

PROJECT CONTEXT

Tell us where in the watershed you live or work by placing a sticky dot on the map



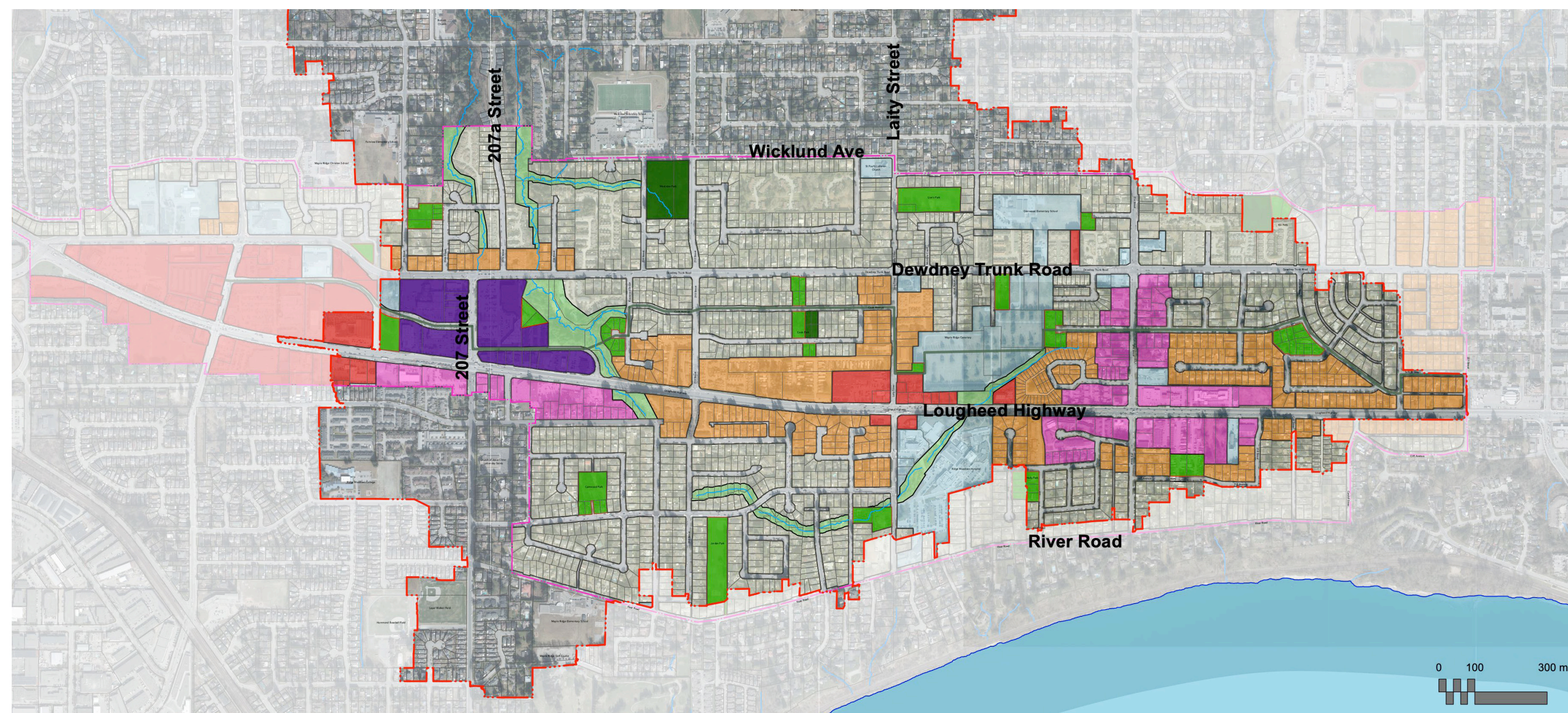
WHY ARE WE DOING THIS PROJECT?

The way land is developed within a watershed directly affects the health of its rivers, creeks, and connected downstream ecosystems. The McKenney Creek Watershed has seen over 100 years of car centric development which has impacted McKenney Creek and its riparian ecosystem. Future growth and climate change will continue to affect the long-term health of the watershed if left unmitigated.

The Lougheed Transit Corridor Area Plan (LTCAP), centrally positioned along Dewdney Trunk Road and Lougheed Highway, crosses the McKenney Creek watershed from east to west. Over the next 30 years, significant growth is anticipated within the Lougheed Transit Corridor in response to the future Langley-Haney Place BRT Line.

The proposed LTCAP development will bring new businesses and homes to Maple Ridge. It will also cause a significant transition from a landscape that absorbs water to one that generates stormwater runoff among other substantial changes to the landscape.

Through this project, the City of Maple Ridge is being proactive with the urban and environmental planning to ensure development of LTCAP and the associated transitions of the landscape do not have negative consequences to the long-term health of the watershed and McKenney Creek.



THE PROJECT PURPOSE

Restore and enhance McKenney Creek as an ecologically functional riparian corridor that is resilient to the impacts of urban densification that will occur through the development of the Lougheed Transit Corridor as well as the forecasted climate change.

THE MCKENNEY CREEK WATERSHED

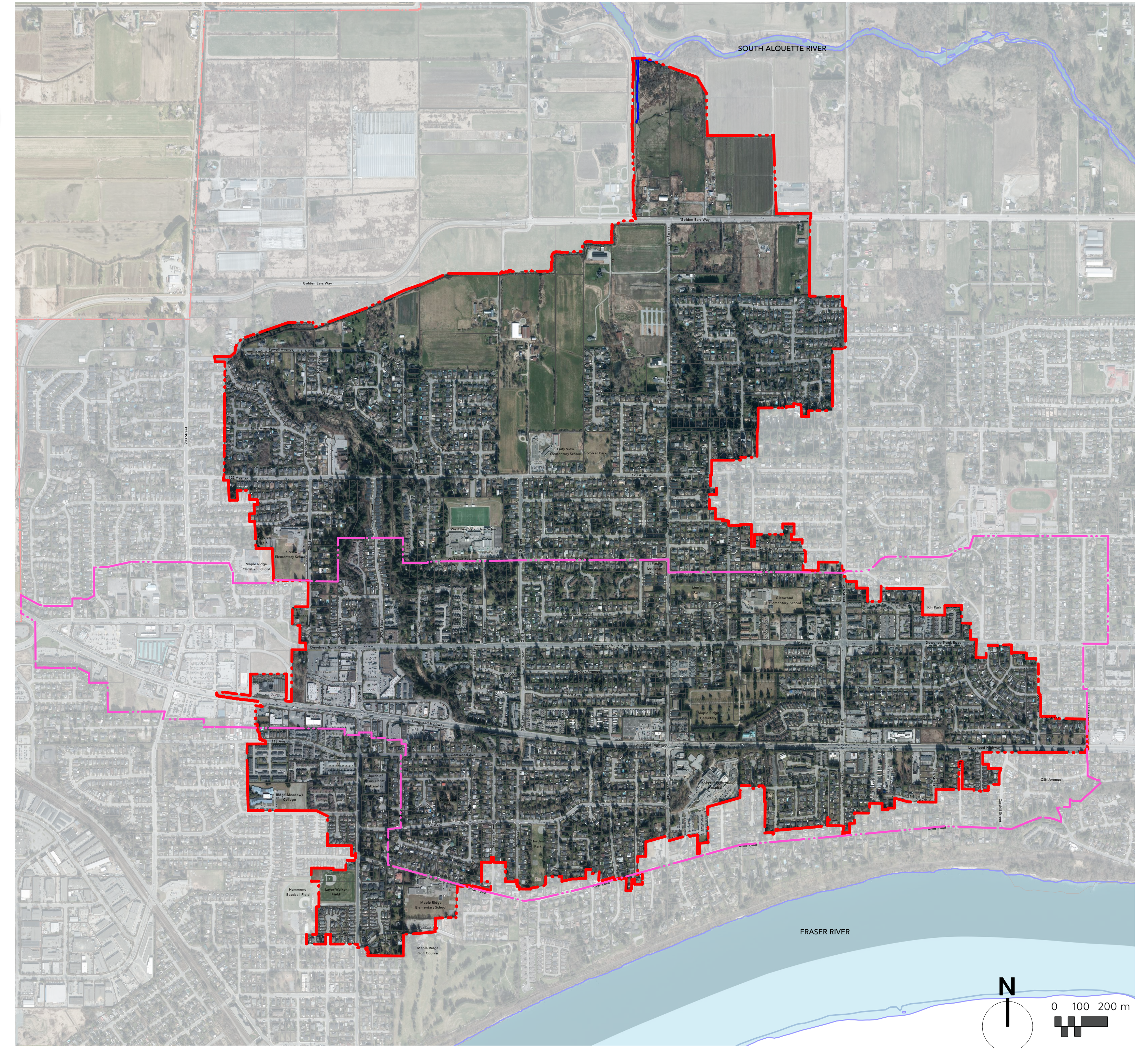
The McKenney Creek watershed is a 500-hectare area in the City of Maple Ridge that collects rainwater and snowmelt through 5 different creeks and drains into the South Alouette River. McKenney Creek is the largest of these creeks.

