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Partington Creek: A New Watershed Development Planning Process

Where Watershed Health is as Important as Development Needs

SUBMITTED BY:

KERR WOOD LEIDAL
consulting engineers

Coquitlam

Partington Creek: A New Watershed Development Planning Process

Member Firm Submitting:	Kerr Wood Leidal Associates Ltd. 200 - 4185A Still Creek Drive Burnaby, BC V5C 6G9 Tel: 604-294-2088 Fax: 604-294-2090 Email: jcarter@kwl.ca
Contact Name:	Joan Carter
Project Title:	Partington Creek: A New Watershed Development Planning Process
Location of Project:	Coquitlam, BC
Component being Submitted:	Watershed Management Process and Plan
Category of Entry:	Category C, Water Resources
Project Owner:	City of Coquitlam
Project Client:	City of Coquitlam
Prime Consultant:	Kerr Wood Leidal Associates Ltd.
Summary Description of Project:	The ecologically rich Partington Creek watershed in Coquitlam, BC is planned for a $1.5 billion greenfield development for 12,000 people. KWL developed an Integrated Watershed Management Plan that caused the land use plan to be changed and the town centre moved.
Names of Other Consultants Involved:	Raincoast Applied Ecology (environmental assessment) HB Lanarc Consultants Ltd. (land use planning) Gartner Lee Ltd. (hydrogeological assessment)
Names of Contractors Involved:	N/A

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Project Highlights

Greater Vancouver's population is projected to grow from 2.2 million (2006 census) to 3.4 million by 2041[1]. This puts incredible pressure on local governments to find creative ways to meet development needs while at the same time maintaining the liveability of their communities and protecting the environment they inhabit. As part of Metro Vancouver's Regional Growth Strategy and the City of Coquitlam's Official Community Plan, the lower third of the Partington Creek watershed is planned for greenfield development. Over the next 20 years, what is now forested land will become a new town centre, home to about 12,000 people. The Partington Creek Integrated Watershed Management Plan (IWMP), completed in conjunction with the Partington Creek Neighbourhood Plan (PCNP), charts a new and better way to plan communities because it effectively met the needs of community growth and development while actually *improving* fish habitat and maintaining the ecological health of the watershed through sustainable development planning.

The City of Coquitlam's (City's) goal was to create a sustainable, economically viable, and low-impact development that would preserve the natural creek system and environmental values in the Partington Creek watershed. The City retained Kerr Wood Leidal Associates (KWL) to lead a multidisciplinary consulting team to develop an Integrated Watershed Management Plan (IWMP). KWL provided project management, stormwater management, computer modelling, hydrology, hydraulics, environmental health designation, floodplain management, and stakeholder consultation.

The project was extremely complex, proceeding in several phases over six years and involving the concurrent preparation of the IWMP and Partington Creek Neighbourhood Plan (PCNP). Both study groups collaborated to develop watershed and neighbourhood plans with common goals. Layered on this was extensive stakeholder consultations conducted throughout both projects. This included the development of an IWMP Advisory Committee composed of City departments, regulatory agencies, environmental groups, developers, and local residents. The process included public meetings and presentations to City Council. The key recommendations of the IWMP were strongly supported by the stakeholder groups.

The outstanding engineering achievements for this project were the environmental protection and enhancements planned for the watershed. The IWMP calls for sustainable infrastructure that goes well beyond regulatory requirements in preserving this undeveloped watershed's ecology. The key features of the plan are:

- **Integrating land use planning with stormwater engineering.** This resulted in moving the proposed town centre to preserve small ephemeral headwater watercourses valued by DFO. Various land use types were changed and were placed in strategic locations to minimize impacts to the

[1] Metro Vancouver 2040 Backgrounder, Metro Vancouver 2040 Growth Projections, November 2009

watercourses and maximize the space for stormwater source controls. This was accomplished without compromising on the densities, liveability or economic viability of the development.

