

The Hamnak Pipeline

New Zealand's Longest PVC-O Water
Transmission Pipeline

Jay Roy
Water NZ Conference 2019

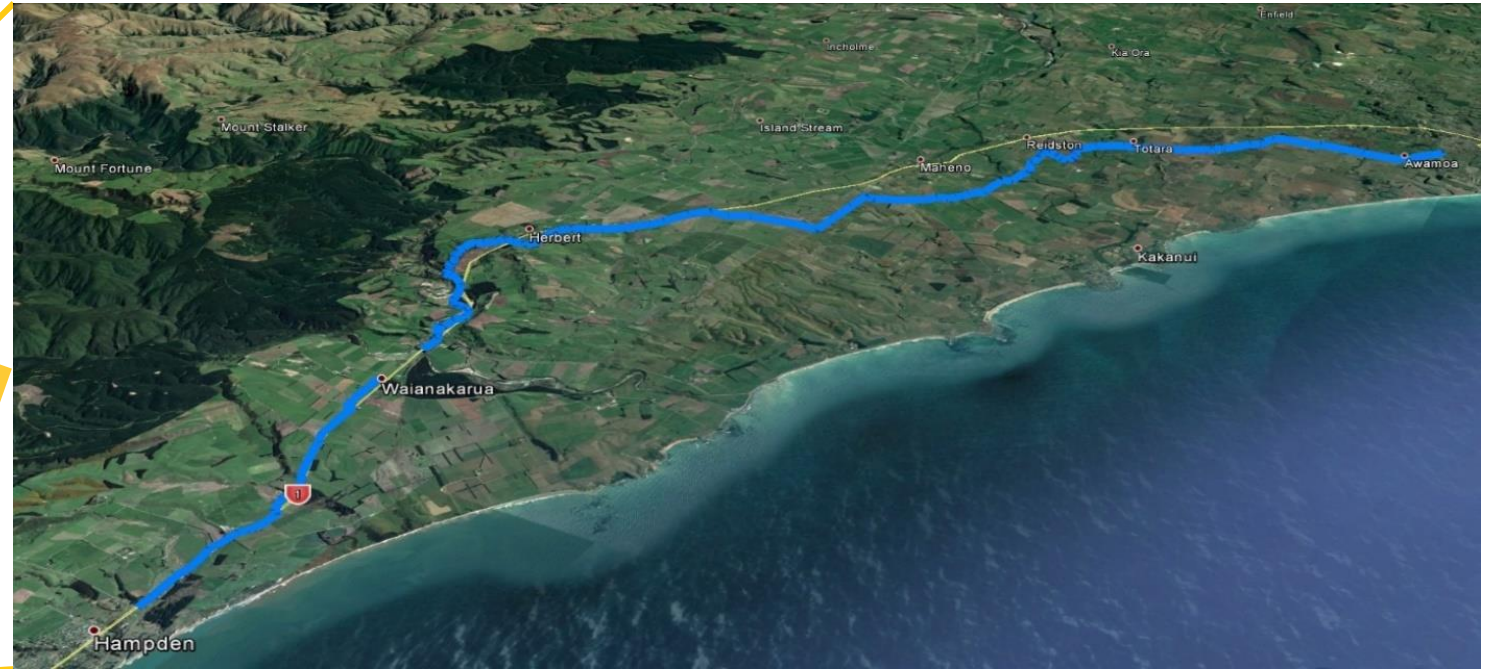
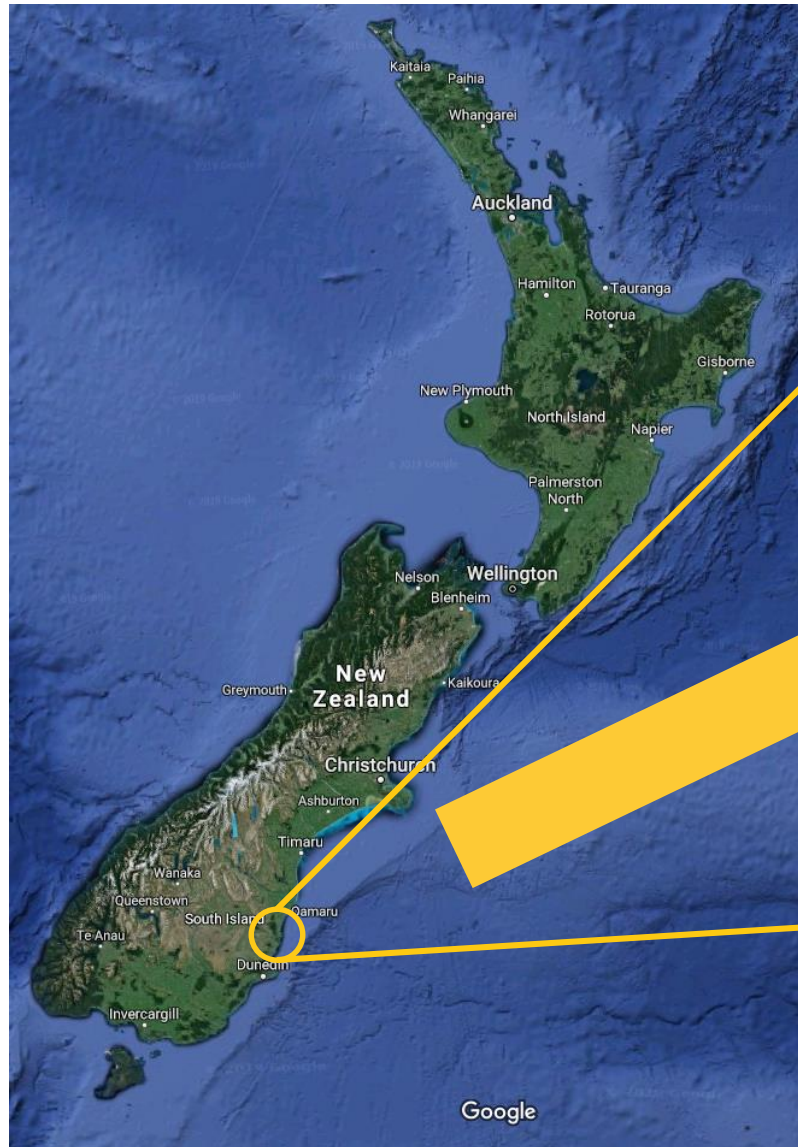


