Designing Large-Scale Fish Habitat Offsets for a Major Mine Development: A Multi-Disciplinary Approach

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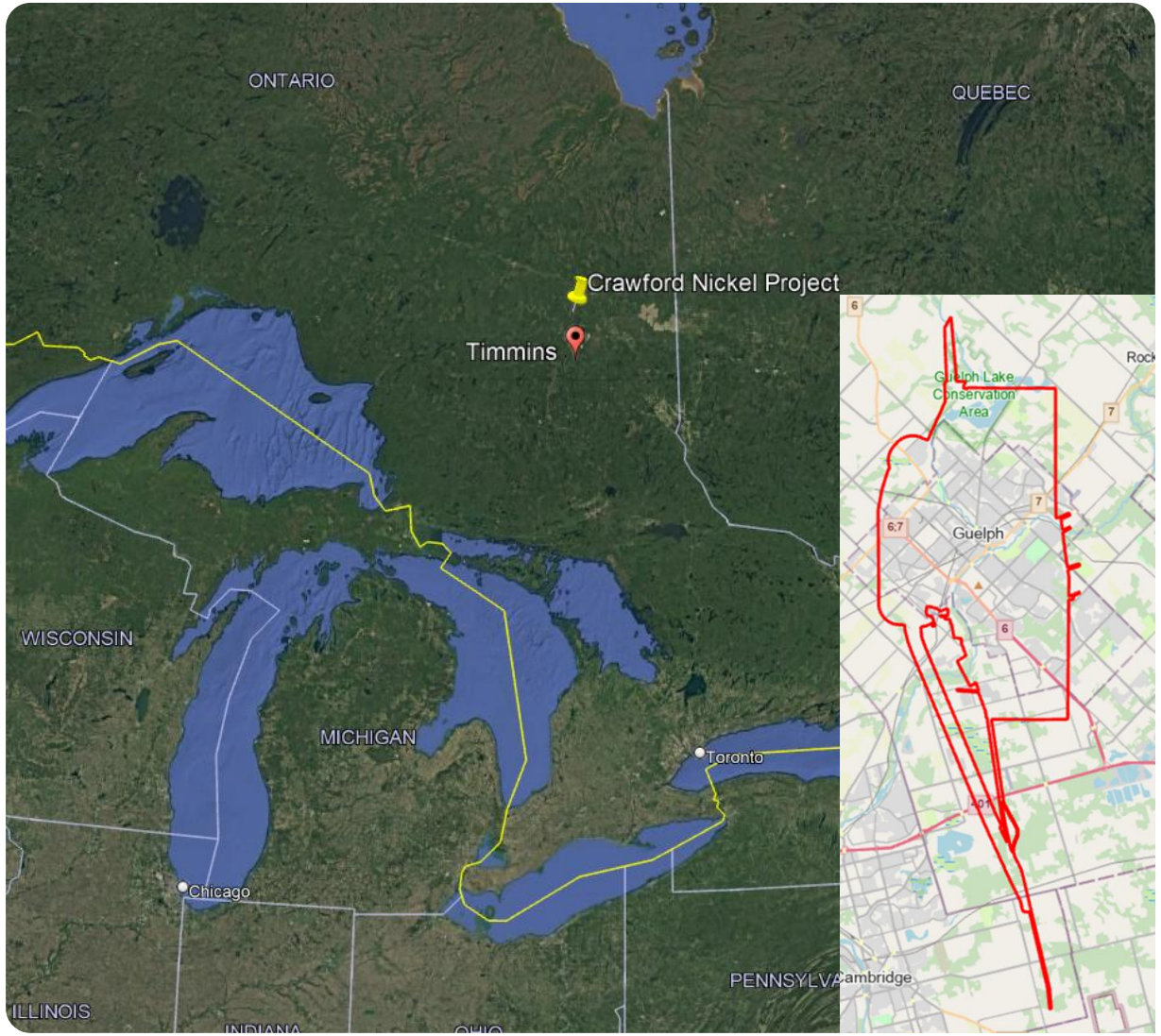
Agenda

