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TRIECA 2018



The Stream Failed. Or Did It? Expectations for Natural Channel Design After Construction

Jeff Muirhead



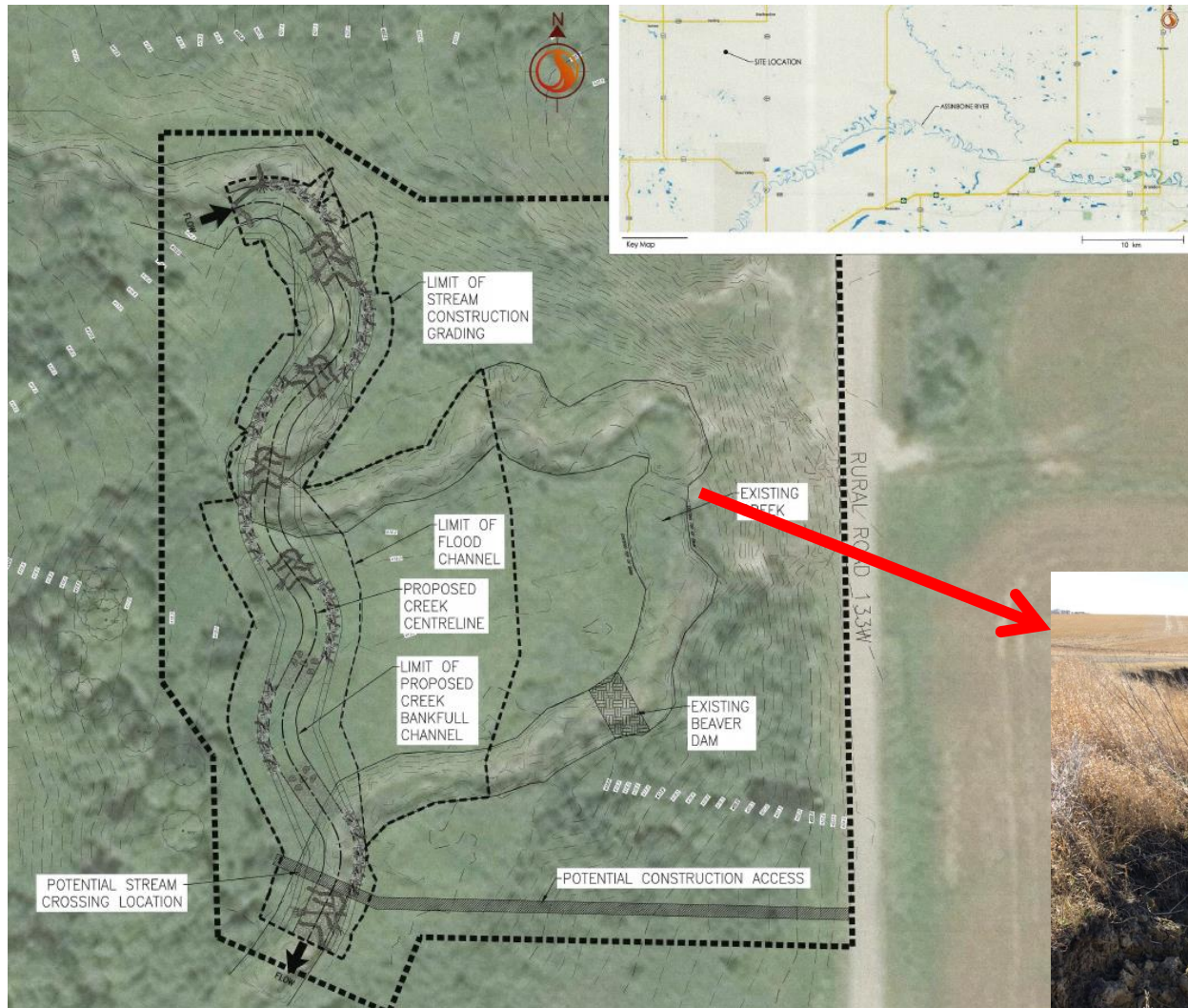
Agenda

1. The Project
2. The Flood
3. Expectations for NCD
After Construction



The Project

The Project



Erosion on outer meander bend threatening rural road

1. Stabilize embankment
2. Realign creek



The Players

Owner: Rural Municipality of
Wallace-Woodworth

Designer: Stantec Consulting Ltd.