- **Enhancing the best fish habitat in the watershed**, the main stem of Partington Creek. An existing roadway will be moved away from the creek channel to create 30-metre riparian setbacks. This has multiple benefits such as flood protection, an increased sediment management area, increased riparian setbacks, and instream complexing. These measures will provide significant ecological health gains for the watershed and a net environmental *gain* for fish and fish habitat in the watershed.
- **Mitigating the impact of development through leading-edge stormwater technologies**, including underground baseflow augmentation facilities, which will mimic the natural hydrologic processes in the watershed and sustain aquatic life. This new technique uses specialized flow splitters such that baseflows, low flows and flushing flows continue to the natural creek system, and excess impervious area flows are conveyed to a diversion structure that discharges directly to the receiving water body. Unlike surface ponds, which are common practice in stormwater management and are heat sinks that can warm creek systems to fish-harming levels, these underground rock trenches will keep water temperatures cool for fish.

In addition to the baseflow augmentation facilities, two other key elements make this project truly new and innovative. First is the idea of conducting watershed planning, land development planning, and financial modelling *concurrently*. The current approach to land development is to first develop land use plans and then engage civil engineers to mitigate the impacts of development. This reactive approach limits the mitigation opportunities and solutions available, and many environmental impacts cannot be fully alleviated. The end result is inadequate and costly mitigation plans, and urban developments that significantly harm adjacent watercourses and their aquatic life. The Partington Creek team of planners, engineers, and biologist worked together and *changed* the initial land use plan to maximize environmental protection and rainwater management – something we believe is unique in Canada. Land use designations were redrafted to strategically minimize impacts to the creek and optimize stormwater infrastructure. As well, the most valuable fish habitat along Partington Creek will be enhanced to achieve a net environmental benefit.

The second key innovation is KWL's idea of determining how best to protect the environment by considering what is best for the watershed as a whole. The IWMP calls for some losses in a less sensitive tributary, Star Creek, in favour of bolstering and enhancing the best fisheries habitat areas on the main stem of Partington Creek. By protecting the very best habitat in the watershed at the expense of a much less environmentally valuable area, the City will achieve a 'net environmental benefit for fish and fish habitat' for the watershed. This means that after development of the watershed fish habitat will actually be *better* than current conditions.

All of this was accomplished while still meeting the financial objectives of the development, and without compromising the development's population or liveability. The IWMP's $30 million in recommendations are fully funded through development cost charges. This is a winning solution for all concerned.

The project was completed in July 2011.

Introduction

Greater Vancouver's population is projected to grow from 2.2 million (2006 census) to 3.4 million by 2041[2]. This puts incredible pressure on local governments to find creative ways to meet development needs while at the same time maintaining the liveability of their communities and protecting the environment they inhabit. As part of Metro Vancouver's Regional Growth Strategy and the City of Coquiltam's Official Community Plan, the lower third of the Partington Creek watershed is planned for greenfield development. Over the next 20 years, what is now forested land will become a new town centre, home to about 12,000 people. The Partington Creek Integrated Watershed Management Plan (IWMP), completed in conjunction with the Partington Creek Neighbourhood Plan (PCNP), charts a new and better way to plan communities because it effectively met the needs of community growth and development while actually *improving* fish habitat and maintaining the ecological health of the watershed through sustainable development planning.

The Partington Creek Watershed is an undeveloped and ecologically rich watershed located on Burke Mountain in Coquitlam, British Columbia. Most of its 625 hectares is covered by diverse second-growth forest. Partington Creek is one of the last ecologically healthy streams in Metro Vancouver, a prolific salmon spawning stream and home to many aquatic species-at-risk such as white sturgeon, Dolly Varden and coastal cutthroat trout. Black bear, river otter, mink, and great blue heron are frequently observed in the watershed, and terrestrial species-at-risk such as the Pacific Water Shrew are found in the riparian zone surrounding the main channels.

