrogeology underlying the PDA are likely very similar to that of the setting of the Well #3 is drilled in the Lower Sussex Aquifer (GEMTEC Consulting Engineers and Scientists, 2024). The Lower Sussex Aquifer is classified as a well-sorted glaciofluvial/ ice contact sand and gravel with thicknesses greater than 10 m (Brinsmead, 1981). The Middle Sussex Aquitard overlies the Lower Sussex Aquifer, this layer ranges from 3 m to 18 m (Brinsmead, 1981). Within the PDA it is anticipated that the Upper Sussex Aquifer overlies the Middle Sussex Aquitard. The upper aquifer is identified as unconfined well-sorted sand and gravel with high permeability (Broster & Pupek, 2001). Drilling during other groundwater exploration programs for Sussex it was discovered that the Middle Sussex Aquitard is discontinuous, and that there are possible windows present (Broster & Pupek, 2001). The importance of this is that in some places hydraulic communication between the upper and lower aquifer units could exist.

The recharge to the Lower Sussex Aquifer likely originates from the upstream valley of Trout Creek, and partially from the Parsons Brook Valley (Neill and Gunter Limited, 2004). Neill and Gunter (2004) completed hydraulic testing on Well 3, which estimated the transmissivity of the Lower Sussex Aquifer between 1110 m2/day and 5120 m2/day and storativity between 1.0 x 10-2 and 2.0 x 10-11. The Parsons Brook PDA falls within Zone A of the Sussex Corner Designated Wellfield.

Well locations are illustrated in Figure 4.4. OWLS only includes wells drilled after 1994, so additional wells may exist within the study area.



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Legend:
- Well Locations
- Project Development Areas (PDAs)

Note:
1. Coordinate system: NB; Stereographic projection, NAD83 (CSRS) Datum.
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Project:	Drawing: Well Locations
Sussex Flood Mitigation Project, Sussex, New Brunswick	Client: Sussex

Drawn by:	Checked by:	Date:	Project Number:	Drawing Number:	Revision No.
CR	KW	February 2026	101539.009	Figure 4.4	0

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4.1.3.1 Groundwater Quality

Key groundwater chemistry parameters were selected to provide a representative summary of water quality conditions in the vicinity of the PDA. In accordance with *Regulation 93-203* under the *New Brunswick Clean Water Act*, the well chemistry data are presented in aggregate form and do not identify the specific locations from which each sample was collected.

To avoid redundancy in the dataset – given that well identifiers are not included – a 5 km buffer was applied around the centre of the Trout Creek Diversion Channel PDA when downloading records, rather than the 3 km buffer used for individual Project components, as described earlier. This approach ensured that overlapping wells were not overrepresented while still capturing the relevant hydrogeological context.

Each parameter was compared against the applicable limits established in the Guidelines for Canadian Drinking Water Quality (Health Canada, 2025). These guidelines include two main types of thresholds:

- **Maximum Acceptable Concentration (MAC)**: health-based limits intended to protect against adverse health effects over a lifetime of exposure
- **Aesthetic Objectives (AO)**: non-health-based guidelines intended to maintain consumer acceptability, such as taste, odour, or appearance

The selected parameters and comparison to guideline values are summarized in Table 4.1.

Table 4.1 Groundwater Chemistry Data for Wells within 5 km of Centre of Site

Parameter	MAC	Number of Samples	Number of Exceedances	Minimum	Maximum Concentration
Alkalinity	-	78	NA	25	313
Aluminum	2.9	83	0	0.001	1.6
Antimony	0.006	79	0	0.0001	0.0044
Arsenic	0.01	82	3	0.001	0.0153
Barium	2	82	0	0.01	1.2
Boron	5	82	0	0.009	4.8
Bromide	-	72	NA	0.1	0.336
Cadmium	0.007	82	0	0	0.0005
Calcium	None required	82	NA	0.108	451
Chloride	≤ 250 (AO*)	82	4	1.85	1445

Parameter	MAC	Number of Samples	Number of Exceedances	Minimum	Maximum Concentration
Chromium	0.05	82	0	0	0.032
Conductivity	-	82	NA	92.4	4960
Copper	1 (AO*)	82	0	0.002	0.245
E. coli - P/A	None per 100 mL	84	4	NA	NA
Fluoride	1.5	82	1	0.06	1.76
Hardness	-	70	NA	0.65	1230
Iron	≤ 0.1 (AO)	83	29	0.01	3.82
Lead	0.005	82	3	0	0.034
Magnesium	None required	82	NA	0.1	51.1
Manganese	0.12	83	4	0	1.2
Nitrate	45	69	0	0.05	4.4
Nitrite	3	69	0	0.05	0.05
Nitrite/Nitrate	-	73	NA	0.05	4.4
pH	-	82	NA	6.07	9.38
Potassium	-	82	NA	0.3	64
Selenium	0.05	75	0	0.001	0.0065
Sodium	≤ 200 (AO*)	82	4	2.21	919
Sulphate	≤ 500 (AO*)	82	3	1.03	1147
Thallium	-	82	NA	0	0.0012
Total Coliform – P/A	None per 100 mL water	84	31	NA	NA
Turbidity	-	82	NA	0.08	103
Uranium	0.02	73	1	0.0005	0.025
Vanadium	-	4	NA	0.001	0.024
Zinc	≤ 5.0 (AO*)	82	0	0.002	0.27

Table Note: All parameters are expressed in milligrams per litre (mg/L) unless otherwise indicated. Conductivity is reported in microsiemens per centimetre (µS/cm), turbidity in nephelometric turbidity units (NTU), pH is unitless, and *E. coli* and total coliform are reported as presence/absence (P/A). Parameters marked with an asterisk (*) are compared against AO rather than MAC.

4.1.4 Hydrology

Hydrology is a principal focus of the overall study and has been the subject of extensive modelling efforts undertaken to inform the feasibility assessments, conceptual designs, and support studies for the Sussex Flood Mitigation Project.

To address this VC in full, a detailed Hydrotechnical Report has been prepared and is appended to this EIA submission (Appendix A). The report provides a comprehensive characterization of the current hydrological conditions of the Kennebecasis River, Trout Creek, and Parsons Brook. It also presents projected changes in hydrology under various Shared Socioeconomic Pathway (SSP)-based climate scenarios and evaluates anticipated modifications associated with the flood mitigation solutions considered during project planning – particularly the eventual selection of the proposed diversion channels.

Hydrologic and hydraulic modelling completed to support the Hydrotechnical Report formed the basis for delineation of the LAA, as described in Section 3.2.3.2.

4.1.4.1 Methodology

Analysis Software

HEC-RAS 2D was used to generate a detailed hydrologic and hydraulic model of the Kennebecasis River and its tributaries and conduct local and regional hydrologic assessments. This model was developed using the existing physiographic and hydrologic data, discussed below.

Physiographic Data Sources

Surveyed data and publicly available mapping resources were used to characterize the existing topography within the LAA. These include the following:

- Provincial LiDAR data captured in 2018 and obtained through GeoNB (GNB, 2026) were used to develop a high-resolution digital elevation model (DEM). This dataset formed the basis for delineating drainage pathways, flow directions, and surface water dynamics within the LAA
- Drone-captured LiDAR data captured in 2025 by GEMTEC was used to update the 2018 provincial LiDAR data within the PDA
- Provincial land cover map updated in 2025 and obtained through the NRED
- Provincial soil map obtained through GeoNB Data Catalogue (GNB, 2026)
- Provincial orthoimages obtained through GeoNB Data Catalogue (GNB, 2026)
- Government of Canada Land Use Maps updated in 2020 (Natural Resources Canada, 2022)
- Oak Ridge National Laboratory (ORNL) hydrologic soil group map obtained through NASA database (Ross, et al., 2018)

Climate and Hydrological Data Sources

Long-term regional climate and hydrology records were used to characterize local climate and hydrology conditions in the LAA. The primary sources used to obtain regional climate and hydrological data include:

- Historical Weather and Canadian Climate Normals data, retrieved from ECCC (ECCC, 2026). This includes temperature, precipitation, and other climatic features for various meteorological stations in the region (Government of Canada, 2025; Government of Canada, 2002, 2009, and 2025)
- Historical water level and flow data from ECCC hydrometric station (Government of Canada, 2025)
- Provincial flood maps, retrieved from GeoNB (Government of New Brunswick, 2025). This consisted of both historical and projected climate change-adjusted to the year 2100 flood levels for 20- and 100-year return periods events
- Published reference studies for the Kennebecasis River system. This includes the historical calculated flows and water levels from historical studies (ADI Ltd., 1982; J. E. Peters Management Ltd., 1983; M. E. Folster, 1981)

The climate stations were selected based on their reliability with representing the climate within the LAA. Key factors for selecting a regional climate station included proximity to site, period of record, overlap with hydrometric records, and similarity of local topography. The climate stations used to complete the hydrotechnical study are summarized in Table 4.2 below and the climate stations within LAA are illustrated in Figure 4.5.

Table 4.2 Climate Stations Used for the Hydrotechnical Study

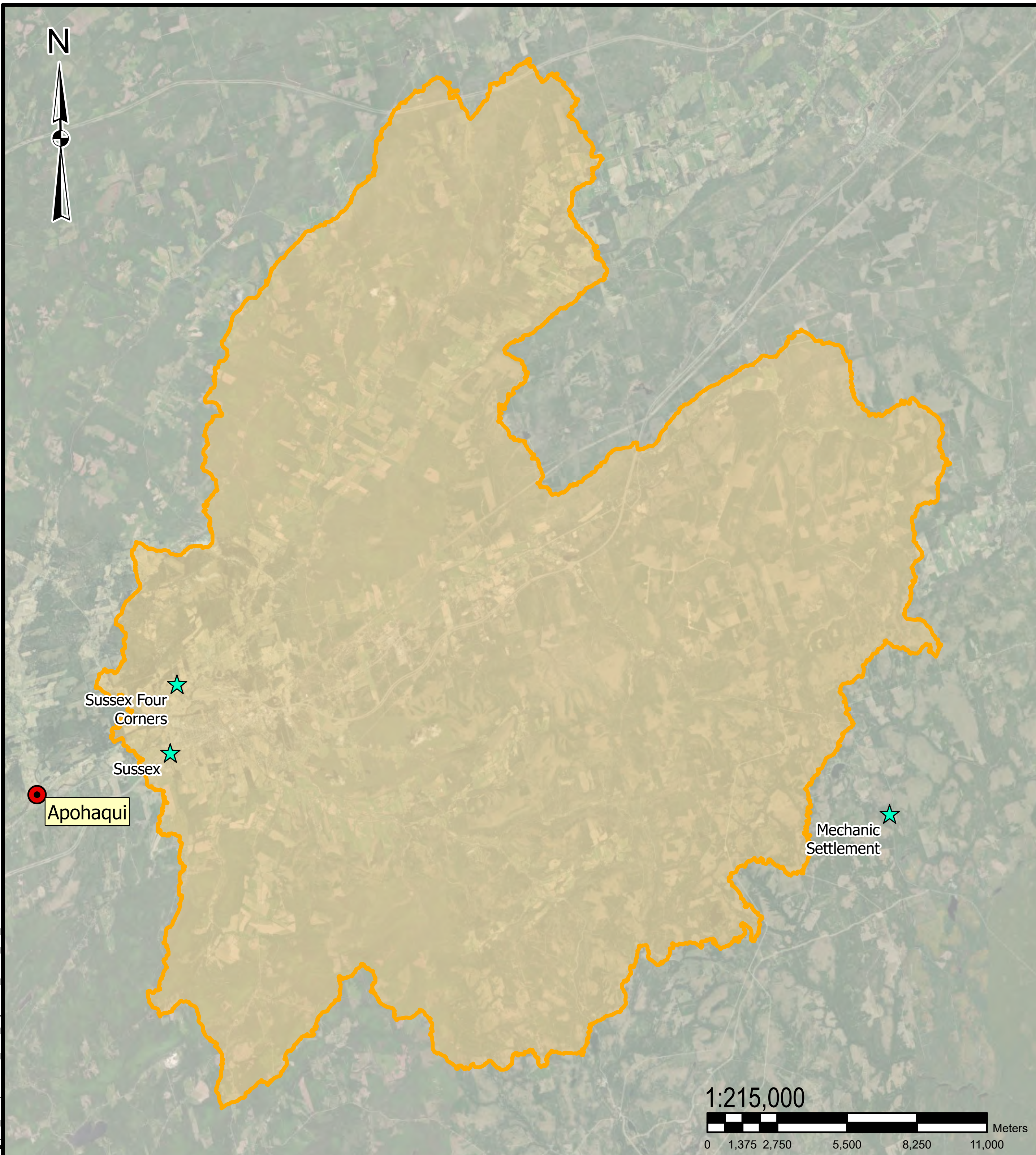
Climate Station Name	ID	Latitude	Longitude	Years of Record
Sussex	8105200	45.7167	-65.5333	1897-2009
Sussex Four Corners	8105210	45.7417	-65.5289	2015-2025
Mechanic Settlement	8102848	45.6936	-65.1650	2006-2025
Saint John A	8104900	45.3181	-65.8856	1958-2002
Fredericton CDA	8101605	45.9203	-66.6089	1959-2025
Moncton Intl A	8103201	46.1122	-64.6786	1946-2025

The hydrometric station was selected based on its reliability with representing the climate within the LAA. Key factors for selecting a regional hydrometric station included proximity to site, period of record, and overlap with precipitation records.

The hydrometric station used to complete the hydrotechnical study is presented in Table 4.3 below and is shown in Figure 4.5.

Table 4.3 Climate Stations Used for the Hydrotechnical Study

Hydrometric Station Name	ID	Latitude	Longitude	Years of Record
Kennebecasis River at Apohaqui	01AP004	45.7013	-65.6016	1961-2026



Legend:
- Climate Stations
- Hydrometric Station
- Watershed

Note:
1. Coordinate system: NB; Stereographic projection, NAD83 (CSRS) Datum.
2. Contains information licensed under the Open Government License - New Brunswick.
3. Service Layer Credits: Earthstar Geographics

Project: Sussex Flood Mitigation Project, Sussex, New Brunswick		Drawing: ECCC Climate and Hydrometric Stations	GEMTEC Consulting Engineers and Scientists
		Client: Sussex	
Drawn by: CR	Checked by: KW	Date: February 2026	Project Number: 101539.009
Drawing Number: Figure 4.5	Revision No. 0		

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4.1.4.2 Results

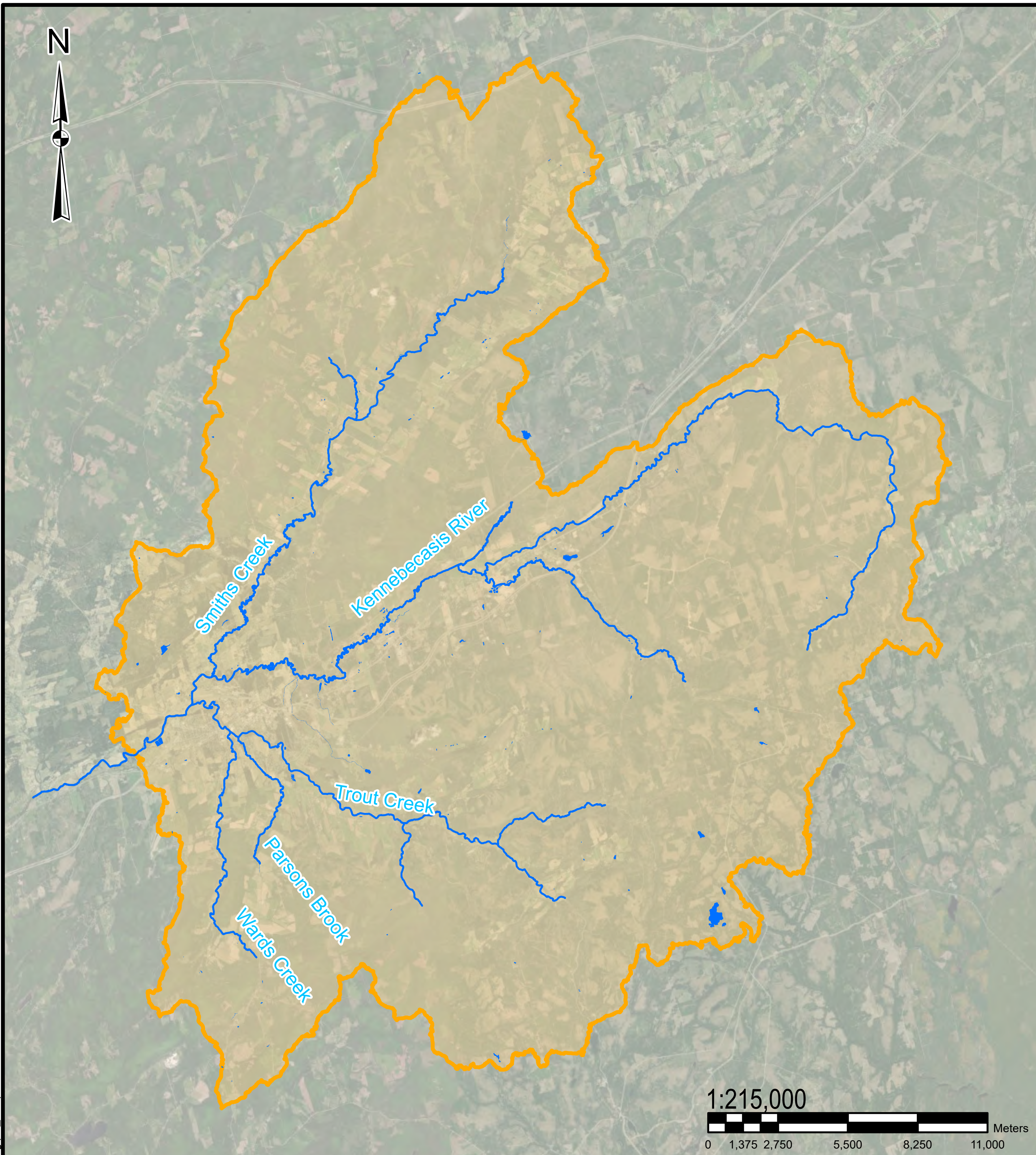
The following subsections describe the existing hydrologic and climate conditions within the LAA. These conditions will be compared to a post-development assessment to quantify the predicted impacts of the Project to the surface water hydrology in the LAA.

Drainage

Drainage Overview

The drainage characteristics within the LAA were defined using the delineation tool in the PCSWMM Professional software 2D (PCSWMM) with a DEM (GNB, 2026) land use data (Government of Canada, 2019; Government of Canada, 2022; Government of New Brunswick, 2025), soil hydrologic group data (Ross C. L., 2018), and the New Brunswick hydrographic network dataset (Government of New Brunswick, 2025).

The extents of the Kennebecasis River and its tributaries draining within the LAA are presented in Figure 4.6.



Legend:
Watercourse
Waterbody
Watershed

Note:
1. Coordinate system: NB; Stereographic projection, NAD83 (CSRS) Datum.
2. Contains information licensed under the Open Government License - New Brunswick.
3. Service Layer Credits: Earthstar Geographics

Project: Sussex Flood Mitigation Project, Sussex, New Brunswick	Drawing: Kennebecasis River Watershed and Its Tributaries	GEMTEC Consulting Engineers and Scientists
	Client: Sussex	

Drawn by:	Checked by:	Date:	Project Number:	Drawing Number:	Revision No.
CR	KW	February 2026	101539.009	Figure 4.6	0

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Catchment Areas

The details of the catchment areas are as follows:

Parsons Brook

The Parsons Brook catchment area at its confluence with Trout Creek is approximately 12 km^2, representing 1.5% of the total drainage area and draining into Trout Creek near Main Street, which ultimately discharges into the Kennebecasis River approximately 3.2 km downstream. The average slope of Parsons Brook watershed is 1.1%.

Wards Creek

The Wards Creek catchment area at its confluence with Trout Creek is approximately 50 km^2, representing 6.5% of the total drainage area and draining into Trout Creek above Magnolia Avenue, which ultimately discharges into the Kennebecasis River approximately 2.8 km downstream. The average slope of Wards Creek watershed is 2.1%.

Trout Creek

The Trout Creek catchment area at its confluence with the Kennebecasis River is approximately 220 km^2, accounting for 28.6% of the total drainage area. It drains into the Kennebecasis River south of Route 1, approximately 8.4 km upstream of Apohaqui. The average slope of Trout Creek catchment area is 2.7%.

Smiths Creek

The Smiths Creek catchment area at its confluence with the Kennebecasis River is approximately 207 km^2, representing 26.9% of the total drainage area. It drains into the Kennebecasis River downstream of Route 890, approximately 10.4 km upstream of Apohaqui. The average slope of Smiths Creek catchment area is 1.2%.

Kennebecasis River

The Kennebecasis River Catchment area at the water treatment plant 6.4 km upstream of Apohaqui is approximately 770 km. The average slope of the catchment area is 1.8%.

Watercourses

Watercourses within LAA

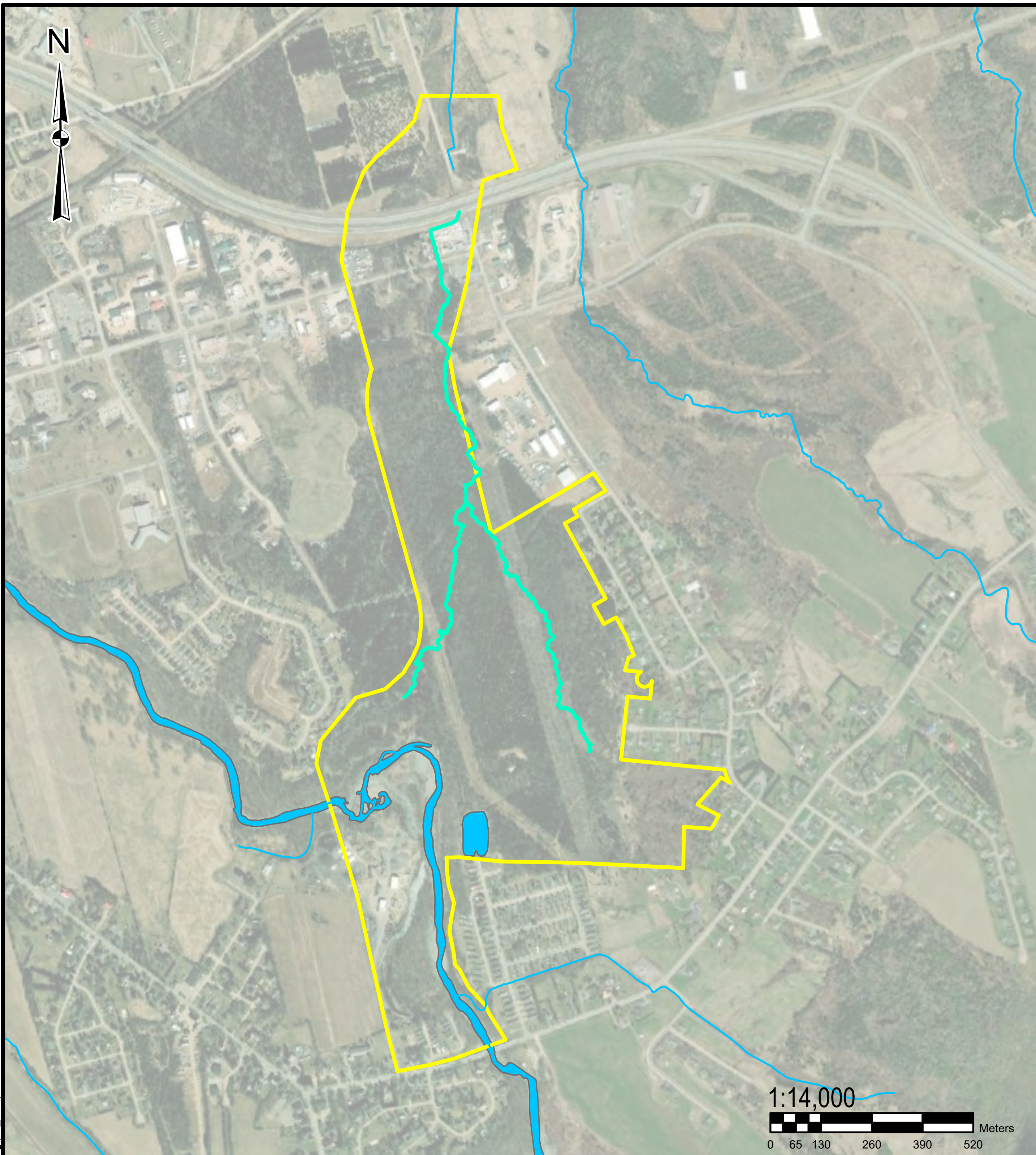
The details of the major watercourses within the LAA are presented in Table 4.4.

Table 4.4 Major Watercourses within LAA

Watercourse	Average Slope (%)	Bankfull Width (m)	Tributaries Present	Tributaries within PDA
Parsons Brook	1.0	2.0 - 4.5	• None	None
Wards Creek	1.8	8 - 22	• McCarthy Brook • Unnamed tributaries	None
Trout Creek	0.8	8 - 22	• Parsons Brook • Wards Creek • Mill Brook • Parlee Brook • Shannon Brook • Cedar Camp Brook	None
Smith Creek	0.2	6 - 18	• McGregor Brook • Harrison Brook • King Brook • Hawkes Brook • Windgap Brook • Jordan Brook	None
Kennebecasis River	0.3	10 - 50	• Smiths Creek • Trout Creek • Wards Creek • Millpond Brook • McLeod Brook • Stone Brook • South Branch	One unnamed

Watercourses within PDA

In addition to the major mapped watercourses within the LAA, review of LiDAR data identified one or more potential unmapped drainage features, portions of which may be located within the Trout Creek Diversion Channel PDA. Portions of these features were incidentally observed during wetland field investigations; however, a full stream assessment or formal watercourse delineation was not completed as part of the field program. The presence and characteristics of these potential features will be investigated through targeted field assessments during the 2026 field season. The potential locations of these features are shown in Figure 4.7.



Legend:
- GeoNB_Watercourses
- Unmapped Drainage Feature
- Project Development Area (PDA)
- GeoNB Waterbodies

Note:
1. Coordinate system: NB; Stereographic projection, NAD83 (CSRS) Datum.
2. Contains information licensed under the Open Government License - New Brunswick.
3. Service Layer Credits: Vantor

Project: Sussex Flood Mitigation Project, Sussex, New Brunswick			Drawing: Potential Unmapped Drainage Features within the PDA	GEMTEC Consulting Engineers and Scientists
			Client: Sussex	
Drawn by: CR	Checked by: KW	Date: February 2026	Project Number: 101539.009	Drawing Number: Figure 4.7	Revision No. 0

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Intensity-Duration-Frequency Curves

The ECCC Intensity-Duration-Frequency (IDF) gridded dataset was used to calculate the likelihood of significant rainfall events (point precipitation) in the LAA. The total rainfall depth for storms of varying duration across several return periods is summarized in Table 4.5 below.

Table 4.5 Return Period Rainfall Depth

Duration	Return Period (years)							
	2	5	10	20	Future 20	50	100	Future 100
5 min	6.00	8.36	9.92	11.45	14.24	13.34	14.75	19.34
10 min	8.90	12.21	14.59	17.07	21.23	20.38	23.05	30.22
15 min	10.92	14.87	17.80	20.94	26.04	25.26	28.86	37.84
30 min	15.02	20.25	24.24	28.62	35.59	34.85	40.26	52.78
1 hour	20.14	26.95	32.17	37.97	47.19	46.24	53.56	70.21
2 hours	26.62	35.40	42.09	49.44	61.49	59.96	69.21	90.72
6 hours	40.87	53.91	63.55	73.96	91.98	88.44	100.84	132.20
12 hours	53.36	70.04	82.10	94.88	118	112.26	126.77	166.18
24 hours	69.56	90.90	105.92	121.54	151.15	142.17	158.89	208.28

Table Note: Return period describes the likelihood of a particular rainfall event occurring each year, expressed as: Return Period = 1 / Probability of Occurrence

Due to the large size of the Kennebecasis River watershed, a 20% aerial-depletion factor was applied to these point precipitation depths to obtain watershed-scale areal precipitation values. The results were used to calculate and compare the pre- to post-development impacts of the Project on extreme flows within the LAA and to inform the design of required hydraulic infrastructure.

Surface Water Runoff

A detailed integrated hydrologic and hydraulic model was generated using HEC-RAS 2D (U.S. Army Corps of Engineers, Hydrologic Engineering Center, 2025) to analyse floodplain hydraulics, channel–floodplain interactions, and the performance of proposed flood mitigation measures under various design flood conditions. In this configuration, the model performs both rainfall–runoff calculation (using the rain-on-grid method) and hydraulic routing through the river channels and floodplain. The hydrologic component calculates surface runoff based on rainfall inputs, infiltration parameters, and land cover characteristics.

Flow data at ECCC hydrometric station 01AP004 was used to estimate the Kennebecasis River flood flow return frequencies using statistical methods Regional Regression equations and Single Station Proration. These statistical methods were not applied to Trout Creek, Parsons Brook, or Wards Creek because their watershed characteristics differ from the Kennebecasis

River. Additionally, the GeoNB Flood Hazard maps and the data presented in the historical references were used to calibrate the hydraulic model as additional lines of model evaluation.

A summary of the results is provided in Table 4.6 and Table Note: More details in the Hydrotechnical Report (Appendix A)

Table 4.7. The tables compare peak flows and water surface elevations calculated by the hydraulic model with the available values reported in historical studies and those derived from statistical flood frequency methods and the New Brunswick Flood Hazard Maps (GNB, 2026).

Table 4.6 Historical 100-Year Peak Flow Comparison

ID	Location	Peak Flows (m^3/s)			
		HEC-RAS 2D	Historical Studies	Single-Station Proration	Regional Regression
1	Kennebecasis River upstream of Dobson Brook	678	688	671	655
2	Kennebecasis River at confluence with Trout Creek	535	559	513	486
3	Kennebecasis River upstream of Smiths Creek	360	414	352	321
4	Trout Creek at confluence with Kennebecasis River	310	312	-	-
5	Trout Creek at confluence with Parsons Brook	235	250	-	-
6	Parsons Brook at confluence with Trout Creek	46	50	-	-
7	Wards Creek at confluence with Trout Creek	143	122	-	-

Table Note: More details in the Hydrotechnical Report (Appendix A)

Table 4.7 Historical 100-Year Peak Water Level Comparison

ID	Location	Peak Water Level (m, CGVD2013)		
		HEC-RAS 2D	Historical Studies	GeoNB Flood Hazard Maps
1	Kennebecasis River upstream of Dobson Brook	15.83	15.85	15.87
2	Kennebecasis River upstream of Trout Creek	17.01	17.19	17.26
3	Kennebecasis River upstream of Smiths Creek	17.21	17.79	17.40
4	Trout Creek upstream of Kennebecasis River	16.92	17.24	17.22
5	Trout Creek upstream of Parsons Brook (Willow Ct.)	21.62	21.45	21.65
6	Parsons Brook upstream of Trout Creek	21.72	21.58	21.71

Table Note: More details in the Hydrotechnical Report (Appendix A)

4.1.5 Atmospheric Environment

4.1.5.1 Local Climate

The climate of the Sussex region reflects a blend of coastal and inland characteristics, with cold winters and warm summers. Maritime influences from the Bay of Fundy can moderate temperatures resulting in milder winter conditions and occasional cool periods in summer. The PDA is situated within the Valley Lowlands Ecoregion, which tends to receive moderate to high annual precipitation due to regional topographic influences that channel moist air masses through lowland valleys.

According to the Köppen-Geiger climate classification, the Sussex region has a humid continental climate (Dfb) – characterized by cold winters, warm summers, and no distinct dry season (Beck, et al., 2023). This classification aligns with the observed seasonal variation in temperature and precipitation across southern New Brunswick, including the PDA.

To characterize the local climate in more detail, 1991-2020 climate normal were obtained from the Sussex/Four Corners composite climate station, which combines data from two nearby locations operated by Environment and Climate Change Canada (ECCC, 2026). The Sussex station is located approximately 4.5 km west of the centre of the Trout Creek Diversion Channel PDA, while the Four Corners station is located 4.6 km to the northwest. Different climate parameters were measured at each site during different time periods and compiled to form a single, regionally representative dataset. The resulting climate normal include monthly and annual averages for temperature, total precipitation, rainfall, and snowfall as summarized in Table 4.8.

Table 4.8 Climate Normals (1991-2020) at Sussex/Four Corners Station

Parameter	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Year
Mean Temperature (°C)	-7.9	-6.5	-1.6	4.9	11.1	16.4	19.7	19.1	14.7	8.5	2.8	-3.6	6.5
Rainfall (mm)	48.4	37.3	68.8	66.3	90.8	90.0	77.1	65.3	113.9	116.1	100.6	61.0	935.6
Snowfall (mm)	66.4	45.7	50.7	18.7	2.0	0.0	0.0	0.0	0.0	0.2	14.1	49.8	247.7
Precipitation (mm)	116.2	82.4	108.9	80.7	90.4	90.4	71.1	63.7	109.8	113.2	112.3	112.7	1151.9

Table Note: Data are sourced from Environment and Climate Change Canada's *1991 to 2020 Canadian Climate Normals*. The 'Year' column represents the annual average for temperature and annual totals for rainfall, snowfall, and total precipitation.

The mean annual temperature (MAT) at Sussex/Four Corners is 6.5°C, with monthly averages ranging from -7.9°C in January to 19.7°C in July. The region receives an average 1,151.9 mm of total annual precipitation, including 247.7 mm of snowfall, most of which occurs between November and March. Rainfall is typically highest in October and September, while snowfall peaks in January and December.

The Sussex/Four Corners station reports an average frost-free period (FFP) of 128 days, generally extending from May 20 (average last spring frost) to September 26 (average first fall-frost). However, there is notable interannual variability: in 10% of years, frost events have occurred as late as June 12, or as early as September 4. The median frost-free window is 111 days, and 90% of years experience 132 frost-free days or fewer. This variability influences the timing of soil freeze-thaw cycles, the regional growing season, and snowmelt runoff patterns.

Sussex lies within Zone 3 of the New Brunswick Winter Weight Program zones (DTI, 2024), a region encompassing the Bay of Fundy lowlands. This area is characterized by frequent freeze-thaw cycles throughout the winter, driven by maritime air masses that cause temperatures to fluctuate around the freezing point. These conditions lead to repeated freezing and thawing of surface and subsurface materials, which play a significant role in the seasonal hydrologic regime and ground stability of the region.

4.1.5.2 Ambient Air Quality

Air quality is monitored provincially by DELG in New Brunswick. There are no permanent provincial air quality monitoring stations located in Sussex. The nearest stations operated by the GNB are located in Moncton and Saint John, with the latter also hosting several industrial monitoring sites.

In the absence of a dedicated air quality monitoring station in Sussex, data from the DELG station Moncton – Thanet Street were considered. While Moncton is located downwind of Sussex under typical west-to-northwest wind patterns, it is the nearest provincial air quality station (~68 km from centre of Trout Creek Diversion Channel PDA) with long-term monitoring data and is more representative of the general regional background than the industrially influenced stations in Saint John.

The GNB station measures key pollutants such as carbon monoxide, fine particulate matter, ground level ozone, and nitrogen dioxide Supplementary data including relative humidity, ambient temperature, barometric pressure, wind speed, and wind direction are also collected (DELG, 2026).

The Province of New Brunswick has Air Quality Objectives (Table 4.9) for regulated air contaminants under the *Air Quality Regulation* of the *New Brunswick Clean Air Act*. Additionally, the Province follows guidance objectives outlined in the federal Canadian Ambient Air Quality Standards (CAAQS) set forth by ECCC (2024).

Table 4.9 New Brunswick Air Quality Objectives

Pollutant	Type of Objective	Calculated Statistic	Numeric Value
Carbon Monoxide (CO)	Provincial	1-hour average	30 ppm
		8-hour average	13 ppm
Fine Particulate Matter ($PM_{2.5}$)	CAAQS	3-year average of daily maximum 24-hour average	27 µg/m^3
		3-year average of annual averages	8.8 µg/m^3
Ground Level Ozone (O_3)	CAAQS	3-year average of 4th worst daily 8-hour maximum	62 ppb
Nitrogen Dioxide (NO_2)	Provincial	1-hour average	210 ppb
		24-hour average	105 ppb
		Annual average	52 ppb
	CAAQS	3-year average of 98th percentile daily 1-hour maximum	60 ppb
		Annual average	17 ppb

Table Note: Table sourced from (DELG, 2024). CAAQS refers to the Canadian Ambient Air Quality Standards. Units are defined as ppm (parts per million), µg/m^3 (micrograms per cubic metre), and ppb (parts per billion).

For all four monitored pollutants, air quality data from August 2022 to August 2025 indicate consistent compliance with applicable standards, with no recorded exceedances of the Provincial Air Quality Objectives or the CAAQS (DELG, 2026). Table 4.10 summarizes the maximum recorded pollutant concentrations and relevant multi-year statistics over the multi-year period. These results provide a baseline for existing air quality conditions and further confirm that monitored values remain well within regulatory limits.

Table 4.10 Summary of Pollutant Concentrations at the Moncton - Thanet Street Air Quality Monitoring Station (2022-2025)

Pollutant	Calculated Statistic	Numeric Value
Carbon Monoxide (CO)	1-hour average maximum	1.45 ppm
	8-hour average maximum	0.73 ppm
Fine Particulate Matter ($PM_{2.5}$)	3-year average of daily maximum 24-hour average	6.25 µg/m3
	3-year average of annual averages	4.92 µg/m3
Ground Level Ozone (O_3)	3-year average of 4th worst daily 8-hour maximum	47.00 ppb
Nitrogen Dioxide (NO_2)	1-hour average maximum	34.7 ppb
	24-hour average maximum	20.21 ppb
	Annual average maximum	3.40 ppb
	3-year average of 98th percentile daily 1-hour maximum	21.32 ppb

Table Note: Data sourced from (DELG, 2026)

4.1.5.3 Greenhouse Gas Emissions

Greenhouse gas (GHG) emissions are typically expressed in megatonnes (Mt) of carbon dioxide equivalent (CO_2eq), a unit that accounts for the differing global warming potentials of individual gases. The principal components of GHG inventories include carbon dioxide (CO_2), methane (CH_4), and nitrous oxide (N_2O), with smaller contributions from synthetic gases such as hydrofluorocarbons (HFCs) and sulphur hexafluoride (SF_6).

According to the 2025 National Inventory Report (ECCC, 2025), Canada's total GHG emissions in 2023 were approximately 694 Mt of CO_2eq, down from 747 Mt in 2018 and 759 Mt in 2005. This represents a national reduction of approximately 8.5% below 2005 levels as of 2023 (ECCC, 2025).

In New Brunswick, total GHG emissions in 2023 were reported at 11 Mt CO_2eq, a 42% reduction from 20 Mt CO_2eq in 2005 and 8% below the 13 Mt CO_2eq recorded in 2018. These reductions align with provincial objectives established under the New Brunswick *Climate Change Act*, which legislated GHG emission limits of

- 14.8 Mt CO_2eq in 2020
- 10.7 Mt CO_2eq in 2030
- 5 Mt CO_2eq in 2050

The province surpassed its 2020 target, achieving actual emissions of 12.4 Mt CO_2eq that year, exceeding its legislated objective by more than 2 Mt CO_2eq (Province of New Brunswick, 2024). These results indicate meaningful progress toward the 2030 target of 10.7 Mt CO_2eq, which represents a 46% reduction below 2005 levels.

4.1.6 Acoustic Environment

The PDA is composed of three spatially distinct components that collectively surround Sussex. As a result, ambient noise levels vary considerably across the PDA, reflecting differences in land use, nearby infrastructure, and local human activity.

The Parsons Brook Diversion Channel PDA is located adjacent to Sussex Corner Elementary School in the former Village of Sussex Corner, now amalgamated into Sussex. This portion of the PDA is situated in a relatively quiet, low-density residential area bordered by active agricultural fields. Ambient noise levels here are characteristic of small-town environments, with occasional contributions from farming equipment and school-related activity.

The Trout Creek Diversion Channel PDA traverses the industrial sector of Sussex and extends from a concrete paving facility at its southern end. While this portion of the PDA is characterized by light-to-heavy industrial land use, residential areas are also present in the vicinity of the proposed Plant Road embankment raise. As a result, nearby residential receptors may occur adjacent to this portion of the PDA. Ambient noise conditions in this area are influenced by ongoing industrial operations and traffic along McLeod Drive, Leonard Drive, Cougle Road, and NB Route 1. Traffic along this major provincial highway contributes to consistent background noise levels, particularly during peak travel periods.

The Salmon Covered Bridge and Route 890 Bridge Raising PDA is located north of Sussex in a more rural setting. While generally quieter than the other two components, this area lies within 1 km of the J.D. Irving, Limited Sawmill, a substantial industrial facility that may intermittently influence local acoustic conditions, depending on operational schedules and wind direction.

