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Credit Valley Conservation – inspired by nature

Source to Stream, Brampton, ON

Heather Amirault, P.Eng., CISEC

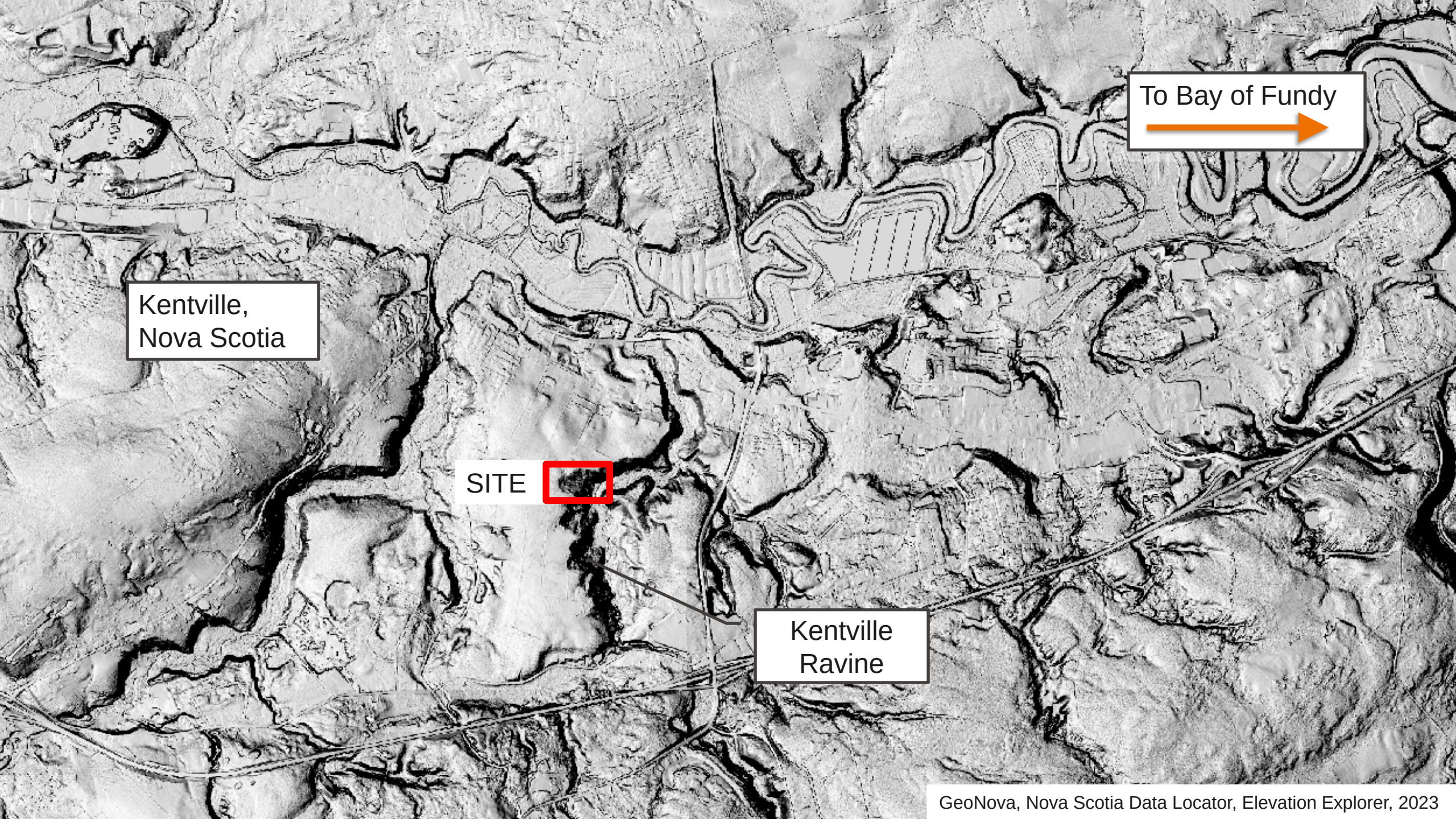
March 22, 2023

After the Landslide – A Field Fit Creek Restoration

Stantec

Agenda

1. Kentville Ravine
2. Landslide
3. Permitting
4. Design / Construction
5. Restoration



GeoNova, Nova Scotia Data Locator, Elevation Explorer, 2023

Kentville Ravine

- Steep narrow ravine valley
- Old growth hemlock forest
- Popular walking trail
- Elderkin Brook
- Atlantic Salmon
- American Eel

