

Comments on the Town of Sussex Flood Mitigation Project Plan

Presented to the Impact Assessment Agency of Canada

Impact Assessment Agency of Canada
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Re: The Sussex Flood Mitigation Project – IAAC Ref. 89179

To whom it may concern,

As a resident with several family members that will be impacted by the proposed Sussex flood mitigation projects, I was appalled to hear that the projects were in the process of approval without any of the potentially affected family having been contacted by the proponent. Upon an in-depth review of the flood mitigation plans, I began to realize the potential serious and irreversible consequences this project may pose to myself, my family members, neighbours, and other residents downstream of the proposed diversion outlet.

While most people would not be able to understand and grasp the technical implications contained within the Initial Project Description document that was released by the proponent, I have formal education in chemical engineering/chemistry and have worked in the environmental field as a contractor and consultant since 2015. I have seen first-hand the effects of unintended consequences that can arise from implementing projects and infrastructure without first fully understanding the long-term implications. I am concerned that the projects as proposed have not been fully analyzed to determine what kind of risks may be associated with them and I have not received information to date that would make me think otherwise.

It has become clear that, upon discussion and consulting among residents living outside the geographical limits of the Town of Sussex, a significant number of people and property owners that stand to be negatively impacted by the implementation of the Town of Sussex Flood Mitigation Plan were not aware of the full extent of the project nor had been engaged on the potential impacts the project may pose should it be carried out as proposed. After attending the public consultation hearings put in place by the Impact Assessment Agency of Canada, and upon discussion directly with the proponent, I am not satisfied with the available information that due diligence by the proponent was undertaken in their efforts and feel the proponent has a lack of understanding surrounding the long-term impacts the project may have on residents and property owners beyond the geographical limits of the Town of Sussex, including private residences, commercial businesses, and agricultural operations.

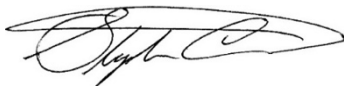
IAAC Project 89179

Included in the following document are comments for the IAAC to review based on the limited time available during the comment period and public knowledge that was available surrounding the project implementation details. It is the opinion of several concerned citizens I spoke with that the proponent did little to ensure engagement with residents and landowners that would be at the mercy of the project, and has minimal concern with regards to the negative impacts that may be suffered by people that may be negatively impacted by the construction of the flood water diversion channels. To top this off, several people I've spoken with have raised concerns with the difficulty in navigating the public consultation and commenting process by way of limited technical abilities in the use of computers and difficulty with the federal website. I have attempted to integrate their input based on my conversations with them into this document as well.

I ask of the IAAC Project Team as well as the pertinent federal agencies to consider the impacts this project may have on our homes, our livelihoods, our safety, and our health. While I agree that the proponent is acting in the best interest of the municipality that it serves, and that something needs to be done to alleviate the losses suffered by the residents of the Town of Sussex due to flooding, I feel that people from outside of the municipality don't have a voice to represent their concerns on a matter that will have lasting effects on them, and feel that we deserve a fair chance to understand the potential consequences, long-term effects, and personal impacts this project will have on us before the proponent begins the federal impact assessment phase of the project.

Thank-you for your time in reviewing these comments and please feel free to reach out to me for any additional questions or clarification.

Sincerely,

A handwritten signature in black ink, appearing to read 'Stephen Carr', written in a cursive style.

Stephen Carr
Resident of 237 Aiton Road

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1. Introduction

The Town of Sussex (herein also referred to as the proponent) is proposing a flood mitigation plan that includes two diversion channels that would divert water from the Parsons Brook watercourse into the Trout Creek watercourse, then divert flood waters from the Trout Creek watercourse (with the added flood waters from Parsons Brook) into an area beyond Town limits to flow into the Kennebecasis River. As the watercourses exist presently, Parsons Brook naturally flows into Trout Creek, and Trout Creek naturally flows into the Kennebecasis. While the ultimate fate of the water flowing in both Parsons Brook and Trout Creek is to end up in the Kennebecasis River, the proposed diversion will result in the water travelling to a location within the Kennebecasis watercourse that is upstream of the natural confluence point of the watercourses. The end result will be an accumulation of water upstream within the Kennebecasis River that will cause flood water elevations to exceed natural conditions as they exist today within the affected upstream areas.

The most recent update on the flood mitigation plan from the proponent is a document authored by GEMTEC Limited (GEMTEC) titled “Initial Project Description Sussex Flood Mitigation Proposal” (herein referred to as the proposal) that is accessible on the Town of Sussex website. The proposal is dated January 2, 2025 and was posted to the Town of Sussex website on January 23, 2025. The document outlines some of the technical details with regards to the diversion channels in addition to several other flood mitigation measures. The excerpt below outlines the other measures proposed:

In addition to the two diversion channels, additional infrastructure upgrades that are included as part of the larger Regional Flood Risk Mitigation Plan include:

- *Construction of a flood berm around the Meadow Crescent subdivision in the former Village of Sussex Corner (now Ward 2).*
- *Construction of a two bridge/overpass structures on New Brunswick Route 1 (eastbound and westbound) where the highway intersects with the proposed Trout Creek diversion channel.*
- *Construction of a culvert or bridge at Leonard Drive where the roadway intersects with the Trout Creek diversion channel.*
- *Raising the bridge deck elevation of the section of New Brunswick Route 890 that crosses the Kennebecasis River.*
- *Raising the bridge deck elevation of the covered bridge adjacent to the section of New Brunswick Route 890 that will also be raised.*
- *Addition of minor flow control measures on the storm sewer systems in downtown Sussex along Trout Creek.*

Based on the proposal, it is understood that the proposed specifications of the diversion channels are as shown in Table 1 below.

Table 1: Proposed specifications for Parsons Brook and Trout Creek diversion channels.

Specification	Parsons Brook	Trout Creek
Design Flow Rate	60 m ³ /s (~1,000,000 USGPM)	220 m ³ /s (~3,500,000 USGPM)
Total Length	580 m (~1,900 ft)	1,600 m (~5,200 ft)
Outlet Upstream Distance from Natural Confluence Point	3 km (~2 miles)	8.8 km (~5.5 miles)
Total Channel Width	50 m (~160 ft)	80 m (~260 ft)
Frequency and Duration of Flow Diversions	One diversion event every 5 years lasting up to 12 hours	One diversion event every 5 years lasting up to 14 hours

2. Diversion Channel Flowrate

Based on the proposal the Trout Creek diversion channel, which is intended to divert flood waters from both Parsons Brook and Trout Creek, will be designed to handle a flow of 220 cubic metres per second (m³/s). While the reported value of 220 m³/s may seem marginal to the layperson, it is a flow equivalent to 220,000 litres per second (L/s) or approximately 3,500,000 US gallons per minute (USGPM).

Conversion factors for volumes:

$$\begin{aligned}
 1 \text{ m}^3 &= 1,000 \text{ L} = 264 \text{ US Gallons} \\
 1 \text{ L} &= 0.001 \text{ m}^3 = 0.264 \text{ US Gallons} \\
 1 \text{ US Gallon} &= 3.79 \text{ L} = 0.00379 \text{ m}^3
 \end{aligned}$$

Conversion of flowrates:

$$\begin{aligned}
 \frac{220 \text{ m}^3}{1 \text{ s}} \times \frac{264 \text{ US Gallons}}{1 \text{ m}^3} &= 58,080 \text{ US Gallons per second} \\
 \frac{58,080 \text{ US Gallons}}{1 \text{ s}} \times \frac{60 \text{ s}}{1 \text{ min}} &\cong 3,500,000 \text{ USGPM}
 \end{aligned}$$

To put this volumetric flow into perspective, an Olympic sized swimming pool holds approximately 2,500,000 L (660,000 US Gallons) of water, which means the proposed flowrate would be able to fill approximately six Olympic sized swimming pools every minute (one every 11 seconds).

At the proposed design flow rate (220 m³/s) and proposed duration of a diversion event (14 hours), the Trout Creek diversion channel will potentially divert approximately 4,435 Olympic sized swimming pools (more than 11 billion litres) to the proposed outlet during a single event.

