



Town of Torbay, NL

Climate Change Vulnerability Assessment Summary Report

March, 2026



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OVERVIEW

This document consists of a series of tables summarizing the climate hazards that may impact Torbay and what the implications of those hazards may be. This assessment has considered events experienced to date and the local climate change projections for the future. These results will directly inform the climate action planning process which is to follow.

This March 2026 document has been updated since the February 2026 version which was presented at the February 11th community event.

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HIGH-LEVEL SUMMARY

Hazard Category	Climate Projection	Risks in Torbay
Drought/Water Supply	More inconsistent precipitation patterns with higher frequency and duration of dry periods	Reductions in or loss of municipal potable water supply and groundwater for private wells with significant implications for resident comfort and safety
Inland flooding	Increasing frequency and intensity of extreme precipitation events	Increasing risk of stormwater management systems becoming overwhelmed resulting in road washouts and property damage
Extreme Temperatures	<ul style="list-style-type: none"> • Hotter days expected more often than experienced historically • Destabilized climate system can also result in extreme cold beyond what we're used to 	Public health risks associated with heatwaves particularly for vulnerable populations without access to cool spaces (e.g. seniors, children, lower income households, etc.). Risk of an extreme temperature event corresponding with a power outage.
Wildfire	Increasing risk of fire weather across the province (dry, warm, and windy)	Direct wildfire risk due to forested areas within and around the Town. Health risks associated with smoke impacts from fires within or outside of Torbay.
Storms	Increasing chance of events with high winds, freezing rain, or heavy snow	Risk of property damage, transportation network disruptions, isolation of vulnerable populations, dangerous outdoor conditions, and strain on infrastructure
Coastal	<ul style="list-style-type: none"> • Sea level rise expected to be about 1 m by 2100 • Hurricanes becoming more frequent and intense in the Atlantic • Atlantic Ocean is warming and becoming more acidic, changing the ecosystem 	Direct risk largely limited to Torbay Beach and Tapper's Cove Wharf areas, both of which contribute significantly to the economy of Torbay via tourism and the fishery.

CLIMATE CHANGE PROJECTIONS SUMMARY

The below climate change projections were obtained from [ClimateData.ca](https://climatedata.ca) in June 2025 for the Avalon Peninsula of Newfoundland and represent the SSP5-8.5 high emissions scenario of the most recent AR6 climate model (unless otherwise noted).

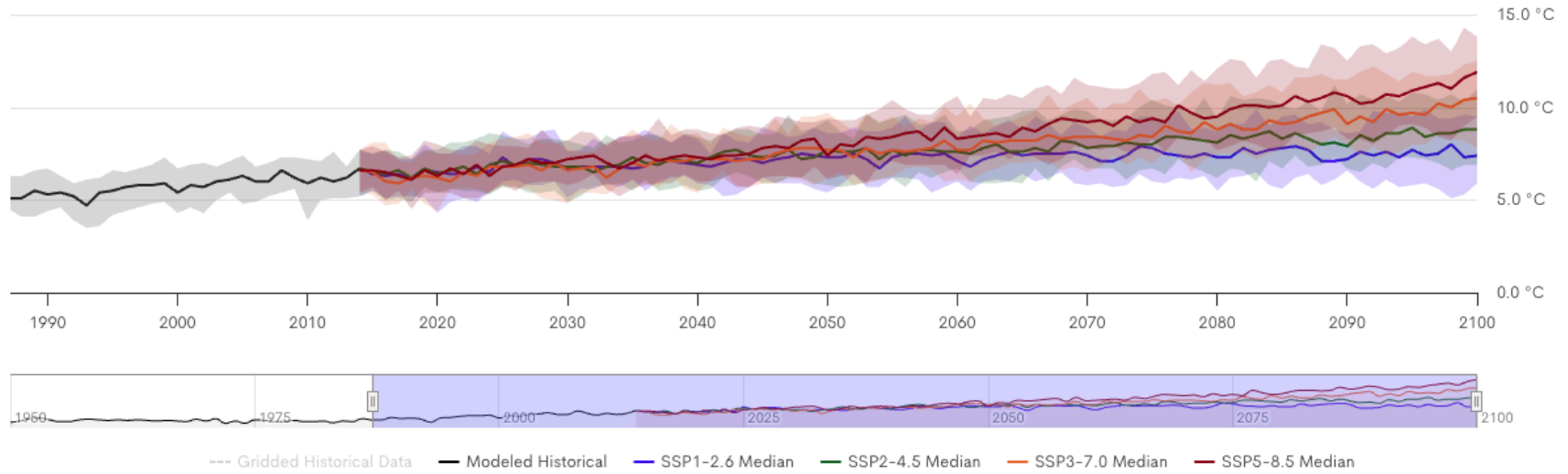
AT A GLANCE: warmer overall with more hot days, more precipitation overall with more frequent and intense storms, higher sea level and higher risk of hurricanes and storm surges, higher wildfire risk

TEMPERATURE

ClimateData.ca Index	Historical Average for 1981-2010	Future Projection for 2041-2070	Future Projection for 2071-2100
Mean Temperature	6 °C	8 – 9 °C	9 – 12 °C
Days with Tmax > 27°C	0 days	2 - 11 days	6 - 43 days
Days with Humidex > 30°C	0 days	3 - 19 days	11 - 59 days
Frost Days	150 days	74 - 113 days	28 - 89 days

In the graphs below, the blue line is the lowest greenhouse gas (GHG) emissions scenario (considers that significant global efforts are made to reduce emissions) and the red line is the highest GHG emissions scenario (considers that emissions continue to increase). The green and orange lines represent in-between emissions pathways. The black line shows what has been the case historically. The solid lines are the median values and the shaded areas around the lines represent the possible range. It is currently best practice for municipalities to plan for the highest emissions scenario where possible to ensure public safety and infrastructure resilience.

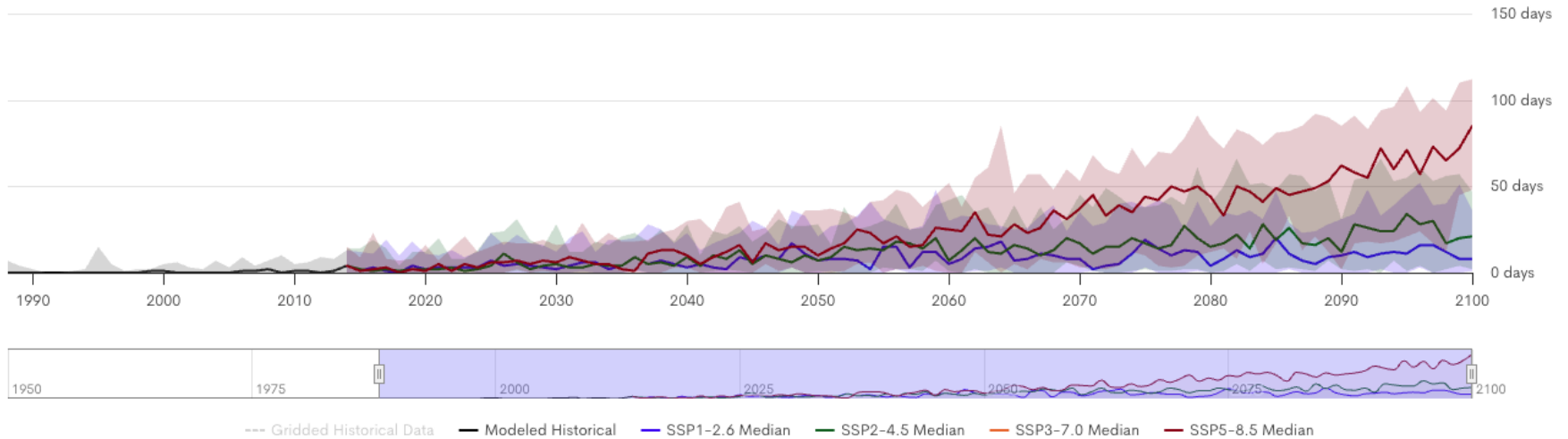
Mean (average annual) Temperature for Torbay, NL