McKenney Creek begins near the Fraser River Escarpment by the cemetery and hospital. It flows west and north through urban and semi-urban areas.

5 tributaries merge with the McKenney Creek at the Agricultural Land Reserve (ALR) area.

The creek is renamed Laity Creek north of 128 Avenue and is constrained by Registered Dike #244. Flowing north through the ALR it connects with and drains into the South Alouette River.

This connection with the South Alouette River is especially important because it supports salmonids and other fish species native to the region.



The watershed includes a wide mix of land uses including agricultural, residential, commercial, institutional, park, and conservation lands. Single-family housing and agriculture being the current dominant land uses.

The watershed also includes riparian corridors, wetlands, and forested areas that provide habitat for wildlife and contribute to the ecological health of Maple Ridge.



Confluence of McKenney/Laity Creek with the South Alouette River



Laity Creek flowing north through the ALR along Dike #244



McKenney Creek flowing through backyards in a semi-urban area



Beaver pond in a semi-urban area and agricultural land use transition

EXISTING CONDITIONS

LANDSCAPE TYPOLOGIES

Two ecotypes were identified:

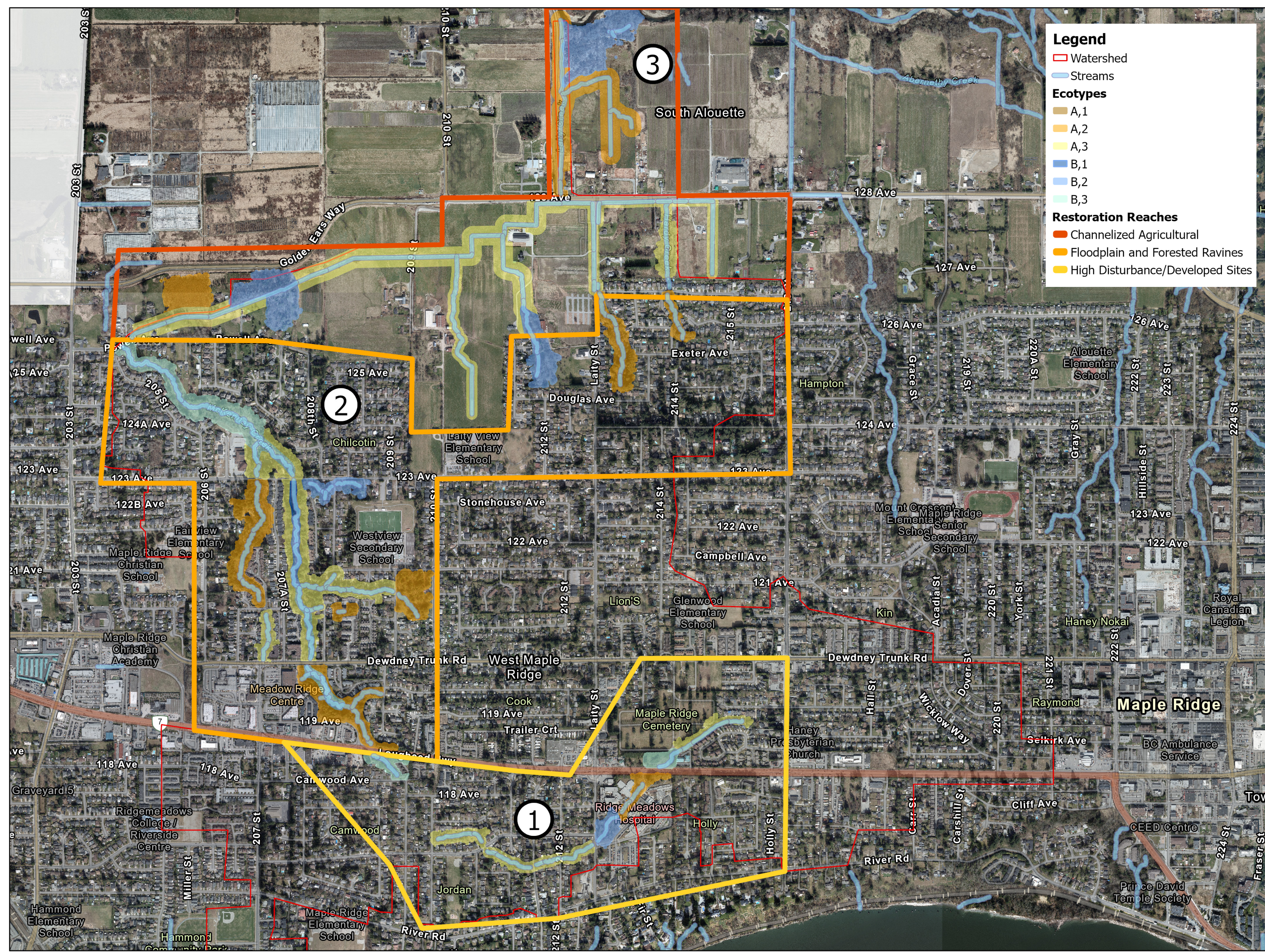
- A - agriculture
- B - urban disturbance

These were further classified based on their disturbance level:

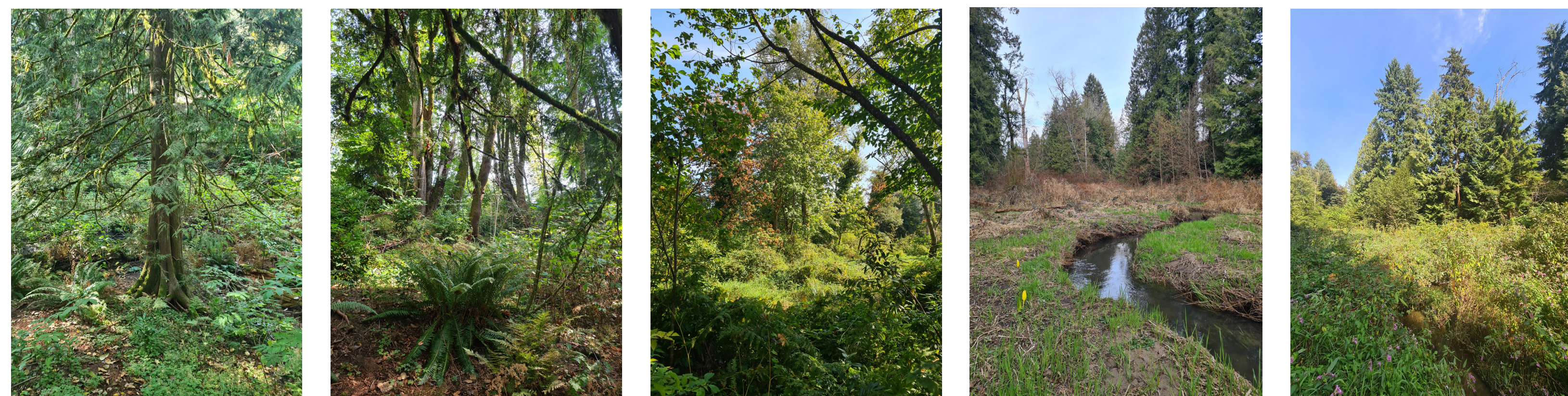
- 1 - natural
- 2 - semi-disturbed
- 3 - disturbed

Three distinct reaches were identified within the McKenney Creek corridor:

- 1 - High Disturbance/Developed Sites
- 2 - Floodplain and Forested Ravines
- 3 - Channelized Agricultural



REACH 1 - HIGH DISTURBANCE / DEVELOPED SITES



REACH 2 - FLOODPLAIN AND FORESTED RAVINES



REACH 3 - CHANNELIZED AGRICULTURAL REACHES

INVASIVE PLANTS

Invasive plant species have established in many areas of McKenney Creek with variable coverage and distribution in the study area. The riparian area in the agricultural land reserve is dominated by invasive plants, notably Reed Canary Grass.