The flow of water coming from the proposed Trout Creek diversion channel outlet as specified in the project description document could cause significant (and potentially catastrophic) irreversible damage to downstream properties, infrastructure, agricultural crops, and sensitive ecosystems (watercourse and wetland). There is also no mention of how the proponent will ensure the flow rate through the diversion channels does not exceed the design capacity. Information regarding how the proponent will limit the flowrate of diverted water through the channels to ensure the design capacities of the channels are not exceeded should be provided by the proponent. If the proponent does not intend to limit the flowrate of the diverted water through the channels, an in-depth risk analysis should be completed to understand any potential consequences of diverted water flowrates exceeding the design capacity of the channels.

3. Diverted Flood Water Outlet Location

The discharge from the outlet of the Trout Creek diversion channel is located upstream on what the proponent asserted to be a “flood plain” of the Kennebecasis River. After reviewing the present-day flood risk models as well as projected flood risk models for the year 2100 (as provided on the GeoNB website), there is little indication that the land where the Trout Creek diversion channel outlet is proposed (currently used as residential and agricultural) is in-fact flood plain. As shown in Figure 1 below, the residential and agricultural land would be subject to only marginal effects (if any) during a future flood event given the current state of the naturally occurring watercourses proposed for diversion.

While some minor flooding effects are notable in the scenarios presented in Figure 1, present day 1-in-100-year flood events do not impact the majority of the area used for agricultural and residential purposes. With an additional flow of approximately 3.5 million gallons per minute flowing from the proposed outlet, the adjacent land will inevitably experience increased flooding. This would artificially create a flood plain in an area where one does not currently exist.

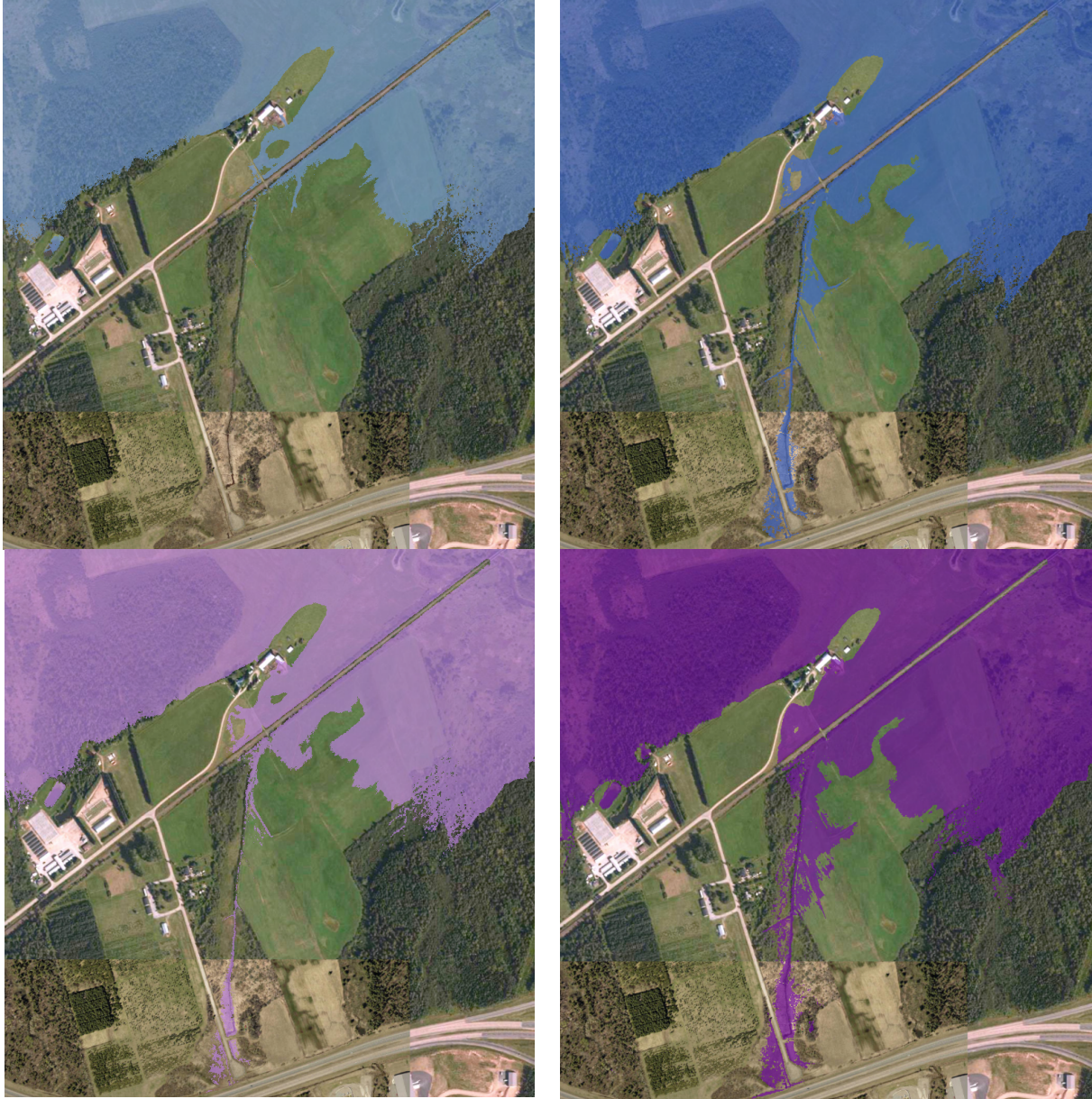


Figure 1: Top left - present day 1-in-20-year flood event; top right - present day 1-in-100-year flood event; bottom left – 1-in-20-year flood event in the year 2100 adjusted for climate change; bottom right – 1-in-100-year flood event in the year 2100 adjusted for climate change.

The proponent has also indicated that a known watercourse will carry flood waters from the diversion channel outlet to the Kennebecasis River flood plains (see Figure 2). The watercourse being referenced is a small brook that would not be reasonably believed to carry the proposed volumetric flow of water from the diversion channels to the Kennebecasis flood plains without additional impacts of flooding onto adjacent properties. Further information from the proponent should be supplied to indicate how the watercourse is integrated into the overall design considerations for the diverted waters.

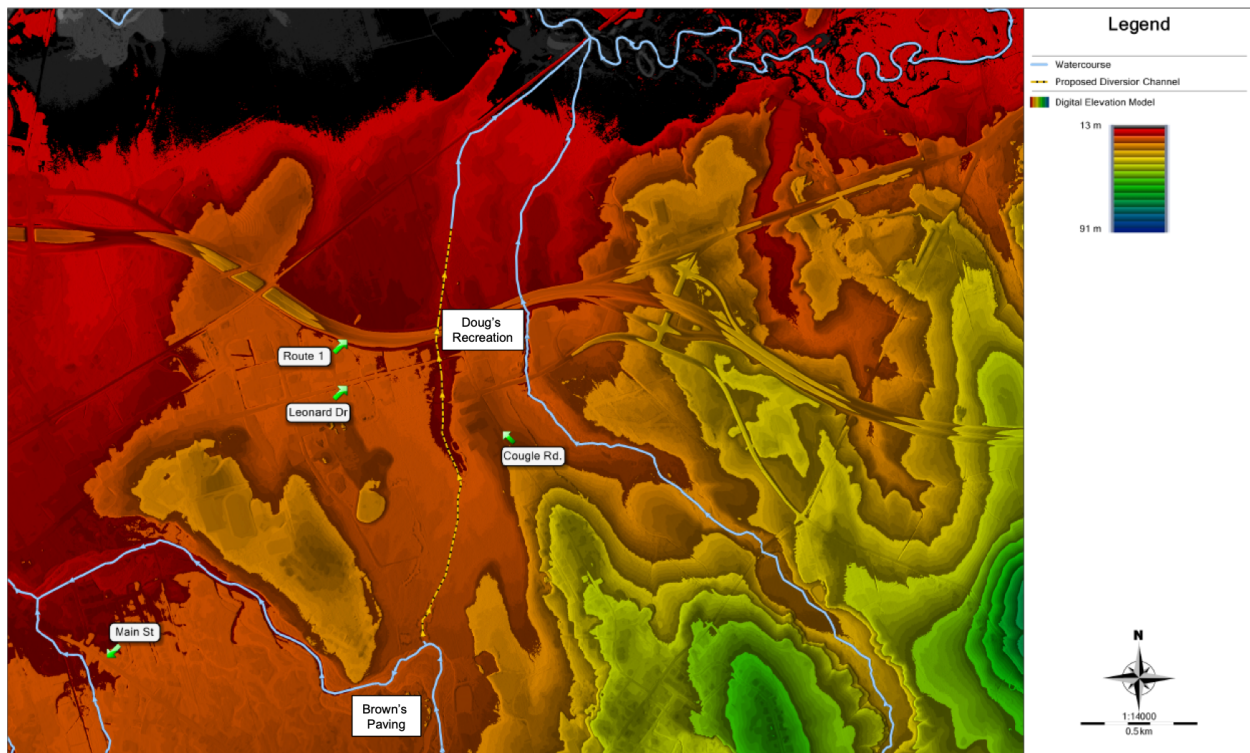


Figure 2: Elevation mapping of the proposed Trout Creek diversion channel area indicating flow of diverted water will follow the known watercourse north of the outlet (excerpt from the March 30, 2022 presentation).