--- Gridded Historical Data — Modeled Historical — SSP1-2.6 Median — SSP2-4.5 Median — SSP3-7.0 Median — SSP5-8.5 Median

Highcharts.com

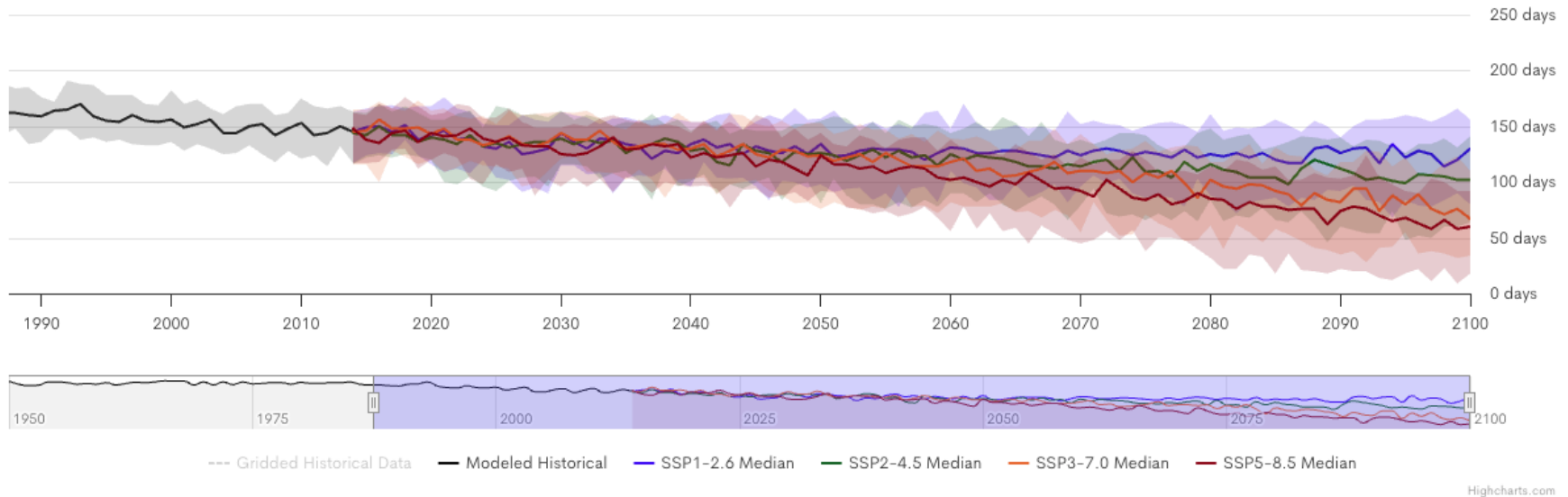
Days with Humidex above 30°C for Torbay, NL



--- Gridded Historical Data — Modeled Historical — SSP1-2.6 Median — SSP2-4.5 Median — SSP3-7.0 Median — SSP5-8.5 Median

Highcharts.com

Frost Days for Torbay, NL



- As most homes and buildings in this region do not have air conditioning systems, there is an increasing chance of **extreme heat events** impacting the population, particularly vulnerable groups like seniors, children, those with pre-existing conditions, outdoor workers, or the unhoused.
- A warmer climate also means that ecosystems are shifting. We may see new plants, animals, and insects that we haven't historically, some of which may have impacts on agriculture (new pests, ability to grow new crops), culture (change in species available to hunt or fish), or health (new disease-spreading insects like mosquitos and ticks).

KEY TAKEAWAYS - warmer overall, hotter and longer summers with increased risk of heat waves, warmer and shorter winters, changes in local ecosystems

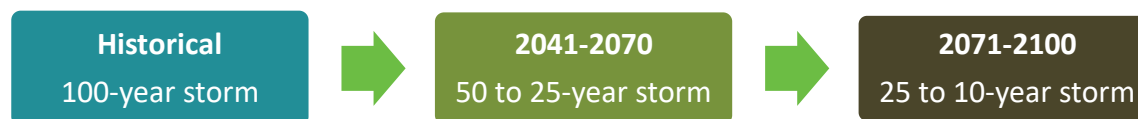
PRECIPITATION

ClimateData.ca Index	Historical Average 1981-2010	Future Projection for 2041-2070	Future Projection for 2071-2100
Total Precipitation	1647 mm	1697 - 1838 mm	1726 - 1941 mm
Wet Days >= 20 mm	19 days	22 - 26 days	24 - 28 days

The global climate models show that precipitation is going to increase overall, but they have more trouble estimating specific precipitation amounts, types, or timing in specific places.

[Intensity-Duration-Frequency \(IDF\) curves](#) are maintained by the Provincial Government to inform infrastructure design. The below table shows the amount of rain in millimeters (mm) that could fall within a single 24-hour period about once every 2, 5, 10, 25, 50 or 100 years on the Avalon Peninsula - heavier rain events are more rare.

Gov. NL IDF CURVES 24 Hour Duration Precipitation Event (mm)	Average Frequency of Event (every X years)					
	2	5	10	25	50	100
Historical (Observational records to 2015)	67	94	112	134.5	151.5	168
2041-2070	86	114.5	134	159.5	178.5	198
2071-2100	88	119	142.5	172	193.5	215.5



- What was considered a 1-in-100 year storm in the past (i.e. 168 mm in 24 hours) will happen more often in the future because of climate change (168 mm in 24 hours could happen every 50 or 25 years instead by 2050 or even more often by 2100)

- In other words, the chance of it raining 168 mm in 24 hours used to be about 1% each year, but in 2050 it could be between 2% (1 out of 50) and 4% (1 out of 25) - or, a storm of this size will become 2 to 4 times more likely to happen (by 2100, it could be 6 or 10 times more likely).
- There will still be storms that are only 1% likely to happen each year, but those storms will be bigger than before - in 2050, a 24 hour 100-year-storm may be 198 mm instead of 168 mm.

