

Waimea Community Dam TDC Council

21 April 2020

Waimea Water

Context (SOI)

Risk	Probable Cost (\$)
1. Unforeseen Conditions	\$19.1
Material for Dam filling	
Void; Plinth, Starter Dam and Culvert	
Additional Slope Stabilisation	
Other Items at risk	
2. Improved Resilience	
Improve drainage beneath the spillway and modify spillway for encounter	
Additional grout curtain, grout specification and plinth modification to red	
Waterstops and sealing of the joints in the culvert	
3. Under / not budgeted	
Mechanical and Electrical not designed or priced at budget	
Office, overhead and construction engineering underbudgeted	
4. Self-Help / Savings (budget of -\$1.8m)	
Carpi	
Bridges, Fibre, Trees	
Total	\$26.5
Contingency	\$3.0
Committed Costs (excludes Budgeted Contingency and Savings)	\$99.8
TOTAL EXPECTED COST TO COMPLETE	\$129.4

Agenda

- 1. Context**
- 2. Safety (no injuries, incident)**
- 3. Construction update (video)**
- 4. Construction issues**
- 5. Rockfill**
- 6. Geosynthetic Membrane**
- 7. Spillway**
- 8. TDC request to look at any 'shovel ready' opportunities**
- 9. Update on Covid-19 implication**

Meet the WWL Team



- Designer (PS-1, PS-4)
 - Reviewer (PS-2)
 - Engineer to Contract
 - Contractor (PS-3)
 - Quantity Surveyor
 - Contract Law
 - Programme
 - Safety
 - Accountant
 - Banker
 - Auditor
- Damwatch Engineering
 - GHD Engineering
 - Stantec
 - Fulton Hogan Taylors
 - Rawlinsons
 - Anderson Lloyd
 - CCCL
 - Impac; Intesafety
 - Findex
 - ANZ
 - Audit NZ

Agenda

1. Context
2. Safety (no injuries, incident)
- 3. Construction update (video)**
4. Construction issues
5. Rockfill
6. Geosynthetic Membrane
7. Spillway
8. TDC request to look at any 'shovel ready' opportunities
9. Update on Covid-19 implication

Construction Issues: Voids



Construction Issues: Stabilisation



Rockfill: The Geology Challenge

- Embankment trials late December 2019 and early January 2020 identified Rock degradation



