CP'S ENVIRONMENTAL RESPONSE TO RECORD FLOODS

LEVERAGING EXISTING RELATIONSHIPS WITH REGULATORS TO ACHIEVE WIN-WIN OUTCOMES: CP'S ENVIRONMENTAL RESPONSE TO RECORD FLOODS

Joe Van Humbeck, P.Biol, R.P.Bio.
Canadian Pacific – System Manager Environmental Assessment

Kasey Clipperton, B.Sc., M.E.Des.
Golder Associates - Principal

OVERVIEW

- CP and Parks Canada – a long relationship
- 2013 – a record flood
- Requirements for compensation
- A win-win solution

CP AND PARKS CANADA

- Canadian Pacific and Parks Canada have a long and intertwined history
- In the fall of 1883, during the construction of the mainline, three CPR construction workers discovered hot springs in a cave.
- In 1885 Canada's first (and the world's third) National Park – Rocky Mountains National Park – was created around the "Cave and Basin Hot Springs"

CP AND PARKS CANADA

- In order to develop tourist traffic for the transcontinental passenger routes, CPR built grand hotels in Banff and Lake Louise.

CP AND PARKS CANADA

- More recently CP and PC have been working together on environmental issues

- In 2010 established the Joint Action Plan, a five year research program to investigate the causes of wildlife mortality (primarily grizzly bear) along the rail corridor and test potential mitigations.
- CP invested $1MM over the five years with a substantial portion of the funds being matched by the National Science and Engineering Research Council. PC provided logistical, permitting, volunteer and in-kind support.
- Results will be shared at a public symposium in Banff in January as well as an industry workshop following the symposium.

2013 FLOOD

- In June of 2013, Southern Alberta and Southeastern British Columbia experienced recording flooding.
- Canada's costliest natural disaster (over $5B in insured and uninsured losses)
- Over 100,000 people evacuated from flood zone in Calgary

- Occurred in the heart of CP's Network
- Response effort involving hundreds of CP employees

OUR NETWORK REGIONS

EAST AND WEST

2013 FLOODS

- Washouts in dozens of locations
- Significant damage to three bridges
- Emergency response required to stop catastrophic failures
- Armouring of river bed and banks to protect infrastructure from further erosion

REGULATORY REQUIREMENTS

- Canada *Fisheries Act* prohibits any activity or undertaking that causes serious harm to fish, which includes permanent alteration or loss of fish habitat
  - *Fisheries Act* managed by Fisheries and Oceans Canada (DFO)
  - DFO can issue an Authorization for such activities, but requires offsetting to be developed by the proponent to counterbalance the losses
  - Under normal circumstances, this is done prior to the start of work

- DFO granted emergency Authorizations to CP for the emergency works completed to protect infrastructure in response to flood damage
  - Future offsetting was required based on the final footprint of the instream works for all flood projects combined