4. Uncertainty in Flood Simulation Model

In the document authored by R.V. Anderson Associates Limited (RVA) titled “Sussex Region Flood Risk Mitigation Plan – Final” and dated June 28, 2019, it is stated that “The conceptual model of the Kennebecasis River identified increases in flood risk at the crossings of CN Rail, Route 890 (an old wooden cover bridge and a concrete bridge built in 1985) and Route 1 due to the flow transfer from Trout Creek. The increase in flood risk at the Route 890 crossings was found to be particularly significant as the structural spans under Route 890 are half the length of the spans under the CN Rail and Route 1 bridges. To fully understand the flow transfer dynamics and better quantify the hydraulic performance (and increases in flood risks) of the bridge crossings at CN Rail, Route 890 and Route 1, additional detailed modelling is required.”

As such, it is implied that the full extent of potential upstream and downstream consequences is not fully understood by the proponent nor their consultant and that more detailed modelling needs to be completed (it is unclear what kind of additional modelling has been completed, if any, in the proposal).

Many property owners/purchasers, financial institutions, and insurance companies make informed decisions based on the risks presented by the provincial flood risk models making these an often-referenced resource that is generally accepted as accurate. During public commentary sessions held by the IAAC, the proponent indicated that the modelling they completed was “enhanced” in comparison to the provincial flood risk models available on GeoNB.

A refined and more extensive flood model should be completed to accurately depict the extent of potential impacts. Model refinements should include (but should not be limited to):

- A thorough bathymetry scan of the Kennebecasis River should be completed for all areas modelled and either be incorporated into the flood model or used to justify assumptions made in the model.
- The model should incorporate flows from Smiths Creek and McGregor Brook which both enter the Kennebecasis River between the natural confluence point of Trout Creek and the proposed outlet location of the Trout Creek diversion and may experience increased flooding effects during a diversion event.
- The model should extend upstream in the Kennebecasis River to its confluence point with McLeod Brook (the nearest significant upstream tributary of the proposed diversion outlet) as well as downstream to the natural confluence point with the Millstream watercourse. If significant variation from the provincial flood risk models is still observed at the model limits, the geographical limits of the model should be extended further until no significant variations are observed from current provincial flood risk mapping. This is an important consideration so that all residents/property owners who are potentially affected can understand what the risk to them and their properties could be.
- The model should include parameters representative of any man-made structures that would impede and/or affect the flow of water during flood events including but not limited to buildings, berms (both current and proposed) and bridges present within the geographical limits of the model.
- Consideration for blockages within diversion channels, intake structures, and downstream flow paths (i.e. culvert blockage due to ice/debris, blockage of natural watercourse due to presence of beaver lodges/dams, blockage of Trout Creek diversion channel inlet in a scenario where Parsons Brook diversion channel continues to operate as intended).

A third-party peer review of the modeling should be completed to ensure all parameters and assumptions made in the model accurately represent the anticipated flood conditions to be expected in future flood events.

A full report on the refined flood modelling including pictorial results of all relevant model simulations should be completed by the proponent and made available to the public. The report should include all parameters used in the model, any relevant field collected data used in the model, any enhancements done to the model, and any assumptions used when creating the model with justifications for each. The parameters included in the report should provide the necessary information so that the modelling can be recreated by a third-party using the same software. The report should also include all peer review comments and how they were integrated into the final flood model.

5. Due Diligence in Notification of Affected Parties

In Section 2.1 of the proposal, the proponent stated that “extensive engagement with organizations and landowners was conducted. Stakeholder engagement to date includes

landowners along the proposed diversion channel alignments” and “general public (via public presentations on October 26, 2016, September 10, 2020, and March 30, 2022).”

While it may be accurate that some landowners along the proposed channel alignments were contacted, proprietors of both PID# 30025902 and 00200683 were not directly engaged by the proponent despite being listed in Table 10 in the proposal. Furthermore, proprietors of PID# 30032627 and 30161269 were not notified by the proponent despite being adjacent to and immediately downstream of the proposed diverted flow (prior to entering the Kennebecasis River).

While it also may be accurate that public sessions were held by the proponent, the presentation from September 10, 2020 included graphical representations of the flood modeling completed. The extents of the flood model did not reach beyond Town limits, suggesting the flood mitigation measures did not have any potential consequences to residents outside of the Town.

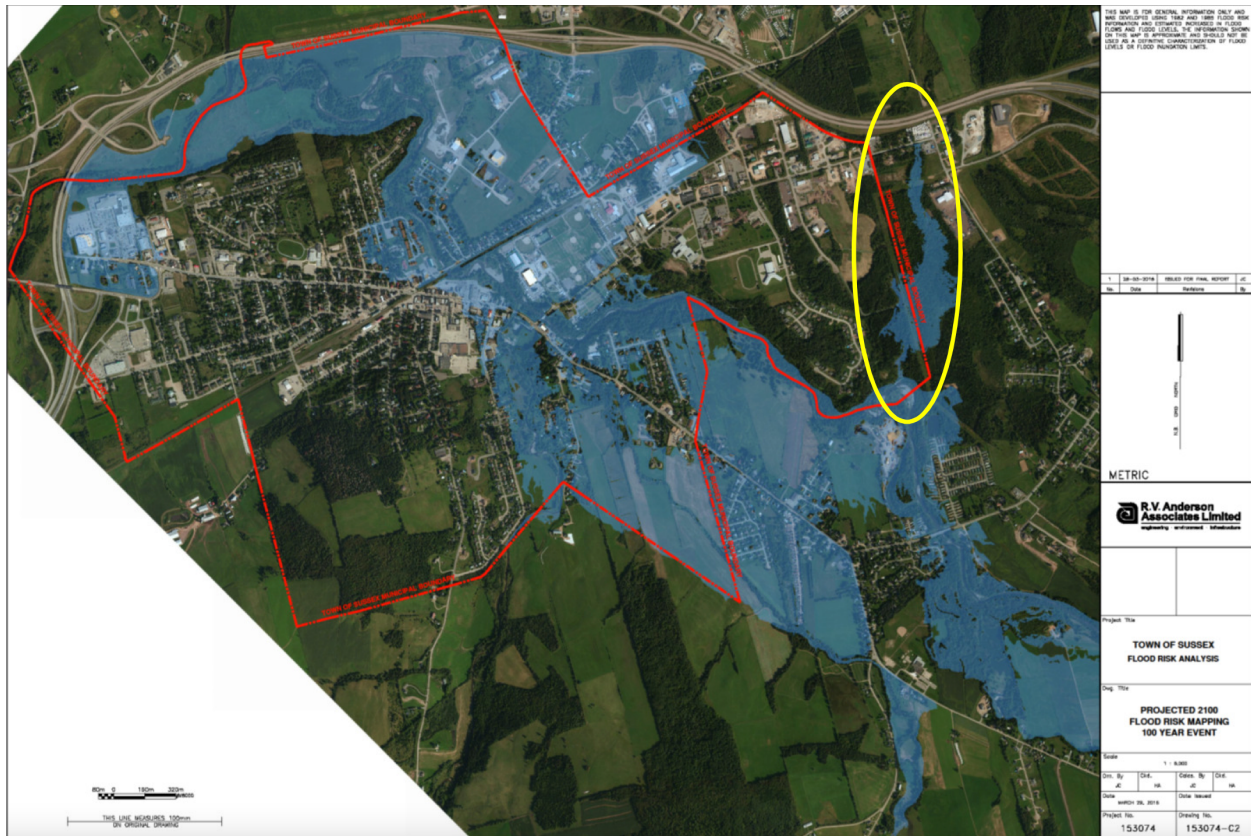


Figure 3: Excerpt from September 10, 2020 slideshow from the Town of Sussex website. Note the lack of flood modelling extending beyond town limits to the north and west (including the upstream and downstream portions of the Kennebecasis River).