Expected and Needed

Discovered



Less broken down– Free draining

Heavily broken down– Not free draining

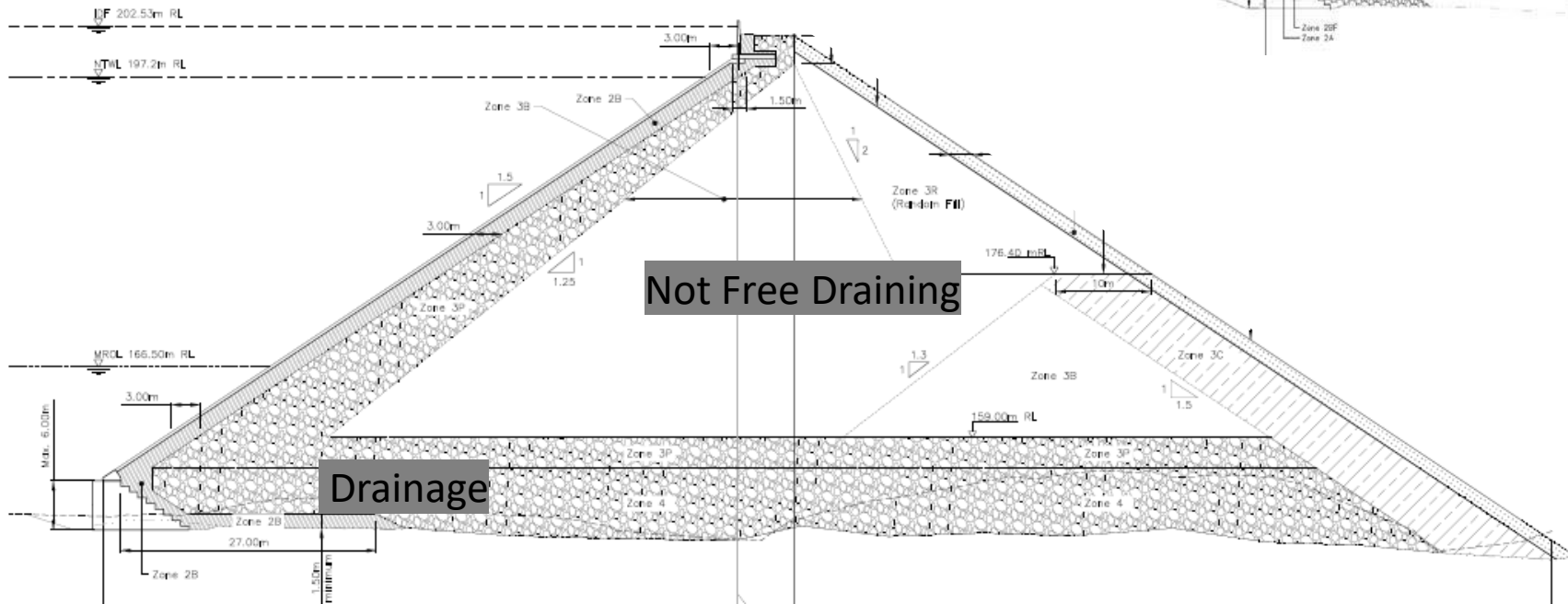
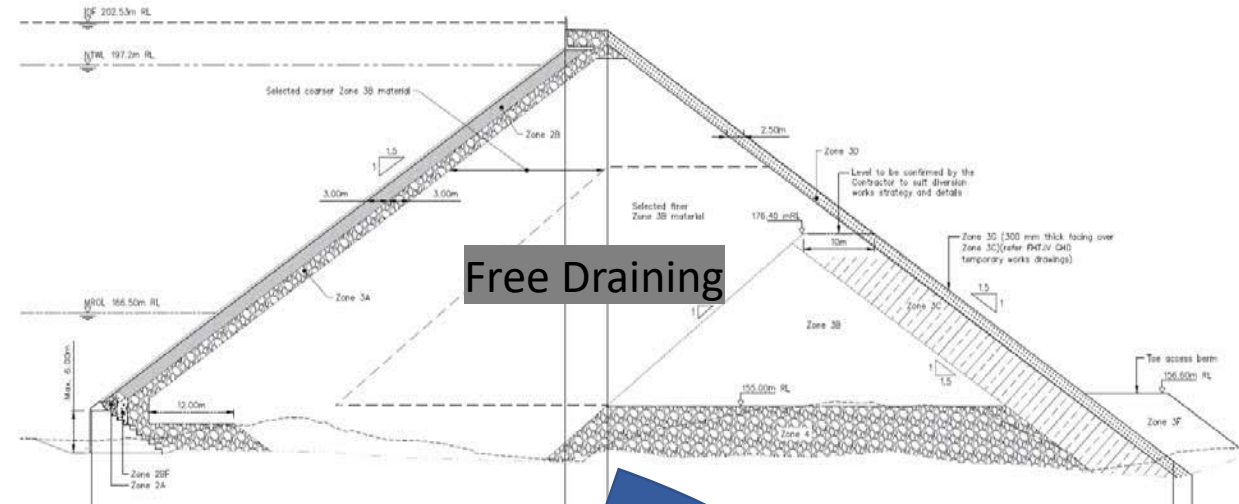
Rockfill: The Geology Challenge