Project Objectives

The City of Coquitlam's (City's) goal was to create a sustainable, economically viable, and low-impact development that would preserve the natural creek system and environmental values in the Partington Creek watershed. The City retained Kerr Wood Leidal Associates (KWL) to lead a multidisciplinary consulting team that would develop a sustainable, integrated stormwater management strategy for the watershed as a whole. KWL provided project management, stormwater management, computer modelling, hydrology, hydraulics, environmental health designation, floodplain management, and stakeholder consultation. The environmental assessment was completed by Raincoast Applied Ecology, and land use planning was completed by HB Lanarc. These three firms also worked on the PCNP study. The hydrogeological assessment for the IWMP was completed by Gartner Lee Ltd. KWL's engineers exceeded the stated objectives by developing solutions that provide a net environmental *benefit* for the prized lower channel fish habitat of Partington Creek. This included floodplain creation, riparian reforestation and instream complexing, and maximized mitigation measures for the impacts of a substantial development.

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[2] Metro Vancouver 2040 Backgrounder, Metro Vancouver 2040 Growth Projections, November 2009

Solutions and Achievements

The project was extremely complex, proceeding in several phases over six years and involving the concurrent preparation of the IWMP and PCNP. Both study groups collaborated to develop watershed and neighbourhood plans with common goals. Layered on this was extensive stakeholder consultations conducted throughout both projects. This included the development of an IWMP Advisory Committee composed of City departments, regulatory agencies (Fisheries and Oceans Canada (DFO), BC Ministry of Environment, and Agricultural Land Commission)), environmental groups (Burke Mountain Naturalists, Friends of Deboville Slough), developers, and local residents. The process included public meetings and presentations to City Council. The key recommendations of the IWMP were strongly supported by the various stakeholder groups.

The first three phases of the IWMP study were completed from 2005 to 2007. The PCNP was initiated in 2006 to establish the land use and form of the Partington Creek Village. The City then put both studies on hold to review and address developers' concerns regarding the proposed low impact development recommendations of both of these studies. The IWMP resumed during the spring of 2009, and the PCNP resumed in 2010. With new topographic information available small watercourses not previously identified were noted. The KWL team initiated more field work to identify, map, and inventory every creek and stream in the watershed, and assign each an environmental valuation. Through this process, the engineers were able to identify a network of small, seemingly insignificant watercourses located squarely under the proposed town centre. They were, in fact, a network of ephemeral headwater streams that provide an important food source to downstream fish habitat. The study team recommended that the town centre be moved to better protect the watershed's ecology…and it was!

The IWMP was completed in July of 2011 on time and within the approved budget. Careful project management was crucial to this. KWL's engineers maintained frequent communication with the client, regulators and various stakeholders. This enabled issues to be addressed in a collaborative and efficient manner.

Outstanding Engineering Achievements

The outstanding engineering achievements for this project were the environmental protection and enhancements planned for the watershed. The IWMP calls for sustainable infrastructure that goes well beyond regulatory requirements in preserving this undeveloped watershed's ecology. The key features of the plan are:

- **Integrating land use planning with stormwater engineering.** This resulted in moving the town centre to preserve small ephemeral headwater watercourses valued by DFO. Various land use types were changed and were placed in strategic locations to minimize impacts to the watercourses and maximize the space for stormwater source controls. This was accomplished without compromising on the densities, liveability or economic viability of the development. Regional stormwater facilities will be located on proposed school and park sites.

