Wastewater Network Overflow Consent

CONSULTATION MEETING

3 AUGUST 2016

BRIDGET O'BRIEN AND MIKE BOURKE, CHRISTCHURCH CITY COUNCIL

Overview

- What is wastewater?
- Current state of the wastewater network
- Why do wastewater overflows occur?
- Wastewater overflow consent process
- How frequently do overflows occur?
- What is the current state of the waterways?
- What is Council doing to improve the waterways?
- What is the Council doing to reduce overflows?
- What can you do to improve the waterways?
- What do you value about the waterways where overflows occur?

What is wastewater?

- Wastewater is water from internal drains (e.g. toilet, shower, bath, kitchen sink, dishwasher, washing machine, laundry tub)
- Wastewater is conveyed by pipes and pump stations to wastewater treatment plants for treatment and disposal
- The main purpose of a wastewater system is to protect public health
- In order of priority, aim to keep wastewater:
  - Off properties
  - Off the street
  - Out of waterways
- Stormwater comes from rainfall and is collected in external drains (e.g. downpipes off roofs, kerb and channel on roads)

Why do wet weather overflows occur?

- Stormwater and groundwater gets into the wastewater network through cracked pipes, flooded manholes and gully traps, and cross-connections (e.g. downpipe accidentally connected to wastewater)
- This can cause the capacity of the wastewater network to be overwhelmed in a large storm
- Constructed overflow points are safety valves in the wastewater network, to prevent overflows on properties and on the street
- For 3 year Annual Recurrence Interval storm:
  - 125 manholes overflow, total overflow volume 42,000 m^3
  - 22 constructed overflows operate, total overflow volume 36,000 m^3

GeoPlan - Christchurch_PostRebuild_Models_2016! (version 10) (Scenario Query309) (R/O) - Query309_Rob_Meek_LiftStations>Query309 3yr 24hr Design Event start at 3am [Target]

Long Section - Christchurch_PostRebuild_Models_2016! (version 10) (Scenario Query309) - Query309_Rob_Meek_LiftStations>Query309 3yr 24hr Design Event start at 3am

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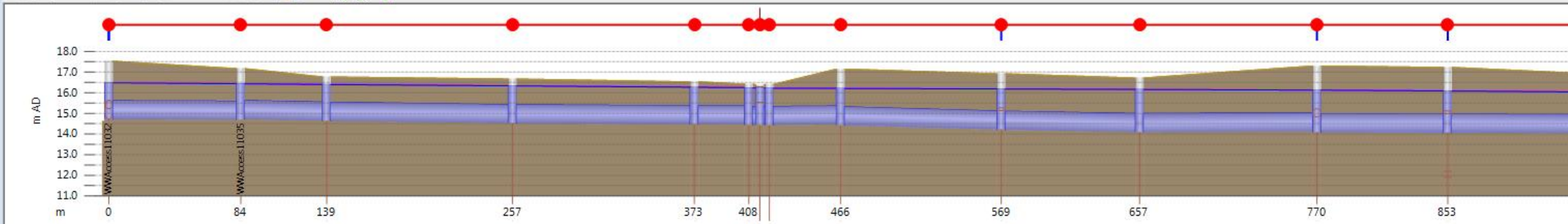