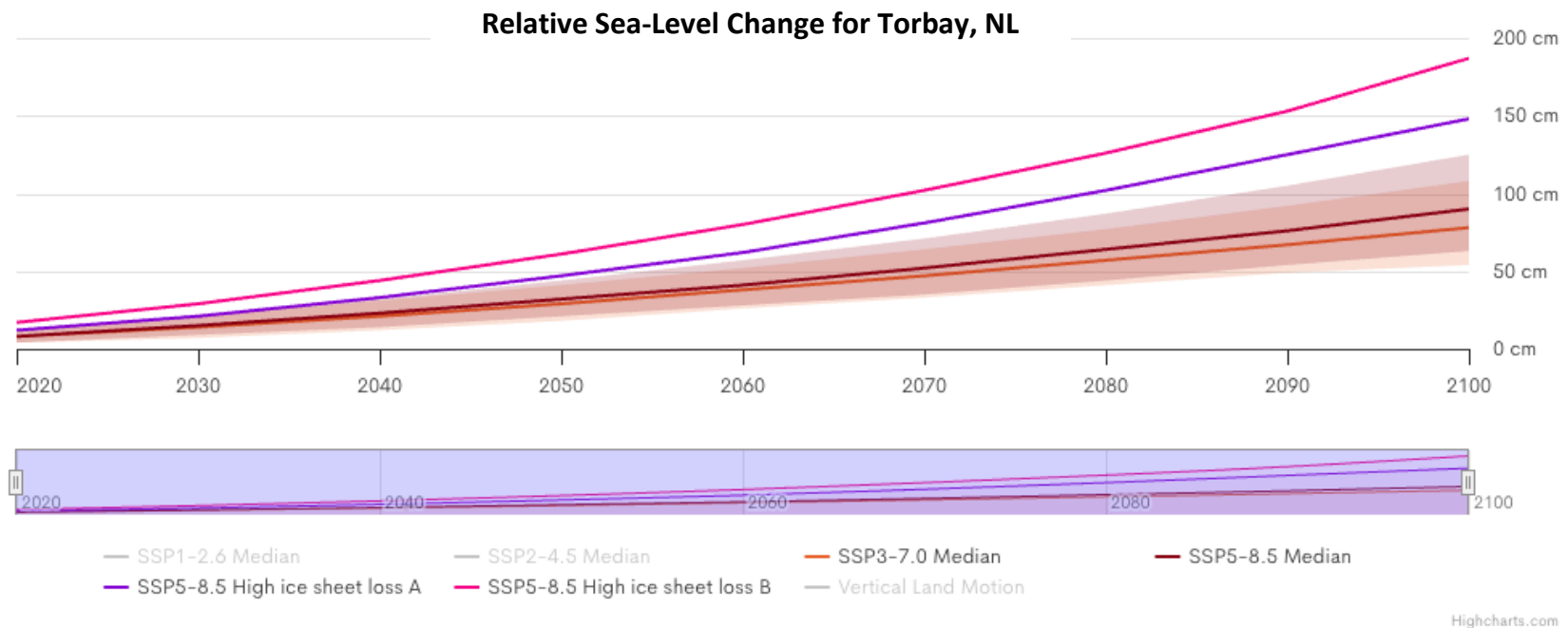
Local experts also expect:

- Less consistent/more unpredictable precipitation (longer dry periods between incidents of heavier precipitation – may have impacts on local water supplies and agriculture)
- More rain, rain-on-snow, or rain-on-frozen-ground events during the winter (higher flood risk)
- More frequent and severe thunderstorms (risks associated with lightning, hail, heavy winds)

KEY TAKEAWAYS – more precipitation overall, more intense and frequent storms with increased risk of flooding, potential for more/longer dry spells, less likely to snow

RELATIVE SEA LEVEL RISE

Year	Low Projection (SSP3-7.0)	Medium Projection (SSP5-8.5)	High Projection (SSP5-8.5 High Ice Sheet Loss Scenario A-B)
2050	30 cm	32 cm	48 - 62 cm
2070	47 cm	52 cm	82 - 102 cm
2100	78 cm	90 cm	149 - 185 cm



These projected changes are with respect to the average conditions across the period 1994-2015 and consider the [vertical motion of land](#). The different emissions scenarios or SSP's ([Shared Socio-economic Pathways](#)) represent possible future development pathways for our society on a global scale. They consider the policy commitments of different countries, levels of international cooperation, economic activity, and population trends. On top of this, there is uncertainty around how quickly the Antarctic ice sheets will melt. Since it

is very difficult to predict what will actually happen in all of these realms, climate vulnerability exercises such as this one are more so about assessing the possible outcomes and determining what level of risk is tolerable for a given location or situation.

Overall, the ocean and atmosphere are beginning to behave in ways that they have not historically, and changes are occurring at a pace that is surpassing even the most conservative climate models. We must therefore be prepared for surprises.

Also consider:

- [Recent studies](#) have shown that it is now **twice as likely** for hurricanes in the Atlantic to develop from a Category 1 to a major hurricane (Category 3 or higher) within 24 hours compared to the 1970s and 80s. This increased storm activity is expected to continue increasing as the ocean warms, increasing the frequency and magnitude of storm surges for coastal communities.
- Even if not a hurricane, storms with heavy precipitation and strong winds can create large waves which impact the coast, particularly if the storm aligns with high tide.
- These events, or just sea level rise on its own, may cause existing stormwater and sewer outfalls to become below the water level, resulting in inland flooding and sewer back-ups.
- Sea level rise is also raising the ground water level, resulting in basement flooding or the inability to construct basements in coastal areas.

KEY TAKEAWAYS – a significant amount of sea level rise is expected which will change the location of our coastlines, higher baseline sea level means waves and storm surges have larger impact, hurricanes and storm surges are becoming more likely and more severe

WILDFIRE

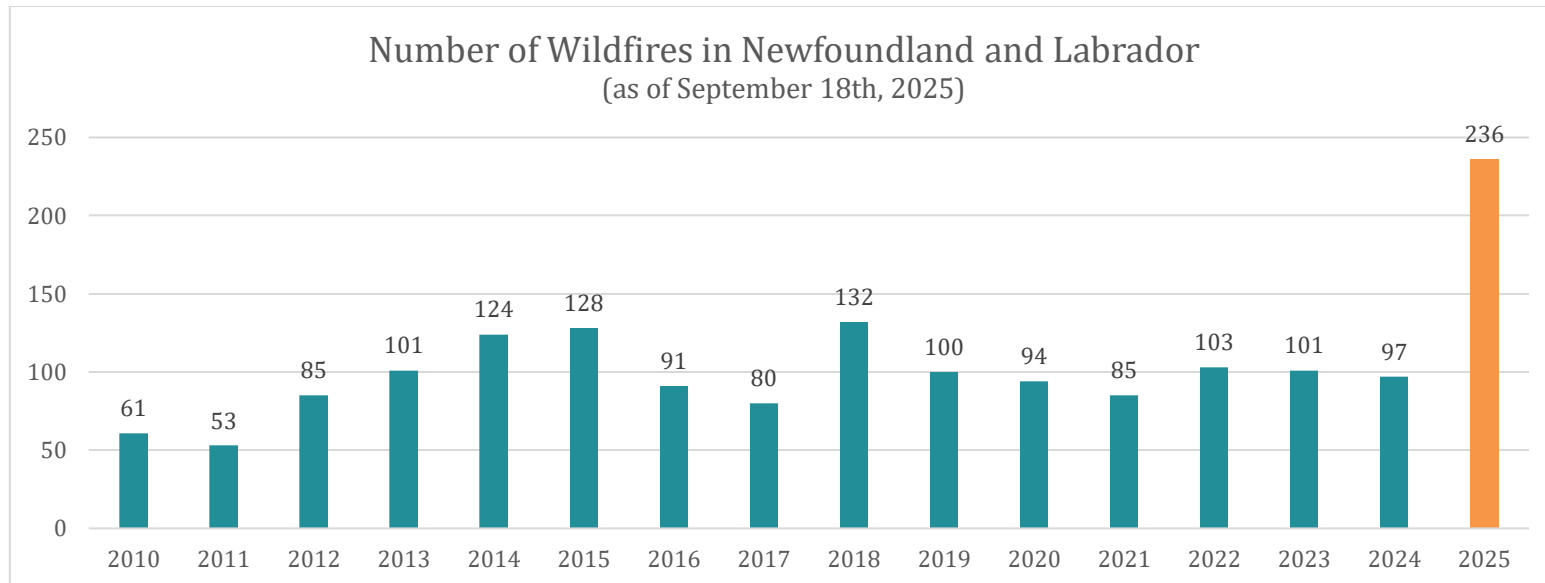
Factor	Historical Average for 1971-2000	Future Projection for 2041-2070	Difference
Fire Season Length	180 days	224 days	+ 44 days

In 2025, the wildfire season was April 24th to September 30th on the Island of Newfoundland. From 2014 to 2021 the fire season started on May 1st.

