

No Dig Resin Based Sewer Rehabilitation Performance Post 2014

Water New Zealand Conference
September 2017

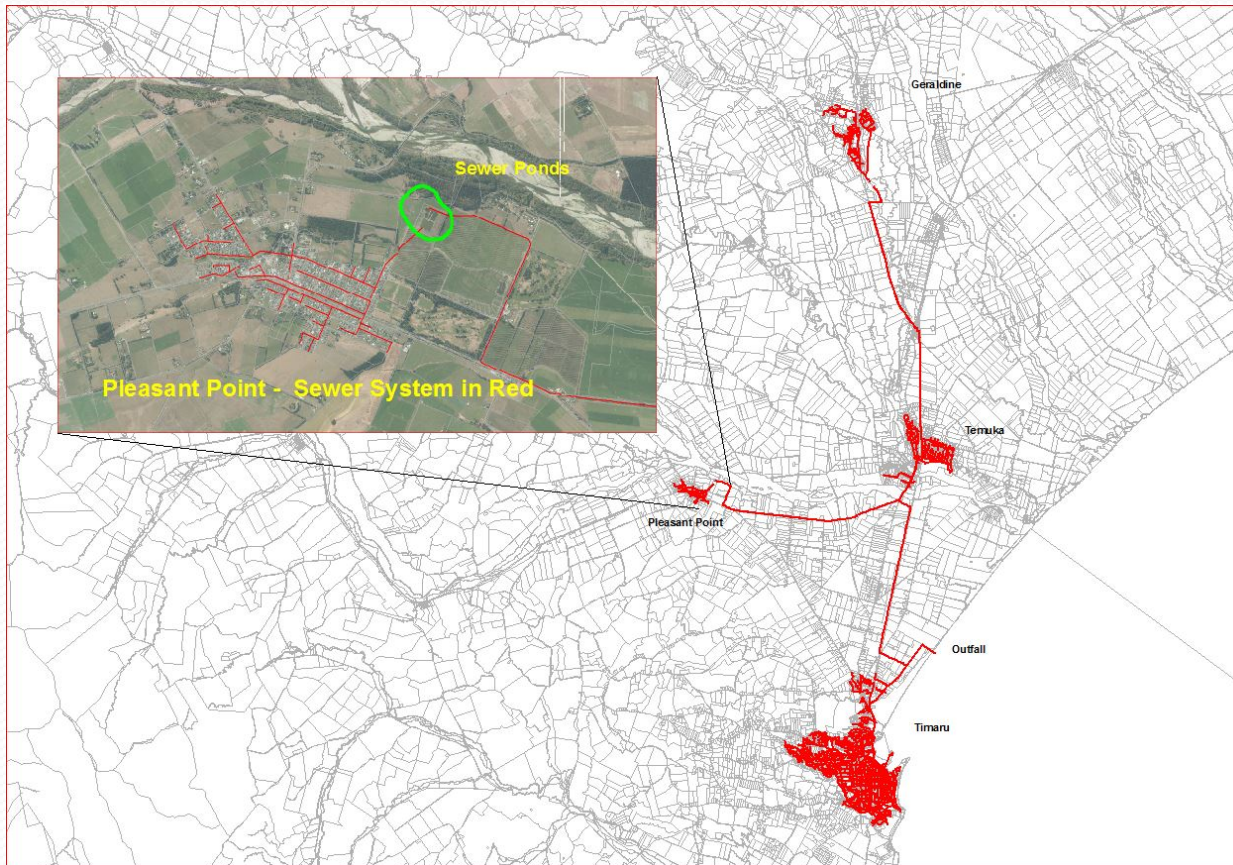
Gerard Cody – Water Services Reticulation Engineer
Timaru District Council