- **Enhancing the best fish habitat in the watershed**, the main stem of Partington Creek. KWL's proposed floodplain creation and environmental enhancements will be accomplished by moving an existing 1.5 km roadway a further 40 metres away from the creek channel to create 30-metre riparian setbacks. (The current setbacks are 15 metres on the north side and 0 metres on the south.) This has multiple benefits such as flood protection, an increased sediment management area, increased riparian setbacks, and instream complexing. These enhanced riparian setbacks are wider than required by the Riparian Area Regulation. Floodplain forest and marshes will be restored to pristine conditions. Side-channels, instream wood structures, boulder groups and spurs, and stable debris jams will be created to improve fish habitat. Sediment and sand traps are located at strategic locations to allow for efficient and fish-safe sediment removals. The works will benefit all aquatic species, with the greatest benefit to the spawning habitat for chum salmon. A 25% long-term increase in their numbers is expected. These measures will provide significant ecological health gains for the watershed and a net environmental *gain* for fish and fish habitat in the watershed.
- **Mitigating the impact of development through leading-edge stormwater technologies**, including underground baseflow augmentation facilities, which will mimic the natural hydrologic processes in a watershed and sustain aquatic life. This new technique uses specialized flow splitters such that baseflows, low flows and flushing flows continue to the natural creek system, and excess impervious area flows are conveyed to a diversion structure that discharges directly to the receiving water body. Unlike surface ponds, which are common practice in stormwater management and are heat sinks that can warm creek systems to fish-harming levels, these underground rock trenches will keep water temperatures cool for fish. The land area above them can be used for recreational uses. This is the first time that large-scale baseflow augmentation facilities will be used in Metro Vancouver, and they will form pilot projects for the region. DFO also endorsed the use of this new technology. KWL's engineers also recommended other sustainable practices such as maximizing stormwater source controls such as roadside rain gardens, bio-retention facilities, vegetated swales and green roofs, which are not only effective but aesthetically pleasing stormwater mitigation techniques that increase property values. Other recommendations included water quality treatment facilities, high flow diversions, and preservation of riparian setbacks and 99% retention of the existing natural watercourses.

Technical Excellence and Innovation

In addition to the baseflow augmentation facilities mentioned above, two other key elements make this project truly new and innovative. First is the idea of conducting watershed planning, land development planning, and financial modelling *concurrently*. The current approach to land development is to first develop land use plans and then engage civil engineers to mitigate the impacts of development. This reactive approach limits the mitigation opportunities and solutions available, and many environmental impacts cannot be fully alleviated. The end result is inadequate and costly mitigation plans, and urban developments that significantly harm adjacent watercourses and their aquatic life.

Because engineering, land use, and financial decisions could be made during the IWMP process, engineers could recommend the best solutions for environmental protection, and for building and servicing a

sustainable community. In fact, the IWMP recommendations had such a profound affect on the land use planning process that the land use plan was redrafted in response to it, something that, to our knowledge, has never before occurred in Canada. To address environmental concerns, the location of the planned village core was moved to the east and land use densities were modified to retain and protect the environmentally valuable headwaters tributaries to Partington Creek. Acting on advice from the engineers, planners increased the proposed building heights and forms, and the scale and intensity of the development, so that more space could be set aside for environmental protection and sustainable infrastructure. Land use designations were redrafted and refined, and road layouts amended, to strategically minimize impacts to the creek and optimize stormwater infrastructure.

The second key innovation is KWL's idea of determining how best to protect the environment by considering what is best for the watershed as a whole. The IWMP calls for some losses in a less sensitive tributary, Star Creek, in favour of bolstering and enhancing the best fisheries habitat areas on the main stem of Partington Creek. By protecting the very best habitat in the watershed at the expense of a much less environmentally valuable area, the City will achieve a 'net environmental benefit for fish and fish habitat' for the watershed. This means that after development of the watershed fish habitat will actually be *better* than current conditions. Of significance, the project received a letter of endorsement from DFO – a first for the Metro Vancouver region.

> "The IWMP is a significant achievement and is expected to be instrumental in ensuring that future development activity in the watershed is congruent with the fish habitat values that currently exist in the Partington Creek watershed.
>
> DFO would like to commend City of Coquitlam staff and their consultants for their dedication to the project and for the efforts that were taken to ensure that the comments and recommendations of the advisory committee were addressed to the fullest extent possible."
>
> Ms Diane Trager, Area Director, Fisheries and Oceans Canada

Environmental, Economic and Social Benefits

The Partington Creek IWMP process has preserved watershed health as a whole, while meeting community needs and allowing development to occur. Using a progressive approach of iterative collaboration among planning, engineering, biology, and financial professionals, and stakeholders, it was possible to create a more sustainable and economically viable community.