- Discovering more argillite (mud / siltstone) (~70%) and less greywacke (sandstone) than expected
- Greywacke (sandstone) dispersed amongst predominant argillite. Difficult to salvage. (VIDEO)
- Fissile argillite showing tendency to break along insipient foliations
- Spillway Excavation: *“May yield a minimum of 350,000 m³ of rock that will consist of slightly weathered to weathered (Class 1 & 2) greywacke.”* (2014). ➡ Predominantly fissile argillite
- Need to find suitable drainage material from alternative sources (cost)



Design: Rezoning embankment to manage geology

- ❖ Expect less harder class-1 material
- ❖ Testing in early 2020 identified breakdown on compaction
- ⇒ Increase drainage layers
- ⇒ Alternatively source drainage rock



Design: Geosynthetic membrane

Replace concrete face with Geosynthetic membrane

- ⇒ Improved **resilience** to settlement and seismic (elasticity), benefit accentuated by softer rock
- ⇒ CO2, Cost and Schedule **savings**
- ⇒ Easy to repair; performance warranty
- ⇒ Testing demonstrates expected life 50-100 years (robust to UV)
- ⇒ Meets EU and International standards for Health and Environmental impacts

Carpi Ltd: Installed

- 54 New Dams since 1988 (26 larger than Waimea)
- 142 Retrofitted Dams since 1970 (63 since 2010)
- Used on Tekapo Canals (2013 / 2014)



Design: Spillway modified for improved resilience

Design modifications due to recent learnings from international spillway incidents (*international standards*)

- ⇒ Oroville (right) failure due to poor drainage and anchoring detailing (*pressure beneath fn velocity*)
- ⇒ Whaley Bridge (UK) no drainage and poor slab detailing combined with poor maintenance