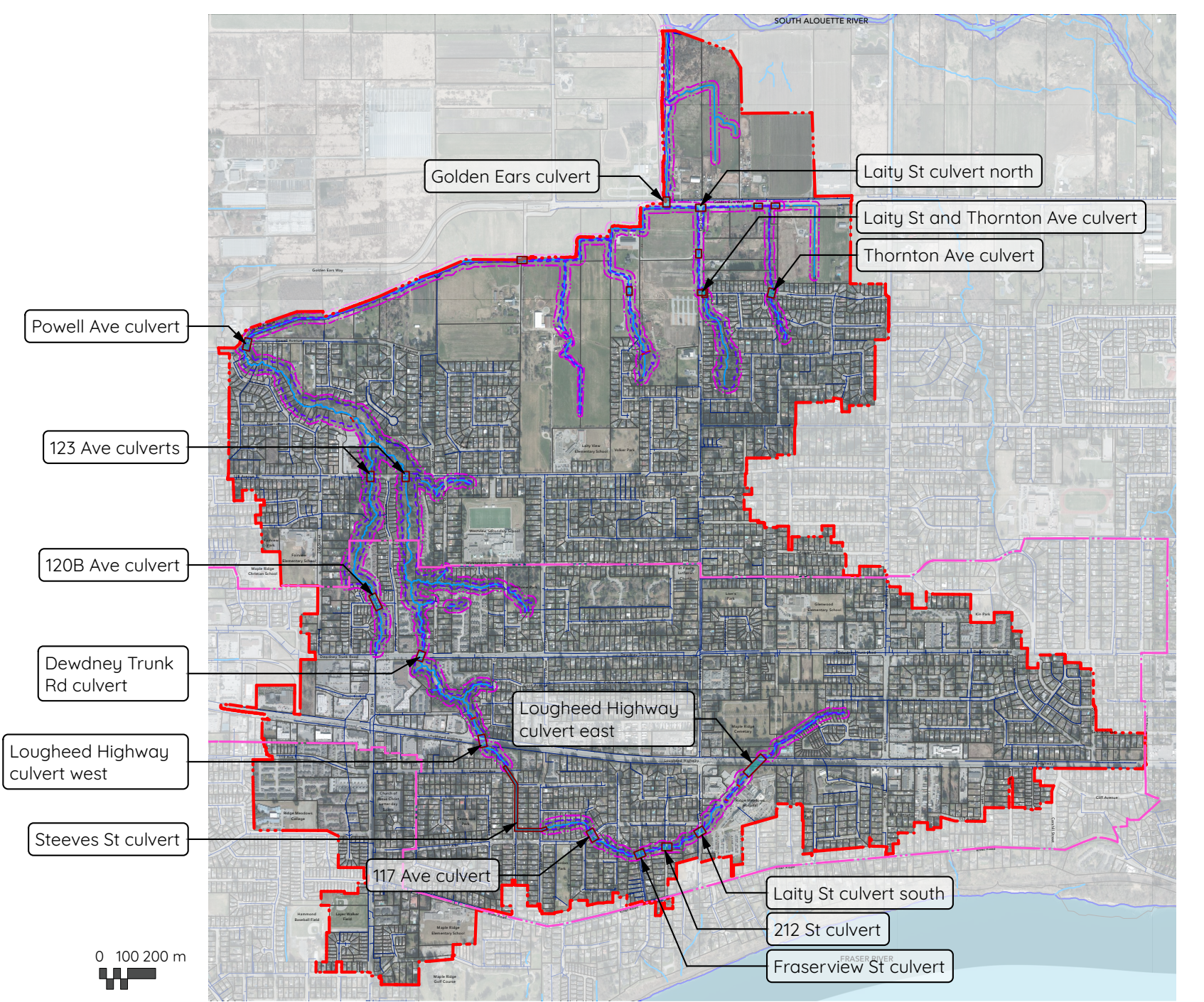


CONNECTIVITY AND FISH HABITAT

Connectivity is relatively intact, with most sections remaining hydrologically connected to the South Alouette River.

Overall connectivity can support fish movement, however there is significant opportunity to improve the fish and wildlife connectivity.

Salmon fry were observed in the reach within the agricultural land reserve. A juvenile salmonid has been observed in the McKenney Creek between Dewdney Trunk Road and Lougheed Highway.



WATER QUALITY

While this study did not directly assess water quality, observed land uses and site conditions, indicate that it is likely that water quality is affected by urban and agricultural runoff, historical alterations to the channel, exposure due to clearing of riparian areas and inputs from stormwater infrastructure.



STORMWATER AND FLOODING

There are areas within the watershed that exceed the stormwater system capacity and others that see flooding. These issues will be magnified by increased storm flows due to climate change and development within the watershed if not mitigated.

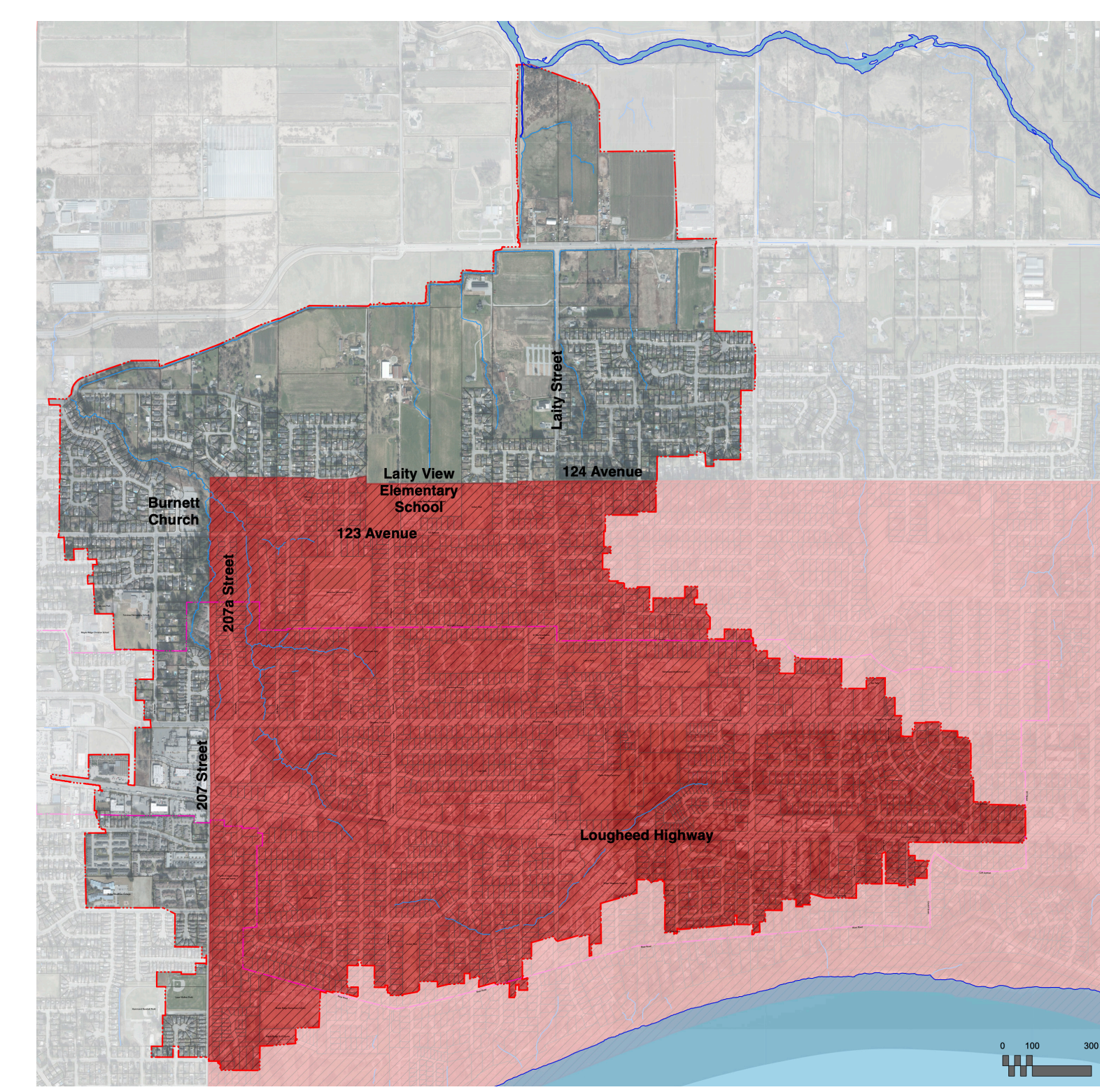


WATERSHED MODELING

WATERSHED CHARACTERISTICS

Due to concerns over slope stability of the Fraser River escarpment, the Fraser River Escarpment (FRE) Policy prohibits rainwater infiltration (allowing water to be absorbed by the ground). It requires that the drainage from new construction (residential, commercial, road or parking) in the FRE area will be connected to sewers and/or stormwater ditches with no ponding water.

This interrupts the natural water cycle and restricts groundwater recharge. Groundwater is a critical source of water in McKenney Creek.