The IWMP not only exceeds the watershed goals, developed at the outset of the project, but also reflects the wishes that stakeholders expressed during the project. This diverse group included naturalist groups, rate payers, recreation groups, regulatory agencies, Coquitlam residents, and developers. The most strongly desired outcomes for the watershed, such as protecting watercourses, and maximizing forest cover, green spaces, and conservation area, are provided for in the IWMP. This will result in a highly livable community as defined by those who may live in or near it, and who care the most about it.

All of this was accomplished while still meeting the financial objectives of the development and preserving the development's pro forma. By creatively changing the land use to accommodate environmental objectives, the study team was able to maintain the City's population plan and preserve its development cost charge (DCC) revenue. The total value of the development once built out will be approximately $1.5 billion. The IWMP's $30 million in recommended works are fully funded through DCCs. This is a winning solution for all concerned.

Photo 1: The Partington Creek watershed is mostly covered by second-growth forest and has sparse rural development.

Photo 2: The lower third of the Partington Creek watershed is planned for a $1.5 billion greenfield development, future home to about 12,000 people.

Photo 3: Partington Creek is one of the last ecologically healthy streams in Metro Vancouver, a prolific salmon spawning stream.

Photo 4: The IWMP provides for a net environmental *gain* for fish and fish habitat, with the greatest benefit to the spawning habitat for chum salmon. A 25% long-term increase in their numbers is expected.

Photo 5: Much of the forest cover in the watershed is protected through dedicated parks and setbacks to support the diverse and abundance wildlife, including species at risk such as the Pacific Water Shrew.

Photo 6: Stormwater solutions include maximizing source controls to infiltrate rainwater where it falls and provide water quality treatment.