1. The Crawford Nickel Project
2. Fisheries Impacts
3. Collaborating on Fish Habitat Offsetting
4. Summary

The Crawford Nickel Project

Geography

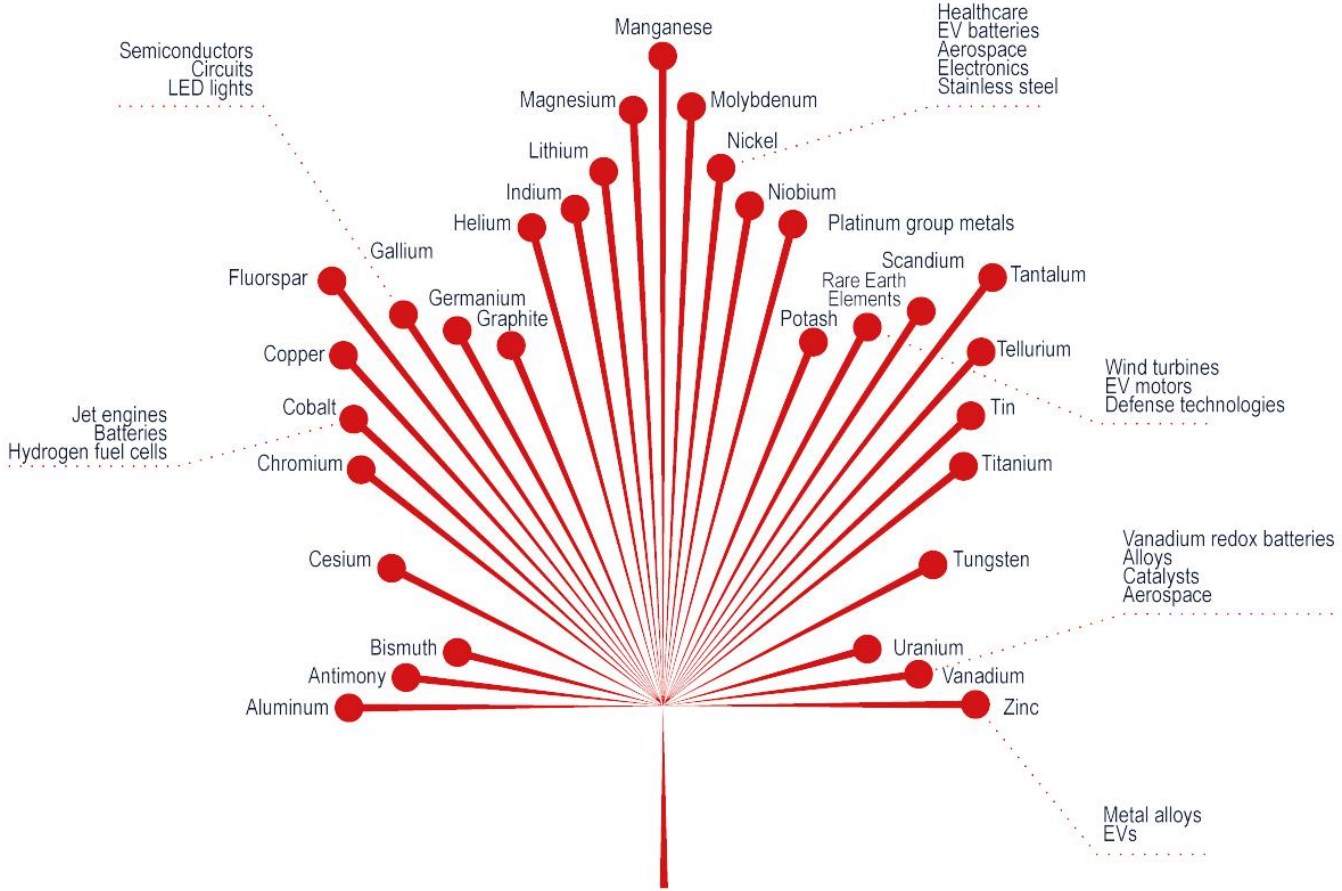

ONTARIO
QUEBEC
Crawford Nickel Project
Timmins
WISCONSIN
MICHIGAN
Toronto
Chicago
ILLINOIS
PENNSYLVA
Guelph Lake Conservation Area
Guelph
Cambridge

CANADA NICKEL COMPANY

THE CRAWFORD NICKEL PROJECT

Government Priorities

- Energy and resources sovereignty
- Critical Minerals Strategy
- Referred to Canada's Major Projects Office
- One Project One Process