4.2 Biophysical Features

Biophysical features described in this section were characterized using a combination of desktop review and field-based investigations. To reflect this approach, each biophysical component is presented with separate subsections describing survey methodologies and results.

4.2.1 Wetlands

Detailed descriptions of existing wetland conditions and assessment methods are provided in the Wetland Environment Technical Report included as Appendix B. This section presents a summary of existing wetland conditions relevant to the Project.

4.2.1.1 Methodology

DELG administers the WAWA Regulation in New Brunswick. Wetlands and watercourses, mapped or unmapped, are regulated provincially and generally require delineation by a qualified wetland consultant prior to any proposed alteration. Wetlands which could potentially be affected by the Project were documented as part of the baseline assessment of existing conditions. The New Brunswick Wetlands Conservation Policy defines wetlands as '*land that has the water table at, near, or above the land's surface, or which is saturated, for a long enough period to promote wetland or aquatic processes as indicated by hydric soils, hydrophytic vegetation, and various kinds of biological activities adapted to the wet environment*'.

For the purposes of this EIA, only the wetland area within the PDA has been considered in field delineation and functional assessments. The extent of the wetlands beyond the PDA was not field verified.

A revision to the PDA was completed in late 2025 to incorporate the proposed Plant Road embankment raise, which is intended to reduce residual flooding west of Trout Creek. This revision extends the Trout Creek PDA southward towards Post Road and northward across Adam Lane, and includes the full extent of PID 00204248. The presence of wetlands within these newly incorporated portions of the PDA has not yet been assessed. Information on wetland delineation and function within these areas will be provided as an addendum following completion of the 2026 field season.

Desktop Review

As part of the existing conditions assessment, a desktop review was conducted to identify the potential presence of wetlands within the PDA and surrounding LAA and to inform subsequent field verification. The WAWA Reference Map (DELG, 2020) was reviewed to identify mapped wetlands, including Provincially Significant Wetlands (PSWs). This review indicated the potential presence of wetlands within the PDA. Aerial imagery and provincial LiDAR data were also examined to identify terrain features and drainage patterns indicative of unmapped wetlands (GNB, 2026).

Wetland Delineation

In July and August of 2024 and 2025, GEMTEC biologists conducted wetland delineations within the Trout Creek Diversion Channel PDA and Parsons Brook Diversion Channel PDA using accepted industry standards, as outlined 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). Delineations involved identifying the presence of dominant hydrophytic vegetation, hydric soils, and hydrological indicators, including surface water, soil saturation, and drainage patterns.

Wetland Functional Assessment

Delineated wetlands were evaluated for ecosystem function using the Wetland Ecosystem Services Protocol for Atlantic Canada (WESP-AC). WESP-AC is a rapid assessment tool used to assess function and relative value of tidal and non-tidal wetlands in temperate regions of North America (DELG, 2019). Data required to support the WESP-AC assessments were collected concurrently with wetland delineations.

4.2.1.2 Results

Wetlands occupy a substantial portion of the PDA and comprise a mosaic of forested swamp and marsh habitat. The wetlands assessed include areas associated with the Trout Creek and Parsons Brook Diversion Channels. Wetland information for portions of the Trout Creek Diversion Channel PDA that have not yet been assessed will be provided as an addendum following completion of the 2026 field season. A summary of field observations and descriptions of the delineated wetlands is provided below.

Wetland Delineation

Wetland boundaries were delineated within the PDA, and only wetland areas located within the PDA were considered for the purposes of this EIA. Wetlands that extend beyond the PDA were not assessed. Delineated wetland boundaries, together with GeoNB wetland mapping and field data point locations, are shown on Figure 4.8 and Figure 4.9. Detailed delineation forms and representative site photographs are provided in Attachment B-1 and Attachment B-2 of the Wetland Environment Technical Report (Appendix B).

Trout Creek Diversion Channel PDA Wetlands

Five wetlands were delineated within the Trout Creek Diversion Channel PDA (Figure 4.8). These wetlands include a range of forested swamp, marsh, riparian, and floodplain wetland types and are disturbed along the Trout Creek corridor and adjacent low-lying areas. Individual wetland features are described below.

Wetland 1 occupies approximately 17.57 ha within the PDA and consists of a mix of forested swamp and marsh habitats. The southern portion of Wetland 1 contains a 0.28 ha open-water feature surrounded by marsh, while the northern portion is characterized by mixedwood swamp habitat. Two upland islands were delineated within Wetland 1. A potential watercourse or drainage feature, identified through LiDAR interpretation and field reconnaissance, occurs along the eastern margin of Wetland 1. The feature extends northward, passes beneath NB Route 1 via a culvert, and continues toward Wetland 2. A formal watercourse assessment was not completed as part of the wetland delineation and will be addressed in a subsequent addendum.

Wetland 2 occupies approximately 1.15 ha within the PDA, north of NB Route 1 and west of Adam Lane. It is primarily classified as a marsh, with areas along the western edge supporting vegetation communities more consistent with forested wetland conditions. From Wetland 2, the potential watercourse or drainage feature extends through a ditch beneath Adam Land and continues beyond the PDA.

Wetland 3 occupies approximately 1.49 ha in the southern portion of the PDA and is classified as a riparian wetland contiguous with Trout Creek. The wetland generally extends parallel to the creek, with a localized extension toward the east.

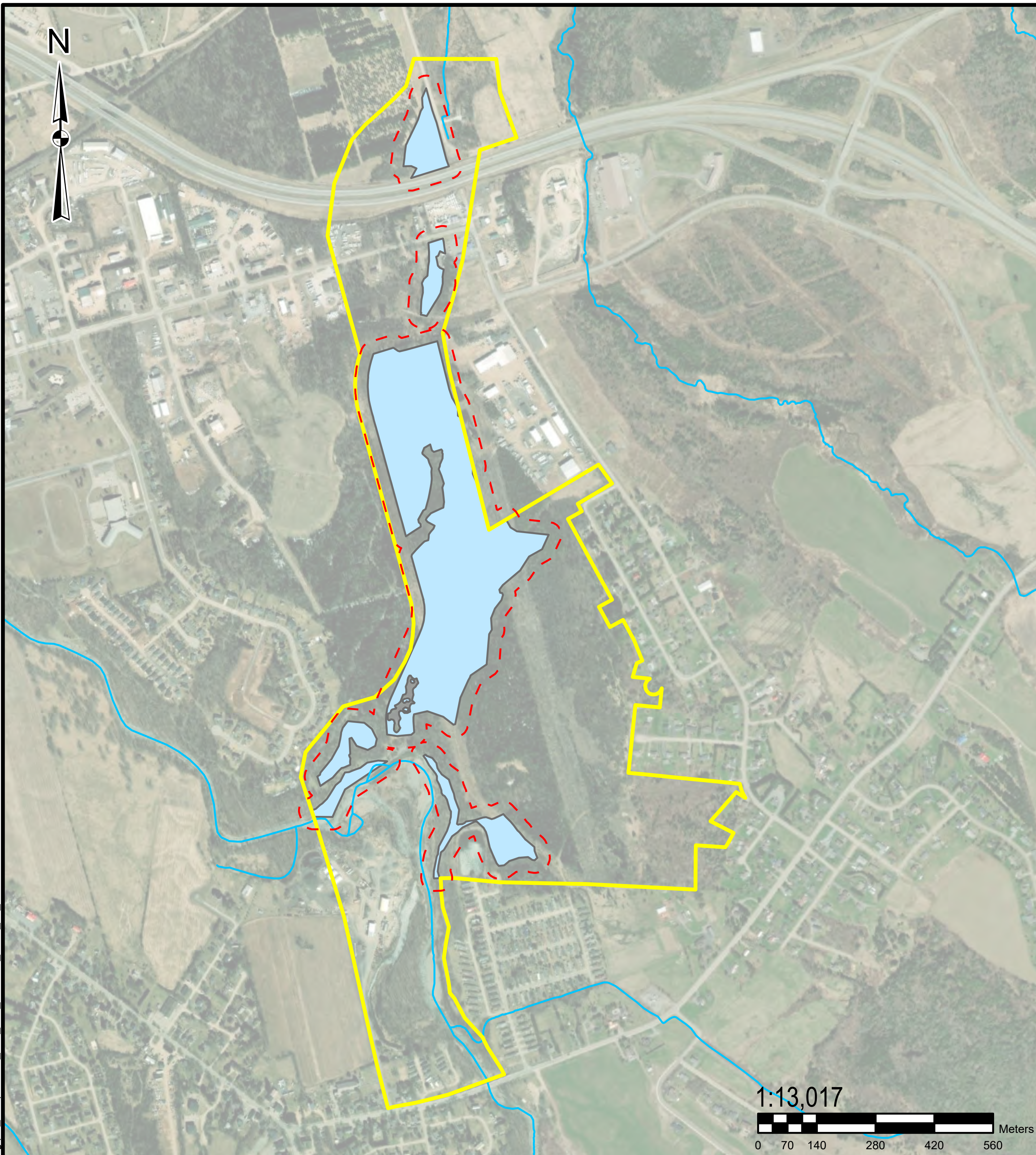
Wetland 4 is located in the southern portion of the PDA, north of Wetland 5, and occupies approximately 0.77 ha. It is classified as a forested wetland and is not currently contiguous with a mapped watercourse. However, Wetlands 4 and Wetland 5 are assumed to have been historically connected prior to the construction of a narrow linear access feature separating the two wetlands. A drainage channel was observed along the eastern portion of Wetland 4, directing water toward Trout Creek.

Wetland 5 is located south of Wetland 4 and occupies approximately 0.56 ha. It is classified as a floodplain wetland adjacent to Trout Creek. Drainage channels were observed within the wetland, likely associated with seasonal flooding events.

Parsons Brook Diversion Channel PDA Wetlands

One wetland was delineated within the Parsons Brook Diversion Channel PDA (Figure 4.9).

Wetland 6 occupies approximately 1.46 ha. It is classified as a forested swamp and is located east of the Sussex Corner Elementary School yard and west of Herbs Pond.



Legend:

- GeoNB Watercourses
- Wetland Delineation
- Project Development Area (PDA)
- Wetland Delineation Buffer (30 m)

Note:
1. Coordinate system: NB; Stereographic projection, NAD83 (CSRS) Datum.
2. Contains information licensed under the Open Government License - New Brunswick.
3. Service Layer Credits: Vantor

Project:		Drawing: Trout Creek Wetland Delineation		GEMTEC Consulting Engineers and Scientists
		Client:		
Drawn by: CR	Checked by: KW	Date: February 2026	Project Number: 101539.009	Drawing Number: Figure 4.8	Revision No. 0

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Legend:

- GeoNB Watercourses
- Wetland Delineation
- Project Development Area (PDA)
- Wetland Delineation Buffer (30 m)

Note:
1. Coordinate system: NB; Stereographic projection, NAD83 (CSRS) Datum.
2. Contains information licensed under the Open Government License - New Brunswick.
3. Service Layer Credits: Vantor

Project:	Drawing:	
Sussex Flood Mitigation Project, Sussex, New Brunswick	Parsons Brook Wetland Delineation	GEMTEC Consulting Engineers and Scientists
	Client: Sussex	

Drawn by:	Checked by:	Date:	Project Number:	Drawing Number:	Revision No.
CR	KW	February 2026	101539.009	Figure 4.9	0

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Wetland Functional Assessment

Wetlands 1 through 6 were assessed using the Wetland Ecosystem Services Protocol for Atlantic Canada (WESP-AC), with Wetlands 3 to 5 evaluated as a single riparian forested swamp unit. Overall, the assessed wetlands provide a moderate level of wetland function, with functional ratings varying by ecosystem service and wetland type (Table 4.11).

Across all wetlands, hydrologic, habitat, and ecological support functions were generally rated Moderate to Higher. Functions related to surface water storage, stream flow and temperature support, wildfire resistance, organic nutrient export, and aquatic primary productivity were consistently rated Moderate, indicating a meaningful contribution to local hydrological regulation and ecosystem processes.

The wetlands demonstrated strong habitat value, particularly for wildlife. Ratings for resident and other fish habitat, waterbird nesting habitat, raptor and wetland songbird habitat, and pollinator habitat were predominantly Higher across all assessed wetlands. Amphibian habitat was rated Moderate to Higher, with Wetland 6 providing particularly high amphibian habitat value. Carbon capture was also rated Moderate to Higher, indicating an important role in regional carbon dynamics.

In contrast, nutrient and contaminant retention functions were generally rated Lower. Sediment and toxicant retention, nitrate removal and retention, and, in some wetlands, phosphorus retention exhibited lower functional scores, reflecting limited capacity for nutrient processing and contaminant attenuation. Native plant habitat and keystone mammal habitat also showed greater variability, ranging from Lower to Moderate, depending on wetland type and landscape context.

Overall, the WESP-AC assessment indicates that the wetlands within the study area provide moderate functional performance, with particular strength in wildlife habitat support, carbon sequestration, and hydrologic functions, and comparatively lower performance in nutrient retention and water quality–related functions. These results provide important context for evaluating potential project interactions, mitigation needs, and wetland compensation planning.

Table 4.11 WESP-AC Results for Wetlands 1 through 6

Wetland Functions or Other Attributes	Wetland 1		Wetland 2		Wetlands 3-5		Wetland 6	
	Function Score	Function Rating	Function Score	Function Rating	Function Score	Function Rating	Function Score	Function Rating
Surface Water Storage	4.48	Moderate	0.75	Lower	3.82	Moderate	4.50	Moderate
Stream Flow & Temperature Support	4.73	Moderate	7.05	Higher	3.42	Moderate	3.00	Moderate
Sediment & Toxicant Retention & Stabilization	2.68	Lower	1.69	Lower	1.67	Lower	2.05	Lower
Phosphorus Retention	5.29	Moderate	4.53	Moderate	2.69	Lower	1.73	Lower
Nitrate Removal & Retention	0.24	Lower	0.55	Lower	0.32	Lower	1.50	Lower
Wildfire Resistance	5.19	Moderate	3.47	Moderate	3.02	Moderate	4.24	Moderate
Carbon Stock Preservation	6.19	Moderate	5.52	Moderate	3.25	Lower	4.16	Moderate
Carbon Capture	5.63	Moderate	6.07	Moderate	5.97	Moderate	6.64	Higher
Organic Nutrient Export	7.37	Moderate	8.02	Moderate	6.95	Moderate	6.78	Moderate
Aquatic Primary Productivity	4.45	Moderate	5.68	Moderate	5.05	Moderate	5.97	Moderate
Anadromous Fish Habitat	5.75	Moderate	5.67	Moderate	5.96	Moderate	5.90	Moderate
Resident & Other Fish Habitat	6.69	Higher	6.56	Higher	7.88	Higher	7.58	Higher
Amphibian Habitat	4.81	Moderate	5.85	Moderate	4.40	Moderate	8.97	Higher
Waterbird Feeding Habitat	5.75	Moderate	6.24	Moderate	5.86	Moderate	6.10	Moderate
Waterbird Nesting Habitat	7.39	Higher	7.95	Higher	7.89	Higher	7.73	Higher
Raptor & Wetland Songbird Habitat	9.05	Higher	8.93	Higher	9.26	Higher	8.99	Higher
Keystone Mammal Habitat	0.47	Lower	6.51	Higher	4.31	Moderate	2.77	Moderate
Native Plant Habitat	2.90	Lower	2.23	Lower	4.04	Moderate	4.59	Moderate
Pollinator Habitat	9.26	Higher	9.35	Higher	9.11	Higher	9.28	Higher

4.2.2 Fish and Fish Habitat

A Fish and Fish Habitat Technical Report was prepared to describe the methods used to assess this VC and to document existing conditions in detail. Key information from the report is summarized below, and the full report is included as Appendix C of this document.

4.2.2.1 Methodology

Desktop Review

A desktop review of existing information on fish and fish habitat within the Kennebecasis River Watershed was completed, including Trout Creek and its tributaries. This review involved gathering and summarizing data from multiple sources (Connell, 1995; Whalen, McKnight, & MacQuarrie, 2014; Gautreau & Curry, 2020) to establish baseline conditions and identify potential fish species and habitat characteristics within the LAA.

The following key components formed the basis of the desktop analysis:

- Watershed Classification and Habitat Characterization
- Water Quality Assessment
- Fish Species Assemblage
- Species at Risk Review

As noted in Section 4.1.4, a review of available LiDAR data identified a potential watercourse within the Trout Creek Diversion Channel PDA. An incidental observation recorded during wetland delineations identified a portion of a potential watercourse; however, fish presence was not confirmed during this observation, and a full stream assessment or formal watercourse delineation was not completed at the time. On-site watercourses will be fully assessed during the 2026 field season, and the results will be incorporated into this EIA through an addendum.

Field Study

Fish habitat assessments and water quality sampling were conducted to characterize potential areas of impact within Trout Creek, Parsons Brook, and the Kennebecasis River. Fish habitat surveys were completed by GEMTEC biologists from December 3 to December 4, 2024, following standard methodologies outlined by NRED and DFO (Hooper, W.C, McCabe, & Roberston, 1995).

Field assessments were completed within three watercourse reaches that may be influenced by the proposed diversion channels. Within Parsons Brook and Trout Creek, 7 cross-sectional transects were established primarily downstream of proposed inlet locations, spaced approximately 50 m apart, to characterize geomorphic conditions and aquatic habitat within hydraulically connected reaches. An additional transect was surveyed at the proposed Trout

Creek Diversion Channel inlet to account for local conditions and seasonal water-level variability.

Downstream conditions related to the Trout Creek Diversion Channel were further characterized through surveys of the outflow wetland drainage ditch and 3 cross-sections along the Kennebecasis River (at the confluence, upstream, and downstream), spaced approximately 50 m apart. Channel morphology and habitat characteristics were recorded at all transects. Transect locations and surveyed reaches are shown on (Figure 4.10).

Legend
- Historical Sampling Locations
- Sampling Stations
- GeoNB Watercourses
- Project Development Areas (PDAs)
- Local Assessment Area (LAA)

Notes
1. Coordinate system: New Brunswick Stereographic, NAD83 (CSRS) Datum.
2. Geographic dataset source: GeoNB Data Catalogue.
3. Contains information licensed under the Open Government Licence - New Brunswick.
4. This drawing is a schematic representation. Sizes, locations and dimensions are approximate.
5. Service Layer Credits: Vantor

Date	Draw by	Checked by
FEBRUARY 2026	CR	KW

Client: Municipality of Sussex

Project: Sussex Flood Mitigation Project, Sussex, New Brunswick

Drawing: Historical and Recent Surface Water Sampling Locations

Scale: 1:25,185

0 165 330 660 990 1,320 Meters

Project No.	Drawing No.	Rev.No.
101539.009	FIGURE 4.10	0

GEMTEC Consulting Engineers and Scientists

Document Path: N:\Projects\101500\101539.009\06_Civil Drafting\01_GIS\101539_009_Aquatics_2025_07_10\101539_009_Aquatics_2025_07_10.aprx

4.2.2.2 Results

Desktop Review

The Kennebecasis River Watershed is a Level 2 Watershed within the broader Saint John River Basin Level 1 Watershed. It has a drainage area of approximately 2,146 km^2 (NRED, 2024).

Trout Creek is a tributary of the Kennebecasis River that spans 26.75 km from south of Waterford, through Sussex, where it drains into the Kennebecasis River (Kennebecasis Watershed Restoration Committee, 2024).

According to the Atlantic Canada Conservation Data Centre (ACCDC, Report No. 8083, Appendix D), no aquatic SAR, Species of Conservation Concern (SOCC), or species listed under the Committee on the Status of Endangered Wildlife of Canda (COSEWIC) have been recorded within a 5 km radius of the PDA, although several are documented within 100 km (Table 4.12). Given the Project location, marine species were excluded from this assessment.

Table 4.12 Aquatic SAR and SOCC Documented within 100 km of the Site

Common Name	Scientific Name	NB SARA Status	SARA Status	COSEWIC Status	Provincial S-Rank
Fish					
American eel	*Anguilla rostrata*	THR	-	THR	S4N
Atlantic salmon – Inner Bay of Fundy population	*Salmo salar pop. 1*	END	END	END	S2
Atlantic salmon – Outer Bay of Fundy population	*Salmo salar pop. 7*	END	-	END	SNR
Atlantic salmon – Gaspe Southern Gulf of St. Lawrence population	*Salmo salar pop. 12*	SC	-	SC	S2S3
Atlantic sturgeon	*Acipenser oxyrinchus*	THR	-	THR	S3B,S3N
Lake trout	*Salvelinus namaycush*	-	-	-	S3
Shortnose sturgeon	*Acipenser brevirostrum*	SC	SC	SC	S3
Striped bass	*Morone saxatilis*	SC	-	SC	S3S4B,S3S4N
Molluscs					
Brook floater	*Alasmidonta varicosa*	SC	SC	SC	S3
Tidewater mucket	*Atlanticoncha ochracea*	-	-	-	S3
Triangle floater	*Alasmidonta undulata*	-	-	-	S3

Common Name	Scientific Name	NB SARA Status	SARA Status	COSEWIC Status	Provincial S-Rank
Yellow lampmussel	*Lampsilis cariosa*	SC	SC	SC	S3

Table Note: Data sourced from ACCDC Report. The following codes represent the indicated conservation status: THR = Threatened, END = Endangered, SC = Special Concern, NAR = Not at Risk in Canada. ACCDC S-Rank are as follows: S1 is critically imperiled in the province; S2 is imperiled in the province; S3 is vulnerable in the province; S4 is apparently secure in the province; S5 is secure 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: N is the nonbreeding population of the species in the province; M is the species are considered a migrant and only make transient occurrences in the province

According to DFO species-at-risk screening and mapping, Trout Creek, Parsons Brook, the Kennebecasis River, and several nearby tributaries are identified as watercourses where freshwater SAR may occur. Based on this screening, Shortnose sturgeon is the only freshwater SAR identified as known or potentially present within these watercourses. Other aquatic SAR listed in Table 4.12 are documented within the broader region (within 100 km) based on ACCDC records but are not identified by DFO as occurring or potentially occurring within the Project watercourses.

The only known Canadian population of Shortnose sturgeon is located in the Saint John River system. This species spawns in fast-flowing water over boulder and gravel substrates. In the Saint John River basin, spawning is believed to occur within a 10 km reach downstream of the Mactaquac Dam, approximately 138 km from the estuary at Saint John. One confirmed overwintering site in Canada is at the confluence of the Kennebecasis and Hammond Rivers, where adults are known to remain in fast-moving water at depths of 3 to 6 m (COSEWIC, 2015).

Information on juveniles is limited; however, they have been observed between 35 and 120 km upstream from the estuary, with smaller individuals typically occurring further upriver. This suggests that younger sturgeon may prefer upstream habitats (COSEWIC, 2015).

Although the overwintering site falls within the RAA for the Project, it is not located within the PDA or potential zone of influence within the LAA. Shortnose sturgeon is not anticipated in the watercourses within the LAA; nonetheless, transient occurrences in the Kennebecasis River are possible.

Field Studies

Physical characteristics that define fish habitat suitability varied among the surveyed reaches. Detailed results, including tables and figures, are provided in the Fish and Fish Habitat Technical Report (Appendix C). The surveyed sites are described below, grouped by their corresponding watercourses.

Parsons Brook

Parsons Brook is represented by a single site expected to have direct interaction with the proposed diversion channel infrastructure: the Parsons Brook Diversion Channel Inlet.

Baseline conditions at this site indicate an environment generally suitable for coldwater fish species such as brook trout. High dissolved oxygen levels, stable temperatures, and a neutral pH support fish health and spawning potential. However, localized nutrient enrichment and runoff from upstream agricultural land may contribute to future increases in nutrient levels.

Trout Creek

Trout Creek is represented by two sites expected to have direct interaction with the proposed diversion channel infrastructure: the Parsons Brook Diversion Channel Outlet and the Trout Creek Diversion Channel Inlet.

Parsons Brook Diversion Channel Outlet

The Parsons Brook Diversion Channel Outlet was characterized using seven cross-sections spaced at 50 m intervals downstream of the proposed outlet location.

Baseline conditions at this site indicate channel and water quality characteristics consistent with use by coldwater fish species, including brook trout. Water quality conditions are generally neutral, and physical habitat includes a mix of riffle and run features with gravel substrates. Eroded banks are present in some sections, contributing localized sediment inputs that may influence spawning substrate quality or cover availability. Shallow riffle areas with gravel substrates provide conditions suitable for redd construction.

Trout Creek Diversion Channel Inlet

The Trout Creek Diversion Channel Inlet was characterized using nine cross-sections spaced primarily at 50 m intervals.

Baseline conditions indicate a channel with distinct hydrological and geomorphological characteristics relevant to fish habitat. The main channel exhibits active flow, high dissolved oxygen, and coarse substrate, which are consistent with habitat requirements of coldwater species such as Atlantic salmon and brook trout. In contrast, a low-flow side channel at the proposed inlet location is characterized by reduced velocities, increased sediment deposition, and limited connectivity under typical flow conditions, with flow primarily conveyed during elevated water levels or flood events. The inlet location therefore intersects a portion of the channel that is hydraulically active during high-flow conditions, while minimizing interaction with the main channel during normal flows.

Kennebecasis River and Drainage Ditch

The main stem of the Kennebecasis River was not fully assessed during the fish habitat surveys due to adverse field conditions (swift water in late fall). Transects were not established in this reach.

The drainage ditch located directly north of the Trans-Canada Highway will serve as the outflow point for the Trout Creek Diversion Channel, conveying water to the adjacent wetland – and ultimately to the Kennebecasis River – during flood events. Fish habitat within the ditch appears minimal under typical conditions; however, ephemeral high-flow events, such as the spring freshest, may temporarily increase flow and provide short-tern habitat or movement opportunities for fish.

4.2.3 Avifauna

An Avifauna Technica Report was prepared to describe the methods used to assess this valued component and to document baseline conditions in detail. Key findings from the report are summarized below, and the full technical report is provided in Appendix E.

4.2.3.1 Methodology

Desktop Review

A preliminary desktop review of existing information on avifauna within the terrestrial LAA was conducted prior to the completion of bird surveys for the Project. 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 review included the following sources:

- ACCDC Report
- Maritimes Breeding Bird Atlas (MBBA)

Field Studies

Breeding Bird Surveys

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 (2024). However, a full 10-minute point count protocol was used (Environment Canada, 2007), and birds were recorded based on an estimated position within concentric 50 and 100-m radiuses. Counts were partitioned into two 5-minute intervals. 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 locations were randomly distributed throughout the PDA to reduce habitat bias and were spaced at least 200 m apart to maintain sampling independence.

A single round of point count surveys was completed on June 7, 2024 during the core nesting period for breeding birds in the region. Surveys were conducted under favourable weather conditions and followed ECCC (2023) guidance. The timing of the survey was selected o coincide with peak vocal activity for the majority of regional species.

Nightjar Surveys

Nightjar surveys were conducted in accordance with the *Canadian Nightjar Survey Protocol 2024* (Birds Canada, 2024). Surveys were conducted on June 26, 2024, during the peak breeding period. The survey followed a passive point count design, consisting of six stations spaced at least 600 m apart to maintain sampling independence and minimize overlap.

4.2.3.2 Results

Desktop Review

The ACCDC report summarizes records of SAR and SOCC within 5 km of the PDA centre. Within this radius, 11 avian SAR listed under NB SARA were identified. Among them is the bald eagle (*Haliaeetus leucocephalus*), a location-sensitive species for which precise coordinates are withheld to prevent potential disturbance or exploitation.

The identified avian SAR, along with their respective federal and provincial status designations and S-Ranks for New Brunswick, are presented in Table 4.13.

Table 4.13 ACCDC Results - Avian SAR within 5 km of the PDA

Common Name	Scientific Name	NB SARA Status	SARA Status	COSEWIC Status	Provincial S-Rank
Bald eagle	*Haliaeetus leucocephalus*	END	-	NAR	S4
Bank swallow	*Riparia riparia*	END	THR	THR	S2B
Barn swallow	*Hirundo rustica*	THR	THR	SC	S2B
Bobolink	*Dolichonyx oryzivorus*	THR	THR	SC	S3B
Canada warbler	*Cardellina canadensis*	THR	THR	SC	S3S4B
Chimney swift	*Chaetura pelagica*	THR	THR	THR	S2S3B, S2M
Common nighthawk	*Chordeiles minor*	THR	SC	SC	S3B, S4M
Eastern wood-pewee	*Contopus virens*	SC	SC	SC	S3B
Olive-sided flycatcher	*Contopus cooperi*	END	SC	SC	S3B
Rusty blackbird	*Euphagus carolinus*	SC	SC	SC	S2S3B, S3M
Wood thrush	*Hylocichla mustelina*	THR	THR	THR	S1S2B

Table Note: The following codes represent the indicated conservation status: THR = Threatened, END = Endangered, SC = Special Concern, NAR = Not at Risk in Canada. ACCDC S-Rank are as follows: S1 is critically imperiled in the province; S2 is imperiled in the province; S3 is vulnerable in the province; S4 is apparently secure in the province; S5 is secure 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: N is the nonbreeding population of the species in the province; M is the species are considered a migrant and only make transient occurrences in the province.

A search of the MBBA database identified six SAR recorded within the surveyed square containing the project site: bald eagle, barn swallow (*Hirundo rustica*), bobolink (*Dolichonyx oryzivorus*), chimney swift (*Chaetura pelagica*), common nighthawk (*Chordeiles minor*), and Eastern wood-pewee (*Contopus virens*). An additional 11 SAR have been documented in the broader Saint John region (Appendix E).

Field Studies

Breeding Bird Surveys

Breeding status was assessed using evidence codes adapted from *the Ontario Breeding Bird Atlas* (Birds Canada, 2024). 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 2024 BBS results is presented in Table 4.14. In total, 378 individual birds were recorded, representing 43 species. The majority of these species are considered common in NB, with S-Ranks of S3 or higher.

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

- American crow (*Corvus brachyrhynchos*): 84 individuals
- Song sparrow (*Melospiza melodia*): 34 individuals
- Black-throated green warbler (*Setophaga virens*): 26 individuals

Table 4.14 Breeding Bird Survey Results

Common Name	Scientific Name	S-Rank	Breeding Behavior	# Individuals
Alder flycatcher	*Empidonax alnorum*	S5B	S	7
American crow	*Corvus brachyrhynchos*	S5B	S	84
American goldfinch	*Spinus tristis*	S5	S	14
American redstart	*Setophaga ruticilla*	S5B	S	10
American robin	*Turdus migratorius*	S5B	S	10
Belted kingfisher	*Megaceryle alcyon*	S5B	S	1
Black-and-white warbler	*Mniotilta varia*	S5B	S	12
Blackburnian warbler	*Setophaga fusca*	S5B	S	1
Black-capped chickadee	*Poecile atricapillus*	S5	S	6
Black-throated green warbler	*Setophaga virens*	S5B	S	26
Blue jay	*Cyanocitta cristata*	S5	H	5
Blue-headed vireo	*Vireo solitarius*	S5B	S	2
Brown creeper	*Certhia americana*	S5	S	2
Cape may warbler	*Setophaga tigrina*	S3B, S4S5M	S	1
Cedar waxwing	*Bombycilla cedrorum*	S5B	H	16
Chestnut-sided warbler	*Setophaga pensylvanica*	S5B	S	1
Chipping sparrow	*Spizella passerina*	S5B	S	1

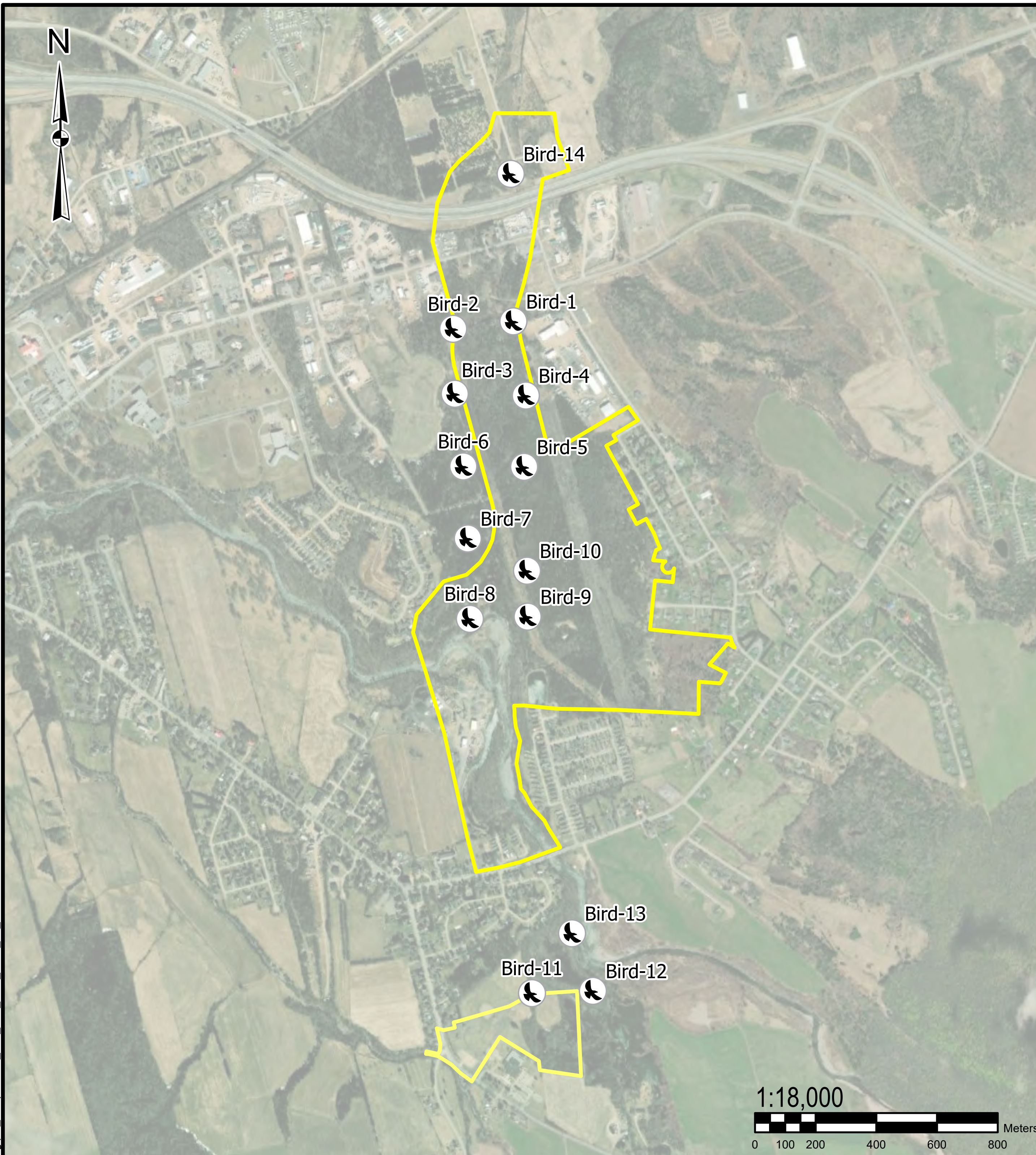
Common Name	Scientific Name	S-Rank	Breeding Behavior	# Individuals
Common grackle	*Quiscalus quiscula*	S5B	S	5
Common yellowthroat	*Geothlypis trichas*	S5B	S	9
Dark-eyed junco	*Junco hyemalis*	S5	S	12
Eastern bluebird	*Sialia sialis*	S4B	S	1
Eastern wood-pewee	*Contopus virens*	S3B	S	6
Golden-crowned kinglet	*Regulus satrapa*	S5	S	2
Grey catbird	*Dumetella carolinensis*	S4B	S	1
Hairy woodpecker	*Dryobates villosus*	S5	S	2
Hermit thrush	*Catharus guttatus*	S5B	S	19
Magnolia warbler	*Setophaga magnolia*	S5B	S	1
Mourning dove	*Zenaida macroura*	S5B,S4N	S	1
Mourning warbler	*Geothlypis philadelphia*	S4B,S5M	S	1
Northern cardinal	*Cardinalis cardinalis*	S4	S	3
Northern parula	*Setophaga americana*	S5B	S	12
Ovenbird	*Seiurus aurocapilla*	S5B	S	11
Red-breasted nuthatch	*Sitta canadensis*	S5	S	1
Red-eyed vireo	*Vireo olivaceus*	S5B	S	10
Red-winged blackbird	*Agelaius phoeniceus*	S4B	S	16
Ruby-throated hummingbird	*Archilochus colubris*	S5B	H	1
Song sparrow	*Melospiza melodia*	S5B	S	34
Veery	*Catharus fuscescens*	S4B	S	1
White-breasted nuthatch	*Sitta carolinensis*	S4	S	1
White-throated sparrow	*Zonotrichia albicollis*	S5B	S	13
Yellow warbler	*Setophaga petechia*	S5B	S	3
Yellow-bellied sapsucker	*Sphyrapicus varius*	S5B	S	1
Yellow-rumped warbler	*Setophaga coronata*	S5B	S	12

Table Note: The following codes represent the indicated conservation status: S = Singing male or adult producing other sounds associated with breeding, H = Species observed in suitable nesting habitat during its breeding season. ACCDC S-Rank are as follows: S1 is critically imperiled in the province; S2 is imperiled in the province; S3 is vulnerable in the province; S4 is apparently secure in the province; S5 is secure 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: N is the nonbreeding population of the species in the province; M is the species are considered a migrant and only make transient occurrences in the province.

BBS results were organized by the seven habitat units defined by the Ecological Land Classification (ELC) completed previously by GEMTEC. A summary of bird species recorded within each habitat type is provided in the Avifauna Technical Report (Appendix E).

Eastern wood-pewee (*Contopus virens*) is listed as *Special Concern* under the provincial and federal SARA. Six individual Eastern wood-pewee were observed during the 2024 BBS for the Project, with detections distributed across hardwood, mixedwood, softwood, and thicket habitats (Figure 4.11). The consistent observation of singing males suggests territorial behaviour, indicating that individuals were likely established on breeding territories within or adjacent to the PDA.

Observations across multiple habitat types suggest that the Study Area supports a range of suitable habitats for Eastern wood-pewee, particularly areas with partially open canopies and edge conditions. Although the species remains relatively widespread in New Brunswick, its continued population decline, and provincial listing underscore the importance of conserving appropriate habitat features during project development.



Legend:

Bird Survey Points

Project Development Area (PDA)

Note:
1. Coordinate system: NB; Stereographic projection, NAD83 (CSRS) Datum.
2. Contains information licensed under the Open Government License - New Brunswick.
3. Service Layer Credits: Vantor

Project: Sussex Flood Mitigation Project, Sussex, New Brunswick				Drawing: Breeding Bird Survey Locations Client: Sussex	
Drawn by: CR	Checked by: KW	Date: February 2026	Project Number: 101539.009	Drawing Number: Figure 4.11	Revision No. 0

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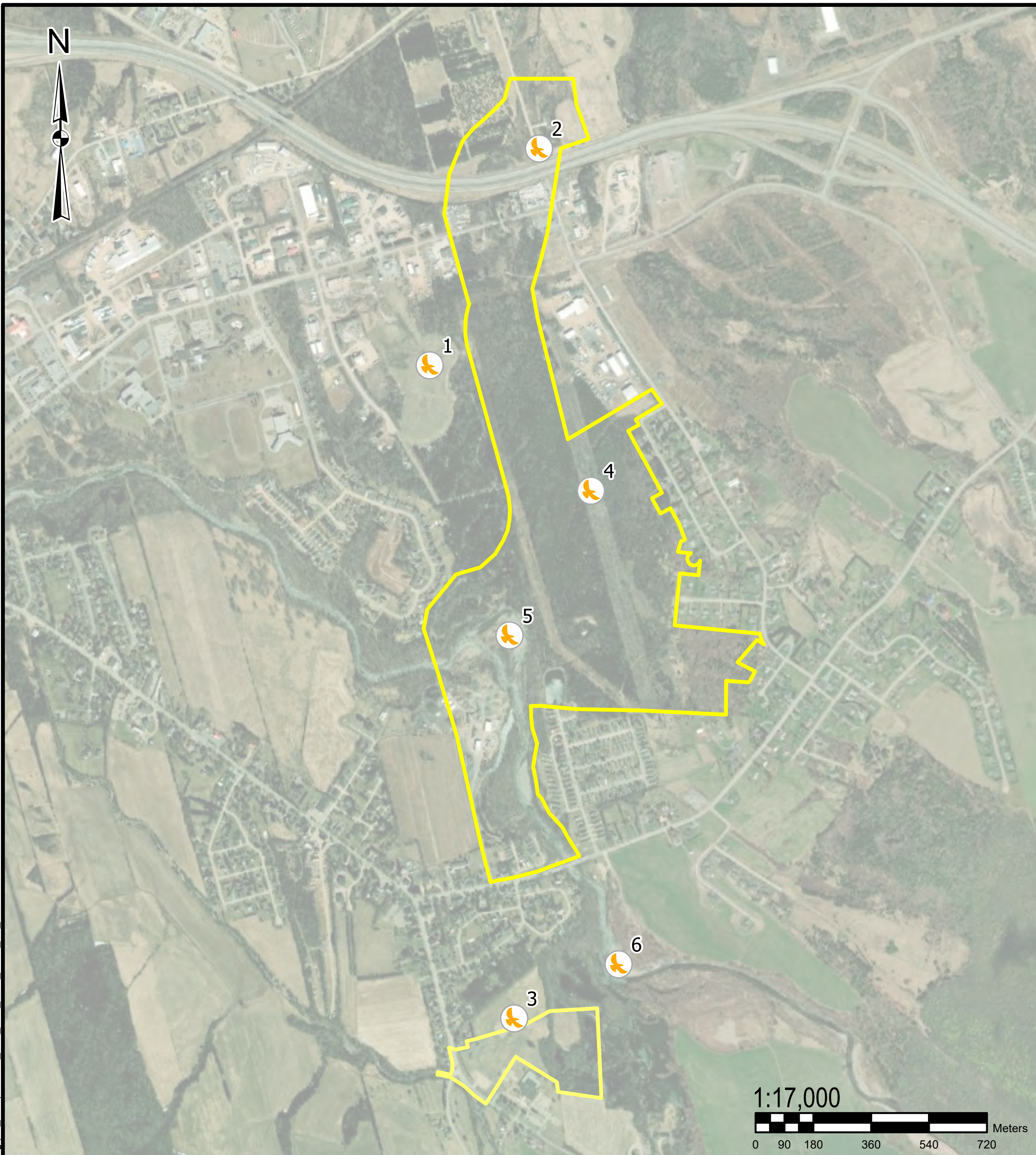
Nightjar Surveys

No nightjar species were detected at any survey point on June 26, 2024. The absence of detections may reflect true absence, low local abundance, or limitations related to habitat and detectability. The surveyed area is located within a developed urban setting, which may reduce habitat suitability for nightjars and hinder detectability due to ambient noise, artificial lightning, and fragmented open space – factors that can interfere with nightjar presence and vocal activity (Figure 4.12).