Topic Items

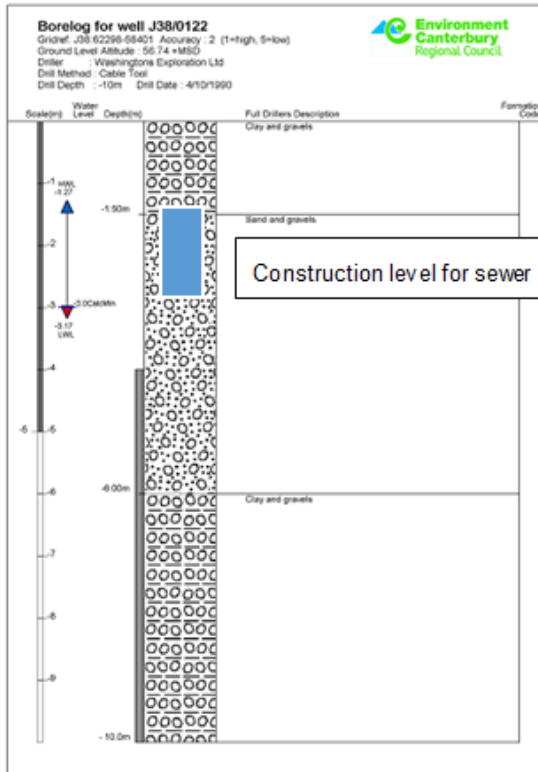
- Pleasant Point township background and sewer rehabilitation drivers
- Groundwater levels, Sewer flow Data and problems arising
- Regional Council (ECan) Involvement – Abatement Notice
- Reticulation catchment analysis and inspection results
- Rehabilitation – What we are doing and new rehabilitation ideas
- Questions

Background

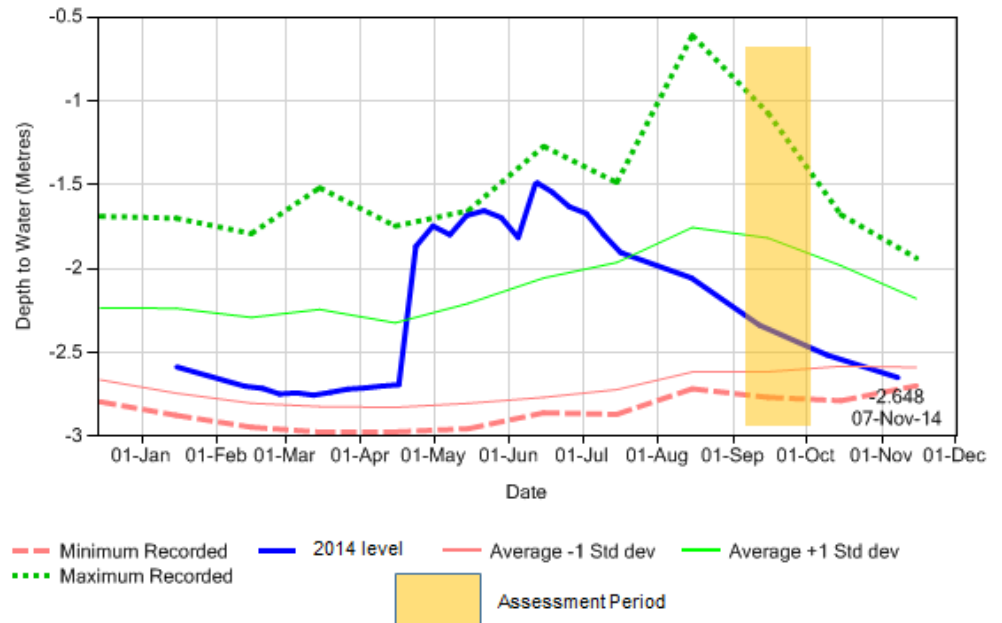
- Pleasant Point township 14km inland from Timaru/Coast
- Sewer Connections - 541
- Sewer Reticulation length 22.5km
- Treatment of sewerage - oxidation pond - piped to Timaru Treatment plant - Ocean outfall



Sewer level vs Ground water



Groundwater envelope plot for well J38/0122



Investigations – Sewer flow data

- Investigations identifying areas of infiltration into the Pleasant Point sewer scheme.