Landslide

- Early Spring 2022
- Location of former landfill
- ~5000 m3 of material
- Creates a swath of destruction
- Landslide debris dams Elderkin Brook

Landslide

- Landslide dam creates large backwater
- Trail is gone
- Possible contamination from landfill
- No upstream fish passage

Permitting

Who is involved:

- Agriculture and Agri-Food Canada (AAFC), (landowner)
- Fisheries and Oceans Canada (DFO)
- Environment and Climate Change Canada (ECCC)
- Nova Scotia Department of Environment and Climate Change (NSECC)

- Stantec team

- Local Contractor

- Trail users / Friends of the Ravine

Permitting

Step 1

Create a diversion channel, install ESC.

Step 2

Clear out the landslide debris

Step 3

Ongoing sediment quality sampling

Step 4

Reconnect the Creek and stabilize failure area

Needs Official Permits

Restoration Timeline

Project Activities	Typical Timeline	Urgent Timeline
Planning Designing Permitting Tendering Construction	1-2 years	2-3 months

Permitting

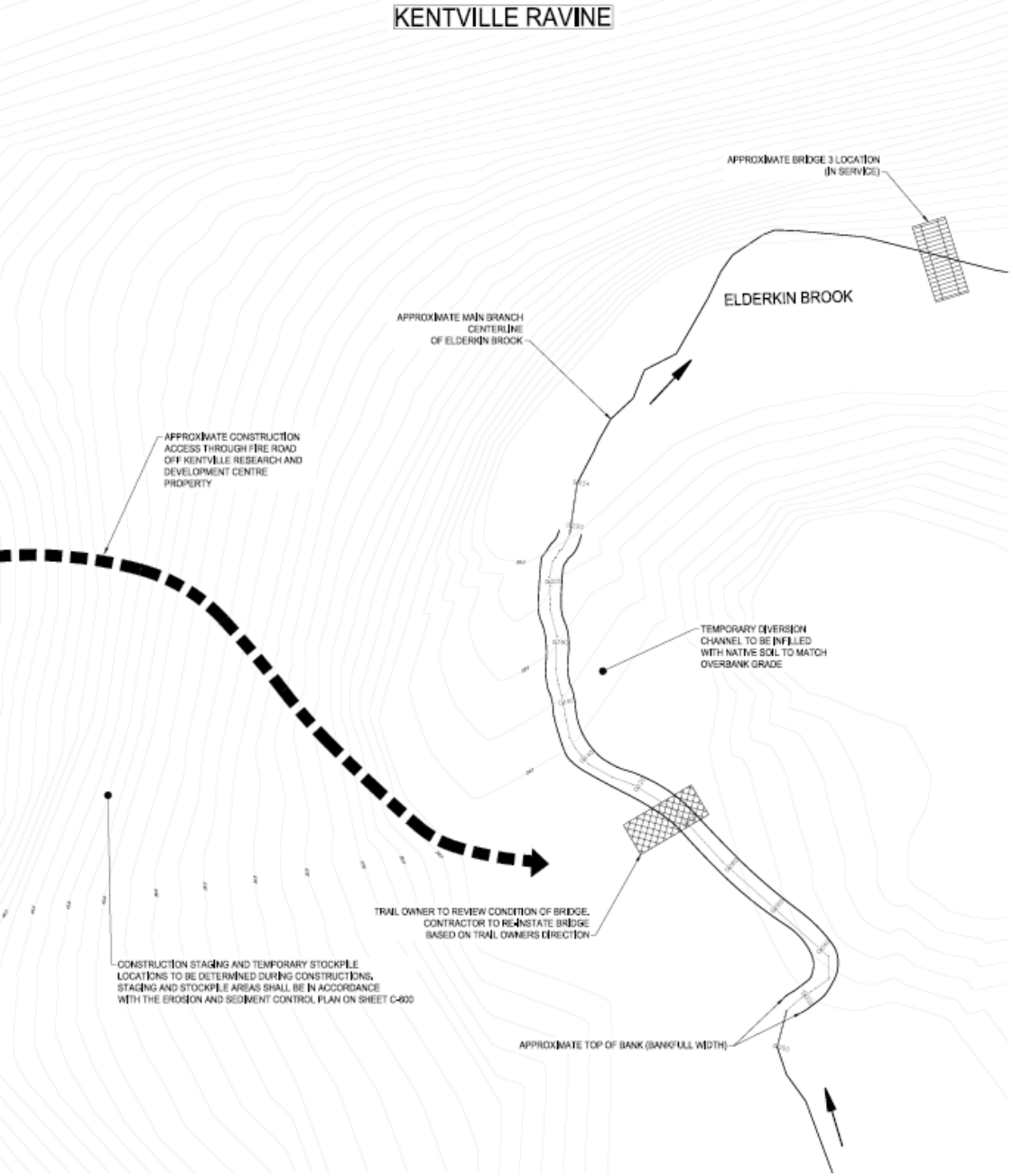
Typically:

- Permitting happens after design

- Hiring a contractor happens after design

Regulators acknowledge urgency.

High level concept design.



Permitting

Permits obtained based on:

- Short report
- High level drawings
- General construction notes
- Typical details
- Commitment to ongoing communication

Design / Construction

Survey – detailed Topo

Layout – based on design surface using GPS

Instream Structure Selection – based on habitat diversity

Contractor Selection – based on pre-qualifications / relevant experience

Design / Construction

Survey – detailed Topo

Survey – Limited and minimal

Layout – based on design surface using GPS

Layout – using string, stakes, and spray paint

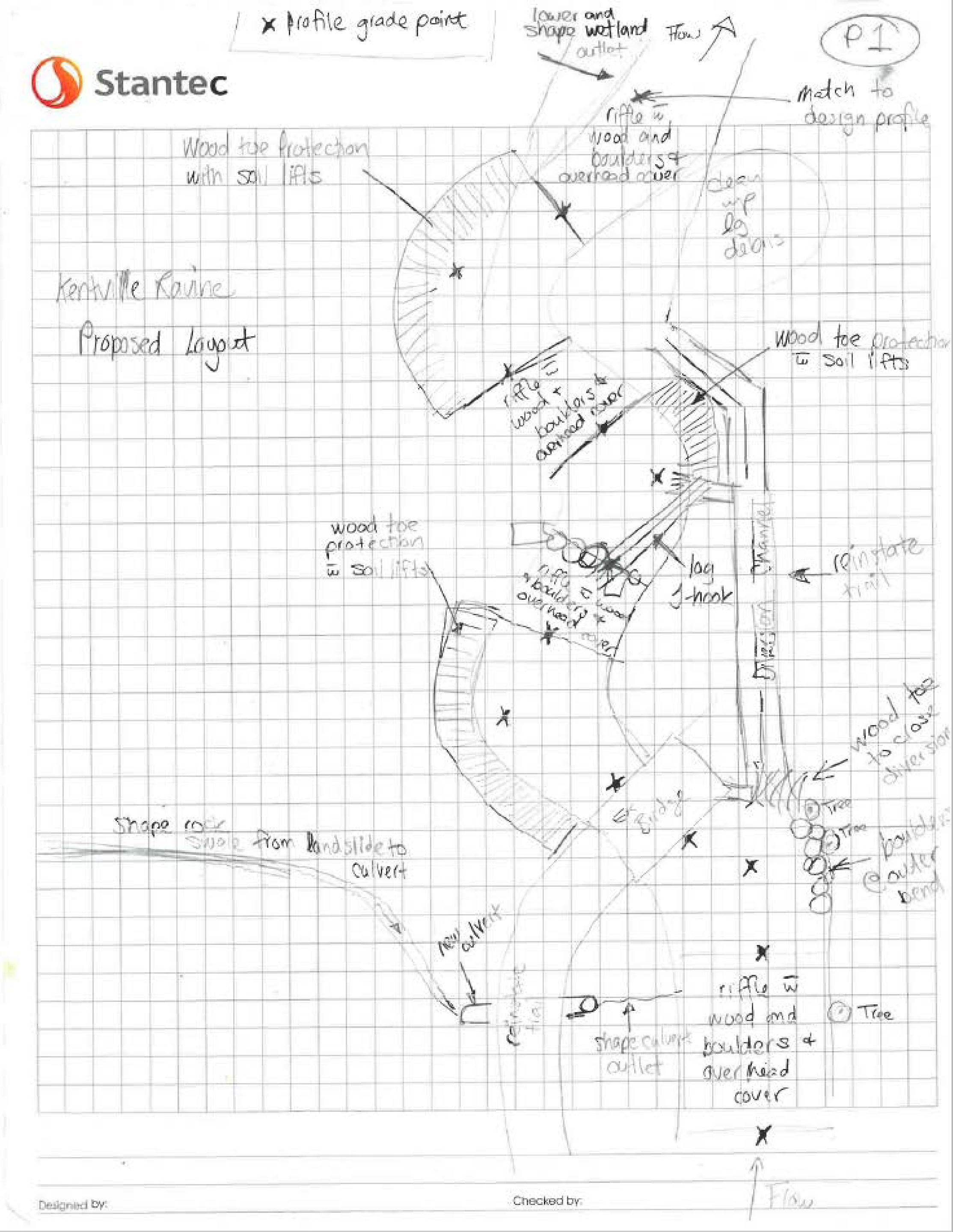
Instream Structure Selection – based on habitat diversity