Legend:
Nightjar Survey Points
Project Development Areas (PDAs)

Note:
1. Coordinate system: NB; Stereographic projection, NAD83 (CSRS) Datum.
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3. Service Layer Credits: Vantor

Project: Sussex Flood Mitigation Project, Sussex, New Brunswick			Drawing: Nightjar Survey Locations		GEMTEC Consulting Engineers and Scientists
			Client: Sussex		
Drawn by: CR	Checked by: KW	Date: February 2026	Project Number: 101539.009	Drawing Number: Figure 4.12	Revision No. 0

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4.2.4 Vegetation and Ecological Land Classification

A Vegetation and Ecological Land Classification Technical Report was prepared to describe the baseline conditions and assessment methods for this VC. The report includes detailed descriptions of vegetation communities, rare plant species, and ELC within the PDA and LAA. Key findings are summarized below, and the full report is provided in Appendix F of this document.

Desktop Review

A review of the ACCDC database identified 27 flora species (23 vascular and 4 nonvascular) historically recorded within a 5 km radius of the PDA. Of these, two vascular plant species are considered SAR under this assessment:

- **Butternut (*Juglans cinerea*)** is listed as *Endangered* under COSEWIC, Schedule 1 of the federal SARA, and the provincial NB SARA. Butternut typically occurs in a variety of forested habitats, including floodplains, streambanks, terraces, and ravine (COSEWIC, 2017). ACCDC data indicate historic occurrences along Trout Creek, approximately 2 km upstream of the proposed Parsons Brook Diversion Channel Outlet and along sections of Trout Creek between the two proposed diversion channels.
- **Black ash (*Fraxinus nigra*)** is not currently listed under Schedule 1 of SARA but is designated *Threatened* by COSEWIC and is under consideration for federal listing. It is provincially ranked as S3/S4 (vulnerable to apparently secure) in New Brunswick. Like Butternut, Black ash was historically recorded along Trout Creek approximately 2 km upstream of the proposed infrastructure footprint.

The remaining 25 flora species identified by the ACCDC are considered SOCC but are not listed under COSEWIC, SARA, or NB SARA. A complete list of species identified in the desktop review is provided in Appendix D.

Field surveys were conducted to verify the occurrence of these and other species of interest and to document existing vegetation communities on site.

Field Surveys and Ecological Land Classification

Vegetation surveys were conducted by GEMTEC biologists to characterize plant communities and identify plant species with a focus on rare or at-risk species present within the PDA. ELC was used to delineate and describe five habitat units observed during field studies:

- **Wetland –** Saturated, low-lying areas dominated by hydrophytic vegetation and hydric soils, typically supporting diverse moisture-tolerant plant communities
- **Anthropogenic –** Disturbed or developed areas influenced by human activity, often dominated by non-native or disturbance-tolerant species

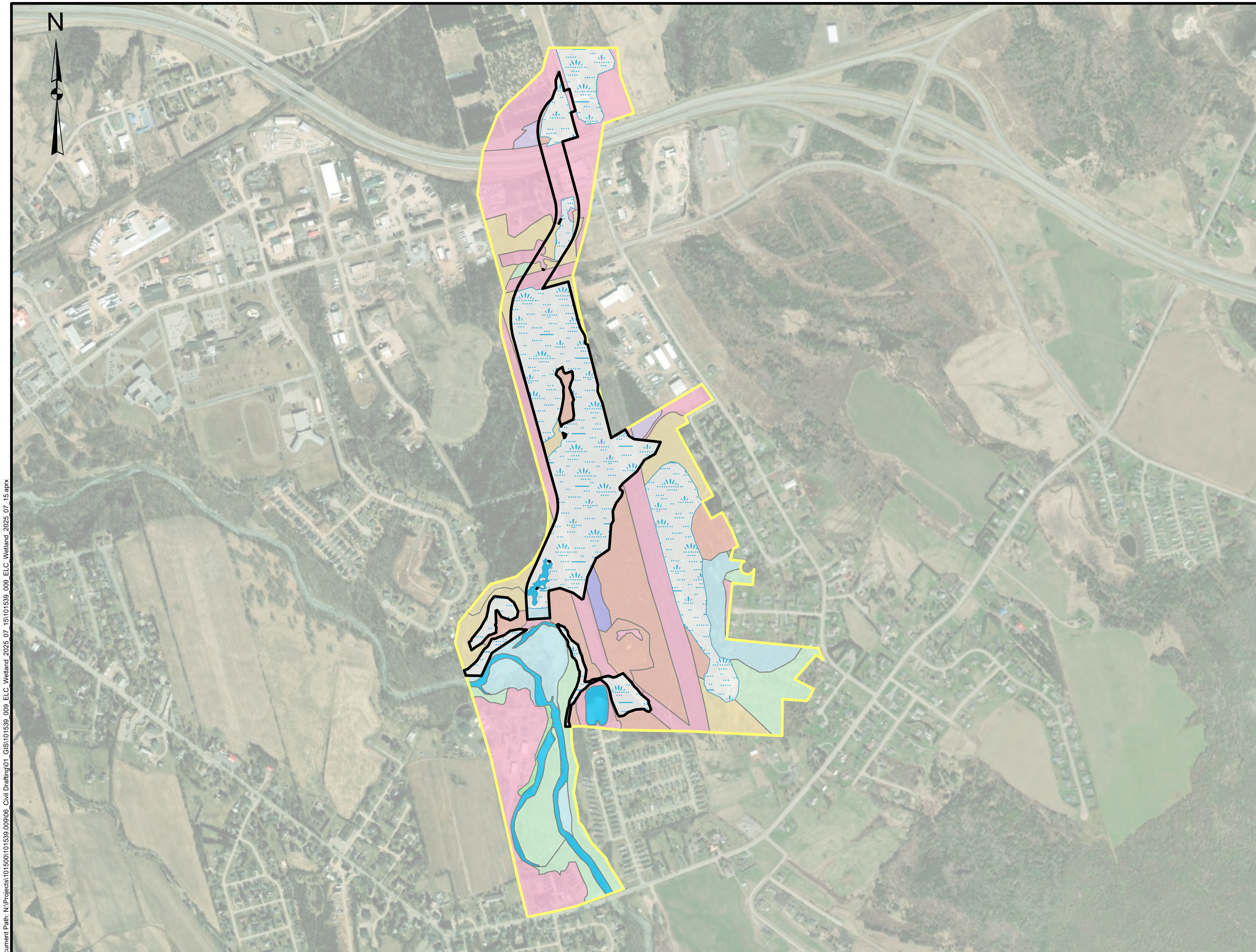
- **Mature Mixedwood Forest –** Forest stands with a mix of coniferous and deciduous overstory species, including balsam fir (M-BFMX), poplar (M-POMX) and spruce (M-SPMX).
- **Waterbody –** Open aquatic systems such as ponds or streams, with limited vegetation and riparian shrub zones dominated by species like speckled alder (*Alnus incana*)
- **Non-commercial Woodland (NOCM)** – Early-successional or low-productivity forest areas with limited commercial value, typically underrepresented in provincial data

Desktop Assessments and Ecological Land Classification

Desktop assessments were conducted by GEMTEC biologists to characterize plant communities and other habitat features within the PDA. Desktop ELC was used to delineate and describe seven habitat units observed during field studies:

- **Wetland –** Saturated, low-lying areas dominated by hydrophytic vegetation and hydric soils, typically supporting diverse moisture-tolerant plant communities
- **Anthropogenic –** Disturbed or developed areas influenced by human activity, often dominated by non-native or disturbance-tolerant species
- **Immature Hardwood Forest**: Immature forest stands with a shade intolerant deciduous dominated overstory
- **Mature Mixedwood Forest –** Mature forest stands with a mix of coniferous and deciduous overstory species, including balsam fir (M-BFMX), black spruce (M-BSMX), poplar (M-POMX) and spruce (M-SPMX)
- **Mature Softwood Forest**: Mature forest stands with a coniferous dominated overstory, including spruce (M-SPRC)
- **Waterbody –** Open aquatic systems such as ponds or streams, with limited vegetation and riparian shrub zones dominated by species like Speckled alder (*Alnus incana*)
- **Non-commercial Woodland (NOCM)** – Early-successional or low-productivity forest areas with limited commercial value, typically underrepresented in provincial data

Full descriptions of these habitat types – including dominant species composition, structural characteristics, and on-site Habitat Units with accompanying photographs – are provided in the Vegetation and Ecological Land Classification Technical Report (Appendix F).



Legend

- Project Development Area (PDA)
- Field Verified

ELC Unit

- ANTHRO
- I-INHW
- I-NOCM
- M-BFMX
- M-BSMX
- M-POMX
- M-SPMX
- M-SPRC
- WATER
- WETLAND

Notes
1. Coordinate system: New Brunswick Stereographic, NAD83 (CSRS) Datum.
2. Geographic dataset source: GeoNB Data Catalogue.
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4. This drawing is a schematic representation. Sizes, locations and dimensions are approximate.
5. Service Layer Credits: Vantor

Date	Draw by	Checked by
FEBRUARY 2026	CR	KW

Client

Sussex

Project

Sussex Flood Mitigation Project,
Sussex, New Brunswick

Drawing

Trout Creek
Ecological Land Classification

Scale

Scale: 1:10,890

0 65 130 260 390 520 Meters

Project No.	Drawing No.	Rev.No.
101539.009	FIGURE 4.13A	0

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Legend

- Field Verified
- Project Development Area (PDA)

ELC Unit

- ANTHRO
- M-POMX
- M-TOHW
- WETLAND

Notes
1. Coordinate system: New Brunswick Stereographic, NAD83 (CSRS) Datum.
2. Geographic dataset source: GeoNB Data Catalogue.
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4. This drawing is a schematic representation. Sizes, locations and dimensions are approximate.
5. Service Layer Credits: Source: Esri, Vantor, Earthstar Geographics, and the GIS User Community

Date	Draw by	Checked by
FEBRUARY 2026	CR	KW

Client: Sussex

Project: Sussex Flood Mitigation Project, Sussex, New Brunswick

Drawing: Parsons Brook Ecological Land Classification

Scale: Scale: 1:1,697

0 10 20 40 60 80 Meters

Project No.	Drawing No.	Rev.No.
101539.009	FIGURE 4.13B	0

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Document Path: N:\Projects\101500\101539.009\06_Civil Drafting\01_GIS\101539_009_ELC_Wetland_2025_07_15\101539_009_ELC_Wetland_2025_07_15.aprx

Rare Plant Observations

Vegetation field surveys confirmed the presence of rare plant species within and adjacent to the PDA, including species listed or under consideration under federal and provincial legislation, as well as species with elevated provincial rarity rankings. Observations within the PDA included black ash (*Fraxinus nigra*) and white elm (*Ulmus americana*), while additional rare plant species were recorded outside the PDA, including rosy sedge (*Carex rosea*, S3) and inflated narrow-leaved sedge (*Carex grisea*, S1). The habitat characteristics and associated conservation considerations for these species, along with species identified through the desktop review, are described below.

Red ash (Fraxinus pennsylvanica) and Black ash (Fraxinus nigra)

Five individuals of black ash were recorded during GEMTEC's vegetation field surveys within the PDA. While black ash currently under consideration for addition to Schedule 1 of SARA, it is ranked as Threatened by COSEWIC due to widespread population declines linked primarily to emerald ash borer (*Agrilus planipennis*), an invasive insect responsible for extensive mortality of ash species across eastern North America.

Black ash is a compound-leaved deciduous tree that typically grows in wet, poorly drained soils, especially in swamps, riparian forests, and seasonally flooded lowlands. It is ecologically important for maintaining wetland structure and biodiversity, offering food and habitat to various bird, amphibian, and invertebrate species. The species also hold significant cultural value for Indigenous communities, where its pliable, fibrous wood is traditionally used basketmaking and ceremonial objects. (COSEWIC, 2018)

The individuals observed within the PDA were in moist, floodplain-associated habitat, consistent with the species' known environmental preferences. Given its conservation status, the presence of black ash in the PDA should be considered in future project planning and mitigation design.

In addition to black ash, one observation of red ash was also present within the PDA. Red ash is a medium-sized deciduous tree characterized by opposite, compound leaves, gray-brown furrowed bark, and winged seeds. It typically occurs in large riparian zones, floodplains, swamps, and moist lowlands, but can also tolerate a wide range of soil textures and periodic flooding. (Canada, 2024)

Butternut (Juglans cinerea)

Ten individuals were observed within the PDA. As an *Endangered* species under federal and provincial legislation, any future detection of butternut during construction or pre-construction monitoring should trigger further assessment and avoidance or mitigation actions in accordance with applicable regulations. Butternut is a medium-sized deciduous tree native to eastern North America, recognized by its compound leaves, furrowed gray bark, and oblong fruits. It produces edible nuts and provides important food for wildlife. Butternut grows best in well-drained, fertile soils along slopes, stream banks, and in mixed hardwood forests. The species has declined significantly due to butternut canker.

Inflated Narrow-leaved Sedge (Carex grisea)

One individual of inflated narrow-leaved sedge was observed just outside the PDA (~25m). It is not currently ranked under SARA or COSEWIC; however, it is ranked as S1 which categorizes this species as “critically imperilled” in New Brunswick. Inflated narrow-leaved sedge (*Carex grisea*) is a perennial, clumping sedge distinguished by narrow leaves and characteristic inflated, oval perigynia that give the plant a coarse textured fruit. It typically occurs in moist to wet habitats such as deciduous forest floodplains, shaded swamps, stream margins, and rich lowlands. The species favors moist to seasonally saturated soils and is commonly associated with nutrient-rich substrates under partial to full canopy cover. (Native Plant Trust, 2026)

Rosy Sedge (Carex rosea)

One individual of rosy sedge (*Carex rosea*) was observed outside the PDA (~160m). It is not currently ranked under SARA or COSEWIC; however, it is ranked as S3 which categorizes this species as “vulnerable” in New Brunswick. Rosy sedge is a perennial sedge recognized by its narrow, arching leaves and small, star-shaped, rounded spikelets at the stem tip. It typically occurs in dry to moist deciduous forests, woodland edges, and shaded uplands. The species prefers well-drained, sandy or loamy soils and is commonly found within relatively undisturbed forest understories rather than wetland environments. (Native Plant Trust, 2026)

Legend

- Project Development Area (PDA)
- Black Ash
- Butternut
- Green ash
- Inflated Narrow-leaved Sedge
- Rosy Sedge

Notes
1. Coordinate system: New Brunswick Stereographic, NAD83 (CSRS) Datum.
2. Geographic dataset source: GeoNB Data Catalogue.
3. Contains information licensed under the Open Government Licence - New Brunswick.
4. This drawing is a schematic representation. Sizes, locations and dimensions are approximate.
5. Service Layer Credits: Vantor

Date	Draw by	Checked by
FEBRUARY 2026	CR	KW

Client
Sussex

Project
Sussex Flood Mitigation Project,
Sussex, New Brunswick

Drawing
Rare Plants

Scale
Scale: 1:16,000
0 100 200 400 600 800 Meters

Project No.	Drawing No.	Rev.No.
101539.009	FIGURE 4.14	0

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4.2.5 Terrestrial Wildlife

A desktop review of the ACCDC database was conducted to identify terrestrial wildlife SAR with the potential to occur within or near the PDA. The review considered records within a 5 km radius of the PDA and included species assessed under COSEWIC, SARA, and/or NB SARA. These records provide regional context for terrestrial wildlife potentially occurring in the Project area and inform the evaluation of Project interactions.

Table 4.15 ACCDC Results - Terrestrial SAR within 5 km of the PDA

Common Name	Scientific Name	NB SARA Status	SARA Status	COSEWIC Status	Provincial S-Rank
Cougar - Eastern population	*Puma concolor pop. 1*	END	-	DD	SU
Grey wolf	*Canis lupus*	SX	-	NAR	SX
Monarch	*Danaus plexippus*	SC	SC	END	S2S3?B
Snapping turtle	*Chelydra serpentina*	SC	SC	SC	S3
Wood turtle	*Glyptemys insculpta*	THR	THR	THR	S2S3
Yellow-banded bumble bee	*Bombus terricola*	-	SC	SC	S4

Table Note: The following codes represent the indicated conservation status: THR = Threatened, END = Endangered, SC = Special Concern, NAR = Not at Risk in Canada, SX = Extirpated, DD = Data Deficient. ACCDC S-Rank are as follows: S1 is critically imperiled in the province; S2 is imperiled in the province; S3 is vulnerable in the province; S4 is apparently secure in the province; S5 is secure 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: N is the nonbreeding population of the species in the province; M is the species are considered a migrant and only make transient occurrences in the province.

The ACCDC review identified 4 terrestrial wildlife SAR historically recorded within 5 km of the PDA, representing mammals and insects (Table 4.15). In addition, two reptile species listed under federal and provincial legislation were identified as location-sensitive within the same search radius. In accordance with provincial data-sharing practices, precise location information for location-sensitive species is restricted to prevent disturbance or exploitation of critical habitats and is therefore not disclosed in this report.

Historical ACCDC records for grey wolf (*Canis lupus*) and cougar (*Puma concolor*, eastern population) reflect species that are presumed extirpated or of uncertain status in NB, with no confirmed breeding populations documented in the province. These species are not expected to occur within the PDA or interact with Project activities.

Should any terrestrial wildlife SAR or location-sensitive species be identified during Project construction or operations, additional assessment would be undertaken, and appropriate mitigation or avoidance measures would be implemented in accordance with applicable regulatory requirements.

4.2.5.1 Methodology

Surveys for wood turtle (*Glyptemys insculpta*) and snapping turtle (*Chelydra serpentina*) were conducted within the PDA to assess the presence of suitable habitat and species occurrences. Survey transects were completed at random within both aquatic and terrestrial environments, stratified to include:

- Streams and associated floodplains
- Ponds, lakes, and marshes
- Riparian areas and wetlands
- Adjacent upland habitats such as meadows and agricultural fields

Transects were walked systematically to visually detect turtles, signs of turtle activity, suitable habitat, and suitable nesting areas. Survey timing was designed to overlap with peak turtle activity periods in late May to mid-June, when individuals are more visible basking near watercourses. Snapping turtle surveys coincided with their nesting period in late spring and early summer, when individuals emerge to nest in open, sand, or gravel areas.

Field methods consisted primarily of visual observations. Aquatic transects focused on clear, slow-moving watercourses and adjacent floodplains where wood turtles are typically associated with sand, gravel, or cobble substrates. Snapping turtle surveys emphasized ponds, marshes, lakes, and beaver-influenced wetlands where soft, muddy bottoms and aquatic vegetation are common. Terrestrial transects extended outward from shorelines into open habitats to assess potential nesting sites. In addition to direct observations of turtles, surveys included searches for secondary signs such as fresh tracks or trails, disturbed or excavated substrate, and evidence of nesting activity.

All areas of suitable nesting substrate and general suitable habitat were photographed for documentation. For each survey location, habitat characteristics were also recorded, including:

- Water flow conditions
- Substrate type
- Canopy cover and shading
- Adjacent vegetation community
- Features supporting basking or nesting (e.g., sandbars, open banks, or point bars)

Standardized effort tracking was applied to each transect and included:

- Survey length and duration
- Weather conditions
- Observer details

All spatial data including turtle sightings, nesting habitat, transect start and end points, and habitat notes were recorded directly into ArcGIS FieldMaps using Global Positioning Device (GPS) enabled devices. This ensured accurate georeferencing and allowed the creation of a spatial database for mapping both survey coverage and identified habitat features.

If either wood turtle or snapping turtle was observed within the PDA, a follow-up assessment was initiated to evaluate the potential impacts of project activities on individuals and their habitat. This included consideration of mitigation measures such as timing restrictions on construction activities, establishment of protective buffers, and avoidance of identified nesting or basking sites.

All survey activities followed the requirements of the federal SARA, the NB SARA, and guidance from the NRED to ensure compliance with conservation obligations for these location-sensitive species.

4.2.5.2 Results

Based on the comprehensive turtle surveys conducted within the PDA on June 24, 2024, by two GEMTEC biologists, no wood turtles (*Glyptemys insculpta*) or snapping turtles (*Chelydra serpentina*) were observed during field investigations. Incidental observations of turtles were to be collected throughout the PDA during all other surveys; however, no turtle species were encountered.

The surveys encompassed all wetland and watercourse habitats within the PDA, specifically areas adjacent to Herbs Ponds and Trout Creek in Sussex, New Brunswick, as well as Herbs Ponds and Trout Creek itself. Survey transects were randomly walked through diverse habitat types including the ponds, associated wetlands, riparian areas, and adjacent upland habitats such as meadows and agricultural fields. All areas surveyed demonstrated potential for supporting general wood turtle and snapping turtle habitat, exhibiting the key habitat features identified in the methodology including suitable water flow conditions, appropriate substrate types, adequate canopy cover and shading, diverse adjacent vegetation communities, and features supporting basking or nesting activities.

Despite the presence of suitable habitat conditions throughout the surveyed areas, no direct sightings of either turtle species were recorded. Additionally, no secondary signs of turtle presence were detected, such as tracks, trails, or evidence of nesting activity. However, three potential nesting locations were identified along Trout Creek within the PDA, characterized by suitable substrate conditions and open areas that could provide nesting opportunities for turtle species. All areas of potentially suitable nesting substrate and general habitat were documented and photographed, with detailed habitat characteristics recorded for each survey location.

The absence of these species within the surveyed areas, despite the presence of suitable habitat and identified potential nesting sites, indicates that the proposed project activities are unlikely to impact wood turtle or snapping turtle populations in the immediate vicinity of the PDA.

4.3 Socioeconomic Features

4.3.1 Protected Areas

Managed Areas and Significant Areas

In addition to rare and endangered flora and fauna, the ACCDC report provides the location and information of significant or managed natural areas. A Managed Area (MA) is a site with some level of protection for wildlife within the boundaries. The Ecologically Significant Areas (ESAs) are sites that may or may not have legal protection.

The ACCDC report did not identify any MAs within the search radius. Two ESAs were identified:

- **Sussex Salt Spring ESA**: Located approximately 2.6 km northeast of the proposed Trout Creek diversion channel outlet. According to the ACCDC data provided, this is one of very few known inland salt springs with high salinity and vegetation characteristic of coastal salt marshes. Saltwater bubbles up from underground, is caught in a small pool, and the outflow is quickly diluted in freshwater ditch/tributary
- **Rockville Escarpment ESA**: Located on Trout Creek approximately 3.3 km upstream of the proposed Parsons Brook diversion channel outlet into Trout Creek. According to the ACCDC data provided, this is a large escarpment and cliff area hosting
  - 3.3 km from the Parsons Brook diversion channel, southeast
  - Large escarpment and cliff area hosting rock spikemoss, rock harlequin, and bearberry. The escarpment also hosts a stand of White and Red Pines, with a few Jack Pines and Red Oak in some areas

Both the Sussex Salt Spring ESA and the Rockville Escarpment ESA are located at substantial distances from the PDA, with the Sussex Salt Spring ESA situated approximately 2.6 km northeast and the Rockville Escarpment ESA located around 3.3 km upstream of the Parsons Brook diversion channel outlet. Given their upstream locations and the considerable separation from the PDA, no direct or indirect impacts are anticipated to these ecologically significant areas as a result of the proposed activities.

Protected Natural Areas

Protected Natural Areas (PNA) were designated under the Provincial Protected Natural Areas Act, 2003 with the purpose of ensuring the persistence of wilderness areas and preventing the loss of New Brunswick’s natural habitats. PNAs are designated under the following classification:

- **Class I PNA**: access is prohibited except by scientific or education permit to protect sensitive features
- **Class II PNA**: low-impact recreation is allowed

There are no Class I or Class II PNAs within 5 km of the PDA. The nearest PNA from the PDA is Picadilly Mountain (approximately 6 km from the PDA), followed by Saddleback Brook (~22 km), and Big Salmon River (27 km), all of which are designated as Class II.

Nature Legacy Protected Areas

Nature Legacy Protected Areas were established by NRED to help achieve New Brunswick's target of 10% protected lands within the province. To protect and conserve New Brunswick's biodiversity, the province has prohibited a number of activities that will alter or damage the natural environment. This includes construction, clearing of land, road building, and industrial extraction of natural resources. These areas lack a titled designation but have numerical identifiers included in the database (NRED, 2022).

There are currently no Nature Legacy Protected Areas within 5 km of the PDA. The nearest Nature Legacy Protected Area (ID 4039000) is approximately 10 km east of the PDA, there are several other identified Nature Legacy Protected Areas south of the PDA ranging from approximately 13 km to 17 km from the PDA.

Ecologically and Biologically Significant Areas

Ecologically and Biologically Significant Areas (EBSA) are federally designated marine areas that have biological or ecological significance in comparison to the surrounding marine ecosystem. EBSAs are used to inform projects that have potential to have marine interactions and provide a basis for assigning managed and protected areas within a marine environment. The nearest marine environment from the PDA is Chignecto Bay, where the nearest point of the Mary's Point EBSA is approximately 51 km away. Modiolus reefs on Nova Scotia Shore is approximately 56 km south of the PDA.

Wildlife Refuges and Wildlife Management Areas

Wildlife Refuges and Wildlife Management Areas were established by NRED to manage wildlife species that are hunted, trapped, or snared by restricting these activities in certain areas. There are no Wildlife Refuges or Wildlife Management Areas within 5 km of the PDA. The nearest Wildlife Management Area is Canaan River Wildlife Management Area, approximately 41 km north northwest of the PDA, where hunting, trapping, and snaring are prohibited. The Mount Ararat Wildlife Management Area is located approximately 50 km west of the PDA. Hunting is prohibited within the area; however, trapping and snaring are permitted under the *Fish and Wildlife Act*.

Wellfield Protection Areas

Wellfield protection areas include the surface and subsurface areas that surround a water well that supplies a public water system. In these areas, there prohibitions or limitations or chemical storage or land use activities. The PDA is within 150 m of Zone C – Preliminary Wellfield 52 (Sussex) in addition Parsons Brook Diversion Channel overlaps Zone A – Designated and Zone B - Designated of Wellfield 53, originally designated for the former Village of Sussex Corner.

Important Bird Areas

The nearest Important Bird Areas (IBA) is Quaco Bay approximately 37 km south of the PDA, secondly Lower Saint John River (Sheffield / Jemseg) is approximately 40 km west of the PDA and Shepody Bay West is approximately 50 km east of the PDA.

Deer Wintering Areas

Deer wintering areas were designated by NRED to serve as forested area that can provide habitat on crown lands for herds of white-tailed deer (*Odocoileus virginianus*) during winter months. There were no Deer Wintering area identified within 5 km of the PDA. The nearest Deer Wintering Area is approximately 24 km north northwest, and another approximately 24 km south of the PDA.

Wildlife Management Zones

Wildlife Management Zones were designated by NRED to help manage wildlife populations that are commonly hunted in the area, including deer, moose, and bear. The PDA falls within Wildlife Management Zone 22 (north of PDA) and Zone 23 (south of PDA). Both Zones are open to hunting, trapping, and snaring. The exception is Fundy National Park and Fundy Trail Provincial Park which are both closed to hunting, trapping, and snaring.

Watershed Protection Areas

DELG introduced the Watershed Protection Program to protect water supplies by placing standards on activities within municipal drinking water supply watersheds. The Watershed Protection Program designated watersheds that supply municipal drinking water and established the following zones of protection:

- **Zone A**: any watercourse, including lakes, streams, ponds, rivers or brooks that supply the drinking water within the designated watershed
- **Zone B**: the 75 m setback zone consisting of the area within a horizontal distance of 75 m from the bank of the watercourse
- **Zone C**: the remainder of the watershed located outside the 75 m setback but within the watershed boundary

The Watershed Protected Area Designation Order – *Clean Water Act* outlines which activities are permitted in the protected areas and applies to properties located in the various Zones.

The PDA does not interact with any Watershed Protected Areas. The nearest area is Zone C, Loch Lomond Watershed Protected Area, located approximately 35 km southwest from the PDA.

4.3.2 Archaeological and Heritage Resources

Archaeological investigations were completed in 2024 and 2025 to characterize existing archaeological and heritage conditions within the Project area and surrounding landscape (Appendix G). These investigations considered both areas where ground disturbance is proposed and areas that may be indirectly affected by Project-related changes in hydrology, within a landscape shaped by alluvial landforms, watercourses, and historical land use. The existing conditions described in this section are based on the maximum Project footprints assessed during the archaeological investigations.

Areas identified as having moderate to high archaeological potential, including portions of the PDA, will be subject to additional subsurface archaeological testing (test pitting) during the 2026 field season. The results of this work will be documented in an updated Archaeological Impact Assessment and incorporated into this EIA through an addendum, with the implications of any subsequent refinements to the PDA addressed in the effects assessment section of this report.

4.3.2.1 Archaeological Resources – 2024 Investigation

An Archaeological Impact Assessment (AIA) was completed in 2024 for the Project to assess areas where ground disturbance was proposed, including the Parsons Brook and Trout Creek diversion channel alignments. The investigation included a desktop review and pedestrian (walkover) surveys of the PDA, in accordance with the *Guidelines and Procedures for Conducting Professional Archaeological Assessments in New Brunswick* (Archaeology and Heritage Branch (AHB), 2012).

The PDAs are situated within an alluvial landscape associated with Trout Creek and Parsons Brook and fall within elevated archaeological potential zones due to their proximity to watercourses, paleochannels, and predicted alluvial plains. These environmental characteristics are recognized as settings where deeply buried archaeological materials may occur.

No significant archaeological artifacts or features were observed or recovered during the 2024 pedestrian surveys. However, the absence of surface or near-surface materials was not considered sufficient to rule out the presence of buried archaeological resources, given the geomorphic context and potential for deeply stratified alluvial deposits. As a result, the PDA were characterized as having moderate to high archaeological potential.

4.3.2.2 Archaeological Resources – 2025 Investigation

A supplemental AIA was completed in 2025 to assess potential indirect effects to archaeological resources outside the PDA, specifically along the Kennebecasis River corridor near the CN Rail line. This investigation was undertaken to evaluate whether residual elevated flood water levels associated with the diversion channels could affect archaeological resources in areas where no ground disturbance is proposed.

The study area of the AIA is located on an elevated alluvial terrace adjacent to the Kennebecasis River and is characterized by mature forest cover and deep fine-grained alluvial sediments. The investigation included pedestrian survey and limited exploratory testing of LiDAR-identified anomalies.

The study area was determined to retain high archaeological potential, and archaeological resources and features of historical significance were identified and documented. The environmental setting, including terrace elevation, vegetation cover, and sediment depth, was assessed as providing a degree of protection against erosion or scour under elevated flood conditions. The investigation concluded that the study area would not be directly disturbed by project activities and that potential interactions would be limited to indirect hydrologic effects.

4.3.2.1 Heritage Features

The region is recognized for its notable concentration of wood-constructed covered bridges, with a total of 16 located throughout central Kings County. Sussex is commonly referred to as the Covered Bridge Capital of Atlantic Canada. Eight of these heritage structures are situated within a ten-minute drive of Sussex Town Hall, with the nearest covered bridge located approximately 3 km from the PDA.

The Intercolonial Railway Station, a designated historical structure of regional significance, is located approximately 2.5 km from the PDA. This heritage asset contributes to the broader historical and cultural context of the area.

No designated heritage structures are located within the PDA itself.

4.3.3 Public Health and Safety

4.3.3.1 Police

The Sussex Royal Canadian Mounted Police (RCMP) Detachment, located at 43 Leonard Drive, provides essential policing services to the town and surrounding areas. Situated approximately 1.5 km from the PDA, the detachment is a vital part of the RCMP network, responsible for maintaining public safety, enforcing laws, and delivering community policing support. The detachment offers various services, including criminal record checks, fingerprinting, and responding to non-emergency complaints. It also plays a crucial role in crime prevention, ensuring that residents have access to resources that promote safety and security. The Sussex RCMP Detachment works closely with local organizations, government agencies, and the community to address public safety concerns and foster a strong relationship between law enforcement and residents. The detachment is staffed by a dedicated team of RCMP officers committed to ensuring a safe and secure environment for all.

4.3.3.2 Fire

The Sussex Fire Department, located at 22-1 Maple Avenue in Sussex, New Brunswick, provides essential emergency services to the community. Situated about 2.5 km from the PDA, the department covers approximately 120 square miles and protects around 15,000 residents. Staffed by 29 firefighters and 11 officers, the department responds to fire suppression, rescue operations, hazardous material incidents, and medical emergencies. In addition to emergency response, the Sussex Fire Department engages in fire prevention and public education programs. Through its dedicated team and proactive approach, the department ensures a swift and effective response to emergencies while maintaining strong ties with the community.

4.3.3.3 Medical

Ambulance New Brunswick (ANB) provides land and air ambulance services for all New Brunswick. ANB employs more than 1,000 health care professionals and operates a fleet of 134 ambulances stationed around New Brunswick and 2 aircrafts stations in Moncton, NB.

Ambulance New Brunswick operates an emergency medical service station at 77 McLeod Drive in Sussex, which is located less than 1 km from the PDA. This station is staffed by trained paramedics who provide essential pre-hospital emergency care and transport services to residents and visitors in the Sussex area. The proximity of the station ensures a quick response time for medical emergencies, contributing to the overall health and safety of the community. Ambulance New Brunswick works in collaboration with local healthcare providers and other emergency services to offer comprehensive care to those in need.

4.3.4 Community and Local Economy

On January 1, 2023, Sussex, New Brunswick, underwent amalgamation, merging the former Town of Sussex, the Village of Sussex Corner, and a portion of the local service district of the Parish of Sussex into one unified municipality. This restructuring was part of broader provincial reforms aimed at improving local governance, streamlining municipal services, and enhancing operational efficiency. The newly formed community retained the name "Sussex" to honor its historical and regional identity. It is important to note that census data provided in the following sections is only relevant to the former boundaries of Sussex Corner and the Town of Sussex prior to amalgamation, as updated census data for the newly amalgamated municipality is not yet available.

4.3.4.1 Demographics

Demographic information is presented using census subdivision data that predates municipal amalgamation (2023); as such, statistics are reported separately for the former Town of Sussex and the former Village of Sussex Corner. The PDA is located within the municipal boundaries of both the Town of Sussex and Sussex Corner, with Sussex Corner being the closest town center, approximately 1 km south of the southern PDA boundary.

The population of the Town of Sussex saw a slight decrease between 2011 and 2016, with figures of 4,312 and 4,282, respectively (Statistics Canada, 2016b). However, according to the 2021 Census, the population of Sussex increased by 3.7% or 158, bringing the total population to 4,440 (Statistics Canada, 2021b). Similarly, Sussex Corner experienced a small decline in population between 2011 and 2016, with numbers decreasing from 1,495 to 1,461 (Statistics Canada, 2016a). In 2021, the population saw a negligible decrease of 3, resulting in a total population of 1,458 (Statistics Canada, 2021a).

In 2021, the median age of the population in the Town of Sussex was 48 years, with the largest group of residents falling within the 60 to 64 age range. Among the occupied private dwellings, the most common household type was single-person households, and 55% of the dwellings were single-household structures (Statistics Canada, 2021b). In Sussex Corner, the median age was 50 years, with most residents aged between 55 and 59 years. Single-detached homes were the predominant dwelling type, with most households consisting of two persons (Statistics Canada, 2021a).

4.3.4.2 Employment and Median Income

According to the 2021 Census, the Town of Sussex recorded an unemployment rate of 11.1%. Of the 3,660 residents aged 15 years and older who were sampled, 1,940 were in the labour force, with 215 individuals unemployed and 1,715 not participating in the labour force. In comparison, Sussex Corner reported a lower unemployment rate of 6.8%. Of the 1,220 residents aged 15 years and older who were sampled, 665 were in the labour force, with 45 individuals unemployed and 555 not in the labour force.

Figure 4.15 below shows the total employment income distribution for the years 2016 and 2020 for individuals aged 15 years and older living in the Town of Sussex, while Figure 4.16 shows that of Sussex Corner, according to Statistics Canada (Statistics Canada, 2016a; Statistics Canada, 2016b; Statistics Canada, 2021b; Statistics Canada, 2021a).

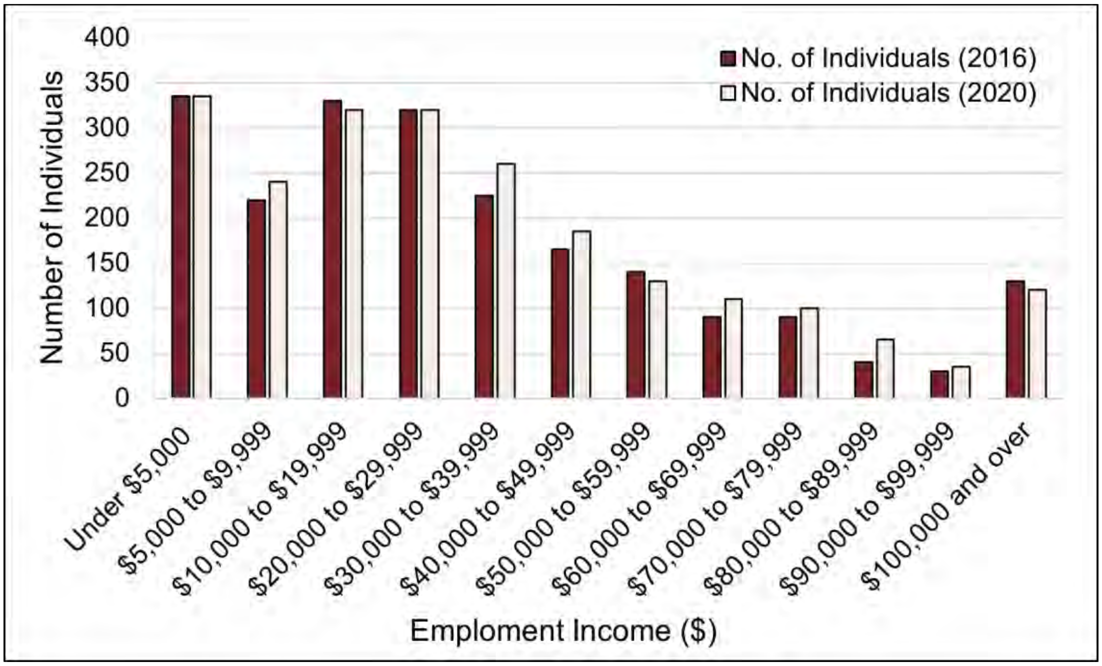


Figure 4.15 Income Distribution of Aged 15 and Over in the Town of Sussex for 2016 and 2020

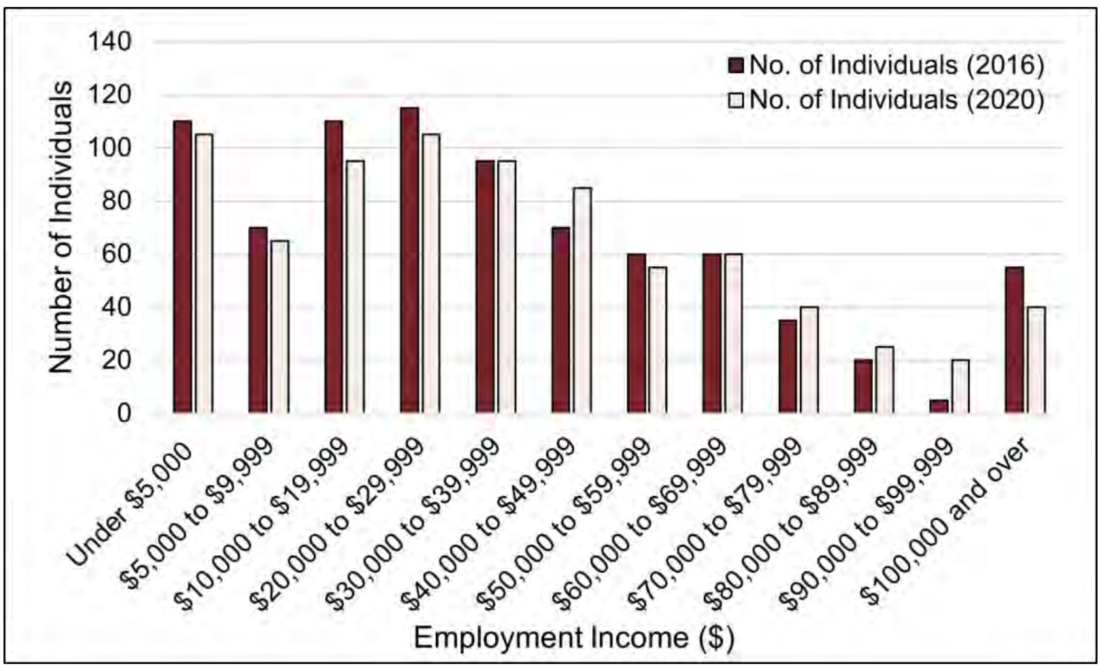


Figure 4.16 Income Distribution of Aged 15 and Over in the Village of Sussex Corner for 2016 and 2020

4.3.4.3 Economic Region

The PDA is located in New Brunswick's Southwest Economic Region, consisting of Saint John, Kings and Charlotte counties and making up a total land area of 8,362 km^2. In 2023, the largest employment by sector included wholesale and retail trading, followed by healthcare and social assistance then construction (GNB, 2024).