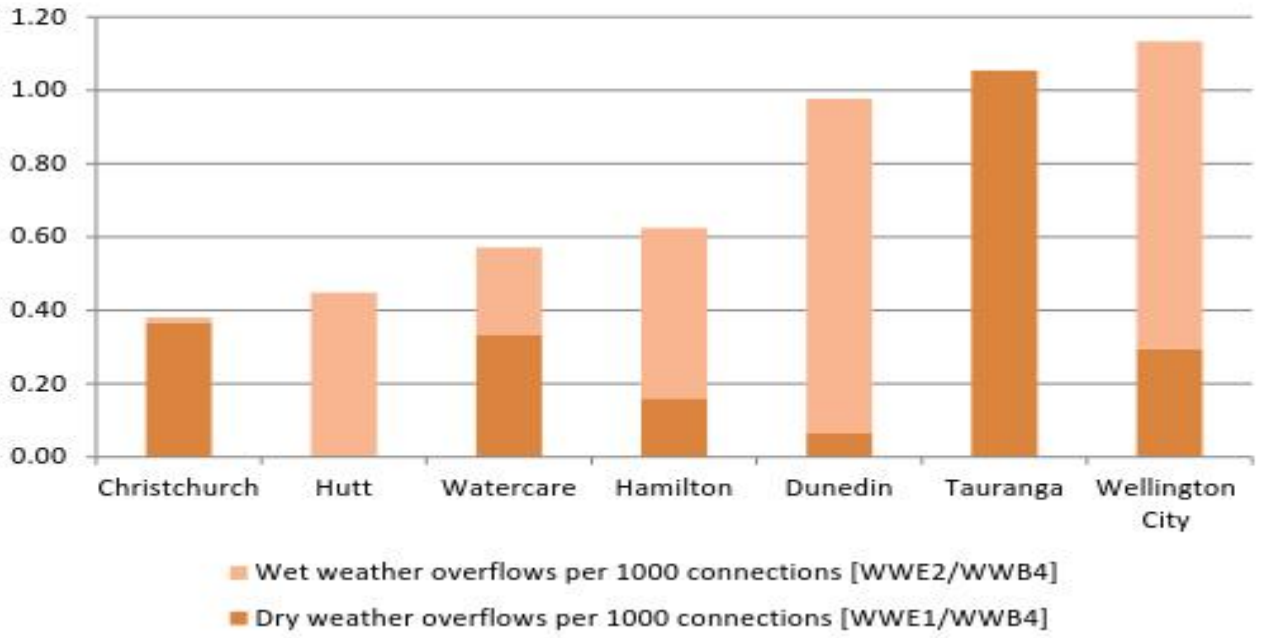
Link	WWAccess11032.1	-	WWAccess11036.1	WWAccess11037.1	-	-	-	WWAccess11042.1	WWAccess11044.1	WWAccess11047.1	WWAccess11050.1	WWAccess11052.1
width (mm)	900	900	900	900	900	-	900	900	900	900	900	900
us inv (m AD)	14.709	14.718	14.639	14.518	14.480	-	14.434	14.415	14.204	14.094	14.087	14.061
ds inv (m AD)	14.688	14.644	14.522	14.469	14.467	-	14.458	14.214	14.094	14.122	14.053	14.040
r.pfc (l/s)	268	627	536	349	329	-	-391	756	602	-267	343	261
DS flow (l/s)	392.62	393.39	393.40	393.41	393.41	-	315.39	314.75	326.92	329.44	415.77	426.25

Node	-	WWAccess11035	WWAccess11036	WWAccess11037	WWAccess11038	-	-	WWAccess11042	WWAccess11044	WWAccess11047	WWAccess11050	WWAccess11052	
level (m AD)	16.483	16.434	16.400	16.332	16.266	-	-	16.209	16.182	16.158	16.126	16.084	16.0
vol.lost (m3)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	

How does Christchurch compare to other cities?

6.4 Wastewater Overflows

Figure 82: Wastewater overflows per 1000 connections for metropolitan participants



Current state of the wastewater network

- SCIRT wastewater repair work is largely completed but has only repaired damage to critical assets or assets in critical locations, or damage that is expected to last less than 5 years
- Replacement or repair major damage across half of the network
  - Where obvious infiltration found this will be repaired by SCIRT
- Post SCIRT network model has been built
  - Needs calibrating in wet weather to improve model accuracy
- Currently average flows are back to “normal” - maybe! However the long dry period may be misleading and groundwater levels are low.