Instream Structure Selection – based on available material on site

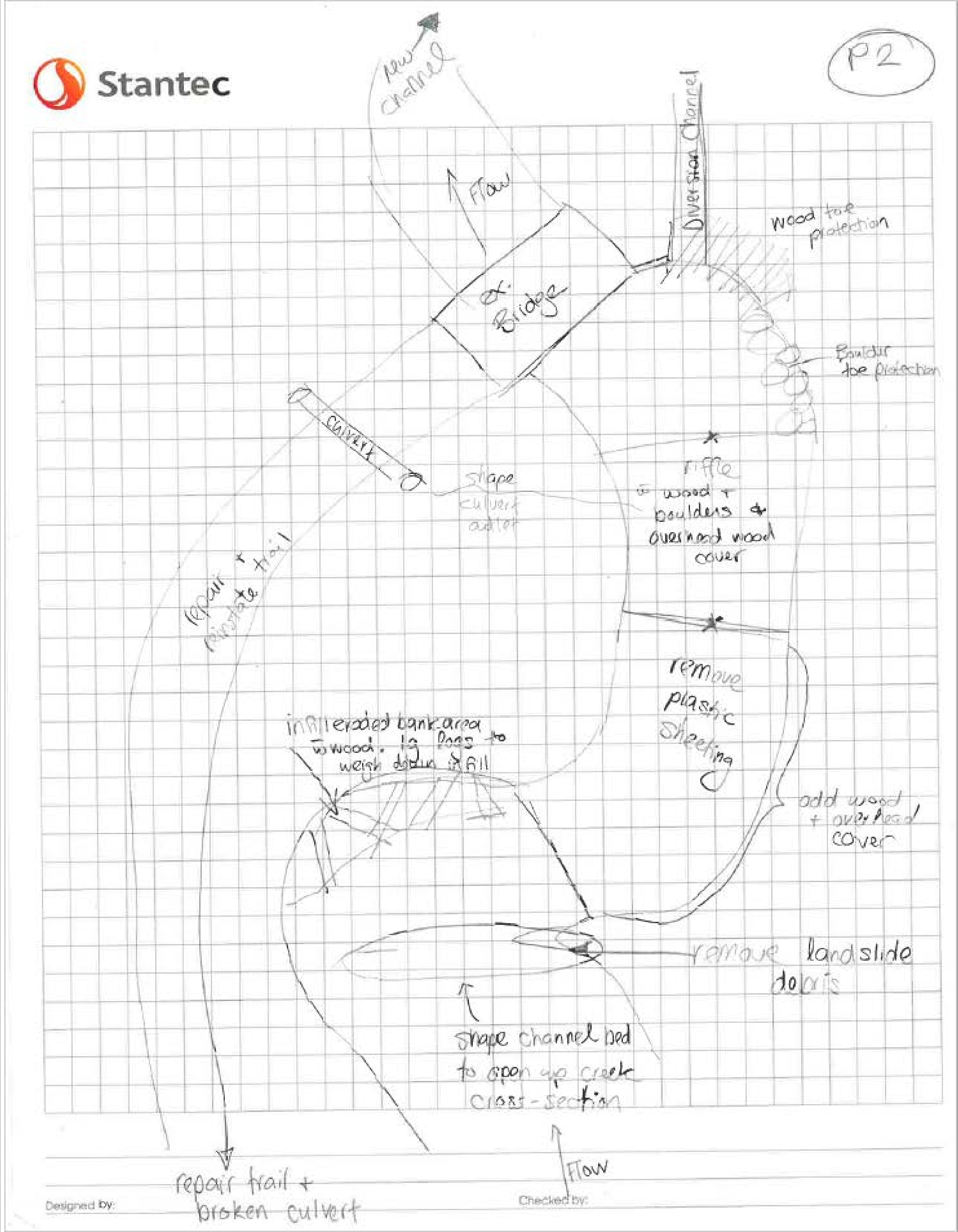
Contractor Selection – based on pre-qualifications / relevant experience