4.3.5 Transportation and Infrastructure

4.3.5.1 Roadways

The primary east–west transportation corridor serving the area is the Trans-Canada Highway (Route 1), which runs directly through the PDA. Access to the PDA from Route 1 is available via two nearby exits: the St. Martin's Road (Highway 111) exit, located approximately 1 km east of the PDA, and the Marble Street exit, situated approximately 1.5 km west of the PDA. Route 10 extends northwest from Sussex toward the City of Fredericton, while Highway 121 runs southeast from the former Town of Sussex into Sussex Corner. Highway 111 extends southwest from the St. Martin's Road exit to the former Sussex Corner, providing further connectivity. Leonard Drive and Cougle Road offer the closest access to the PDA from the south side of Route 1, whereas Aiton Road and Adams Lane provide the nearest access from the north side of the highway. These transportation routes form a well-connected network supporting efficient access to and from the PDA.

4.3.6 Land and Resource Use

4.3.6.1 Traditional and Historic Land Use

The land on which Sussex is located forms part of the traditional and unceded territory of the Wolastoqiyik (Maliseet). Archaeological, ethnographic, and historical sources indicate Indigenous peoples have occupied and used lands throughout southern and central New Brunswick for millennia prior to European contact, with river systems functioning as primary travel corridors and focal areas for settlement and resource use (Deal, Rutherford, Murphy, & Buchanan, 2006; Deal, 2017).

The Saint John River valley and its associated tributary networks have been widely documented as core areas supporting Indigenous travel, fishing, hunting, plant harvesting, and access to inland terrestrial habitats (Deal, Rutherford, Murphy, & Buchanan, 2006; Deal, 2017). Early post-glacial Indigenous occupation has been identified elsewhere in southwestern New Brunswick, supporting long-term Indigenous presence in the broader region following deglaciation (Suttie, et al., 2013). At the time of early European contact (circa 1500), Indigenous communities were closely associated with marine and freshwater shorelines, with river systems and connected lakes playing a central role in traditional land use due to their ecological productivity and transportation value (Aiton, 1967; Deal, 2017).

Within the regional context of Sussex and the lower Kennebecasis River watershed, waterways would have served as important movement corridors and resource areas for the Wolastoqiyik and their ancestors. Areas near present-day Apohaqui, located approximately 10 km west of the PDA, are documented as having supported traditional Indigenous agriculture, including the cultivation of corn, beans, and squash, reflecting sustained and organized land use within the broader region (Deal, 2017).

Indigenous knowledge systems reflect a long-standing and evolving relationship with the land, encompassing detailed understanding of water bodies, wildlife, vegetation, and seasonal ecological processes. This knowledge continues to inform contemporary cultural practices and land stewardship approaches within Wolastoqey communities (Deal, 2017).

No known Indigenous archaeological sites, burial grounds, or cultural features have been identified within the PDA based on available desktop information. Archaeological assessment requirements and Indigenous engagement are addressed separately in this EIA.

Pedestrian archaeological surveys completed in 2024 did not identify surface or near-surface archaeological materials; however, portions of the PDA were characterized as having moderate to high archaeological potential due to geomorphic conditions and the potential for buried resources. As a result, subsurface archaeological testing (test pitting) is planned for 2026 within the PDA. Results of this work will be documented in an updated AIA and incorporated into this EIA through an addendum.

Any previously unidentified Indigenous cultural resources encountered during Project activities would be managed in accordance with applicable provincial protocols and consultation commitments.

4.3.6.2 Existing Land Use

The existing land use within and surrounding the PDA comprises a mix of commercial, light industrial, residential, rural, and undeveloped lands, reflecting the area's transitional location between the urban boundary of Sussex and the surrounding Kings Rural District.

Within the PDA and its immediate surroundings, land use is regulated by the *Town of Sussex Zoning By-law* and applicable rural zoning regulations for unincorporated areas. The PDA itself includes lands that are primarily designated as "Business Park (BP)" and "Industrial (I)", allowing for commercial, light industrial, and logistical operations (Town of Sussex, 2021a). Adjacent zoning to the south includes "Residential (R1)" and "Highway Commercial (HC)" designations along Leonard Drive and Cougle Road. To the north, zoning transitions into "Agricultural (AG)" and "Rural (RU)" designations, consistent with lower-density residential, agricultural, and resource-based land use. The zoning framework supports mixed-use development and is reflective of Sussex's intent to accommodate economic growth while preserving residential character and agricultural land on the outskirts (Town of Sussex, 2021a).

Land ownership within and surrounding the PDA is composed of a combination of privately held parcels and municipally owned land, including lands designated for development under the Town's strategic growth and servicing plans (Town of Sussex, 2021b). The surrounding properties are predominantly privately owned, with larger parcels to the north and east utilized for agriculture or rural residential purposes (GNB, 2026). In the south and west, ownership consists of smaller residential lots, local businesses, and parcels held by Sussex or provincial government entities for transportation and infrastructure use (GNB, 2026).

4.3.6.3 Recreation

Recreational opportunities in the vicinity of the PDA are diverse and reflect the region's emphasis on outdoor and community-based activities. The area surrounding the PDA includes several multi-use trails, green spaces, and public parks that support both active and passive recreational use. Notably, the Sussex Nature Trail System, a well-maintained network of walking and cycling trails, is accessible from multiple points within Sussex and extends toward the outskirts of the PDA. The Buttercup Trail and Mill Brook Trail are popular for walking, running, and cycling and are frequented by both residents and visitors. Princess Louise Park, located approximately 2 km from the PDA, serves as a major recreational hub, offering sports fields, playgrounds, picnic areas, and hosting community events such as the annual Sussex Flea Market and agricultural fair. The 8th Hussars Sports Centre, located nearby, provides year-round indoor recreational opportunities including skating, hockey, and community programming. Also located nearby is the Sussex Bark Park, a popular off-leash dog park used by residents which provides a safe, fenced-in area for dogs to exercise and socialize.

The surrounding rural landscape supports seasonal recreation such as cross-country skiing, snowmobiling, and all-terrain vehicle (ATV) use, with connections to the New Brunswick Trail System (NB Trails). Although no official trails or formal recreational infrastructure are currently identified within the PDA by either QuadNB (2026) or Snowmobile Motoneige NB (2026), nearby trail networks and green corridors enhance community connectivity and reflect the region's integration of recreation into broader land use planning.

4.3.7 Cultural Features

While the immediate vicinity of the PDA does not contain significant cultural or historical landmarks, the broader Sussex region encompasses a variety of recognized cultural, historical, and recreational features of regional significance. These resources contribute to the overall character and identity of the area.

4.3.7.1 Cultural and Artistic Resources

Sussex is widely recognized for its outdoor mural program. A total of 26 murals were completed in 2006 and 2007, establishing the town's reputation as the Mural Capital of Atlantic Canada. These artworks are primarily located in the town centre and are not within the immediate vicinity of the PDA.

Cultural diversity in Sussex is further supported by organizations such as the Multicultural Association of Sussex, which has provided newcomer settlement and cultural exchange programming in Kings County since 2018.

4.3.7.2 **Community Events and Festivals**

Sussex hosts several major annual events that draw visitors from across the province and beyond. These include:

- The Atlantic Balloon Fiesta, Atlantic Canada's largest hot air balloon festival, held each September
- Canada's largest outdoor flea market, held annually in August
- The Sussex Agricultural Fair, a long-standing event celebrating over 100 years of agricultural heritage

4.3.7.3 **Natural and Recreational Opportunities**

The PDA is not situated near any national or provincial parks. Fundy National Parks and the Fundy Trail Parkway Provincial Park – both prominent natural tourism destinations – are located more than 30 km away. Nonetheless, the Sussex area functions as a regional gateway to these outdoor recreation areas, offering services and accommodations that support park visitors.

Additionally, Poley Mountain, the only alpine ski facility in southern New Brunswick, is located approximately 8 km southeast of the Sussex town centre. While it is outside the immediate PDA, it represents a notable regional recreational asset.

5.0 ENVIRONMENTAL EFFECTS ASSESSMENT AND MITIGATION

The evaluation of potential effects, mitigation measures, and residual impacts of the Project is based on the Project Description and existing conditions presented in Sections 2.0 and 4.0, respectively.

The effects assessment focuses on the Site Preparation and Construction phase, as well as the Operations and Maintenance phase of the Project. A distinct Closure and Decommissioning phase was not assessed, as the Project consists of permanent flood mitigation and water management infrastructure that is not anticipated to be decommissioned or abandoned over its operational life. As such, effects associated with closure or decommissioning are not expected and were not considered in this assessment.

Spatial boundaries applied in the effects assessment, including the PDA, LAA, and RAA, are as defined in Section 3.2.3, unless otherwise specified within individual VC sections.

5.1 Hydrogeology

5.1.1 Impact Pathways

The Parsons Brook PDA is within Zone A of the Sussex Corner Designated Wellfield protected area and will require an exemption prior to commencement of any work. It should be noted that Well 3 is currently not in use by Sussex due to increasing manganese concentrations in exceedance of human health guidelines. Sussex is currently beginning an investigation for a new well in Ward 2, and is anticipating decommissioning Well 3 once a new well is established.

Site Preparation and Construction

Construction activities associated with the diversion channels, intake structures, access roads, and associated infrastructure have the potential to interact with shallow groundwater systems. Ground disturbance resulting from clearing, grubbing, excavation, and grading may locally alter shallow groundwater flow patterns by changing surface elevations, soil structure, and permeability. Excavation of channel alignments and intake structures could temporarily intercept shallow groundwater, resulting in localized drawdown during construction dewatering.

Dewatering activities required for intake structure construction, culvert installation, and bridge/culvert foundations may temporarily lower groundwater levels in the immediate vicinity of excavations. These effects would be short-term and spatially limited but could influence groundwater-surface water interactions near Parsons Brook, Trout Creek, and the Kennebecasis River floodplain during active construction.

There is also a potential risk of groundwater quality effects during construction due to accidental spills of fuels, lubricants, or other construction-related substances, as well as the mobilization of fine sediments. Improper handling or storage of hazardous materials could result in infiltration to shallow soils and groundwater. These risks are most relevant in areas where permeable soils are present and where construction occurs near watercourses or wetlands.

Operations and Maintenance

During the operational phase, the diversion channels are designed to remain dry under normal conditions and to convey water only during flood events. As such, no continuous alteration of groundwater recharge, discharge, or flow regimes is anticipated. Temporary inundation of channel beds and adjacent floodplain areas, during diversion events and could result in short-term increases in infiltration; however, these events are expected to be infrequent and of limited duration. Pooled water has potential to have an effect on the upper and lower aquifer depending on the continuity of the aquitard.

Routine maintenance activities, such as vegetation management, debris removal, and occasional dredging at intake or outlet areas, have a low potential to affect groundwater. These activities will be localized, infrequent, and conducted using standard environmental protection measures and through consultation with federal and provincial regulatory authorities.

No groundwater extraction, injection, or long-term dewatering is associated with the Project. As a result, maintenance effects on regional groundwater levels, groundwater-dependent receptors, or groundwater quality are not anticipated.

5.1.2 Mitigation

Potential effects on hydrogeology are primarily associated with short-term construction activities and temporary inundation of channel beds. Standard best management and regulatory controls are expected to effectively minimize risks to groundwater quantity and quality.

Mitigation measures will include the implementation of a comprehensive EMP to guide construction activities. Key measures relevant to hydrogeology include:

- Limit the extent and duration of excavation and dewatering to the minimum required for safe construction
- Managing dewatering effluent in accordance with applicable provincial requirements to prevent erosion, sedimentation, and contamination of soils or watercourses
- Implementing ESC measures to reduce the mobilization of fine sediments that could infiltrate groundwater
- Proper handling, storage, and refueling procedures for fuels and hazardous materials, including secondary containment and spill response protocols. Refueling and machinery maintenance will be completed outside of the Designated Wellfield.
- Immediate containment and cleanup of any accidental spills in accordance with the EMP and applicable regulations
- Progressive site stabilization and revegetation to restore natural infiltration patterns following construction
- Construction and grading of channel to prevent long term ponding of water within the channel

Table 5.1 summarizes the identified impact pathways by Project phase and the associated mitigation measures proposed to avoid or minimize residual effects.

Table 5.1 Potential Effects and Proposed Mitigations for Hydrogeology

Source of Potential Effect	Project Phase	Potential Changes to Valued Component	Area of Influence	Proposed Mitigations
Excavation and grading	Construction	• Localized alteration of shallow groundwater flow • Temporary groundwater interception	PDA	• Limit excavation footprint • Progressive stabilization and restoration
Construction dewatering	Construction	• Temporary groundwater drawdown • Altered groundwater-surface water interactions	PDA	• Minimize duration of dewatering • Manage discharge in accordance with regulatory requirements
Accidental spills or improper material handling	Construction	• Localized groundwater quality degradation	PDA	• Spill prevention and response measures • Secondary containment for fuels and hazardous materials • Complete refuelling and maintenance outside of Designated Wellfield.
Temporary floodwater infiltration	Operations	• Short-term localized increase in recharge	PDA/LAA	• Passive design limits duration and frequency of inundation
Routine maintenance activities	Operations	• Minor, localized soil disturbance	PDA	• Standard environmental protection practices
Ponding of water in channel	Operations	• Potential effects on groundwater quality	PDA/LAA	• Design and construction to prevent ponding of water within channel

5.1.3 Significance Determination

The potential effects of Project activities on hydrogeology were evaluated assuming effective implementation of all proposed mitigation measures.

Magnitude of residual effects is assessed as Low. Construction-related effects on groundwater levels and quality are expected to be localized, short-term, and limited to shallow groundwater systems. No long-term changes to regional groundwater flow or aquifer productivity are anticipated.

Duration of effects is classified as Short Term, as potential interactions with groundwater are confined primarily to the construction phase. Operational effects are episodic and limited to brief flood diversion events.

Frequency is assessed as Once for most construction-related effects and Sporadic for operational effects associated with flood events and maintenance activities.

Spatial extent of effects is expected to be limited to the PDA, with no measurable effects anticipated beyond the immediate Project footprint.

Reversibility is rated as Reversible, as groundwater levels and quality are expected to return to baseline conditions following completion of construction and stabilization of disturbed areas.

Likelihood of effects is assessed as Likely for minor construction-related interactions with shallow groundwater and Possible for accidental contamination events, contingent on adherence to mitigation measures.

Based on the localized nature of the Project, the passive and infrequent operation of the diversion channels, and the application of standard mitigation measures, all residual effects on hydrogeology are considered Not Significant.

Table 5.2 Significance Determination of Identified Effects for Hydrogeology

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood	Significance
Temporary groundwater interception and drawdown	Low	Short Term	Once	PDA	Reversible	Likely	Not Significant
Localized groundwater quality effects from construction	Low	Short Term	Once	PDA	Reversible	Possible	Not Significant
Short-term infiltration during diversion events	Low	Short Term	Sporadic	PDA	Reversible	Possible	Not Significant

5.1.4 Monitoring and Follow-Up

Prior to construction, an application for an Exemption to the Wellfield Protected Area Designation Order will be submitted DELG, as required.

Given the localized, short-term, and not significant nature of potential effects on shallow groundwater, no routine groundwater monitoring or follow-up is proposed for this Project. Groundwater-related risks are expected to be adequately managed through Project design, standard construction practices, and compliance with applicable regulatory requirements.

Should unanticipated groundwater-related issues arise during construction (e.g., unexpected groundwater inflows or changes in groundwater conditions), appropriate corrective measures would be implemented in consultation with regulatory authorities and in accordance with conditions of approval.

5.2 Hydrology

5.2.1 Impact Pathways

Site preparation and construction activities may impact the hydrology within the PDA. These activities include:

Site Preparation and Construction

Site preparation and construction activities have the potential to affect hydrologic conditions within the PDA and, by extension, the LAA. These effects are primarily associated with ground disturbance, temporary in-water works, and the construction of permanent Project infrastructure that may alter surface water flow, drainage patterns, and water quality.

Key construction activities with the potential to influence hydrology include vegetation clearing and grubbing, grading, installation of temporary cofferdams, construction of intake control structures, culvert installation, construction of two bridge/culvert crossings, and raising of the Plant Road embankment. Collectively, these activities may modify existing surface water pathways and affect both the quality and quantity of surface water runoff within the PDA.

As a result of these activities, the following hydrology-related impact pathways have been identified:

- **Increased turbidity of surface water runoff**: Construction activities will disturb soils within the PDA and increase the likelihood of sediment transport in surface water runoff, resulting in elevated turbidity. If not effectively managed, increased turbidity has the potential to adversely affect downstream aquatic environments and aquatic life within the LAA
- **Increased organic content of surface water runoff**: Clearing and grubbing activities will generate organic stockpiles and increase the potential for nutrient-rich runoff from the PDA, which may temporarily elevate organic content in receiving surface waters
- **Changes in flow paths and surface water conveyance**: Construction of diversion channels, temporary cofferdams, and the raised Plant Road embankment may alter local drainage patterns within the PDA, with the potential to affect surface water flow paths and increase the risk of localized ponding or flooding during construction

Operations and Maintenance

Operations and maintenance activities have the potential to influence hydrologic conditions within the PDA and, by extension, the LAA. These activities are associated with the ongoing operation of flood mitigation infrastructure during high-flow events, as well as periodic maintenance required to ensure the continued functionality of diversion channels and associated structures.

Key operational and maintenance activities with the potential to affect hydrology include operation of the diversion system during flood events, routine and corrective maintenance, and occasional dredging at intake or outlet locations where sediment or debris accumulation may occur. While these activities are expected to be infrequent and localized, they may temporarily influence hydraulic conditions and surface water quality.

As a result of these activities, the following hydrology-related impact pathways have been identified:

- **Flow redistribution and backwater effects**: Operation of the diversion channels, culverts, and the raised Plant Road embankment may alter local flow distribution during flood events, potentially increasing upstream or adjacent water levels and modifying velocity patterns under high-flow conditions
- **Increased turbidity and organic content of surface water runoff**: Routine maintenance activities, including vegetation management, debris removal, and occasional dredging at intake or outlet areas, may disturb soils or organic material. These disturbances could result in temporary increases in turbidity and organic content in surface waters within the LAA

5.2.2 Mitigation

Mitigation measures will be implemented during construction, operation, and maintenance to limit potential effects on hydrology and surface water quality within the PDA and LAA. During construction, best management practices will be applied to reduce soil disturbance, manage runoff, and maintain existing drainage patterns where practicable. Temporary works will be designed and sequenced to limit disruption to natural flow conditions. Maintenance activities will be scheduled, where feasible, during low-flow periods to minimize hydrologic disturbance. Where work occurs near watercourses, additional measures will be applied to reduce sediment transport, localized flooding, and accidental spills. Table 5.3 presents a summary of identified impact pathways by Project phase and the associated mitigation measures proposed to avoid or minimize residual effects.

Table 5.3 Potential Effects and Proposed Mitigations for Hydrology

Source of Potential Effect	Project Phase	Potential Changes to Valued Component	Area of Influence	Proposed Mitigations
Vegetation clearing and grubbing	Construction	• Increased organic content in runoff • Increased turbidity from exposed soils	PDA	• Limit clearing to required footprint • Stockpile organics away from drainage paths • Stabilize exposed soils promptly (seed/mulch/erosion control blankets) • Install erosion and sediment controls measures (silt fence, sediment traps)
Grading and earthworks	Construction	• Increased turbidity and sediment transport • Localized changes in drainage routing • Short-term ponding	PDA	• Phase grading to minimize exposed area • Maintain temporary drainage and swales • Stabilize slopes and disturbed ground • Inspect and maintain erosion and sediment control measures after rainfall
Temporary cofferdams	Construction	• Backwater effects upstream • Localized velocity changes and scour risk	PDA	• Design cofferdams for expected flows • Maintain bypass conveyance where needed • Install scour protection
Diversion channel construction	Construction	• Temporary increase of turbidity and sediment transport • Changes to flow paths	PDA	• Use erosion and sediment control measures along diversion channel corridor • Maintain temporary drainage across work zone • Install permanent drainage and reinstatement measures
Diversion channel operation during flood events	Operation	• Flow redistribution between watercourses • Localized changes in water levels and velocities	LAA	• Maintain intake/outlet free of debris • Monitor performance during early operation period • Inspect after flood events
Plant Road embankment raise	Construction/Operation	• Localized ponding • Backwater effects during flood flows • Increased turbidity and sediment transport during construction	LAA adjacent to Plant Road	• Maintain temporary drainage across work zone • Install permanent drainage and reinstatement measures • Implement localized flood mitigation measures (including but not limited to backwater valves, road raises, berms)

Source of Potential Effect	Project Phase	Potential Changes to Valued Component	Area of Influence	Proposed Mitigations
Routine maintenance and potential dredging	Maintenance	• Short-term turbidity from localized disturbance • Organic material mobilization	PDA	• Schedule work during dry period • Stockpile organics away from drainage paths • Stabilize disturbed areas

5.2.3 Significance Determination

The potential effects of Project activities on the hydrology were evaluated assuming effective implementation of all proposed mitigation measures.

Magnitude of residual effects is assessed as Low. Construction-related effects on surface water flow patterns and water quality are expected to be localized, temporary, and limited to areas within the PDA. Operational effects are limited to changes in flow distribution and water levels during 20-year return-period storm events and larger

Duration of effects is classified as Short Term for maintenance and construction-related activities, with effects confined to active work periods. Operational effects are Intermittent, occurring only during flood events when the diversion channels function.

Frequency is assessed as Once for most construction-related effects and Occasional for operational effects associated with 20-year return-period storm events and larger, along with routine maintenance activities.

Geographic extent of effects is expected to be Local, limited to the PDA and localized portions of the LAA influenced by the diversion inlets, outlets, and modified infrastructure. No measurable changes in hydrologic conditions are anticipated beyond the LAA.

Reversibility is rated as Reversible, as changes in flow distribution and water levels occur only during elevated flow conditions when the diversion channels operate. Outside flood events, hydrologic conditions return to stable baseline conditions, and no ongoing or progressive alteration of hydrologic function is anticipated.

Likelihood of residual effects is assessed as Likely for minor, short-term construction-related changes in runoff characteristics and Occasional for operational effects associated with diversion channel operation during large storm events.

Based on the limited magnitude, short duration, localized extent, and reversible nature of the predicted effects, and considering the passive operation of the diversion channels during infrequent large storm events, residual effects on hydrology are considered Not Significant.

Table 5.4 Significance Determination of Identified Effects for Hydrology

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood	Significance
Increased organic content in runoff	Low	Short Term	Sporadic	PDA	Reversible	Likely	Not Significant
Increased turbidity and sediment transport	Low	Short Term	Sporadic	PDA	Reversible	Likely	Not Significant
Localized changes in drainage	Negligible	Short Term	Once	PDA	Reversible	Likely	Not Significant
Localized changes in water levels and velocities during construction	Low	Short Term	Once	PDA	Reversible	Possible	Not Significant
Changes in water levels and velocities during operation	Moderate	Short Term	Sporadic	LAA	Reversible	Possible	Minor Adverse

5.2.4 Monitoring and Follow-Up

Hydrologic mitigation measures identified for the Project will be implemented through a project-specific Environmental Management Plan, including erosion and sediment control, runoff management, and construction sequencing measures to limit potential effects on surface water quantity and quality within the PDA and LAA.

Given the localized, episodic, and not significant nature of predicted residual hydrologic effects, no routine long-term hydrologic monitoring is proposed for the Project. Hydrologic risks are expected to be managed through Project design, adherence to standard construction practices, and compliance with applicable regulatory requirements.

During construction, temporary works affecting surface water conveyance, including cofferdams, diversion tie-ins, and culvert installations, will be inspected regularly to confirm maintenance of drainage continuity and effective sediment control. Diversion inlets, outlets, and other drainage features will also be inspected during and following major rainfall or runoff events to confirm proper function and identify any need for corrective action.

During operation, routine inspections of diversion channel inlets and outlets will be conducted as part of maintenance activities to address debris accumulation, erosion, or sediment buildup. Should unanticipated hydrologic conditions arise during construction or operation, such as unforeseen localized flooding or changes in drainage behaviour, appropriate follow-up actions will be implemented in consultation with regulatory authorities and in accordance with conditions of approval.

5.3 Atmospheric Environment

5.3.1 Impact Pathways

Site Preparation and Construction

Site preparation and construction activities including clearing, grubbing and grading, and excavation, associated with the construction of diversion channels and associated infrastructure have a potential to affect the local atmospheric environment.

The atmospheric and ambient air impacts during construction activities include:

- Fugitive dust generated from moving earth/disturbing soil, wind erosion from soil or rock stockpiles, and increase in traffic near construction sites
- Elevated emissions of greenhouse gasses and combustions gasses from the combustion of fossil fuels from heavy equipment and vehicles utilized during on-site construction activities. The transporting of materials off-site may result in the dispersion of air contaminants to off-site receptors
- Reduction of local air quality where ambient limits are exceeded as a result of operation of equipment and other air contaminant emissions generating activities

Heavy equipment, particularly in construction and industrial sectors, is a notable source of GHG emissions. These emissions primarily come from the use of heavy-duty diesel engines and large-scale earthmoving operations. Expected equipment utilized during site preparation and construction activities include excavators, cranes, bulldozers, dump trucks, concrete trucks, flatbed semi trucks, skid-steers, compactors, and front-end loaders. Not all equipment will be used at the same time. For a full description of Construction Details, see Section 2.8.

Contaminants of potential concern during the site preparation and construction phase include greenhouse gases, fine particulate matter, total suspended particulates, carbon monoxide, and nitrogen dioxide.

Operations and Maintenance

Routine and reactive maintenance activities will be infrequent and are expected to have a low potential to affect the atmospheric environment due to the limited duration and scale of activity. Atmospheric effects during the operations and maintenance phase are anticipated to be limited to minor, localized emissions from vehicles and equipment used during maintenance activities.

Any scheduled or reactive maintenance requiring the use of construction equipment would result in atmospheric effects similar to those described for the construction phase, but at a reduced scale and frequency. Similar to construction, operation of maintenance equipment will result in minor greenhouse gas emissions; however, these activities will be infrequent and of limited duration.

5.3.2 Mitigation

All project works associated with site preparation and construction will be in accordance with the provincial Air Quality Regulation under the *Clean Air Act* as well as the Canadian Counsil of Ministers of the Environment (CCME) CAAQS (2023).

Table 5.5 summarizes the identified impact pathways by Project phase and the associated mitigation measures proposed to avoid or minimize residual effects.

Table 5.5 Potential Effects and Proposed Mitigations for Atmospheric Environment

Source of Potential Effect	Project Phase	Potential Changes to Valued Component	Area of Influence	Proposed Mitigations
Dust generation from excavation, grading, vegetation clearing, and earth-moving activities	Construction	• Reduced local air quality due to increased particulate matter • Potential impacts on visibility and human health	PDA	• Most construction areas will not be directly adjacent to residential areas with the Trout Creek Diversion Channel outlet traversing an industrial area • Apply water or environmentally safe dust suppressants regularly to exposed soils and active work areas • Minimize the extent of exposed soils and stabilize them promptly after disturbance • Limit vehicle speeds on-site to reduce dust • Materials being trucked to and from the site will be covered • Cease dust-generating construction activities during periods of excessive wind • Incorporate the shortest traffic route(s) possible
Exhaust emissions from construction equipment, vehicles, and machinery operation	Construction	• Temporary increase in local air pollutants	LAA	• Ensure equipment meets all applicable provincial and air quality regulations and emissions standards • Restrict the idling of equipment where feasible • Equipment/vehicles/machinery will be inspected regularly to ensure they comply with current emission standards • Ensure equipment is fueled using low-sulphur diesel (to reduce SO_x air emissions) • Maintain engines and exhaust systems according to the manufacturer's specifications and the recommended maintenance schedule

5.3.3 Significance Determination

The potential effects of Project activities on the atmospheric environment were evaluated assuming effective implementation of all proposed mitigation measures.

Magnitude of residual effects is assessed as Low. Dust generation and exhaust emissions associated with site preparation and construction activities are expected to be minor due to the linear nature of the Project, the temporary exposure of disturbed soils, phased construction activities, and the short duration of active earthworks. While the Project is located within Sussex and nearby receptors are present, the intensity of construction activities is not expected to result in sustained or substantial degradation of local air quality.

Duration of effects is classified as Short Term, as potential atmospheric effects are limited to discrete periods of active construction and will cease following completion of earthworks and site stabilization.

Frequency of effects is assessed as Once, corresponding to the single construction period required to complete the diversion channel works. Any operational or maintenance-related atmospheric effects would be infrequent and of limited duration.

Spatial extent of effects is expected to be limited primarily to the PDA, with minor, localized effects potentially extending into the LAA during periods of active construction or material transport. Effects are not expected to persist beyond the immediate vicinity of construction activities.

Reversibility is rated as Reversible, as air quality conditions are expected to return to baseline levels following cessation of construction activities and implementation of site stabilization measures.

Likelihood of effects is assessed as Almost Certain, as dust generation and equipment emissions are inherent to construction activities; however, these effects are expected to be minor and effectively managed through the application of standard mitigation measures.

Based on the limited duration and episodic nature of construction activities, the localized extent of potential atmospheric effects, the implementation of standard air quality mitigation measures, and the temporary nature of emissions, all residual effects of the Project on the atmospheric environment are considered Not Significant.

Table 5.6 Significance Determination of Identified Effects for Atmospheric Environment

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood	Significance
Dust generation from excavation, grading, vegetation clearing, and earth-moving activities	Low	Short Term	Once	PDA	Reversible	Almost Certain	Not Significant
Exhaust emissions from construction equipment, vehicles, and machinery operation	Low	Short Term	Once	LAA	Reversible	Almost Certain	Not Significant

5.3.4 Monitoring and Follow-Up

Given the localized, short-term, and construction-limited nature of potential atmospheric effects, and the absence of operational emission sources, no air quality monitoring is proposed for the Project.

Air quality effects will be managed through implementation of the construction EMP, which will include dust suppression, equipment emission controls, and other standard measures to minimize atmospheric emissions during site preparation and construction.

Should unforeseen circumstances arise during construction that indicate a need for additional air quality management, the requirement for any supplemental measures would be addressed in consultation with regulatory authorities.

5.4 Acoustic Environment

5.4.1 Impact Pathways

Site Preparation and Construction

Site preparation and construction activities associated with the Project will temporarily increase noise levels due to the operation of construction equipment and construction-related traffic during clearing, grubbing, excavation, and related works. These effects will be limited to periods of active construction within the PDA.

Construction activities with the potential to affect the acoustic environment include clearing and grubbing, excavation, road building, bridge modifications, and construction of intake structures. Noise effects are expected to be localized and temporary, occurring only while equipment is operating.

Potential acoustic effects during site preparation and construction include temporary increases in ambient noise levels associated with the operation of construction equipment and vehicles, which may be perceptible at nearby receptors during active work periods.

Increased vibration from construction equipment was identified as a potential interaction with the acoustic environment; however, significant vibration effects are not anticipated, as the Project does not involve blasting or other high-vibration construction methods.

Noise levels of commonly used construction equipment are provided in Table 5.7. Noise increases during construction will primarily be associated with equipment such excavators, dump trucks, loaders, and other heavy machinery. Not all equipment will operate concurrently, which will limit cumulative noise levels.

Table 5.7 Typical Construction and Equipment Operation Noise Levels

Equipment	Sound Level (dB_A) at 15 metre distance
Backhoe	78
Chainsaw	84
Dozer	82
Dump Truck	76
Excavator	81
Front End Loader	79
Generator	81
Pickup Truck	75
Roller	80
Scraper	84

Table Note: dB_A = Decibels on an "L_{max}" weighted scale. L_{max} is the highest value measured on a sound meter over a given period of time.

The potential for construction noise to affect nearby receptors will depend on the type and duration of equipment operation, distance from the noise source, and local environment conditions. Noise levels from construction equipment are expected to decrease with increasing distance from active work areas, with sound levels typically attenuating by approximately 6 decibels (dBA) for each doubling of distance in open environments. Additional attenuation may occur due to intervening buildings, vegetation, and terrain, while existing industrial infrastructure and transportation corridors contribute to elevated background noise levels in portions of the PDA and LAA.

Based on the existing acoustic environment described in Section 4.1.6, construction noise associated with the Trout Creek Diversion Channel is expected to occur primarily within an industrial setting where ambient noise levels are already influenced by industrial operations and highway traffic. However, localized construction activities associated with the proposed Plant Road embankment raise occur in proximity to residential areas and may be perceptible at nearby residential receptors during periods of active construction, although baseline ambient noise levels in this area are already influenced by adjacent industrial land use associated with a concrete paving facility. Construction activities within the Parsons Brook Diversion Channel PDA and portions of the Route 890 Bridge Raising PDA may also be perceptible at nearby residential or institutional receptors. In all cases, these effects are expected to be temporary, localized, and limited to daytime construction periods

The extent to which construction noise may be perceptible at nearby receptors depends on factors such as the type of equipment in use, distance from the noise source, surrounding land use, and prevailing weather conditions. Sound levels from construction equipment generally decrease with increasing distance from the source, with typical attenuation of approximately 6 dBA for each doubling of distance in open environments. Additional attenuation may occur due to intervening buildings, vegetation, and terrain, while existing industrial infrastructure and transportation corridors contribute to elevated background noise levels in some portions of the PDA. Construction noise may be perceptible at distances of several hundred metres under certain conditions; however, individual equipment sound levels are expected to range from approximately 75 to 84 dBA at a distance of 15 m from the source (Table 5.7), with noise levels diminishing rapidly beyond active work areas.

Operations and Maintenance

No significant acoustic disturbances are anticipated during the operation of the diversion channels. Even during high-flow events, the channels are designed to convey water in a smooth, unobstructed manner, which is not expected to generate noticeable water-related noise.

Routine maintenance activities, including vegetation mowing, snow clearing, and occasional dredging to remove sediment from channel bottoms, may result in temporary increases in noise levels. However, with the implementation of appropriate mitigation measures outlined in Table 5.8, these disturbances are expected to be minor, localized, and not significant.

5.4.2 Mitigation

To minimize construction-related noise and potential disturbances to sensitive receptors during construction, the protective mitigation measures outlined in Table 5.8 will be implemented. All project activities will adhere to applicable noise guidelines and best management practices to reduce acoustic impacts.

Routine maintenance activities, such as vegetation mowing, snow clearing, and periodic dredging, may result in temporary increases in noise levels. However, these activities are expected to be infrequent and short in duration. With proper scheduling and noise mitigation measures in place, as outlined in Table 5.8, the overall impact on the acoustic environment is expected to remain minimal.

Table 5.8, summarizes the identified impact pathways by Project phase and the associated mitigation measures proposed to avoid or minimize residual effects.

Table 5.8 Potential Effects and Proposed Mitigations for Acoustic Environment

Source of Potential Effect	Project Phase	Potential Changes to Valued Component	Area of Influence	Proposed Mitigations
Noise generated from excavation, grading, and earth-moving activities	Construction	• Temporary increase in noise levels, potentially affecting nearby residents and wildlife	PDA	• Limit construction activities to daytime hours where feasible • Maintain equipment to reduce excessive noise emissions • Use noise barrier or berms where practical to reduce sound propagation
Increased traffic noise from construction-related vehicle movement on local roads	Construction	• Increased background noise levels due to the movement of haul trucks and construction vehicles	LAA (Sussex)	• When possible, plan haul routes to avoid residential receptors • Limit engine break use in residential areas
Intermittent noise from maintenance activities (e.g., vegetation mowing, snow clearing, dredging)	Operations and Maintenance	• Periodic noise disturbances from operational equipment	PDA	• Most maintenance activities will be limited to routine tasks commonly associated with general park upkeep, such as mowing and snow clearing • Schedule maintenance activities during less sensitive times of day where feasible • Use low-noise equipment where possible

5.4.3 Significance Determination

The potential effects of Project activities on the acoustic environment were evaluated to determine their significance (Table 5.9). This assessment assumes that all mitigation measures outlined above will be effectively implemented during each phase of the Project.

Magnitude was assessed as Low for most effects because:

- The Project does not require the use of highly specialize or particularly loud equipment beyond standard construction machinery
- The construction fleet is relative limited in variety and number, reducing overall noise levels compared to larger-scale infrastructure projects
- Most noise sources will be intermittent rather than continuous, with activities occurring in phases rather than sustained over long periods
- Most construction sites for the Project are not in a densely populated urban area, reducing the number of sensitive receptors that could be affected by noise

Duration of the effects was classified as Short Term, as the construction phase will not extend over multiple years. Similarly, maintenance activities will be temporary and not result in prolonged acoustic disturbances. The frequency of noise-generating activities is expected to be Once during Construction activities but Sporadic during occasional maintenance, all producing intermittent bursts of sound rather than continuous exposure.

Spatial extent was assessed as primarily within the PDA, as most noise sources – such as excavation, grading, and equipment operation – will be contained within the construction zone. However, some effects, such as transportation of materials to and from the site, could extend beyond the PDA into the LAA, particularly along haul routes.

Reversibility was classified as Reversible since any noise increases associated with the Project will cease once construction, or maintenance activities are completed, allowing sound levels to return to baseline conditions.

Likelihood of effects was determined as Almost Certain for construction and maintenance activities, as these are integral and planned components of the Project.

Table 5.9 Significance Determination of Identified Effects for Acoustic Environment

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood	Significance
Noise generated from excavation, grading, and earth-moving activities	Low	Short Term	Once	PDA	Reversible	Almost Certain	Not Significant
Increased traffic noise from construction-related vehicle movement on local roads	Low	Short Term	Once	LAA	Reversible	Almost Certain	Not Significant
Intermittent noise from maintenance activities (e.g., vegetation mowing, snow clearing, dredging)	Low	Short Term	Sporadic	PDA	Reversible	Almost Certain	Not Significant

5.4.4 Monitoring and Follow-Up

Noise mitigation measures identified for the Project will be implemented through the construction EMP, which will address construction scheduling, equipment operation, and complaint response procedures to minimize potential noise effects during site preparation, construction, and maintenance activities.

Given the temporary and localized nature of construction-related noise, and the absence of continuous operational noise sources, no routine noise monitoring is proposed for the Project. Should noise-related concerns be raised during construction, these would be addressed through adaptive management measures implemented in consultation with regulatory authorities, as required.

5.5 Vegetation and Rare Flora

5.5.1 Impact Pathways

Site Preparation and Construction

Vegetation clearing, grubbing, excavation, grading, and road construction during the construction phase present the greatest potential for direct effects on vegetation and rare flora. Clearing activities may result in the permanent loss of plant cover, including rare or sensitive plant species (if present), and contribute to habitat fragmentation. Grubbing and excavation can disturb soil seed banks and root structures, inhibiting natural regeneration. In areas adjacent to watercourses such as Trout Creek, Parsons Brook, and the Kennebecasis River, changes in local hydrology could also affect riparian plant communities.