Between 2011 and 2021, 81.9% of the wildfires in the Eastern Region were caused by residents or recreational activities (ignition from cigarettes, campfires, etc.), 1.5% by lightning, and 16.6% by other (garbage dump, industrial operations, etc.) or unknown causes

Also consider:

- the above temperature projections (warmer overall, more hot days = higher fire risk)
- the above precipitation projections (more dry periods, more lightning, less snow = higher fire risk)
- the amount of forested area in the region and its proximity to critical infrastructure and evacuation routes (especially where there is only one way in and out of an area)



KEY TAKEAWAYS – wildfire season is getting longer, wildfire-supporting weather conditions are occurring more often (fires can start and spread more readily), wildfires are most often started by the activity of people

VULNERABILITY ASSESSMENT SUMMARY TABLES

DROUGHT/ WATER SUPPLY

- inconsistent precipitation with higher frequency and duration of dry periods

Risk/Vulnerability to Service Area/Population	Impact/Implications
Reductions in or loss of municipal potable water supply and/or associated impacts to water quality	<ul style="list-style-type: none"> • Water conservation orders, boil water advisories, potential state of emergency • Significant cost and inconvenience to residents and the Town to source and distribute bottled water
Reductions in or loss of potable water supply from private wells	<ul style="list-style-type: none"> • Inconvenience, added cost, property value impacts, and potentially health risks for affected households • Note that PFAS contamination of groundwater is an additional concern, however, it is not related to projected climate changes
Reductions in or loss of water available for fire suppression	<ul style="list-style-type: none"> • Potential significant risk to life and property
Agriculture & home gardens	<ul style="list-style-type: none"> • Potential significant negative impacts on crops such as reduced yields or complete crop failure
COMPOUNDING HAZARDS → Extreme Temperatures, Wildfire (both can contribute to or be caused by drought)	
RELATED COMMUNITY CONCERNS → Housing Development (must have adequate water supply to support additional homes)	

Notes:

- The existing North Pond water supply disruption system has a back-up generator in place to ensure no service disruption during a power outage
- Funds have been allocated to development of a new potable water treatment and distribution system at Great Pond

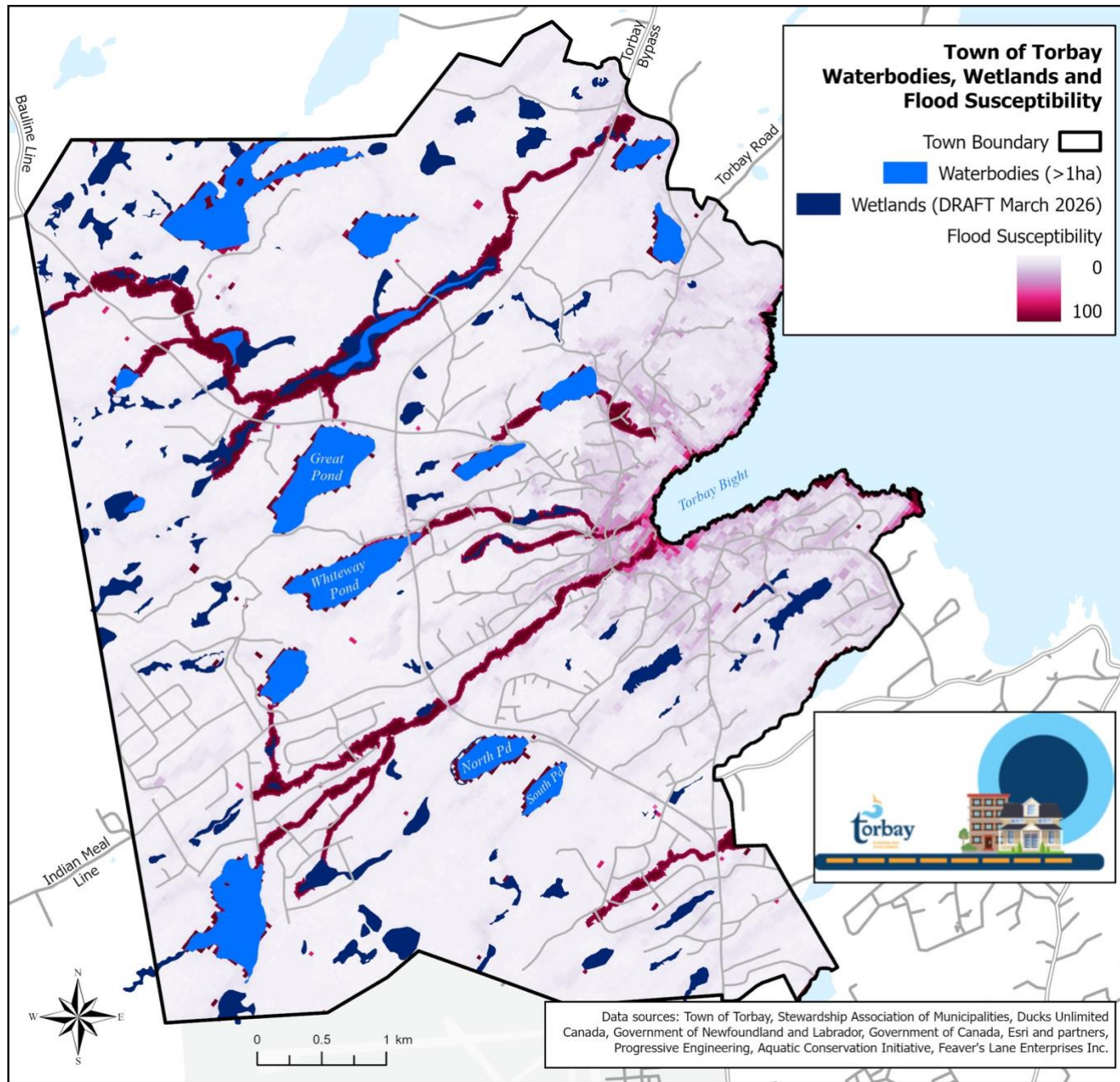
INLAND FLOODING

- increasing frequency and intensity of extreme precipitation events
- Historical 1-in-100 year events are becoming more like 1-in-25 year events

The Town commissioned studies in 2018-2019 to identify flood risk areas and mitigation options and has been implementing the resulting Stormwater Management Plan:

Risk Area	Study Finding	Study Recommendation	Status
Skipper's Landing (near Civic #11)	Drainage ditch too small causing basement/property flooding in heavy rain	Widen/deepen ditch	Completed (2021-2022)
Western Island Pond Drive (Civic #30)	Property floods during major storms because two culverts are undersized and runoff pools	Upsize culverts	Ongoing (2025-2026)
Middle Three Island Pond Road	Two culverts under gravel section likely too small for a 100-year storm, risking road washout	Lower priority as little infrastructure in immediate area	Investigating
Bauline Line	Several culverts are too small	Upsize culverts	Provincial Jurisdiction
Bridge Road (Civic #20)	Brook overtops and floods property; house sits nearly level with stream	Detention Pond	Planned
Rattling Brook Road	Ponding at culvert inlet; backs up and overtops road in extreme storms	Upsize culverts and construct berms	Investigating
Cannon Marsh Road	Culverts overwhelmed and in need of repairs	Upsize culverts and construct berms	Completed (2020-2021)
Country Drive (Whiteway Pond outlet)	Culverts undersized; 100-year storms would flood the road	Upsize culverts and construct berms	Ongoing (2026)

Risk Area	Study Finding	Study Recommendation	Status
Hickey's Lane & Country Drive (intersection)	Culvert overtopping sends flow across intersection in major storms	Construct berm	Completed (2020-2021)
Russworthy Place	Culvert too small; localized flooding in 100-year events	Construct berm	Investigating
Crowe's Lane	History of road washouts: four culverts are too small for extreme storms, risk of another washout	Bigger culverts, wider channel, lower pond	Planned (2026)
Anstey's Cove Lane & Davalan Place	Berm added post-2014 but flooding still predicted in updated 100-year storms; flow bypasses berm into streets.	Lower both ponds 1 foot to add storage, upgrade stream/ditch to carry runoff.	Investigating
Rosebud Street / Cordelia Crescent	Damaged culvert causes the stream to overtop in heavy rain, flooding one property and affecting a nearby playground.	Upsize culverts and construct berms	Completed
Forrest River Road Subdivision	Adjacent stream overtops during heavy rain and spills into the subdivision	Construct berm	Investigating
Civic #23 Lynch's Lane	Identified as at risk: stream hits capacity, flow spills into the wetland	Build a berm or retaining wall	Planned (2026)
Mahon's Lane	Flood modelling shows up to ~1.0 m depth near homes with potentially high speed flows, creating some safety risk.	Build a berm or retaining wall	Planned (2026)
COMPOUNDING HAZARDS → Drought, Wildfire (both can leave land especially dry and more susceptible to flooding)			
RELATED COMMUNITY CONCERNS → Housing Development (new development must not create more flooding downstream)			



Flood risk is higher near wetlands or bodies of water such as ponds, rivers, and streams because they are typically in relatively low-lying areas.

If wetlands are disturbed, such as by development, flood risk can increase downstream because wetlands provide natural storage for excess water.

The Town of Torbay has been working on an updated map of the community's wetlands to inform both the climate vulnerability assessment/action planning and overall community development planning.

The map to the left shows the state of this wetland identification exercise as of March 2026 (dark blue), and also highlights the waterbodies (lighter blue), and relative flood susceptibility (darker pink and red areas being higher risk for flooding than lighter pink and white areas).

EXTREME TEMPERATURES

- hotter days expected more often than experienced historically
- destabilized climate system can also result in extreme cold beyond what we're used to

Risk/Vulnerability to Service Area/Population	Impact/Implications
Extreme heat is a health risk to individuals in private residences (particularly those that are isolated, elderly, or have pre-existing conditions) and retirement/long-term care facilities	<ul style="list-style-type: none"> • Seniors and children are especially vulnerable to extreme heat. Death can result in severe cases, as was the case for over 600 people in BC in 2021. • Most homes in NL do not have a source of cooling • Potential for compounding risk if heat event is aligned with water supply issues or power outage
Extreme heat is a health risk to individuals in public institutions (e.g., children in schools or day cares, guests at community centres, staff at Town facilities)	Lack of cooling in these institutions could result in cancellation of programming
Extreme heat and generally higher summer temperatures may have impacts on tourism (East Coast Trail and other outdoor attractions/community spaces)	Increasing temperatures may have a positive impact on outdoor tourism and activity, though the prevalence of more very hot days may be a deterrent to some, or individuals may become distressed if they are not equipped for the weather (carrying enough water, etc.). A warmer climate will also change which pests are active and when, such as ticks.
Extreme cold can also put vulnerable populations at risk, particularly if combined with power outages	Compared to extreme heat, extreme cold is somewhat less of a concern because: 1) the overall trend is that winters are getting warmer because of climate change, 2) all homes and buildings in NL are already equipped with heating systems, and 3) while extreme cold can also be fatal in extreme situations, that is a less likely occurrence compared to an extreme heat event
Agriculture & home gardens	Higher summer temperatures and longer summers may have positive impacts on agriculture in Newfoundland, however, periods of extreme heat can stress crops, as well as the presence of more or new pests.
COMPOUNDING HAZARDS → Drought, Wildfire, Power Outages (each would make dealing with extreme heat more difficult)	

WILDFIRE

- increasing risk of fire weather (dry, warm, and windy)

Risk/Vulnerability to Service Area/Population	Impact/Implications
Health risk and disruption to usual activities due to wildfire smoke (which may travel from a fire that is not located directly in the Town)	<ul style="list-style-type: none"> • Exacerbation of existing respiratory conditions, cancellation of outdoor events • If combined with an extreme heat event, may introduce additional risk/complication as windows and air exchangers should be closed/off to keep smoke out, but those without cooling systems may rely on these things to cool the house
Middle Three Island Pond Road has one route in/out. All properties along Bauline Line may be at higher risk due to being surrounded by forest (see Image 1 below)	Isolation risk, delayed emergency response, difficult evacuations (especially for mobility-limited residents); potential for residents to be cut off during fast-moving events
Potential impact on tourism (East Coast Trail)	Wildfires are becoming more likely in all forested areas. When conditions are very dry, trails may have to be closed for safety.
Risk to all private properties	Any property is at risk if a wildfire moves through the Town. Impacts could be catastrophic.
North Pond (and future Great Pond) water supply are surrounded by forest (see Image 1 and 2 below)	A fire near the water supply could have negative impacts such as contamination from ash or fire suppression substances, or depletion of the supply due to suppression efforts
COMPOUNDING HAZARDS → Drought, Extreme Heat (both can contribute to fires starting and make dealing with fire harder)	

Image 1 – Northern Torbay is quite heavily forested. Bauline Line and Middle Three Island Pond Road in particular are surrounded by forest with limited/singular road access. Area surrounding future water supply, Great Pond, is forested.