Catchment	Infiltration (Flow Difference) (ls ⁻¹)	Infiltration Factor
1	-0.03211	0.922864865
2 (With 4, 5 & 6)	21.99845	18.61468318
2 (Individual)	5.37371	8.2747521
3 (With 7)	18.06897	13.96849151
3 (Individual)	15.58124	20.73382605
4	0.78593	19.82005987
5	12.20475	49.03127572
6	3.75809	42.61785875
7	2.65719	6.551887968

* Catchments 2, 3 and 5 high infiltration observed from flow

* Catchments 4, 5 and 6 high infiltration factor

* Areas suspected to be big issues were 4, 5 and 6

* Catchments 2 and 3 have catchments feeding into them compounding the theoretical problem

* When isolated catchment 2 ceases to be an issue, however catchment 3 as a standalone is an issue

Telemetry - Rain and Ground water levels collide

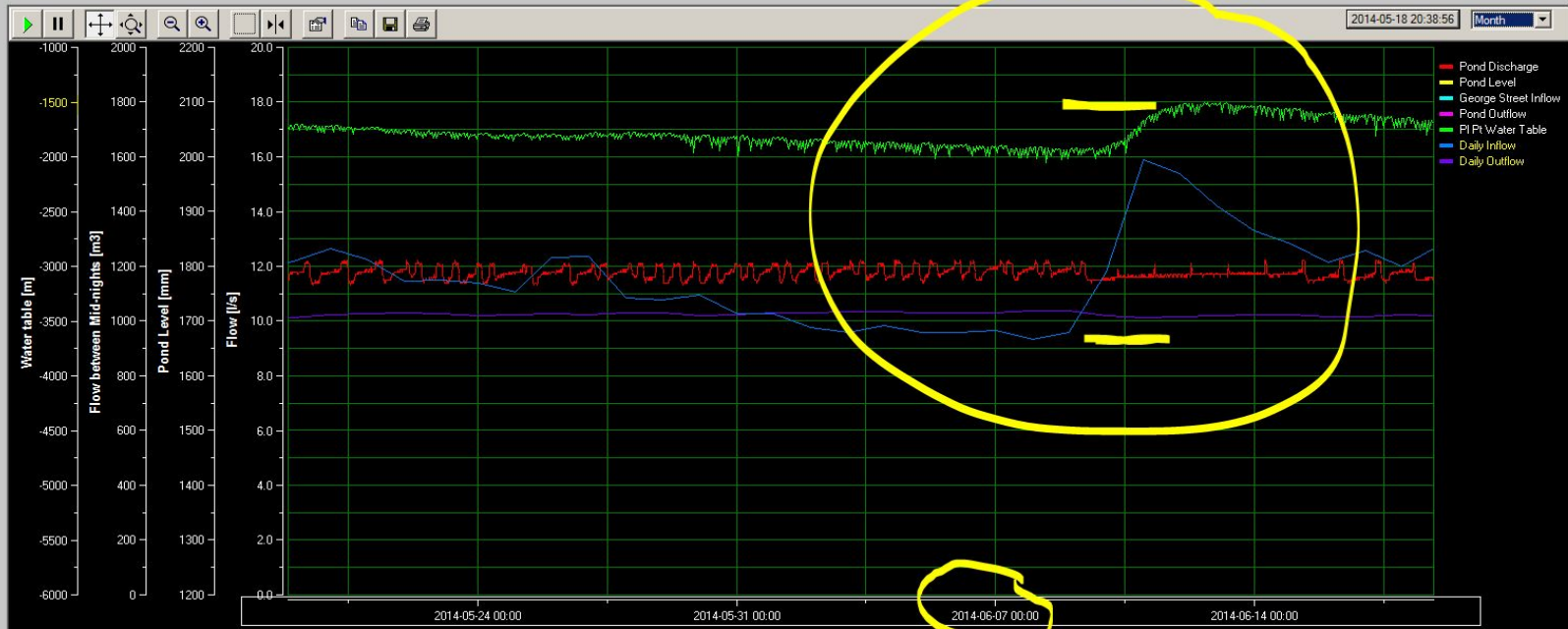
- Telemetry 07/06/2014 Showing water table in green – 1.5 meters below GL and pond inflow in blue 1600m³ for the day.