Geotechnical:

Winnipeg, MB office

Stream Restoration:

Waterloo, ON office

General Contractor:

Tri-Wave Construction,
Brandon, MB

Sub-Contractor (stream works):

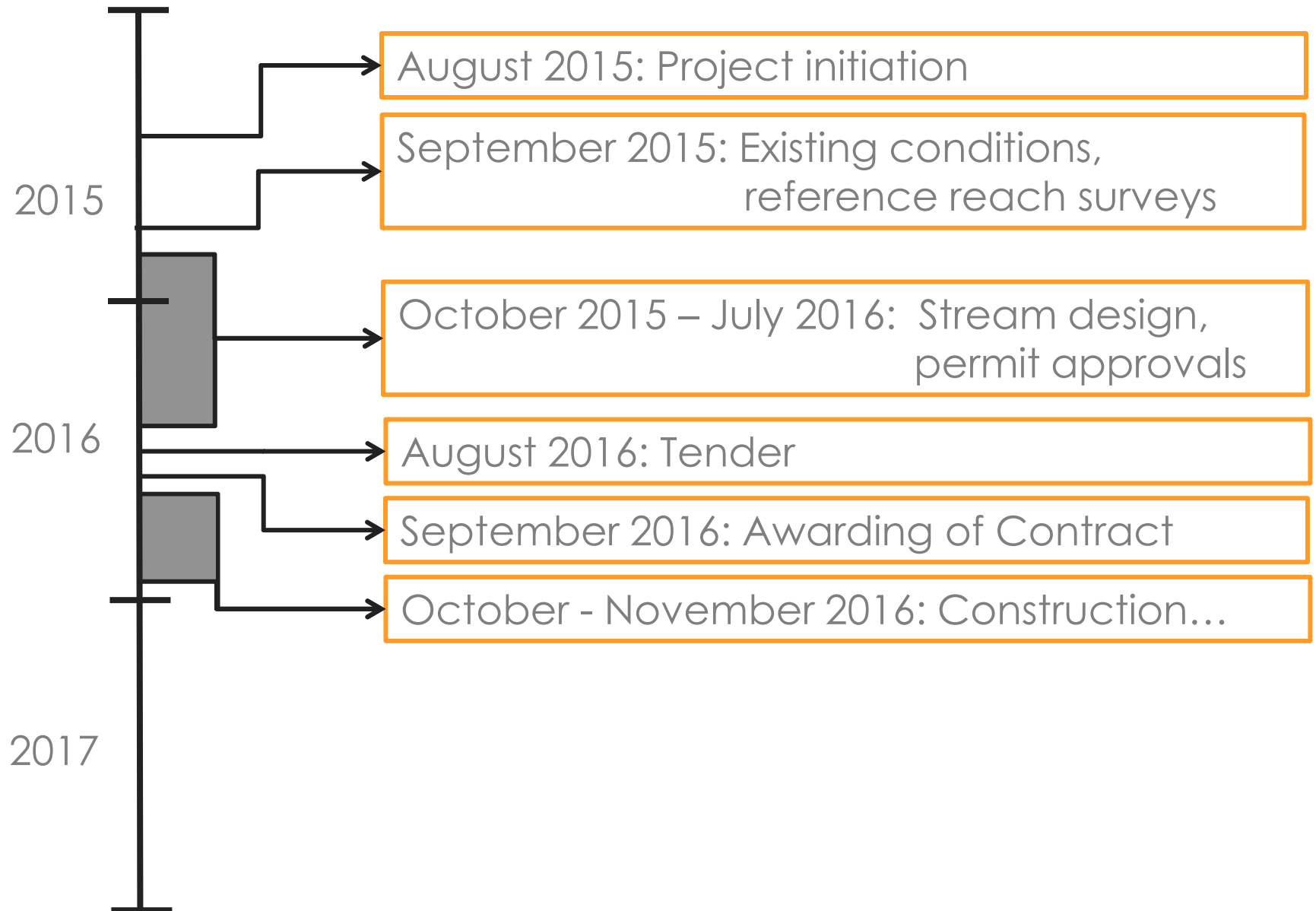
Livingstone Landscaping,
Brandon, MB



Tri-Wave Construction