Additionally, flow rates detailed in the “Sussex Region Flood Risk Mitigation Plan - Final” by RVA indicates the flow rate for the Trout Creek diversion channel (referred to as the East Town Limit Diversion Channel in the document) would be approximately 91 m³/s. The proposal authored

by GEMTEC indicates a flow rate of 220m³/s, a 140% increase from the flowrate outlined in the RVA document. This would suggest the plan presented to the public as of 2022 has changed significantly or was not fully communicated during previous documentation and should thus warrant additional notification to the public, with no additional significant changes in project description and/or desired outcome.

A combination of these factors may have contributed to the lack of knowledge/understanding by residents outside of town limits that would be negatively impacted by the project.

Once refined and peer-reviewed (as outlined in Section 4 above), a notice of modelling results (in language that is accessible and understood by a non-technical audience) and detailed project descriptions should be delivered by registered mail to owners of any property shown by the modelling to be affected by an increase in floodwater elevation caused by the implementation of the proposed flood mitigation project. The notices should include an overlay of the anticipated extents of flooding (based on the updated model) overlaid onto satellite imagery of the properties simulating conditions both without the proposed mitigative measures, as well as with the proposed mitigative measures in place for:

- Present day – 1-in-20-year flood events
- Present day – 1-in-100-year events
- Year 2100 – 1-in-20-year flood events accounting for climate change
- Year 2100 – 1-in-100-year flood events accounting for climate change.

Additionally, another round of public consultation should be held with a predetermined date and time communicated in the registered mail to residents (as outlined above) to ensure all parties potentially affected by the flood diversion projects understand the full extent of impacts it may have.

6. Erosion and Damage to Nearby Downstream Features

With a sustained flow of 220 m³/s being discharged from the Trout Creek diversion channel, further study is required to determine if additional negative effects of flooding could be caused, including, but not limited to:

- Erosion of embankments along the watercourse
 - o High flow rates of water flowing through watercourses in a surge can often cause erosion of bank soils. With enough eroded soils, trees and vegetation lining the banks can be uprooted which can amplify effects of erosion in future surge events.
 - o Additional consequences can be realized if eroded trees and soil accumulate downstream and create a partial or full blockage of the water flowing through the watercourse. The water could then be backed up causing increased flooding in the upstream areas.
 - o While erosion of embankments along watercourses is a naturally occurring phenomenon, the acceleration of erosion due to anticipated changes in surge flows should be thoroughly studied and quantified by the proponent prior to implementation of the proposed diversion channels.

- Damage to private property and infrastructure
 - Residential buildings along the proposed diversion channels and discharge path, specifically those located along the east side of Adam Lane, will potentially experience flooding and associated water damages from both the surface water flowing from the Trout Creek diversion channel as well as an elevated ground water table caused by the diverted flow of water.
 - Private culverts and roads exist along the proposed flow path of the Trout Creek diversion channel discharge. Excessive flows could potentially cause wash-outs of private roads and culverts creating costly and time-consuming repairs for the owners and potentially creating unsafe conditions if unknowingly compromised.
 - Transport Canada should ensure no increased risk of adverse effects will result on the federally regulated rail traffic that travel on the rail line north of the diversion outlet.

- Destruction of wetland habitat
 - Provincially designated wetlands are downgradient of the proposed discharge location of the Trout Creek diversion channel. The proponent should study and quantify the potential effects the discharge could have on wetland habitat and resulting effects on any species at risk.

- Destruction of agricultural crops and/or damage to agricultural land
 - The large volumetric flow rate of water travelling from the proposed Trout Creek diversion outlet to the Kennebecasis River could induce removal of topsoil and crop plants from the fields causing long-term consequences on the production of crops from the affected fields.
 - Several agricultural operations are present along the Kennebecasis River between the proposed Trout Creek diversion outlet and the natural confluence point of Trout Creek and the Kennebecasis River, all of which could suffer negative impacts due to the proposed flood mitigation measures.
 - A quantified estimate of how much agricultural land is at risk is not provided by the proponent.

- Deposition of unwanted refuse and/or debris onto properties and agricultural fields
 - Under current conditions, flood waters rising from the Kennebecasis River encroach on the northwest portion of the agricultural land where the proposed Trout Creek diversion outlet is located. Flood waters typically rise at a low velocity and travel through vegetation (brush, hardtack, trees, etc.) providing a natural filter that removes large debris and refuse, preventing its deposition onto the agricultural land.
 - No such control has been considered for the Trout Creek diversion channel.
 - Debris such as branches, if carried by flood waters into the agricultural fields, could cause damage to farm equipment and create significant financial damages in the form equipment repairs and lost opportunity.
 - Property owners will be unnecessarily burdened with financial costs and/or lost time required for clean-up of any deposited debris.

7. Potential for Contaminant Migration

Changes to surface water flows can impact groundwater elevation and groundwater flow direction which can lead to the migration of contamination (if present) within soil and groundwater (which can ultimately re-emerge into surface water). Once additional refined flood modeling is complete, the proponent should complete a study of anticipated changes to hydrologic and hydrogeologic conditions of affected properties based on the revised flood model. Properties that could be impacted by changes in hydrological and/or hydrogeological changes related to the proposed flood mitigation measures should be thoroughly assessed to determine if current and/or historical activities carried out on the properties could have resulted in the release of potentially harmful substances to the environment. Changes caused by the proposed flood mitigation project could create an increased risk of contaminant migration for documented and undocumented contamination through changes to hydrological and hydrogeological conditions. This could also impact the effects of contaminants released to the environment in the future.

Additionally, assessments should be completed to determine if infrastructure related to storm water and/or waste water treatment may be present on potentially impacted properties (including out-of-town properties). Often industrial properties as well as commercial properties that store/handle/use/transfer/distribute petroleum products (such as fuels, grease and oil) have oil-water separators installed to ensure light non-aqueous phase liquids (LNAPL) and sludge are separated from water being discharged to the environment or municipal stormwater handling systems.

Oil-water separators are designed to handle a certain flowrate of influent water. If the design flow is exceeded, the accumulated LNAPL within the oil-water separator can be flushed out and discharged into the environment. The design flow and handling capacity of such affected systems should be analyzed based on the refined flood model to determine if any additional risk of discharging potentially harmful substances into the environment exists due to increased floodwater and groundwater elevations that may be caused by the proposed flood mitigation projects.

7.1. Additional Consideration for Changed Receptors

Sites which have previously received regulatory closure through the provincial contaminated sites program will need to be reassessed to determine if changes to hydrology and hydrogeology caused by the proposed flood mitigation projects could have impacts on receptors that were not considered during previous environmental site assessments. Properties downstream of the diverted flood water path use shallow groundwater as a source for potable water. Additionally, land use and ecological receptors as well as emerging contaminants of concern that were not previously considered in the site assessments should be re-evaluated. The proponent has a duty to ensure the health and safety of people with potable water sources that may be impacted by the implementation of the proposed flood mitigation projects are not adversely affected.

The proponent should commit to (in writing) an approved sampling schedule of potable water sources on downstream affected properties. This should include potable water sampling for all properties potentially affected by the implementation of the flood diversion project as shown in an updated/refined version of the flood model. Quarterly (seasonal) sampling of potable water should be conducted by the proponent for a minimum of one year (four rounds of sampling) prior to the implementation of the project to define baseline water quality values of potable water sources that may be potentially impacted. In addition, potable wells should be sampled annually for as long as the diversion channels are in place as well as after any event which causes water from Trout Creek to breach the passive intake structure of the diversion channel. Analyses of potable water samples should be performed by an accredited laboratory to assess for:

- Total metals (including mercury)
- Low-level petroleum hydrocarbons
- Polychlorinated Dibenzo-p-dioxins and Polychlorinated Dibenzofurans (PCDDs and PCDFs)
- Polyfluoroalkyl substances (PFAS)
- Polychlorinated biphenyls (PCBs)
- Chlorinated solvents
- Pesticides
- Bacteria / coliforms
- Nutrients (total nitrogen and total phosphorus)
- Any other contaminant of concern listed as part of the Canadian Drinking Water Quality Guidelines (or applicable federal criteria) at the time of sampling
- Any other contaminant of concern listed by Provincial authorities as pertaining to drinking water
- Any other contaminant of concern identified by environmental site assessments within a 100 m distance from the diversion channel and as may be present on sites potentially impacted by increased flood water elevations.