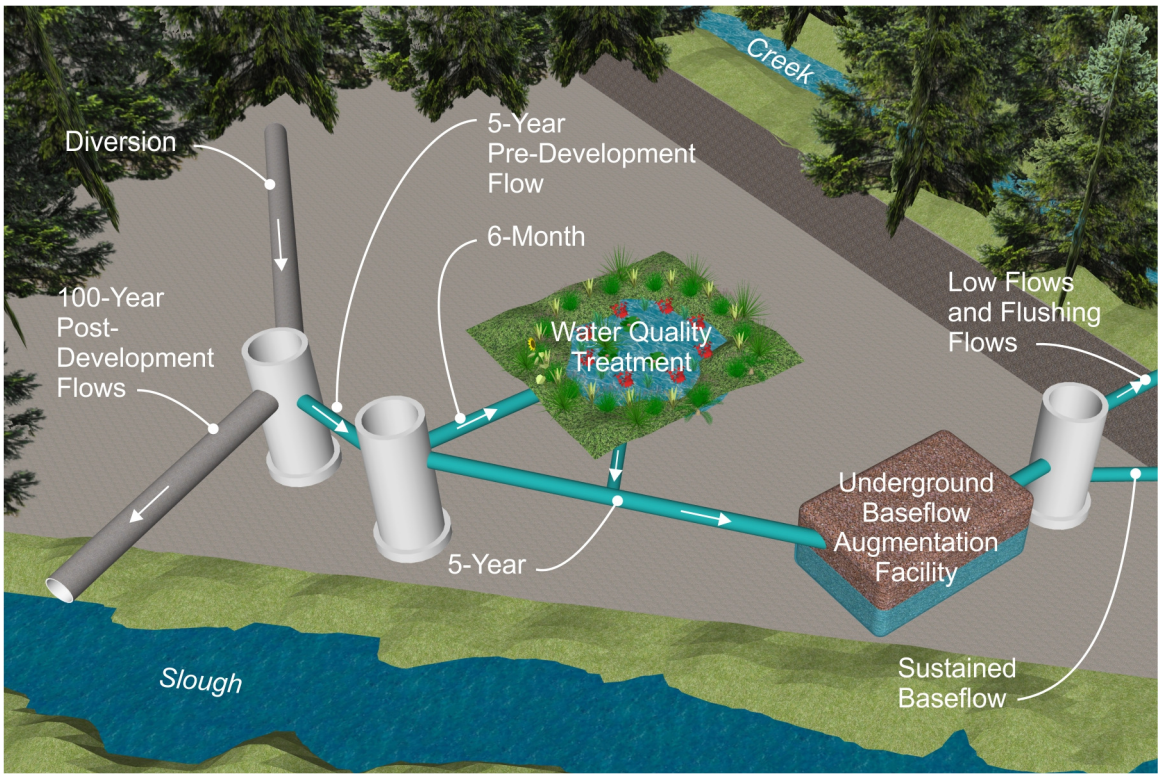


Photo 7: New and innovative baseflow augmentation facilities and diversions with flow splitters will mimic natural creek flows. These will be located underground.