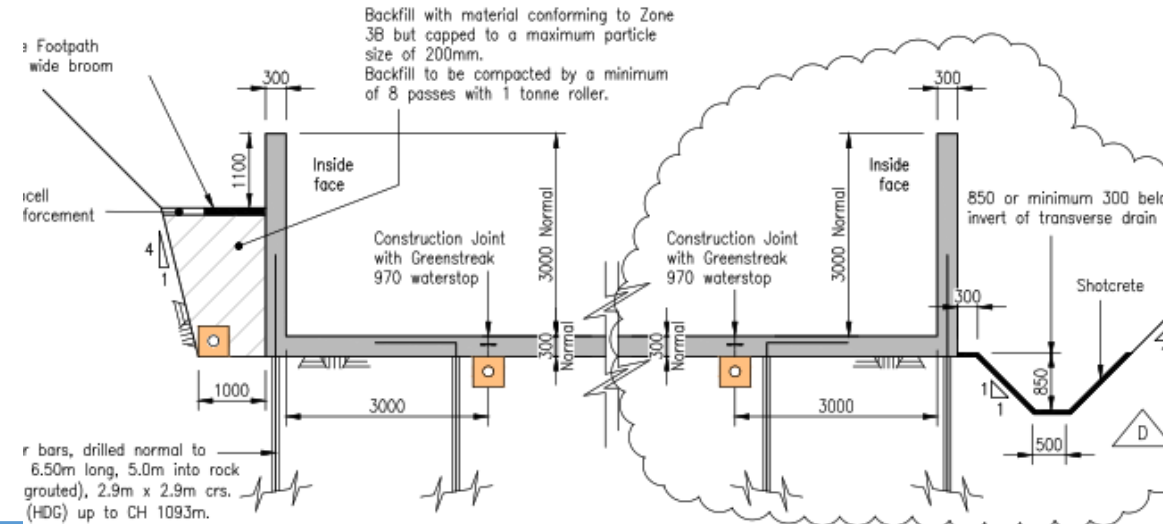
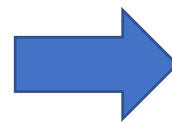
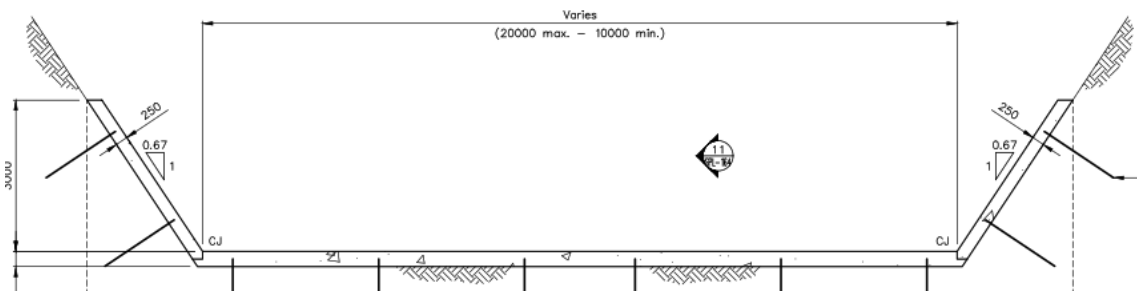
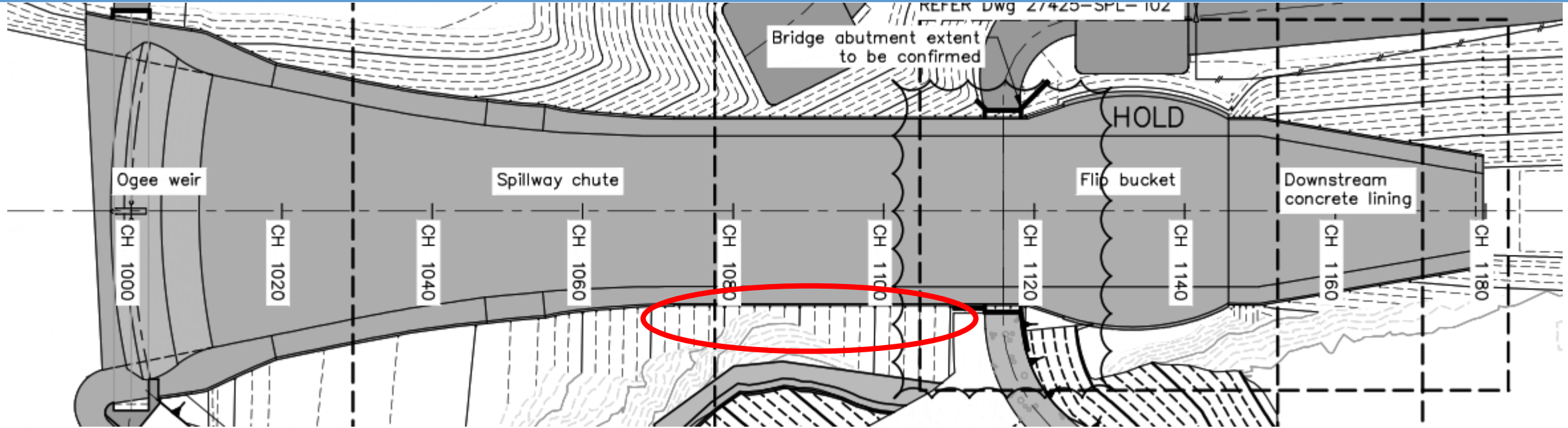
Modifications for resilience (requested by CIIL):

- ⇒ Drainage reviewed and upgraded
- ⇒ Anchoring design reviewed and upgraded

Additional modifications driven by topography and encountered geology.



