Stormwater Flood

Occurs when precipitation cannot infiltrate or be conveyed by drainage infrastructure. It is also called local, pluvial, or flash flooding.

EXTENTS	CONSEQUENCE
LOCAL-REGIONAL	MODERATE-HIGH

TYPE	DURATION	SEASONALITY	WARNING TIME	LIKELIHOOD
SHOCK	HOURS-DAYS	FALL-SPRING	DAYS	VERY LIKELY

About the Hazard

Stormwater flooding can damage low lying urban areas, such as basement homes, and make roads and trails impassable. It is primarily **driven** by intense rainfall events within the local hydroclimate. The likelihood of such rainfall can be influenced by large-scale climate patterns (fall and winter atmospheric rivers). Stormwater flood events are **modulated** by land use and changes (especially urbanization that increases imperviousness and reduces water infiltration into the ground) and watershed physical characteristics (local topography and soil infiltration capacity). The design and condition of stormwater systems is also critical. When these systems are blocked or flow exceeds their conveyance capacity, local flooding occurs.

What We Assessed

In the face of limited data availability, **we mapped information that provides a sense of the City's understanding of the hazard**. This is shown in the map in terms of the areas covered by stormwater modelling studies, as well as areas of concern (as observed by City ground personnel).

We also mapped projections for extreme rainfall (see the associated technical studies for results). Slightly different indices for extreme precipitation were mapped and are provided in this report under the extreme precipitation hazard section.

Recent Past | **Current** | Future | Far Future

Challenges

- Our reviews of existing studies, done by others, were limited.
- The areas outside of the stormwater systems were not studied, but pluvial flooding can occur where there is no stormwater infrastructure to convey flows.
- There are uncertainties associated with the statistical rainfall data (i.e. intensity-duration-frequency curves), as well as climate change projections.

Mapping Results

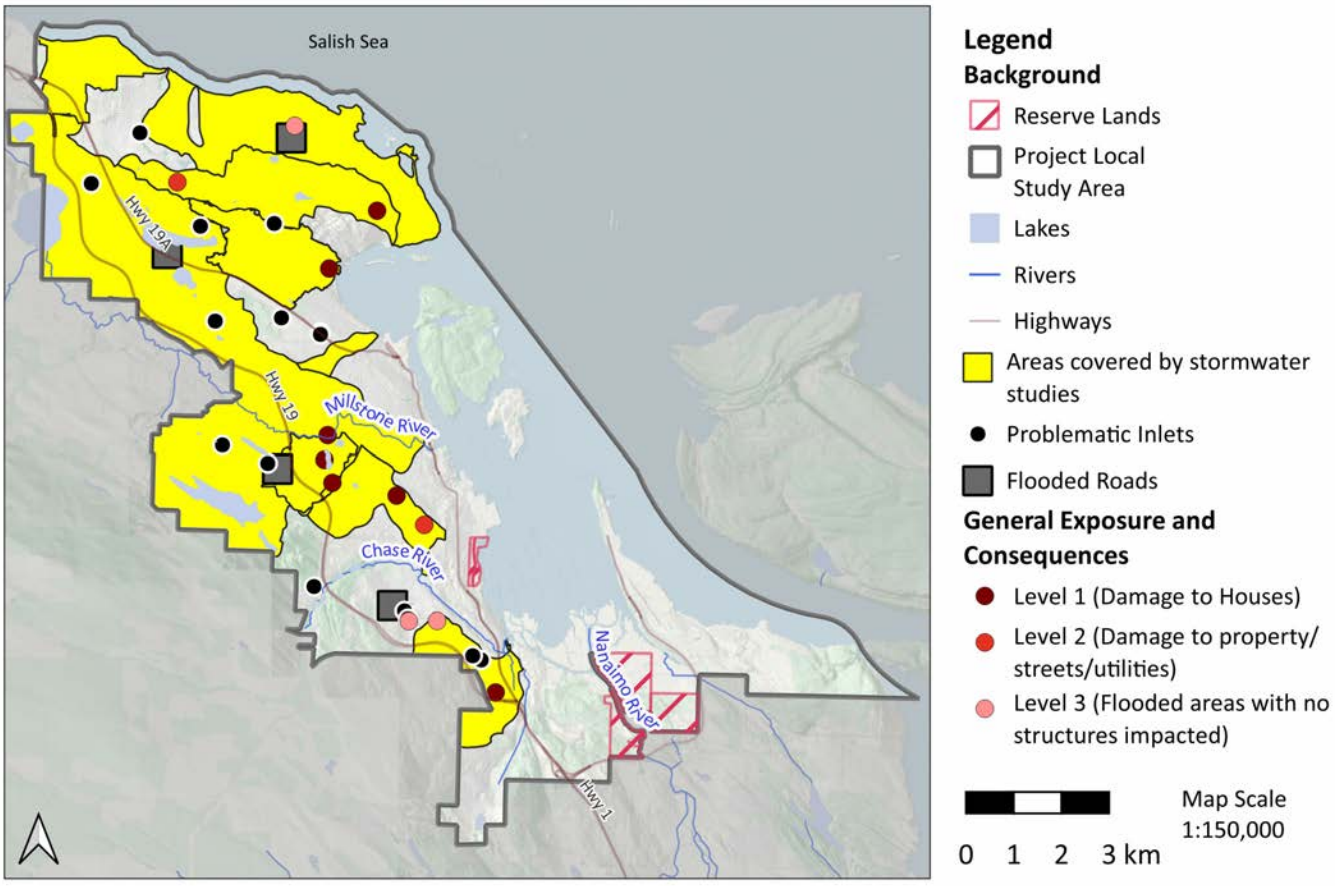
- Approximately 55% of the LSA has been assessed using stormwater models, drainage studies and master plans.
- The majority of the identified areas of concern (AOCs), which consist of problematic inlets, flooded roads and other linear segments, and general exposure and consequence, occur within the areas that have been studied using stormwater models.
- The majority of the AOCs are located within 100 m of a stream or lake, which means that they could be influenced by riverine flood hazard (see the relevant mapping results in the riverine flood hazard section).

