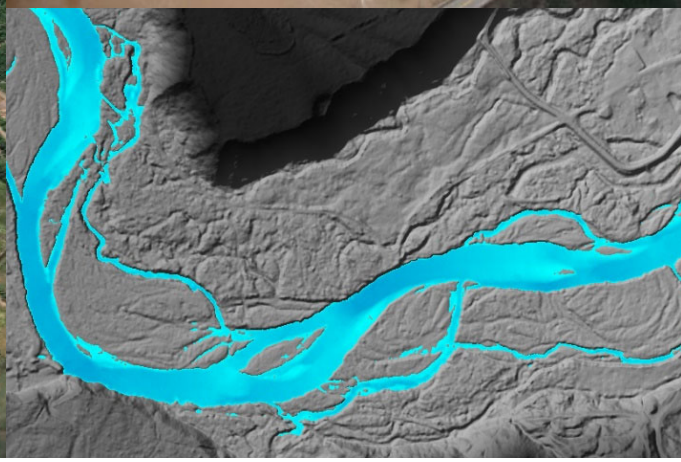
Salmon & White Rivers Flood Risk Assessment

Project # 2221-49200 | Revision 0 | April 4, 2019



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2221-49200

1. INTRODUCTION

McElhanney Limited was retained by the Strathcona Regional District (the District) to complete a flood risk assessment for the Salmon and White Rivers. The report has been developed to meet the requirements of the National Disaster Mitigation Program (NDMP), Stream 1. Specifically, the report is structured around gathering the necessary information to fill out the Risk Assessment Information Template (RAIT) and meet the requirements to pursue NDMP Stream 2 funding. In addition to the NDMP requirements, it is also intended that this report can be used to support the District when developing their own initiatives including emergency preparedness planning, input into GIS systems, budgeting for future investigations or mitigation and land use planning.

1.1. SCOPE OF WORK

This project was completed utilizing funding from National Disaster Mitigation Program (NDMP). In recognition of increasing disaster risks and costs, the Government of Canada is investing $200 million over five years for the NDMP. The NDMP addresses flood risks and costs and builds the foundation for informed mitigation investments that could reduce the effects of flood events in the future. Public Safety Canada established the NDMP in April 2015 to build a body of knowledge on flood risks in Canada and invest in foundational flood mitigation activities. Activities include developing a wider understanding of flood risks and employing effective mitigation strategies to reduce the impacts of flooding.

Funding for the NDMP is allocated to recipients via four streams:

Stream 1 (Risk Assessments) provides funding for the completion of risk assessments to inform flood risks. Risk assessments are the foundational step in disaster mitigation. These risk assessments will identify flood hazards, potential impacts, and community and infrastructure vulnerabilities, as well as the overall flood risk profile for the area.

Stream 2 (Flood Mapping) provides funding for the development and/or modernization of flood maps. A flood map identifies the boundaries of a potential flood event based on type and likelihood and can be used to help identify the specific impacts of a flood event on structures, people and assets.

Stream 3 (Mitigation Planning) provides funding for the development and/or modernization of mitigation plans to address flood risks. A comprehensive mitigation plan allows applicants to develop realistic and sustainable mitigation solutions by clearly outlining the plan's objectives, key activities, expected outputs, timelines, and roles and responsibilities.

Stream 4 (Non-structural and Small-Scale Structural Mitigation Projects) provides funding for other non-structural and small-scale structural disaster mitigation projects. Eligible projects would include actions such as the replacement of storm culverts, or projects that improve flood resilience by proactively preventing or mitigating damages and losses.

The Scope of Work for this assignment represents Stream 1 funded work. This report summaries the work that was basis for the completed RAIT and Stream 2 application. The completed RAIT is included in Appendix A.

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2. BACKGROUND INFORMATION COLLECTION AND REVIEW

2.1. INFORMATION REVIEWED

The risk assessment relies on existing information, including anecdotal and record information on historic flooding within the community. This information is combined with other existing information such as GIS base mapping, current 200-year floodplain mapping, Ministry of Environment historical records, building information, and infrastructure databases to determine the risk of flooding to the community.

Floodplain modelling for the 200-year event was undertaken in 1980. This modelling does not extend to cover the Village of Sayward but covers the Sayward valley immediately upstream of the village. The basis for this assessment and the completion of the RAIT has therefore been historical flooding based on anecdotal information from the District and community members.

The Regional District have previously mapped an approximate extent for the 2016 flood event which was also used in the analysis of flood risk.

2.2. PUBLIC CONSULTATION

Community engagement sessions were held on 4 and 10 December 2018 to engage with members of the public regarding flooding that has been experienced in the past.

A total of approximately 20 residents attended between the two sessions, with feedback provided across the study area. Residents and members of the community identified areas that have previously flooded, as well as the impacts of this flooding as shown on the attached maps (Appendix B). Community members were asked to provide details on the dates and extents of flooding that had been experienced as per the questionnaire in Appendix C.