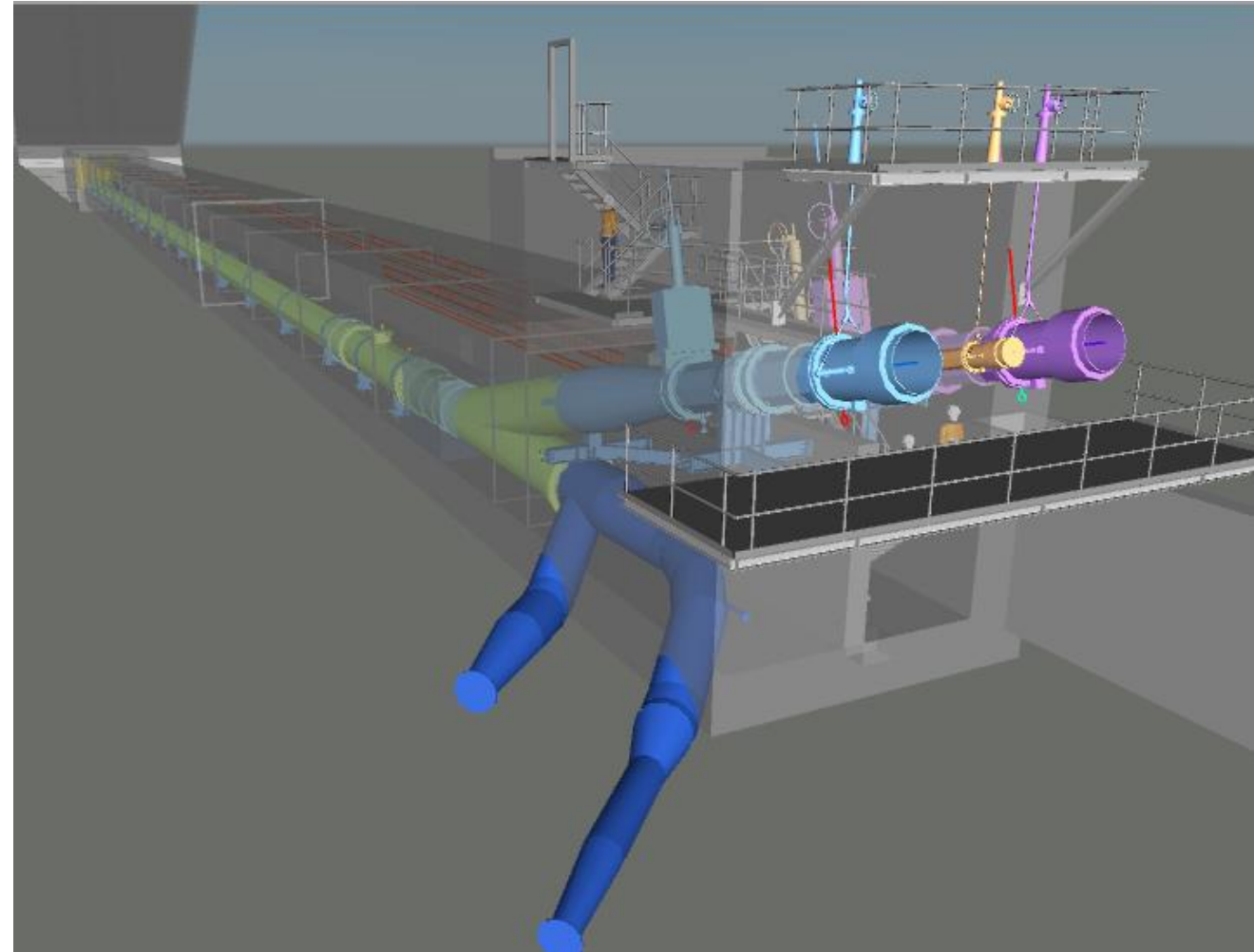
Design: Spillway modified for improved resilience



Design Update: Other items

Mechanical and Electrical

- ❖ Not designed or priced at commencement of work
 - ⇒ Provision Sum challenged
 - ⇒ To be priced ~3rd Quarter 2020
- Progressing detailed design
 - ⇒ Switch to single outlet pipe aiming to realise cost savings
 - ⇒ Modifications for future hydropower installation