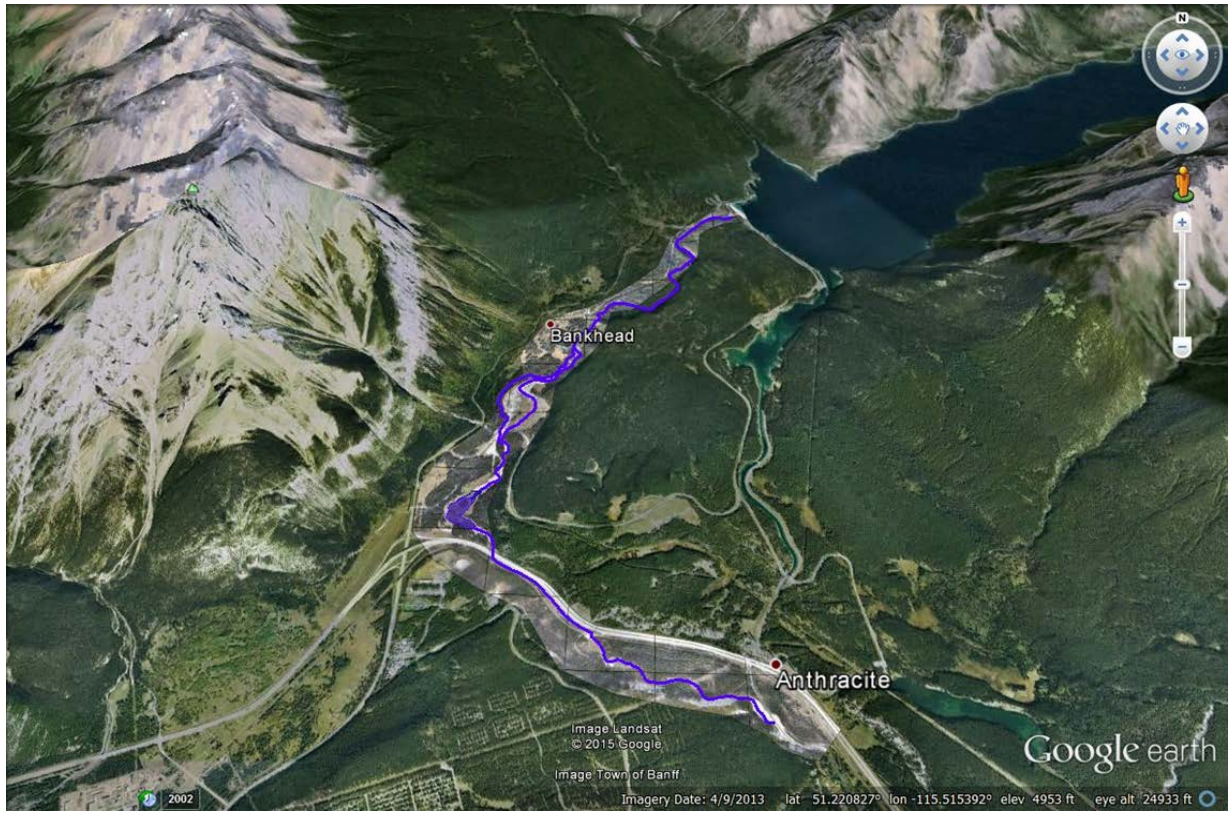
PROPOSED OFFSETTING PROJECT

- Objective for offsetting:
  - Find a single project that could achieve offsetting for all of the flood footprints – requirement to create ~10,000 m^2 of fish habitat to meet offsetting obligations

- CP, Golder, and Parks Canada identified an opportunity within Banff National Park
  - Restoration of Cascade Creek was an existing PC priority but has not had funding to complete the design and execute the plan
  - Preliminary concept had been developed by PC
  - Project is located adjacent to CP main line – good partnership opportunity
  - CP hired Golder to develop conceptual design and evaluate feasibility

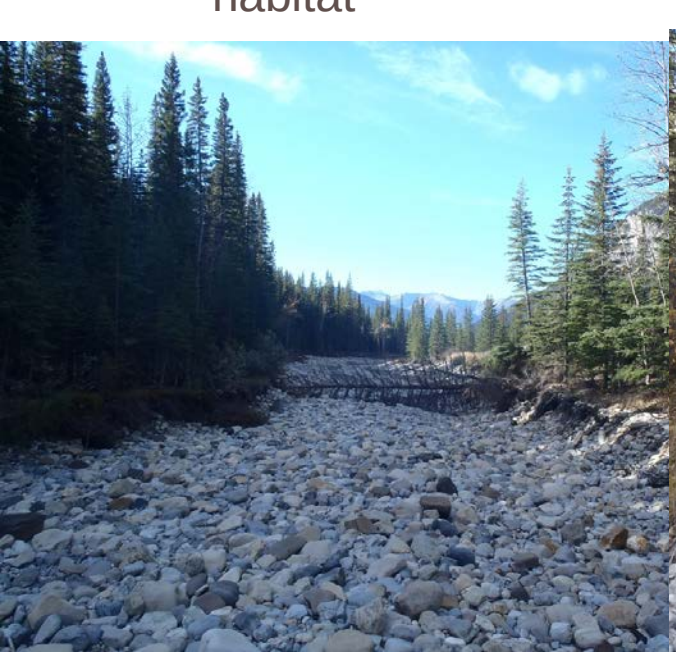
CASCADE CREEK PROJECT

- Cascade Creek is bypass reach downstream of a dam (hydropower)
- Channel scoured from spill release during 2013 floods
- Channel goes dry based on existing negligible flow releases
- Restoration project involves channel modifications and increased base flow
- Provide habitat for Westslope Cutthroat Trout (listed species)