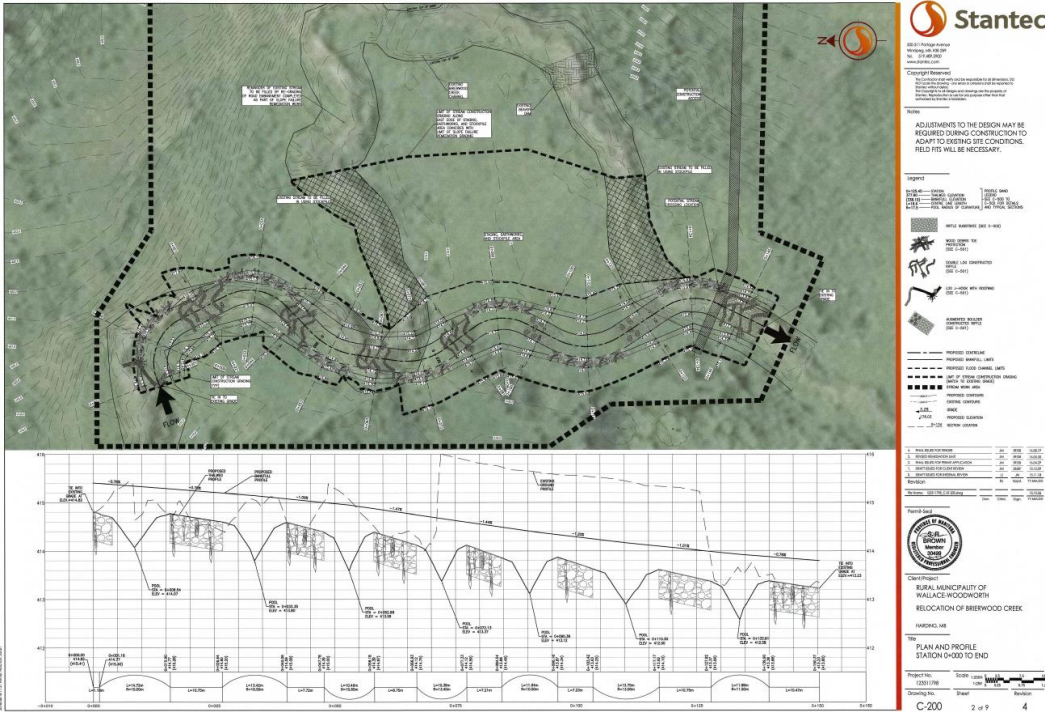


Timeline



Construction

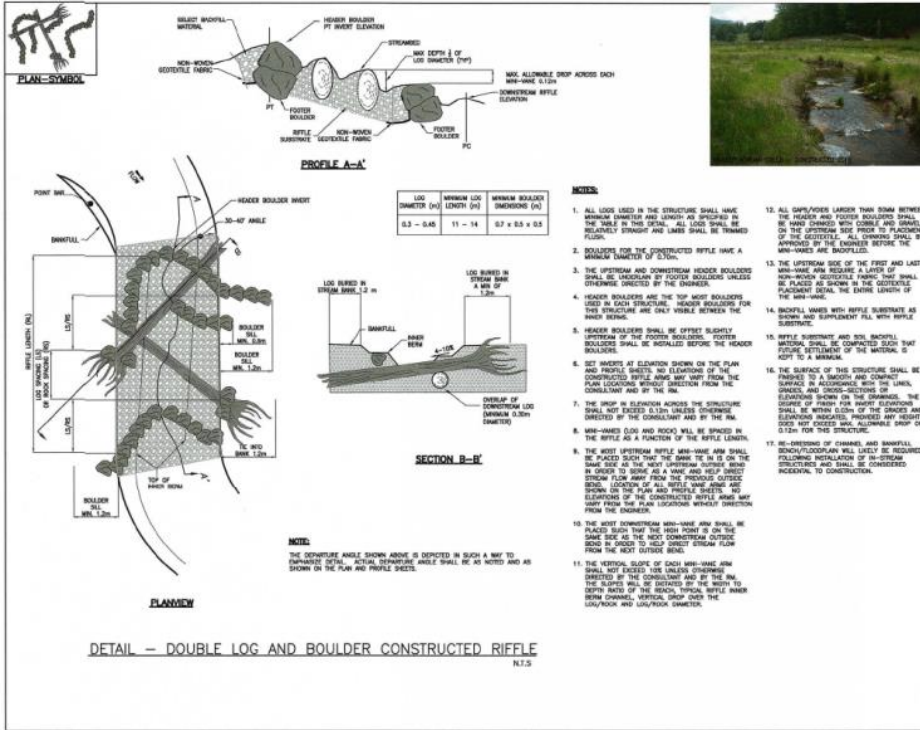




Stable Plan and Profile

150 m of natural
channel design





Riffles



8 Log and Boulder Constructed Riffles for aquatic habitat and grade control