Construction of access roads may contribute to edge effects, altering vegetation composition along the corridor and potentially facilitating the spread of invasive species. Similarly, hydro-seeding, seeding, and sodding activities could introduce non-native or invasive species if mixes are not carefully selected. These impacts are largely concentrated within the PDA, but the spread of invasive species may extend into the LAA, depending on site conditions and management effectiveness.

Operations and Maintenance

Vegetation-related maintenance activities, such as mowing to prevent overgrowth, may affect plant community structure if not properly timed. If conducted during sensitive growth or reproductive periods (generally late spring to mid-summer), mowing may hinder regeneration. Although these activities are relatively low in intensity, repeated disturbance can cumulatively affect native vegetation, particularly along the banks of the diversion channels.

In addition, improper reseeding practices during ongoing stabilization or erosion control efforts could introduce invasive species, contributing to long-term shifts in vegetation composition. These impacts are generally localized along the constructed channels.

5.5.2 Mitigation

Potential effects on vegetation and rare flora during Project development are primarily associated with vegetation clearing, grading, excavation, and access road construction. These activities have the potential to result in vegetation loss, habitat alteration, soil disturbance, and the introduction or spread of invasive species. However, characteristics of the existing environment, along with the proposed mitigation measures, are expected to reduce the magnitude and significance of these effects.

The Project footprint is largely situated within areas that have experienced prior disturbance and are bordered by hydro corridors, residential areas, and commercial or industrial properties. While such conditions generally reduce the likelihood of encountering plant species associated with mature or undisturbed forest communities, species of conservation concern such as butternut and black ash are known to persist in disturbed or edge habitats. Baseline botanical surveys conducted for the Project confirmed that butternut and black ash were identified within the PDA.

To further reduce potential effects, a range of mitigation measures will be implemented during construction and operations. These include limiting the clearing footprint to areas required for Project implementation, applying a comprehensive EMP, and implementing phased clearing and progressive restoration. ESC measures will be used to protect soils and adjacent vegetation, and native soils and seed banks will be reused where feasible to support natural regeneration.

Access road footprints will be minimized, and ecologically sensitive areas will be avoided where practicable. A clean equipment protocol will be applied to reduce the potential for the introduction and spread of invasive species (Halloran, Anderson, & Tassie, 2013). Native and locally adapted seed mixes will be used for hydro-seeding, roadside stabilization, and site restoration. Vegetation management during operations will be timed, where feasible, to avoid sensitive growth and reproductive periods (generally late spring to mid-summer) and will use selective techniques to maintain plant community diversity.

Table 5.10 summarizes the identified impact pathways by Project phase and the corresponding mitigation measures proposed to prevent or minimize residual effects.

Table 5.10 Potential Effects and Proposed Mitigations for Vegetation and Rare Flora

Source of Potential Effect	Project Phase	Potential Changes to Valued Component	Area of Influence	Proposed Mitigations
Vegetation clearing and grubbing	Construction	• Direct loss of vegetation • Potential to affect rare flora • Habitat alteration and fragmentation • Introduction of invasive species could harm the native flora and fauna	PDA (RAA for invasive species spread)	• Establish protection zones around identified rare flora • Limit clearing to essential areas only • Implement ESC measures, which will be detailed in an EMP
Excavating and grading	Construction	• Soil disturbances leading to loss of seed banks and root structures • Potential changes in local hydrology affecting riparian vegetation	LAA	• Implement phased clearing and progressive restoration • Implement ESC measures, including silt fences and erosion control blankets • Reuse native soil and seed banks to support natural regeneration
Construction of access roads	Construction	• Habitat fragmentation and edge effects altering vegetation composition • Introduction of invasive species could harm the native flora and fauna	PDA	• Minimize road footprint and avoid ecologically sensitive areas • Follow *Clean Equipment Protocol for Industry* (Halloran, Anderson, & Tassie, 2013) • Use native species in roadside stabilization and revegetation
Seeding, hydro-seeding, and sodding	Construction Operations and Maintenance	• Potential introduction of non-native or invasive species if improper seed mixes are used	PDA	• Use only native and locally adapted seed mixes
Vegetation management	Operations and Maintenance	• Alteration of plant community structure • Potential impact on rare species during key growth periods	LAA	• Time mowing to avoid sensitive growth and reproduction periods • Use selective vegetation management techniques to maintain habitat diversity

5.5.3 Significance Determination

The potential effects of Project activities on vegetation and rare flora were evaluated to determine their significance (Table 5.11). This assessment assumes that all mitigation measures outlined above, including avoidance measures for any identified rare vegetation species, will be effectively implemented throughout all phases of the Project.

Magnitude was assessed as Low to Medium. Although vegetation clearing, grading, and access road development will result in some loss and disturbance of vegetation, the Project footprint is located within an area that has been previously disturbed by residential, commercial, and utility development. Baseline field surveys did not identify any rare flora species within the PDA. Where plant species of conservation concern were identified in proximity to the PDA, their locations were documented, and avoidance measures will be implemented during construction to prevent direct effects. The plant communities present within the PDA are primarily composed of common and disturbance-tolerant species. Habitat fragmentation effects are limited by the already modified nature of the landscape, and the risk of invasive species establishment is reduced through proactive mitigation measures such as equipment cleaning protocols and the use of native seed mixes.

Duration of residual effects was classified as Short Term, Medium Term, and Medium to Long Term, depending on the specific effect. Direct loss of vegetation and seed banks is expected to be limited to the construction phase, while some longer-term alteration of vegetation patterns, including those associated with invasive species or vegetation management, may occur intermittently throughout the Project's operational life but not on a continuous basis.

Frequency was assessed as Once or Sporadic, as most vegetation-related disturbances – such as clearing and grading – will occur as one-time activities during construction. Potential impacts associated with invasive species or vegetation management may occur intermittently throughout the Project's operational life but not on a continuous basis.

Spatial extent of effects was determined to be primarily within the PDA, where direct ground disturbance and vegetation removal will occur. However, the potential spread of invasive species could extend into the LAA if not effectively controlled.

Reversibility was rated as Reversible for all residual effects. Mitigation measures, including progressive restoration, use of native seed banks and soils, and long-term revegetation plans, are expected to restore vegetation structure and function over time. Even in cases where seed banks or root structure are temporarily lost, natural regeneration is likely with proper restoration practices.

Likelihood of effects was assessed as Almost Certain or Likely, depending on the activity. Vegetation removal, soil disturbance, and other construction-related effects are certain to occur. The establishment of invasive species is considered Possible but depends on environmental conditions and the effectiveness of mitigation measures. Considering the localized nature of the effects, the absence of rare flora within the PDA, the documentation and avoidance of any rare vegetation species identified nearby, and the application of standard and site-specific mitigation measures, all residual effects on vegetation and rare flora are considered Not Significant (Table 5.11).

Table 5.11 Significance Determination of Identified Effects for Vegetation and Rare Flora

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood	Significance
Direct loss of vegetation	Medium	Long Term	Once	PDA	Reversible	Almost Certain	Not Significant
Habitat alteration and fragmentation	Medium	Medium Term	Once	PDA	Reversible	Likely	Not Significant
Introduction of invasive species	Low	Medium Term	Sporadic	LAA	Reversible	Possible	Not Significant
Loss of seed banks and root structures	Low	Short Term	Once	PDA	Reversible	Almost Certain	Not Significant

5.5.4 Monitoring and Follow-Up

No residual effects on vegetation and rare flora are anticipated following implementation of the proposed mitigation measures. As such, no routine monitoring specific to vegetation or rare flora is proposed beyond construction-phase restoration verification.

Post-construction restoration will be implemented to ensure disturbed areas are successfully stabilized and re-vegetated with native and locally adapted species. This includes lining diversion channel beds and banks with appropriate sod-forming grasses to promote soil stabilization and reduce erosion. These measures will be implemented through the EMP, which will also outline procedures for vegetation clearing, invasive species prevention, and site restoration. Where necessary, adaptive management measures—such as reseeding or supplemental planting—will be applied to support successful site recovery.

As described in Section 4.2.4, the PDA was expanded in late 2025 to incorporate the proposed Plant Road embankment raise. Vegetation communities and rare plant investigations within these newly included areas have not yet been completed and will be carried out during the 2026 field season. Results of these surveys will be documented in an addendum to this EIA Registration, and any additional mitigation requirements identified will be addressed in consultation with regulatory authorities.

5.6 Fish and Fish Habitat

5.6.1 Impact Pathways

Site Preparation and Construction

Several project components during the construction phase have the potential to affect fish and fish habitat, particularly in Trout Creek and Parsons Brook. The most direct impact will occur during the construction of the intake control structures, which will require dewatering and isolation of sections of the watercourses, temporarily altering fish habitat and local flow conditions. These activities may influence both upstream and downstream reaches, particularly if conducted outside of low-flow periods.

Additional construction activities, such as excavation and movement of equipment, introduce the potential for sediment release. Sediment mobilization can degrade water quality, smother spawning habitat, and increase the risk of fish mortality, especially downstream of the intake structures and within the Kennebecasis River floodplain.

The use of construction equipment within or near watercourses also creates a pathway for the introduction of invasive species, which could pose a broader risk to native aquatic ecosystems across the Kennebecasis and potentially the greater Saint John River Watershed.

Operations and Maintenance

During operation, the activation of the diversion channels during high-flow events will result in temporary redirection of water from Parsons Brook and Trout Creek into engineered channels, ultimately discharging into the Kennebecasis River. This redirection alters the natural flow regime, which could disturb aquatic habitat and influence fish movement or behaviour. However, the diversion channels are not intended to redirect flows to a different watershed, and base flows are expected to remain within the natural channel.

Another potential pathway involves the sediment transport during flood events. There is potential for sediment to deposit downstream of the intake or be transported to the Kennebecasis River floodplain, where it could affect habitat quality.

Changes in flow conditions during and following flood events may also result in temporary pooling or isolated pockets of water within the diversion channels. If aquatic organisms become stranded in these areas, they may be exposed to low oxygen conditions or desiccation, resulting in mortality.

5.6.2 Mitigation

Potential effects on fish and fish habitat during Project development are primarily associated with in-water works, sediment release, flow alteration, stranding, and the potential for invasive species introduction. These activities may result in temporary habitat loss, degradation of water quality, and disruption of natural flow regimes in Parsons Brook, Trout Creek, and the Kennebecasis River. However, these effects are expected to be minimized through the application of best practices, targeted mitigation measures, and site-specific design considerations.

The most direct effects are anticipated during the construction of the intake control structures. However, site-specific characteristics at both proposed intake locations will substantially reduce the intensity of these impacts. At Parsons Brook, the intake structure will be constructed at a section of the watercourse that is narrow and typically exhibits low flows, allowing for relatively simple dewatering and isolation. At Trout Creek, the proposed intake structure will be located at a braided loop, an area that has been documented to experience low flows and occasional stagnant or isolated pools. These sites are described in detail in the Fish and Fish Habitat Technical Report (Appendix C). Based on these conditions, the intake structure is expected to be constructed without requiring a major dewatering operation, further minimizing potential impacts to aquatic habitat. Work areas will be isolated with temporary barriers, which will minimize erosion and sedimentation risk. Fish rescue by qualified biologists will be completed in any standing water in isolated work areas prior to dewatering or commencing work in those areas. Furthermore, construction will be scheduled during periods of minimal flow to further reduce potential impacts.

Sediment release during construction, particularly near watercourses and floodplains, poses a risk to aquatic habitat through increased turbidity and substrate deposition. These effects will be mitigated through the implementation of ESC measures, including silt fencing, erosion control blankets, and hydro-seeding or sodding to promote rapid vegetative stabilization. These measures will be outlined in the EMP and applied throughout all relevant construction activities.

To minimize the risk of aquatic invasive species introduction, all equipment will follow the Clean Equipment Protocol for Industry (Halloran, Anderson, & Tassie, 2013). This is especially important given the potential for invasive species such as zebra mussels (*Dreissena polymorpha*), which can attach to and be transported by submerged equipment. Zebra mussels have not yet been reported in this section of the Saint John River watershed (NRED, 2023), and preventing their introduction is critical to protecting native fish habitat and water quality. Strict adherence to cleaning protocols will help mitigate this risk during construction activities in and around watercourses connected to the Kennebecasis River.

During operations, diversion channels will be activated during high-flow events to temporarily redirect water from Trout Creek and Parsons Brook into engineered channels, discharging to the Kennebecasis River at a location further upstream than their natural confluence. While this represents a modification of the discharge location, there is no change to the overall direction of flow, and all diverted water remains within the same watershed. Base flows will continue to follow the natural channel outside of diversion events. Passive intake control structures—to be constructed at the entry points of both diversion channels—are designed to operate based on flow conditions, allowing water to enter the diversion channels only during flood events while maintaining base flows in the natural channels under typical conditions. These structures will include a control weir to limit the amount of sediment bedload entering the diversion channels and flow deflectors to minimize reductions in velocity that could otherwise lead to sediment deposition. Together these features help ensure diversion channel operation does not negatively impact downstream fish habitat through unnatural sediment accumulation or flow alteration.

Finally, flow recession following flood events could lead to temporary pooling in the diversion channels. However, the channels will be designed to fully drain, significant reducing the likelihood of fish stranding or mortality due to isolated, deoxygenated pools.

Table 5.12 summarizes the identified impact pathways by Project phase and the associated mitigation measures proposed to avoid or minimize residual effects.

Table 5.12 Potential Effects and Proposed Mitigations for Fish and Fish Habitat

Source of Potential Effect	Project Phase	Potential Changes to Valued Component	Area of Influence	Proposed Mitigations
Dewatering during construction of intake control structures	Construction	• Temporary removal of fish habitat • Altered flows in Trout Creek and Parsons Brooks once areas are isolated	PDA (Intake structures) LAA (Immediate downstream of intake structures)	• The construction area will be isolated to not allow fish passage during in-water works • Fish salvages will be conducted by qualified biologists prior to commencing any in-water works. Fish will be relocated upstream of the isolated construction area • Previous research supporting the Project design indicates the proposed location for the intake control structure of the Trout Creek diversion channel has a wide bank full width and experiences near-dry conditions at certain times of the year. Construction will take place during periods of minimal flow, minimizing impacts to the rest of the watercourse
Introduction of invasive species through the use of machinery and other equipment during excavation	Construction	• Introduction of aquatic invasive species could adversely impact the native species (e.g. zebra mussels could alter water quality and substrate composition)	RAA	• The use of construction equipment will follow the *Clean Equipment Protocol for Industry* (Halloran, Anderson, & Tassie, 2013)
The release of sediment due to erosion of soils from construction areas including the intake control structures and channel excavation.	Construction	• Degradation in the quality of fish habitat and/or fish mortality	LAA (Immediate downstream of intake structures)	• ESC measures will be installed during construction including silt fencing and erosion control blankets to support construction of intake control structures and excavation, respectively • Hydro-seeding and sodding will be incorporated into the design of the diversion channels to promote vegetation growth and soil stabilization
If not properly designed, the diversion channels could initiate sediment deposition in Trout Creek and transport sediment from Trout Creek to the Kennebecasis River floodplain during flood events.	Operation and Maintenance	• Degradation in the quality of fish habitat and/or fish mortality	LAA (Immediate downstream of intake structures)	• Intake control structure design will incorporate deflectors to minimize flow velocity reductions (and resulting potential sediment deposition) in Trout Creek, as well as a control weir to minimize the flow of sediment bedload into the diversion channel
Altered flows when diversion channels are operating	Operation and Maintenance	• Operation of the diversion channels could alter the natural flow regime resulting in disturbance to fish habitat	LAA	• The proposed location of the diversion channel was selected to ensure that flow is not redirected to another water basin • During 20-year return periods, the diversion channels will redirect flow away from downtown Sussex, though discharge into the Kennebecasis River will be retained
Change in flow conditions in the diversion channels during and following flood events	Operation and Maintenance	• The change in flow conditions could leave fish stranded in dry spots or small deoxygenated pools of water leading to mortality.	LAA	• This risk is comparable to the natural trapping of fish in floodplains, where water pooling in undulations becomes isolated from the river or stream as flood waters recede • The diversion channels will be designed to completely drain, minimizing the likelihood of aquatic species being trapped after a flood event

5.6.3 Significance Determination

The potential effects of Project activities on fish and fish habitat were evaluated to determine their significance (Table 5.13). This assessment assumes that all mitigation measures outlined above will be effectively implemented during each phase of the Project.

Magnitude was assessed as Low for all effects. While project activities such as dewatering, flow alteration, and sediment release have the potential to affect aquatic habitat, these effects are expected to be minor, localized, and well-managed. The use of site-specific intake designs, ESC measures, and adherence to best practices significantly reduces the severity of potential effects. In addition, the PDA does not support rare or sensitive aquatic species (Appendix C) that would elevate the magnitude of impact.

Duration was classified as Short Term for most construction-related effects, as these are confined to the active construction period. Operation effects, such as altered flows during flood events or sediment transport through the diversion channels, were assessed as Medium Term, as they may occur intermittently throughout the lifespan of the Project.

Frequency was rated as Once for effects that occur only during specific activities (e.g., dewatering or sediment release during excavation), and Sporadic for those associated with periodic flood events or maintenance activities.

Extent was generally assessed being within the PDA for direct construction impacts. Where downstream movement of water or sediment could result in off-site effects (e.g., altered flows, sediment deposition), the spatial extent was considered to reach the LAA.

Reversibility was rated as Reversible for all effects. Habitat conditions affected during construction are expected to recover through natural processes and planned restoration. Flow alterations and potential sediment transport during operation are temporary and not expected to result in long-term changes to habitat structure or function.

Likelihood was determined based on the expected frequency and confidence in mitigation effectiveness. Construction-related impacts such as dewatering and temporary flow alteration are Almost Certain or Likely to occur as part of planned works. The potential for sediment release to result in habitat degradation or fish mortality was rated as Possible, given that mitigation measures (e.g., ESC, low-flow timing) are expected to significantly reduce the risk. Similarly, effects such as fish stranding or the introduction of aquatic invasive species were rated as Possible, given appropriate design and adherence to protocols.

Based on the localized, reversible nature of the effects, the implementation of standard and project-specific mitigation measures, and the low sensitivity of the affected aquatic habitat, all residual effects on fish and fish habitat are assessed as Not Significant.

Table 5.13 Significance Determination of Identified Effects for Fish and Fish Habitat

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood	Significance
Temporary removal of fish habitat (due to dewatering)	Low	Short Term	Once	PDA	Reversible	Almost Certain	Not Significant
Altered flows in Trout Creek and Parsons Brooks during construction	Low	Short Term	Once	LAA	Reversible	Likely	Not Significant
Introduction of aquatic invasive species	Low	Medium Term	Sporadic	RAA	Reversible	Possible	Not Significant
Degradation in fish habitat or fish mortality (from sediment release during construction)	Low	Short Term	Once	LAA	Reversible	Possible	Not Significant
Altered flows during operation (due to flood event diversion)	Low	Medium Term	Sporadic	LAA	Reversible	Likely	Not Significant
Fish stranding (in diversion channels after flood recession)	Low	Short Term	Sporadic	PDA	Reversible	Possible	Not Significant
Sediment transport and deposition during operation	Low	Medium Term	Sporadic	LAA	Reversible	Possible	Not Significant

5.6.4 Monitoring and Follow-Up

Potential interactions with fish and fish habitat are expected to be effectively mitigated through Project design, timing restrictions, and implementation of standard best management practices. Monitoring and follow-up activities will therefore focus on verifying the effectiveness of mitigation measures during construction and confirming the ongoing integrity of permanent infrastructure during operations.

In addition, potential watercourses identified within the PDA through LiDAR review will be subject to a full on-site stream assessment during the 2026 field season to confirm the presence or absence of fish habitat. The results of this assessment will be documented and incorporated into this EIA through an addendum, and any additional mitigation or regulatory requirements identified as a result will be addressed in consultation with DFO.

During construction, ESC measures will be implemented in accordance with industry best practices and regulatory requirements to protect adjacent watercourses. ESC measures will be routinely inspected and maintained during ground-disturbing and in-water activities, particularly prior to forecasted rainfall events, and deficiencies will be addressed promptly through the EMP.

The Project is expected to be subject to review under the federal *Fisheries Act* through a Request for Review (RfR) submitted to DFO. Depending on the final design and determination of residual effects on fish and fish habitat, a Fisheries Act Authorization (FAA) may be required. Any monitoring or follow-up requirements identified through this regulatory review process would be implemented in accordance with conditions of approval.

During operations, inspections may be conducted following major flood events to confirm the structural integrity and function of diversion channels, intake structures, and associated flow paths. These inspections will focus on identifying erosion, sediment accumulation, debris blockages, or other conditions that could affect fish habitat or fish passage. Where issues are identified, appropriate corrective actions will be implemented, and DFO will be consulted as required.

Currently, no routine long-term monitoring of fish populations or fish habitat is proposed, as residual effects on fish and fish habitat are not anticipated with the application of mitigation measures and site-specific design controls. However, should unanticipated conditions arise during construction or operation, or if requested by regulatory authorities, additional monitoring or follow-up measures may be developed and implemented in consultation with DFO.

All in-water works, including any required fish salvage activities, will be conducted by qualified personnel under applicable authorizations, including a DFO Section 52 Licence where required, and in accordance with established fish timing windows for New Brunswick (generally June 1 to September 30).

5.7 Wetlands

5.7.1 Impact Pathways

Cumulatively, the PDA intersects with 23 ha of wetland (Figure 4.8 and Figure 4.9). A total of 23 ha represents the combined area of all wetlands identified within the PDA and was used to define the maximum potential impact area for assessing both direct and indirect effects on wetlands.

This section describes the potential effects of the Project on wetlands identified by project phase.

Site Preparation and Construction

Construction activities (Section 3.2.1.1) including clearing, excavation of earth, seeding, hydro-seeding and sodding, constructing physical project components, stormwater control, dewatering of the intake structure will impact the wetland footprint within the PDA, and all have potential to affect wetland function. The Trout Creek PDA intersects with 21.54 ha of wetland, and the Parsons Brook PDA intersects with 1.46 ha of wetland. Impact pathways and potential effects of Construction on wetlands include:

- Immediate loss or disturbance of wetland area due to clearing, grubbing, and excavation of earth
- Change in hydrological inputs to receiving wetlands and watercourses through the implementation of stormwater management infrastructure along roadways (i.e., ditching, culverts, etc.), and the change in hydrology of wetlands through the construction of the diversion channels
- Introduction of invasive species into wetlands from seeding, hydro-seeding and sodding, and through construction vehicles
- Changes in native plant species in affected wetland areas including distribution and abundance
- Potential for sedimentation into wetlands and watercourses during ground disturbing activities required for construction

Operations and Maintenance

Operations and Maintenance activities (Section 3.2.1.2), including operation during flood events, site maintenance such as the use of de-icing agents on access roads, as well as vegetation management, have the potential to impact nearby wetlands. Impact pathways and potential effects of Operations and Maintenance on wetlands include:

- Loss or disturbance of wetland during site maintenance activities (e.g., maintenance related grubbing)
- Changes in wetland hydrology that may impact wetland-dependent species and degradation or loss of wetland habitat
- Disturbance and damage to wetlands due to runoff of de-icing agents into wetlands
- Vegetation management within or adjacent to wetland areas
- Introduction of invasive species

5.7.2 Mitigation

Both federal and provincial guidelines will be followed to reduce impacts during wetland alterations or construction near wetlands. These guidelines include the Wetlands Conservation Policy for Canada (Environment Canada, 1996), the New Brunswick Wetlands Conservation Policy (DELG, 2002), and the Watercourse and Wetland Alteration Technical Guidelines (DELG, 2012).

Structures have been sited to avoid wetlands and associated regulated setbacks where possible. Additionally, any work in or around wetlands must be completed in accordance with guidelines and regulations presented within issued WAWA permits that will be obtained prior to construction. All construction related work must respect environmental timing windows to minimize disturbances to sensitive wetland ecosystems and wildlife. In New Brunswick, wetland activities are typically recommended during the drier summer months, from June 1 to September 30 (DELG, 2012), to reduce potential impacts on wetland functions.

Project activities that may affect wetlands, as well as the required WAWA Permits, are summarized in Section 2.5.1 along with proposed mitigation measures to minimize and mitigate for any potential impacts.

A wetland compensation plan will be developed for all direct impacts to wetlands . The compensation strategy will be developed in collaboration with Ducks Unlimited and will incorporate guidance and recommendations from DELG. Compensation will be based on the total area of wetlands that intersect with project activities.

Indirect impacts (e.g. localized changes to hydrology patterns) that may alter wetland form and function cannot be calculated at this time. To mitigate for this unknown, monitoring of wetlands will occur during and up to 5 years post construction. Details on a monitoring strategy will be detailed in the EMP. Any changes in hydrology that result in loss of wetland area should be documented and accounted for in a post construction compensation plan.

Table 5.14 Potential Effects and Proposed Mitigations for Wetland Habitat.

Source of Potential Effect	Project Phase	Potential Changes to Valued Component	Area of Influence	Proposed Mitigations
Excavation of diversion channel alignments	Construction	• Direct loss or disturbance of wetland area due to clearing, grubbing, and excavation • Temporary drainage or dewatering of nearby wetlands during excavation, resulting from interception of shallow groundwater • Short-term alteration of wetland hydrology during construction	PDA	• Limit excavation depth, width, and overall footprint to the minimum required for safe construction, in accordance with final design specifications • Sequence excavation activities to minimize the duration of open cuts within and adjacent to wetlands • Avoid leaving excavated channel sections open for extended periods; complete grading, stabilization, and restoration progressively • Implement erosion and sediment control measures prior to and throughout construction to prevent sedimentation of wetlands and watercourses • Manage any localized groundwater interception or dewatering in a controlled manner and discharge in accordance with applicable regulatory requirements • Preserve pre-disturbance surface and subsurface water inputs to wetlands to the extent feasible during construction • Confine grading activities within wetlands to areas strictly necessary for construction • Fell trees within designated clearing limits and direct them away from wetlands and watercourses to prevent additional disturbance • Implement construction staging and final channel design measures to avoid creating a preferential long-term drainage pathway from adjacent wetlands following construction • Ensure all work within and adjacent to regulated wetlands is conducted in accordance with WAWA Regulation permitting • Where permanent wetland loss is unavoidable, a wetland compensation plan will be developed in consultation with provincial regulatory authorities. Preliminary planning is underway to explore compensation opportunities in collaboration with a qualified non-profit organization (e.g., Ducks Unlimited Canada), with final compensation measures subject to regulatory review and approval
Change in hydrological outputs to receiving wetlands and watercourses through stormwater management (e.g., ditching, culverts)	Construction	• Stormwater management could alter water flow though wetlands, resulting in changes to sediment deposition patterns, inundation frequency, duration, and water depth in nearby wetlands • Loss of disturbance of wetland form and function	PDA and LAA	• Pre-disturbance water sources that sustain wetlands and watercourses will be preserved as much as feasible, in order to maintain the natural hydrology of the wetlands • Properly sized culverts to maintain natural water flow and avoid restricting or concentrating flow • Install bottomless or embedded culverts to mimic natural streambeds and avoid disrupting wetland connectivity • Conduct wetland monitoring up to 5 years post construction to assess changes to wetland form and function. Changes to wetland form and function should be documented and compensated for in a post-construction compensation plan.
Loss or disturbance of wetland due to clearing, grubbing, and excavation of earth	Construction	• Loss of disturbance of wetland form and function	PDA	• Sediment and erosion control measures will be implemented and maintained throughout construction to prevent erosion, manage runoff, and minimize sediment entering wetlands. • All work impacted regulated wetlands will adhere to the required permits and approvals. • Vegetation clearing and grubbing will be limited to the essential areas within the PDA to reduce impacts on wetland soils and vegetation. • Trees will be felled within designated clearing zones during clearing and grubbing, ensuring they are directed away from wetlands and watercourses to avoid additional impacts. • Grading activities within wetlands will be confined to areas necessary. • Pre-disturbance water sources that sustain wetlands will be preserved as much as feasible during nearby grading activities, in order to maintain the natural hydrology of the wetlands.
Periodic operation of diversion channels during flood events	Operation	• Periodic high-flow diversions could alter natural flooding regimes, resulting in changes to sediment deposition patterns,	PDA	• Design intake control structures to minimize sudden changes in wetland water levels and flow velocities during diversion events

	inundation frequency, duration, and water depth in nearby wetlands. • Potential reduction in ecological resilience and shifts in wetland vegetation communities due to modified flooding patterns	• Configure diversion channels to operate only during extreme flood conditions, limiting changes to wetland hydrology to infrequent, short-duration events

5.7.3 Significance Determination

The potential effects of Project activities on wetlands were evaluated to determine their significance (Table 5.15). This assessment assumes that all mitigation measures identified above will be effectively implemented during each phase of the Project.

Magnitude was assessed as Medium for the loss or disturbance of wetlands and for changes in drainage and wetland hydrology. These effects reflect permanent or long-term interactions with wetlands within the PDA that result in measurable changes to wetland area or function. As these effects are inherent to the Project footprint and occur with a high degree of certainty, they are assessed as Significant. Other effects, including sedimentation, vegetation disturbance, temporary groundwater drawdown, runoff from fuels and chemicals, and altered flooding patterns, were assessed as Low to Medium in magnitude due to their localized nature and the application of mitigation measures.

Duration for wetland loss and changes in drainage and hydrology was classified as Long Term, as these effects persist for the lifespan of the Project. All other effects were assessed as Short Term, reflecting their temporary nature and confinement to construction activities or intermittent operational conditions.

Frequency was rated as Once for effects associated with discrete construction activities, such as wetland loss and groundwater drawdown, Continuous for changes in drainage and wetland hydrology, and Sporadic for effects that may occur intermittently, such as sedimentation during flood events or vegetation disturbance during maintenance.

Extent was generally assessed as within the PDA for direct construction-related effects, including wetland loss, drainage modification, vegetation disturbance, and groundwater drawdown. Hydrologic effects related to runoff, sediment transport, and altered flooding regimes were considered to potentially extend into the LAA, depending on site conditions and connectivity.

Reversibility varied by effect. Wetland loss and changes in flooding patterns were considered Irreversible within the PDA, whereas changes in drainage and wetland hydrology were assessed as Reversible over time through design measures, stabilization, and compensation. Other effects, including sedimentation, vegetation disturbance, and groundwater drawdown, were also considered Reversible.

Likelihood was determined based on the nature of Project activities and confidence in mitigation effectiveness. Wetland loss and changes in drainage and hydrology were assessed as Almost Certain, as they are integral to the Project design. All other effects were assessed as Possible, given that mitigation measures are expected to reduce the likelihood and severity of adverse outcomes.

Based on the magnitude, duration, and certainty of wetland loss and changes in drainage and wetland hydrology, follow-up wetland monitoring and considering the implementation of the Wetland Compensation Plan to be submitted by Sussex, these effects are assessed as Not Significant. Monitoring, follow-up, and wetland compensation measures have been incorporated into the Project to address these effects and are described in Section 5.7.4. All other residual effects on wetlands are assessed as Not Significant, given their short-term, localized, and generally reversible nature, and the implementation of standard and project-specific mitigation measures.

Table 5.15 Significance Determination of Identified Potential Effects for Wetlands

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood	Significance
Loss or disturbance of wetland	Medium	Long Term	Once	PDA/LAA	Irreversible	Almost Certain	Not Significant
Change in drainage and wetland hydrology	Medium	Long Term	Continuous	PDA/LAA	Reversible	Almost Certain	Not Significant
Runoff from fuels and chemicals into wetland areas	High	Long Term	Sporadic	LAA	Irreversible	Possible	Not Significant
Vegetation management causing disturbance in wetland features	Low	Short Term	Sporadic	PDA	Reversible	Possible	Not Significant
Sedimentation of wetlands, watercourses, and drainage systems during flooding events and construction	Medium	Short Term	Sporadic	LAA	Reversible	Possible	Not Significant
Periodic high-flow diversions could modify the frequency, duration, or extent of flooding in adjacent wetlands, resulting in changes to wetland vegetation composition and structure.	Medium	Short Term	Sporadic	LAA	Irreversible	Possible	Not Significant
Temporary groundwater drawdown from dewatering at intake structures	Medium	Short Term	Once	PDA	Reversible	Possible	Not Significant

5.7.4 Monitoring and Follow-up

Mitigation measures identified in Section 5.7.2 will be implemented through a project-specific EMP, including an ESC plan, to ensure construction and operation activities comply with applicable regulatory requirements and minimize adverse effects on wetlands.

Additional wetland delineations will be completed in 2026 within portions of the PDA that were not previously assessed, including areas associated with refinements to the Project footprint. The results of these delineations will be used to confirm wetland boundaries, inform any additional mitigation measures, and will be documented in an addendum to this EIA.

During construction, ESC measures will be inspected and maintained by the Proponent or a qualified subcontractor to confirm they are functioning as intended. Following completion of construction activities, post-construction monitoring will be conducted to verify that temporary protective measures (e.g., sediment fencing or other ESC controls) have been removed or re-established as appropriate, and that disturbed areas adjacent to wetlands have been stabilized.

Implementation of the Project is expected to result in permanent and functional wetland impacts within the Trout Creek sub watershed, which will require authorization under a future WAWA Permit. In accordance with the *Watercourse and Wetland Alteration Regulation – Clean Water Act* and the New Brunswick Wetland Conservation Policy, these impacts will be offset to achieve no net loss of wetland function. A Wetland Compensation Plan is currently being developed to identify appropriate wetland restoration or creation measures, with monitoring and follow-up requirements for compensation measures defined and implemented in accordance with regulatory approvals.

Wetland monitoring is proposed up to 5 years post construction to assess unknown impacts resulting from changing hydrology. The purpose of the monitoring will be to identify changes to wetland form and function beyond those documented in the original wetland compensation strategy. Results of the monitoring should be documented, and any additional compensation should be accounted for in a post-construction compensation plan. A specific post-construction monitoring plan will be developed to detail appropriate monitoring methods.

In the event of an unplanned or accidental occurrence that could adversely affect wetlands (e.g., fuel spill or chemical release), site-specific follow-up monitoring may be implemented, as outlined in the EMP, to assess potential effects and inform corrective actions if required.

5.8 Avifauna

5.8.1 Impact Pathways

Site Preparation and Construction

Migratory birds and other avifauna rely on a range of habitats within the LAA, including nesting sites, foraging areas, and migration stopover locations. Many of these species are protected under the federal *Migratory Birds Convention Act* (MBCA), with some also listed under NB SARA. Construction activities, particularly vegetation clearing and site preparation, present the greatest potential risk to avifauna compared to other Project phases.

Vegetation removal may result in the loss of nesting habitat and, if conducted during the breeding season (May 1 to August 31), could lead to nest disturbance or mortality. Vegetated areas within the Project footprint are known to support breeding birds during this period, making timing and spatial control of construction activities critical. In addition, noise and artificial lighting associated with construction equipment may interfere with avian foraging behaviour, communication, and navigation. Elevated noise levels may cause temporary avoidance of affected areas, while artificial lighting may disorient birds during nocturnal migration.

Certain species, such as bank swallow (*Riparia riparia*), may nest opportunistically in exposed or unvegetated soil piles commonly created during construction. If not managed appropriately, these features may attract nesting birds and increase the potential for interaction with construction activities.

Operations and Maintenance

The operations and maintenance phase is expected to have limited direct effects on migratory birds and other avifauna. Activities during this phase will primarily consist of inspections, monitoring, and minor infrastructure maintenance, which generally involve low levels of disturbance and minimal vegetation removal.

However, if vegetation within the diversion channels is allowed to develop into dense or undisturbed grassland, the area may attract nesting by grassland bird species such as bobolink (*Dolichonyx oryzivorus*) and Eastern meadowlark (*Sturnella magna*), both of which are listed under NB SARA due to population declines. While colonization by these species could represent a localized ecological benefit, it may also introduce regulatory constraints on vegetation management during the breeding season.

To avoid the creation of suitable nesting habitat and the associated operational restrictions, vegetation within the diversion channels will be actively managed to prevent establishment of dense grassland cover. This approach supports continued operational flexibility while minimizing the potential for disturbance to nesting migratory birds.

5.8.2 Mitigation

The most direct effects on avifauna are anticipated during construction, particularly during vegetation clearing within the diversion channel alignments and associated infrastructure areas. These activities may result in the removal of nesting habitat, disturbance to active nests, and behavioural disruption due to noise and lighting. Mitigation measures have been developed to minimize these effects and ensure compliance with the MBCA and applicable provincial legislation.

Vegetation clearing will be scheduled outside the bird breeding season (May 1 to August 31) where feasible. If clearing is required during this period, nest surveys will be conducted by a qualified biologist using non-intrusive methods. Active nests will be buffered, and work in the affected area will be deferred until nesting is complete.

Certain nesting cavities, particularly those created by pileated woodpecker (*Dryocopus pileatus*), are protected under the Migratory Birds Regulations for up to 36 months, even when unoccupied, due to their reuse by cavity-nesting birds (ECCC, 2023). These cavities will be avoided where feasible; where avoidance is not possible due to safety or infrastructure constraints, a Damage or Danger Permit under Section 70 of the *Migratory Birds Regulations* will be obtained. Construction personnel will be instructed to identify and report potential nesting cavities prior to removal.

Exposed soil piles will be managed to discourage nesting by opportunistic species such as Bank Swallow. Stockpiles intended to remain in place for extended periods will be covered or stabilized, and any discovered nests will be buffered until vacated.

Construction-related noise and artificial lighting will be minimized where feasible, particularly during key migration periods, using directional lighting and adjusted construction scheduling.

Although portions of the existing floodplain used by avifauna will be altered, the diversion channels are designed to replicate floodplain-like conditions during high-flow events. Passive intake control structures will ensure water enters the channels only during flood conditions, maintaining natural base flows and hydrological patterns that support avian habitat. Vegetation within diversion channels will be actively managed to prevent establishment of nesting habitat for grassland birds, with mowing or maintenance scheduled outside the breeding season or preceded by nest surveys where required.

Table 5.16 summarizes the identified impact pathways by Project phase and the associated mitigation measures proposed to avoid or minimize residual effects.

Table 5.16 Potential Effects and Proposed Mitigations for Avifauna

Source of Potential Effect	Project Phase	Potential Changes to Valued Component	Area of Influence	Proposed Mitigations
Tree clearing at proposed diversion channel locations and associated infrastructure	Construction	• Removal of migratory bird habitat • Direct mortality to nesting birds • Destruction of unoccupied nesting cavities used by Pileated woodpeckers and secondary cavity-nesting birds	PDA	• Tree clearing will occur beyond the breeding bird season (May 1 to August 31) • Any tree clearing within that window will first have a nesting survey by a qualified biologist • Compensation plantings will occur following construction to revegetate the riparian zone of the diversion channels • Tree-clearing contractors will be trained to identify potential nesting cavities, particularly those created by Pileated woodpecker • Suspected cavities will be reported for assessment • If removal prior to the 36-month protection period is unavoidable, a Damage or Danger Permit will be obtained under Section 70 of the *Migratory Birds Regulation*
Noise and light from construction equipment	Construction	• High noise from heavy machinery can interfere with birds' communication, navigation, and foraging behaviour, ultimately causing birds to avoid the area during construction • Lighting from construction equipment can disorient migratory birds	PDA	• Steps to reduce noise pollution will be taken during construction and construction activities will be limited during critical migratory periods (i.e. Spring and Fall migration)
Stockpiling of soil during excavation	Construction	• Temporary soil stockpiles during excavation can attract bird species, particularly Bank swallow, who utilize the piles as breeding habitat. The removal of these piles could damage or destroy Bank swallow habitat, a species at risk	PDA	• Soil stockpiles will be covered to avoid potential nesting • If a nesting bird is discovered, the nest site will be protected with silt fencing and a buffer until the bird has vacated the nest, as determined by a bird expert
Unmanaged vegetation in the diversion channels	Operation and Maintenance	• Establishment of nesting by at-risk grassland birds such as bobolink and Eastern meadowlark • Potential disturbance or destruction of nests during routine maintenance	PDA	• Frequent mowing will be used to discourage colonization and avoid regulatory restrictions • Mowing and vegetation control will be scheduled outside of the nesting season (May 1 to August 31) if there is evidence of Bobolink and Eastern meadowlark nesting
Floodplain alteration	Operation and Maintenance	• The altered floodplain will prevent natural flooding, which migratory birds utilize to access feeding and nesting grounds	LAA	• The diversion channels will capture the majority of surface water that previously inundated Sussex, thereby restoring floodplain-like conditions that provide essential feeding and nesting habitats for migratory birds during flood events

5.8.3 Significance Determination

The potential effects of Project activities on avifauna were evaluated to determine their significance based on the nature, scale, duration, frequency, reversibility, and likelihood of each effect, as well as the anticipated effectiveness of proposed mitigation measures (Table 5.17).