Additionally, a detailed plan should be in place by the proponent to supply potable water to residents in the event their potable water sources are adversely affected by the implementation of the proposed flood mitigation projects.

A formal approval from the Canadian Department of Fisheries and Oceans should be acquired by the proponent stating that no additional risk of the release of deleterious substances (as defined in the Canada Fisheries Act) and that no adverse effects to fish-bearing habitat will result from the implementation of the projects, intended or otherwise.

7.2. Sites Requiring Additional Study and Consideration

Additional consideration is required of the potential presence and transport of contaminants from sites on which activities (current or historical) are carried out that may result in the release of potentially harmful substances into the environment. A full list of sites should be determined by a qualified Site Professional and the Site Professional should ultimately

determine the risk associated with those sites. Sites which could potentially be considered for further evaluation include:

- The former McLeod Drive landfill site (PID# 30011001) shown below in Figure 4.
 - o Historic landfill that has been closed and capped (dates of operation not precisely known at time of writing).
 - o The former landfill site is approximately 50 m (160') from the proposed Trout Creek diversion channel location according to GeoNB parcel data and Figure 4 of Appendix A in the proposal.
 - o Given the timeframe during which the landfill was operational, the lack of environmental stewardship considered acceptable at the time, and the various metals and chemicals that were widely available for consumer purchase and use (and ultimately disposal), additional study should be completed to ensure transport of potentially harmful substances to downstream receptors does not occur.
 - o A thorough screening should be done for any potential contaminants of concern (as assessed by a Site Professional) including bioaccumulative substances and environmentally persistent contaminants.

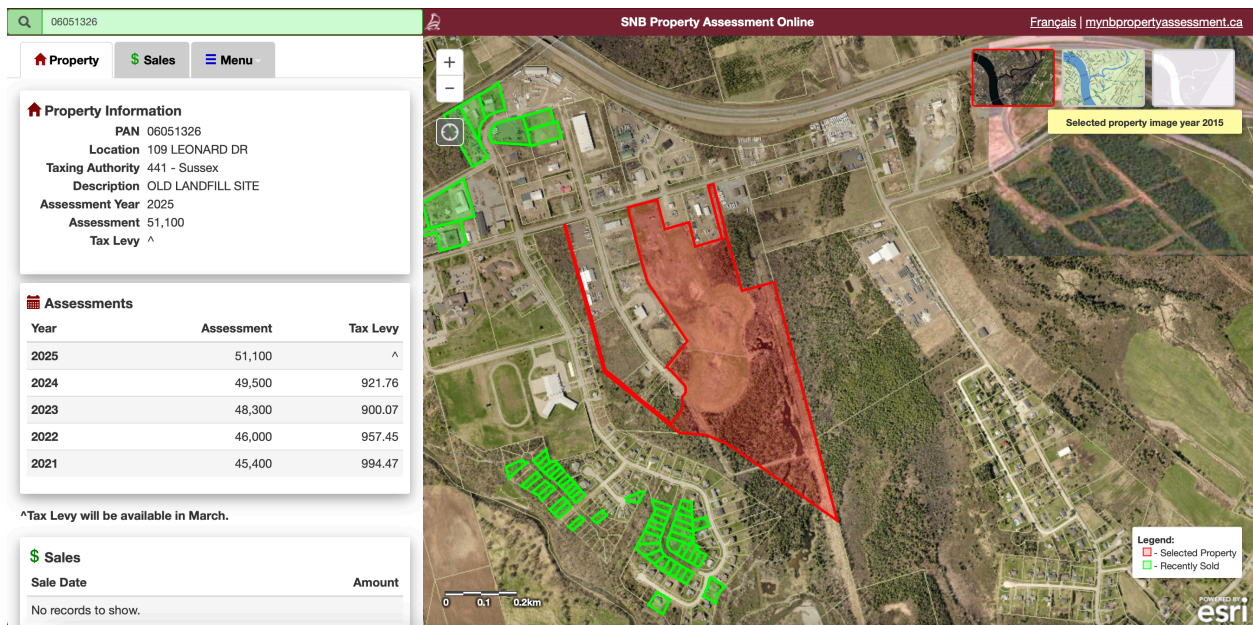


Figure 4: Screenshot from Service New Brunswick online property assessment website. The former McLeod Drive landfill site is highlighted in red.

- The New Brunswick Route 1 highway
 - o Intersects the proposed Trout Creek diversion channel near the proposed outlet.
 - o Roads and highways are often subject to soil and groundwater contamination due to factors such as leaking fluids from vehicles and salt runoff from road maintenance activities.
- Sites within the Sussex industrial park

- In a report titled “A Needs Analysis for Industrial Park Infrastructure in the Greater Sussex Area” by Exp Inc. (dated March 14, 2013), mapping indicates current industrial zoning (indicated in purple) which is adjacent to the proposed Trout Creek diversion channel location (see Figure 5).



Figure 5: Sussex industrial planning areas shown in purple.

- Current commercial/industrial operations within the industrial zones indicated in the report that may require additional environmental considerations include:
 - Chemical and hazardous waste recycling facility and associated operations (PID# 30047138 and 30351076)
 - Bulk fuel storage facility (PID# 30154835)
 - Auto dealership (PID# 30259907)
 - Bus fleet garage (PID# 00270165)
 - Excavation contracting company (PID# 00270298)
 - Tree nursery and forestry research complex (PID# 30137640)
 - Waste transfer station (PID# 30158372)
 - Firefighter training area (PID# 30185805)
 - Municipal garage (PID# 30135362)
 - Manufacturing plant (PID# 30330401)
 - Uniform laundering/dry cleaning service provider (PID# 30285324)
 - Cement plant (PID# 30330906)

- Additionally, an asphalt plant is located near the entrance to the proposed diversion channel (PID# 30347983)
- A study should be completed by a qualified Site Professional to determine which sites may pose a risk to downstream receptors (based on present and historical activities) and to quantify any risk associated with diverting surface water near the sites determined to require additional assessment.
- Emerging contaminants of concern including polyfluoroalkyl substances (PFAS) should be considered in the assessments due to the presence of a nearby firefighting training area.

The proponent made no consideration of potential transport of contaminants from other sites along the downstream areas of the Kennebecasis where natural flood conditions would not normally reach and/or where diverted water could cause more frequent flood conditions. Areas affected with increased flood water frequency and elevations as a result of the project implementation could also have issues with increased groundwater elevations and unanticipated changes in groundwater flow conditions which could result in migration of contaminants through soil, groundwater and ultimately into surface water. Based on refined modelling results, a qualified Site Professional should evaluate the risk of contaminant migration from affected properties. Sites of potential concern include:

- Provincial Department of Transportation and Infrastructure (DTI) garage and adjacent lots (PID# 00204925, 30073589, and 30125207). See Figure 6 below.
 - GeoNB flood risk mapping indicates that portions of the properties are currently at risk of flooding.
 - Records obtained from Service New Brunswick indicate N.B. Transportation as the owner of PID# 30125207 and Land Gazette data indicates that PID# 30125207 had a land notice published related to site remediation as assigned by the New Brunswick Department of Environment and Local Government on October 7, 2021.
 - Potential presence of oil-water separator for garage floor-drains.
 - Road salt storage domes present could pose additional risk of salt run-off.
 - Above-ground petroleum storage tanks are present. Petroleum storage tanks and associated infrastructure (current and historical) should be evaluated to ensure no added risk of contaminant transport and/or accidental release exists.
 - Historical undocumented spills may also be present.