Timaru District Council

TIME | 16 : 51

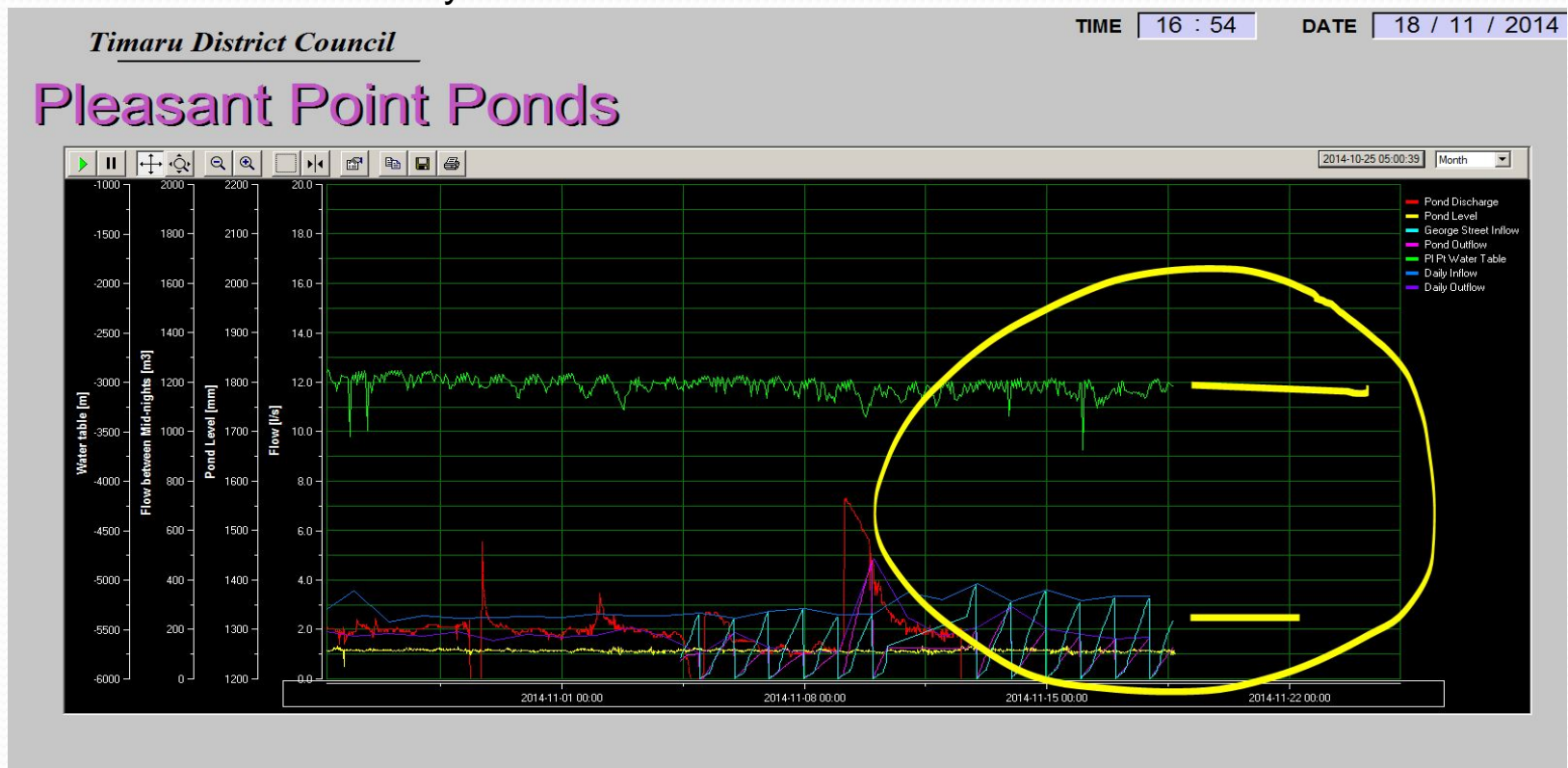
DATE | 18 / 11 / 2014

Pleasant Point Ponds



Telemetry reading after drop in water table

- Telemetry Showing water table in green – 3.0 meters below GL and pond inflow in blue 310m³ for the day.



What is the problem and what we found.

- PVC main joints and Manholes allowing ground water into reticulation. –Installed 1984
- Ground water pressure finding weaknesses in the reticulation. Poor PVC Jointing methods and manhole base installation
- Storm water inflow from low gully traps on private property
- Downpipes directed to gully trap
- Ground Water entry the major problem