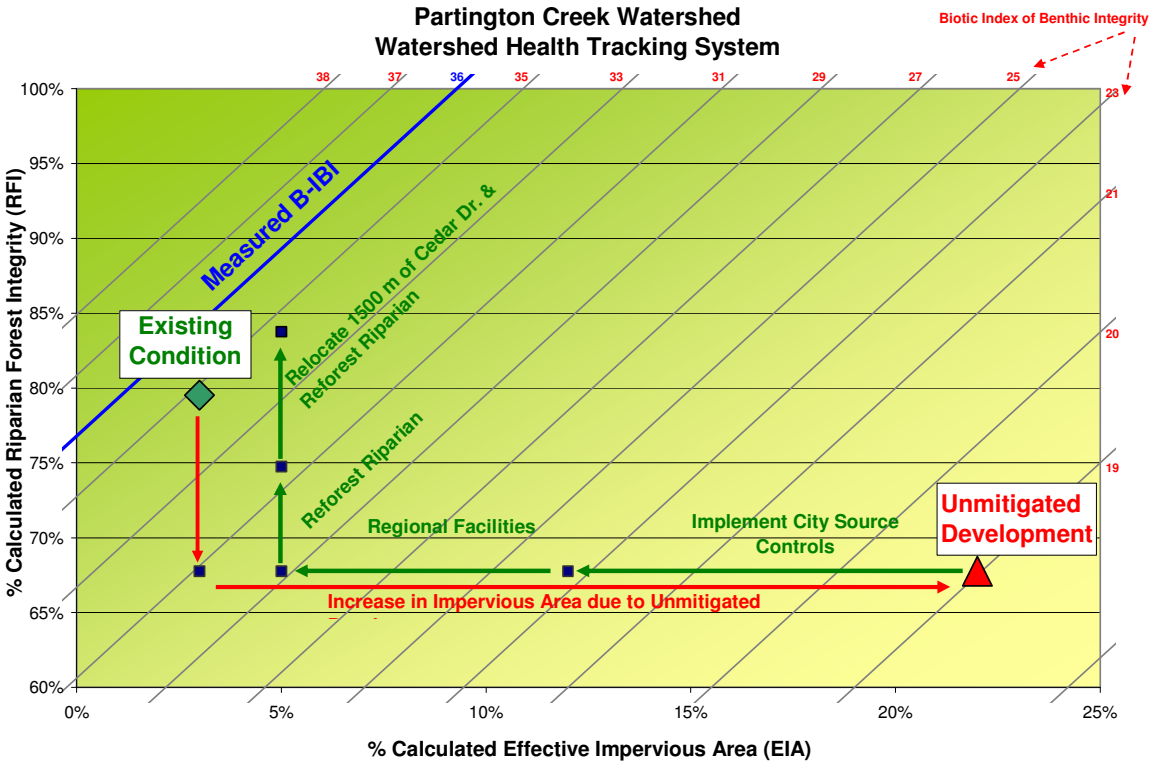
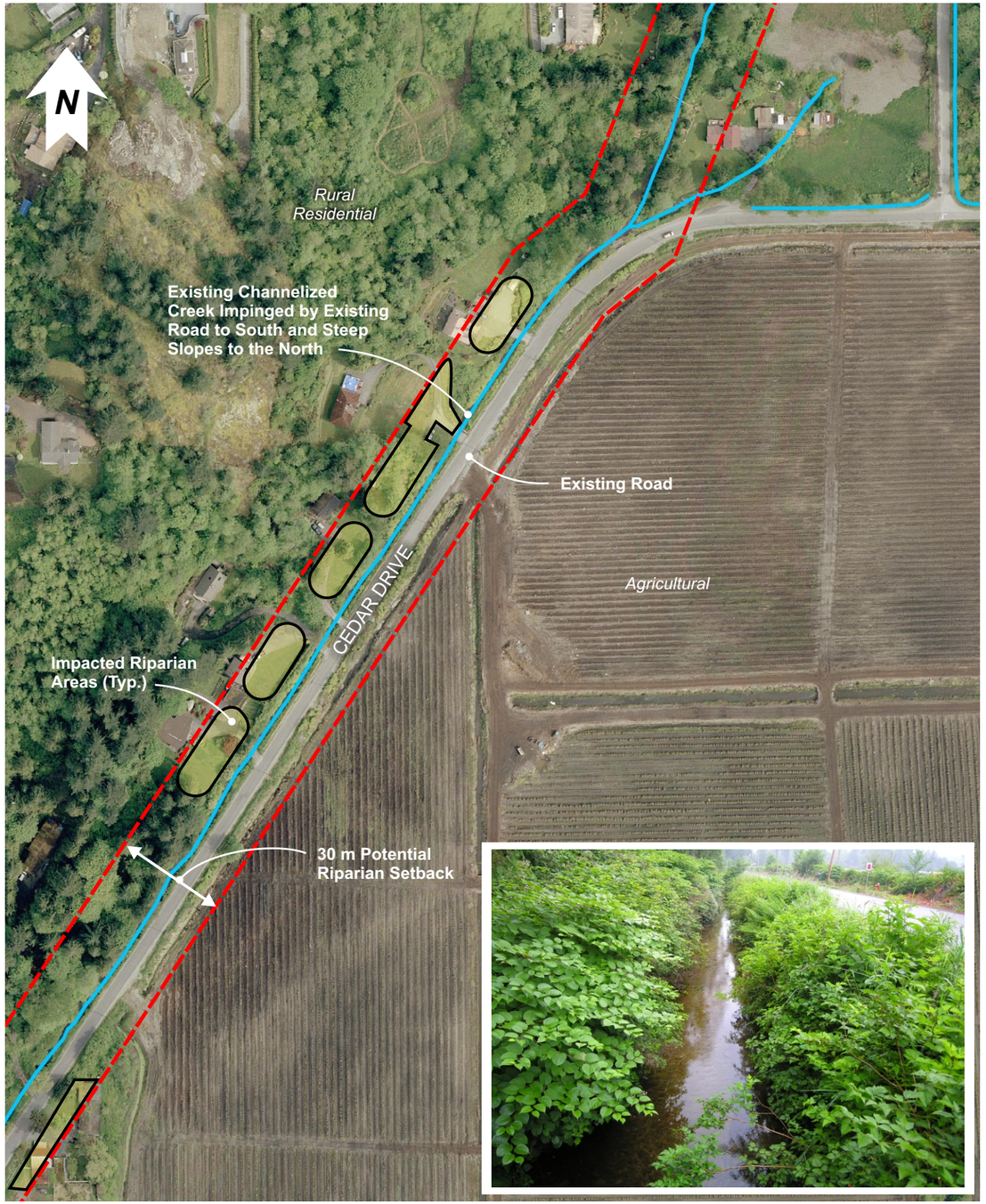


Photo 8: The Watershed Health Tracking System was used to quantify losses and gains in the watershed and the predicted outcome of the implementation of the plan.