The Hamnak Pipeline

What I will cover:

- Introduction
- The Challenge
- The Design
- PVC-O as a material option
- Construction
- Project Execution
- Summary & Conclusions
- Questions

Location – Waitaki District, NZ



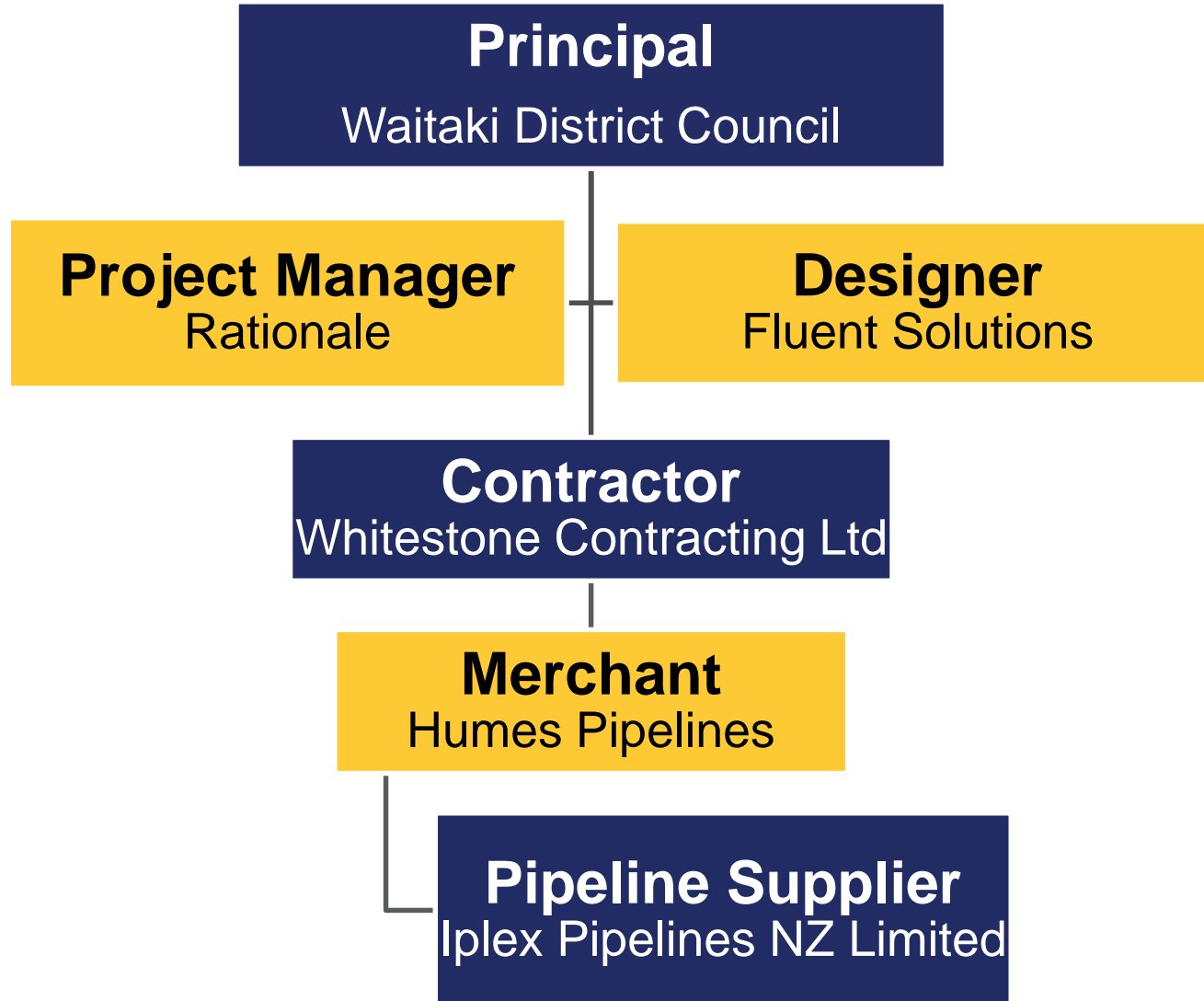
Introduction

Hamnak Pipeline – formally the H2Our Health Project

- Construction of a new 33.2 km watermain and two pumping stations.
- Landmark project. Longest PVC-O pipeline in New Zealand.
- Connecting Oamaru water reticulation with Herbert/Waianakarua and Hampden/Moeraki Water supply reticulations.
- PVC-O Pipe was used for bulk of the pipeline (DN100 PN12.5 up to DN200 PN12.5 Series 2).
- PE100 used for road and river crossings by HDD



Project Stakeholders



The Challenge

Former Infrastructure

- **Non-compliant with Drinking Water Standards New Zealand (DWSNZ).**
- **Vulnerable to drought, flood events & contamination.**
- **Frequent supply restrictions/Boil Water notices.**
- **Undersized for future population & business growth.**
- **Maintained and governed by local scheme operators.**