Future Trends

The following results provide a sense of how the hazard could change in future:

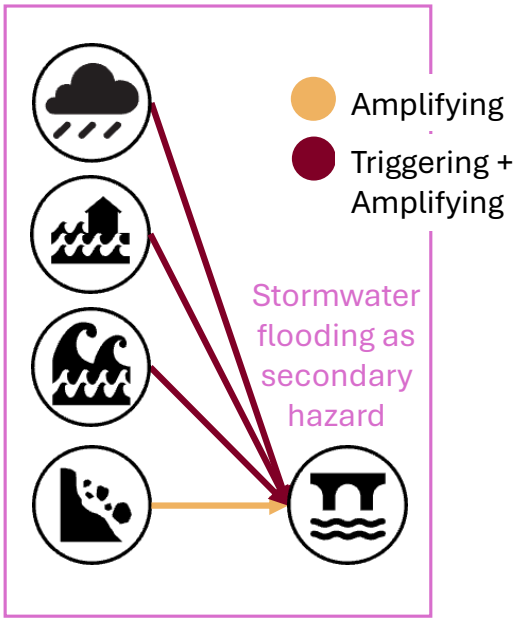
- Extreme rainfall events are becoming more intense and the projected changes are greater for events of longer duration and larger magnitude. Based on the projections for the Nanaimo City Yard station, the 1-day rainfall event is likely to increase in intensity by more than 20% in the future compared to the recent past.
- Recent stormwater modelling studies have accounted for climate change projections, which should help the City adapt systems to the projected increases in rainfall.
- As the City builds out, the impervious area could increase from the current 65% to 80% in 2046. This condition could exacerbate the hazard substantially if stormwater management systems are not properly planned and maintained to convey more intense rainfall.

In the next 5-10 years, the precipitation projections are likely to apply, meaning that this hazard is trending toward getting worse. However, issues of stormwater management systems and impervious surfaces may be adapted to offset increases in rainfall. Based on the limited information we reviewed, this is currently uncertain.



Interactions with Other Hazards

Stormwater flooding is primarily triggered, amplified, and coincided by extreme rainfall and by backwater effects from riverine or coastal flooding. Mass movements can also amplify and coincide with stormwater flooding (by blocking drains). The first stormwater flood of the rainy season, called the "first flush," can follow drought periods. Periods of stormwater flooding may be succeeded by extreme heat.



Emergency Management Considerations

- Higher annual precipitation amounts are linked to La Niña events, whose forecasting can be used to track upcoming hazard potential (see Provincial resource discussed in Section 9 Recommendations)[28].
- Follow weather alerts, local forecasts, and websites to monitor rainfall accumulations.
- Continue to monitor areas of concern.

28 The ENSO index is based on long-term average conditions, and it does not mean that an extreme precipitation event cannot occur during an El Niño phase.