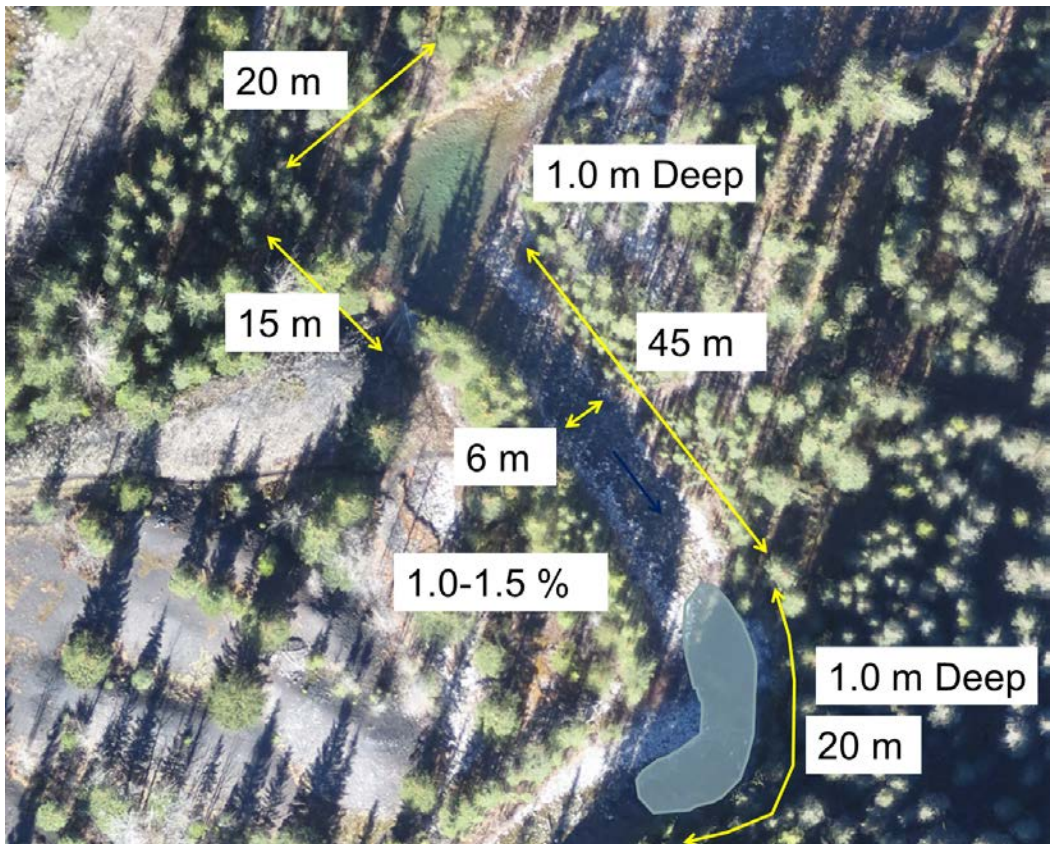
DESIGN CONCEPT

- Basic Concept – create a smaller channel along existing alignment designed to accommodate increased minimum flow release from the dam to restore fish habitat