**Former Herbert-Waianakarua water supply intake
(Normal conditions)**



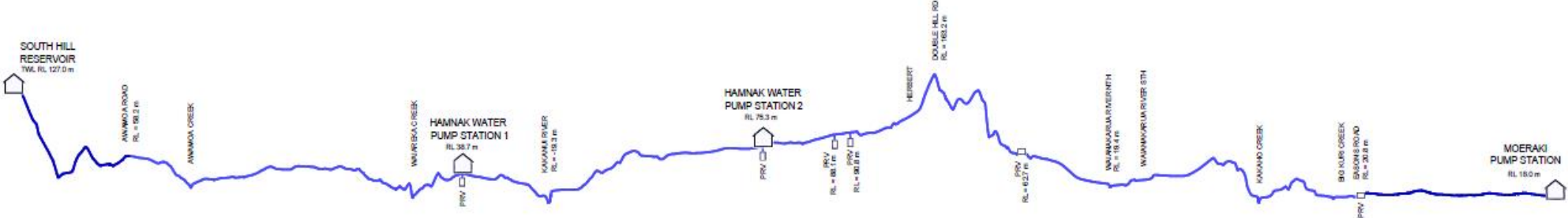
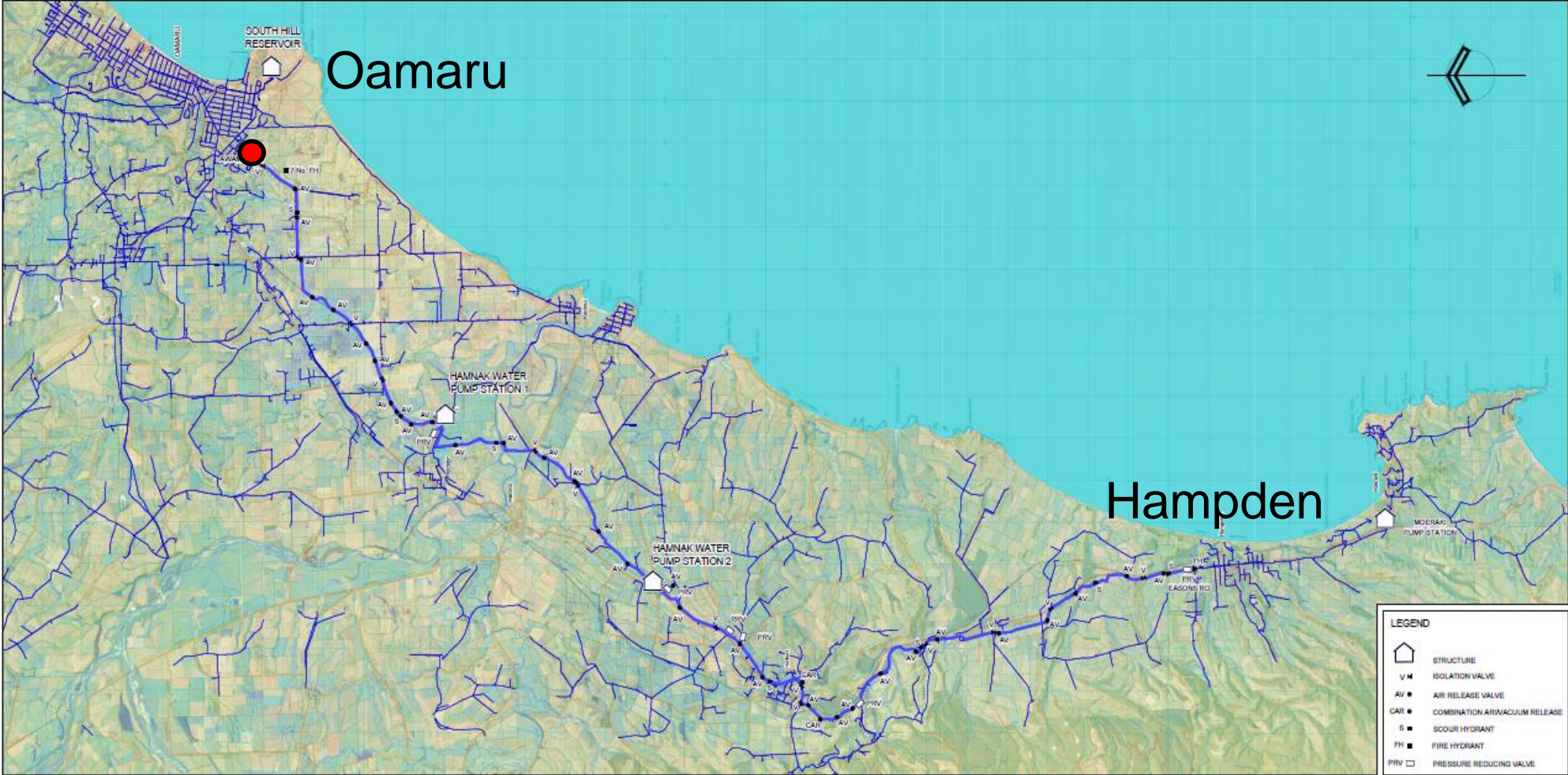
**Former Herbert-Waianakarua water supply intake
(Flood conditions)**

Several design solutions considered...