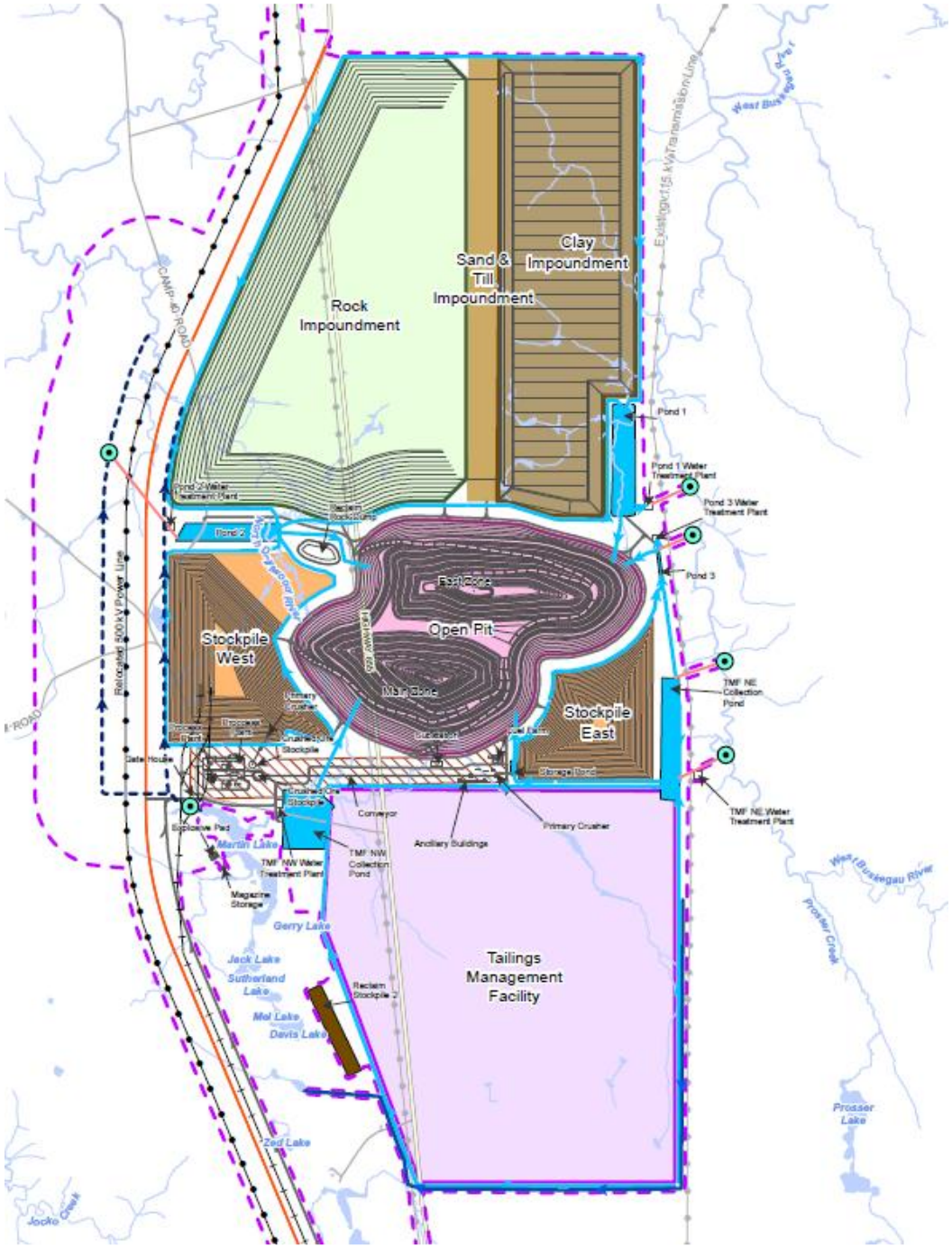


CANADA NICKEL COMPANY

THE CRAWFORD NICKEL PROJECT

Project Context

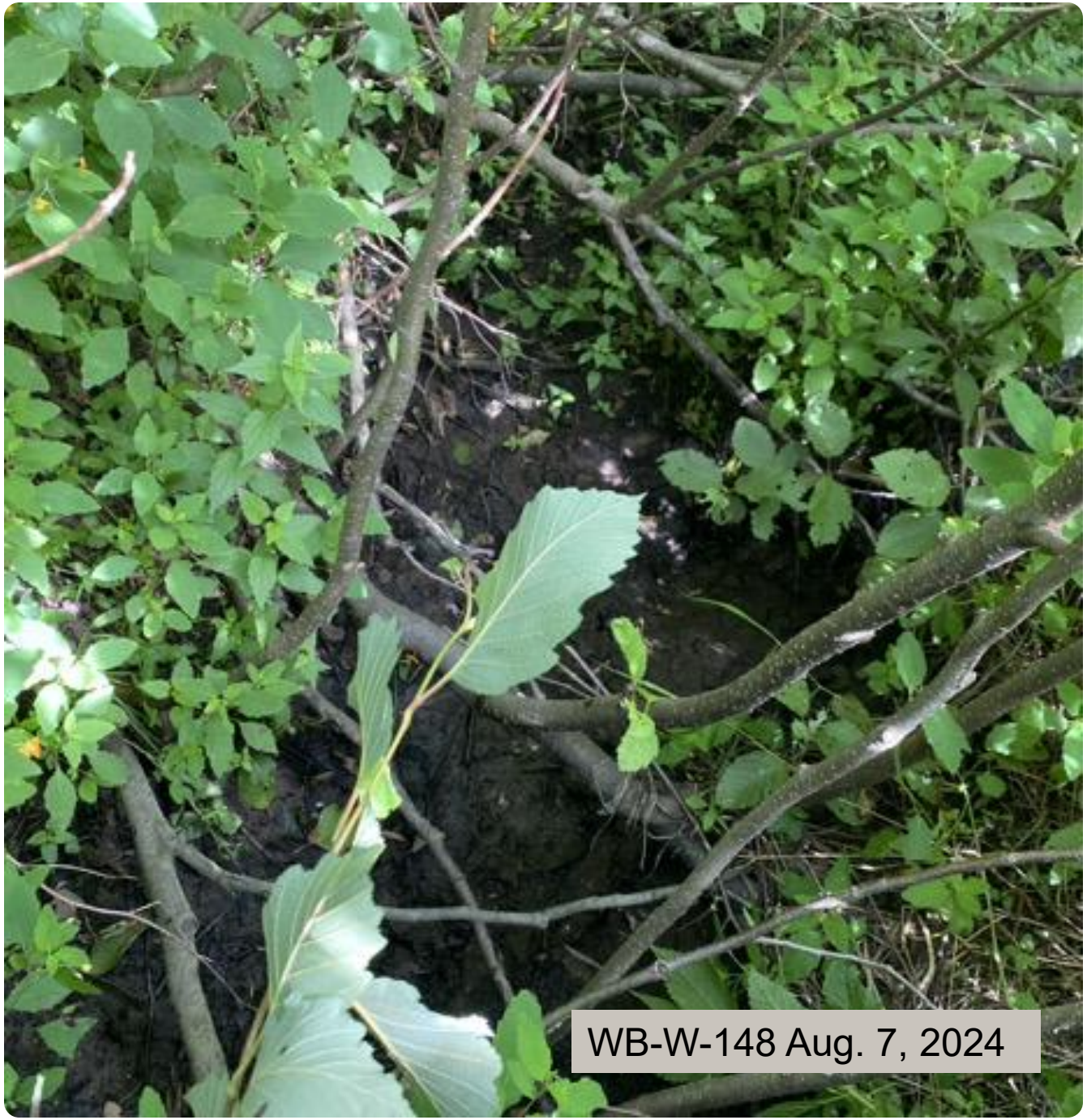
- Open Pit mine processing approximately 120,000 tonnes per day of ore
- Large Impoundment Areas
- Tailings Management Facility
- Key infrastructure connections and relocation
- Three-year construction life span (plus expansion)
- 41 years of active extraction and operation
- Potential for 1.3 M tonnes / year of carbon sequestration