Most effects were assessed as having a low magnitude, meaning they are unlikely to result in population-level impacts or permanent degradation of habitat or health. Two effects- removal of migratory bird habitat and alteration of floodplain function – were assessed as medium magnitude due to their broader spatial footprint and ecological importance. These effects are nonetheless considered localized and reversible with appropriate mitigation, including compensation plantings and hydrologic design that replicates floodplain-like conditions.

The duration of effects ranges from short term to medium term. For example, vegetation clearing impacts are confined to the construction phase, while intermittent effects such as those resulting from invasive species encroachment, vegetation management, or operational mowing may extend into the operations phase but are not expected to be continuous or long-lasting.

The frequency of effects was categorized as once for discrete actions like initial tree clearing or nest cavity removal, and sporadic for recurring impacts such as periodic mowing, noise and artificial light, or flood-driven habitat changes. The geographic extent of effects is limited to the PDA and the LAA, which includes both direct disturbance zones and adjacent areas where sensory or indirect effects may be experienced.

All identified effects were assessed as reversible. Construction-related disturbances are expected to recover through natural regeneration and restoration measures. Operational impacts, such as those associated with changes to floodplain hydrology or incidental nest establishment, are manageable through design features and adaptive vegetation control practices.

The likelihood of each effect varies. Habitat removal is considered almost certain, as it is an inherent aspect of construction. Other effects – such as bird disorientation from lightning, nesting in unprotected soil stockpiles, or cavity nesting by Pileated woodpeckers – are considered possible to likely, depending on environmental conditions and the successful implementation of mitigation strategies. The potential for grassland-nesting species to colonize diversion channels is considered possible if mowing is infrequent but can be effectively managed through routine vegetation maintenance.

Given the localized, intermittent, and reversible nature of all identified effects, the implementation of targeted mitigation measures, and the moderate sensitivity of affected bird species and habitats, all residual effects on avifauna are assessed as Not Significant.

Table 5.17 Significance Determination of Identified Effects for Avifauna

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood	Significance
Removal of migratory bird habitat	Medium	Medium Term	Once	PDA	Reversible	Almost Certain	Not Significant
Direct mortality to nesting birds	Low	Short Term	Once	LAA	Irreversible	Possible	Not Significant
Noise disturbance (communication, navigation, foraging)	Low	Short Term	Sporadic	LAA	Reversible	Likely	Not Significant
Lighting from construction equipment can disorient migratory birds	Low	Short Term	Sporadic	LAA	Reversible	Likely	Not Significant
Temporary soil stockpiles during excavation can attract bird species, who utilize the piles as breeding habitat. The removal of these piles could damage or destroy habitat.	Low	Short Term	Sporadic	LAA	Reversible	Possible	Not Significant
The altered floodplain will prevent natural flooding, which migratory birds utilize to access feeding and nesting grounds	Medium	Medium Term	Sporadic	PDA	Reversible	Likely	Not Significant
Destruction of pileated woodpecker nesting cavities during clearing	Low	Short Term	Once	PDA	Reversible	Possible	Not Significant
Colonization of diversion channels by bobolink and Eastern meadowlark leading to potential nest disturbance during mowing	Low	Medium Term	Sporadic	PDA	Reversible	Possible	Not Significant

5.8.4 Monitoring and Follow-Up

While formal monitoring is not proposed, awareness during construction and operations will support the protection of migratory birds and their habitats within the PDA and broader LAA. A general emphasis will be placed on situational awareness and adherences to best practices, particularly during sensitive periods such as the breeding season (mid-April to late-August).

During site preparation and clearing, on-site personnel and contractors will be briefed on the presence of nesting birds, including cavity-nesting species such as pileated woodpecker, which may create protected nesting cavities. Staff will be instructed to watch for signs of nesting activity and to report any suspected cavity features. Where avoidance is not feasible and removal of a pileated woodpecker nesting cavity is necessary, the need for a Section 70 Damage or Danger Permit under the MBR will be considered, in accordance with federal guidance.

If vegetation clearing must occur during the breeding season, non-intrusive nest searches will be conducted as a precautionary measure. Where active nests are identified, a wide buffer will be established and flagged around the nest location, and vegetation clearing within the buffered area will be deferred until nesting is complete. Nests and nest trees will not be flagged or otherwise marked.

Temporary soil stockpiles will be managed to reduce the potential for colonization by bank swallow, which is known to nest in vertical soil faces. Where practical, stockpiles will be covered or compacted. If nesting activity is observed, work near the nest will be paused, and the site will be left undisturbed until the birds have vacated.

During operations, grassland vegetation within the diversion channels may provide habitat for bobolink and Eastern meadowlark, both of which are SAR. While the use of these areas by grassland birds may be considered a positive ecological outcome in other context, their establishment within the diversion channels could impose restrictions on vegetation management during the breeding season, potentially compromising the channels' flood control function. To avoid this, frequent mowing will be employed to discourage nesting and ensure that vegetation remains in a state unsuitable for colonization. This approach will help maintain the operation integrity of the channels while avoiding potential regulatory complications related to nest disturbance.

Field surveys conducted during baseline studies recorded the presence of Eastern wood-pewee, a species listed as *Special Concern* under NB SARA. As a precaution, staff will remain attentive to bird activity throughout the construction, and any unexpected interactions or concerns related to avifauna may be discussed with relevant regulatory authorities on an as-needed basis.

5.9 Terrestrial Wildlife

5.9.1 Impact Pathways

Site Preparation and Construction

Site preparation and construction activities, including clearing, grading, excavation, and infrastructure development, have the greatest potential to affect terrestrial wildlife. This phase presents the highest risk due to habitat removal, ground disturbance, and increased human activity including elevated noise and lighting levels.

These activities may lead to habitat fragmentation, displacement of wildlife, and the disruption or destruction of nests and dens, particularly for species that rely on undisturbed habitat for breeding, shelter, or foraging. Wildlife mortality may also occur through vehicle collisions or attraction to improperly managed garbage or food waste.

Operations and Maintenance

During operations and maintenance, the primary interaction with terrestrial wildlife relates to potential alterations in natural flow regimes associated with the operation of diversion channels. Although these structures are designed to manage floodwaters and protect infrastructure, their operation may affect the ecological integrity of adjacent and downstream riparian habitats, which support a range of wildlife species, including turtles.

5.9.2 Mitigation

All Project works associated with site preparation, construction, and operation will be conducted in accordance with applicable federal and provincial guidance where alteration of terrestrial wildlife habitat may occur (e.g., tree clearing). Relevant guidance includes *Guidelines for Wildlife Response Plans* (ECCC, 2022), *Canadian Council on Animal Care (CCAC) guidelines: Wildlife* (2023), and *National Wildlife Emergency Response Framework: guidance* (ECCC, 2023).

Potential effects on terrestrial wildlife will be minimized through the implementation of best management practices and targeted mitigation measures. These include limiting disturbance to sensitive habitats, scheduling works to avoid critical breeding periods where feasible, controlling noise and lighting, cleaning equipment to reduce the spread of invasive species, and implementing appropriate waste and traffic management measures.

During all Project phases, the PDA will be kept free of garbage and food waste to reduce wildlife attraction. If wildlife is observed within active work areas, personnel will cease activities that could result in human–wildlife interactions, including following or feeding wildlife.

In-water works will be avoided during turtle overwintering periods (October to April) to prevent disturbance or mortality, including any dredging or dam removal that may be required during maintenance activities.

Noise levels are expected to increase during active construction due to equipment operation within the PDA. Where feasible, machinery use will be limited to daylight hours to minimize disturbance to terrestrial wildlife.

During the operations and maintenance phase, the use of diversion channels during flood events may alter natural flooding patterns and affect riparian habitats. To mitigate these effects, passive design elements will be incorporated into diversion structures to maintain natural flood regimes to the extent feasible. Post-flood inspections will be conducted to identify any effects on terrestrial wildlife habitats and to inform adaptive management measures, if required.

Together, these measures are intended to minimize disturbance to terrestrial wildlife and support the continued use of the PDA by local wildlife species throughout the life of the Project.

Table 5.18 summarizes the identified impact pathways by Project phase and the associated mitigation measures proposed to avoid or minimize residual effects.

Table 5.18 Potential Effects and Proposed Mitigations for Terrestrial Wildlife

Source of Potential Effect	Project Phase	Potential Changes to Valued Component	Area of Influence	Proposed Mitigations
Vegetation clearing and excavation near watercourses	Construction	• Loss or degradation of terrestrial wildlife habitat; potential disturbance or displacement of wildlife, particularly turtles due to their habitat preferences	PDA	• Clearly delineate sensitive wildlife habitats prior to construction and implement ESC measures to maintain habitat integrity • Schedule vegetation clearing to avoid sensitive wildlife breeding and nesting seasons, when possible
Increased presence of construction equipment and human activity	Construction	• Increased disturbance causing wildlife displacement • Disruption or destruction to nests and dens • Mortality to terrestrial wildlife due to vehicle collision • Mortality or disruption to terrestrial wildlife due to garbage, food waste	PDA	• Limit heavy machinery and human activity in riparian and sensitive terrestrial areas • Provide environmental awareness training for all construction personnel, emphasizing wildlife sensitivity and mitigation measures • If nests or dens are found nearby or on site, exclusion fencing will be implemented by strategically installing silt fencing around active work areas • Incorporate vehicle collisions with wildlife hazard into employee orientation • Implement vehicle speed limits that are clearly posted on site and advise personnel to yield to wildlife • Where possible install wildlife crossing signage in areas of high wildlife occurrences • Where possible reduce on site waste disposal and inspect site regularly for garbage
Noise and light from construction equipment	Construction	• Noise and lighting from construction equipment can significantly affect terrestrial wildlife by causing stress, disrupting communication, and interfering with foraging and navigation.	LAA	• Where possible, schedule noise-producing work in a manner that reduces impacts (i.e. operation during daylight hours) • Reduce, where possible, the amount of time that large lights are used on site, only during necessary work hours in designated active work areas • Maximize the retention of vegetation and make use of topographic features when planning areas of noisier operations
Operation of diversion channels during flood events	Operation and Maintenance	• Potential habitat disruption due to changes in flooding patterns, particularly affecting terrestrial wildlife adapted to specific riparian conditions, such as turtles	PDA	• Incorporate passive design elements in intake structures that maintain natural flooding regimes to the extent practical • Conduct visual inspections following major flooding events to evaluate potential impacts on terrestrial wildlife habitats, and implement adaptive management if necessary

5.9.3 Significance Determination

The potential effects of Project activities on terrestrial wildlife were evaluated to determine their significance (Table 5.19). This assessment assumes that all mitigation measures outlined above will be effectively implemented during each phase of the Project.

Magnitude was assessed as Low for most effects, reflecting localized and temporary interactions unlikely to result in population-level impacts. Loss or degradation of terrestrial wildlife habitat associated with vegetation clearing was assessed as Medium in magnitude due to direct habitat removal within the PDA; however, this effect is localized, reversible, and not expected to result in long-term adverse effects on regional wildlife populations.

Most effects were assessed as Short Term, including wildlife disturbance, nest or den disruption, noise and lighting effects, altered flooding patterns, and wildlife mortality related to increased human activity. Habitat loss or degradation was assessed as Medium Term, reflecting the time required for recovery following construction.

Frequency was rated as Once for effects associated with discrete construction activities, such as vegetation clearing or nest disturbance, and Sporadic for effects that may occur intermittently, including noise, lighting, altered flooding patterns, and vehicle–wildlife interactions.

Extent was generally limited to the PDA for direct habitat-related effects, with indirect effects such as noise, lighting, and wildlife mortality potentially extending into the LAA.

Reversibility was assessed as Reversible for most effects, including habitat loss, disturbance, and hydrological changes. Wildlife mortality due to vehicle collisions or attraction to garbage or food waste was considered Irreversible at the individual level, though the scale of these effects is expected to be limited.

Habitat loss during construction was assessed as Almost Certain, while other effects were assessed as Possible to Likely, depending on activity timing and site conditions.

Based on their limited extent, generally short-term duration, and the implementation of standard and project-specific mitigation measures, all residual effects on terrestrial wildlife are assessed as Not Significant.

Table 5.19 Significance Determination of Identified Effects for Terrestrial Wildlife

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood	Significance
Loss or degradation of terrestrial wildlife habitat	Medium	Medium Term	Once	PDA	Reversible	Almost Certain	Not Significant
Potential disturbance or displacement of wildlife,	Low	Short Term	Once	LAA	Reversible	Possible	Not Significant
Disruption or destruction to nests and dens	Low	Short Term	Once	LAA	Reversible	Possible	Not Significant
Noise and lighting from construction equipment can significantly affect terrestrial wildlife by causing stress, disrupting communication, and interfering with foraging and navigation.	Low	Short Term	Sporadic	LAA	Reversible	Likely	Not Significant
Potential habitat disruption due to changes in flooding patterns, particularly affecting terrestrial wildlife adapted to specific riparian conditions, such as turtles	Low	Short Term	Sporadic	PDA	Reversible	Likely	Not Significant
Mortality or disturbance to terrestrial wildlife due to increased human activity, including attraction to garbage or food waste and vehicle collisions.	Low	Short Term	Sporadic	LAA	Irreversible	Possible	Not Significant

5.9.4 Monitoring and Follow-Up

Mitigation measures identified above will be implemented through a project-specific EMP, including ESC plans and a Wildlife Response Plan developed in accordance with the *Guidelines for Effective Wildlife Response Plans* (ECCC, 2022)

Given the limited and localized nature of potential effects on terrestrial wildlife, no additional, VC-specific monitoring is proposed. However, in the event of an unplanned or accidental occurrence that could adversely affect terrestrial wildlife (e.g., wildfire or other unforeseen event), site-specific follow-up monitoring or corrective measures may be implemented, as outlined in the EMP.

If unanticipated effects on terrestrial wildlife are identified during construction or operations, adaptive management measures, including additional mitigation or monitoring, may be implemented in consultation with regulatory authorities.

5.10 Archaeological and Heritage Resources

5.10.1 Impact Pathways

Site Preparation and Construction

Ground-disturbing activities associated with site preparation and construction, including clearing, grading, excavation, and infrastructure installation, have the potential to inadvertently disturb undocumented archaeological or heritage resources. While no registered archaeological or heritage resources have been identified within the Project footprint, the possibility of encountering previously unrecorded sites cannot be ruled out, particularly in areas where Indigenous cultural heritage resources may be present but not formally documented.

Inadvertent disturbance of archaeological or heritage resources could result in the loss of cultural, historical, or spiritual values, particularly where resources are associated with Indigenous land use and occupation. As such, site preparation and construction represent the Project phases with the greatest potential to interact with archaeological and heritage resources.

Operations and Maintenance

During the operations and maintenance phase, the Project is expected to have a generally beneficial interaction with archaeological and heritage resources through the reduction of flood-related damage in Sussex. By diverting high flows away from flood-prone areas, the Project may contribute to the long-term protection of known and potential cultural heritage sites, including Indigenous archaeological resources located within the broader area. This outcome aligns with broader objectives related to climate resilience and the preservation of culturally and historically significant places.

It is also recognized that operation of the diversion channels could result in changes to hydrology or sedimentation patterns downstream, including along the Kennebecasis River.

While available hydrological modelling indicates no significant downstream effects, changes to shoreline stability or sediment regimes could have implications for heritage resources in sensitive areas. Accordingly, these pathways are considered within the context of ongoing engagement with Indigenous communities and local heritage stakeholders.

5.10.2 Mitigation

Potential effects on archaeological and heritage resources may arise from ground-disturbing activities during construction. To address this risk, the following mitigation measures will be implemented:

- If an archaeological site is discovered during the AIA, the archaeological sub-contractor or provincial regulators at the THC may recommend archaeological monitoring during construction
- Discovery of archaeological resources during any Project phase will be managed in accordance with the *Guidelines and Procedures for Conducting Professional Archaeological Assessments in New Brunswick* (Archaeology and Heritage Branch (AHB), 2012).
- If a suspected archaeological resource is encountered, work will stop immediately, and THC will be notified.

During operations and maintenance, the Project is expected to support the protection of archaeological and heritage resources by reducing flood-related risks to both Indigenous and non-Indigenous cultural features in flood-prone areas. Mitigation will include continued operation and maintenance of diversion infrastructure and review of hydrological performance to inform adaptive management, if required.

The Project will continue engagement with Indigenous communities and heritage stakeholders to share findings and remain responsive to new information or concerns related to culturally sensitive areas.

Collectively, these measures are intended to avoid or minimize adverse effects on archaeological and heritage resources while supporting their long-term protection.

Table 5.20 summarizes the identified impact pathways by Project phase and the associated mitigation measures proposed to avoid or minimize residual effects.

Table 5.20 Potential Effects and Proposed Mitigations for Archaeological and Heritage Resources

Source of Potential Effect	Project Phase	Potential Changes to Valued Component	Area of Influence	Proposed Mitigations
Ground-disturbing activities such as clearing or excavation	Construction	• Disturbance or loss of unrecorded archaeological or heritage resources	PDA	• If an archaeological site is discovered during AIA, THC or the archaeological sub-contractor may recommend monitoring by an archaeological • All site personnel will follow the general guidance from the Archaeology and Heritage Branch • If a suspected archaeological resource is encountered, work will stop immediately and THC will be contacted
Reduced flood risk due to diversion infrastructure	Operations and Maintenance	• Enhanced protection of key heritage and cultural assets, supporting long-term preservation	LAA	• Maintain long-term operation and maintenance of diversion infrastructure • Incorporate flood resilience planning for cultural and heritage infrastructure • Monitor hydrological performance and adapt as needed
Changes to downstream hydrology and sedimentation patterns	Operations and Maintenance	• Potential erosion or destabilization or shoreline cultural or heritage sites	LAA	• Hydrological modelling conducted to date does not predict significant changes in flow patterns along the Kennebecasis River as a result of the diversion infrastructure • Continue engagement with Indigenous communities and heritage stakeholders to share modelling results and identify and concerns related to culturally sensitive downstream sites • Maintain an adaptive approach, remaining responsive to new information or concerns that may arise regarding potential effects on shorelines heritage or cultural sites

5.10.3 Significance Determination

The potential effects of Project activities on archaeological and heritage resources were evaluated to determine their significance (Table 5.21). This assessment assumes that all mitigation measures outlined above will be effectively implemented during each phase of the Project.

Magnitude was assessed as Low for potential adverse effects on archaeological and heritage resources, reflecting the limited likelihood and localized nature of ground disturbance within the PDA. No registered archaeological or heritage resources have been identified within the Project footprint, and any interaction with previously undocumented resources would be limited in scale. An indirect beneficial effect associated with reduced flood risk was assessed as Medium in magnitude, reflecting the potential for reduced inundation or erosive forces in areas of heritage interest; however, this benefit is indirect in nature.

Duration of potential adverse effects was assessed as Short Term, as interactions with archaeological or heritage resources would be limited to construction-related ground disturbance. The indirect flood-related benefit was assessed as Long Term, corresponding to the operational lifespan of the diversion infrastructure.

Frequency of potential adverse effects was assessed as Sporadic, as any interaction with unrecorded archaeological materials would be contingent on chance discovery during discrete construction activities. The indirect beneficial effect associated with flood risk reduction was assessed as Continuous, reflecting the ongoing function of the Project during flood events.

Extent of potential adverse effects was assessed as limited to the PDA, where ground-disturbing activities will occur. The indirect beneficial effect associated with reduced flooding was assessed as extending into the LAA, reflecting the localized nature of floodplain interactions and heritage resource distribution.

Reversibility of adverse effects on archaeological resources was assessed as Irreversible, as disturbance or loss of archaeological materials cannot be undone. However, the likelihood of such effects occurring is low. The indirect flood-related benefit was assessed as Reversible, as it does not permanently alter the condition or context of archaeological materials, which are generally resilient to episodic flooding or remain unaffected by changes in flood frequency under most conditions.

Likelihood of adverse effects on archaeological and heritage resources was assessed as Unlikely, given the absence of known sites within the Project footprint, prior disturbance in the surrounding area, and the implementation of standard stop-work and notification procedures. The likelihood of the indirect flood-related benefit was assessed as Possible, reflecting uncertainty in the degree to which reduced flooding would materially influence the preservation state of archaeological resources.

Based on the low magnitude, short-term, localized, and unlikely nature of potential adverse effects – and the implementation of appropriate mitigation measures – residual adverse effects on archaeological and heritage resources are assessed as Not Significant. While the Project may provide an indirect long-term benefit through reduced flood risk, this effect is also assessed as Not Significant, as it is unlikely to materially alter the preservation or integrity of archaeological and heritage resources.

Table 5.21 Significance Determination of Identified Effects for Archaeological and Heritage Resources

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood	Significance
Disturbance or loss of unrecorded archaeological or cultural materials	Low	Short Term	Sporadic	PDA	Irreversible	Unlikely	Not Significant
Enhanced protection of key heritage assets through reduced flood risk, supporting their long-term preservation and integrity	Medium	Long Term	Continuous	LAA	Reversible	Possible	Not Significant
Potential erosion or destabilization of shoreline cultural or heritage sites due to downstream hydrological changes	Low	Medium Term	Sporadic	RAA	Reversible	Possible	Not Significant

5.10.4 Monitoring and Follow-Up

The 2024 AIA identified areas of moderate to high archaeological potential within the PDA where subsurface testing is required if avoidance is not feasible. As recommended in the AIA, test pitting will be completed during the 2026 field season prior to ground disturbance in these areas. The recommended program includes approximately 747 test pits, comprising approximately 315 test pits within the Parsons Brook PDA and approximately 432 test pits within the Trout Creek PDA. This total number is contingent upon the finalized design of channel alignments and the required area to be excavated, and may be reduced.

The results of the 2026 test pitting program will be documented in an updated Archaeological Impact Assessment and incorporated into this EIA through an addendum. Any additional mitigation, avoidance measures, or regulatory requirements identified as a result of this work will be implemented in accordance with provincial direction and authorization.

Provided that the 2026 test pitting program does not identify archaeological or heritage resources requiring additional protection or mitigation, no routine, VC-specific archaeological monitoring during construction is proposed. Under this scenario, potential risks would be effectively managed through implementation of standard mitigation measures and adherence to approved archaeological protocols during construction and site activities.

If archaeological or cultural materials are encountered during construction, all work in the immediate area will cease immediately. The site will be secured and preserved in its existing condition, and the discovery will be reported without delay to the THC. In accordance with the Heritage Conservation Act, further investigation or protective measures may be required, subject to provincial direction and authorization.

5.11 Public Health and Safety

5.11.1 Impact Pathways

Site Preparation and Construction

Site preparation and construction activities, including clearing, grading, excavation, and installation of Project components, have the potential to affect public health and safety. This phase represents the highest risk period due to the intensity of work, the presence of heavy machinery, and increased activity within and adjacent to the Project area.

Key concerns during construction include increased vehicle traffic, elevated noise and dust levels, and temporary road closures or detours. These conditions may disrupt access and pose safety risks to pedestrians, cyclists, and motorists, particularly near sensitive receptors such as Sussex Corner Elementary School and the Sussex Health Centre. There is also a limited potential for accidental events, such as spills or fires, which could pose risks to public health and the environment if not properly managed. With appropriate planning and mitigation, these risks are expected to be temporary and localized.

Operations and Maintenance

During operations and maintenance, the Project is not expected to introduce significant direct risks to public health and safety. In contrast, the operation of the diversion infrastructure is anticipated to result in a net positive effect by reducing flood risk within Sussex, thereby decreasing the potential for flood-related hazards to residents, infrastructure, and emergency services.

Potential safety considerations during this phase include the accumulation of standing water within diversion channels following flood events, which could present a drowning hazard, particularly in areas accessible to the public, including near Sussex Corner Elementary School adjacent to the proposed Parsons Brook Diversion Channel. In addition, there remains a low potential for accidental events such as fires, chemical spills, or equipment failures, which will be managed through standard operational controls and emergency preparedness.

While the Project is expected to result in net positive effects at the community scale, hydrotechnical modelling indicates that residual flooding may occur in localized areas east of Trout Creek during extreme flood events, mostly due to the Plant Road embankment raises. In these areas, residual flood exposure could result in temporary disruption to residential land use, housing stability, or localized economic activity. Sussex will implement the Project such that residual flood risk to existing residential properties does not exceed baseline (pre-Project) conditions, and appropriate flood risk management measures will be finalized prior to commencement of construction.

5.11.2 Mitigation

All Project activities will be conducted in accordance with applicable federal and provincial legislation, including the *Canada Labour Code, Canada Occupational Health and Safety Regulations,* and the New Brunswick *Occupational Health and Safety Act,* among other relevant regulatory instruments.

During construction, public health and safety risks related to traffic, heavy equipment operation, noise, dust, and temporary access changes will be mitigated through the following measures:

- Development and implementation of a traffic management plan
- Clearly marked haul routes and avoidance of peak traffic periods
- Noise and dust control measures (e.g., road watering, equipment maintenance)
- Restricted work hours and advance communication with nearby residents
- Use of clear signage and traffic control measures near construction zones

During operations and maintenance, the Project has been designed to promote effective drainage, with diversion channels retaining water primarily during flood events. Additional safety measures, including warning signage and restricted access near open water or excavation areas, will be implemented where public access is likely.

Residual flood risk may occur for existing residential properties east of Trout Creek during extreme flood events. Sussex is currently considering a range of flood risk mitigation measures, which may include, but are not limited to, localized elevation of residential structures, construction of low-profile flood containment features between residential areas and Trout Creek, or relocation of vulnerable structures to areas outside the residual floodplain. The selection and implementation of a preferred mitigation approach will be informed by detailed engineering, further technical review, land-use considerations, and consultation with affected residents, and will be finalized prior to commencement of Project construction.

Across all Project phases, the limited potential for accidental events such as fires, chemical spills, or equipment failures will be managed through:

- Development and implementation of an Emergency Response and Spill Contingency Plan
- Routine staff training in emergency preparedness and spill response
- On-site availability of spill containment and fire suppression equipment

Collectively, these measures are intended to minimize public health and safety risks during construction and operation while supporting the Project's overall objective of reducing flood-related hazards to the Sussex community.

Table 5.22 summarizes the identified impact pathways by Project phase and the associated mitigation measures proposed to avoid or minimize residual effects.

Table 5.22 Potential Effects and Proposed Mitigations for Public Health and Safety

Source of Potential Effect	Project Phase	Potential Changes to Valued Component	Area of Influence	Proposed Mitigations
Increased construction vehicle traffic and heavy equipment use	Construction	• Increased risk of vehicle collisions or accidents; elevated noise and dust levels	LAA	• Develop and implement a traffic management plan • Clearly mark routes for construction vehicles • Avoid peak traffic hours • Implement dust suppression measures, where possible • Maintain equipment to reduce noise
Construction noise and vibration	Construction	• Disturbance to residents and sensitive receptors (schools, hospitals, elderly facilities)	PDA	• Schedule noisy activities during daylight hours only • Notify nearby residents of noise-generating work
Construction of access roads, culvert, bridge modifications	Construction	• Temporary road detours and altered traffic patterns causing public confusion or increased accident risk • Pedestrian and cyclist safety risks	PDA	• Provide clear signage and public communication on detour routes and construction schedules • Implement traffic control where necessary
Accidental events (fires, chemical spills, equipment leaks)	Construction Operations and Maintenance	• Risk of fire or hazardous substance release affecting public health and safety • Potential contamination of local resources (water, air, soil)	LAA	• Develop and implement an Emergency Response and Spill Contingency Plan • Train staff in emergency response • Maintain on-site spill containment and fire suppression equipment
Residual flooding due to diversion channel operation and Plant Road embankment raises	Operations and Maintenance	• Increase flood depth and extent during extreme flood events east of Trout Creek • Increased flood hazard to residential properties, including mobile homes, and their occupants • Potential constraints on safe access, egress, and emergency response during flood events	LAA	• Use hydrotechnical modelling results to inform refinement of Project design and adjacent flood management measures, where feasible • Sussex will implement the Project such that residual flood risk to existing residential properties east of Trout Creek does not exceed baseline (pre-Project) flood risk during extreme flood events
Standing water accumulation in diversion channels	Operations and Maintenance	• Potential drowning hazard	PDA	• Channels have been designed to drain under normal conditions • Install secure fencing and safety signage near channels

5.11.3 Significance Determination

The potential effects of Project activities on public health and safety were evaluated to determine their significance (Table 5.23). This assessment assumes that all mitigation measures outlined above will be effectively implemented during each phase of the Project.

Magnitude for all identified effects was assessed as Low, reflecting that potential interactions with public health and safety are expected to result in minor, temporary disturbances rather than substantive or long-term risks. Effects such as increased traffic, noise, dust, and temporary access disruptions are anticipated to be manageable, localized, and not expected to adversely affect community health or safety beyond short-term inconvenience.

Most effects were assessed as Short Term, corresponding primarily to the construction phase. A small number of effects associated with operations, including the accumulation of standing water in diversion channels, potential accidental events, and residual flood risk during extreme flood events, were assessed as Medium to Long Term, reflecting their intermittent occurrence over the operational life of the Project rather than continuous exposure.

Frequency was rated as Sporadic for all effects, as they are expected to occur intermittently under specific conditions (e.g., construction activities, extreme flood events, or accidental incidents) rather than on a continuous basis.

Extent was generally assessed as within the LAA for construction-related effects such as traffic, noise, dust, and disturbance to sensitive receptors. Effects related to standing water were confined to the PDA, while potential contamination of local resources could extend into the RAA under unlikely circumstances. Residual flooding effects on residential properties east of Trout Creek were assessed at the LAA scale.

All effects were assessed as Reversible, as any temporary changes to public health or safety conditions are expected to resolve through the implementation of mitigation measures, natural recovery, or standard operational controls.

Likelihood of occurrence was assessed as Possible for most effects, reflecting a credible but limited potential for interaction given the nature of Project activities and the effectiveness of proposed mitigation measures. Residual flooding effects on residential properties were assessed as Unlikely, as Sussex has committed to implementing additional flood risk management measures to ensure residual flood risk does not exceed baseline (pre-Project) conditions.

Based on the low magnitude, generally short- to medium-term duration, limited spatial extent, reversible nature of the identified effects, and the Town’s commitment to addressing residual flood risk prior to construction, all residual effects on public health and safety are assessed as Not Significant.

Table 5.23 Significance Determination of Identified Effects for Public Health and Safety

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood	Significance
Increased risk of vehicle collisions or accidents	Low	Short Term	Sporadic	LAA	Reversible	Possible	Not Significant
Increased noise and dust affecting residents' health	Low	Short Term	Sporadic	LAA	Reversible	Possible	Not Significant
Disturbance to residents and sensitive receptors (schools, hospitals, elderly facilities)	Low	Short Term	Sporadic	LAA	Reversible	Possible	Not Significant
Potential sleep disruption and associated health impacts	Low	Short Term	Sporadic	LAA	Reversible	Possible	Not Significant
Pedestrian and cyclist safety risks	Low	Short Term	Sporadic	LAA	Reversible	Possible	Not Significant
Accumulation of standing water in diversion channels may pose a potential drowning hazard.	Low	Medium Term	Sporadic	PDA	Reversible	Possible	Not Significant
Risk of fire or hazardous substance release affecting public health and safety	Low	Medium Term	Sporadic	LAA	Reversible	Possible	Not Significant
Potential contamination of local resources (water, air, soil)	Low	Medium Term	Sporadic	RAA	Reversible	Possible	Not Significant
Residual flood risk to residential properties and occupants east of Trout Creek during extreme flood events	Low	Long Term	Rare	LAA	Reversible	Possible	Not Significant

5.11.4 Monitoring and Follow-Up

Given the low potential for adverse effects on public health and safety, no additional monitoring efforts are recommended at this time. Identified risks are expected to be effectively managed through the implementation of standard Project mitigation measures.

Sussex will implement the Project such that residual flood risk to existing residential properties east of Trout Creek does not exceed baseline (pre-Project) conditions. Achievement of this performance objective will be addressed through the selection and implementation of appropriate flood risk management measures prior to Project construction.

If an incident occurs that adversely affects public health and safety – such as fire, chemical spill, or equipment failure – an investigation may be conducted, and additional monitoring may be implemented as warranted. Potential accidental events are described in Section 6.0.

Should unforeseen impacts to public health and safety emerge during construction or operations, further monitoring or mitigation measures may be introduced in consultation with the appropriate regulatory authorities.

5.12 Community and Local Economy

5.12.1 Impact Pathways

Site Preparation and Construction

The site preparation and construction phase is expected to generate a combination of short-term economic benefits and temporary disturbances for the local community and economy.

From an economic perspective, construction activities will create employment opportunities, with workers sourced from the Sussex area where feasible. Project-related spending will increase demand for locally provided goods and services, benefiting small businesses such as restaurants, suppliers, and service providers. These activities are expected to contribute positively to short-term economic activity and local employment during construction.

Construction activities may also result in temporary adverse effects on the surrounding community. These include increased traffic congestion along Maple Avenue, Main Street, Leonard Drive, Dutch Valley Road, and other affected routes, as well as elevated noise, dust, and vibration levels. Temporary access restrictions may disrupt daily routines for residents, while businesses located near construction areas may experience short-term reductions in customer access or visibility. Local tourism and recreational use of affected areas may also temporarily decline due to construction-related disturbances.

In limited locations, implementation of Project infrastructure may require temporary or permanent acquisition of land, which could include expropriation of small portions of private property where required to accommodate diversion channels or associated works. Where applicable, this may result in localized effects on affected property owners, including changes to land use or access. Any land acquisition or expropriation would be undertaken in accordance with applicable provincial legislation and municipal processes, with the intent of minimizing effects on property owners.

Staff and students at Sussex Corner Elementary School may experience elevated noise or disruption during construction due to the school's proximity to the Parsons Brook Diversion Channel.

While land use changes are expected to be minimal, the installation of new infrastructure may result in minor, localized changes to visual character or recreational use in certain areas of the community.

Operations and Maintenance

The operations and maintenance phase is expected to have a substantial long-term beneficial effect on the community and local economy. By reducing the frequency, severity, and extent of flooding along Trout Creek and Parsons Brook, the Project will provide increased protection for homes, businesses, public spaces, and essential services within Sussex. This reduction in flood risk is expected to minimize property damage, reduce disruption to daily life and economic activity, and increase confidence among residents, business owners, and institutions regarding the long-term security of community infrastructure.

Improved flood protection will enhance overall community resilience and stability, supporting long-term economic continuity, emergency preparedness, and climate adaptation within Sussex. These benefits extend beyond the immediate Project area and represent the primary objective and outcome of the Project.

While the Project is expected to result in net positive effects at the community scale, hydrotechnical modelling indicates that residual flooding may occur in localized areas east of Trout Creek during extreme flood events. In these areas, residual flood exposure could result in temporary disruption to residential land use, housing stability, or localized economic activity. Sussex will implement the Project such that residual flood risk to existing residential properties does not exceed baseline (pre-Project) conditions, and appropriate flood risk management measures will be finalized prior to commencement of construction.

No adverse effects on the community or local economy are anticipated during this phase following implementation of the identified mitigation measures. The footprint of the diversion channels is not expected to interfere with the use or enjoyment of nearby recreational facilities, including Kelti Field and the Sussex Walking Trail. The Project has been designed to integrate with existing land uses and recreational areas to maintain public access and functionality.

5.12.2 Mitigation

During construction, the community and local economy may experience both positive and negative effects. Positive effects include increased employment opportunities and demand for local goods and services. Potential adverse effects include temporary disruptions related to traffic, access, noise, vibration, and dust, particularly near active construction areas. These disturbances may also affect local tourism, recreational use, and business operations in the short term.

To mitigate these effects, the Project will implement measures such as prioritizing local hiring and procurement where feasible, providing advance and transparent communication regarding construction schedules and access changes, and coordinating traffic management to avoid peak periods where possible. Additional mitigation will include dust suppression, noise control measures, detour signage, and ongoing engagement with residents, businesses, and community institutions. Disturbed areas will be restored following construction, where applicable.

During the operations and maintenance phase, activities such as vegetation management, snow clearing, or dredging may result in temporary, localized disturbances, including noise, dust, or traffic effects. These activities will be managed through careful scheduling, avoidance of peak recreational and business periods where feasible, and the use of low-impact methods to minimize disruption.

Residual flood risk may occur for existing residential properties east of Trout Creek during extreme flood events. Sussex is currently considering a range of flood risk management measures to achieve this objective, which may include, but are not limited to, localized elevation of residential structures, construction of low-profile flood containment features between residential areas and Trout Creek, or relocation of vulnerable structures to areas outside the residual floodplain. The selection and implementation of a preferred mitigation approach will be informed by detailed engineering, further technical review, land-use considerations, and consultation with affected residents, and will be finalized prior to commencement of Project construction.

Despite short-term construction and maintenance-related disturbances, the Project is expected to deliver significant long-term benefits to the community and local economy through sustained flood-risk reduction. Improved protection of residential, commercial, and public infrastructure will support economic stability, continuity of essential services, and long-term community resilience. Ongoing maintenance of diversion channels and integration with broader land use and emergency planning will further reinforce these outcomes.

Collectively, these measures are intended to minimize residual adverse effects while supporting the long-term health, resilience, and economic stability of the Sussex community

Table 5.24 summarizes the identified impact pathways by Project phase and the associated mitigation measures proposed to avoid or minimize residual effects.

Table 5.24 Potential Effects and Proposed Mitigations for Community and Local Economy

Source of Potential Effect	Project Phase	Potential Changes to Valued Component	Area of Influence	Proposed Mitigations
Employment opportunities and increased demand for goods and services	Construction	• Temporary boost to local employment and economic activity • Increased revenue for local businesses	RAA	• Prioritize hiring local workforce and sourcing local goods/services where possible • Communicate job opportunities clearly to the local community • Share project timeline with local businesses in advance to allow time to prepare goods/services
Increased construction-related traffic	Construction	• Temporary inconvenience and disruption to local businesses and residents (e.g., access issues) • Potential reduction in customers to businesses due to detours or traffic congestion	LAA	• Schedule construction traffic to minimize impacts during peak business hours • Clearly communicate detours and construction schedules to local businesses and residents
General construction and maintenance-related disturbances	Construction Operations and Maintenance	• Reduced quality of life for local residents (e.g., noise, vibration, dust) • Temporary disruptions to businesses, community activities, and recreational use • Potential short-term impacts on tourism due to reduced accessibility or area aesthetics	LAA	• Communicate regularly with residents and businesses about scheduled activities and potential disruptions • Implement disturbance mitigation measures (e.g., dust suppression, noise control) • Schedule high-impact work outside peak business hours and tourism or recreation periods • Provide clear signage and safe detour routes to maintain access • Use low-impact equipment and methods where feasible
Land-use changes due to infrastructure development	Construction Operations and Maintenance	• Long-term changes to community land use and character • Potential reduction in land available for recreation or other local uses	LAA	• Engage with community stakeholders during design and planning • Incorporate community input into decisions about access and land use where feasible • Restore disturbed areas post-construction where appropriate
Lower risk of building flooding	Operations and Maintenance	• Increased protection for homes, businesses, public spaces, and essential services, leading to greater community resilience and stability	LAA	• Emergency preparedness coordination • Long-term operation and maintenance of flood diversion channels • Stormwater management upgrades • Land use planning
Residual flood due to diversion channel operation and Plant Road embankment raises	Operations and Maintenance	• Potential changes in flood exposure affecting residential land use east of Trout Creek • Risk of temporary disruption to hosing stability, property use, and community cohesion during extreme flood events • Potential economic impacts related to property damage, recovery costs, or temporary displacement	LAA	• Use hydrotechnical modelling results to inform refinement of Project design and adjacent flood management measures, where feasible • Sussex will implement the Project such that residual flood risk to existing residential properties east of Trout Creek does not exceed baseline (pre-Project) flood risk during extreme flood events

5.12.3 Significance Determination

The potential effects of Project activities on the community and local economy were evaluated to determine their significance (Table 5.25). This assessment assumes that all mitigation measures outlined above will be implemented during each phase of the Project.

All adverse effects were assessed as Low in magnitude, reflecting that predicted disruptions—such as temporary access limitations, traffic congestion, noise, dust, and minor land-use changes—are expected to have limited influence on community well-being and economic activity. These effects are localized, short term, and manageable through standard mitigation measures.

Duration for most adverse effects was assessed as Short Term, corresponding to the construction phase. Long-term adverse effects are limited to permanent land-use changes associated with the diversion channel footprint, which persist beyond construction. Residual flood risk to residential properties east of Trout Creek during extreme flood events was assessed as Long Term in duration, reflecting its potential to occur intermittently over the operational life of the Project rather than as a continuous condition.

Frequency was assessed as Sporadic for most effects, with Once assigned to discrete activities such as initial land conversion. Residual flooding effects were assessed as Rare, consistent with their association with extreme flood events. Spatial extent for adverse effects is generally limited to the PDA or LAA, while short-term economic benefits, including increased local employment and spending, may extend into the RAA.