- **Dedicated/Separate Water Treatment Plants.**
- **A dedicated transmission pipeline connecting to the Oamaru reticulation considered most efficient.**
- **Extensive hydraulic & network flow modelling carried out to find optimum solution.**
- **Final pipeline route considered concurrent renewal/replacement of aging reticulation.**
- **Final design allowed PE100 and PVC-O as acceptable material options.**
- **Total length of pipeline circa 34 km. 5 x water and roadway crossings installed by HDD.**
- **2 x booster pump stations included in the design.**



Final agreed pipeline route



Specification allowed PVC-O or PE100

- Gave Tenderers freedom to offer alternative material choices.
- Enabled construction methodologies that were cost effective.
- Achievable within the 14 month installation window.
- PVC-O and PE100 permitted for bulk of project
- PE100 only for HDD waterway and roadway crossings

Pipe Specification for bulk of pipeline

	Size 1 (PN12.5)		Size 2 (PN12.5)		Size 3 (PN12.5)	
Option	A	B	A	B	A	B
Material	PVC-O	PE100	PVC-O	PE100	PVC-O	PE100
Nominal Diameter	DN200 S2	DN250 S1	DN150 S2	DN180 S1	DN100 S2	DN125 S1
Mean ID (mm)	218.4	212.4	166.8	152.8	114.5	106.1

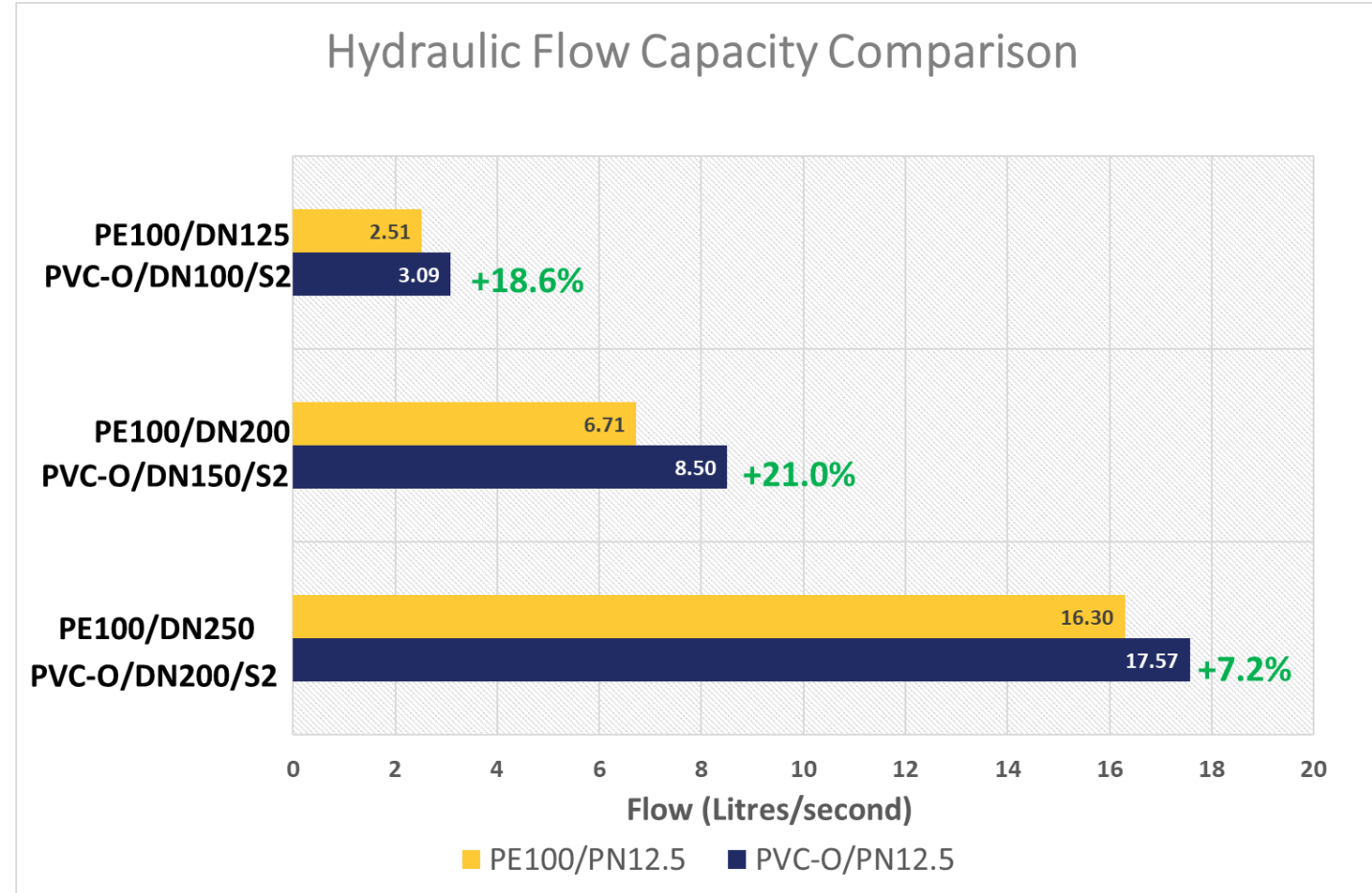
Pipe Specification for water & roadway crossings