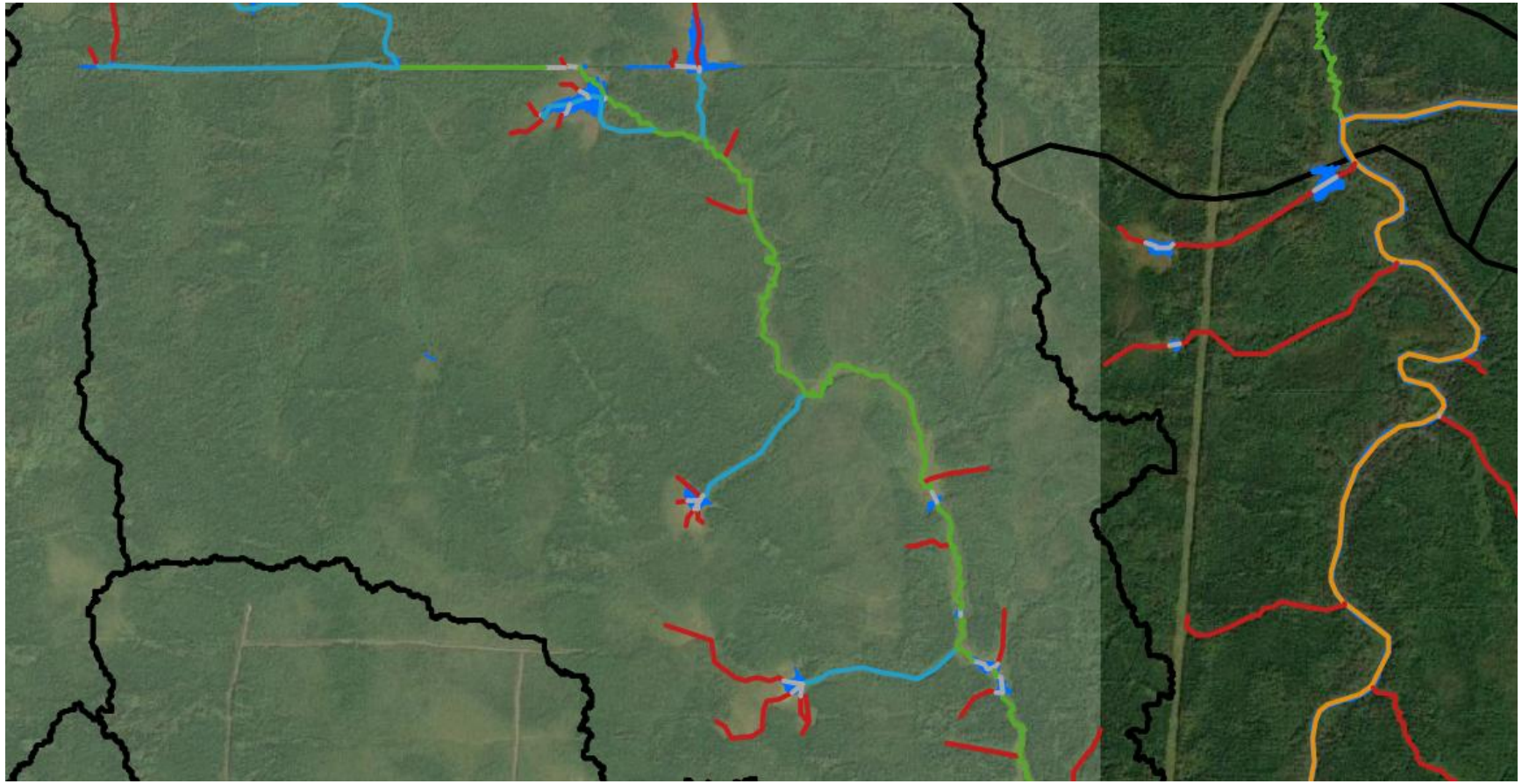
Fisheries Impacts

Fisheries Investigations in Tributaries

- Baseline data collection began in 2021
- Conservative in-field estimates by fisheries biologists of where fish habitat begins in first order streams
- GIS exercise to plot watercourses potentially affected by the project