Christchurch Wastewater Treatment Plant Total Daily Flow

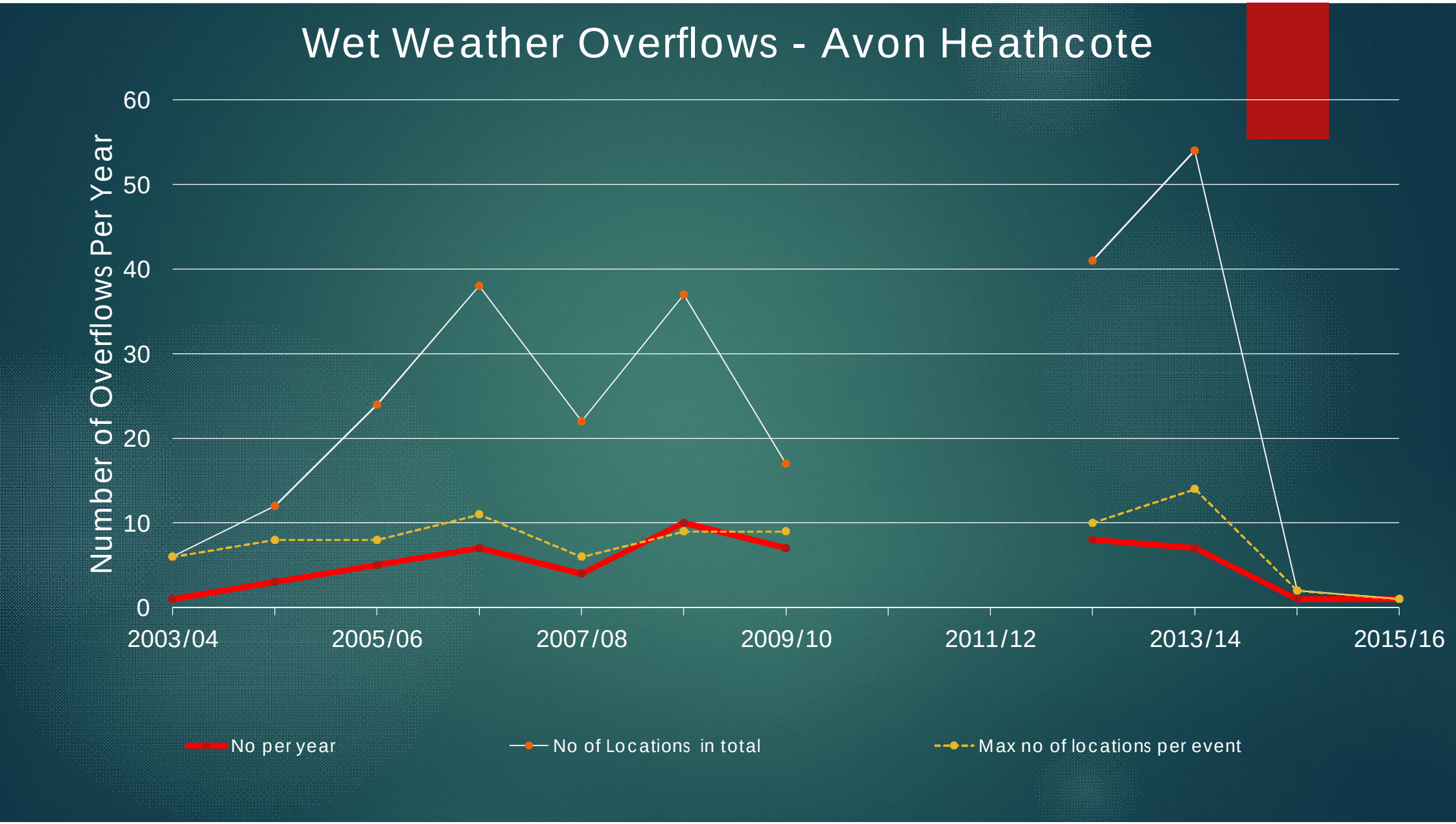
Wastewater overflow consent process

- Current wet weather overflow consent expires in 2025
- Due to earthquake damage to wastewater network, non-enforcement agreement with Environment Canterbury
- By 1 March 2017, need to comply with existing consent or apply for a new consent
- Currently running 15 years historical rainfall in wastewater network model to assess compliance, but will take several months
- Due to earthquake damage probably won't comply with existing consent, so new consent application underway
- New consent will include Lyttelton Harbour and Akaroa Harbour

Wastewater overflow consent process

- Previous consent based on reducing the frequency of overflows to the Avon River, Heathcote River and Avon/Heathcote Estuary
- But no real link between overflow frequency and effects on the environment
- Taking an effects based approach for the new consent:
  - What values do the waterways have?
  - What effects do wastewater overflows have on those values?
  - What is the best practicable option to reduce those effects?