	Size 1 (PN16)	Size 2 (PN16)
Material	PE100	PE100
Nominal Diameter	DN250 S1	DN180 S1
Mean ID (mm)	203.4	146.3

PVC-O selected by Contractor

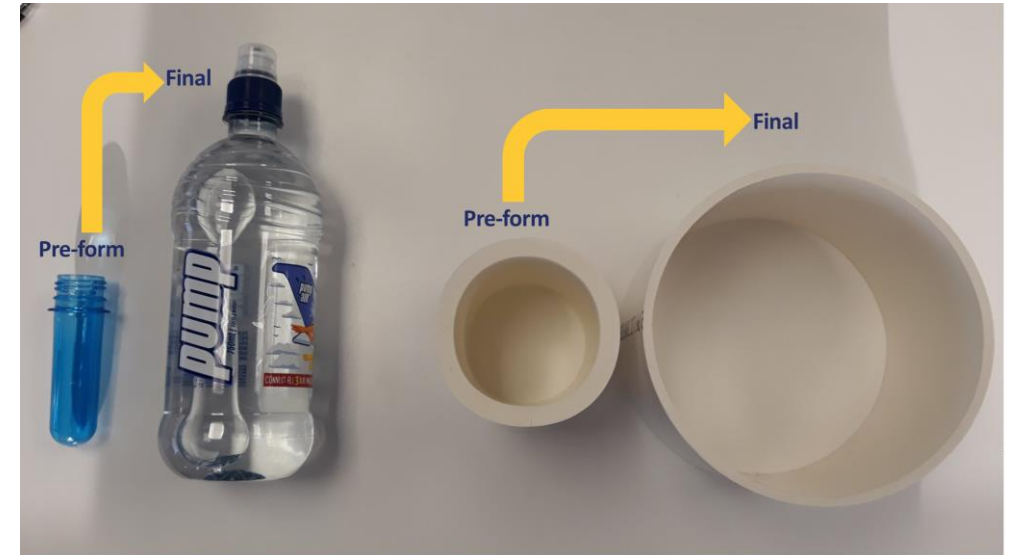
Enabled a fully compliant tender

- No competitive advantage to using PE100 in a mostly open-cut project.
- PVC-O delivered highest hydraulic flow capacity for given size and pressure class.
- Simple in-trench jointing of PVC-O meant speedier Construction and reinstatement.
- PVC-O avoided external fusion costs associated with a PE100 option.
- Asset Owner and Contractor were familiar with PVC-O and confident with this material choice.
- PE100 only for waterway and roadway crossings.