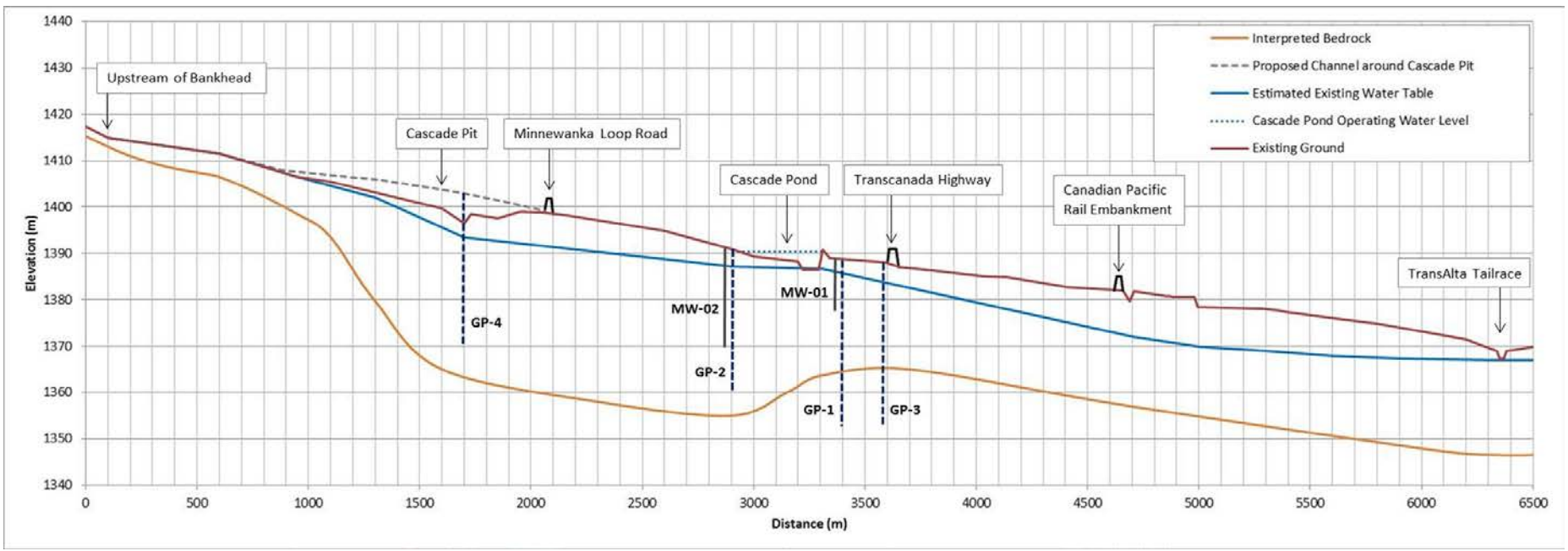
ADVANCE THE DESIGN

- Questions remained about feasibility
  - Losses of flow to groundwater
  - Appropriate channel dimensions
  - Channel alignment
- Golder conducted studies to evaluate feasibility
  - UAV surveys to generate high-res imagery and DEM
  - Hydrogeology investigation to estimate groundwater losses
  - Identify channel analogue for habitat design