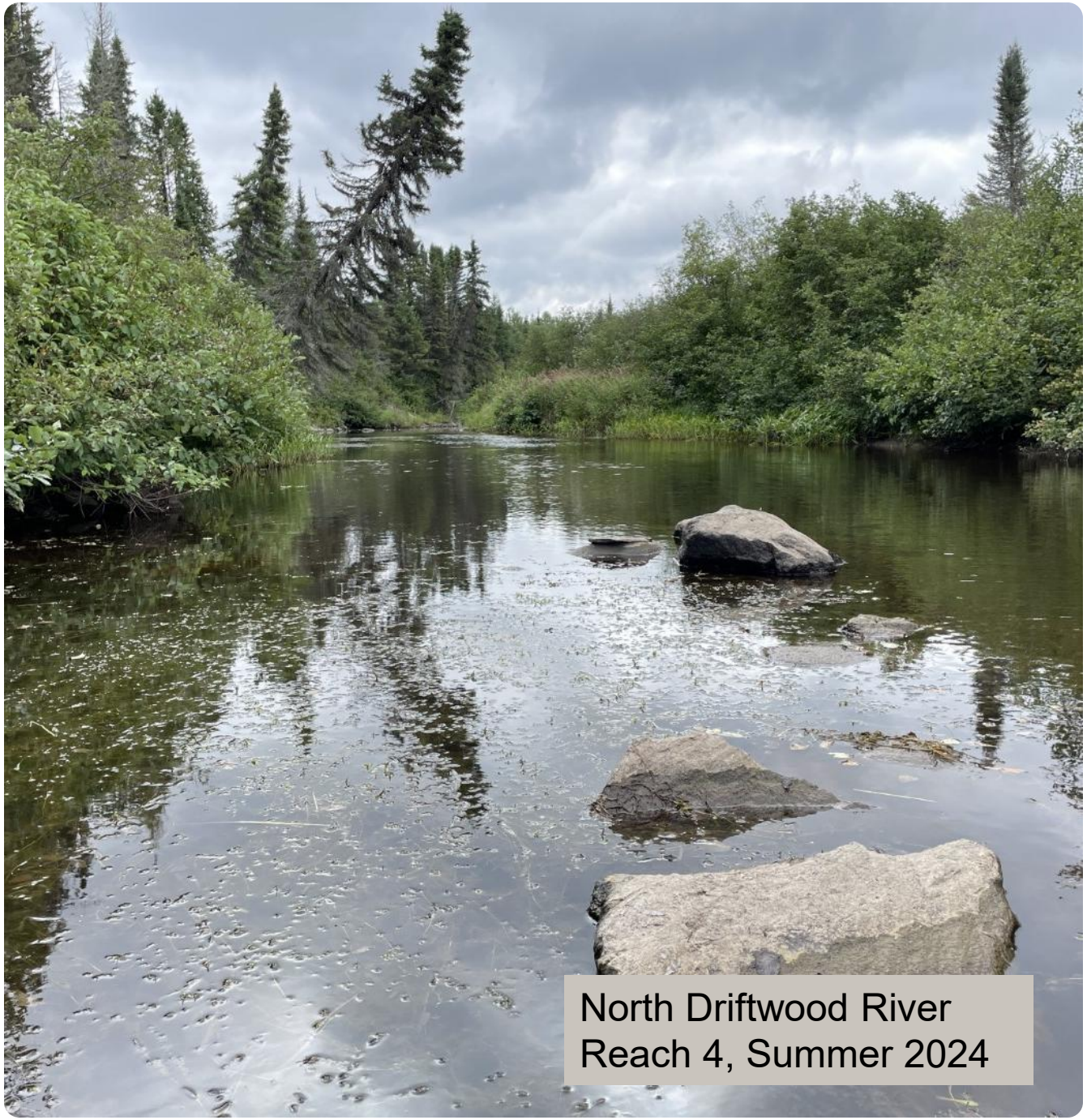


Stream Order Classification



Fisheries Investigations in Named Watercourses

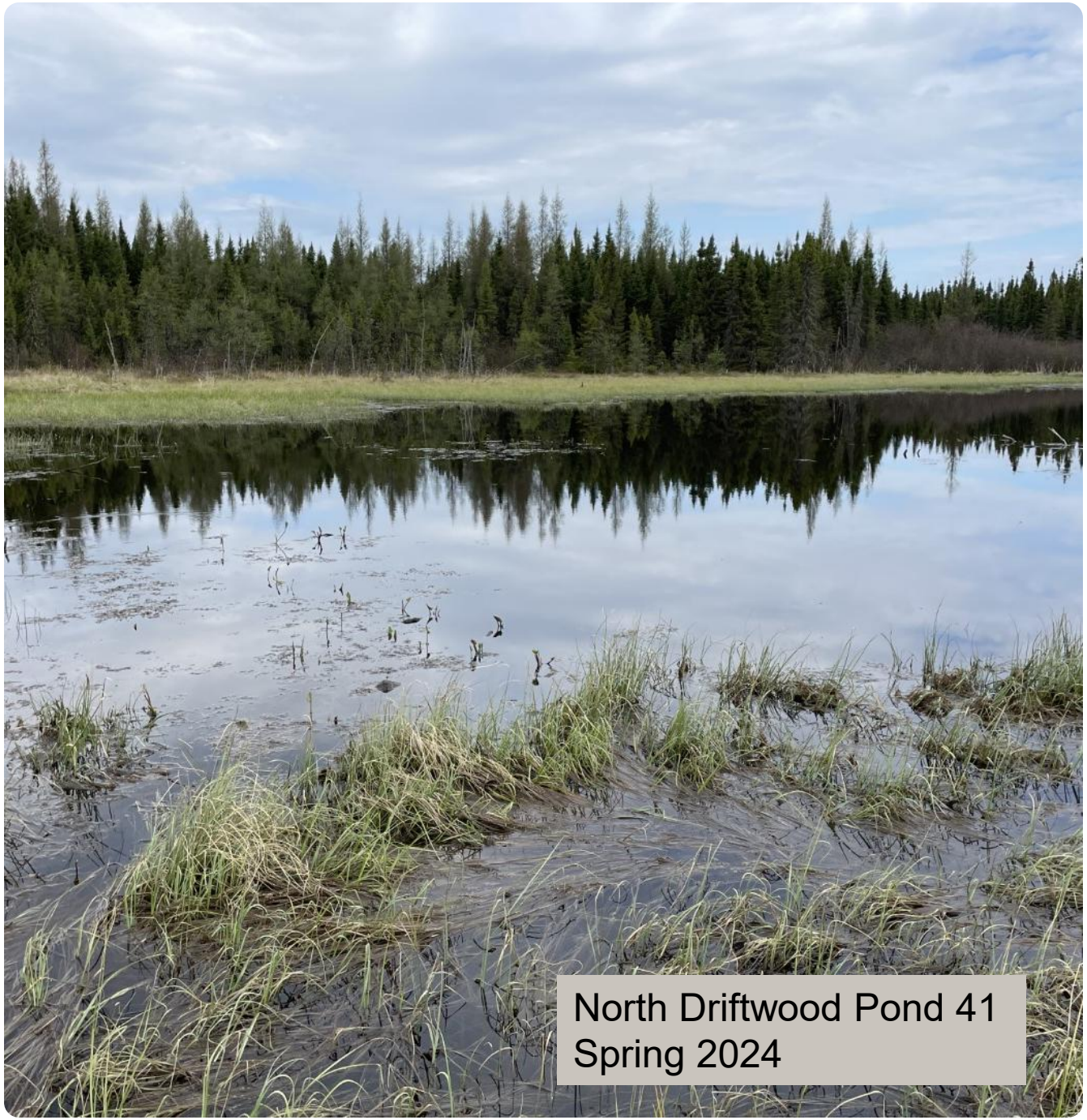
- Aerial survey of mainstems to identify potential spawning areas (i.e., riffles) and barriers to upstream fish passage
- Fish habitat characterizations and fish community assessments in potentially affected reaches
- Spring surveys to document presence and abundance of large-bodied spring spawning species
- Summer fish community assessments included repeated sampling within each reach for estimates of variability



North Driftwood River
Reach 4, Summer 2024

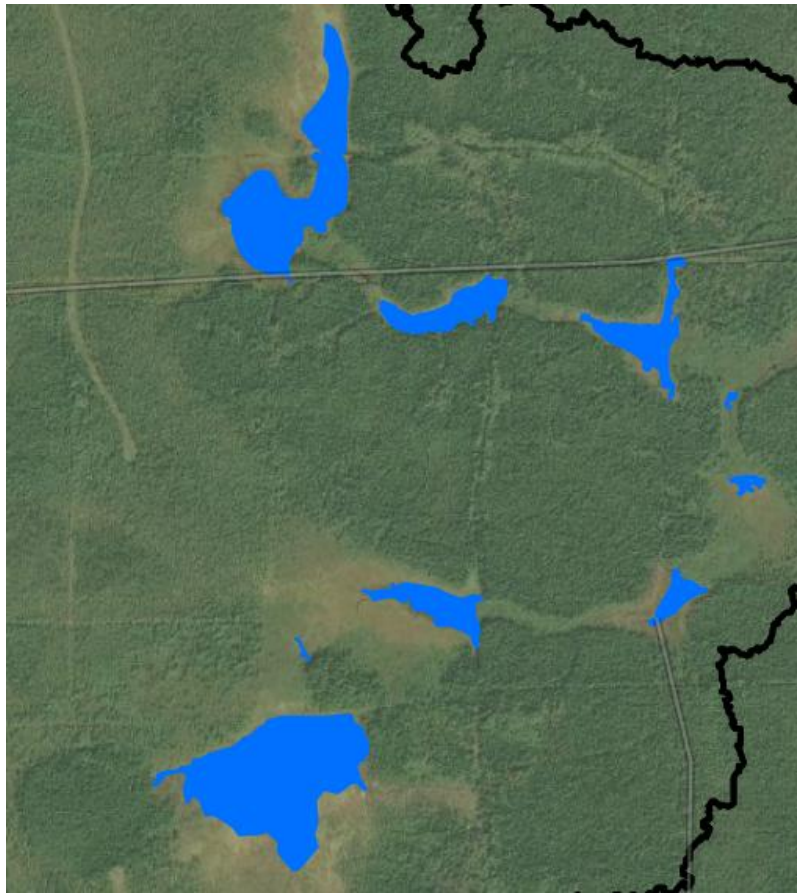
Fisheries Investigations in Ponds

- Aerial imagery interpretation to identify ponds potentially affected by the project
- High-water mark conservatively estimated and used to generate potential available fish habitat estimates
- Fish habitat characterizations and fish community assessments in representative 20 ponds



North Driftwood Pond 41
Spring 2024

Extent of Pond Habitat



Habitat Weighting

Relative Habitat Value (ranging from 0-2) to reflect differences in habitat productivity.