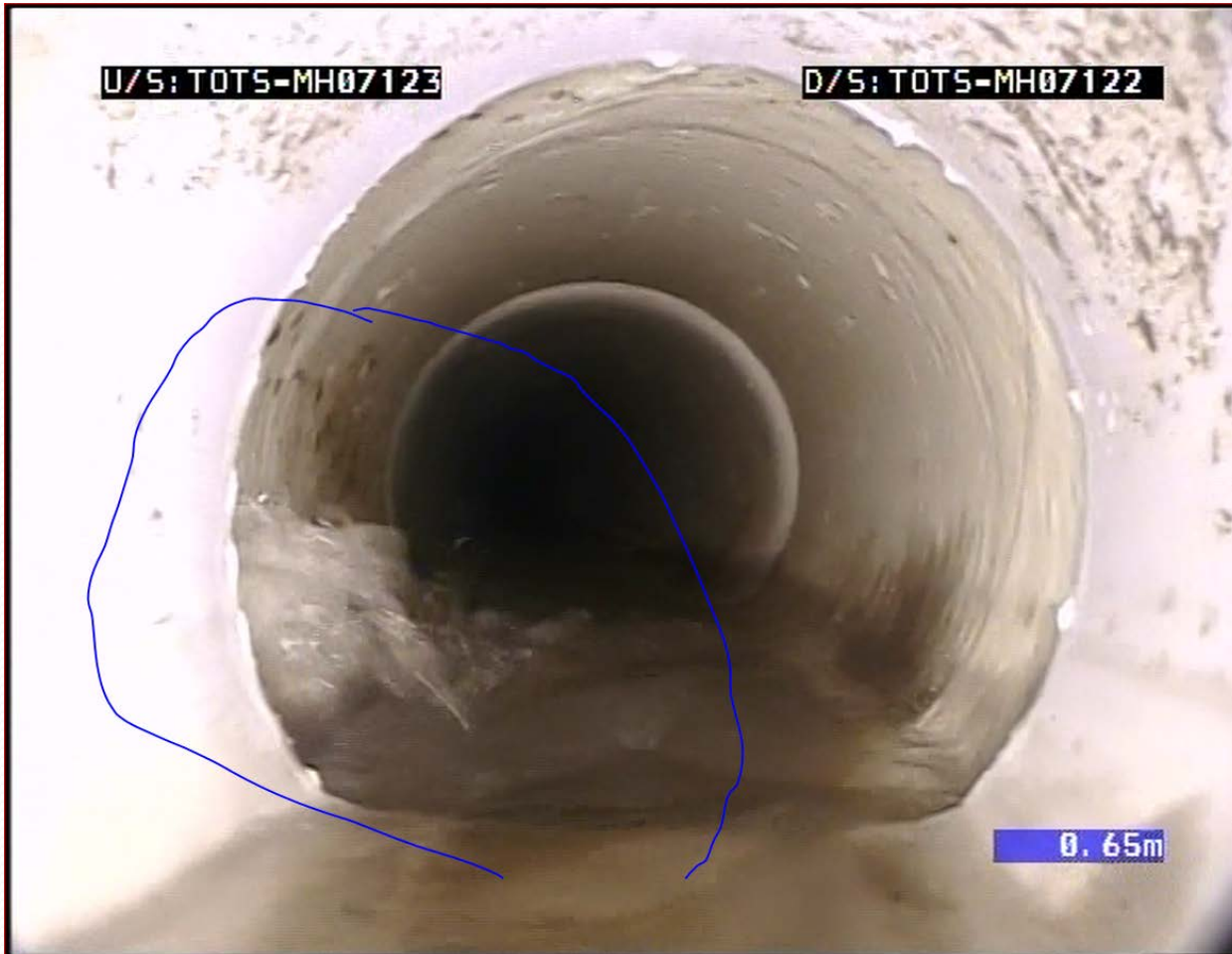
The Network – CCTV Inspection