7 pools with
Wood Debris Toe
Protection for
aquatic habitat
and bank
stability

Wet Conditions



100 mm of rain in 4 days in
early November



New Contractor



Slow going, but we got it right

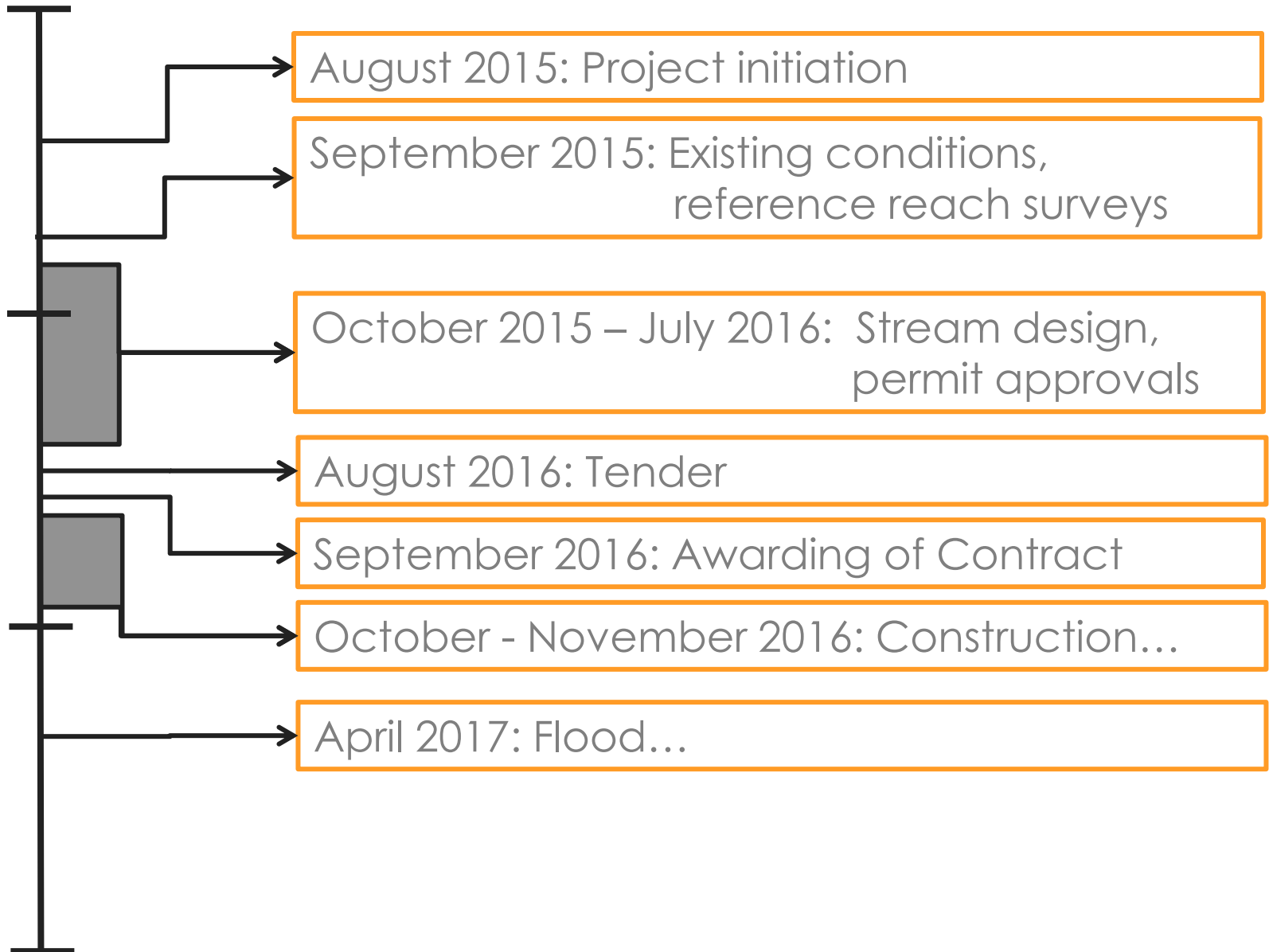
Just in Time

November 28, 2016...