- Ponds
  - Small ponds (< 1 ha): RHV = 0.5
  - Large Ponds (> 1 ha): RHV = 0.75
- Streams
  - 1st order stream (0.29 m): RHV = 0.25
  - 2nd order stream (1.18 m): RHV = 0.5
  - 3rd order stream (4.93 m): RHV = 1
  - 4th order stream (9.26 m): RHV = 2

- 116 hectares (unadjusted) = 95 hectares (RHV adjusted)

Application to Offsetting Strategy

- Proposed offset features are assigned RHV values based on habitat type.
- Impacts and offsets to be compared using weighted habitat area, with the objective of achieving equivalency or a net benefit in fish habitat quality.
- Time to function reduction
- Complimentary measures as remainder of offset

Fish Habitat Offsetting

Disciplines and Priorities

Owners

- Schedule & Budget
- Permits
- Support of Rights holders

Regulators

- Submissions and plans meet requirements of Acts

Rights Holders

- Habitat: Avoid > Reduce > Restore > Replicate
- Consider culturally important fish species

Designers

Encompasses all other discipline priorities

Plus: Develop functional designs that meet the needs of the project

- Geotechnical engineers
- Hydrogeological engineers
- Hydrologists
- Hydraulic modelers
- Surface water engineers
- River engineers
- Water quality specialists
- Aquatic biologists
- Terrestrial Biologists
- GIS and CAD technicians
- Construction specialists
- Assessment and permitting pros

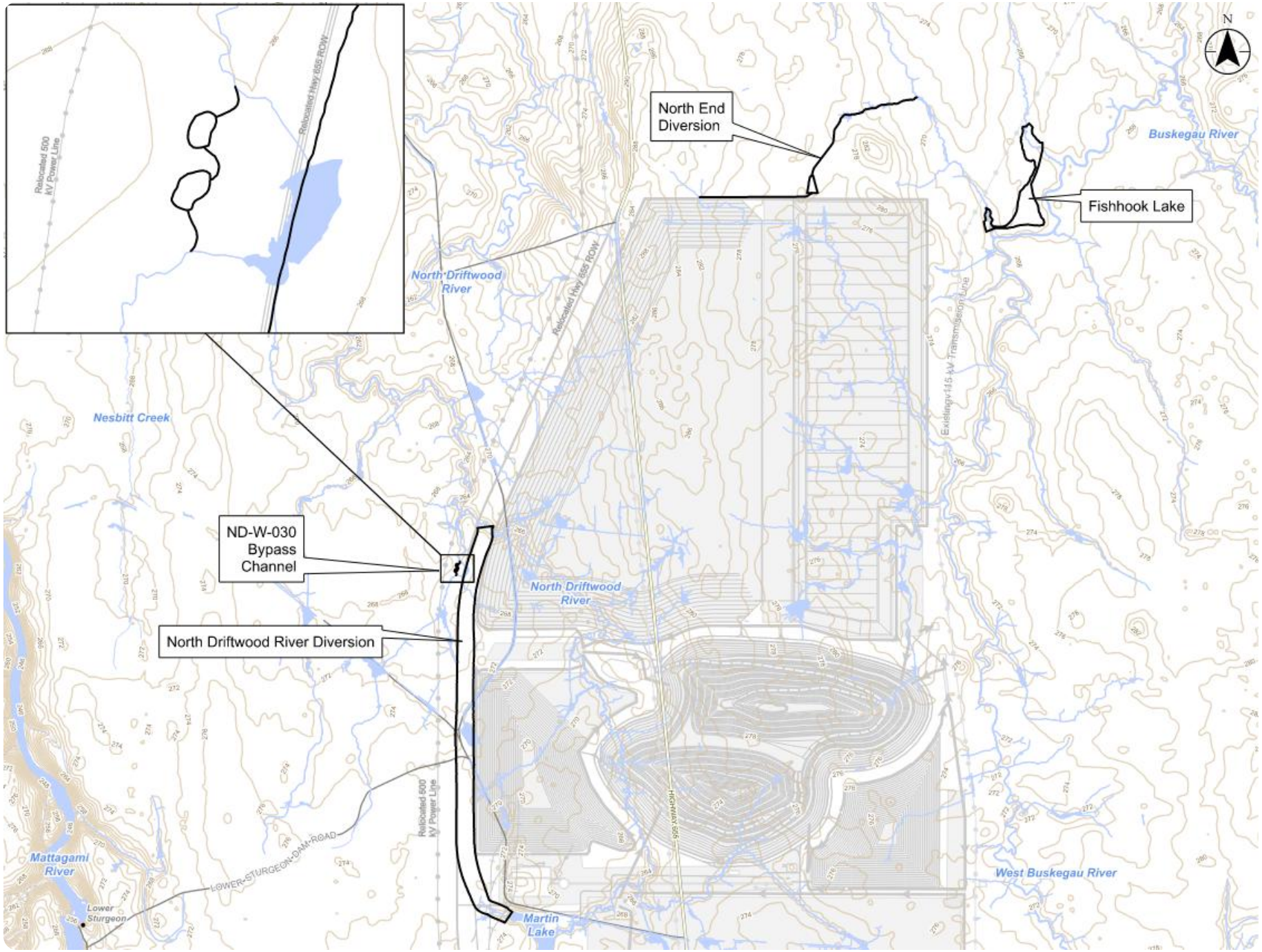
Offsetting Sites

HADD = ~116 ha

Anticipated offsetting needs = 95 ha (RHV)