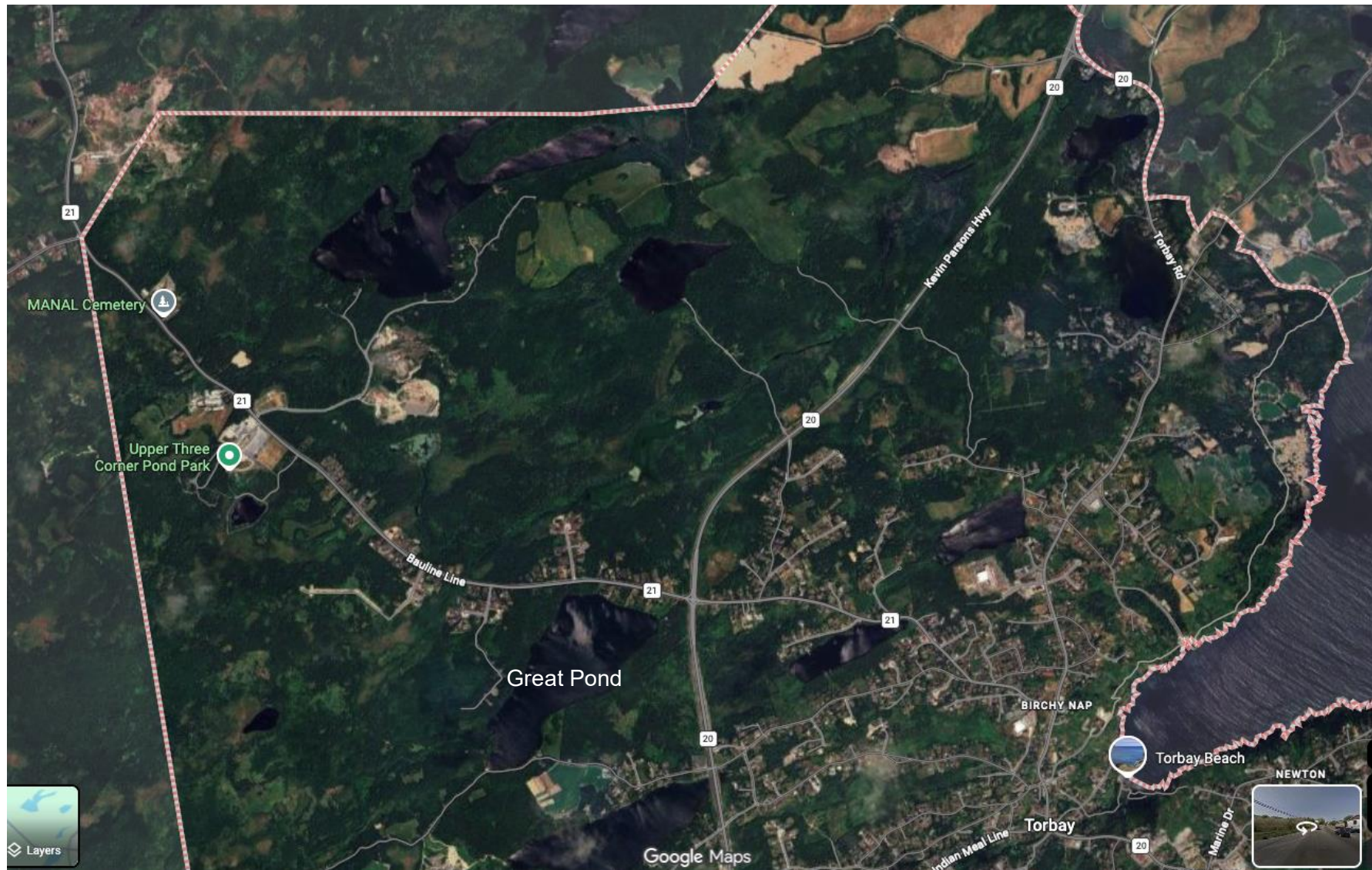
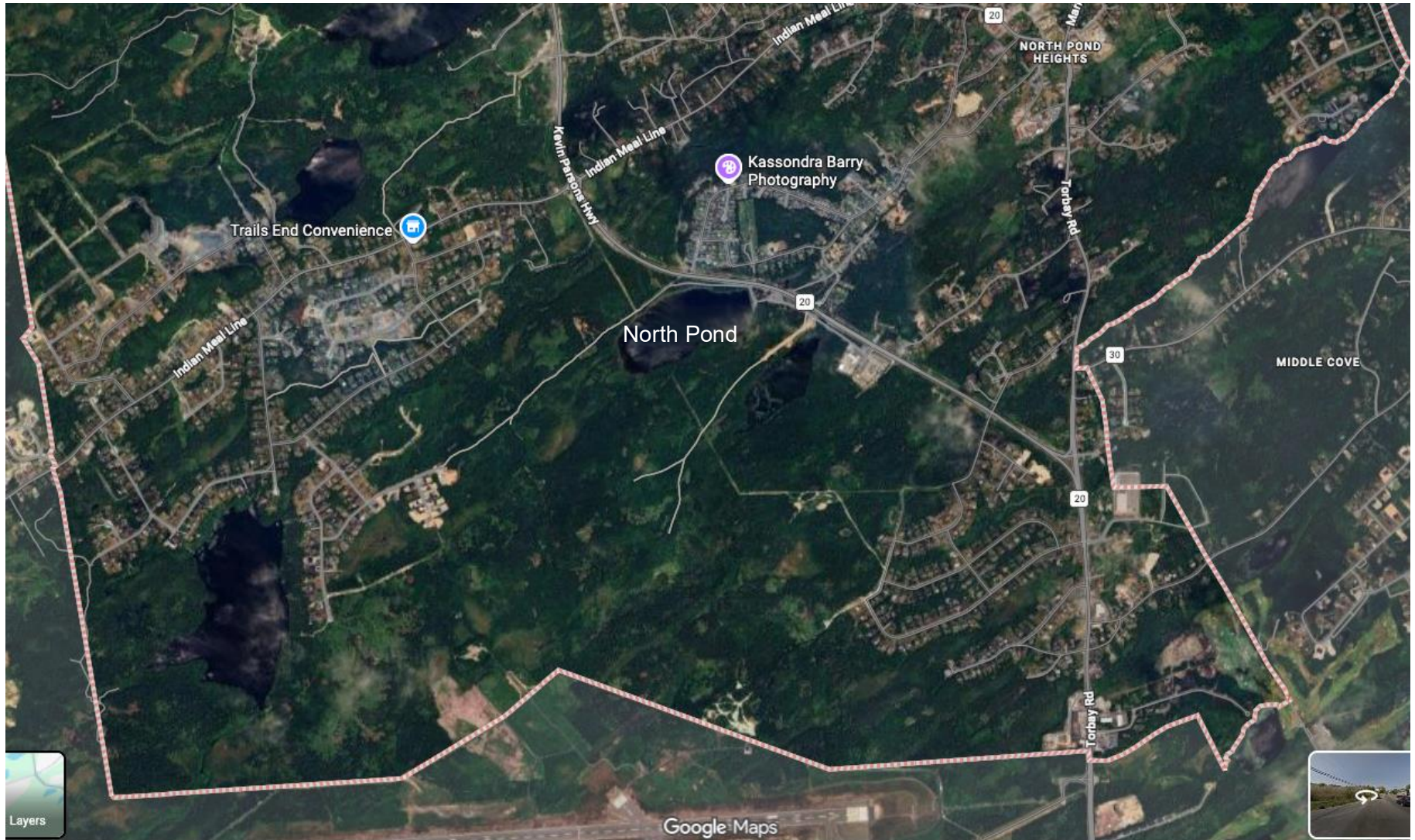


Image 2 – There is a large area of forest in Southern Torbay as well, however, it is likely to be more well monitored due to its proximity to the airport, and the neighbourhoods are less isolated. Area surrounding current water supply, North Pond, is forested.