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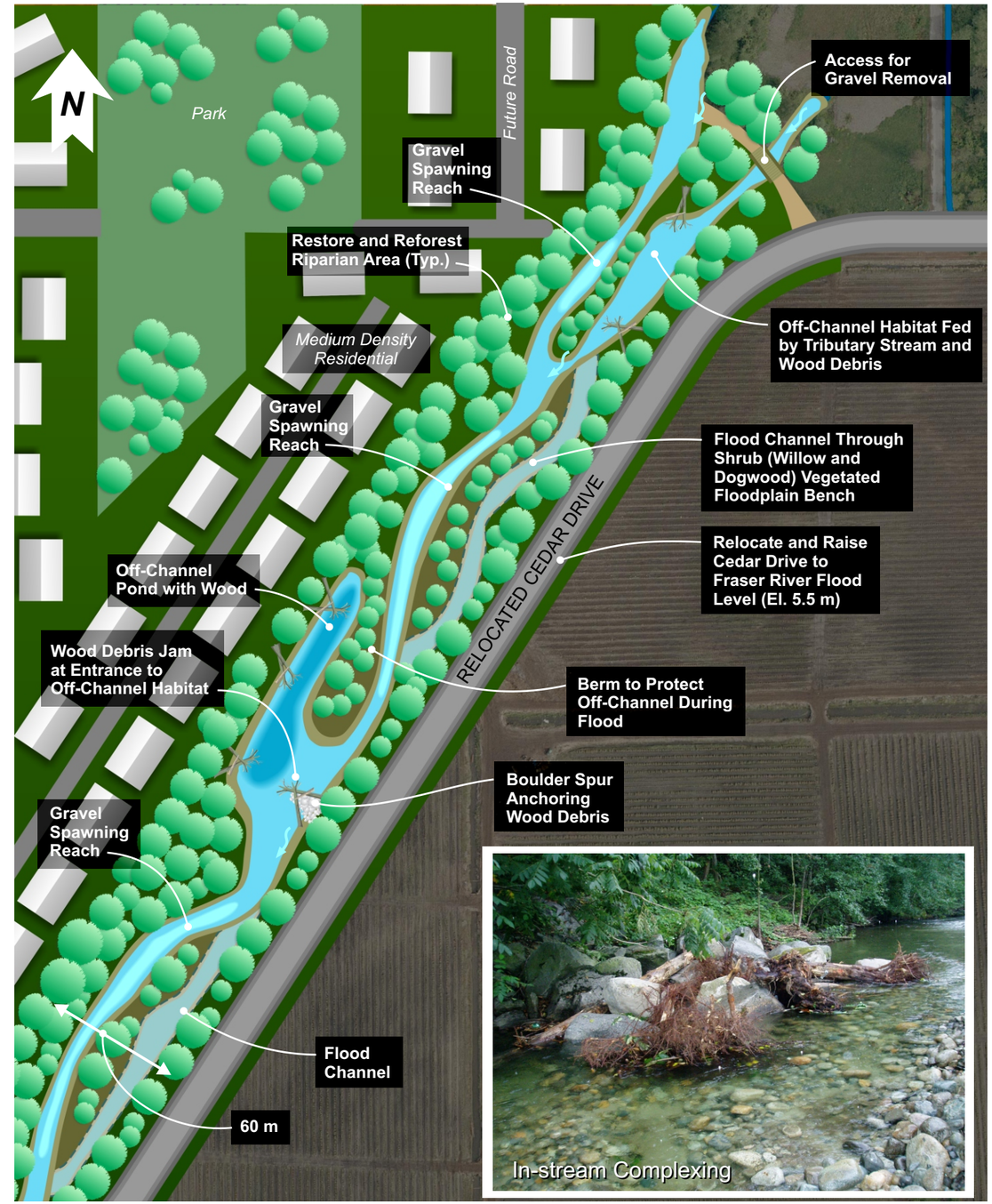

PROPOSED

Enhancing the Watershed's Most Valuable Fish Habitat

Partington Creek Main Stem - 1.4 km of Enhancements

Figure 1