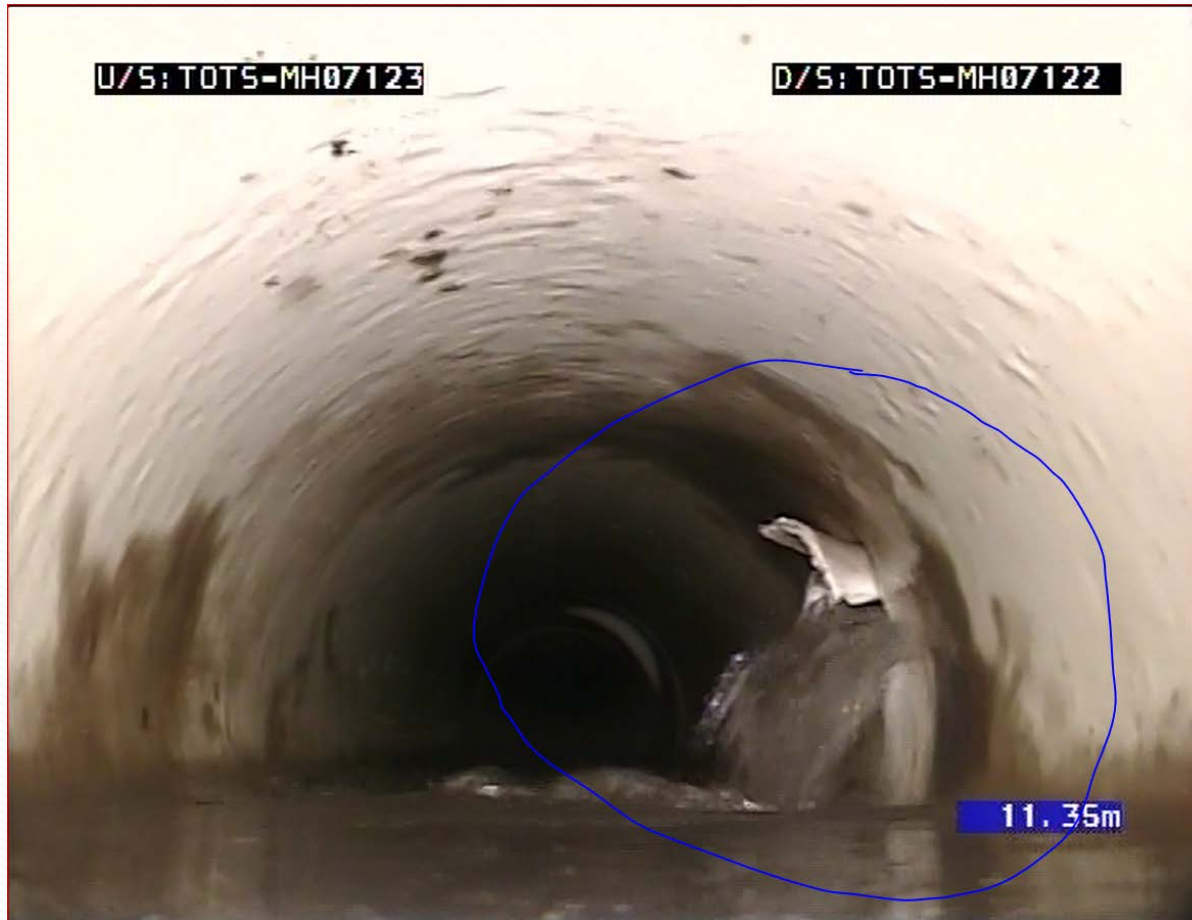
CCTV inspection of sewer catchments 3, 4, 5 and 6.
In total – 3.4 km