Wet Weather Overflows - Avon Heathcote



What is the Council doing to reduce overflows?

- Rubber flaps on constructed overflows, to stop river water getting into wastewater network
- In flood prone areas, replacing vents on our manholes with solid lids, to stop stormwater getting into wastewater network
- In flood prone areas, putting plastic lids on household gully traps, to stop stormwater getting into wastewater network
- Conducted house to house surveys in Diamond Harbour and Lyttelton, to identify where stormwater is getting into our wastewater system and asking property owners to fix issues
- House to house surveys planned next in Akaroa and then Governors Bay
- Completed Major Sewer Upgrade project, $150 million of major projects over 15 years

What is the Council doing to reduce overflows?

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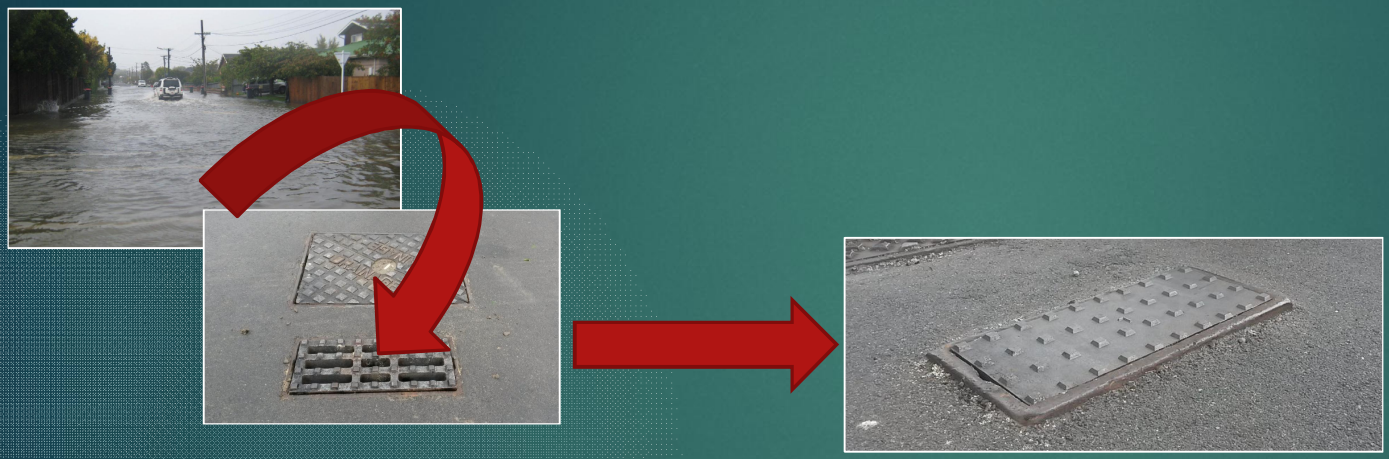


- In flood prone areas, putting plastic lids on household gully traps, to stop stormwater getting into wastewater network

What is Council doing now to reduce overflows?

- Reducing infiltration
  - Supporting the SCIRT repair program
    - Renewing seriously damaged pipes
    - Repair major breaks and leaks identified through CCTV
    - Pressure sewer and vacuum areas will have much less infiltration.