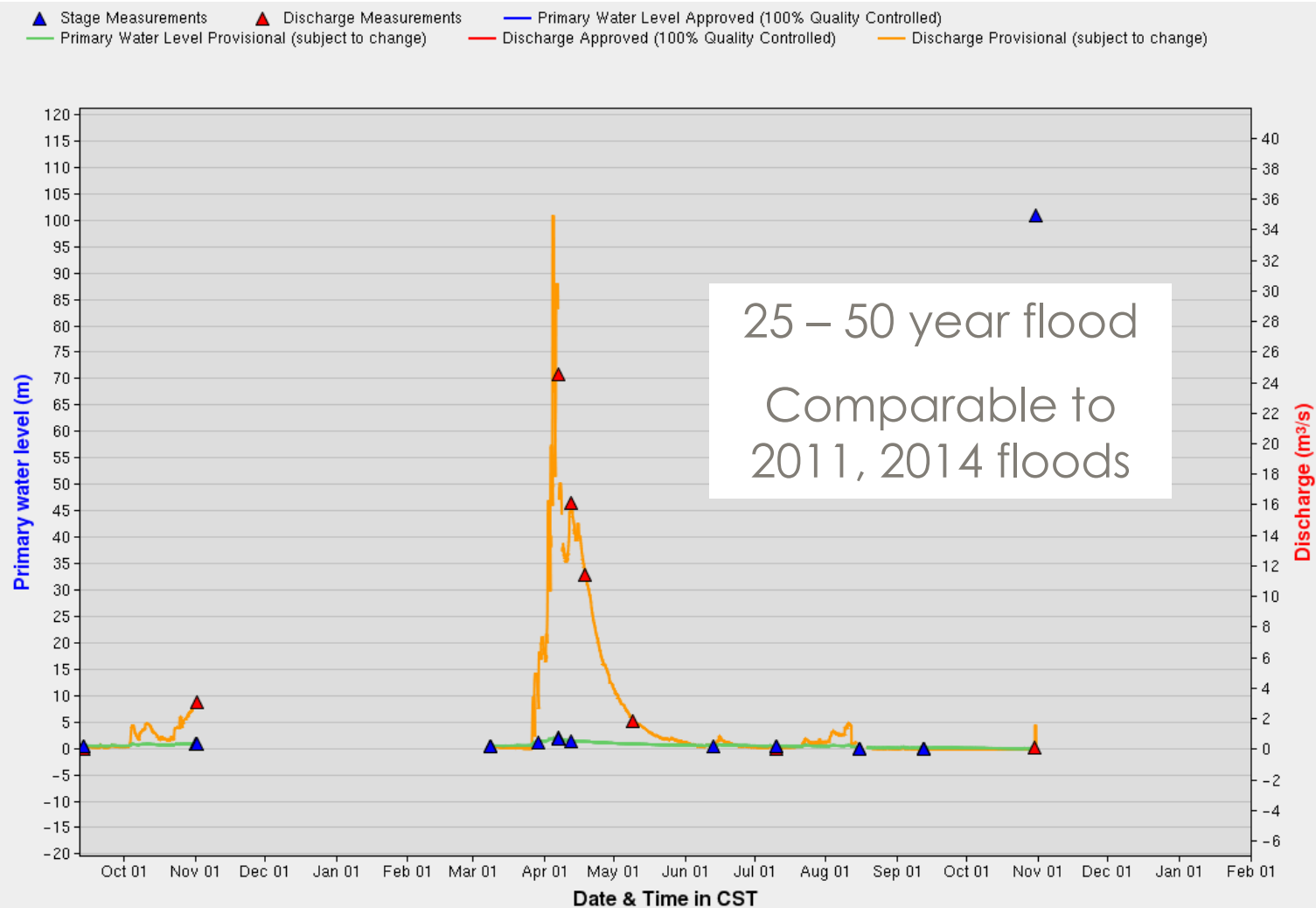


Stream completed despite some difficult conditions

Timeline



April 2017 Flood



Flood Damage



June 5, 2017



June 5, 2017



June 5, 2017

Why?