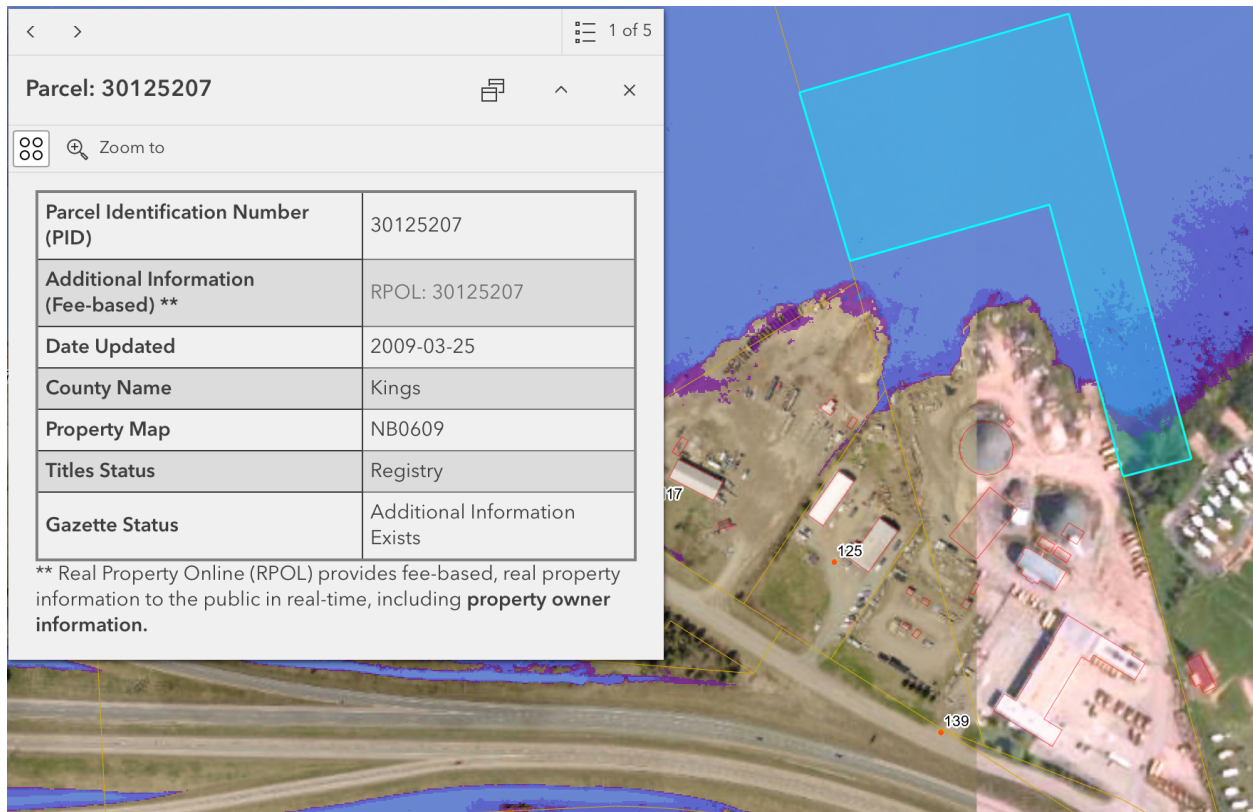


Figure 6: Screenshot of GeoNB with PID# 30125207 highlighted. DTI garage and associated properties located south of highlighted property. Flood risk mapping shows flood waters currently encroach on these properties and Gazette Status indicates "Additional Information Exists."

- Properties associated with fuel retail and/or automotive service stations, both current (PID# 00202465, 30131627, 30131635, 00202481, 30131643, 30131650, and 30119556) and historical (PID# 30361794, and PID# 00207043)
 - o GeoNB flood risk maps indicate flood waters encroach on several of these properties (see Figure 7).
 - o Fuel retail systems often have issues with leaking underground infrastructure including underground storage tanks (USTs), petroleum product piping, and oil-water separators for stormwater treatment.
 - o Legacy unknown/undocumented contamination may be present from historical spills that potentially occurred during fuel transfer activities including consumer fuel purchases and fuel delivery to USTs.
 - o Oil-water separator (if present) should be assessed by a professional engineer to determine that no negative impacts would result from increased stormwater influent volumes (due to increased flood water elevations) so as not to exceed the systems design capacity to handle storm water and result in the release of accumulated LNAPL from within the system.
 - o Former gasoline and service stations were operated on some of these properties (exact dates unknown). Environmental regulations and stewardship during the period the stations were operational often resulted in petroleum product spills being unreported and/or undocumented and discharge of automotive fluids directly onto/into the ground.

- A thorough study should be completed to ensure potential legacy contamination in the soil and groundwater of these sites is not present, and if so, that the effects of elevated groundwater and/or flood water will not pose an issue that causes migration of contaminants into the Kennebecasis watershed/watercourse or other downstream receptors.
 - Some PIDs referenced indicate additional information exists within the Land Gazette.
- Properties associated with the current truck and automobile parking area (PID# 30270292, 00206722)
- Transport trucks often require large volumes of fluids for their operation. When parked for long periods of time (i.e. overnight), it's possible for significant volumes of fluids to leak out onto the ground below. Often times drivers will depart without doing a thorough scan of the ground below to ensure no fluids were spilled and/or depart during dark conditions when spilled fluids may not be easily observable.
 - Instances could have occurred where drivers that are aware of leakages/spills from their equipment depart without reporting them in fear of environmental/financial repercussions.
 - Additional information exists within the Land Gazette.

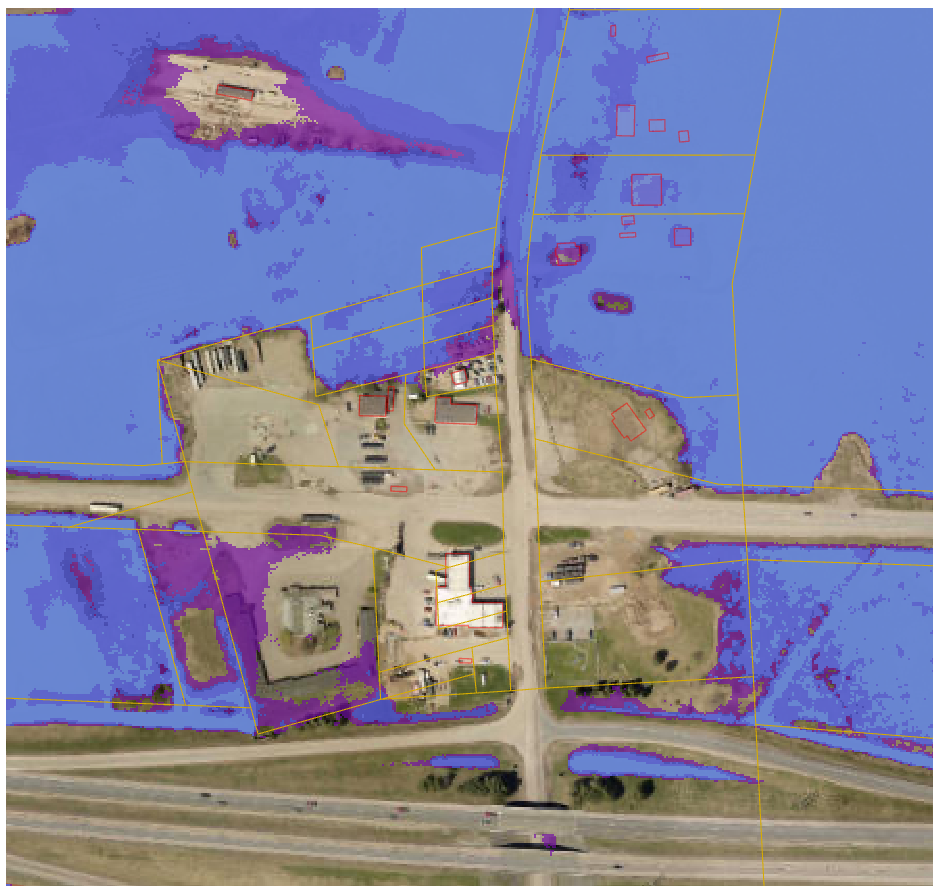


Figure 7: View of "Four Corners" intersection on GeoNB with overlay of flood risk models. Properties on each corner of the intersection have current models showing encroaching flood waters.

- Properties associated with current industrial saw mill operations (PID# 30183370, 00204305)
 - o Mobilization of large quantities of wood chips and/or sawdust due to flood waters could impact the suitability of aquatic habitat in the Kennebecasis River in the form of suspended solids. The proponent should ensure no additional risk is posed in the Kennebecasis River due to increased suspended solids concentrations caused by increased flood water elevations.

- Property associated with truck wash facility (PID# 30152540)
 - o GeoNB flood risk mapping indicates flood waters may encroach on this property.
 - o Equipment washing facilities often use degreasers and surfactants to remove grease and oil from equipment.
 - o Potential presence of oil-water separator and/or wash water treatment equipment which may need evaluating.