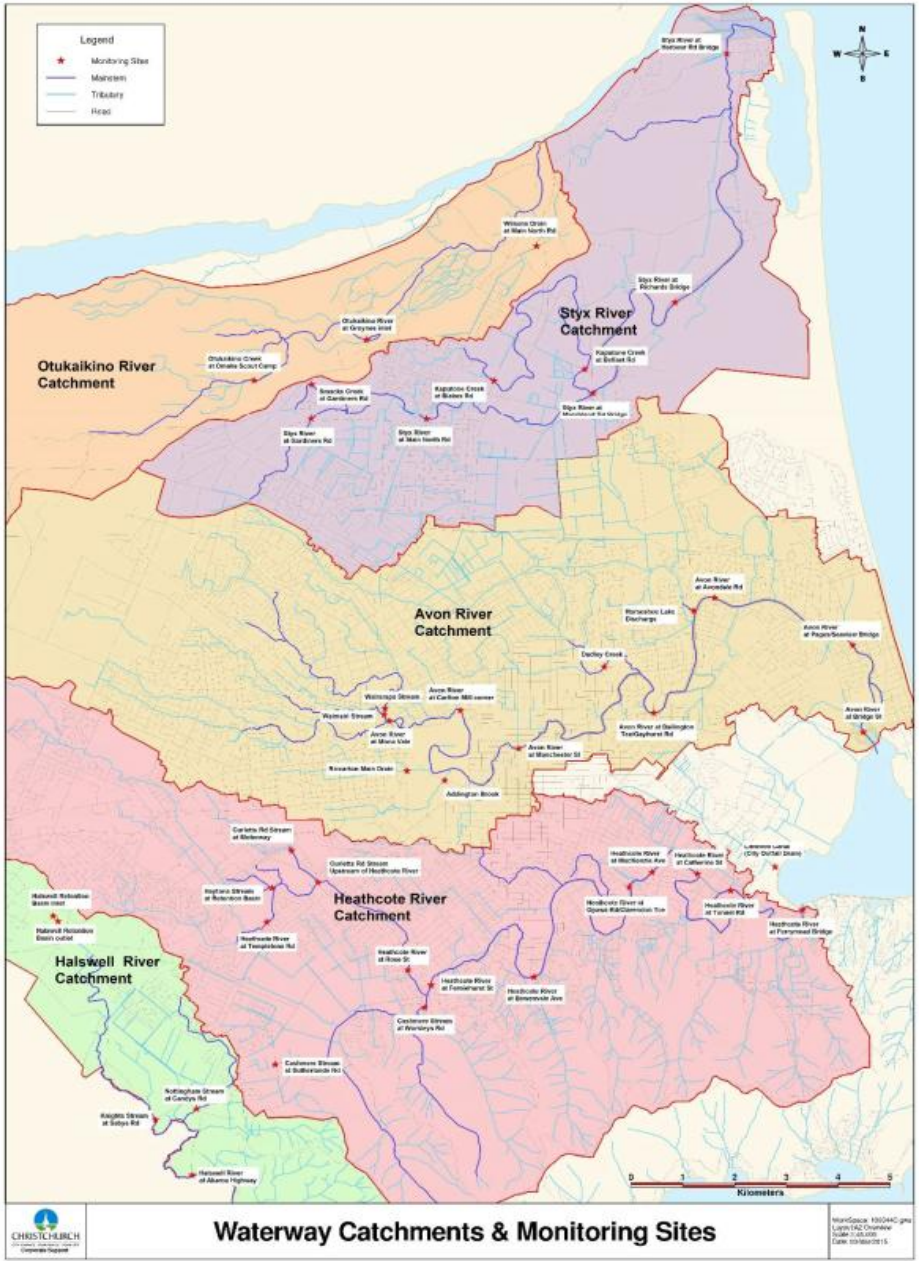
What is Council planning to do to reduce overflows?

- Already spent some $50 million on new Pump Station 11, pressure mains, Fendalton Pump Station and duplication, and Western Interceptor for additional capacity.
- Riccarton Road wastewater trunk main upgrade and Lower Riccarton Interceptor, $13.7 million over FY16-18
- Colombo Street wastewater trunk main upgrade and Beckenham Street cross connection $2.4 million over FY16-18
- Heathcote River wet weather wastewater overflow reduction project, $19.3 million over FY19-25
- Northern Relief project, $46.7 million over FY19-25