- 25 – 50 year flood
- No vegetation on frozen, unconsolidated soils

Repairs



Washed out banks throughout reach

Re-grading, re-vegetation,
design for interim conditions



Post-Flood



Repaired





Post-Flood



Repaired



Expectations...



Was This a Reasonable Result?

“An engineered channel is strongest the day it is built
and gets progressively weaker;
A natural channel is weakest the day it is built and gets
progressively stronger.”

25 – 50 year flood
event

Wet, unconsolidated
soils flash frozen

No vegetation
establishment

Yes? No?
Somewhere in
between?



Who Pays for Fixing It?



Contractor?

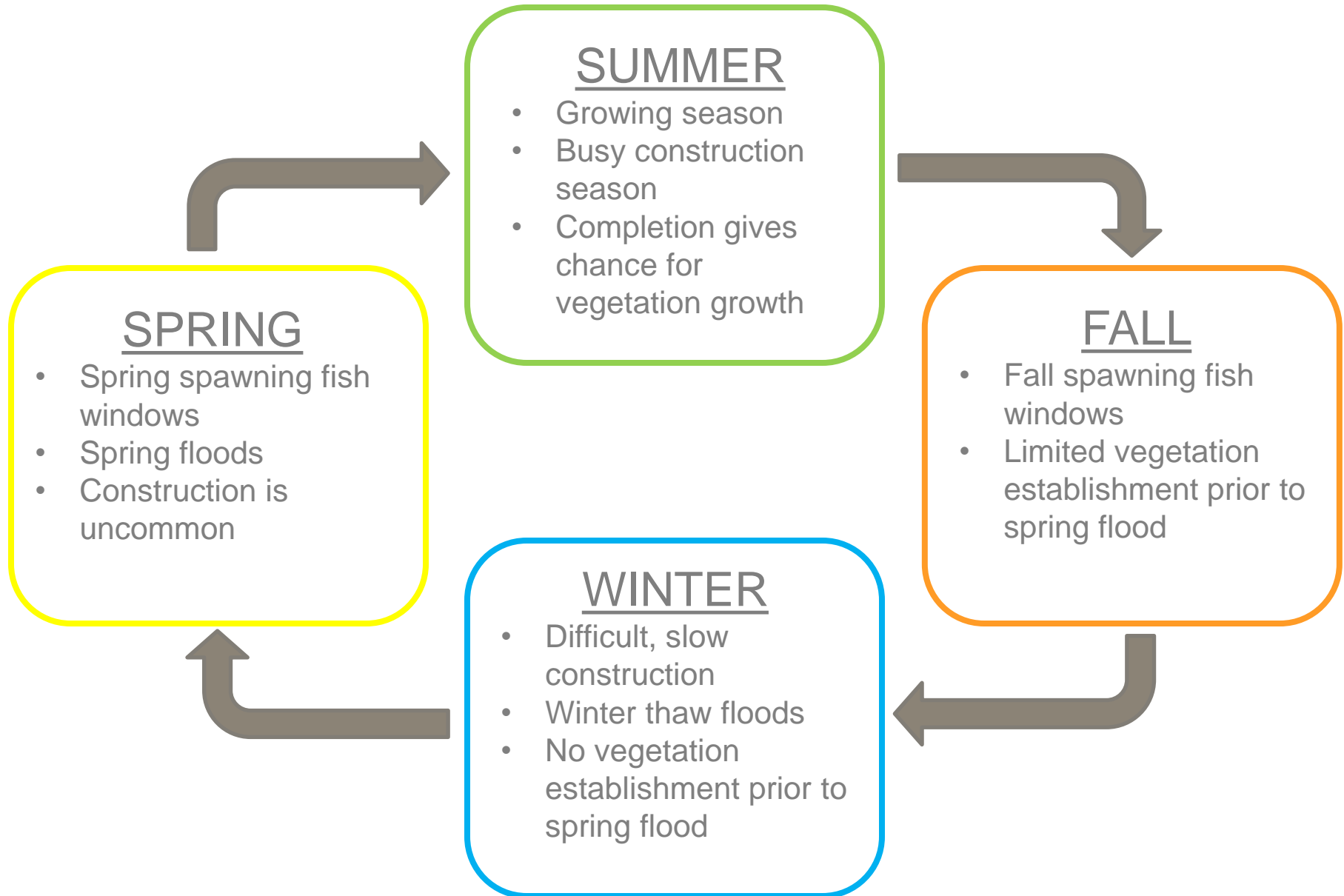
Owner?