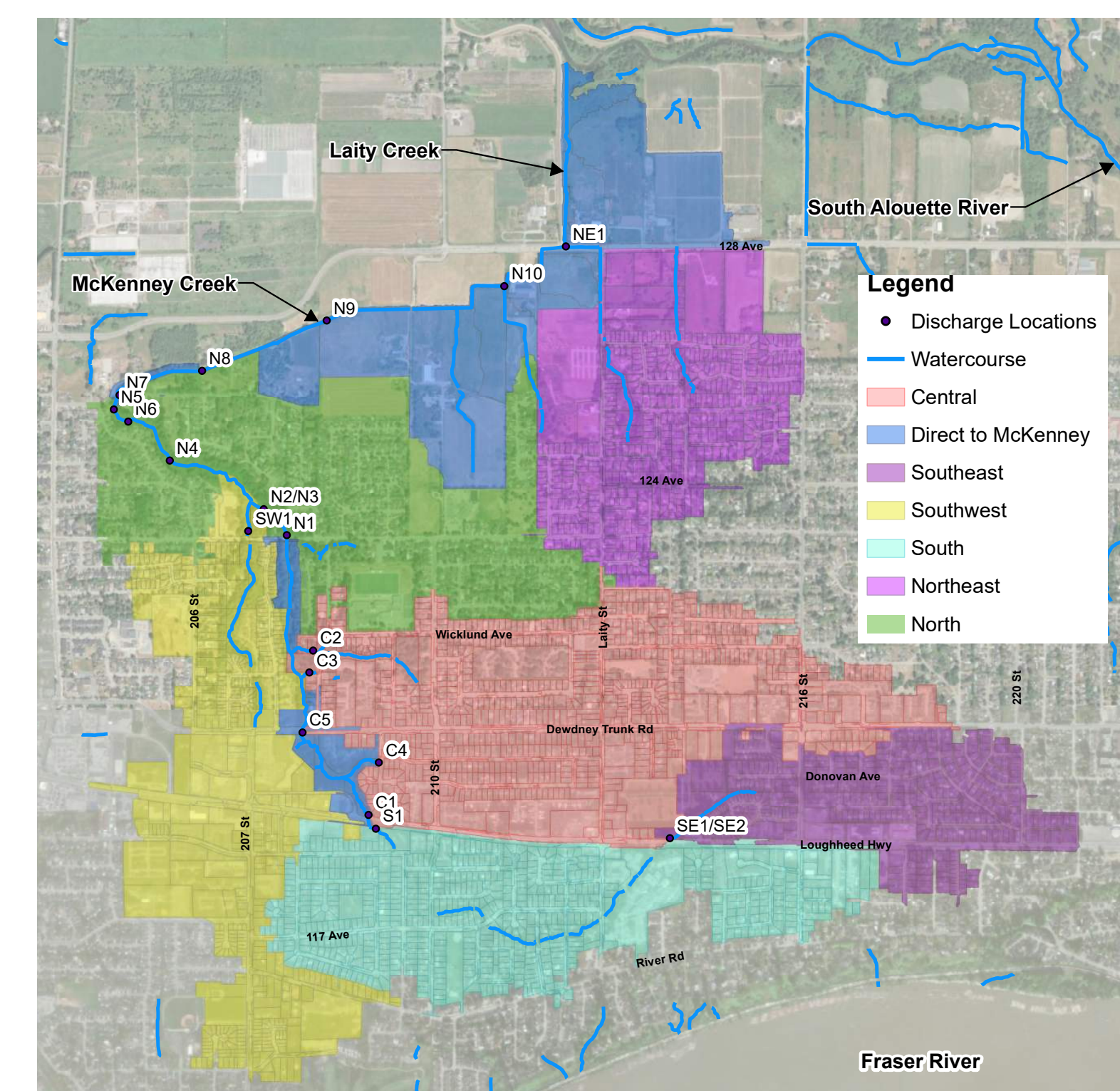
FRASER RIVER ESCARPMENT POLICY AREA

MODELING GOALS

RUNOFF MANAGEMENT: Maintaining post-development, climate-adjusted stormwater peak flows at or below existing levels.

STORAGE: Designed to allow for control to target release rates into McKenney Creek. Outside of the Fraser River Escarpment Policy area, infiltration techniques are preferred to reduce storage requirements.

WATER QUALITY: Identify unique connection points to the creek for application of both distributed and point controls at the outlets. Targets are 80% TSS removal and enhanced controls for specific pollutants of concern in heavy traffic or industrial areas.



WATERSHED DRAINAGE CATCHMENTS

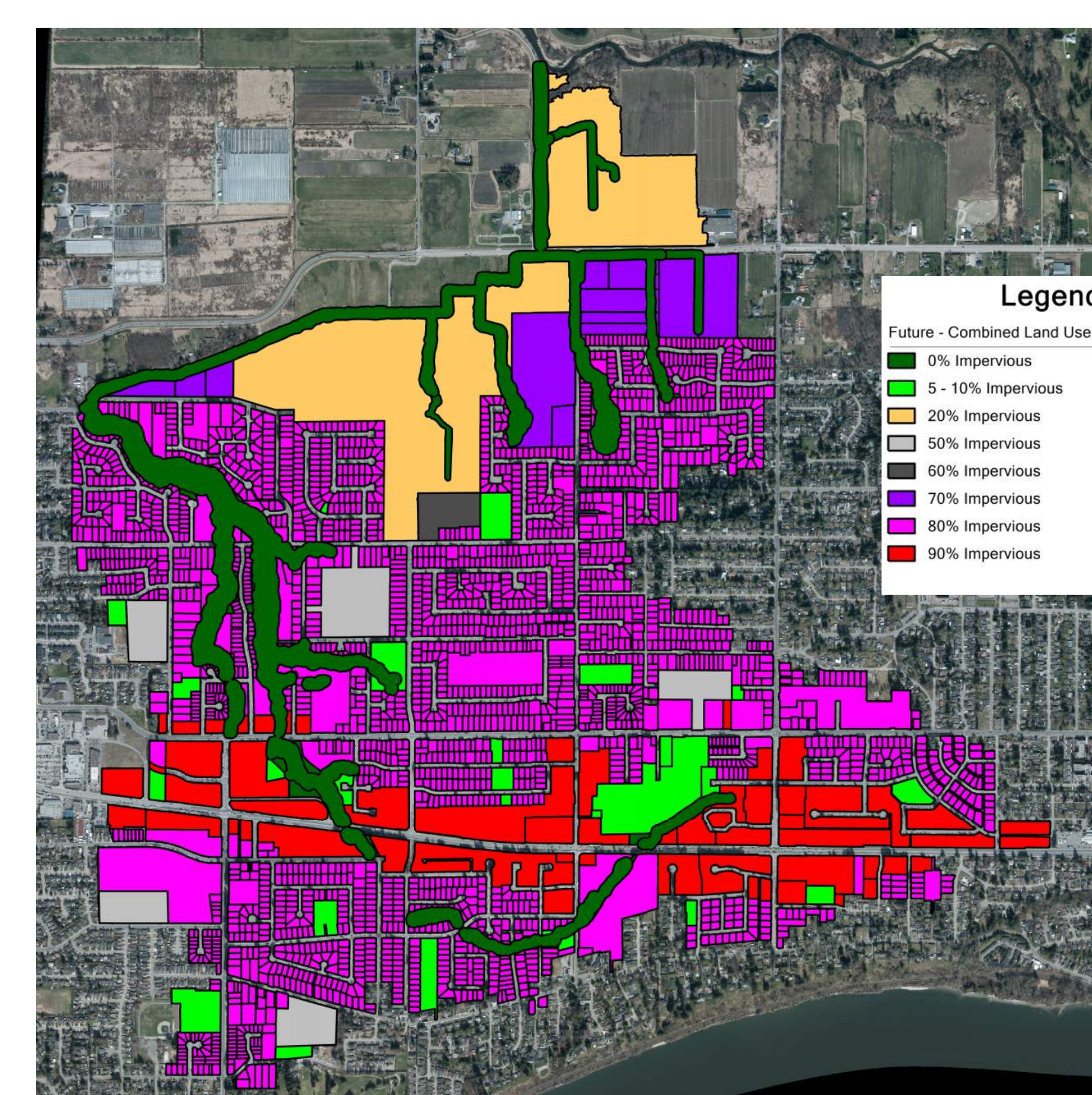
MODELING RESULTS

The modelling has been completed to determine the storage volumes required in each catchment area to maintain or reduce the stormwater peak flows at existing or below existing levels in the post-development scenario to protect McKenney Creek.

The results show, that with an interconnected green-grey infrastructure rainwater management system, the impacts of both development and climate change can be mitigated.

The development allowed in the watershed will shift the land to the illustrated impervious (non-absorbent) site conditions. This decrease in absorbent landscape will result in more runoff and less infiltration into the ground.

The stormwater modeling has been completed based on the forecasted 2100 climate change and allowed site impervious conditions within the watershed.