Contractor Selection – local team that did the debris clearing

Design

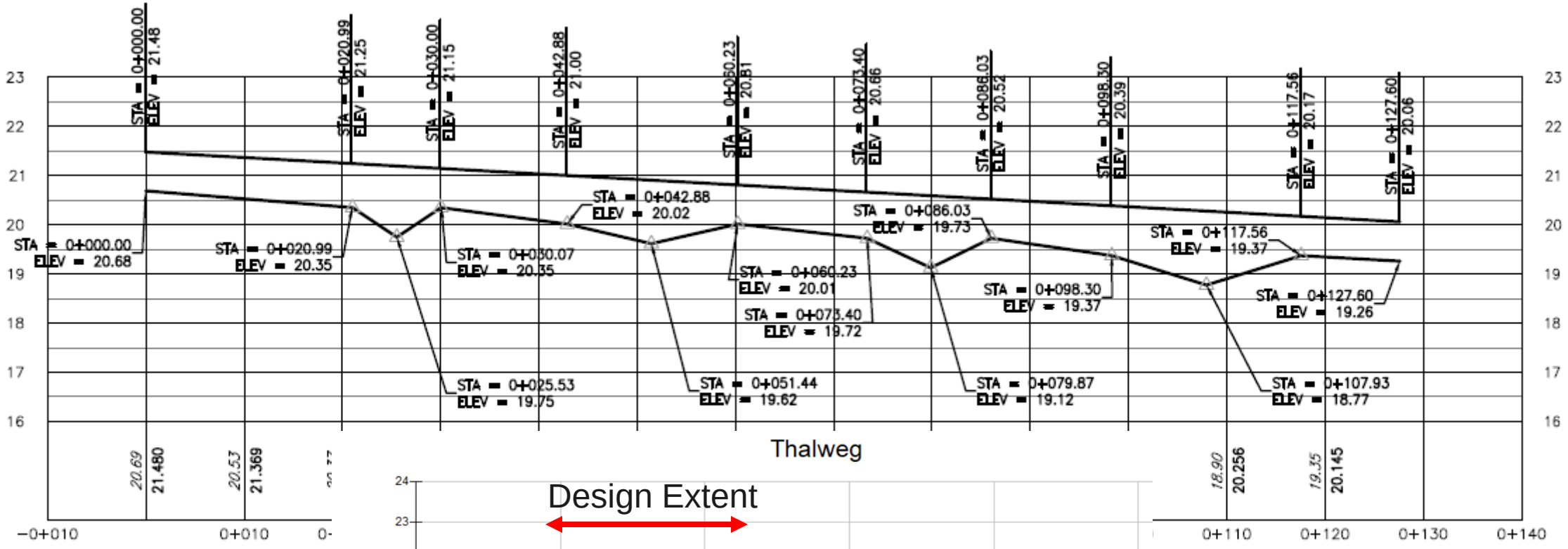


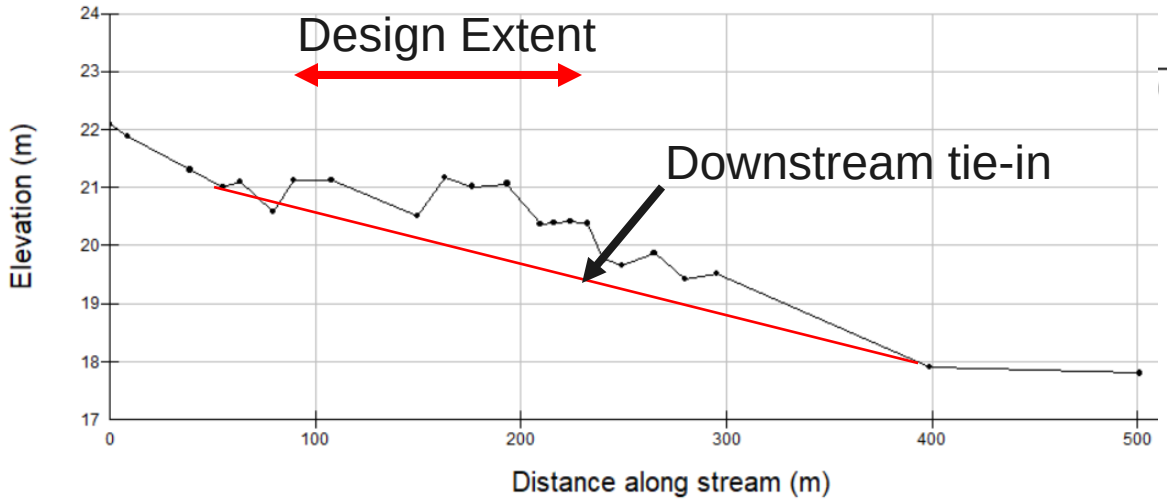
× profile grade point
lower and shape wetland outlet
Flow
P1
Stantec
match to design profile
riffle w wood and boulders & overhead cover
Wood toe protection with soil lifts
clean up log debris
Kentville Ravine
Proposed Layout
riffle w wood + boulders & overhead cover
wood toe protection w Soil lifts
wood toe protection w soil lifts
log J-hook
reinstate trail
Diversion Channel
wood toe to close diversion
Bridge
Tree
boulders @ outer bend
shape rock swale from landslide to culvert
new culvert
shape culvert outlet
riffle w wood and boulders & overhead cover
Tree
Flow
Designed by:
Checked by:



P2
Stantec
new channel
Diversion Channel
Flow
ex. Bridge
wood toe protection
Boulder toe protection
Culvert
shape culvert outlet
riffle w wood + boulders & overhead wood cover
repair + reinstate trail
remove plastic sheeting
infill eroded bank area w wood, lg logs to weigh down & fill
add wood + overhead cover
remove landslide debris
shape channel bed to open up creek cross-section
repair trail + broken culvert
Flow
Designed by:
Checked by:

Design Profile





Construction

Construction

Restoration

Field Fit - Key Takeaways

- Communication
- More communication
- Minimum data requirements
- Low tech options
- Available materials
- Minimum work requirements (area)

QUESTIONS?

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Abstract

In spring of 2022, a landslide occurred next to a small creek in a deep valley. The landslide debris swept away trees, buried the creek, filled the creek valley, caused flows to back up and create a large pond, disconnected the upstream portion of the channel from the downstream portion of channel, and created a fish barrier. This presentation will review the process that was used to control flows through the landslide site, remove the debris, and restore the damaged section of watercourse. Unique site conditions included the potential for contaminated soils, a bridge and popular walking trail, and Species at Risk including Atlantic Salmon (endangered) and American Eel (special concern). Given the unique site conditions and the time sensitive nature of the environmental impacts, a quick response was critical, necessitating a compressed regulatory timeline and the need to field fit the restoration working from a conceptual plan.

We will review project timelines, permitting, design, layout, and construction of the restoration. A discussion on high-tech and low-tech design and layout approaches will be included. Discussion on communication and planning items that should be included even in emergency response situations will also be presented. Lessons learned working with a contractor with limited in water work experience will be shared.

3 learning objectives:

1. Review of typical process for restoration for standard vs emergency works.
2. Review of effective applications of low-tech design and layout methods.
3. Importance of communication at all project phases.