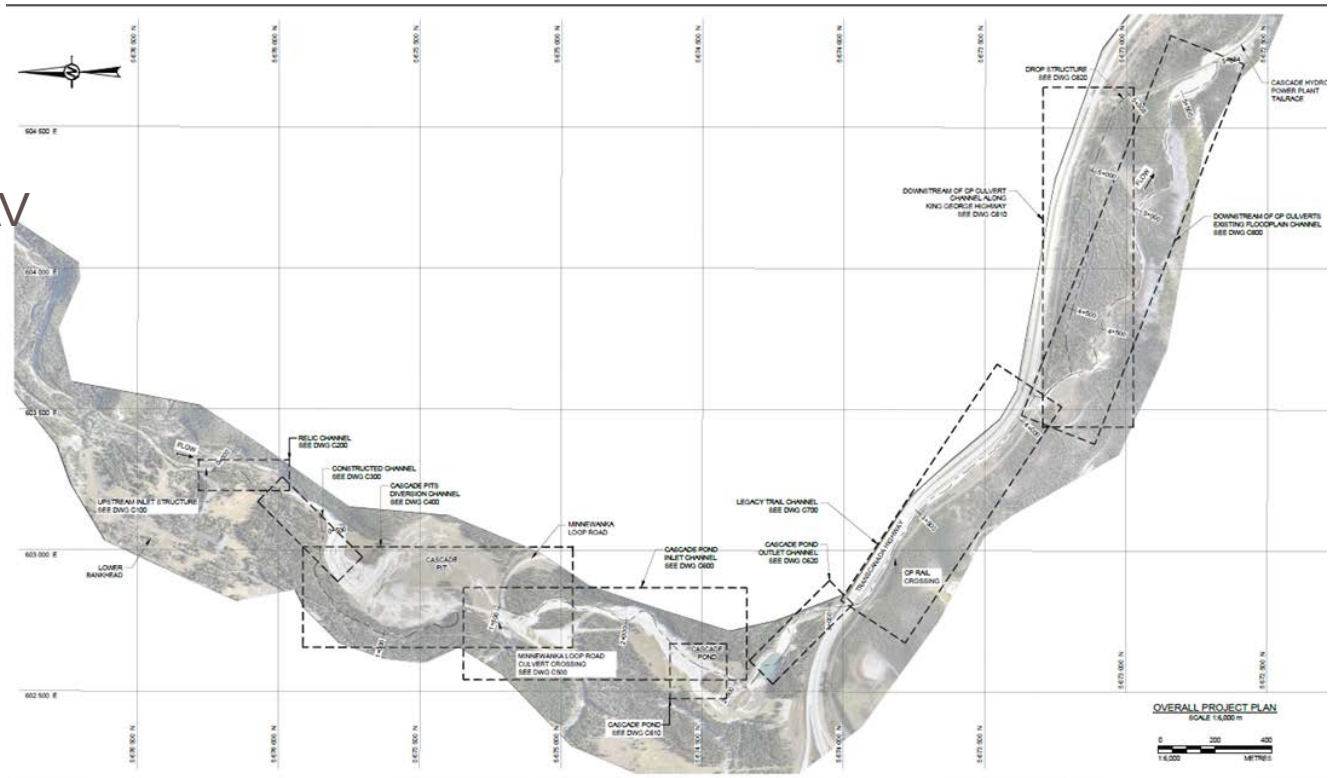
PROPOSED DESIGN FLOW

- Estimated groundwater losses to be ~ 0.3 m^3/s
  - Proposed release of 1.1 m^3/s to sustain flow and habitat in restored channel



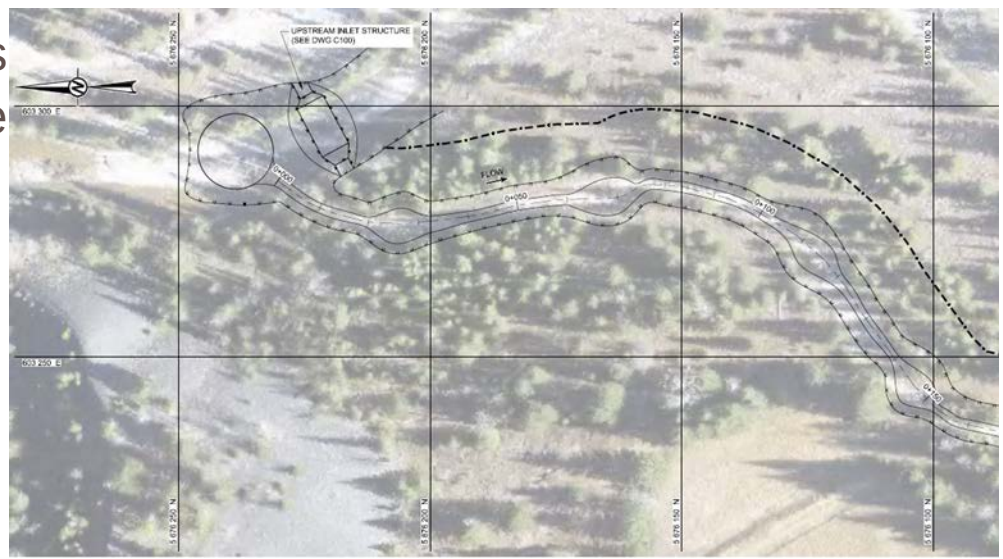
DESIGN DETAILS

- Developed channel alignment based on UAV survey and DEM
- Two distinct restoration zones allow phased or partnering approach
- Total length of channel design of ~ 5.3 km