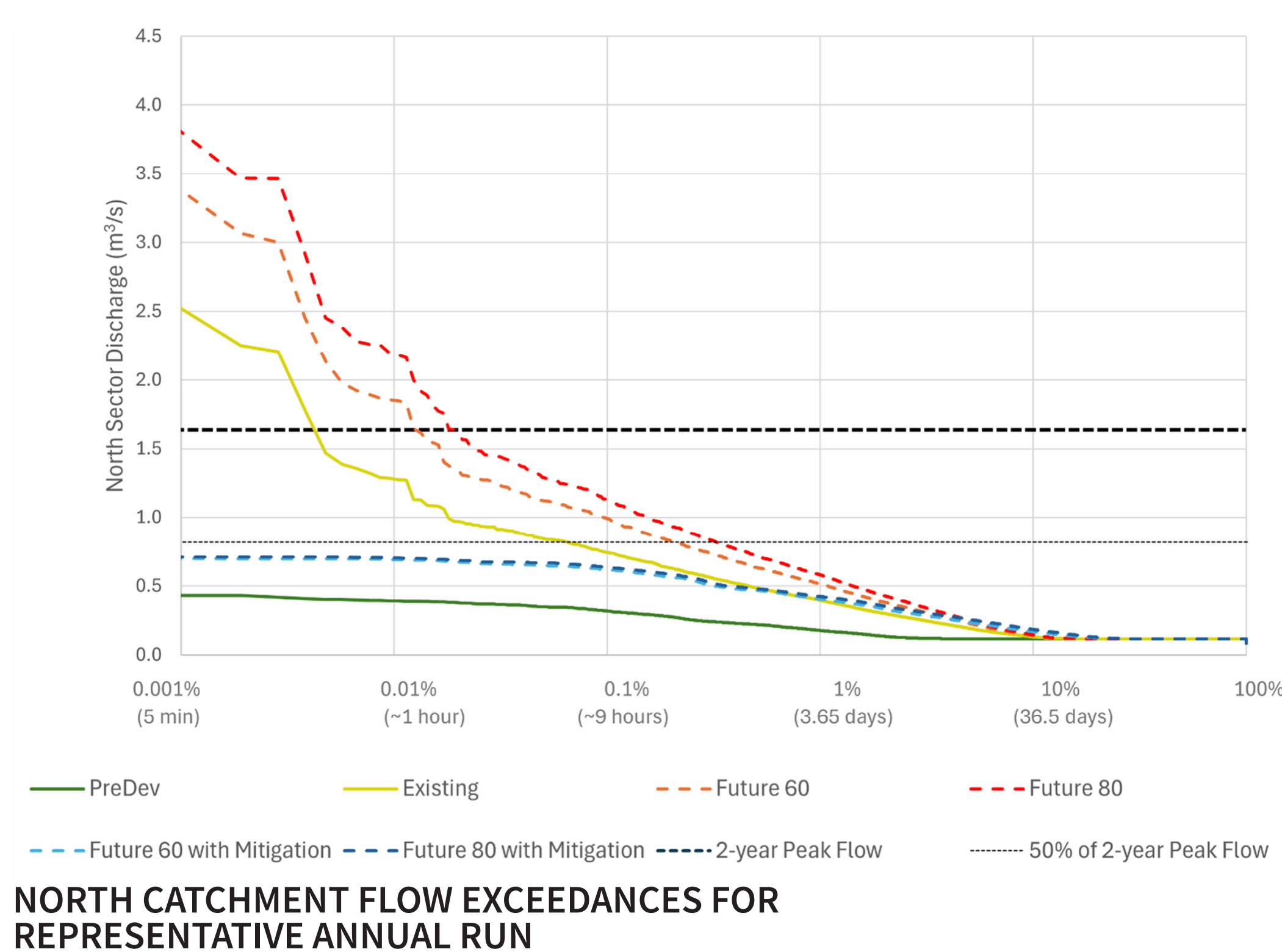


IMPERVIOUS SITE COVERAGE

MODELING ANNUAL RESULTS

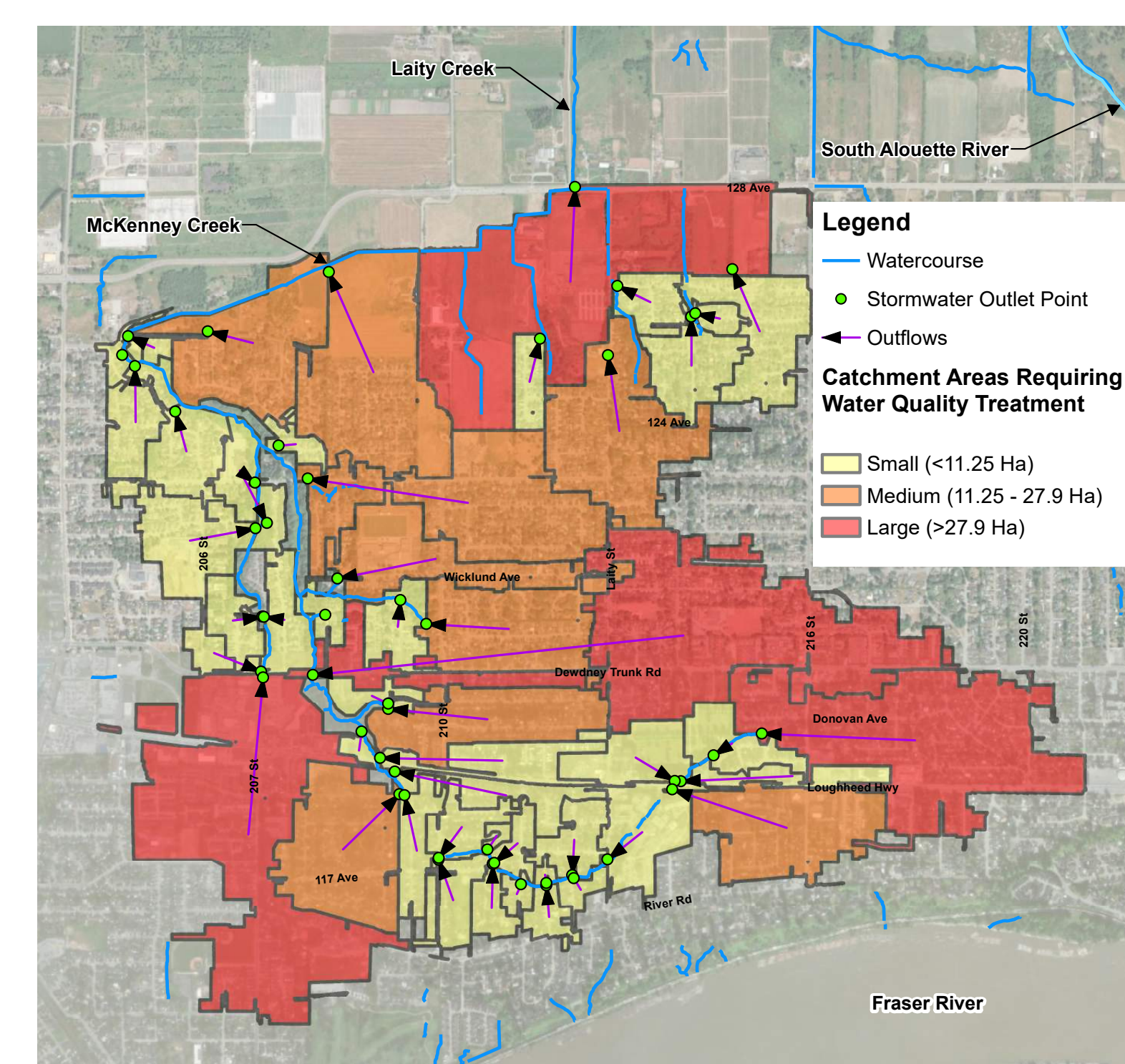
50% of the 2-year peak flow is generally considered a good estimate of when a storm event begins to have erosion-initiating flow.

The treatment controls proposed in the model bring erosive storm events well below the existing condition and below 50% of the 2-year peak flow for certain catchments.



Improving water quality is a critical aspect of the McKenney Creek watershed plan to achieve the restoration and enhancement objectives.

The size and landuse within each subcatchment influences the treatment requirements.