All adverse effects were assessed as Reversible, with conditions for residents, businesses, and recreational users expected to return to baseline through natural recovery, site restoration, or mitigation. Likelihood ranges from Possible to Likely, depending on the nature of the activity and its proximity to community receptors. Residual flood risk to residential properties east of Trout Creek was assessed as Possible, reflecting its dependence on infrequent extreme flood events and the implementation of mitigation measures.

One effect—enhanced protection of homes, businesses, public spaces, and essential services through flood-risk reduction—was assessed differently. This benefit is characterized by High magnitude, Long Term duration, Continuous frequency, RAA extent, and an Almost Certain likelihood. Given its durability, spatial reach, and contribution to long-term resilience, this positive effect is assessed as Significant.

Considering the low magnitude, generally short-term or infrequent nature, limited spatial extent, and reversible characteristics of all adverse effects, including residual flood risk to residential properties east of Trout Creek, residual adverse effects on the community and local economy are assessed as Not Significant, while the long-term flood protection benefit is assessed as Significant.

Table 5.25 Significance Determination of Identified Effects for Community and Local Economy

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood	Significance
Temporary boost to local employment and economy activity	Low	Short Term	Sporadic	RAA	Reversible	Possible	Not Significant
Increased revenue for local businesses	Low	Short Term	Sporadic	RAA	Reversible	Possible	Not Significant
Temporary inconvenience and disruption to local businesses and residents (e.g., access issues)	Low	Short Term	Sporadic	LAA	Reversible	Possible	Not Significant
Potential reduction in customers to businesses due to detours or traffic congestion	Low	Short Term	Sporadic	PDA	Reversible	Possible	Not Significant
Reduced quality of life for local residents (e.g., noise, vibration, dust)	Low	Short Term	Sporadic	LAA	Reversible	Possible	Not Significant
Potential adverse impacts on tourism and recreation due to reduced attractiveness or accessibility	Low	Short Term	Sporadic	LAA	Reversible	Possible	Not Significant
Long-term changes to community land use and character	Low	Long Term	Once	PDA	Reversible	Likely	Not Significant
Potential reduction in land available for recreation or other local uses	Low	Long Term	Once	PDA	Reversible	Likely	Not Significant
Increased protection for homes, businesses, public spaces, and essential services, leading to greater community resilience and stability	High	Long Term	Continuous	RAA	Reversible	Almost Certain	Significant
Residual flood risk to residential properties and occupants east of Trout Creek during extreme flood events	Low	Long Term	Rare	LAA	Reversible	Possible	Not Significant

5.12.4 Monitoring and Follow-Up

Given the low potential for adverse effects on the community and local economy, no additional monitoring efforts are recommended. Identified risks are expected to be effectively managed through the implementation of standard Project mitigation measures and ongoing communication with local stakeholders.

Sussex will implement the Project such that residual flood risk to existing residential properties east of Trout Creek does not exceed baseline (pre-Project) conditions. Achievement of this performance objective will be addressed through the selection and implementation of appropriate flood risk management measures prior to Project construction.

5.13 Transportation and Infrastructure

5.13.1 Impact Pathways

Site Preparation and Construction

Site preparation and construction activities are expected to result in short-term interactions with local and provincial transportation infrastructure within Sussex. Potential effects include increased wear on roads and bridges, elevated risk of traffic conflicts associated with construction vehicle movements, reduced road safety due to dust and debris, and localized congestion or delays related to lane closures and construction staging.

Several Project components will directly interact with provincially controlled transportation infrastructure:

- **NB Route 1** will require structural modification to allow the Trout Creek Diversion Channel to pass beneath the highway, involving staged excavation and installation of a culvert or tunnel beneath an active provincial transportation corridor
- **Salmon Covered Bridge and Route 890** will be raised to accommodate projected increases in flood levels along the Kennebecasis River, requiring temporary road closures, detours, and coordination with bridge engineers and traffic safety personnel
- **Plant Road** will be raised to limit residual flooding west of the proposed Trout Creek Diversion Channel, resulting in temporary access disruptions during construction

These activities represent the primary pathways through which construction may affect transportation infrastructure and road users. All works on provincially controlled highways will require coordination with the DTI and/or the New Brunswick Highway Corporation and will be subject to applicable permitting and traffic control requirements.

Operations and Maintenance

No adverse effects on transportation infrastructure are expected during the operations and maintenance phase. In contrast, the Project is anticipated to provide a long-term benefit by reducing the frequency and severity of flood-related road closures, access disruptions, and infrastructure damage. Improved flood conveyance is expected to enhance road safety, reliability, and emergency access during high water events.

5.13.2 Mitigation

During construction, temporary effects on transportation infrastructure and road users will be managed through a comprehensive suite of mitigation measures designed to maintain safety, minimize disruption, and protect infrastructure assets.

Mitigation measures will include:

- Pre-construction condition assessments of roads and bridges
- Acquisition of required Highway Occupancy Permits and adherence to site-specific requirements established by DTI and/or the New Brunswick Highway Corporation
- Designated haul routes and load management to reduce wear on infrastructure
- Traffic management planning, including detours, temporary lane closures, speed reductions, and the use of trained flaggers
- Scheduling of construction vehicle movements during off-peak hours where feasible
- Dust and debris control along haul routes and active work areas, and
- Clear communication with the public regarding construction timing, access changes, and detour routes

Construction activities affecting NB Route 1, Salmon Covered Bridge and Route 890, and Plant Road will be coordinated closely with provincial and municipal authorities to ensure compliance with applicable standards and to maintain safe passage for motorists and pedestrians.

During the operations and maintenance phase, the Project is expected to support transportation infrastructure resilience by reducing flood-related risks to key roadways and structures. Ongoing maintenance of diversion channels and associated infrastructure will help sustain these benefits and ensure continued protection of transportation assets during high water events.

Collectively, these mitigation measures are intended to minimize short-term construction-related disruptions while delivering long-term improvements to transportation safety and reliability within Sussex.

Table 5.26 summarizes the identified impact pathways by Project phase and the associated mitigation measures proposed to avoid or minimize residual effects.

Table 5.26 Potential Effects and Proposed Mitigations for Transportation and Infrastructure

Source of Potential Effect	Project Phase	Potential Changes to Valued Component	Area of Influence	Proposed Mitigations
Construction beneath NB Route 1	Construction	• Land closures, traffic disruption, potential safety risks	RAA	• Coordinate with DTI and/or NB Highway Corporation • Obtain and follow Highway Occupancy Permit requirements • Schedule work during off-peak hours • Implement land control, signage, and public communication
Elevation of Salmon Covered Bridge and Route 890	Construction	• Temporary bridge and road closures, detours, and traffic delays	RAA	• Coordinate with provincial authorities • Provide well-marked detour routes and advance public notice • Conduct structural lifting safely with traffic control measures
Damage to roads, bridges, and other infrastructure	Construction	• Increased wear and tear on local roads; potential structural impacts on bridges and culverts	RAA	• Pre-construction condition assessments • Load restrictions • Use designated haul routes • Repair or restore any infrastructure damaged by construction activities
Chance of vehicle collisions	Construction	• Increased risk of traffic accidents due to higher volumes of construction-related traffic	RAA	• Traffic management plan • Off-peak scheduling • Use trained flaggers and clear signage • Coordinate with local emergency services
Dust and debris on roads	Construction	• Construction-generated dust and material tracking can reduce visibility and road safety	RAA	• Regular road sweeping • Wheel wash stations • Dust suppression measures
Traffic congestion and delays	Construction	• Slower travel times and temporary bottlenecks caused by construction vehicles and temporary lane closures	RAA	• Coordinate timing with provincial and municipal traffic authorities • Maintain alternate access routes • Limit use of sensitive or high-traffic corridors
Lower risk of road flooding	Operations and Maintenance	• Improved reliability of transportation routes during flood events	LAA	• Regular channel maintenance and associated infrastructure

5.13.3 Significance Determination

The potential effects of Project activities on transportation and infrastructure were evaluated to determine their significance (Table 5.27). This assessment assumes that all mitigation measures outlined above will be effectively implemented during each phase of the Project.

Magnitude for most construction-related effects was assessed as Low, reflecting temporary and manageable disruptions such as increased wear on roads, traffic delays, reduced road safety due to dust or debris, and elevated collision risk. Two activities were assessed as Medium in magnitude due to their direct interaction with critical infrastructure: installation of a culvert beneath NB Route 1 and elevation of the Salmon Covered Bridge and Route 890. While more intensive, these activities are short term and subject to controlled implementation.

Duration of construction-related effects was assessed as Short Term, while the flood diversion infrastructure was assessed as having a Long Term duration of effect due to its ongoing role in reducing flood-related damage to transportation infrastructure.

Frequency was assessed as Sporadic for most construction-related effects, with Once assigned to discrete activities such as culvert installation and bridge elevation. The flood protection benefit was assessed as Continuous throughout the operational life of the Project.

Extent of most construction-related effects was assessed as within the RAA, reflecting the regional importance of affected roadways. The flood mitigation benefit also extends across the RAA.

All effects were assessed as Reversible, with transportation conditions expected to return to baseline following construction. Likelihood of most construction-related effects was assessed as Possible, while effects associated with NB Route 1 and the Salmon Covered Bridge were assessed as Likely. The flood protection benefit was assessed as Almost Certain.

One effect – improved flood diversion reducing the potential for road closures and infrastructure damage during high water events – was assessed differently. This effect is characterized by High magnitude, Long Term duration, Continuous frequency, RAA extent, and an Almost Certain likelihood, and is therefore assessed as Significant.

Considering the low magnitude, short-term, sporadic, and reversible nature of all adverse effects, residual adverse effects on transportation and infrastructure are assessed as Not Significant, while the long-term flood protection benefit is assessed as Significant.

Table 5.27 Significance Determination of Identified Effects for Transportation and Infrastructure

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood	Significance
Increased wear and tear on local roads; potential structural impacts on bridges and culverts	Low	Short Term	Sporadic	RAA	Reversible	Possible	Not Significant
Increased risk of traffic accidents due to higher volumes of construction-related traffic	Low	Short Term	Sporadic	RAA	Reversible	Possible	Not Significant
Construction-generated dust and material tracking can reduce visibility and road safety	Low	Short Term	Sporadic	RAA	Reversible	Possible	Not Significant
Slower travel times and temporary bottlenecks caused by construction vehicles and temporary lane closures	Low	Short Term	Sporadic	RAA	Reversible	Possible	Not Significant
Temporary road closures and traffic disruptions from NB Route 1 culvert installation	Medium	Short Term	Once	RAA	Reversible	Likely	Not Significant
Temporary bridge closure and detours during elevation of Salmon Covered Bridge and Route 890	Medium	Short Term	Once	RAA	Reversible	Likely	Not Significant
Improved flood diversion reduces potential for road closures or damage due to high water levels	High	Long Term	Continuous	RAA	Reversible	Almost Certain	Significant

5.13.4 Monitoring and Follow-Up

Given the low potential for adverse effects on transportation and infrastructure, no additional, VC-specific monitoring is proposed. Identified risks are expected to be effectively managed through standard Project controls and compliance with applicable regulatory requirements.

Sussex and the Project team have engaged in ongoing discussions with DTI regarding transportation-related components of the Project, including the Plant Road embankment raise and the Route 890 bridge deck raising. Coordination with DTI will continue through detailed design and implementation to confirm design requirements, access considerations, and applicable permitting or approval processes. All necessary authorizations and approvals will be obtained prior to commencement of construction activities affecting provincial transportation infrastructure.

In the event of an incident, such as a vehicle collision involving Project personnel or contractors, the incident will be reported and managed in accordance with procedures outlined in the Project's EMP.

Any observed damage to roads or transportation infrastructure that may be attributable to Project activities will be documented and communicated to the DTI or other relevant authority, as required.

5.14 Land and Resource Use

5.14.1 Impact Pathways

Site Preparation and Construction

Site preparation and construction activities are expected to result in temporary effects on land and resource use within the PDA. These effects are primarily related to land clearing, grading, excavation, and active construction within areas zoned for a mix of industrial, residential, rural, institutional, park, environmental protection, and transportation uses.

During construction, access to forested, undeveloped, or recreational lands may be temporarily restricted, and land use within the PDA may be altered for the duration of construction. Recreational resources located near portions of the PDA, including Kelti Field, the Sussex Walking Trail, and school greenspace at Sussex Corner Elementary School, may experience short-term disruptions such as reduced access, visual disturbance, and increased noise or dust. While these effects are temporary and localized, they represent manageable changes to land and recreational resource use during construction.

Operations and Maintenance

During the operations and maintenance phase, land and resource use interactions are expected to reflect the permanent presence of municipal flood mitigation infrastructure within existing zoning designations that permit land for public purpose and stormwater management systems.

Post-construction, disturbed areas will be stabilized and revegetated, supporting recovery of land capability and, in some locations, improving the condition of previously disturbed sites.

The diversion channels may result in localized, long-term constraints on land use immediately adjacent to the infrastructure, including limitations on future development or changes to visual character. However, these constraints are consistent with zoning permissions and the intended function of the Project as municipal infrastructure. In some areas, restored access or upgraded crossings may enhance community use of recreational trails or greenspace. Infrastructure improvements near waterways are also expected to reduce erosion and flood risk, thereby protecting surrounding residential, rural, and recreational land uses.

Routine maintenance activities may result in intermittent, short-duration access restrictions; however, these are expected to be infrequent and compatible with surrounding land uses.

5.14.2 Mitigation

Temporary impacts on land and resource use during construction will be mitigated through measures designed to maintain compatibility with existing zoning and surrounding land uses. Land clearing and grading will be limited to areas required for construction, and designated staging, laydown, and access routes will be used to minimize land disturbance and fragmentation. Disturbed areas will be stabilized and restored where feasible following construction.

Where the Project intersects lands zoned for residential, institutional, park, or recreational use, mitigation measures will include maintaining safe buffer zones, installing clear signage to delineate work areas, and scheduling higher-disturbance activities to avoid peak use periods where feasible. Temporary detours or alternative access will be provided where practicable to maintain continuity of recreational and community land use.

During operations and maintenance, the presence of diversion channels and associated infrastructure may influence adjacent land use through development constraints or visual changes. These effects will be managed through coordination with municipal land use planning processes and clear communication with affected landowners and stakeholders regarding long-term access, maintenance requirements, or development limitations. Maintenance activities will be planned to minimize disruption to adjacent land uses and to remain consistent with zoning permissions. Any future rezoning or land-use approvals, if required, would be undertaken in accordance with the *Town of Sussex Zoning By-law* and *Municipal Plan By-law*.

Collectively, these mitigation measures are intended to reduce short-term disruption to land and resource use during construction, support post-construction stabilization and revegetation, and ensure that long-term land use effects remain compatible with existing zoning and land-use objectives, while enhancing the resilience of flood-prone areas.

Table 5.28 Potential Effects and Proposed Mitigations for Land and Resource Use

Source of Potential Effect	Project Phase	Potential Changes to Valued Component	Area of Influence	Proposed Mitigations
Site clearing and grading	Construction	• Temporary loss of forest, undeveloped land, or recreational space	PDA	• Limit clearing to necessary areas • Restore disturbed areas where feasible
Temporary occupation or compaction of land	Construction	• Reduced land productivity; temporary loss of land usability	PDA	• Use designated laydown/staging areas • Avoid sensitive or high-value lands
Construction of diversion channel through school greenspace	Construction	• Loss of recreational greenspace; visual impact	PDA	• Maintain safe buffer zones • Schedule high-disturbance activities to avoid school outdoor use periods where possible • Install clear signage and visual markers to delineate work zones and ensure student safety • Restore disturbed areas where feasible
Recreational land use may be impacted during activities	Construction Operations and Maintenance	• Temporary disruption or reduced accessibility to recreational areas	PDA	• Post clear signage to alert trail users of construction activities and potential hazards • Maintain safe detours or temporary access where feasible
Operation of diversion channels	Operations and Maintenance	• Restrictions on land development near channels; visual/land use change	PDA	• Integrate land use planning considerations into municipal development strategies • Clearly communicate any development constraints to the public and relevant stakeholders

5.14.3 Significance Determination

The potential effects of Project activities on land and resource use were evaluated to determine their significance (Table 5.29). This assessment assumes that all mitigation measures outlined above will be effectively implemented during each phase of the Project.

Magnitude for all identified effects was assessed as Low, reflecting minor and manageable interactions with land and resource use. These include temporary loss of forested, undeveloped, or recreational lands, short-term reductions in land productivity due to disturbance or compaction, temporary disruptions to recreational access, and localized visual changes associated with construction and infrastructure presence.

Duration of most effects was assessed as Short Term, as they are primarily associated with construction activities and are expected to resolve following completion of works and site restoration. One effect – land use restrictions and visual change near diversion infrastructure – was assessed as Long Term and Continuous, reflecting the permanent presence of flood mitigation infrastructure and its influence on adjacent land use.

Frequency was assessed as Once for construction-related effects, corresponding to discrete land disturbance activities. The long-term land use restriction effect was assessed as Continuous during the operations and maintenance phase.

Extent for all effects was confined to the PDA, indicating that land and resource use interactions are localized and do not affect broader land use patterns beyond the Project footprint.

All effects were assessed as Reversible, as disturbed areas are expected to recover through natural processes or post-construction stabilization and restoration. Long-term land use considerations near diversion infrastructure can be managed through municipal land use planning and clear communication of development constraints to ensure compatibility with surrounding land uses.

Likelihood of occurrence for all identified effects was assessed as Likely, reflecting that these interactions are an expected outcome of construction and infrastructure presence, even with mitigation in place.

Based on the low magnitude, localized extent, generally short-term duration, and reversible nature of the identified effects, all residual effects on land and resource use are assessed as Not Significant.

Table 5.29 Significance Determination of Identified Effects for Land and Resource Use

Effect	Magnitude	Duration	Frequency	Extent	Reversibility	Likelihood	Significance
Temporary loss of forest, undeveloped land, or recreational space	Low	Short Term	Once	PDA	Reversible	Likely	Not Significant
Temporary reduction in land productivity due to compaction or disturbance	Low	Short Term	Once	PDA	Reversible	Likely	Not Significant
Loss of recreational greenspace and associated visual changes	Low	Short Term	Once	PDA	Reversible	Likely	Not Significant
Temporary disruption or reduced access to recreational areas	Low	Short Term	Once	PDA	Reversible	Likely	Not Significant
Land use restrictions and visual change near diversion infrastructure	Low	Long Term	Continuous	PDA	Reversible	Likely	Not Significant

5.14.4 Monitoring and Follow-Up

Given the low potential for adverse effects on land and resource use, no additional, VC-specific monitoring is proposed. Potential risks are expected to be effectively managed through standard construction practices, site restoration measures, and coordination with relevant landowners and stakeholders, as required.

5.15 Cumulative Effects

Potential residual effects, after all mitigation measures are applied, are identified in the preceding sections. For any impact pathway with a residual effect that could extend beyond the immediate spatial boundary of the PDA, the potential for cumulative effects was considered.

Table 5.30 summarizes the potential residual effects identified for each VC, identifies other sources of similar effects (stressors) within the region, and provides an evaluation of the potential for cumulative effects. The anticipated type of interaction (e.g., additive, synergistic, offsetting, or compensatory) is also identified (see additional discussion on stressor interactions in Section 3.5).

Ten potential cumulative effect pathways were identified across all VCs, primarily related to sediment loading in local watercourses, aquatic habitat alteration, wetland and vegetation loss, habitat fragmentation, construction-related noise, dust and particulate emissions, traffic disruptions, and changes to land and resource use. These pathways may interact with existing stressors such as ongoing land development, habitat modification, and infrastructure demands within the region.

The majority of these interactions are considered additive, as Project-related effects would occur alongside existing land use pressures, habitat alteration, and background environmental stressors. For certain components, particularly vegetation and air quality, the potential for synergistic effects cannot be entirely ruled out. For example, vegetation clearing combined with existing invasive species pressure could contribute to incremental loss of native plant communities, while construction-related dust may temporarily compound existing particulate sources. However, these interactions are expected to be limited in magnitude and duration, given the localized and temporary nature of Project-related stressors.

Off-site and indirect effects, such as noise, dust, and traffic congestion, are expected to be episodic and primarily associated with active construction periods. Standard best management practices, including scheduling, buffer zones, signage, and traffic routing, are anticipated to reduce the frequency, intensity, and duration of these effects.

While the Project may contribute to some cumulative effects – such as temporary increases in sedimentation, localized habitat disturbance, and short-term restrictions on land use or access – these effects are expected to be minor in magnitude, limited in duration, and confined to the Project footprint and its immediate surroundings. Over the long term, the Project is anticipated to provide net positive cumulative outcomes, including enhanced flood protection, improved infrastructure resilience, and increased stability of riparian and wetland ecosystems.

Table 5.30 Assessment of Cumulative Effects for any Project-related Residual Effects Identified.

Valued Component	Residual Effects	Other Stressors	Potential Cumulative Effect	Anticipated Interaction Type
Surface Water Quality	• Increased sedimentation during construction of diversion channels.	• Runoff and sediment from agriculture, urban stormwater, existing culverts and bridges.	• Elevated sediment loads in Parsons Brook, Trout Creek, and Kennebecasis River.	Additive
Fish and Fish Habitat	• Disturbance to aquatic habitat during in-stream works.	• Existing stress from fluctuating flow levels, and upstream land use practices.	• Compounded habitat disruption, particularly during spawning or migration periods.	Additive
Wetlands	• Watercourse and Wetland Alteration	• Ongoing land development, and agricultural encroachment.	• Loss of wetland area and function	Additive
Terrestrial Wildlife	• Temporary displacement and habitat loss during construction.	• Ongoing fragmentation from roads, residential growth.	• Increased habitat fragmentation and edge effects, potentially reducing local biodiversity.	Additive
Vegetation	• Vegetation clearing during construction and loss of native plant species.	• Invasive plant species from disturbed soils and nearby land uses. • Habitat loss from agricultural expansion and utility corridors.	• Loss of plant biodiversity and native ground cover. Reduced ecological resilience and habitat quality.	Additive or Synergistic
Acoustic Environment	• Noise related to trucking and other traffic in area and along haul route.	• Traffic noise	• There could be an additive increase in overall noise along haul routes.	Additive
Local Atmospheric Environment (Air Quality)	• Dust and emissions from construction machinery and soil disturbance.	• Dust from trucks in other industry like hauling on roads. Seasonal particulate from pollen, wildfire, campfires, and construction.	• Increased levels of dust and emissions particulates during dry construction periods.	Additive
Avifauna	• Disturbance to nesting or foraging birds during construction. • Habitat alteration or fragmentation in riparian and wetland zones.	• Existing pressures from agriculture, residential expansion, and recreational use.	• Disruption to breeding cycles and nesting success. • Loss of suitable habitat and migratory stopover sites.	Additive
Transportation Infrastructure	• Temporary traffic disruption, restricted access during construction.	• Seasonal road maintenance, concurrent development projects, and tourism traffic.	• Increased demand on local infrastructure and transportation networks.	Additive
Land and Resource Use	• Restrictions on land access. • Interference with current land use patterns.	• Expanding residential, commercial, or agricultural development. • Ongoing municipal land use planning constraints.	• Compounded pressure on recreational access and green spaces. • Land use conflicts near diversion infrastructure.	Additive

5.15.1 Future Activities

The preceding subsection considered potential cumulative effects arising from interaction with existing stressors. This subsection considers known large-scale future projects within the region. Future projects were defined as those that:

- Have been publicly announced with sufficient detail to allow meaningful assessment
- Are currently undergoing environmental assessment
- Are in a permitting process
- Have been approved but are not yet operational

Registered undertakings within the DELG and IAAC registries were reviewed for the RAA, with the search limited to the past five years (Table 5.31).

None of the identified future undertakings are expected to interact cumulatively with the Project. These projects are spatially separated from the Project, differ in timing and effect pathways, or involve unrelated stressors, and are therefore not anticipated to contribute to cumulative effects in combination with the Sussex Flood Mitigation Project.

Table 5.31 Past and Proposed Projects Within the Region

Project Name / Proponent	Description	Year	Approx. Distance to Project (km)	Direction from Project	Status
Kelly Cove Salmon Ltd. Penobsquis Well Project	Decommissioning a poor-quality well and drilling a new well for hatchery operations	2020	~10 km	Northwest	Certificate of Determination issued (2024)
Natural Forces Wocawson Wind Project Expansion	Construction of 12-turbine expansion to the existing windfarm and associated infrastructure.	2024	~20 km	Northeast (Springdale–Portage Vale)	Certificate of Determination issued (2025)
Nutrien Cassidy Lake TMA Decommissioning	Closure and decommissioning of former potash tailings management area	2024	~30 km	Southwest (Cassidy Lake)	Under EIA review (2024)
Midland Meadows Golf Club Expansion	Expansion of golf course including ponds, cart paths, and bridges	2025	~19 km	Southeast (Valley Waters)	Under EIA review (2025)

6.0 POTENTIAL ACCIDENTAL EVENTS

6.1 Potential Interactions with VCs

6.2 Spills

Spills include any accidental release or significant leaks of petroleum products and other chemicals that could harm the environment. Small spills from broken hose lines on equipment, and other equipment malfunctions, are not uncommon on construction sites. It is prudent for proponents and contractors to be prepared for occasional leaks and spills from 1-20 L, which typically consist of hydraulic fluid, oil, and (less commonly) fuel.

6.2.1 Mitigation

The following spill prevention and response measures will be implemented to minimize the risk of contaminating soils, surface water, or groundwater within the PDA and LAA:

- All machinery, vehicles, and other gas-powered equipment will be in good working order and routinely maintained and inspected for signs of leaks or damage
- Refuelling of equipment will take place in designated areas >30 m from watercourses and wetlands, to reduce the risk of spills
- Appropriately sized spill kits will be present on site and personnel will be trained in the use of spill kits, operational best practices, and specific conditions of authorizations like WAWA permits
- A large spill kit should be kept at a designated refueling location, along with shovels and fire extinguishers, and the area should be signed as such. Alternatively, a general ‘emergency response kit’ consisting of spill kit, shovels, and fire extinguishers could be established at a work trailer (if using)
- All site personnel should be trained on spill prevention, the use of spill kits, and the spill response protocol as part of orientation prior to commencing work on site

If a spill occurs, regardless of the severity of the spill, the DELG Kings Rural District Regional office in Hampton will be contacted immediately. Spill response measures will be implemented as soon as possible. Spill details and response should be documented on a Spill Response Form to be included in the EMP.

6.2.2 Potential Residual Effects

With appropriate preventative measures, accidental petroleum spills will be infrequent but should be expected. The extent of spills related to broken hydraulic hoses, etc., should be within the PDA boundaries. The magnitude of the effects of an accidental spill is expected to be low (1-20 L), and reversible, with a well-executed spill response plan. The significance of an accidental spill was therefore classified as not significant, and the likelihood of residual effects considered low.

6.3 Fire

While the PDA is within an urbanized town setting where the risk of large-scale forest fires is significantly reduced compared to rural forested environments, construction-related fire hazards remain an important consideration. Activities during construction, including the operation of heavy machinery, welding, handling flammable materials, and potential mechanical equipment failures, still carry inherent fire risks. The urban context elevates the importance of fire prevention due to the proximity of residential areas, schools, businesses, infrastructure, and associated risks to public safety.

Although wildfire is not a prominent risk in Sussex, climate change continues to contribute to generally increased fire risk through prolonged periods of drought and elevated temperatures, further underscoring the importance of effective fire prevention and preparedness strategies.

6.3.1 Mitigation

Fire prevention and mitigation includes:

- All site personnel will be trained on fire prevention, the use of fire extinguishers, and emergency response protocols as part of orientation prior to commencing work on site
- Use of clearing and excavation equipment should be limited during dry periods in spring and summer. Supervisors should monitor the NB Fire Watch website for fire hazard warnings and restrictions: https://www2.gnb.ca/content/gnb/en/news/public_alerts/forest_fire_watch.html
- Vehicles and equipment should be equipped with appropriately sized fire extinguishers. Additional fire extinguishers should be readily available at designated refueling areas (best kept with a large spill kit in a visible area with signage)
- Gas-powered hand tools (e.g., chainsaws) should be equipped with spark arresters on the exhaust
- Smoking should be prohibited on site, or limited to a designated area away from fuels, equipment, or natural combustible materials like brush piles

6.3.2 Potential Residual Effects

An accidental fire during construction could pose risks to public safety, potentially affecting nearby residence, commercial establishments, and community infrastructure. The residual impacts could include temporary displacement of residents, disruption to local businesses, damage to infrastructure, and adverse health impacts resulting from degraded air quality due to smoke emissions.

Although the likelihood of such an event is significantly lower compared to rural forested areas, there remains a possibility of occurrence despite rigorous mitigation measures. The mitigations identified above are intended to substantially reduce the risk and potential severity of fire incidents but cannot entirely eliminate the risk. Implementing these mitigation measures will significantly minimize the potential for fire occurrence and its associated impacts within the urban project setting.

6.4 Failure of Erosion and Sediment Control

Standard ESC measures for the Project include the use of silt fencing, straw mulch cover, straw bale check dams within drainage ditches, diversion ditches, and other best management practices. ESC measures are especially critical during construction phases involving significant soil disturbance, which could lead to sediment runoff into nearby wetlands and watercourses. Suspended sediments may also carry toxins or cause nutrient loading, particularly if the sediments are naturally enriched with organic matter.

Correct installation, proper maintenance, and routine inspection of ESC measure will be integral components of the Project's EMP during construction. Baseline turbidity measurements were collected during stream assessments to characterize conditions downstream of the proposed diversion channel inlets and outlets. These baseline data will be available for reference and comparison if sediment plumes occur during construction or flooding events in the operations phase.

6.4.1 Mitigation

Preventative measures for ESC structure failures include:

- Incorporate erosion control approaches and protocols into EMP
- Include training on installation and maintenance of ESC structures in site orientation for personnel
- ESC structures and other measures (e.g., covering exposed soils with straw, etc.) should be routinely inspected and maintained as necessary throughout the year and for the life of the Project

Mitigations in the event of a failure of ESC structure include:

- Inclusion of a detailed contingency plan for failure of erosion control structures in the EMP
- Immediate inspection of watercourses and wetlands nearest to the failed structure, to assess whether runoff with eroded sediments has reached these habitats
- Documentation, including photos, of any signs of impacts to wetlands or watercourses
- Immediate implementation of measures to contain runoff in the compromised area, including new diversion ditching, berms, silt fencing, etc. Site supervisor will need to determine the most appropriate method to contain the runoff
- Report the incident to the DELG Kings Rural District Regional Office at (506) 832-6007 within 24 hours to determine next steps and any recommended monitoring requirements
- If it is suspected that runoff or eroded sediments could be contaminated with petroleum products or other chemicals, any spills that reach a watercourse should be reported

immediately to the DELG Kings Rural District Regional Office at (506) 832-6007; for after hours incidents, report the spill to the Canadian Coast Guard: 1-800-565-1633

6.4.2 Potential Residual Effects

Except in cases where erosion event involves contaminants such as petroleum products, residual effects resulting from the failure of ESC structures are anticipated to be short- to medium-term. The severity, extent, and duration of impacts on fish and fish habitat depend primarily on the volume and concentration of sediment released into a watercourse during runoff events. With properly implemented standard ESC measures, the likelihood of a significant sedimentation event occurring in a watercourse is considered relatively low. If an accidental sediment release does occur, following the response plan outline above, which will be detailed further in an EMP, the sediment release is expected to be rapidly contained, resulting in minimal residual effects.

In situations where eroded sediments enter a wetland, remediation actions might be necessary to mitigate residual effects such as wetland infilling and impacts on wetland functions. In these cases, consultation with DELG regional staff would determine suitable remedial actions.

7.0 EFFECTS OF THE ENVIRONMENT ON THE PROJECT

The potential effects of the environment on the Project are primarily influenced by the Project's location, design, and exposure to natural hazards or physical environmental forces. These effects may arise from natural conditions – such as climate, terrain, and geophysical activity – that could impact the integrity of Project components, alter the construction schedule, or result in increased costs.

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

Although these environmental factors present inherent risks, their potential effects can be reduced through proactive planning, the application of industry-standard design and construction practices, adherence to permitting requirements, and the implementation of environmental mitigation measures. Where relevant, these factors have been accounted for in the Project's design, construction planning, and operational procedures to minimize vulnerability to environmental stressors.

7.1.1 Existing and Projected Conditions

7.1.1.1 Climate Change and Severe Weather Events

Climate conditions for the Project area are based on Environment Canada's Climate Normals data, recorded at the Sussex weather station (45.716667°, -65.533333°), located approximately 4 km west of the PDA. These data are considered representative of the climate within the Project area.

Research indicates climate change is expected to alter key variables in NB, including temperature, precipitation, and wind patterns (Lemmen et al., 2008). These changes are projected to increase the frequency and intensity of extreme weather events, which could pose risks to the Project during construction, and operation phases.

Recent projects from the Coupled Model Intercomparison Project Phase 6 (CMIP6) use SSP scenarios to estimate future climate conditions based on different GHG concentration trajectories. SSPs reflect varying levels of global climate change mitigation. For example, SSP5-8.5, a high-emissions "worst-case" scenario, assumes GHG emissions will continue to rise throughout the 21st century with limited mitigation action.

This section provides an overview of current and projected climate conditions relevant to the Project – focusing on temperature, precipitation, and flooding – and assesses their potential risks to the Project infrastructure and timelines.

Temperature

The MAT for the Project area between 1991 and 2020 was 6.5°C, based on data from the Sussex climate station, located approximately 4 km west of the site (ECCC, 2026). The extreme maximum temperature recorded during this period was 35.0°C (May 22, 1992), while the extreme minimum was -34.0°C (January 16, 2009). Seasonal variation is pronounced, with average daily temperatures ranging from -7.9°C in January to 19.7°C in July.

Projections from the CMIP6 model ensemble, as presented by the AdaptWest Project (2021), indicate a consistent warming trend across New Brunswick over the coming decades. Under a low to intermediate GHG emissions scenario (SSP2-4.5), the regional MAT is projected to increase to approximately 8.8°C over the 2041-2070 period. Under a high-emissions scenario (SSP5-8.5), the MAT may rise further to approximately 9.6°C. These values represent a 2.3°C to 3.1°C increase relative to the 1991-2020 baseline (Figure 7.1).

Long-term projections also indicate a reduction in frost days, an earlier onset of spring, and an extended growing season (Bush & Lemmen, 2019). Warmer winters are expected to reduce the duration and extent of snow cover, while summer temperatures are projected to rise more sharply than winter temperatures (Bush & Lemmen, 2019).

The length of FFP – defined as the number of consecutive days per year during which minimum daily temperatures remain above 0°C – provides an additional indicator of warming. Based on 1991-2020 Climate Normals, the average FFP for the Project area was 128 days. Projections for the 2041-2070 period show an increase to 152 days under SSP2-4.5 and 287 days under SSP5-8.5, indicating a substantial extension of the frost-free season under higher-emissions conditions.

The frequency and intensity of extreme heat days – defined as days with a maximum temperature exceeding 30°C – are also expected to increase significantly. Based on historical data from the Sussex station, the Project area currently experiences an average of 6.2 days/year above 30°C (1991-2020). CMIP6 ensemble projections (Sobie, Ouali, Curry, & Zwiers, 2024) show that by the 2050s (2041-2070):

- Under the SSP2-4.5 scenario, the number of extreme heat days is projected to increase to 13.7 days/year.
- Under the SSP5-8.5 scenario, this number could rise to 24.0 days/year

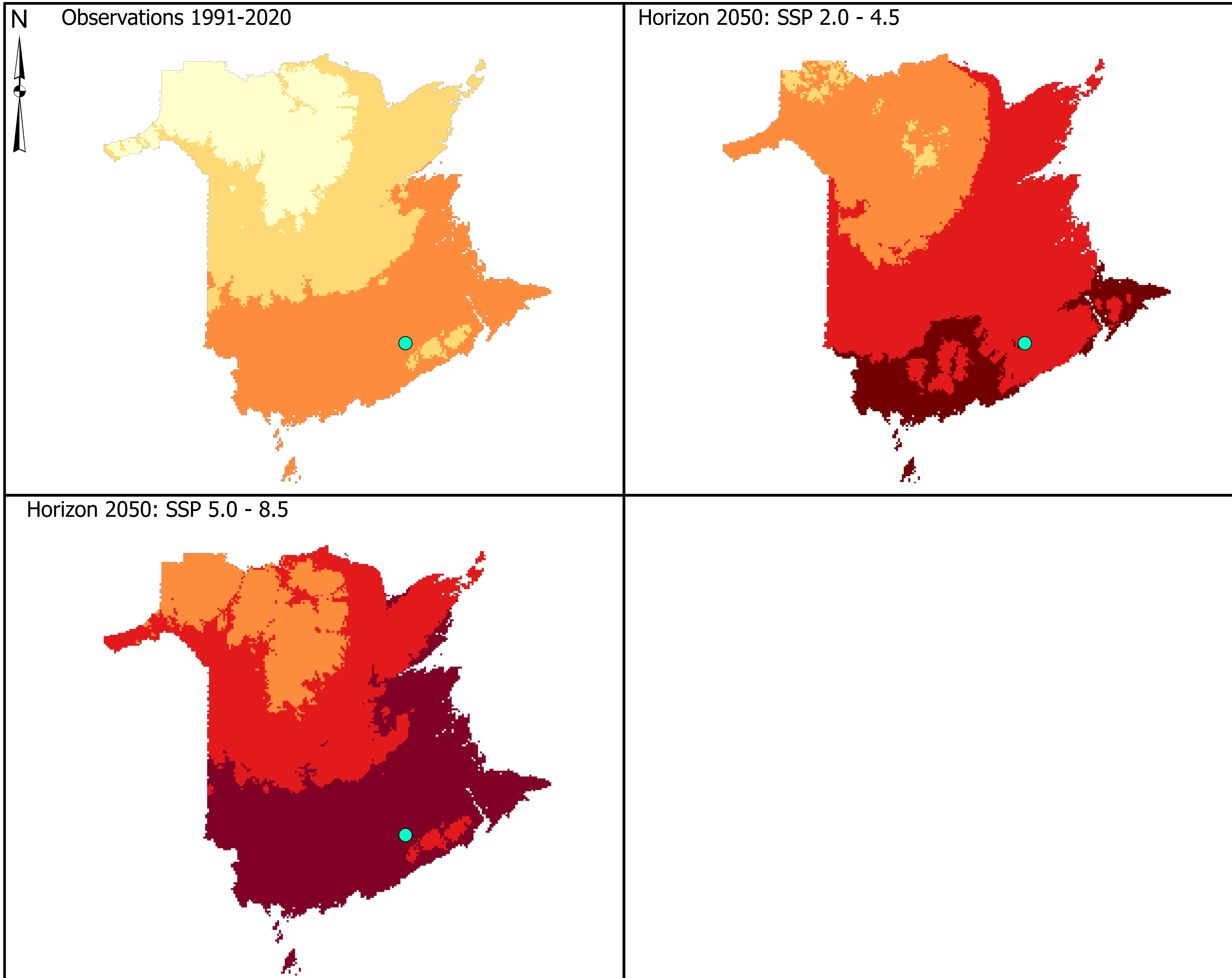
These projections represent an approximate 2.2- to 3.9-fold increase relative to historical conditions.

Further insight into warming trends can be drawn from projected seasonal average temperatures, summarized in Table 7.1 below. Historical climate normal show distinct seasonal variation, with the warmest conditions in summer and the coldest in winter. CMIP6 projections for the 2041-2070 period suggest substantial increases in mean seasonal temperatures across all seasons and emissions scenarios:

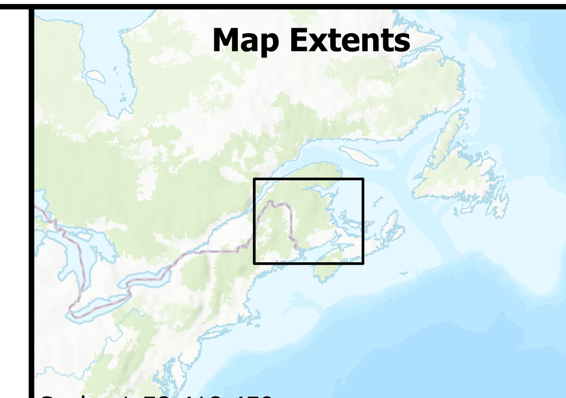
- Winter temperatures are projected to rise by 3.0 to 4.1°C
- Summer temperatures are projected to increase by 1.8 to 2.6°C
- Spring and fall also warm considerably, contributing to an extended warm season and longer FFPs

Table 7.1 Seasonal Mean Daily Temperatures (°C) - Historical and Projected (2041-2070)

Scenario	Winter (Dec-Feb)	Spring (Mar-May)	Summer (Jun-Aug)	Fall (Sep-Nov)
1991-2020 Climate Normals	-6.0	4.8	18.4	8.7
CMIP6 SSP2-4.5 (2041-2070)	-3.0	7.0	20.2	10.9
CMIP6 SSP5-8.5 (2041-2070)	-1.9	7.7	21.0	11.7



Map Extents



Scale: 1:58,418,459

Basemap Source: Sources: Esri, TomTom, Garmin, FAO, NOAA, USGS, © OpenStreetMap contributors, and the GIS User Community, Esri, USGS

Legend

- Project Location

Mean Annual Temperature (°C)

- 1.9 - 3.5
- 3.6 - 5.3
- 5.4 - 7
- 7.1 - 8.8
- 8.9 - 10.5

Notes

1. Coordinate system: New Brunswick Stereographic, NAD83 (CSRS) Datum.
2. Geographic dataset source: AdaptWest Project. 2021. Gridded current and projected climate data for North America at 1km resolution, generated using the ClimateNA v7.01 software (T. Wang et al., 2021). Available at adaptwest.databasin.org.
3. This drawing is a schematic representation. Sizes, locations and dimensions are approximate.