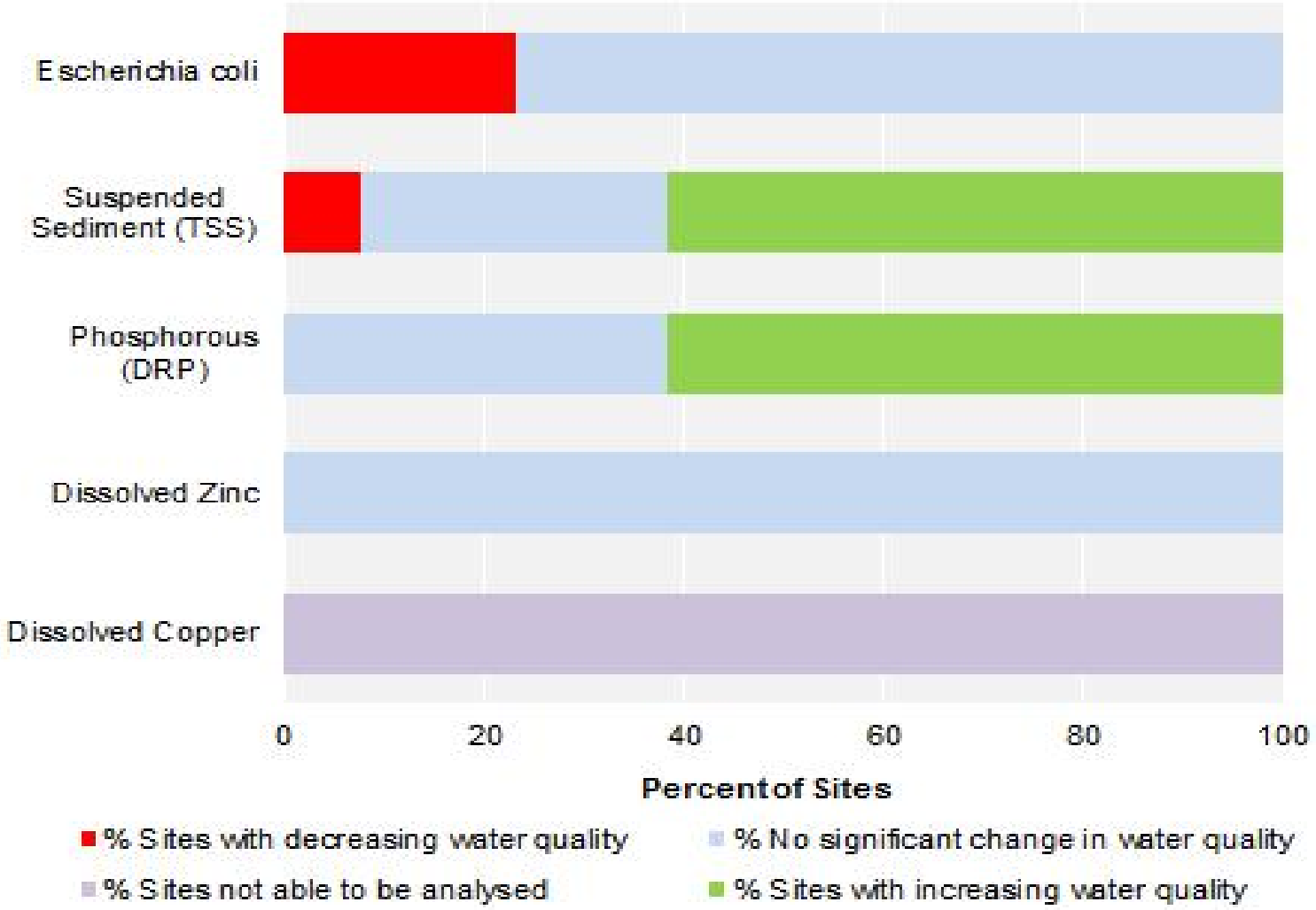
- Total of $82 million in Long Term Plan for reducing overflows

What is the current state of the waterways?