TDC request: shovel ready opportunities / + investment

Acceleration of work

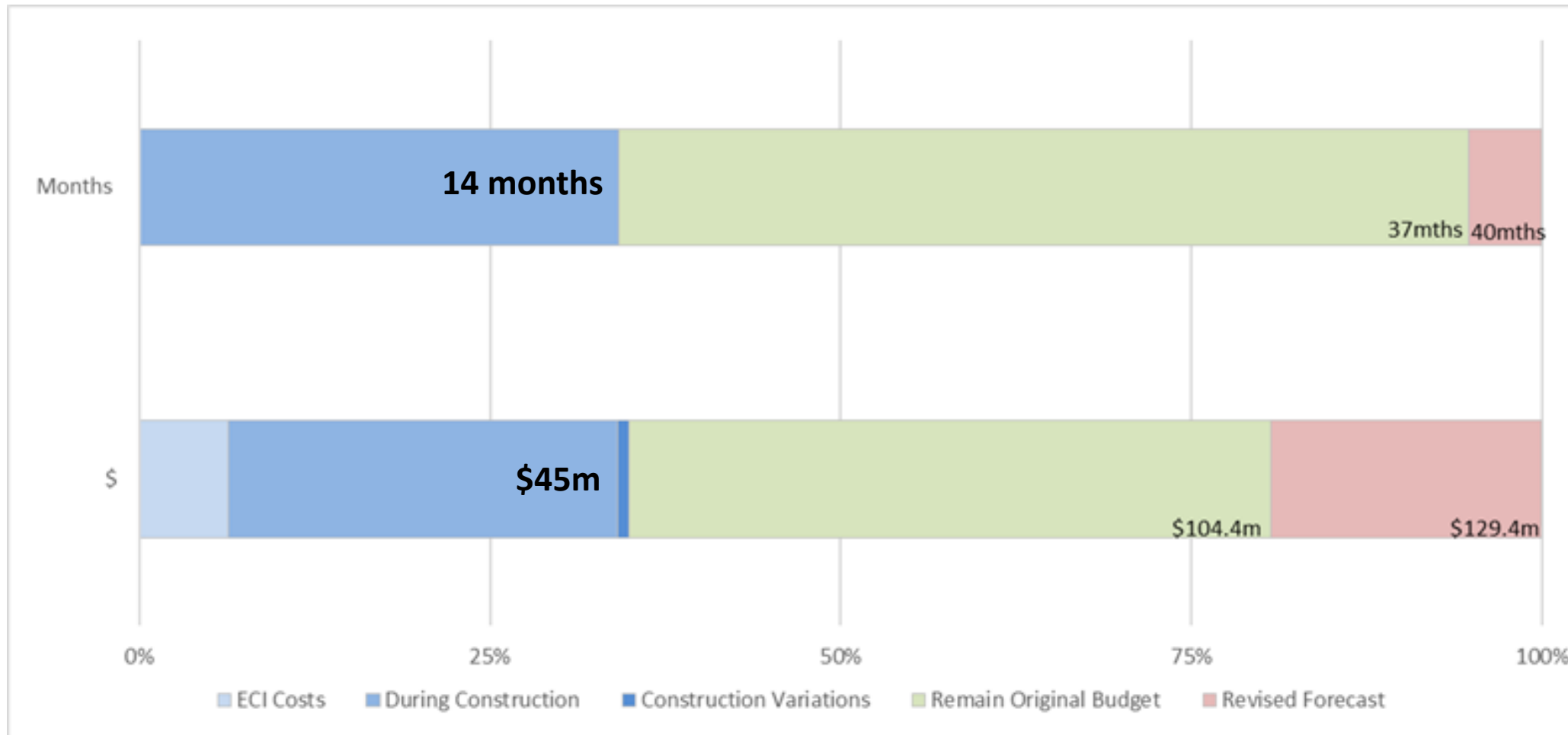
- ⇒ Endeavor to meet 2021/2022 season
- ⇒ Employ additional labour / shift work (employment)

Enlarge Reservoir / Powergen

- Fuse Gate to utilise 2.3m / 5m of flood reservoir
- Activate in event of large flood say 1:10,000 yr AEP (55% - 70% of PMF 1094 m³/s)
- + 1.5Mm³ storage to ~15Mm³ (15%)
 - ⇒ Storage increases powergen utilisation
 - ⇒ Increase resilience to droughts / growth / demand