Date	Draw by	Checked by
FEBRUARY 2026	CR	KW

Client: Municipality of Sussex

Project: Sussex Flood Diversion Channels, Environmental Impact Assessment, Sussex, New Brunswick

Drawing: Mean Annual Temperature Data in New Brunswick

Scale: Scale: 1:3,420,000

Kilometers: 0 15 30 60 90 120

Project No.	Drawing No.	Rev.No.
101539.009	FIGURE 7.1	0

GEMTEC Consulting Engineers and Scientists

Document Path: N:\Projects\101500\101539.009\06_Civil Drafting\01_GIS\101539.009_Climate_Data_2025_07_17\101109_036_Climate_Data_2024_11_06.aprx

Precipitation

The mean annual precipitation (MAP) for the Project area between 1991 and 2020 was 935.6 mm, based on data from the Sussex climate station, located approximately 4 km west of the site (ECCC, 2026). The most extreme daily precipitation event during that period occurred on September 22, 1999, with 113.4 mm of rainfall recorded in a single day.

Projections from the CMIP6 model ensemble, as presented by the AdaptWest Project (2021), indicate a continues increase in total annual precipitation over the coming decades. Under a low to intermediate emissions scenario (SSP2-4.5), MAP is projected to increase to approximately 1241 mm over the 2041-2070 period. Under a high-emissions scenario (SSP5-8.5), MAP is projected to rise to approximately 1264 mm (Figure 7.2). These values represent an increase of approximately 300 to 330 mm, or 32-35%, relative to the historical baseline.

Precipitation as snow (PAS) is projected to decline over the same period, reflecting the influence of rising winter temperatures. Based on Climate Normals, the Sussex station received an average of 247.7 cm of snowfall per year between 1991 and 2020. Using a standard 10:1 snow-to-liquid ratio, this corresponds to an estimated PAS of approximately 248 mm. This ratio is commonly used to estimate water content from snowfall, though actual snow-to-liquid ratios can vary depending on temperature, humidity, and other atmospheric conditions. CMIP6 projections for 2041-2070 show PAS declining to approximately 172 mm under SSP2-4.5 and 127 mm under SSP5-8.5, indicating a significant reduction in snow accumulation. This trend aligns with warmer winter conditions and a shift toward a greater proportion of precipitation falling as rain.

Mean summer precipitation (MSP) is also projected to increase slightly. Based on historical data, the Project area received approximately 437.1 mm of precipitation between May and September during the 1991-2020 baseline period. CMIP6 projections for 2041-2070 show a moderate increase, with MSP rising to approximately 470 mm under SSP2-4.5 and 472 mm under SSP5-8.5. Although smaller than the projected increase in annual totals, these changes may still influence seasonal water balances and surface moisture availability (Bush & Lemmen, 2019).

The frequency of heavy precipitation events is also expected to rise (Center for Climate and Energy Solutions, 2024). According to Climate Normals, the Project area experienced an average of 38.5 days per year with precipitation ≥ 10 mm during the 1991-2020 period. CMIP6 projections for 2041-2070 indicate an increase to approximately 46.1 days/year under SSP2-4.5 and 47.1 days/year under SSP5-8.5, representing a 20-22% increase in moderate-to-heavy rainfall events.

Changes in moisture availability were assessed using two modeled indices: Hogg's Climate Moisture Index (CMI) and Hargreave's Climatic Moisture Deficit (CMD), both available from CMIP6 model outputs (AdaptWest Project, 2021). These indices reflect the balance between precipitation and atmospheric demand for moisture, which increases with temperature. While Environment Canada's Climate Normals dataset includes observed temperature and precipitation data, it does not report modeled indices such as CMD or CMI, as these require additional variables like potential evapotranspiration and solar radiation.

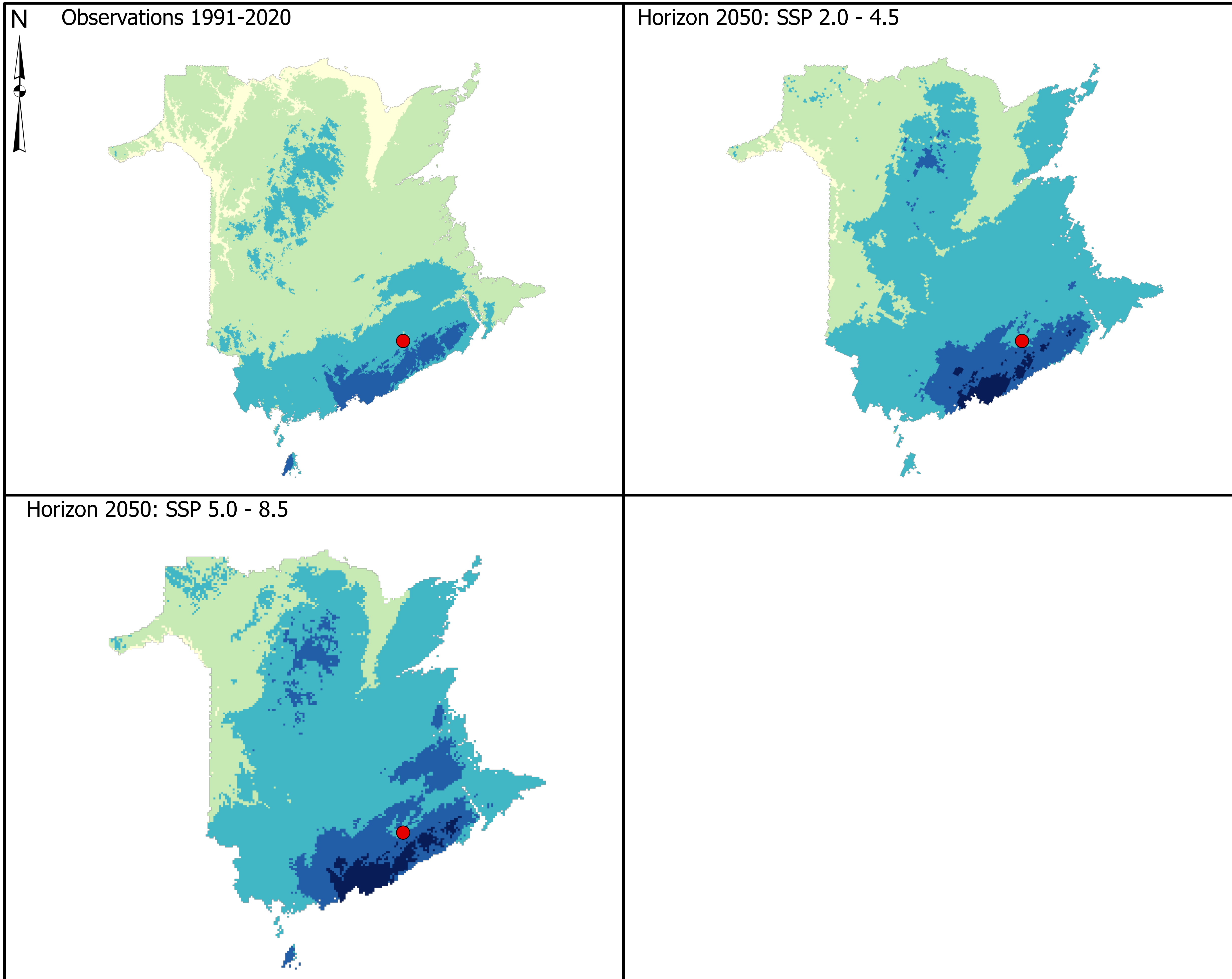
To provide a consistent comparison with future projections, baseline CMI and CMD values were derived from CMIP6 data for the 2011-2040 period under SSP2-4.5. This scenario aligns reasonably well with observed global emissions trends over the past three decades and maintains consistency with the modelling framework used for future projections (IPCC, 2023).

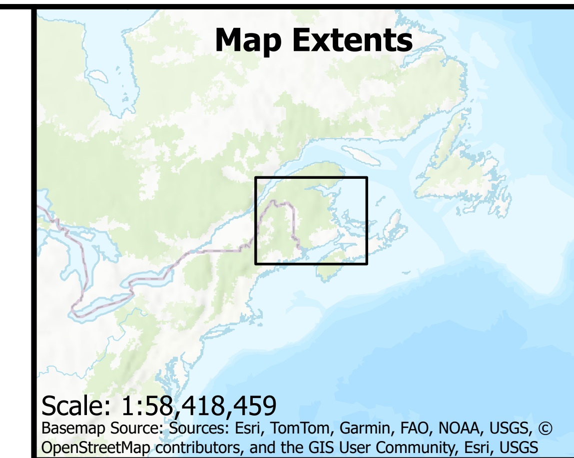
Under SSP2-4.5, CMI declines modestly from 62.8 mm (2011-2040) to 61.1 mm (2041-2070), while CMD increases from 128 mm to 136 mm. Under SSP5-8.5, the drying trend is more pronounced, with CMI decreasing to 59.5 mm and CMD rising to 145 mm. These projections suggest that, despite an increase in annual precipitation, moisture availability may decline overall, due to increased evapotranspiration under warmer conditions. This represents a shift toward a slightly drier climate balance, which may be more pronounced during warmer parts of the year, when evapotranspiration rates are typically highest (Bush & Lemmen, 2019).

Seasonal precipitation trends (Table 7.2) offer further insight in projected changes in the regional hydrologic regime. The historical climate normal indicates the Project area received the highest precipitation in the fall and the least in the winter. CMIP6 projections for 2041-2070 show a substantial increase in winter precipitation, more than doubling under both emissions scenarios. Spring and summer precipitation increase moderately (by approximately 20-25%), while fall precipitation is projected to decline slightly. These seasonal shifts suggest a larger proportion of annual precipitation may occur outside the growing season, particularly in winter and early spring. Although summer precipitation is projected to increase modestly, higher temperatures and associated increases in evapotranspiration may lead to a net reduction in available moisture during the summer months.

Table 7.2 Seasonal Mean Daily Precipitation (mm) - Historical and Projected (2041-2070)

Scenario	Winter (Dec-Feb)	Spring (Mar-May)	Summer (Jun-Aug)	Fall (Sep-Nov)
1991-2020 Climate Normals	146.7	225.9	232.4	330.6
CMIP6 SSP2-4.5 (2041-2070)	355	282	290	314
CMIP6 SSP5-8.5 (2041-2070)	368	288	294	314





Legend

Project Location

Mean Annual Precipitation (mm)

- 976 - 1,080
- 1,080 - 1,185
- 1,185 - 1,289
- 1,289 - 1,394
- 1,394 - 1,499

Notes
1. Coordinate system: New Brunswick Stereographic, NAD83 (CSRS) Datum.
2. Geographic dataset source: AdaptWest Project. 2021. Gridded current and projected climate data for North America at 1km resolution, generated using the ClimateNA v7.01 software (T. Wang et al., 2021). Available at adaptwest.databasin.org.
3. This drawing is a schematic representation. Sizes, locations and dimensions are approximate.

Date	Draw by	Checked by
FEBRUARY 2026	CR	KW

Client: Municipality of Sussex

Project: Sussex Flood Diversion Channels, Environmental Impact Assessment, Sussex, New Brunswick

Drawing: Mean Annual Precipitation Data in New Brunswick

Scale: Scale: 1:3,500,000

0 20 40 80 120 160 Kilometers

Project No.	Drawing No.	Rev.No.
101539.009	FIGURE 7.2	0

GEMTEC Consulting Engineers and Scientists

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7.1.1.2 Seismic and Earthquake Activity

Seismic activity is caused by the movement of tectonic plates and can result in vibration of the ground (i.e., earthquakes). Historical data are used to predict the likelihood and probability of seismic activity and earthquakes in particular areas in Canada.

Natural Resources Canada data were revied to determine historical seismic activity within the Province of New Brunswick in relation to the Project location. The potential earthquake related damage is determined by how the ground moves and how the Project components within the affected region are constructed. Figure 7.3 illustrates the relative hazard range for seismic activity within the Province of New Brunswick. The Project is located within an area of low seismic risk.

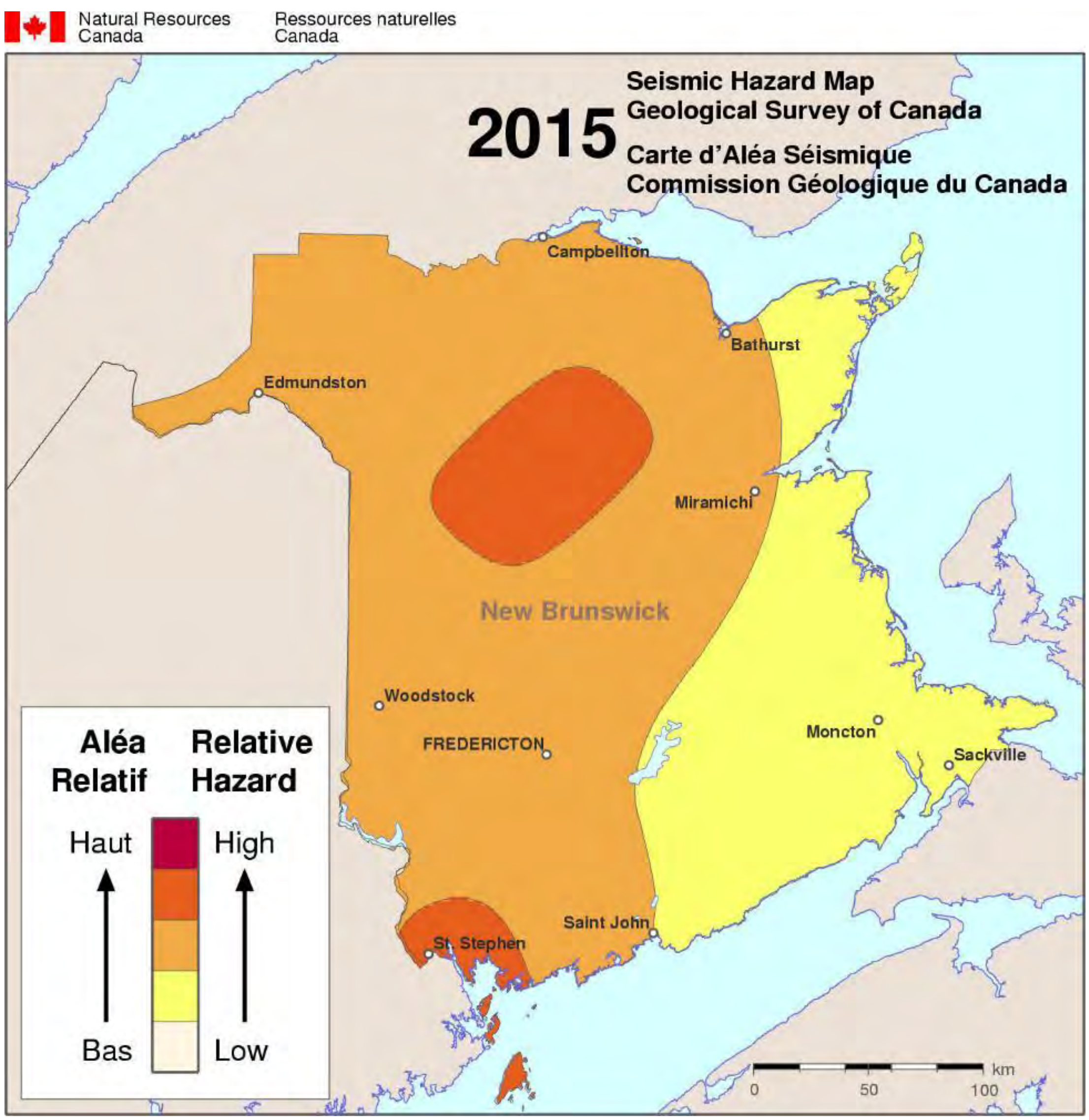

Figure 7.3 Simplified Seismic Hazard Map of New Brunswick

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

Historical seismic data from 1984 to 2024 within 100 km of the Project area were reviewed to identify earthquake activity. The data were filtered to include only seismic events with a magnitude (MN) greater than or equal to 3 MN. Table 7.3 summarizes the number of such events recorded within the 100 km radius since 1984.

Table 7.3 Summary of Seismic Events Since 1984 Within 100 km of the Project Area

Date/Time (UTC)	Latitude (°)	Longitude (°)	Depth (km)	Magnitude (MN)	Description
1988-04-24 01:14:51	46.012	-64.920	5.0	3.6	10 km E from Salisbury, NB
1996-09-02 09:28:09	46.012	-66.197	18.0	3.1	22 km NE from Oromocto, NB (Felt)
2007-08-25 01:18:05	46.522	-66.033	5.0	3.0	52 km SW from Rogersville, NB (Felt)
2008-04-19 21:22:09	46.018	-66.130	5.0	3.0	34 km NE from Oromocto, NB
2010-02-06 03:49:47	46.014	-65.690	5.0	3.2	39 km NW from Sussex, NB (Felt)
2013-03-21 05:22:17	46.430	-66.122	5.0	3.5	61 km SW from Rogersville, NB
2015-08-27 22:47:52	46.210	-66.594	5.0	3.6	30 km N from Fredericton, NB (Felt)
2019-01-10 13:49:00	45.361	-66.240	2.0	3.8	19 km NW from Saint John, NB (Felt)

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

7.1.1.3 Wildfires

The Fire Weather Index (FWI) is a core component of the Canadian Forest Fire Weather Index System, designed to quantify fire intensity and assess the overall danger of wildfire activity in Canada's forested regions (Natural Resources Canada, 2024a). 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 sever fire conditions.

For the Sussex area (located at 45.711647°N, -65.472919°W), historical data spanning 1980 to 2023 were used to estimate the average FWI for the fire season using Inverse Distance Weighting (IDW) interpolation. This method computes a value at a specific location by blending measurements from surrounding grid cells, with closer values weighted more heavily.

The resulting mean FWI values are as follows:

- June: Approximately 5.71
- July: Approximately 5.48
- August: Approximately 2.91

Relative to national standards (Figure 7.4), even the June and July values are considered quite low, indicating that the overall fire risk in Sussex remains low throughout the fire season. While the precise factors behind these low values are complex and can vary regionally, elements such as local climate, moisture availability, land cover, and other environmental characteristics likely contribute to the subdued fire danger in the area. Overall, the interpolated FWI values for Sussex suggest that, even during the typical fire season from June to August, the risk of high-intensity wildfires is low.

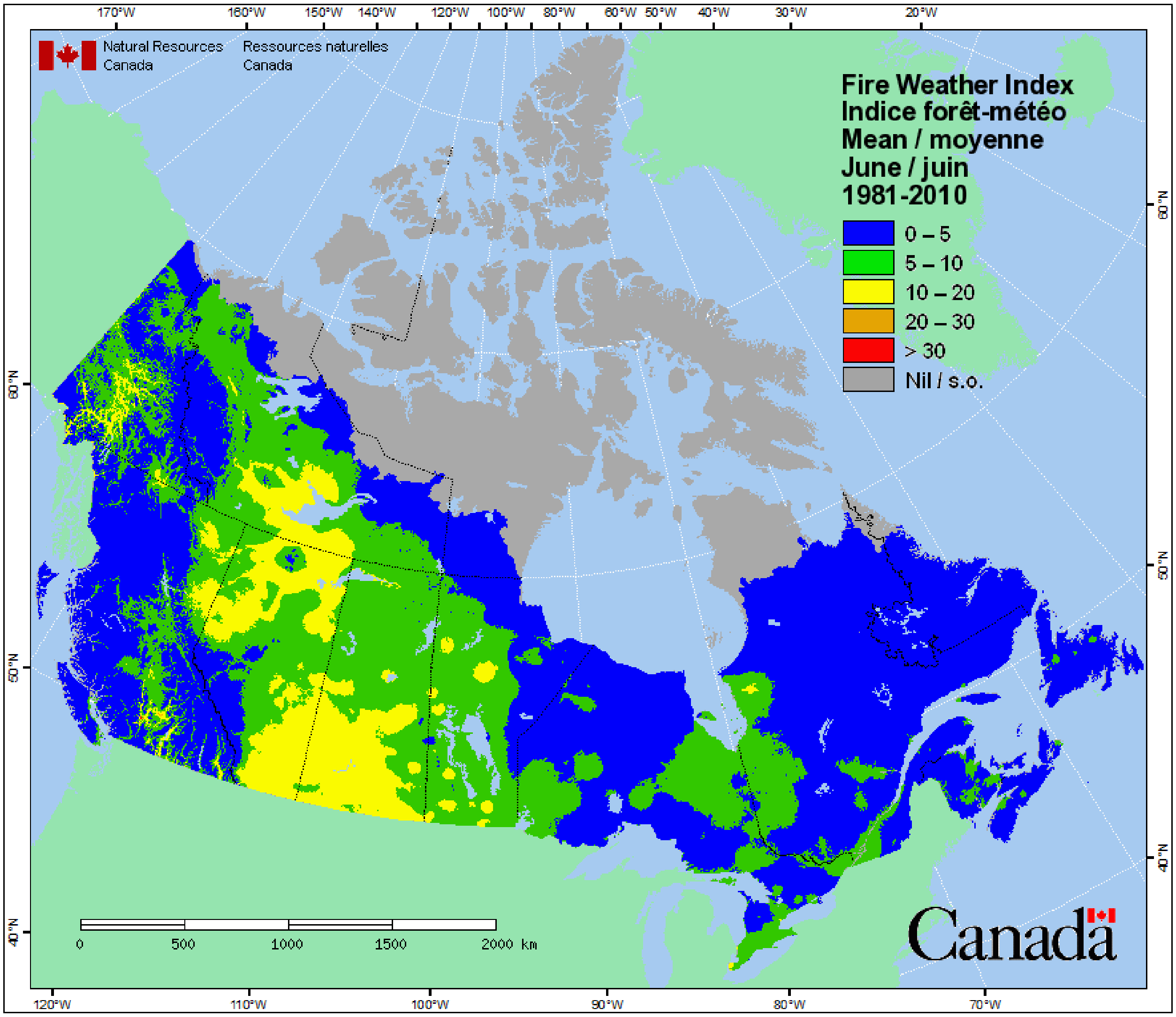

Figure 7.4 Fire Weather Index mean June 1981-2010

Figure Note: Sourced from (Natural Resources Canada, 2010)

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 – even in regions like Sussex that currently experience relative low fire danger. Recognizing this emerging threat, both the Government of Canada and provincial authorities in New Brunswick 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 Canadian Wildland Fire Information System (CWFIS) provides real-time fire danger information and historical data trends (Natural Reasources 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 (NRED, 2026). These proactive measures are essential to safeguard communities and natural resources as the impacts of climate change on wildfire dynamics become more pronounced.

7.1.2 Effects Assessment and Mitigation

7.1.2.1 Climate Change and Sever Weather Events

Increased temperatures may lead to longer FFPs, reduced snow cover, and more frequent heatwaves (Bush & Lemmen, 2019), all of which could influence various aspects of the Project. Prolonged high temperatures may impact construction scheduling and worker health and safety, particularly during summer months. Additionally, temperature extremes could affect material performance, such as concrete curing and expansion, requiring consideration in the design of project components.

While the projected increases in MAT are not expected to significantly alter the viability of the Project, they may warrant the adoption of adaptive management approaches during construction and operation to ensure resilience to future temperature conditions.

7.1.2.2 Seismic and Earthquake Activity

The Project is located in a region classified as having a low risk of seismic activity. Although the likelihood and intensity of earthquakes in the area are minimal, seismic-related effects on infrastructure cannot be entirely ruled out – especially given the long lifespan of the Project.

Seismic events in the region are typically rare and of low magnitude; however, even mild ground movement could affect certain project components such as foundations or sensitive equipment. Despite this potential, regional hazard assessments and historical records indicate that the risk to the Project’s long-term operation is negligible.

To mitigate potential seismic impacts – even in this low-risk setting – the Project will incorporate resilient design measures throughout all stages of development. These measures include a passive design for intake structures that avoids complex components, the use of earthquake-resistant materials, and structural designs that minimize vulnerability. All structural elements will be engineered in accordance with the National Building Code of Canada (NBCC) and other applicable seismic design standards to ensure the infrastructure remains stable and safe in the event of ground motion.

7.1.2.3 Wildfires

The Project area is not currently classified as having a high wildlife hazard based on present-day conditions; however, climate change is contributing to a marked increase in wildfire risk across Canada. Recent years have seen record-breaking fire seasons, with more frequent, intense, and longer-lasting wildlife affecting regions previously considered low-risk. Over the anticipated ~80-year lifespan of the Project, these trends are expected to continue due to rising temperatures, increased frequency of drought, and shifts in vegetation composition and structure.

According to projections from Natural Resources Canada's *Climate Atlas of Canada*, the number of very hot days and length of fire seasons are expected to increase significantly throughout New Brunswick under moderate- to high-emission scenarios (RCP4.5 and RCP8.5). Furthermore, data from the CWFIS and its associated FWI models show that many parts of Atlantic Canada could experience higher seasonal wildfire severity ratings by the mid- to late 21st century.

Recognizing this evolving risk, the Project will integrate wildfire mitigation strategies throughout all phases of planning, construction, and operation. These include reducing flammable materials in proximity to critical infrastructure, maintaining defensible space around project components, incorporating fire-resistant construction materials, and adhering to the New Brunswick Emergency Measures Organization (NB EMO) and NRED wildfire protection guidelines.

Operational readiness will be maintained through on-site fire suppression equipment, staff training in wildfire response procedures, and clearly defined emergency plans, including excavation routes and designated muster points. These measures are intended to reduce wildfire vulnerability and ensure the long-term safety and resilience of the Project under future climate conditions.

8.0 PUBLIC AND FIRST NATIONS INVOLVEMENT

8.1 Context and Responsibilities

Public and First Nation involvement is a core component of EIA in New Brunswick. Public and First Nation engagement for this project adhered to Section 6 of DELG's Guide to Environmental Impact Assessment in New Brunswick (2023), as well as Appendix C of the guide: *Minimum Proponent-Sponsored Notification and Involvement Standards*.

The Minimum Proponent-Sponsored Notification and Involvement Standards describe 8 'steps'. Steps 1 through 4 are required for all registered projects, and Step 8 specifies reporting requirements for all projects. Steps 5 through 7 are additional requirements that only apply to "large scale undertakings, and undertakings in sensitive environmental settings". Regardless, whether this Project would be considered a large-scale project, Sussex intends to satisfy all 8 steps of the minimum standards.

8.1.1 Duty to Consult

It is understood this EIA Registration will be reviewed by the NB Department of Indigenous Affairs (DIA), who will make a determination of whether there exists a (Crown) *Duty to Consult* (DTC) with Aboriginal Peoples, based on Section 35 of the *Constitution Act*, 1982. In New Brunswick, DIA's Duty to Consult determination is completed for EIA reviews to assess whether the Project has potential to adversely impact Aboriginal or Treaty rights of New Brunswick First Nations. If DIA determines such potential exists, the DTC is 'triggered'.

Upon EIA registration, DIA issues an Initial Assessment on the DTC. If the Initial Assessment finds there is a DTC, a formal Consultation process begins. The term 'Consultation' is differentiated from the general term 'Engagement' for the purposes of this EIA and will be reserved for the level of Consultation that would be initiated should DIA find there to be a DTC. It is understood these Consultation requirements (if applicable) are formally delegated to the proponent early in the review process, to be overseen by DIA in cooperation with the EIA Branch, DELG. At the end of the EIA Review, DIA would review the Summary of First Nations Engagement prior to issuing their final Duty to Consult Determination. DIA's determination must be issued before the Minister of Environment and Climate Change will issue an EIA *Certificate of Determination*.

Regardless of whether a *Crown Duty to Consult* is determined to exist, Sussex recognizes that proponents play an important role in supporting the consultation process and have a responsibility to undertake meaningful engagement with First Nations as part of responsible Project planning.

8.2 Overview of First Nation Engagement

Project Proponents play a valuable role in the consultation process by engaging Indigenous Peoples in the development of any Project or proposal and are encouraged to engage Indigenous Groups early in the planning process.

Notification emails containing a high-level project description were sent directly Sussex to the Chiefs of all Mi'gmaq and Wolastoqey First Nations. Mi'gmawe'l Tplu'taqnn Incorporated (MTI) and Wolastoqey Nation of New Brunswick (WNNB) Personnel, Individual First Nation Consultation Coordinators and the DIA were copied on all notifications.

The six Wolastoqey First Nations represented by WNNB include:

- Kingsclear First Nation (Pilick)
- Madawaska Maliseet First Nation (Matawaskiye)
- Oromocto First Nation (Welamukotuk)
- St. Mary's First Nation (Sitanisk)
- Tobique First Nation (Negotkuk)
- Woodstock First Nation (Wotstak)

The eight Mi'gmaq First Nations represented by MTI include:

- Buctouche MicMac First Nation (Tjipõgtõtjg)
- Eel Ground First Nation (Natoaganeg)
- Eel River Bar First Nation (Ugpi'Ganjig)
- Esgenoôpetitj First Nation
- Fort Folly First Nation (Amlamgog)
- Indian Island First Nation (L'Nui Menikuk)
- Metepenagiag First Nation
- Pabineau First Nation (Oinpegitjoig L'Noiegati)

Elsipogtog First Nation was notified independently, as they are not a member of MTI. Kopit Lodge was copied on the email to Elsipogotog First Nation. Peskotomuhkati at Skutik First Nation was also notified independently.

Notification to all First Nations listed above was sent via email on June 7, 2024. Feedback was received directly from Oromocto First Nation (Welamukotuk) and Peskotomuhkati at Skutik First Nation and from MTI representing eight of the nine Mi'gmaq First Nations of New Brunswick. The feedback received is presented below:

- Oromocto First Nation (Welamukotuk): No concerns based on the information package provided; however, more information was requested to advise if the Project will affect Welamukotuk or any other First Nation along the Wolastoq (Saint John River)
- Peskotomuhkati at Skutik First Nation: Defers consultation to the Mi'gmaq First Nation communities as the Project is not in Peskotomuhkati territory
- MTI: Responded with a Mi'gmaq Rights Impact Assessment (MRIA) notification letter, requiring the completion of a MRIA stating Mi'gmaq Aboriginal and Treaty Rights are potentially affected by the Project

Indigenous engagement is an important component of the Project. To ensure appropriate Indigenous engagement activities are completed, Sussex is committed to working closely with representatives from Infrastructure Canada, the IAAC, and the NB DIA. All correspondence, including that already received, resulting from the above notifications will be documented. Concerns raised will be addressed in coordination with the First Nations representatives and NB DIA.

8.2.1 Future First Nation Engagement

Sussex is committed to continue to engage with First Nations as the Project advances. Future engagement activities may include the following:

- Online updates will continue to be provided on the Sussex website
- Sussex will communicate directly with First Nations, as per Engagement and Consultation Contact Protocol (NB DIA, August 2024) to enable them to share project details
- An Open House will be held during the provincial EIA process to which First Nation members, are invited to attend
- Newspaper ads will be placed to advertise the above referenced Open House as appropriate

Sussex will generate a summary report documenting First Nation Engagement which will:

- Describe the engagement activities completed
- Identify First Nations directly contacted
- Include copies of all correspondence received from and sent to First Nations
- Summarize any issues or concerns raised during, or received because of, the engagement activities and indicate how these issues were addressed

8.3 Overview of Public Involvement

Sussex has proactively engaged with municipal elected officials, staff, and key industry groups across the region surrounding the Project area. These efforts have built a foundation of transparency, collaboration, and public trust throughout the planning and development phases.

During the development of Sussex's *Regional Flood Risk Mitigation Plan* and the subsequent *Sussex Flood Mitigation Funding Application*, extensive engagement was carried out with stakeholders, organizations, and landowners. Stakeholder engagement to date includes:

- Landowners along the proposed diversion channel alignments
- Gateway Operations Inc. (responsible for managing the operations, maintenance, and rehabilitation of NB Route 1 Highway)
- Sussex Downtown Business Association
- Sussex and District Chamber of Commerce
- DTI
- New Brunswick Highway Corporation
- Canadian National Railway
- J.D. Irving, Limited
- General public (via public presentations on October 26, 2016, September 10, 2020, and March 30, 2022).

The development of the *Regional Flood Risk Mitigation Plan*, and the subsequent *Sussex Flood Mitigation Proposal* included extensive consultations with landowners, businesses, government agencies, and Indigenous communities. A public meeting in March 2022 provided an additional forum for community input.

In June 2024, a high-level Project description was sent to the Chiefs of all Mi'gmaq and Wolastoqey First Nations. Subsequently, in July 2024, representatives from Sussex and GEMTEC met with the THC to discuss archaeological concerns. It was agreed that an Indigenous Monitor would be present during archaeological assessments. Ongoing engagement with Indigenous groups, Infrastructure Canada, and the NB DIA will continue to ensure that all concerns are addressed appropriately as the Project moves forward.

Sussex has maintained open and transparent communication with residents, neighbouring municipalities, businesses, and stakeholders throughout Kings County. Public updates have been posted regularly on the Town's website, and project documentation has been made accessible. Clear channels have also been established for submitting comments on the IPD, which was submitted to the IAAC.

As part of the federal environmental assessment process, IAAC required submission of the IPD for screening to determine whether the Project would require a federal Impact Assessment (IA).

In doing so, IAAC invited public review and comment on the IPD by February 10, 2025. All feedback received contributed to IAAC's *Summary of Issues*. The process concluded with a decision that no further federal assessment was required. However, the feedback received through the Summary of Issues was reviewed and considered during Project planning and helped inform the scope of subsequent studies in support of this provincial EIA.

Sussex remains committed to continued engagement with potentially affected landowners – both within and beyond municipal boundaries – as well as with other stakeholders. Public involvement will continue through open meetings and direct communication to ensure concerns are identified and addressed as the Project progresses.

8.3.1 Future Public Involvement

Sussex remains committed to engaging the public and key stakeholders throughout the duration of the Project. Future engagement activities are expected to include the following:

- Continued online updates on the Sussex website to provide timely information and project milestones
- Direct communication with elected officials, Regional Service Commissions, community groups (e.g., Sussex Downtown Business Association, Sussex and District Chamber of Commerce, Sussex Trail Association), environmental organizations (e.g., Kennebecasis Watershed Restoration Committee, Nature Sussex, New Brunswick Environmental Network, Fundy Model Forest), and other stakeholders to ensure they remain informed and involved
- Notification mailouts regarding the EIA registration will be distributed to area residents and landowners to inform them of the process and provide a high-level Project overview
- An Open House held during the provincial EIA process, open to stakeholders, community groups, environmental organizations, and the general public
- Newspaper advertisements, where appropriate, to promote the Open House and notify the public of the upcoming EIA registration as part of the public engagement process

Sussex will prepare, and make available to the public, a Public Consultation Summary Report that will:

- Describe the engagement activities carried out
- Identify key public and private stakeholders directly contacted
- Include copies of all correspondence received from and sent to stakeholders, elected officials, and members of the public
- Summarize any issues or concerns raised during, or as a result of, the consultation activities, along with a description of how these were addressed

In addition to the engagement activities described above, Sussex will undertake targeted consultation with residents in areas potentially affects by residual flood during extreme flood events. This engagement will focus on communicating the nature of residual flood risk identified through technical studies and discussing potential flood risk management approaches under consideration.

- Potential approaches may include, but are not limited to:
- Localized measures to reduce flood exposure or vulnerability of existing residences
- Flood containment or conveyance measures to manage overland flow during extreme events
- Land-use or relocation-based approaches to reduce long-term flood risk

The purpose of this engagement will be to ensure affected community members are informed of the range of available options, understand the performance objectives guiding mitigation, and have the opportunity to provide input prior to the selection of a preferred approach. Feedback received through this process will be considered alongside technical, regulatory, land-use, and financial considerations before a final mitigation solution is advanced.

Stakeholder engagement and public dialogue will continue throughout the planning, regulatory, and implementation phases of the Project.

In addition, a digital copy of the EIA Registration Document will be made publicly accessible on the DELG website: https://www2.gnb.ca/content/gnb/en/departments/elg/environment/content/environmental_impactassessment/registrations.html

To ensure effective and meaningful engagement, Sussex has adopted an approach that is inclusive, adaptive, and responsive. A range of communication platforms and outreach methods will continue to be used throughout the engagement process to promote transparency, encourage participation, and ensure accessibility for all interested parties.

8.4 Record Keeping and Deliverables

According to DELG's Minimum Proponent-Sponsored Notification and Involvement Standards (DELG, 2023), the public should be given a minimum of 30 days to provide feedback following any notification and information sessions. Sussex will honour this minimum comment period after the date that the EIA Registration document is posted on DELG's public website.

In the event that any questions or concerns are raised about the Project during the EIA review period, they should be documented, responded to, and reported to the DELG in a summary report on engagement efforts within 60 days of registration of the Project.

Following EIA Registration, and prior to the Minister's EIA Determination, a Summary of Public Involvement will be prepared by GEMTEC and submitted to DELG in accordance with the EIA guidelines. The report will demonstrate how the public and stakeholders have been given the opportunity to review and comment on the proposed undertaking.

9.0 FUNDING AND PROJECT EXPENDITURES

The Project represents a combined investment of more than $38.7 million from federal, provincial, and municipal governments. The federal government is contributing $15.3 million through the Disaster Mitigation and Adaptation Fund (DMAF). The GNB is investing $13.07 million. Sussex has committed $10.34 million to deliver this critical flood mitigation Project.

10.0 PROJECT RELATED DOCUMENTS

This EIA Registration Document includes supporting technical studies and reports appended to this document.

Other than this EIA Registration Document, the documents listed in Section 2.12, and the materials appended herein, there are no additional Project-related documents that are publicly accessible at this time.

The following technical reports are appended to this EIA Registration Document:

- Vegetation and Ecological Land Classification Technical Report
- ACCDC Report
- Archaeological Impact Assessment Report
- Fish and Fish Habitat Technical Report
- Wetland Environment Technical Report
- Hydrotechnical Report
- Avifauna Technical Report

11.0 SUMMARY AND CONCLUSIONS

Sussex developed a Regional Flood Risk Mitigation Project to address recurring flooding within the community. The proposed Project represents the final phase of measures to be implemented under this broader plan and focuses on the construction of two diversion channels designed to redirect flood flows from Parsons Brook and Trout Creek away from the downtown core and into the Kennebecasis River.

This Environmental Impact Assessment evaluated the potential physical, biophysical, and socioeconomic effects associated with the construction, operation, and maintenance of the Project. The assessment concludes that the Project is environmentally feasible and will result in a substantial reduction in flood risk within Sussex. Potential adverse effects were avoided where practicable, minimized through Project design, or can be effectively mitigated through the implementation of appropriate mitigation measures.

The Project is expected to result in a significant positive environmental and socioeconomic effect by reducing the frequency, severity, and extent of flooding affecting residential areas, businesses, public infrastructure, and essential services. This long-term flood risk reduction will enhance community resilience, improve public safety, and support economic stability and climate adaptation within Sussex.

Based on the assessment of available data for all Valued Components, and assuming the effective implementation of proposed mitigation and monitoring measures, no significant adverse residual effects are predicted for any phase of the Project. Accordingly, the Project is considered environmentally acceptable and is expected to provide enduring benefits to Sussex and its community members.

12.0 CLOSURE

This EIA Registration document was prepared by GEMTEC Consulting Engineers and Scientists on behalf of Sussex to fulfil the requirements of the *Environmental Impact Assessment Regulation – Clean 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 Paul Vanderlaan, Senior Environmental Engineer and Environmental Regulatory Specialist at GEMTEC. Paul can be reached by email at Paul.Vanderlaan@gemtec.ca or by phone at 506-262-4477.

12.1 Proponent Signature

Sussex agrees with the contents of this document and acknowledges that it will be submitted in support of a provincial Environmental Impact Assessment registration with the NB Department of Environment and Local Government.

Jason Thorne
Chief Administrative Officer
Sussex

Feb. 5, 2026
Date

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experience • knowledge • integrity

civil	civil
geotechnical	géotechnique
environmental	environnement
structural	structures
field services	surveillance de chantier
materials testing	service de laboratoire des matériaux

expérience • connaissance • intégrité