STORMS

- storms are becoming more frequent and intense (precipitation, wind, and coastal impacts)

Risk/Vulnerability to Service Area/Population	Impact/Implications
Strong winds, potentially related to Atlantic hurricanes which are becoming more frequent and intense	<ul style="list-style-type: none"> ● Damage to public and private property, including from flying ocean/coastal debris. ● Downed trees and/or powerlines
Heavy snow events	<ul style="list-style-type: none"> ● Impacts to transportation network, more plowing demands ● Potential isolation of vulnerable populations
Rain-on-snow or freezing rain events (due to winter temperatures hovering around zero more often)	<ul style="list-style-type: none"> ● Can lead to flooding or dangerous icy conditions ● More freeze-thaw cycles in milder winters could increase strain on infrastructure like pavement, resulting in more potholes and more repairs
COMPOUNDING HAZARDS → Inland Flooding, Coastal (storms can contribute to impacts in each of these categories)	

COASTAL

- Sea level rise expected to be about 1 m by 2100
- Hurricanes becoming more frequent and intense in the Atlantic
- Atlantic Ocean is warming and becoming more acidic, changing the ecosystem

Risk/Vulnerability to Service Area/Population	Impact/Implications
Torbay Beach + Island Pond Brook Trail + Tom Jennings & Tom Gosse Stage (see Image 3 below)	<ul style="list-style-type: none"> ● A storm surge and/or sea level rise could impact The Battery (parking lot and trail along the beach) and could cause North Pond Brook to back-up, potentially causing flooding upstream ● Flooding of the stormwater/sewer outfall pipe located on Torbay Beach could cause sewer back-ups or upstream flooding ● Historically significant area (Amhurst National Historic Site) - Disruption in this area could have an impact on the tourism industry ● It would take a severe event to directly impact homes on Lower Street
Tapper's Cove Wharf & Harbour Authority (see Image 4 below)	<ul style="list-style-type: none"> ● A storm surge and/or sea level rise could wash out the wharf and the parking lot, significantly impacting the commercial fishery ● This would also impact East Coast Trail hikers and tourists who use this location as a lookout and parking spot to access Father Troy's Trail
Silver Mine Head (see Image 5 below)	One section of Silver Mine Head path may be impacted by a moderate-severe storm surge event
COMPOUNDING HAZARDS → Inland Flooding (water moving toward the coast can combine with water moving in from the coast, creating a worse flooding situation), Storms (high winds can result in high waves/storm surges)	
Tourism - Iceberg Watching	There may be more icebergs some years in the nearer future as ice sheets break apart more easily, but long term there is likely to be less and less and eventually none as the ice completely melts before it ever gets to NL due to the warmer ocean.
Fishery	Fisheries may need to completely adjust which species they target or modify fishing locations or times due to shifting ecosystems
RELATED COMMUNITY CONCERNS → Economy	

Image 3 – Torbay Beach considering a 3.7 m water level, which could represent (for example), a Hurricane Fiona-level storm surge (2.7 m) on top of 1 m of sea-level rise.

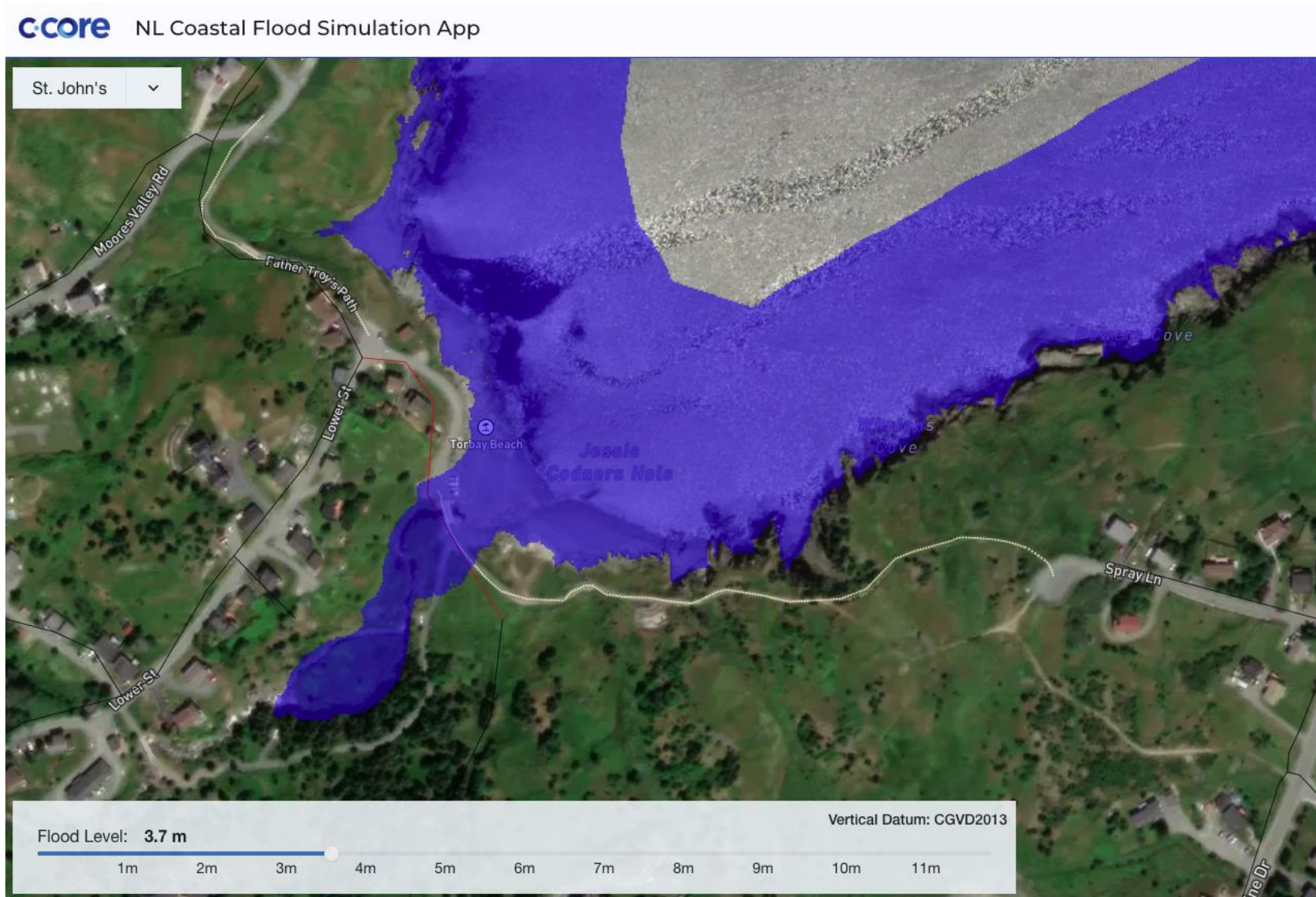


Image 4 – Tapper's Cove Wharf & Harbour Authority considering a 3.7 m water level, which could represent (for example), a Hurricane Fiona-level storm surge (2.7 m) on top of 1 m of sea-level rise.