Members of the public provided information on their own flooding experiences, with flood events in 1975, 1990, 2008, 2011, 2014 and 2018 specifically highlighted. A common theme in the discussion with members of the community was the concern around emergency access during flood events as well as specific property level flood risk. This presents a significant health and safety risk and is discussed later in this report.

It was apparent from the discussions with the public that the level of snow on the adjacent mountains and the speed at which it melts, followed by heavy rainfall causes a concern with public perception of flood risk, as well as changing land use in the surrounding area. Many residents also made reference to the impact of “King tides” on the level of flooding that has been experienced.

Some residents have witnessed contamination of flood water such as oil and sewage and there were many references to fast flowing water during flooding. These issues present both an environmental and health and safety concern, which is discussed later in this report.

In addition to sharing their experiences of flooding, members of the public provided input into potential mitigation to mitigate against/reduce the impact of potential flooding and these options will be assessed and reviewed as part of the later stages of work outside the scope of this report.

2.3. HISTORICAL RECORDS OF FLOODING

Review of a Ministry of Environment document “Flooding and Landslide Events Southern British Columbia 1808-2006” by D.Septer makes reference to flooding in the Sayward area in 1867, when a member of the Slocan band was referenced in the Daily Colonist on June 23, 1894 as having experienced flooding where river levels in the Pend d’Oreille River, near Sayward reached levels some 30ft above the high water mark reached during the 1894 flood.

The same report references a Louis Merigner, a Colville Valley farmer in the same newspaper as refencing flooding in 1877 in the Pend d’Oreille River, near Sayward, where water levels were as high as the 1882 level. The report references the 1882 event in the Sayward area. The 1882 event occurred in June 7-14 1882. The report details that the 1867, 1877 and 1882 floods were all as a result of spring runoff.

The report highlights flooding experienced December 30- January 3, 1927, when rain on snow resulted in widespread flooding in the area, specifically on January 4, warm rain melting snow in the mountains resulted in heavy flooding, with the Sayward Valley experiencing a severe flood after the Salmon River overflowed its banks.

One flood of particular note that the report details is in 1949 (November 26 – December 3) when a Sayward resident was drowned in a raging creek (unspecified name).

Additionally at the public consultation, there were anecdotal reports, photos & newsprint articles regarding flood events in 1975, 1990, 2008, 2011, 2014 and 2018.The public consultation highlighted that these historical flooding events are not restricted to forgotten “history” , with flooding occurring on a semi-regular basis, with most residents able to recall several flood events which had personally affected either their properties, or their access in and out of the Sayward valley.

2.4. METEOROLOGICAL AND SEASONAL CONDITIONS

From the public consultation and the information provided by members of the community it is apparent that many of the flooding incidents that have occurred are as a result of heavy rain following a period of high snowmelt and “King tides” or a combination of both.

Although snowpack data for the flood events was not available at the time of this study, it is reasonable to conclude that snowmelt provides a large contributing factor to the risk of flooding in the study area and it is recommended that a regional hydrologic analysis is undertaken as part of the hydraulic modelling, including analyzing the risk from the potential impacts of climate change. Engineers and Geoscientists of British Columbia and Provincial Jurisdictions such as The Ministry of Forests, Lands, Natural Resource Operations and Rural Development, Ministry of Transportation and Infrastructure and Ministry of Environment and Climate Change Strategy require that the potential effects of climate change be considered in a design. To understand the changes to climatic conditions anticipated by 2080, it is recommended that the Plan2Adapt tool that was developed and maintained by the Pacific Climate Impacts Consortium (PCIC) is utilized. This tool generates maps, graphs, and data describing projected future climate conditions for various regions within British Columbia. These are drawn from a set of 30 Global Climate Model (GCM) projections based on 15 different GCMs, each driven by two different greenhouse gas emissions scenarios. The emissions scenarios are the A2 (high) and B1 (low), which predict atmospheric concentrations of greenhouse gases in the year 2100 of approximately 1250 ppm and 600 ppm, respectively. The Plan2Adapt tool presents the median changes predicted by this ensemble of model projections. The ensemble will predict a range of possible outcomes; the median is a robust estimate of the central tendency of the ensemble members.

For the Salmon River watershed, it is estimated that precipitation as rainfall will increase due to climate change for the Fall/Winter/Spring seasons by approximately 10% by the year 2080. Due to an increase in winter temperatures, snowpack is expected to drastically decrease during this time. Due to the rain-on-snow, or rainfall during freshet flooding which sometimes occurs, it is difficult to predict exactly how climate change may affect flooding in this area.