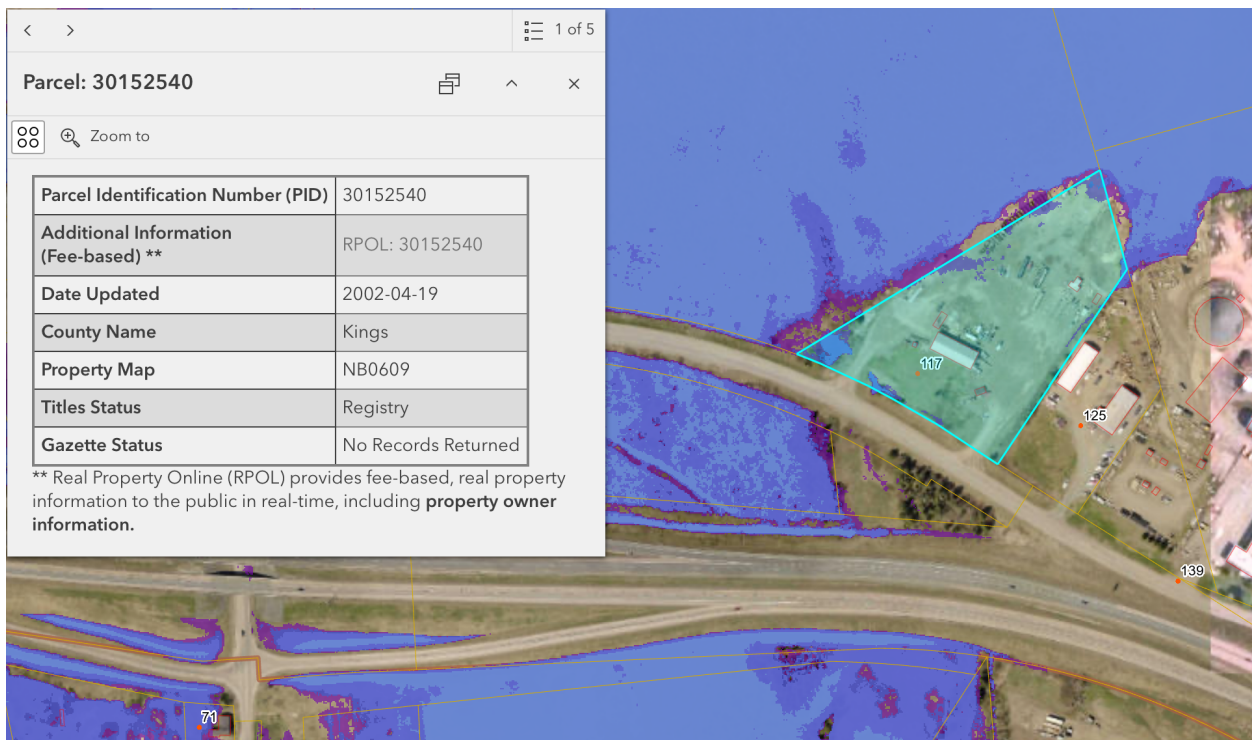


Figure 8: Property associated with truck wash operation.

- Former petroleum delivery service (PID# 00207548)
 - o Potential concerns include undocumented leaks from petroleum infrastructure, spills during petroleum product transfers, and leaks from tank truck equipment.

8. Downstream Flow Restrictions

The proposal makes no mention of downstream features that may restrict the flow of flood waters during flood events. Locals have observed the flood waters of the Kennebecasis River

restricted by the Route 1 overpass near the Gateway Mall Flood Berm and the Route 121 overpass. By eliminating these restriction points, the Kennebecasis River could potentially be better able to receive surge volumes of flood water from Parsons Brook and Trout Creek allowing the watercourses to maintain their natural flow paths and reducing the impacts of flood waters within the Town.

Downriver flow restrictions should be evaluated to determine if diversion of flood waters will ultimately cause flood water elevations in the downtown core to rise causing similar damages to if no diversion channel was in place. Furthermore, assessment of potential for ice blockages by the man-made narrowing of natural watercourse channels (such as bridge structures) should be completed to determine if ice blockages contribute to the increased elevation of flood waters within the Town during flood events. According to the New Brunswick Department of Environment and Local Government website, ice jams are a contributing cause to flood events where the Town experienced significant damages in the past.

Additionally, no consideration was listed to the possible impacts diverted flood water may have on creating ice blockages in the Kennebecasis River. A study should be completed to determine if the artificial swelling of the upstream portion of the Kennebecasis River that would result from diverting flood water could create the risk of additional ice jams within the Kennebecasis River.

9. Devaluation of Properties and Provision for Liability

Owners of properties that are directly impacted by the implementation of the proposed flood mitigation measures could be financially impacted by devaluation of properties. Insurance providers cancel and refuse to provide flood insurance on properties that are known to flood and financial institutions typically do not provide mortgages to purchase properties that cannot be insured. This can negatively impact property market values, limit opportunities for landowners to develop their land, and limit the ability of an owner to sell their property if they so choose.

No means of determining liability is available to landowners that might suffer financial damages due to the implementation of the proposed flood mitigation measures. While some flooding may naturally occur on these properties, there isn't a way to determine what portion of damages the proponent would be liable for by constructing an engineered diversion channel that directly impacts the financial losses suffered due to increased flood water elevations, higher frequency of flood occurrences, ineligibility for flood insurance, loss in property sale value, negative impacts on private potable water and septic systems, loss of crops, land erosion, etc.

The proponent should be required to provide flood insurance as well as a formal claims process to reimburse any and all damages suffered by owners of properties that are impacted by the proposed flood mitigation measures for perpetuity. The insurance should be transferrable upon sale of the property to new owners so as not to prevent potential buyers from being eligible for a mortgage due to lack of insurability. The insurance and claims process should contain options

for financial compensation as well as specific performance. Property owners should be able to initiate a formal claims process if at any time they are impacted by a flooding event where flood waters breach the diversion channel intake structures. The claims process should be mediated by a third-party to ensure fair assessment of damages. Details should be communicated to the owners of any properties that are potentially negatively affected by the flood mitigation measures.

10. Public Safety and Security

The proponent should provide and commit to a detailed plan outlining the proposed security measures to be implemented surrounding the completed diversion channels. There is a concern that the presently (and potential future) increasing population of unhoused people may begin to take refuge in the channel during non-flood conditions which could lead to a public safety issue for nearby residents and to children at the Sussex Corner Elementary School (which sits directly adjacent to the Parsons Brook diversion channel). This could also contribute to larger volumes of refuse being present in the diversion channels than anticipated by the proponent.

Additionally, the proponent should consider the potential consequences of the proposed channels being used as recreational spaces for off-road vehicles (ATVs, dirt bikes, etc.) and how creating an access point into Trout Creek and Parsons Brook may have long term consequences by the unauthorized use of such vehicles within the watercourses and along the riparian areas. Rural areas often see an increased use of off-road vehicles compared to their urban counterparts, and Sussex in particular has public roadways where ATVs are permitted to drive. While the vast majority of riders are responsible and law-abiding, there are always individuals that ignore signage and rules. There is a concern that riders of off-road vehicles may attempt to use the diversion channels as an access point/roadway as well as a recreational area, leading to an increased risk of property damage and unnecessary noise pollution to residents nearby the diversion channel.

11. Climate Change Impacts on Flooding

A more detailed quantification of the climate change effects as they relate to the project should be carried out and reviewed by Environment and Climate Change Canada. The purpose of the funding allocated to the project through the federal government Disaster Mitigation and Adaptation Fund is to help communities “to invest in structural and natural infrastructure projects to increase the resilience of communities that are impacted by natural disasters triggered by climate change.” Based on recorded precipitation increases included in Table 4.4 of Canada’s Changing Climate Report (2019) and referenced in the GEMTEC March 2022 slide deck, the increase in precipitation recorded for the Atlantic provinces between 1948 and 2012 indicated that winter and spring precipitation (responsible for the severe flooding events experienced in Sussex including the April 16, 2014 flood event, and the February 28, 2024 flood event) increased by 5.1% and 5.7% respectively (see Figure 9 below).

REGION	CHANGE IN PRECIPITATION, %				
	Annual	Winter	Spring	Summer	Autumn
British Columbia	5.0	-9.0	18.2	7.9	11.5
Prairies	7.0	-5.9	13.6	8.4	5.8
Ontario	9.7	5.2	12.5	8.6	17.8
Quebec	10.5	5.3	20.9	6.6	20.0
Atlantic	11.3	5.1	5.7	11.2	18.2
Northern Canada	32.5	54.0	42.2	18.1	32.1
Canada	18.3	20.1	25.3	12.7	19.0

^a Changes are represented by linear trends over the period. Estimates are derived from the gridded station data. There is a lack of data for northern Canada (see Figure 4.1 for the location of stations), which reduces confidence in the estimate.