Network Issues



Network Issues



Private sewer connection inspection/smoke testing



- 541 Connections
- 8 Properties with direct stormwater connections
- 40 Properties with low or no Gully trap sides
- 15 laterals relayed





Reticulation Rehabilitation or Renewal

- Renewal cost \$1.15 million – ground conditions not favourable – running gravels – high water table
 - 70 years financial write off – asset only 30 years old.
- Rehabilitation – Grouting and lining of manholes – patching of pipe faults - cost estimate \$160,000. All no dig options
 - 50 year life

Rehabilitation 'No Dig' Components

Manholes – Full repair system

1. Seal Guard
2. Hyperflex
3. Ultracoat

Pipes

1. FRP Glass Patching
2. Quicklock Stainless Steel Sleeves

Manhole Rehabilitation process

1. Seal Guard – polyurethane grout - cartridge type application used on high flow infiltration – fast expanding – quick setting



Manhole Rehabilitation process

2. Hyperflex - cartridge type application -hydrophobic grout- slower curing than Seal Guard – suitable for lesser flows – but able to fill voids behind manholes for ground stabilisation.



Manhole Rehabilitation process

3. Ultracoat – Spray on - Structural epoxy coating of manhole inverts and walls



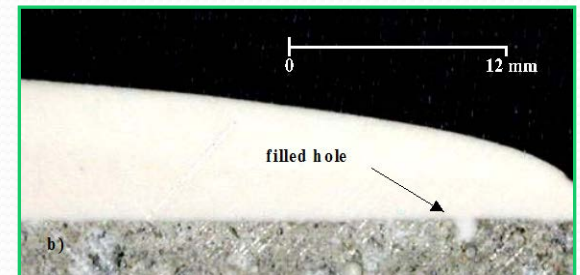


ULTRACOAT EPOXY POLYMER - KEY PROPERTIES

100% SOLIDS EPOXY PROPERTIES

Liquid Properties

- Viscosity = 90,000 to 120,000 cps
- Thixotropic index = 5.0 to 6.0
- Allows 6mm on a vertical surface
- Set time 25°C= 2hrs 4.4°C= 8hrs
- *Meets the requirements of many international standards and certifying agencies such as ANSI, USDA, AWWA*



100% SOLIDS EPOXY PROPERTIES

Solid Properties

- Flexural modulus at 0.1 in. (ASTM 790) =
 - (60,000psi/4,136bar)
- Compressive strength (ASTM D695) =
 - 83 MPa (12,000 psi/827 bar)
- Permeability (water vapour transmission) =
 - 1.5×10^{-6} g/m²/day

PRODUCT FEATURES

- 100% solids epoxy, with no VOC's
 - excellent for confined spaces
- Bonds well to damp substrates
- Does not support algae/bacteria growth
- Chemical resistance - pH 2-14
- Fire retardant grades available
- Coatings to suit virtually any surface