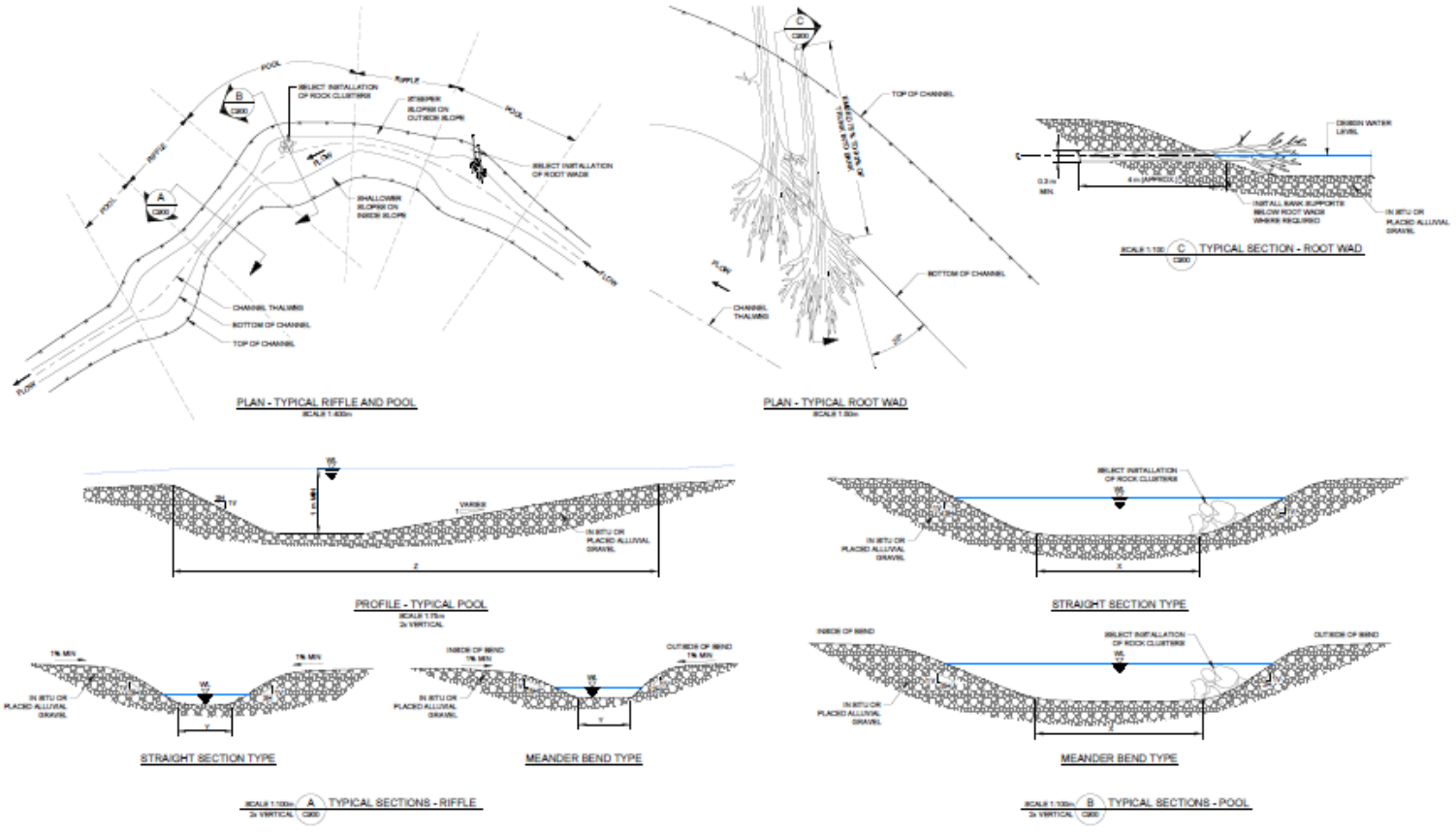
CHANNEL DESIGN

- Design objectives included:
  - Minimize excavation requirements, minimize tree disturbance
  - Achieve channel slope and habitat distribution (target 1:1 riffle:pool ratio)
  - Develop channel dimensions to meet habitat requirements for target species
  - Create depths and velocities to ensure fish passage
  - Identify areas of habitat enhancement to provide fish cover