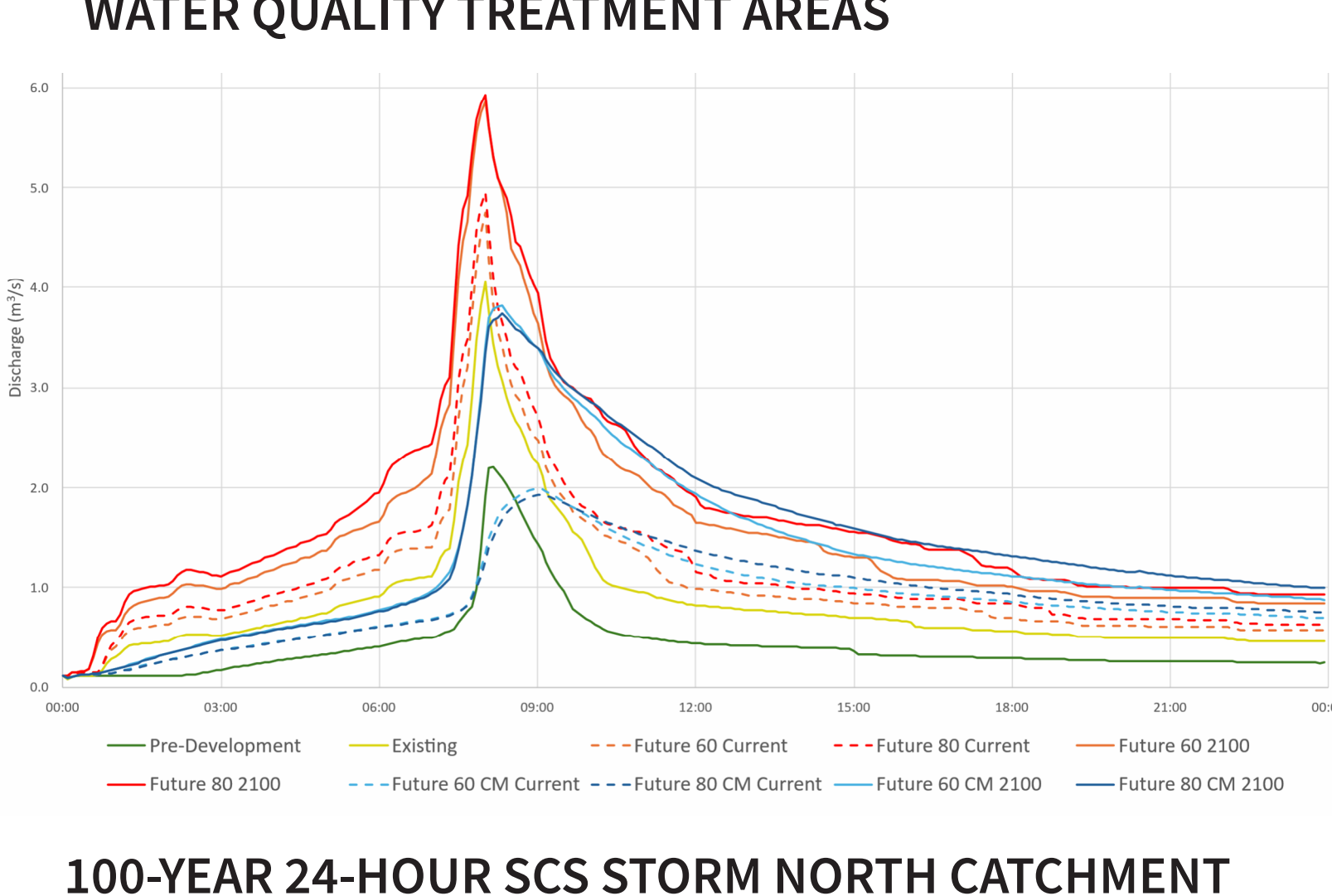
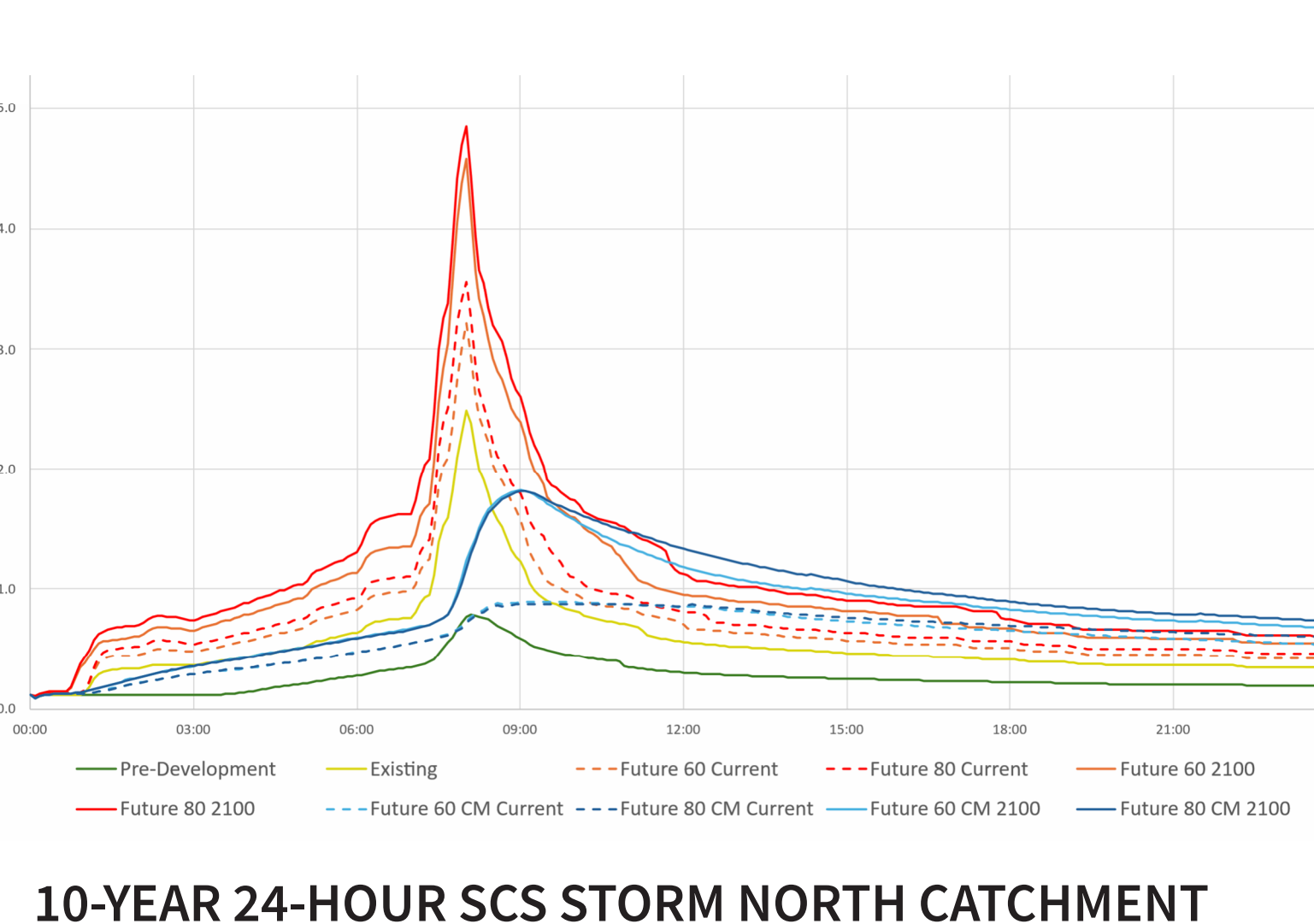
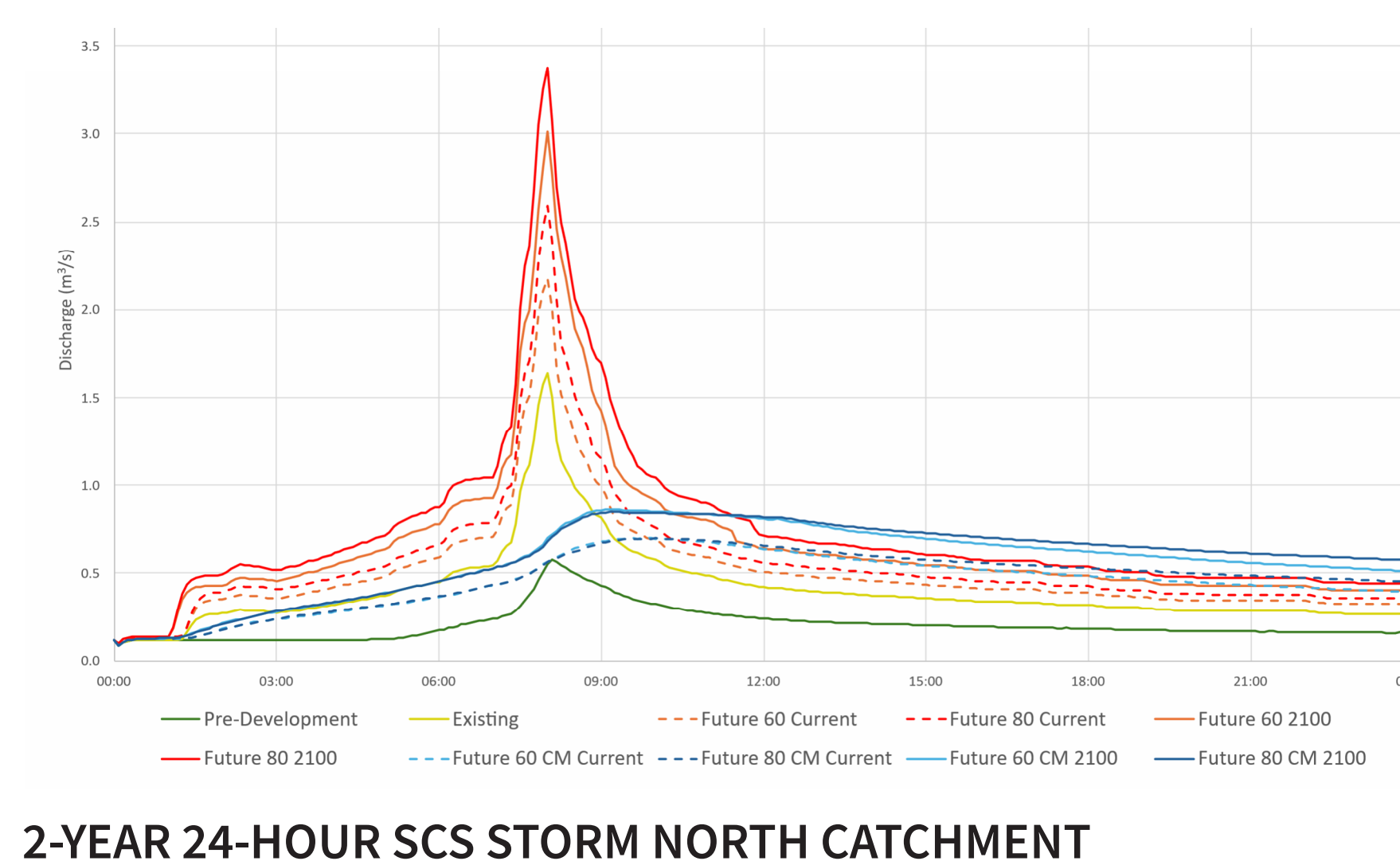