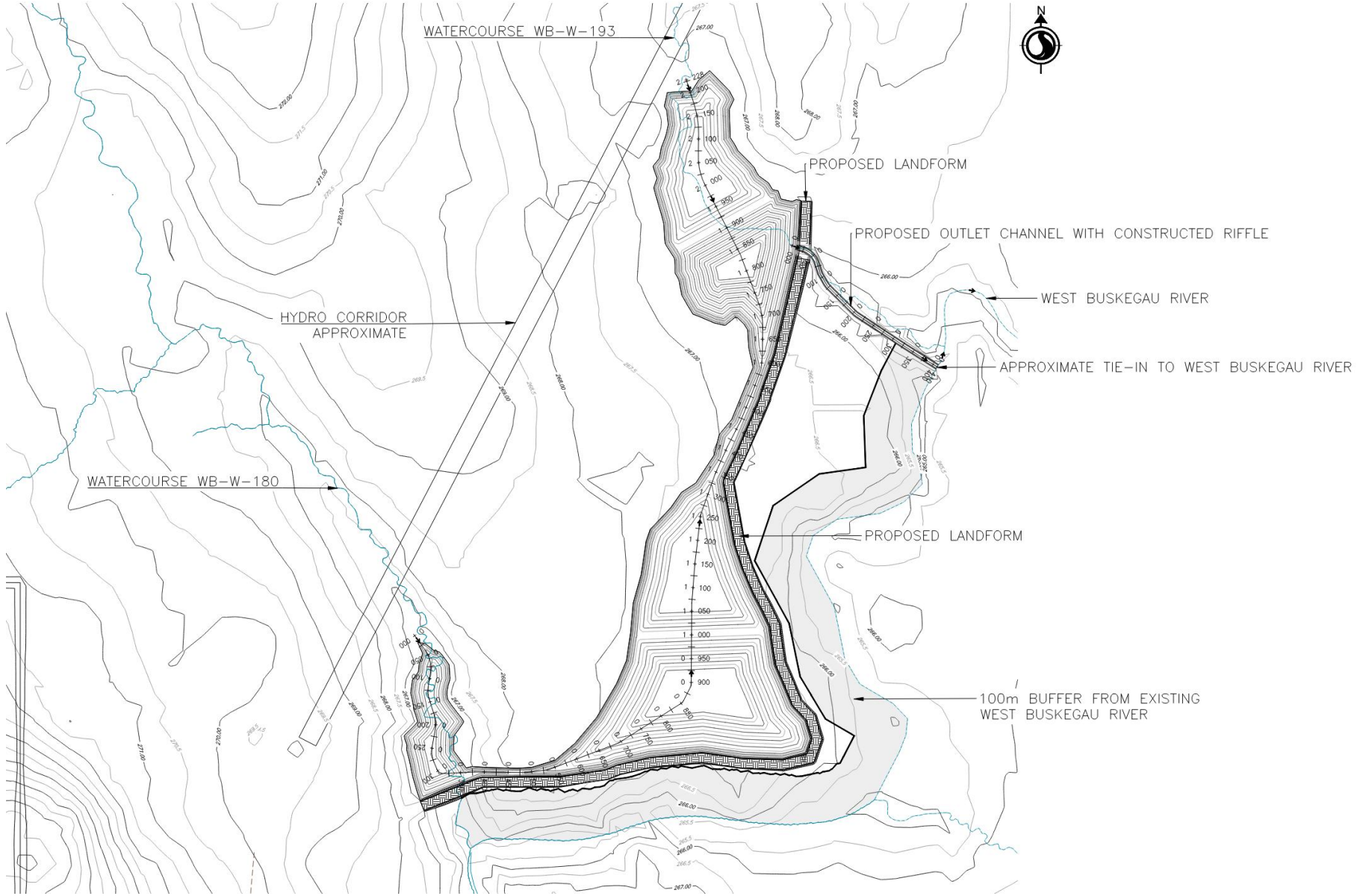
4 sites:

- North End Diversion
- ND-W-30 Bypass
- Fishhook Lake
- North Driftwood River Diversion



Fishhook Lake

- Create new Lake, combine inflows from 2 small tributaries
- Approx offsetting area ~ 32 ha
- Diverse lake depths and habitat elements
- Riffles and spawning habitat at outlet
- Excavation into clay
- Landform to support lake level