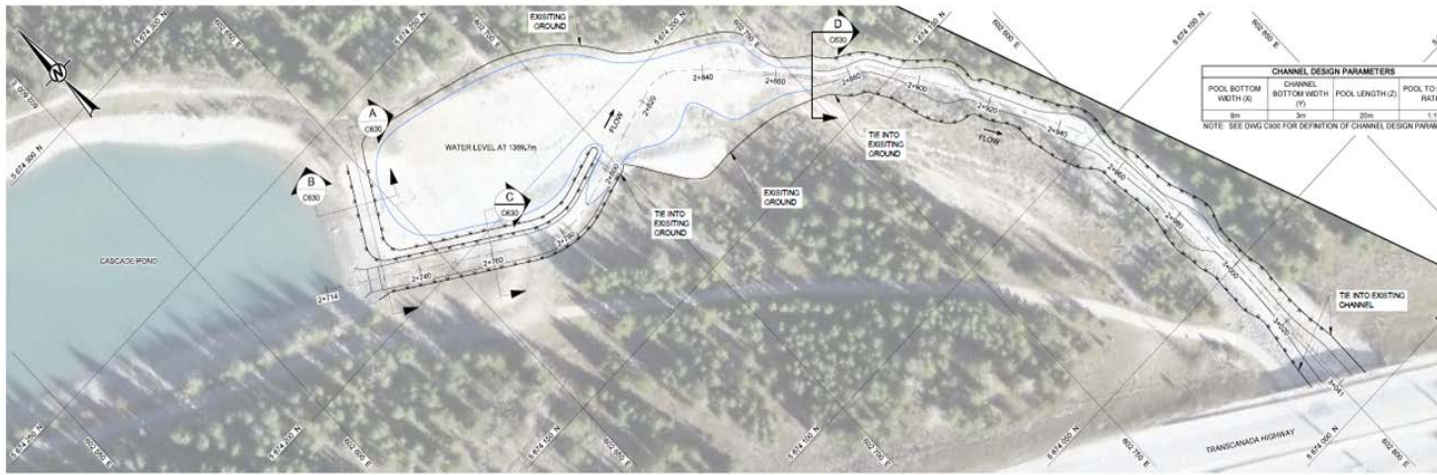
DESIGN DETAILS

- Created habitat features for target species
- Created channel dimensions to match flow and depth criteria

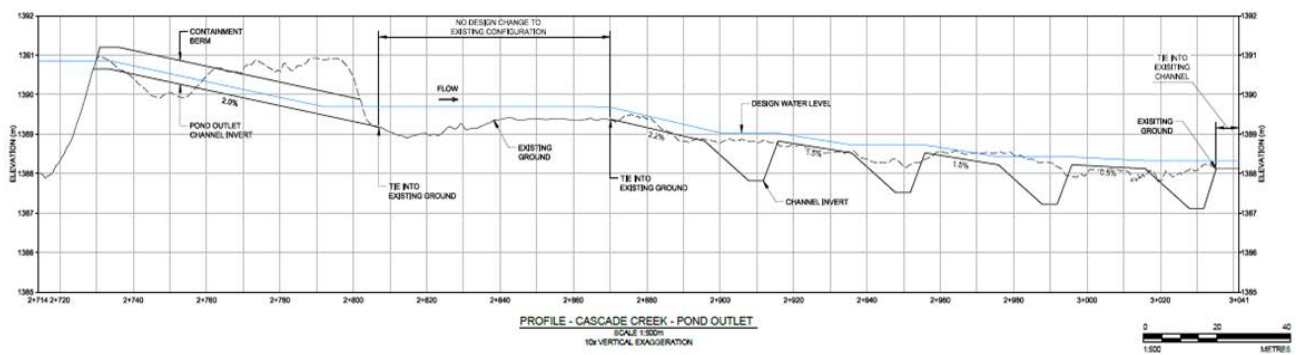


DESIGN DETAILS

- Integrated design with existing infrastructure
- Looked to create enhancement for PC visitor experience objectives though improving pond water levels



PLAN - CASCADE CREEK - POND OUTLET
SCALE 1:500m



PROFILE - CASCADE CREEK - POND OUTLET
SCALE 1:500m
10x VERTICAL EXAGGERATION

CONCLUSION

- Total habitat area created from preliminary design
  - 14,200 m^2 upper section
  - 14,000 m^2 lower section
- Final design created sufficient habitat to meet CP offsetting commitments focusing on one of the restoration sections
- CP's feasibility work pushed project to where additional funding could be secured
- Leveraged existing relationship between CP and PC to achieve objectives for both parties
  - Design advances a PC restoration priority and enhances existing visitor experience sites
  - Achieves CP's regulatory commitments under their *Fisheries Act* Authorization