ULTRACOAT SUMMARY

- Safe for the employees in confined space applications
- Environmentally friendly
- Exceptionally versatile
- Simple and inexpensive to apply
- Rapidly deployable for emergency repair
- Superior epoxy-to-substrate bond characteristics
- Favorable structural characteristic - quick turnaround
- Low flame spread on 100% solids, solvent free epoxies

Pipe Joint/Fault Rehabilitation

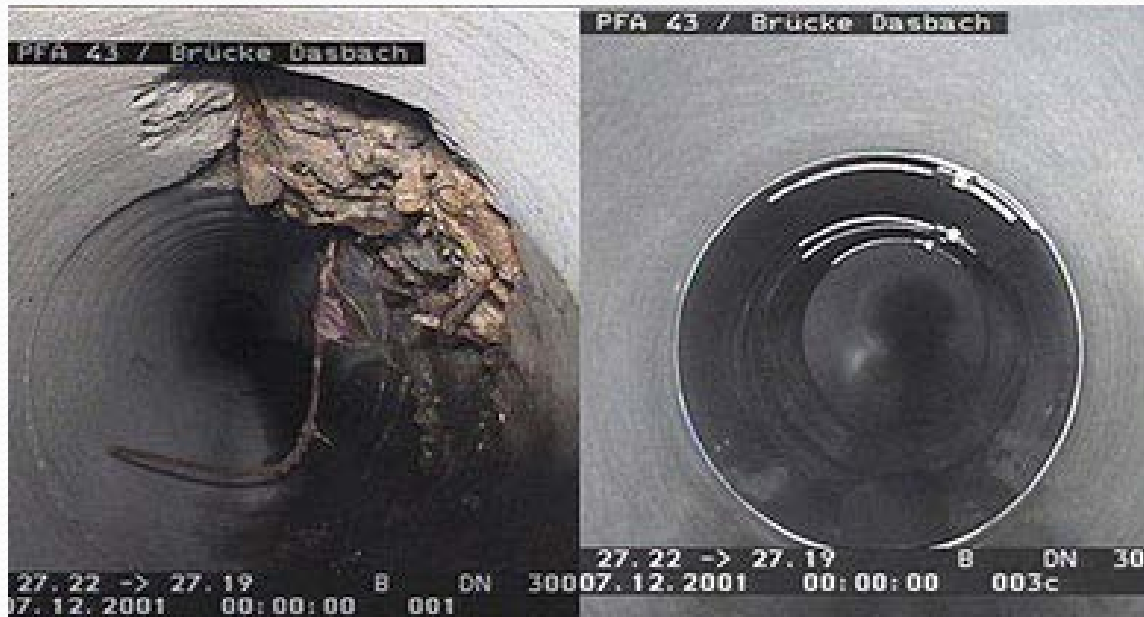
Fernco epoxy resin fibre reinforced glass patches— cured in place



Pipe Joint/Fault Rehabilitation

QuickLock mechanical repair system - 316L stainless steel sleeve and structural body, covered by a seamless EPDM rubber compression seal

Before



After



Observations

- Inflow investigations (smoke testing and house inspections)- \$23,800
- Infiltration Investigations (CCTV) - \$30,000
- Manhole and pipeline rehabilitation - \$150,000
 - 21 Manholes (41 inspected)
 - 9 in pipe repairs to 1.6 kms of sewer main
- Oxidation pond levels were decreased to accommodate higher than expected flows.
- No overflows from the system since rehabilitation completed.

Conclusions

- Initial installation management of assets is crucial.
- Good asset data to scope rehabilitation is good business.
- Rehabilitation product selection to be fit for purpose and application monitoring required to rigorous.
- Operational monitoring essential for proof of outcome to monitoring agencies and for internal reporting eg LOS and KPI.
- Timaru District Council continue to use these products for 'No Dig' rehabilitation solution as a cost effective approach.



- Thank you

- Questions?