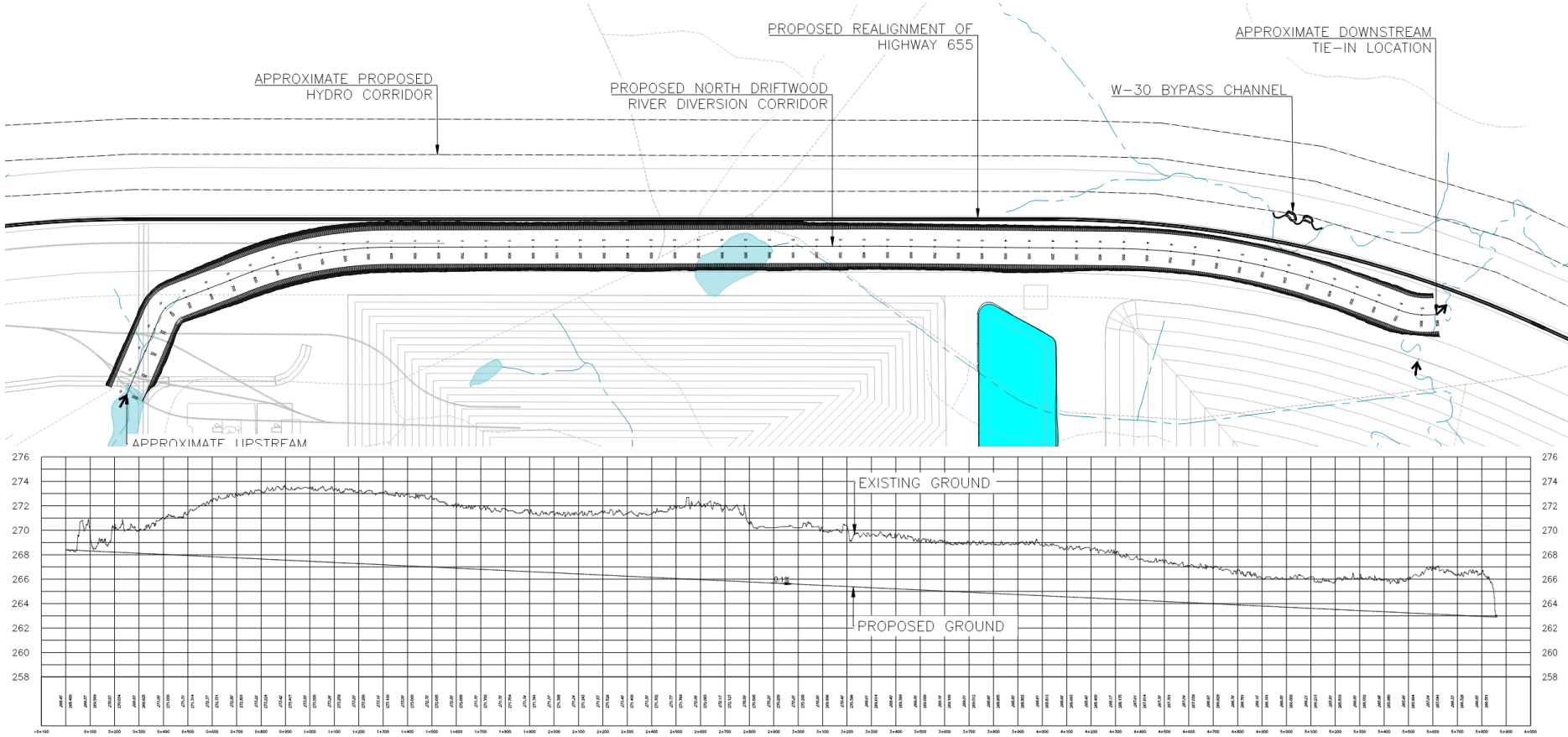


FISH HABITAT OFFSETTING

NDR Diversion

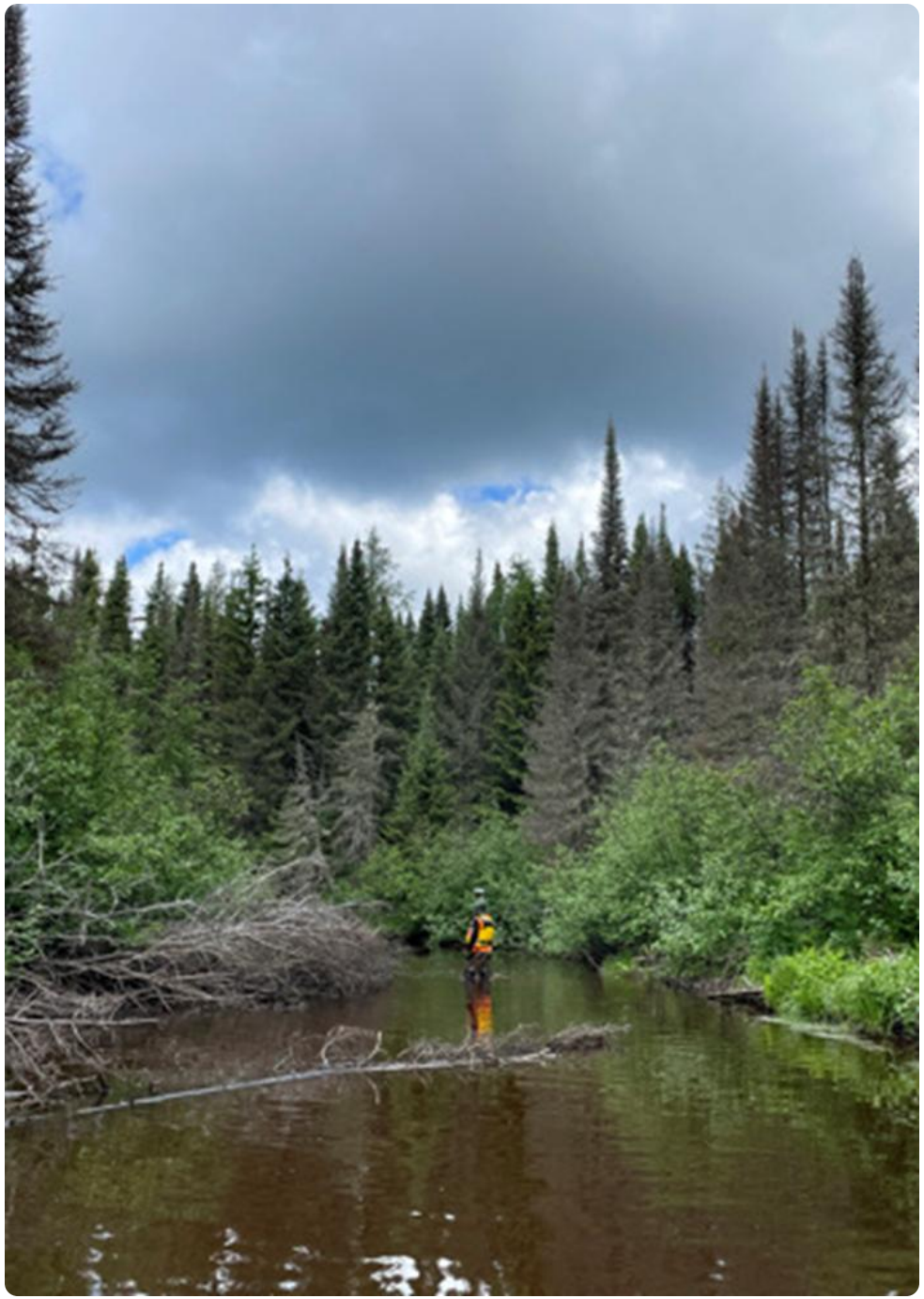
- Realign NDR, mine overprints 12.1 km of the existing river
- Approx offsetting area ~ 26 ha
- River realignment and riparian ponds / wetlands
- Deep excavation into clay
- New contributing drainage area, and mine effluent contributions

FISH HABITAT OFFSETTING



Habitat Function: North Driftwood River Diversion

- ~26 ha of connected flowing-water habitat
- Naturalized channel design with habitat complexity
- Intended to support movement, foraging, rearing, refuge and potential spawning
- Recognizes trade-offs (relative habitat value) and time-to-function
- Monitoring and adaptive management will be required



Summary

- BIG project, moving fast
- Big fisheries impact
- A lot of people involved
    - Priorities all need to be incorporated into design process
- Design requires concurrent input from various disciplines

- Communication, creativity, and collaboration are key!

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Thank you