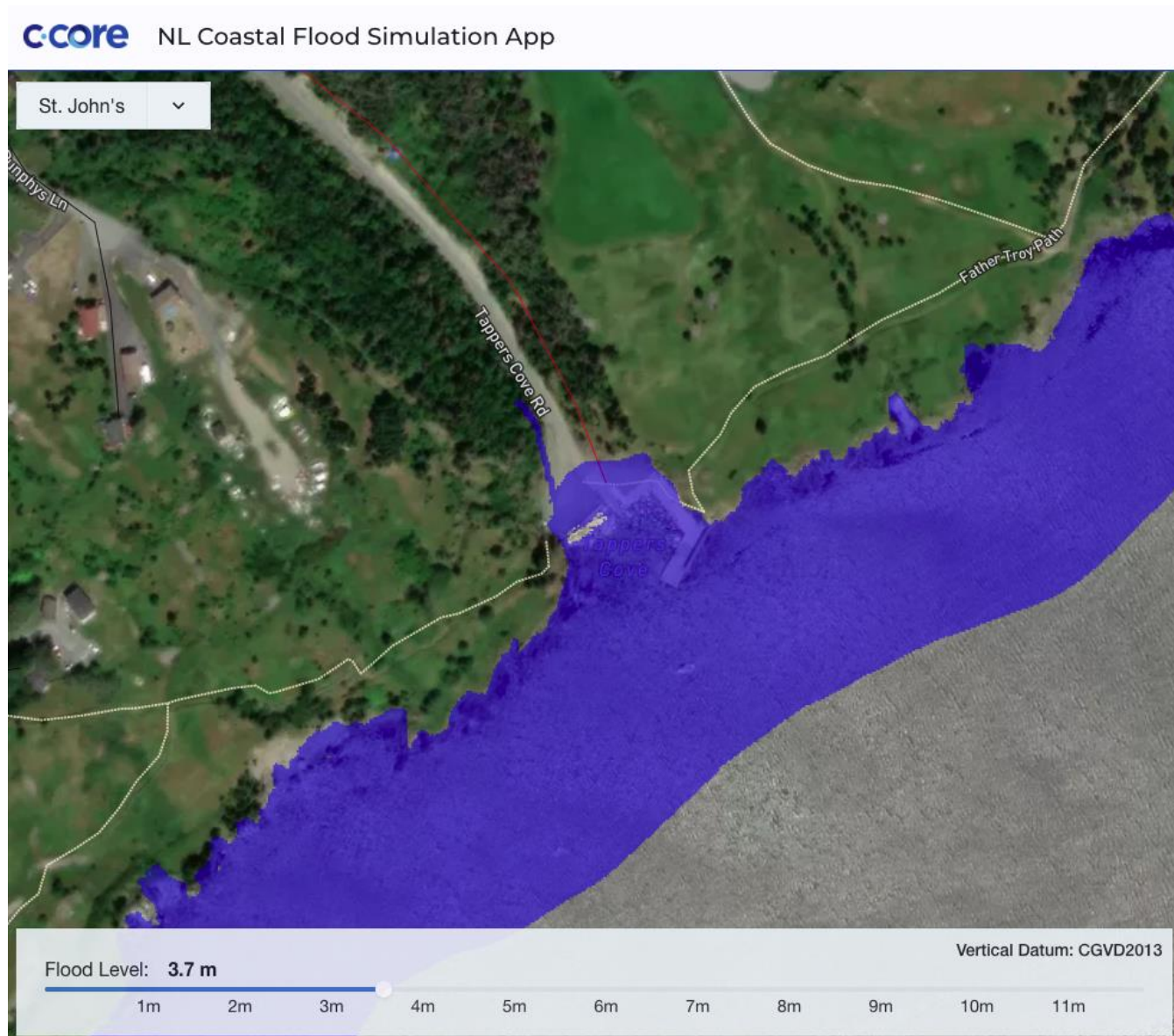


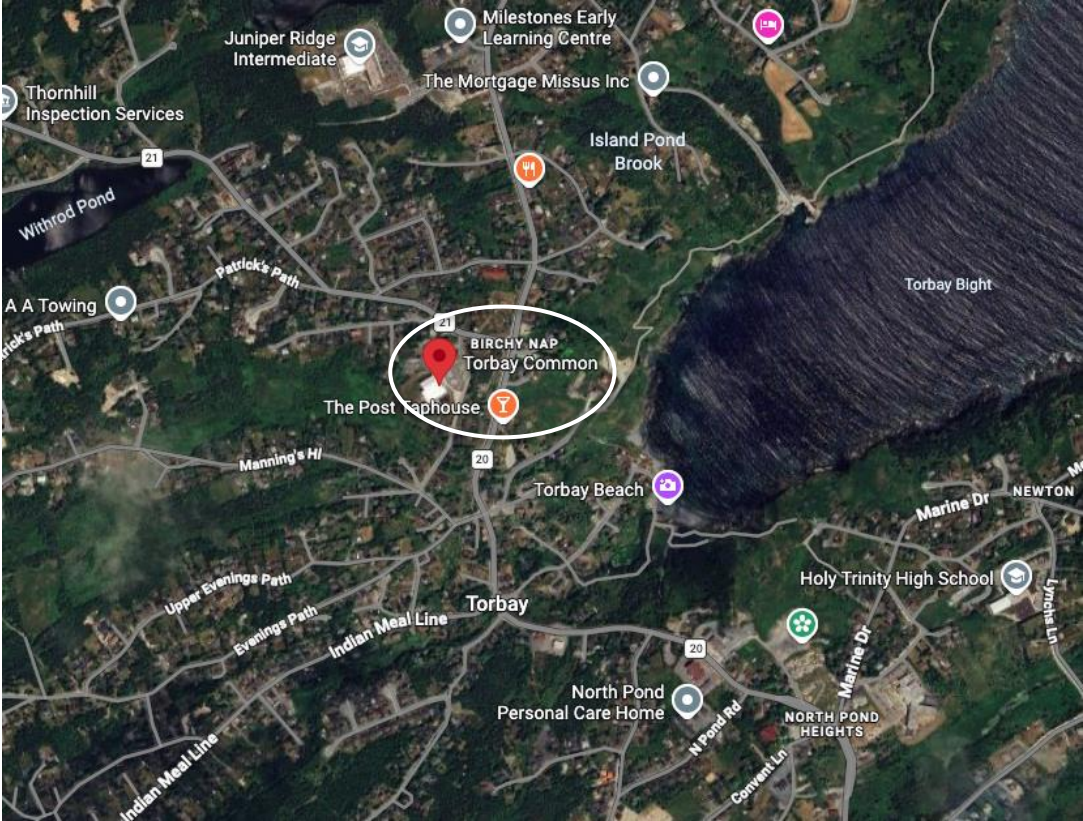
Image 5 – Silver Mine Head considering a 3.7 m water level, which could represent (for example), a Hurricane Fiona-level storm surge (2.7 m) on top of 1 m of sea-level rise.



EMERGENCY RESPONSE

Emergency response and disaster management are related to climate change adaptation, but there are distinct differences. The goal of climate change adaptation planning is prevention – using local climate change projections to inform our decision-making and take **proactive** measures to mitigate risks. Emergency response planning considers how we **react** when an incident occurs, climate change-related or otherwise.

Climate change is impacting which risks we are susceptible to, how often, and to what degree. We are also seeing an increase in **compounding and/or cascading risks** – situations where multiple impacts are occurring at once, or when one impact leads to another. For example, an extreme heat event introduces public health risks on its own, but if the extreme heat event corresponds with a power outage or drought, the risks are even higher as it is more difficult to keep people cool and hydrated – multiple risks are compounding in this case. An example of cascading risks could be how after a wildfire occurs and large amounts of forest are destroyed, the ground is less able to absorb water, increasing the risk of flooding during the next significant precipitation event.



Emergency response planning must consider the increasing likelihood of compounding or cascading risks by considering many different potential scenarios. **This climate change vulnerability assessment will inform future revisions of the Town of Torbay’s Emergency Management Plan.**

The Town’s current Emergency Management Plan includes identification of primary and alternate reception, shelter, and warming centres – **Torbay Common** being the primary location for all purposes (8 Kinsmen Place, pinned on the map to the left).

Emergency preparedness is also important at the household level. Resources are available on the Town website: <https://www.torbay.ca/town-hall/emergency-preparedness/>