Summary of Climate Change for Strathcona in the 2080s

Climate Variable	Season	Projected Change from 1961-1990 Baseline	
		Ensemble Median	Range (10th to 90th percentile)
Mean Temperature (°C)	Annual	+2.5 °C	+1.3 °C to +3.7 °C
Precipitation (%)	Annual	+8%	+1% to +16%
	Summer	-12%	-32% to -0%
	Winter	+12%	+1% to +22%
Snowfall* (%)	Winter	-33%	-59% to -13%
	Spring	-72%	-86% to -14%
Growing Degree Days* (degree days)	Annual	+521 degree days	+270 to +832 degree days
Heating Degree Days* (degree days)	Annual	-877 degree days	-1328 to -467 degree days
Frost-Free Days* (days)	Annual	+35 days	+19 to +52 days

The table above shows projected changes in average (mean) temperature, precipitation and several derived climate variables from the baseline historical period (1961-1990) to the **2080s** for the **Strathcona** region. The ensemble median is a mid-point value, chosen from a PCIC standard set of Global Climate Model (GCM) projections (see the 'Notes' tab for more information). The range values represent the lowest and highest results within the set. Please note that this summary table does not reflect the 'Season' choice made under the 'Region & Time' tab. However, this setting does affect results obtained under each variable tab.

* These values are derived from temperature and precipitation. Please select the appropriate variable tab for more information.

3. RISK ASSESSMENT

3.1. RISK VS HAZARD

The EGBC guidelines on Flood Mapping in BC define Inundation Maps as “Topographic maps showing the extent of floodwater in plan, under defined flood events”; Flood Hazard Maps as “Maps that go beyond inundation maps by providing information on the hazards associated with defined flood events, such as water depth, velocity and duration of flooding”; and Flood Risk Maps as “Maps that reflect the potential damages that could occur as a result of a range of flood probabilities, by identifying populations, buildings, infrastructure, residences and the environment, cultural and other assets that could be damaged or destroyed.”.

This report considers flood risk only; detailing modelling and risk analysis is proposed as part of the next stages of the project, should funding be received.

The mapping produced as part of this report used the District’s base GIS data and the flood mapping data for the 200-year flood event which was completed by the Provincial government in 1980. The information obtained from the public consultation was also mapped onto the GIS base to identify trends and clusters of flooding which have been used in the flood risk assessment below.

3.3. IMPACTS/CONSEQUENCES ASSESSMENT

The area of inundation from the existing modelling does not extend to the centre of the Village of Sayward but includes many residential areas including associated infrastructure. The study area includes residential and commercial development, with associated infrastructure and roads. There are also schools, a hospital, conservation areas, municipal buildings, library, campground, parks, and trails within the study area, many of which were highlighted in the public consultation as having been affected by flooding.

The attached maps show the areas that could be at risk during the 200-year event based on current modelling and identify key infrastructure within Sayward that has been included in the flood risk assessment.

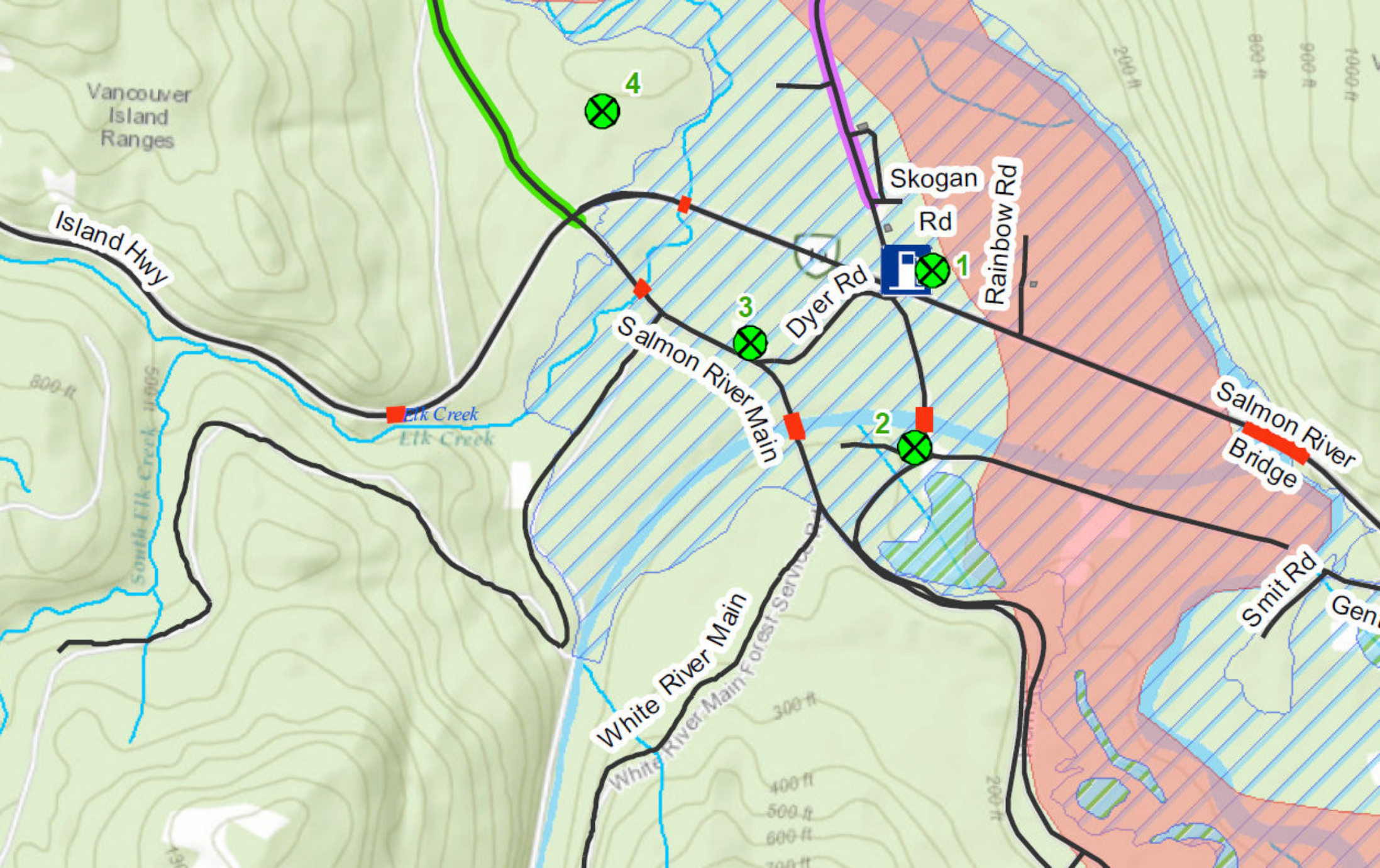
The risk assessment included a review of the following impact categories within 5 impact classes as presented by the National Disaster Mitigation Program:

- People and Societal Impacts
    - Fatalities
    - Injuries
    - Displacement
- Environmental Impacts
- Local Economic Impacts
- Local Infrastructure Impacts
    - Transportation
    - Energy and Utilities
    - Information and Communications Technology
    - Health, Food, and Water
    - Safety and Security
- Public Sensitivity Impacts

Each of these impacts has been assessed in the sections below, along with an explanation of the risk rating as assigned in the RAIT.

Table 1: Potential Flood Environmental Hazards

Potential Flood Environmental Hazard #	Description and Location	Hazard Description
1	Co-op Gas Station at intersection of Sayward Road and Highway 19.	Underground fuel storage tanks and related dispensing facilities. Potential mobilization of fuel contamination in water.
2	Sayward's White River Resort on Sayward Road 0.5 km south of Highway 19 at Salmon River Bridge.	Underground fuel storage tanks and related dispensing facilities. Potential mobilization of fuel contamination in water.
3	Western Forest Products yard on Salmon River Road 0.5 km southwest of Highway 19 intersection.	4 above-ground fuel storage tanks and related dispensing facilities. Potential mobilization of fuel contamination in water.
4	Former Sayward municipal landfill and MacMillan Bloedel ash landfill northeast of Salmon River Road bridge over Highway 19.	Landfilling of municipal waste and industrial wood ash. Potential mobilization of metals and volatile organic contamination in water.


Vancouver Island Ranges
Island Hwy
Elk Creek
Elk Creek
South Elk Creek
Salmon River Main
Dyer Rd
Skogan Rd
Rainbow Rd
Salmon River Bridge
Smit Rd
White River Main
White River Main Forest Service
4
3
1
2
800 ft
300 ft
400 ft
500 ft
600 ft
200 ft

3.3.4. Local Infrastructure Impacts

It is recognized that there are several local infrastructure components, that are fundamental to the viability and sustainability of a community. The NDMP therefore includes local infrastructure in the assessment process to identify components that may be at risk that would have a wider impact on the community. The area includes infrastructure such as roads, storm water infrastructure, and sanitary system infrastructure.