Designer?

What is a
reasonable
design
standard?

Does it change
over time?

When Should We Be Constructing Streams?



Should We Change Our Contracts?

A stream is not the same as a road or a building.

50 million cars in year 1 => no problem



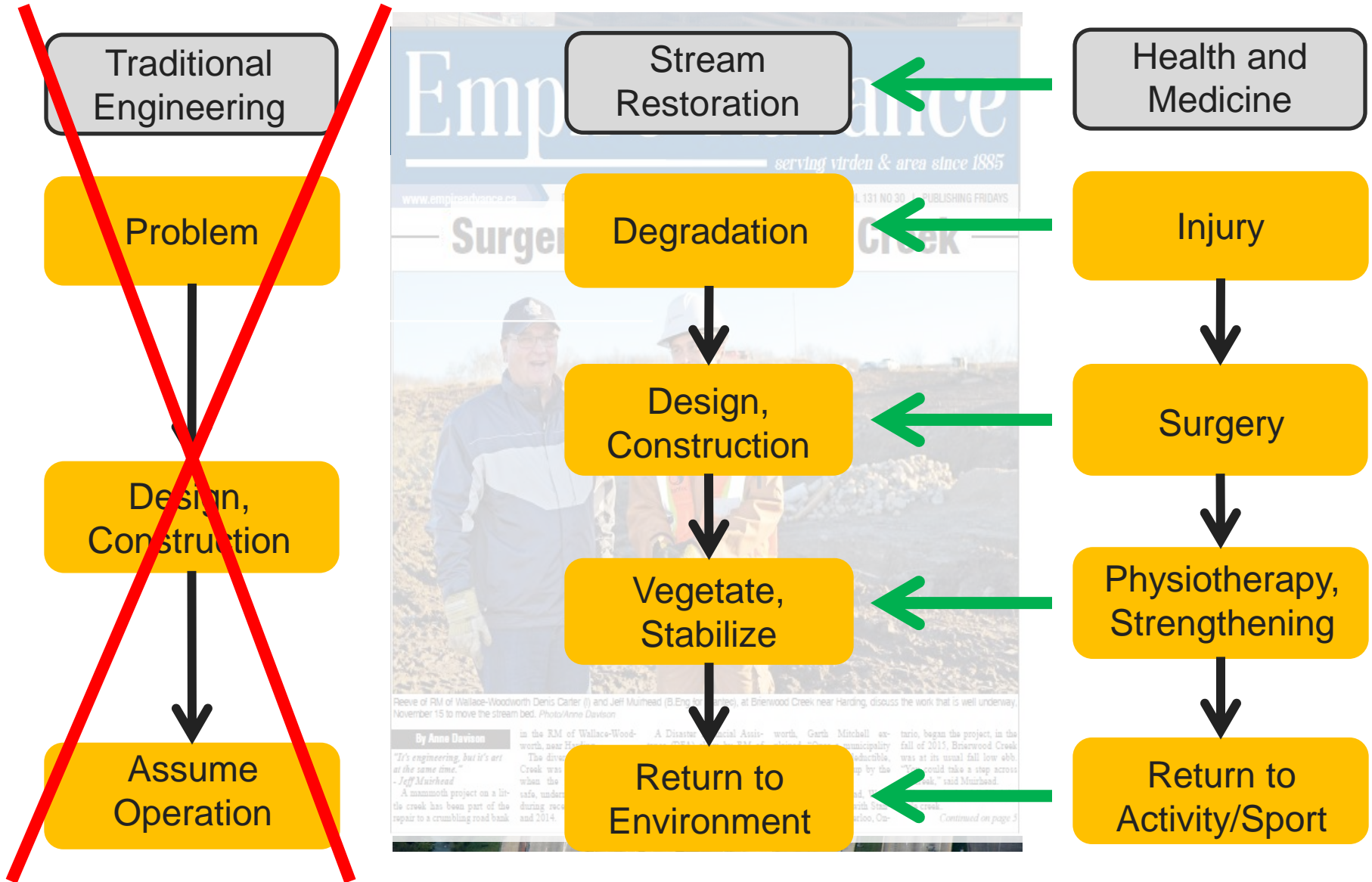
50 year flood in year 1 => damage



So, why do we write our contracts the same?