WATER QUALITY TREATMENT AREAS

MODELING SCENARIOS

The model compares the pre-development, existing, and future condition flow hydrographs (with and without climate change).

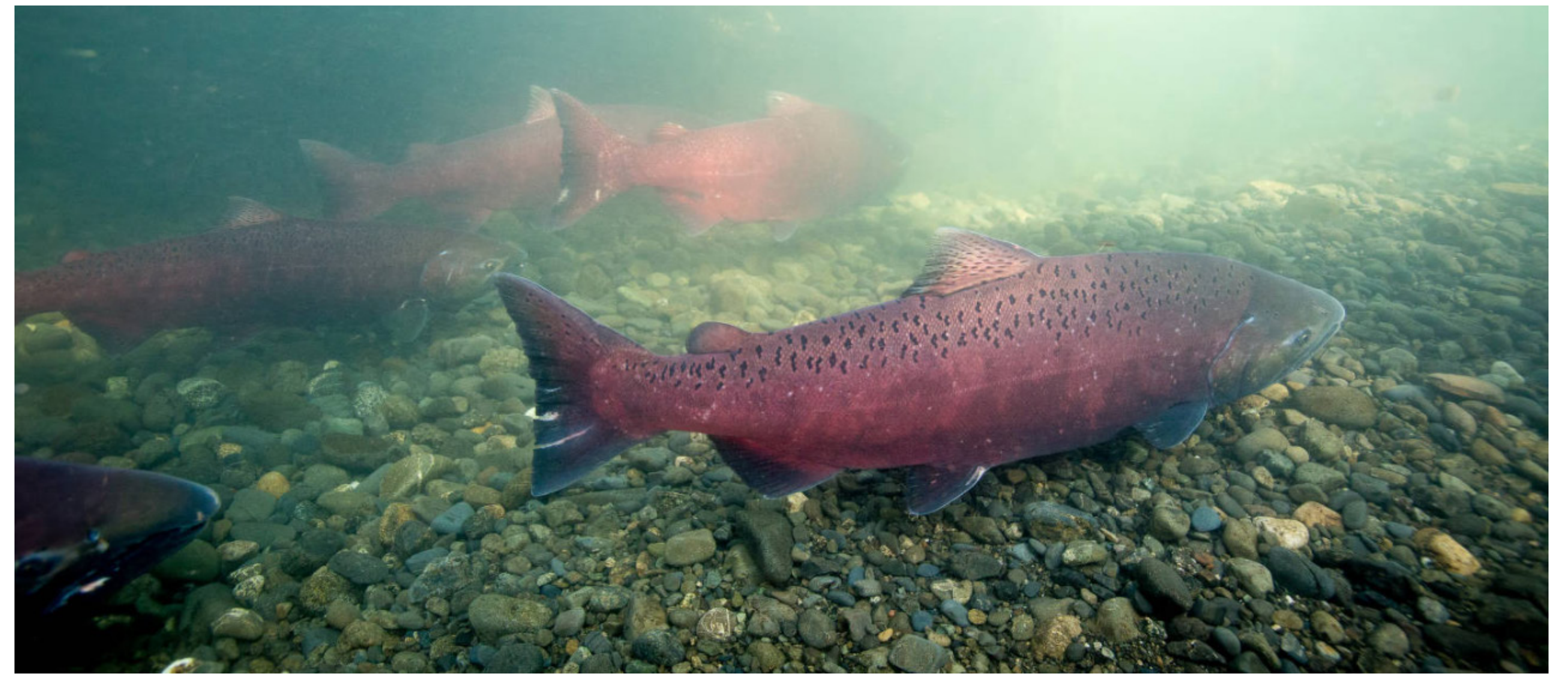
The graphs show the significant reduction in peak flows with the recommended extent of green-grey infrastructure. This indicates that with development and climate change using the recommended green-grey infrastructure system, water can be discharged into McKenney Creek below or near the existing rates.



PROJECT VISION + APPROACH

PROJECT VISION

RESTORING MCKENNEY CREEK TO SUPPORT A HEALTHY, RESILIENT, AND SELF-SUSTAINING SALMON POPULATION.



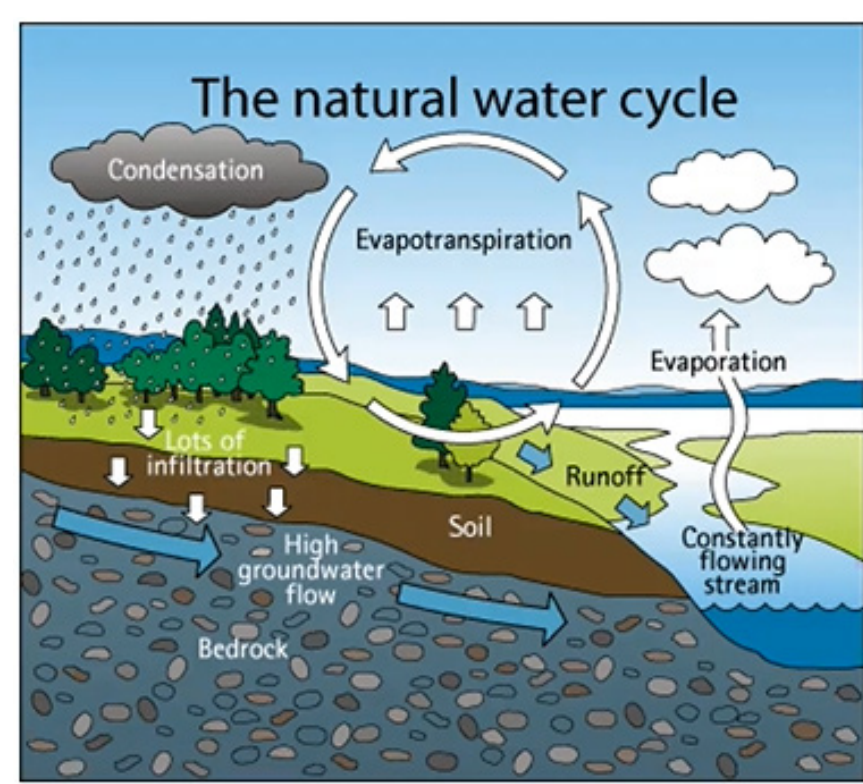
SPAWNING CHINOOK SALMON

PROJECT GOALS

The McKenney Creek watershed plan has 5 goals. They are:

1. A watershed that is resilient to flooding, climate change, and future development.
2. Water quality that supports healthy and productive salmonid habitat.
3. Healthy, connected, and functioning creek and riparian ecosystems throughout McKenney/Laity Creek and its tributaries.
4. A community that recognizes, values, and stewards its watershed.
5. A healthy urban watershed that sustains the natural water cycle.

A HEALTHY URBAN WATERSHED



The plan strives to maintain the natural water cycle in the increasingly urbanized context of the watershed.

Replicating the interactions with rainfall and reproducing the functions of the groundwater table that are affected by development and climate change.

The FRE Policy area and the increased imperviousness are a key challenge to this approach.

STEPPING STONES APPROACH TOWARDS A HEALTHY, RESILIENT AND THRIVING FUTURE

Realizing this ambitious vision requires an approach that is not only methodical but inspirational.

Everyone involved should be able to see and participate in the progress to build a collective momentum and the shared success.

Each step forward brings us into a closer relationship with the creek and closer to the destination on the other side: a healthy, resilient, and self-sustaining salmon population in McKenney Creek.