Transportation Routes & Emergency Access

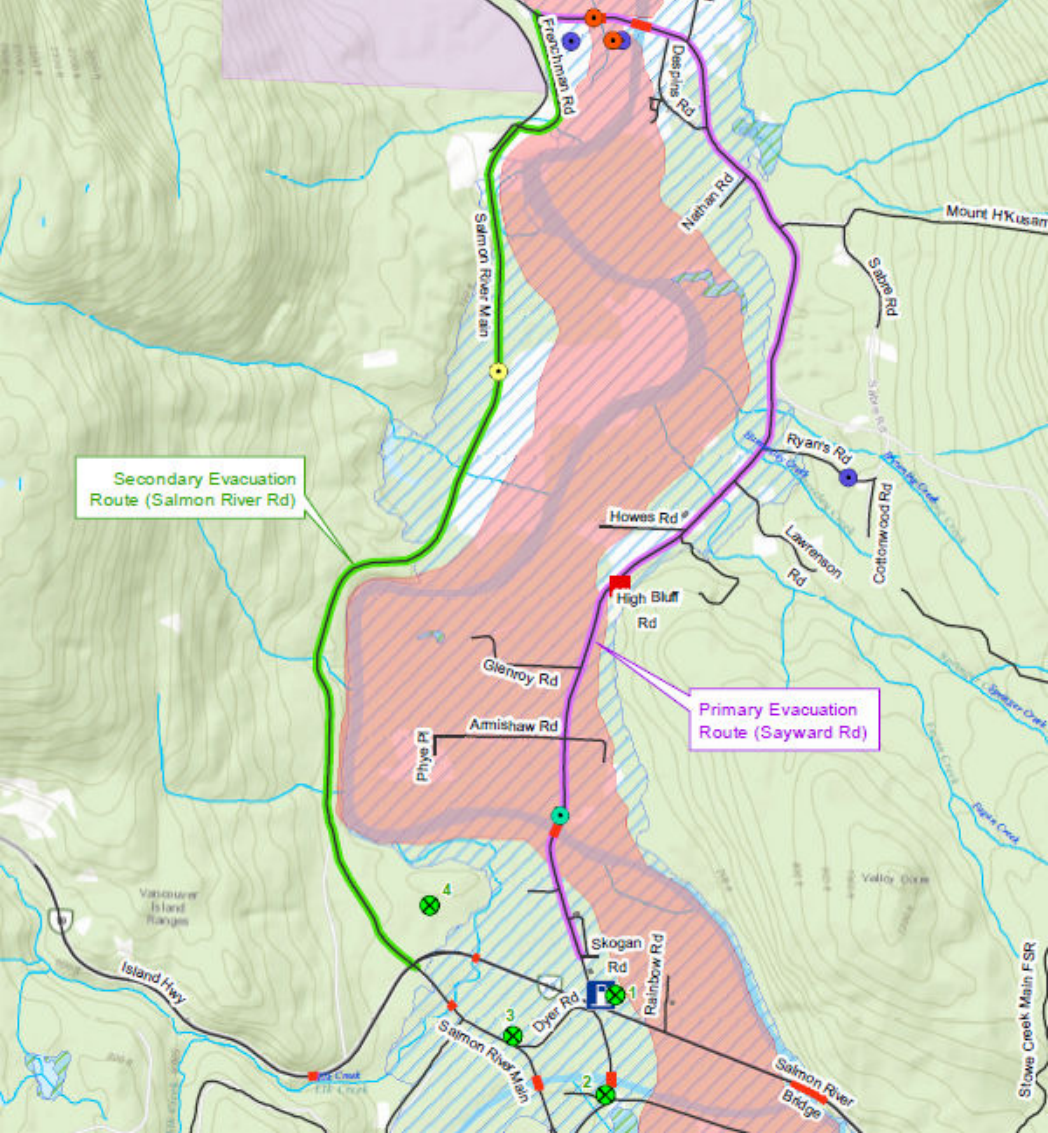
Sayward Road is the main access into the Village of Sayward from the Island Highway. There exists only one alternate access, the Salmon River Main, which generally runs on the opposite side of the Sayward Valley. Based on review of the existing 200-year floodplain extent & discussion with residents, there are indications that both these roads are at risk of flooding and have flooded during past flood events. This can result in the village being completely cut-off from road access.