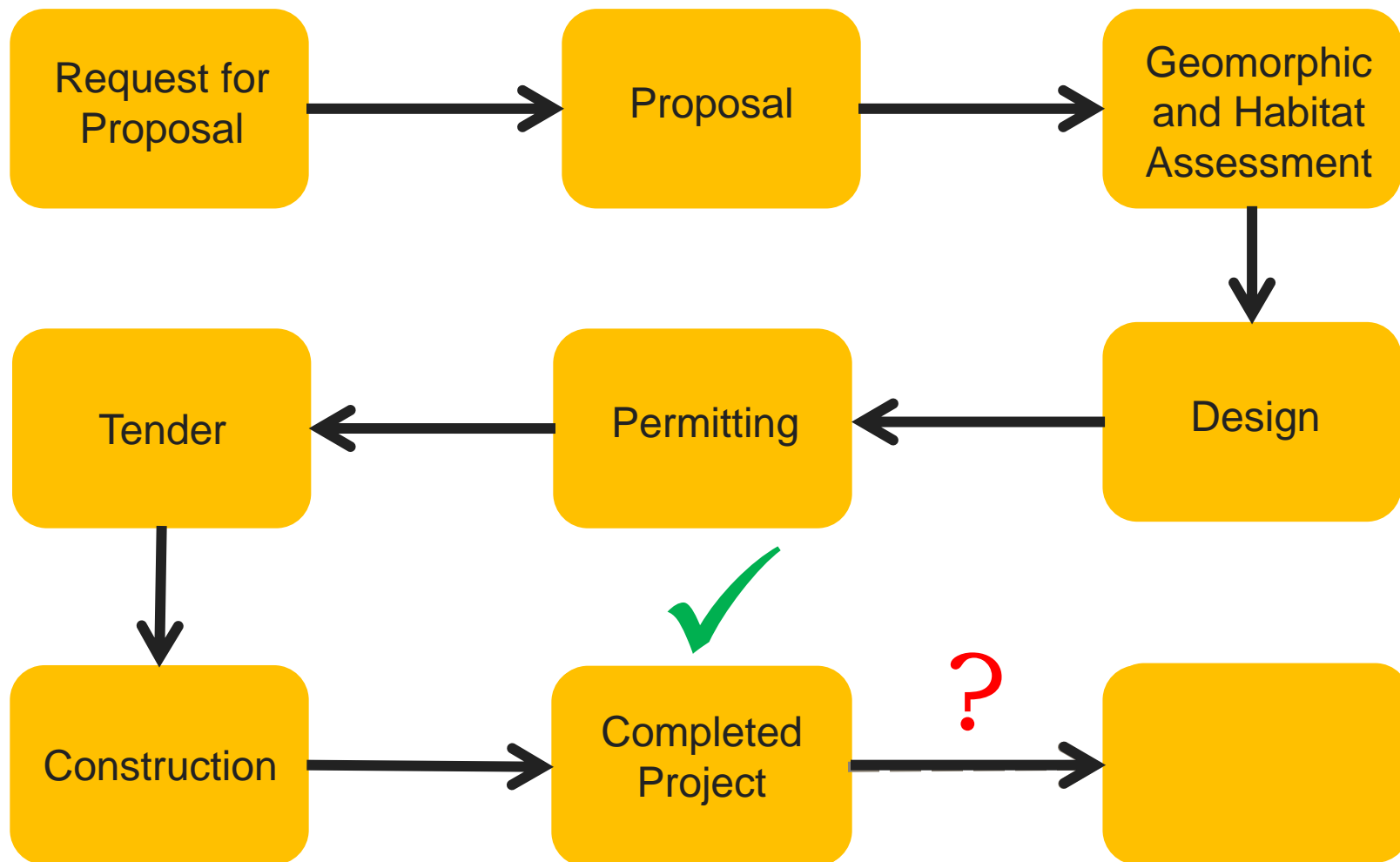
Is the traditional engineering contract structure the most appropriate for NCD?

Should We Change Our Approach?



When is a Stream Project “Complete”?

Life cycle of a successful stream restoration project:



“Take Home” Questions

Natural Channel Designs take 3 – 5 years to fully stabilize



Who pays for repairs as it stabilizes?

Should we consciously plan construction timing?

Should we change how we write our contracts?



Do we need to change how we approach Natural Channel Designs, to give them the best chance at success?



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