Expenditure and progress



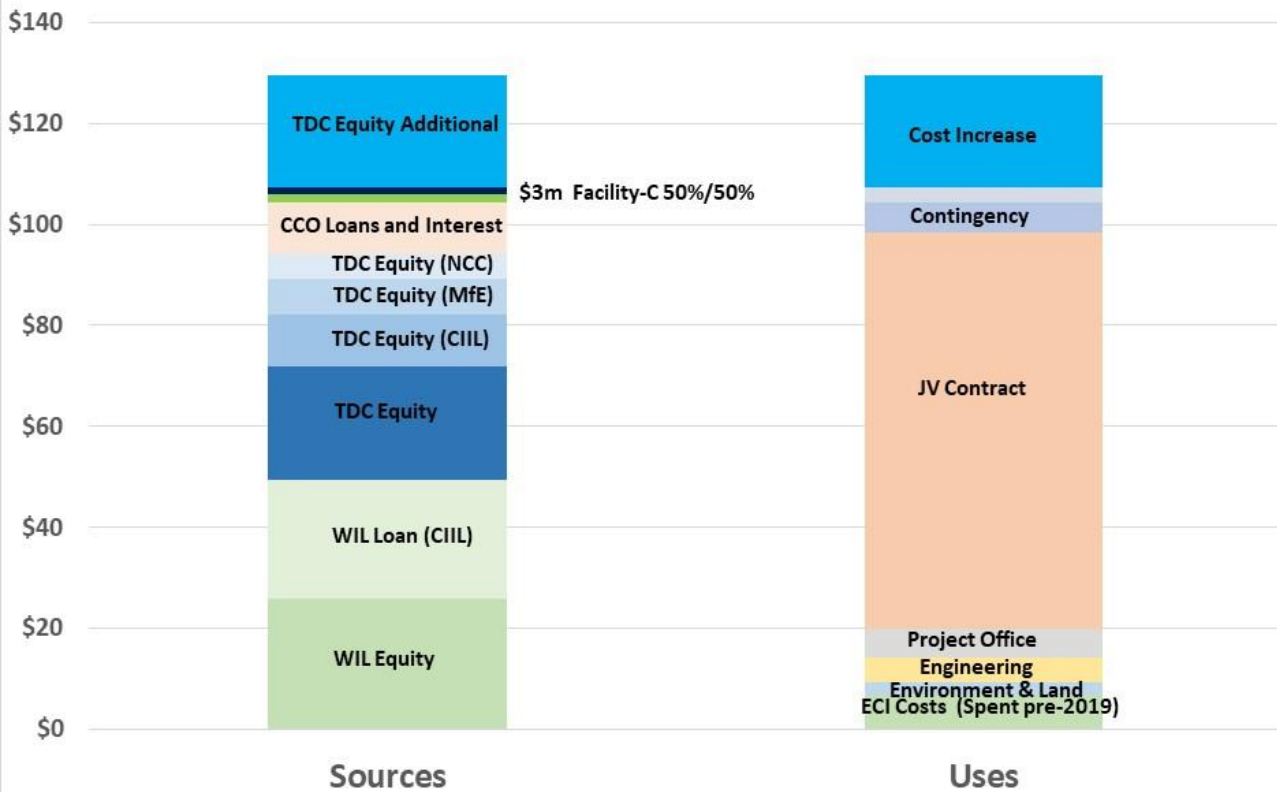
Progress

Expenditure

Funding and expenditure

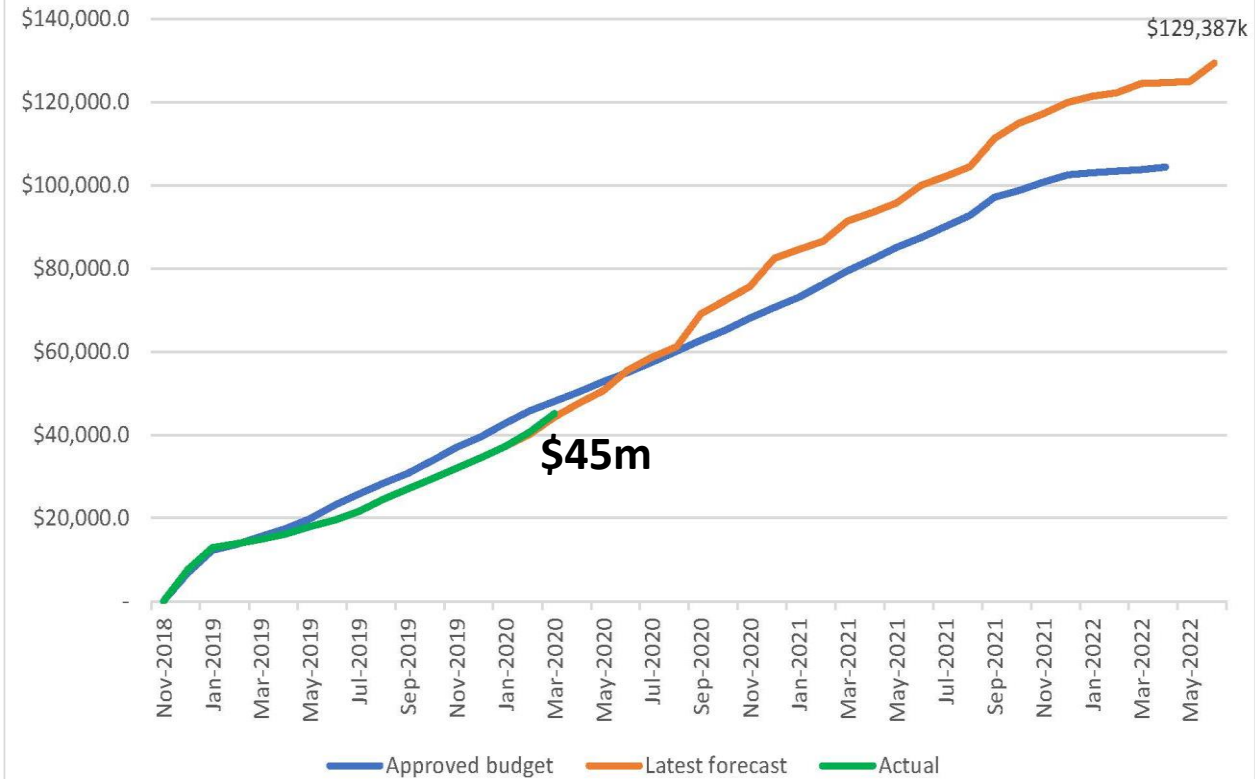
Funding and Spend

WWL Sources and Uses of Funding (\$M)



Forecast cost & schedule to complete

Latest forecast vs Approved Budget (\$m)



- ❖ WWL incurs cost of Delay or Suspension (*no Force Majeure provision in NZ3910*)
 - Not covered by insurance
- ❖ Supply chain constrained and likely to slow project: Spares, parts, equipment
 - Uncertain how international supply chain recovers
- ❖ Productivity likely to be impacted with level-3 operating protocols
 - NZ Construction Industry Standards
- Response to and impact of COVID-19 to be covered in the Final SOI (June)

More Information

→ ↻ 🏠 🔒 https://waimeawater.nz/

📄 ☆ ⌵ 🗒 📄



THE DAM - THE BUILD - NEWS LIBRARY - ABOUT US - CONTACT US



Recent events



Check out the key facts about the dam



Read more news about the dam



Construction update



Latest reports and presentations

**Waimea Community Dam
INFORMATION EVENT**

Richmond Town Hall
9 Cambridge Street
Wednesday 25 September
7:00 to 8.30pm

[DETAILS →](#)

Upcoming events