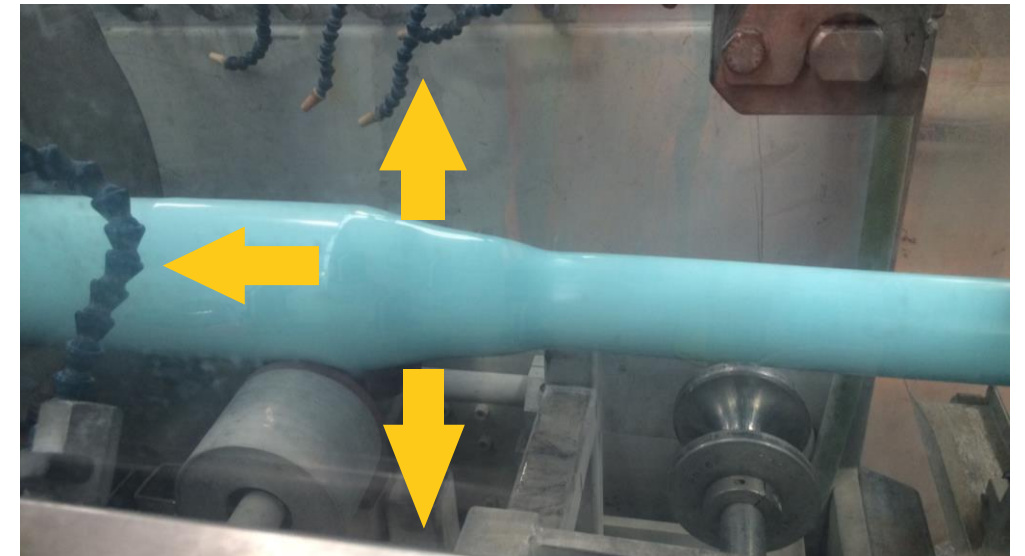


What is PVC-O?

- **Manufactured by stretching a PVC-U feedstock pipe just above glass transition temperature to provide molecular orientation.**
- **Developed in the UK in the 1970s by Yorkshire Imperial Plastics.**
- **Widely used in Civil Infrastructure and Rural Water projects in ANZ since the early 2000s.**
- **Greatly improved mechanical and physical properties.**
- **Stretch is achieved in mono or bi-axial directions.**
- **Has demonstrated excellent seismic resilience in New Zealand Earthquakes**



Examples of molecular orientation



Bi-axial stretch during manufacturing

PVC-O performance



Innovations and transitions

- Open-cut installation methodology used for bulk of project.
- Two pipelaying crews operating at any given time => up to ~200m/day lay-rates.
- HDD installation for waterway and roadway crossings including a 200 m drill shot under Kakanui river.
- Innovative methods used to provide negative buoyancy for some river crossings.
- Particular care taken with PVC to PE transitions => PVC DI Flanged End secured to brackets cast into sizeable anchor blocks.



Kakanui river crossing



PVC-PE transitions

Construction Methodology



Project Planning and Execution

- **Project started in July 2017, handed over to Asset Owner in September 2018.**
- **Consultation with 41+ Landowners critical – Dedicated Contractor liaison resource appointed.**
- **Clear communication & agreements on access, HSE issues, risk management & reinstatement.**
- **Effective sub-contactor management.**
- **Mycoplasma Bovis Outbreak – July 2017.**
- **Access to affected properties on pipeline route - in accordance with MPI Guidelines**



Waitaki DC Mayor Gary Kircher and Assets Group Manager Neil Jorgensen

The successful outcome...

- On time, on budget and delivered on expectations.
- 1300+ residents now have access to clean, DWSNZ compliant drinking water.
- Latest generation of PVC pressure pipe used on project.
- Open + transparent consultation with landowners from project outset.
- Well received by Industry. Contractor won a CCNZ award for the project & Asset Owner was Highly Commended in LGNZ awards



**Les Drummond –
former caretaker of
Wainakarua RWS at
opening ceremony**



**Billy Wilson and Julian
Hardy – from Whitestone
Contracting with CCNZ
Award**

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Thank you

Now for questions...



Waitaki
DISTRICT COUNCIL
TE KAUNIHERA Ā ROHE O WAITAKI



rationale >