STEP ONE

- Data collection
- Priority setting
- Build relationships
- Implement early and shelf-ready projects
- Planning and design

STEP TWO

- Use monitoring data to support prioritization, and detailed planning and design
- Priority project implementation
- Habitat and riparian enhancements
- Green-grey infrastructure

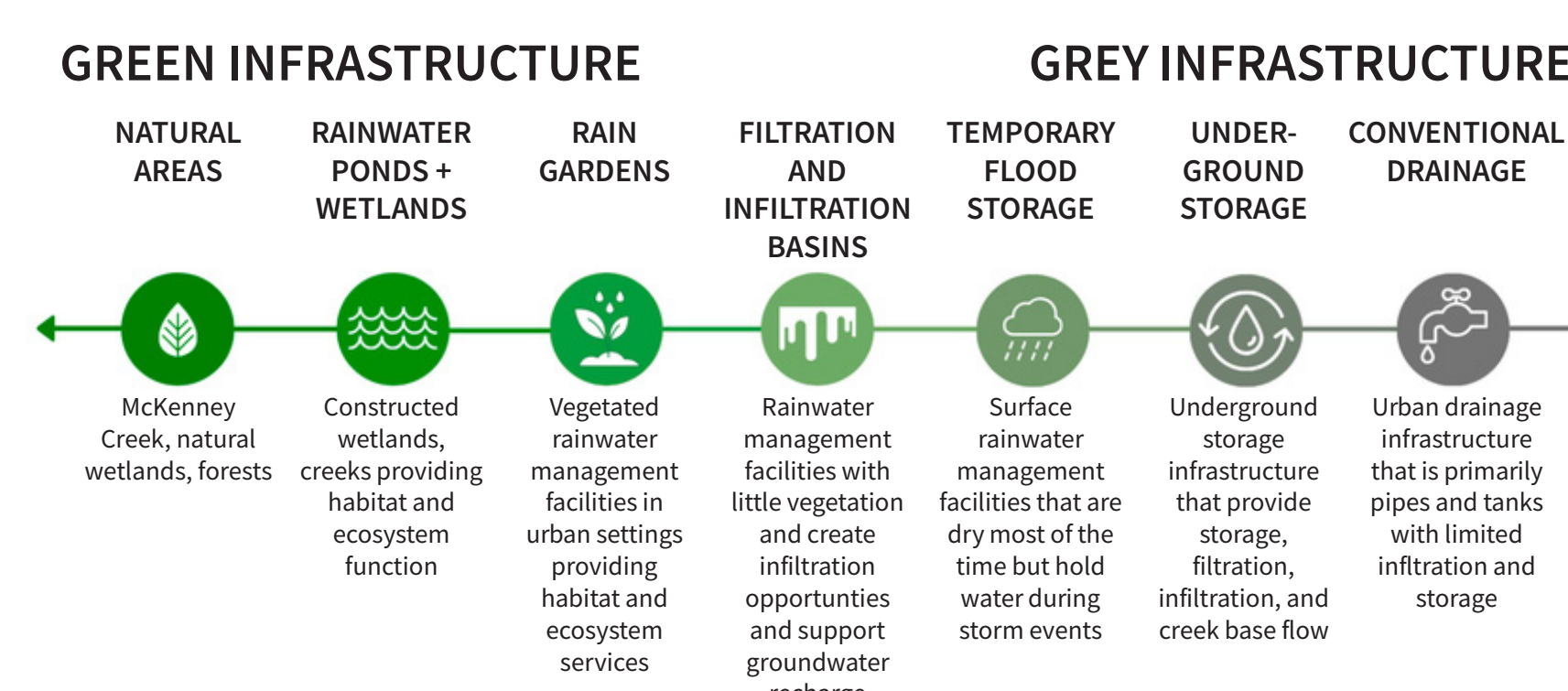
STEP THREE

- Project implementation to restore natural processes and riparian function
- Scale green-grey infrastructure projects to align with development progress and the shifting climate base line

GREEN-GREY INFRASTRUCTURE SYSTEM

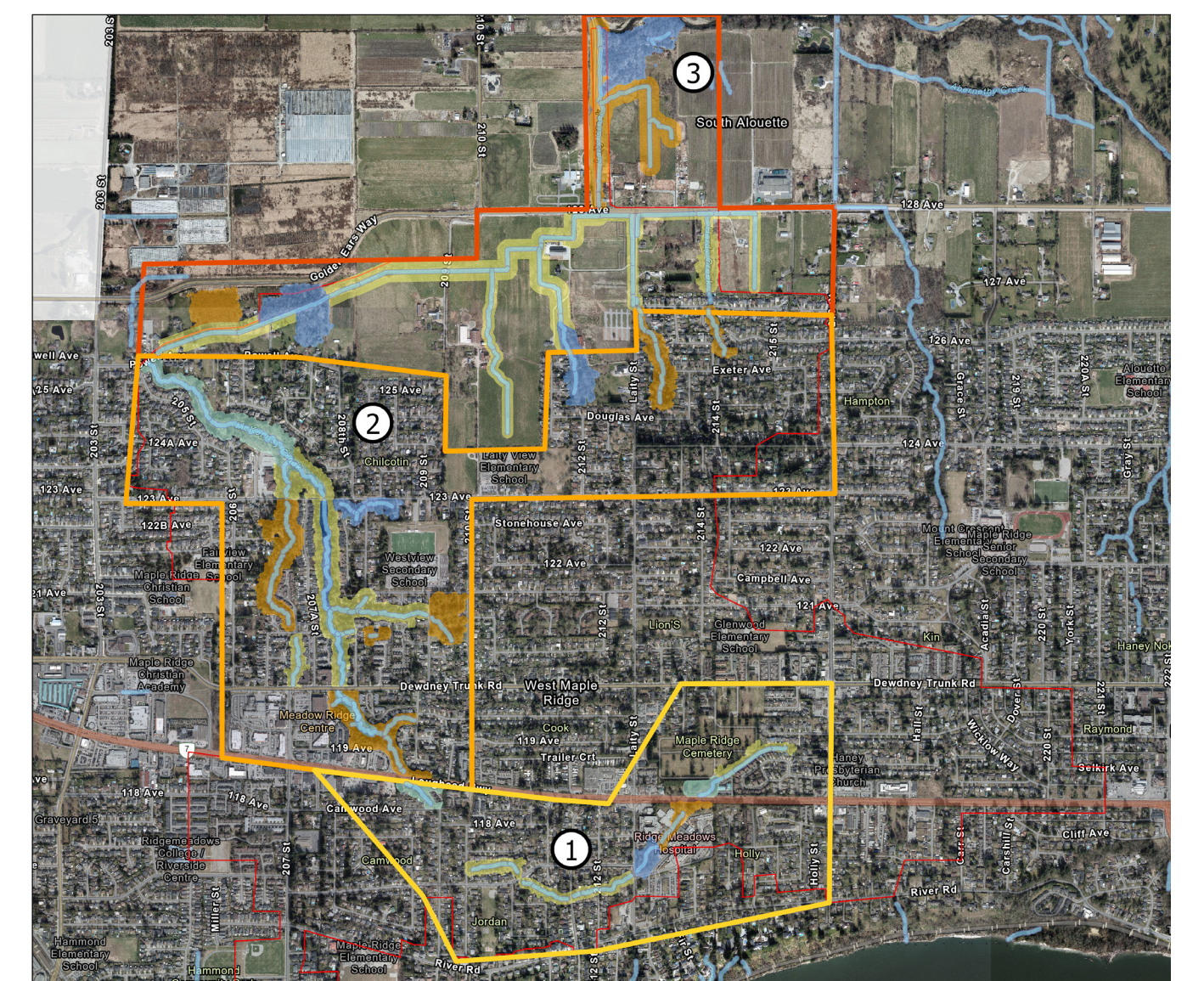
The plan proposes a series of connected interventions that replicate the natural processes.

The connected facilities will cumulatively achieve the storage and treatment targets for each catchment enabling the aspiration of matching pre-development conditions.



REACHES IN THE MCKENNEY CREEK CORRIDOR:

- 1 - High Disturbance/Developed Sites
- 2 - Floodplain and Forested Ravines
- 3 - Channelized Agricultural



REACH 1: HIGH DISTURBANCE / DEVELOPED SITES

STEP ONE

- Establish residential stewardship.
- Manage invasives, introduce native riparian planting.

STEP TWO

- Establish functional riparian setbacks.
- Instream complexity.

STEP THREE

- Restore ecosystem functions and processes in the upper creek.



REACH 2: FLOOD PLAIN AND FORESTED RAVINES

STEP ONE

- Shade out reed canary grass and other invasives
- Restore native swamp plant communities

STEP TWO

- Instream complexity
- Including BDAs or retain existing beaver dams (install beaver coexistence structures)

STEP THREE

- Large diameter culverts for wildlife movement
- Add off-channel habitat or complexity



REACH 3: CHANNELIZED AGRICULTURAL

STEP ONE

- Reduce invasive plants and restore a native plant community
- Introduce tree cover over the water (shade, nutrients)

STEP TWO

- Instream complexity

STEP THREE

- Restore meanders and instream complexity using adjacent AG.
- Off-channel connected wetlands.