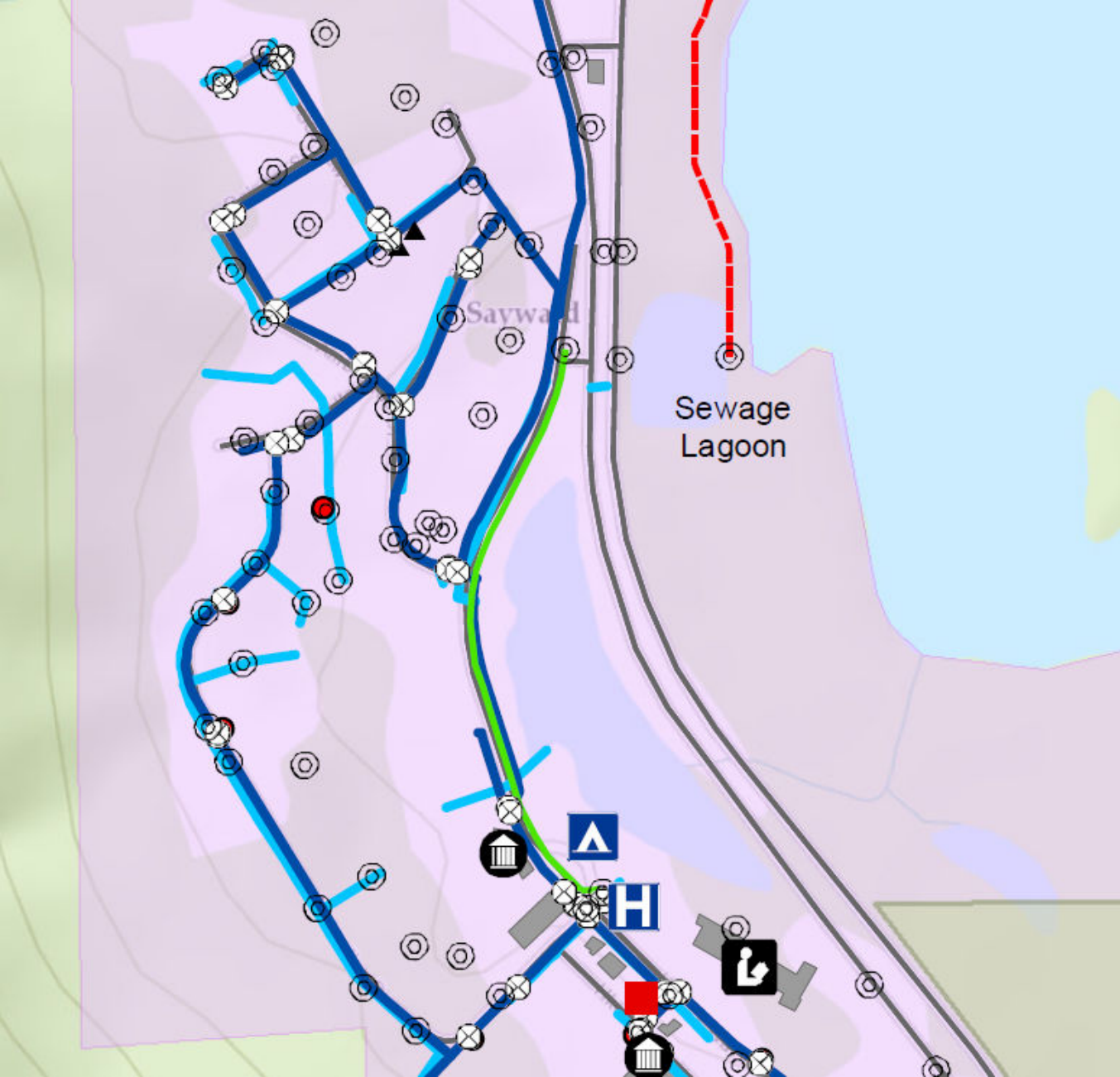
In addition to the Salmon River Main, the Island Highway itself is also shown to be at risk in the 200-year extent. This is a vital north-south transportation corridor for Vancouver Island, and is the only road link for the Southern island to Sayward and the rest of Northern Vancouver Island. Although the Island Highway itself does not flood as often as Sayward Rd / Salmon River Main, it likely would be at risk during a large (200-year) flood event.

A common theme throughout all of the public consultation was the risk of people being cut off or roads becoming inaccessible. Insufficient emergency access presents a great risk for emergency response purposes, as well as economic impacts as discussed above. The public consultation identified a number of bridges that have also experienced flooding, and in some cases, structural damage. These bridges are highlighted in red on the attached maps.

Alternative access & evacuation plans should be considered by the SRD. Although anecdotal evidence from residents is that past (recent) flooding events have only resulted in short-term road blockages of hours, a larger flood event could restrict or cut-off access due to high water for days. If bridges are damaged/washed-out, this could extend to weeks. Alternative access/evacuation possibilities are water access or helicopter access.

Given the far reaching and wide-scale disruption caused to the local infrastructure, the risk rating for transportation has been assigned as 5, the highest level as it is felt that this is the greatest risk to the local community.


Secondary Evacuation Route (Salmon River Rd)
Primary Evacuation Route (Sayward Rd)
Frenchman Rd
Deepline Rd
Nathan Rd
Salmon River Main
Mount H'Kusam
Sabre Rd
Ryan's Rd
Howes Rd
Lawrenson Rd
Cottonwood Rd
High Bluff Rd
Glenroy Rd
Armishaw Rd
Phye Pl
Skogan Rd
Rainbow Rd
Dyer Rd
Island Hwy
Salmon River Main
Salmon River Bridge
Stowe Creek Main FSR
1
2
3
4


Sewage
Lagoon

4.2. NEXT STEPS

The regional District should take the following actions to progress this risk assessment into a more detailed study that can be used to identify potential mitigation options:

- Undertake flood mapping to assess how the area would be affected by flooding events. This would identify the geographical boundaries of several potential flooding events based on the type and likelihood of flooding. An application for Stream 2 NDMP funding can be prepared to undertake this.
    - As part of this exercise, update and extend existing floodplain modelling, to include the interaction with tidal flooding. This help with planning for flood mitigation and also provides a tool for planning purposes when assessing future development.
- Review Sea Level Rise (SLR) estimates, gather estimates of storm surge and/or wave run-up, and compare against the height around the sewage lagoon to determine the potential vulnerability to ocean inundation or damage from storm events (independent from large flood events within the river);
- Use the updated flood mapping to identify structures, people and assets that are within the flood zone that are most likely to be impacted by the flood event and development site-specific response plans, targeted information campaigns, etc.
- Update this risk assessment with data from flood mapping to identify and classify potential hazards and economic impacts of flooding.
- Conduct a detailed assessment of the fuel storage tank locations, including residential fuel oil tanks, determine what flooding safeguards are in place and what improvements, if any, are feasible.
- Conduct a groundwater well location and condition survey to identify locations where the aquifer is vulnerable to contamination via surface water intrusion.

- Conduct a detailed assessment of the former Sayward Municipal / Macmillan Bloedel ash landfill location to determine the extent of vulnerability to floodwater intrusion and determine whether additional protection is needed for this location.
- Use updated flood modelling to identify safe emergency access and egress routes.
- Liaise with external stakeholders, to discuss the potential flood risk.
- Use the updated risk assessment to identify mitigation goals (Stream 3 funding from NDMP can be applied for to undertake this). Identify objectives and strategies to meet these goals, including the identification of specific mitigation projects.
- A review of mitigation options should also consider the options for providing warning systems to alert residents to potential upcoming flooding and provide information on evacuation routes.
- Provide mapping to the public identifying evacuation routes, with the potential to provide this a “live” system with real-time updates on road conditions and flooding levels.
- Undertake a Return on Investment (ROI) analysis for proposed mitigation measures to identify preferred option/s.
- Undertake a public consultation on the proposed mitigation option/s.
- Identify required geotechnical investigation to evaluate the soils conditions in the area and the potential impact of this on flooding and proposed mitigation options.
- Review potential funding sources (including Stream 4 NDMP) to implement preferred mitigation option/s.

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Ottawa, Canada
K1A 0P8

National Disaster Mitigation Program (NDMP)
Risk Assessment Information Template

Risk Event Details			
Start and End Date	Provide the start and end dates of the selected event, based on historical data.	Start Date: 01/01/1975	End Date: 01/01/2018
Severity of the Risk Event	Provide details about the risk, including: • Speed of onset and duration of event; • Level and type of damaged caused; • Insurable and non-insurable losses; and • Other details, as appropriate.	The risk event is not based on any one historical flood event. Instead it is a combination of anecdotal information, photos, etc. from past flooding events which have been combined to form the basis of the risk event for this assessment. Flooding includes events in 1975, 1990, 2008, 2011, 2014 and 2018, as well as flooding that is experienced annually. Review of historical records indicate that flooding was experienced in the Sayward area back to 1867. Further analysis is required to determine the exact causes of the flooding that is experienced. The risk event tends to be due to heavy local rainfall, potentially in combination with a freshet event. This would lead to a rapid onset of increased water levels and velocities in the rivers. The risk event would result in local transportation and access disruptions, which is the main concern for the local community, with previous evacuation issues having been experienced and residents requiring evacuation by helicopter from roof tops. In addition to evacuation concerns, residents have reported that they have experienced damage to property, particularly of driveways and in basements and crawl spaces and loss of materials that are washed away during flood events. The previous flooding that has been experienced has also resulted in mobilization of contaminants, with residents reporting that they witnessed oil and sewage in flood waters.	
Response During the Risk Event	Provide details on how the defined geographic area continued its essential operations while responding to the event.	Major disruption has been experienced to the road network. There are only 2 main roads that connect Sayward to the surrounding area and flooding has been experienced on both at different times. Some areas of the community have been completely cut off with residents needing air evacuation from roof tops. Local road closures have been needed and traffic detours put in place. Residents have reported that bridges were inaccessible and some community members were evacuated as there was concern that other routes would become inaccessible. In some cases, roads have been inaccessible for up to three days and telephone connections have been disrupted.	