Figure 9: Excerpt from Canada's Changing Climate Report "Table 4.4: Observed changes in normalized annual and seasonal precipitation between 1948 and 2012 for six regions and all of Canadian Land Area^a"

Table 4.5 in Canada's Changing Climate Report (also referenced in the GEMTEC presentation) shows the predicted increases in annual precipitation throughout the remainder of the 21st century (see Figure 10 below). The projected annual mean precipitation increase referenced in the presentation indicates a 20% increase in annual precipitation is expected by the year 2100. The forecasted 20% increase in precipitation indicated by the proponent is based on the 75th percentile value in the representative concentration pathways high emission scenario (RCP8.5) as modelled in the Coupled Model Intercomparison Project (CMIP5) for the Atlantic Canada region. Due to the uncertainty inherent to predictive modelling, the climate change initiatives being mandated across the world to reduce greenhouse gas emissions (in an effort to maintain the RCP2.6 low emission scenario), and the low probability of the scenario presented by the proponent (75% of models indicated a lower increase in average annual precipitation in the RCP8.5 scenario), the proponent should provide a more granular review of assumptions made in terms of climate change related impacts on increased precipitation amounts that lead to the flooding events to be mitigated.

Additionally, short-duration extreme rainfall events that are responsible for some of the severe flood events in the Town (including the September 29, 2015 and December 1, 2020 flood events) are arguably not related to climate change. From Canada's Changing Climate Report Section 4.3.2.1 "There do not appear to be detectable trends in short-duration extreme precipitation in Canada for the country as a whole based on available station data. More stations have experienced an increase than a decrease in the highest amount of one-day rainfall each year, but the direction of trends is rather random over space. Some stations show significant trends, but the number of sites that had significant trends is not more than what one would expect from chance...Only about 8.5% of all stations over global land areas with more than 30 years of data show an increase in extreme precipitation at the 5% significance level, which is slightly higher than the rate of stations showing an increase (5%) that could be expected from chance...The detection of the increasing intensity of extreme precipitation over lands on Earth is possible because of the vast amount of data available. On the regional scale,

there is much less information, which is the case for Canada, where long-term observations are very limited, and detection becomes more difficult.”

REGION ^b	SCENARIO; PERIOD; MEDIAN (25TH, 75TH PERCENTILE), %			
	RCP2.6		RCP8.5	
	2031–2050	2081–2100	2031–2050	2081–2100
British Columbia	4.3 (-0.4, 9.8)	5.8 (0.4, 11.9)	5.7 (0.0, 11.4)	13.8 (5.7, 22.4)
Prairies	5.0 (-0.7, 10.8)	5.9 (-0.2, 12.1)	6.5 (0.4, 13.1)	15.3 (6.3, 24.9)
Ontario	5.5 (0.4, 11.1)	5.3 (-0.1, 10.8)	6.6 (1.8, 12.4)	17.3 (8.5, 26.1)
Quebec	7.1 (2.0, 12.2)	7.2 (2.2, 13.0)	9.4 (4.5, 14.7)	22.5 (14.8, 32.0)
Atlantic	3.8 (-0.8, 9.1)	4.7 (0.3, 9.0)	5.0 (0.6, 9.9)	12.0 (5.7, 19.3)
North	8.2 (2.1, 14.6)	9.4 (2.8, 16.7)	11.3 (5.4, 18.1)	33.3 (22.1, 46.4)
Canada	5.5 (0.2, 11.2)	6.8 (0.4, 14.4)	7.3 (2.0, 13.2)	24.2 (13.7, 36.2)

^a The median or 50th percentile value is based on the CMIP5 multi-model ensemble. The 25th percentile value indicates that 25% of the CMIP5 model projections have a change smaller than this value. The 75th percentile value indicates 25% of CMIP5 model projections have a change larger than this value.

Figure 10: Excerpt from Canada's Changing Climate Report "Table 4.5: Projected percentage change in annual mean precipitation for six regions and for all Canadian land area relative to 1986-2005."

The proponent should study available local and regional weather station data along with any local/regional factors that may have a significant impact on expected precipitation events, snowmelt and/or other relevant weather phenomenon to determine if statistically significant evidence exists that indicates climate change is responsible for the increased incidence of flooding within the Town.

Additionally, the proponent should study and determine if any other conditions unrelated to climate change are contributing to the increasing incidences of flood conditions. Other factors that may have increased the magnitude and/or frequency of flooding events would be the construction of berms that restrict the flow of flood waters through the naturally occurring flood plains as well as land use/development in the upstream watersheds of Trout Creek and Parsons Brook that could be impacting snow melt and water run-off rates. New Brunswick has experienced a significant increase in population over the past few years and increased demands for housing and local food production would be expected to increase proportionally. Vegetation and mature forest being removed from the land for development into agricultural land and/or building lots accelerates the rate at which rainfall and snow melt reach the ground and travel to the nearest watercourse. The decrease in tree cover and shade over accumulated snow on the ground causes an increase in the heat transfer to the accumulated snow by means of direct thermal radiation from the sun and increased convective heat transfer caused by increased exposure to warmed air moving unrestricted over the accumulated snow. These combined factors could lead to the snow melting at an accelerated rate.

Since the federal funding allocated to the project is strictly to mitigate disasters caused by climate change, the proponent has a duty to ensure the public funds dedicated to the project are not being spent to mitigate issues caused by other human-induced factors.

12. Cost-Benefit Analysis

The financial losses projection and cost-benefit analysis provided by the proponent indicates that the financial offset was compared to the City of Calgary losses during a 2014 flood event where losses were split into categories of residential and non-residential buildings, then converted to NB property values.

A further breakdown and reassessment of the projected cost-benefit should be completed taking into account if the residential buildings impacted in the City of Calgary were single family dwellings or multi-family dwellings/apartment buildings. Large multi-unit residential buildings typically include significant commercial grade infrastructure within the basements (electrical panels/sub-panels, water distribution manifolds, boilers, costly structural elements required for the safe operation of large-scale buildings, etc.). Comparing the financial losses of large multi-family residential units (as are more popular within densely populated cities such as Calgary) to single family dwellings would provide a skewed financial loss calculation, misrepresenting the actual losses mitigated by the proposed projects. Furthermore, as with residential buildings, commercial properties within large urban centres often include more costly elements within the flood-affected floors of the building compared to smaller commercial buildings present in Sussex.

A refined cost-benefit analysis should be completed using financial loss data from a flood impacted region within the Province of New Brunswick, ideally financial information from within the Town of Sussex itself, to more accurately depict the cost-benefit ratio achieved by the proposed flood mitigation projects prior to the use of public money on such projects. The comparison should be made using the current assessed values of the properties/buildings to be impacted, with an updated/refined flood model (as described previously), and accounting for the area footprint of the specific buildings that would be impacted. The cost benefit analysis should also include financial losses due to potential damages to properties that are shown to experience increased flood risk/damages (both within and beyond Town limits) according to the refined flood model.

The proponent did not include considerations in their cost-benefit analysis toward other potentially affected public infrastructure (such as bridges, roads, culverts, and provincially owned property) and the maintenance/repairs/upgrades that may be required as a result of implementing the project. Additional detail outlining the expected financial impacts on out-of-Town public infrastructure should be included in a refined cost-benefit analysis to more accurately represent the financial losses that may be incurred by the provincial tax base and out-of-town residents, as well as a plan to pay for any potential resulting damages.

13. Disclaimer

The opinions and information expressed in this document are not intended to constitute a legal or professional opinion nor should they be interpreted as such. The contents of this document are meant to raise awareness to the IAAC about potential concerns to be reviewed and considered by the IAAC as it pertains to the Impact Assessment Act and the Sussex Flood Mitigation Project under review by the IAAC. No guarantee (expressed or implied) with relation to the accuracy of the contents of the document is made by the author.

The opinions expressed within the document are the personal opinions of the author (with some integrated opinions, concerns and comments as discussed with other family members and concerned citizens). They do not represent, nor should they be interpreted as representing, any group, organization, corporation or other legal entity.

14. Closing

Thank you for your time and consideration in addressing these concerns, all of which are respectfully submitted,

A handwritten signature in black ink, appearing to read 'Stephen Carr', written in a cursive style.

Stephen Carr