National Disaster Mitigation Program
Risk Assessment Information Template

		Risk Rating	Definition	Assigned risk rating
Displacement	Percentage of displaced individuals	5	> 15% of total local population	5
		4	10 - 14.9% of total local population	
		3	5 - 9.9% of total local population	
		2	2 - 4.9% of total local population	
		1	0 - 1.9% of total local population	
	Duration of displacement	5	> 26 weeks (6 months)	4
		4	4 weeks - 26 weeks (6 months)	
		3	1 week - 4 weeks	
		2	72 hours - 168 hours (1 week)	
		1	Less than 72 hours	
Supplemental information (optional)		There are only 2 road options into the town of Sayward and given the risk of inaccessibility of these potential routes, the affect of flooding would extend to the majority of the local population. Depths up to 5ft of flooding have previously been experienced and hence recovery time is likely to extend into months, although this is mostly related to infrastructure flooding. A long recovery period is expected because permanent, long-term repairs to roads and bridges generally takes months.		
B) Environmental impacts				
		5	> 75% of flora or fauna impacted or 1 or more ecosystems significantly impaired; Air quality has significantly deteriorated; Water quality is significantly lower than normal or water level is > 3 meters above highest natural level; Soil quality or quantity is significantly lower (i.e., significant soil loss, evidence of lethal soil contamination) than normal; > 15% of local area is affected	4
		4	40 - 74.9% of flora or fauna impacted or 1 or more ecosystems considerably impaired; Air quality has considerably deteriorated; Water quality is considerably lower than normal or water level is 2 - 2.9 meters above highest natural level; Soil quality or quantity is moderately lower than normal; 10 - 14.9% of local area is affected	
		3	10 - 39.9% of flora or fauna impacted or 1 1 or more ecosystems moderately impaired; Air quality has moderately deteriorated; Water quality is moderately lower than normal or water level is 1 - 2 meters above highest natural level; Soil quality is moderately lower than normal; 6 - 9.9 % of area affected	

National Disaster Mitigation Program
Risk Assessment Information Template

	2	< 10 % of flora or fauna impacted or little or no impact to any ecosystems; Little to no impact to air quality and/or soil quality or quantity; Water quality is slightly lower than normal, or water level is less than 0.9 meters above highest natural level and increased for less than 24 hours; 3 - 5.9 % of local area is affected	
	1	Little to no impact to flora or fauna, any ecosystems, air quality, water quality or quantity, or to soil quality or quantity; 0 - 2.9 % of local area is affected	
Supplemental information (optional)	The local conservation area is at risk, During times of previous flooding, members of the local community has experienced oil and sewage present in floodwaters. There are log dumps, sewage systems, the Town's sewage lagoon, a gas station, and many other potential sources of contamination present within the floodplain extents. Based on anecdotal evidence of historical flood events, there have not been any catastrophic environmental impacts due to this type of flood event. However, the potential is present and past performance is no indication of future outcomes, especially as infrastructure ages/deteriorates and development continues.		

C) Local economic impacts

	Risk Rating	**Definition**	**Assigned risk rating**
	5	> 15 % of local economy impacted	5
	4	10 - 14.9 % of local economy impacted	
	3	6 - 9.9 % of local economy impacted	
	2	3 - 5.9 % of local economy impacted	
	1	0 - 2.9 % of local economy impacted	
Supplemental information (optional)	Disruption to roads is likely to cause large-scale disruption that would affect not only local businesses, but also local residents. Anecdotal evidence indicates that local residents have experienced significant economic damages in previous events. A long recovery period is expected because permanent, long-term repairs to roads and bridges generally takes months.		

National Disaster Mitigation Program
Risk Assessment Information Template

D) Local infrastructure impacts			
	Risk Rating	**Definition**	**Assigned risk rating**
Transportation	5	Local activity stopped for more than 72 hours; > 20% of local population affected; lost access to local area and/or delivery of crucial service or product; or having an international level impact	5
	4	Local activity stopped for 48 - 71 hours; 10 - 19.9% of local population affected; significantly reduced access to local area and/or delivery of crucial service or product; or having a national level impact	
	3	Local activity stopped for 25 - 47 hours; 5 - 9.9% of local population affected; moderately reduced access to local area and/or delivery of crucial service or product; or having a provincial/territorial level impact	
	2	Local activity stopped for 13 - 24 hours; 2 - 4.9% of local population affected; minor reduction in access to local area and/or delivery of crucial service or product; or having a regional level impact	
	1	Local activity stopped for 0 - 12 hours; 0 - 1.9% of local population affected; little to no reduction in access to local area and/or delivery of crucial service or product	
Supplemental information (optional)	Infrastructure, particularly road access is considered to be the greatest risk to the local community. Roads have previously been totally cut off with residents requiring emergency evacuation by helicopter. The town of Sayward has only 2 access roads to the link it to the local area, both of these routes have experienced flooding previously. In addition, bridges have been identified as having flooded, with some structural damage experienced. Lack of access and egress into and out of the town impacts the entire community, this has therefore been given the highest risk rating possible.		
Energy and Utilities	5	Duration of impacts > 72 hours; > 20% of local population without service or product; or having an international level impact	2
	4	Duration of impact 48 - 71 hours; 10 - 19.9% of local population without service or product; or having a national impact	
	3	Duration of impact 25 - 47 hours; 5 - 9.9% of local population without service or product; or having a provincial/territorial level impact	
	2	Duration of impact 13 - 24 hours; 2 - 4.9% of local population without service or product; or having a regional level impact	
	1	Local activity stopped for 0 - 12 hours; 0 - 1.9% of local population affected; little to no reduction in access to local area and/or delivery of crucial service or product	