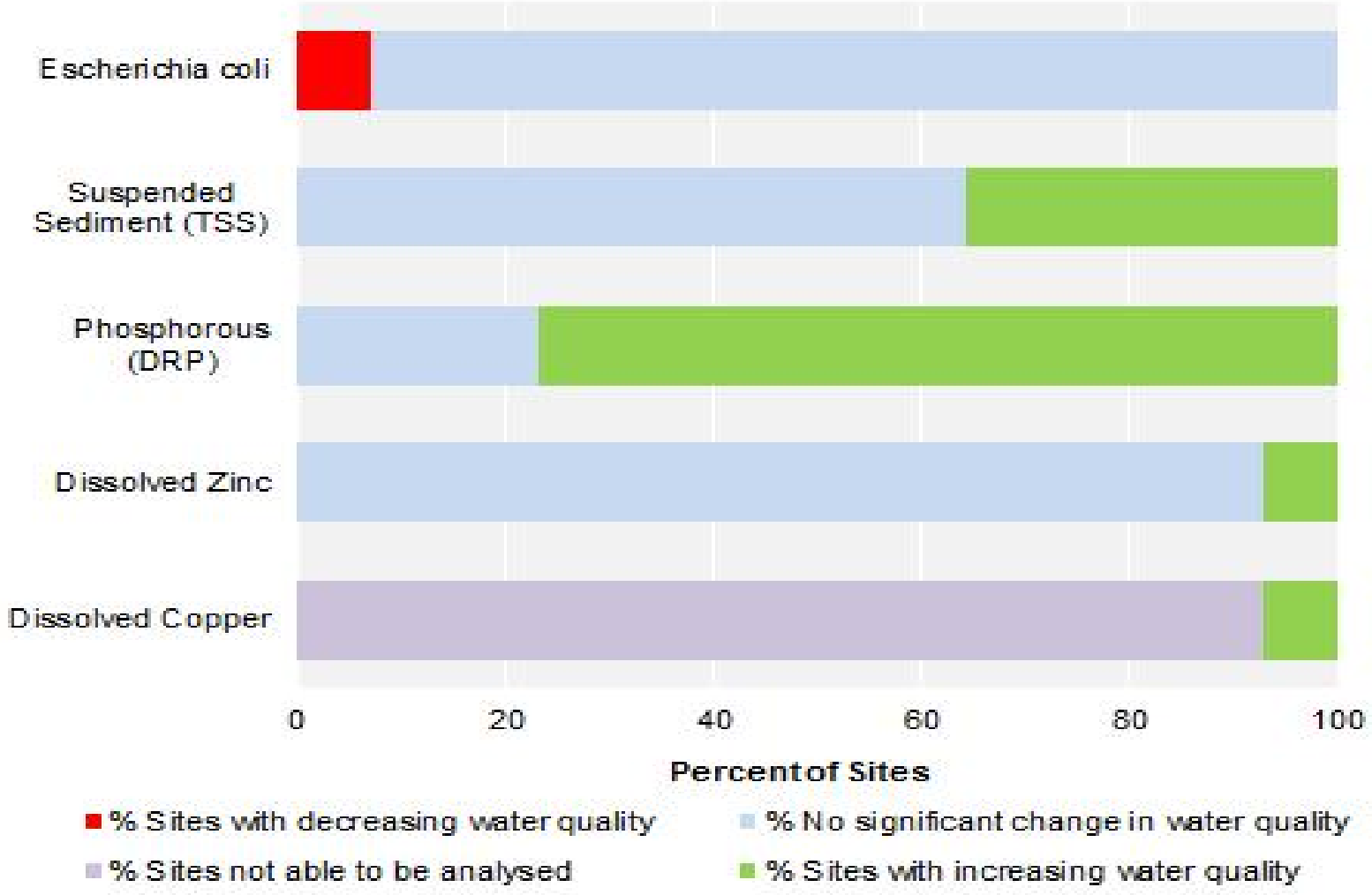
- Council carries out extensive monitoring of water quality – over 7,000 samples last year
- Key contaminants:
  - 1. Sediment – smothers habitat and food, can be contaminated. Comes from runoff from construction sites, unstabilised surfaces, vehicles and earthquakes
  - 2. Metals (zinc and copper) – toxic to fish and other creatures. Comes from brake pads, tyres and building products (roofs, spouting, downpipes)
  - 3. Bacteria – public health risk. Mostly comes from dogs and ducks, and occasionally from wastewater overflows
  - 4. Nutrients (nitrogen and phosphorus) – can be toxic (e.g. ammonia) and encourage growth of weeds and algae. Comes from fertiliser, soils, faeces of livestock, ducks and dogs.
- Most sites no change since 2007, and with removal of large amounts of sediment, the waterways are back to normal after the earthquakes


Legend
Monitoring Sites
Mainstem
Tributary
Road
Styx River Catchment
Otukaikino River Catchment
Avon River Catchment
Heathcote River Catchment
Halswell River Catchment
Kilometers
Waterway Catchments & Monitoring Sites

Avon River/Ōtākaro
Water Quality Trends (2007 - 2013)

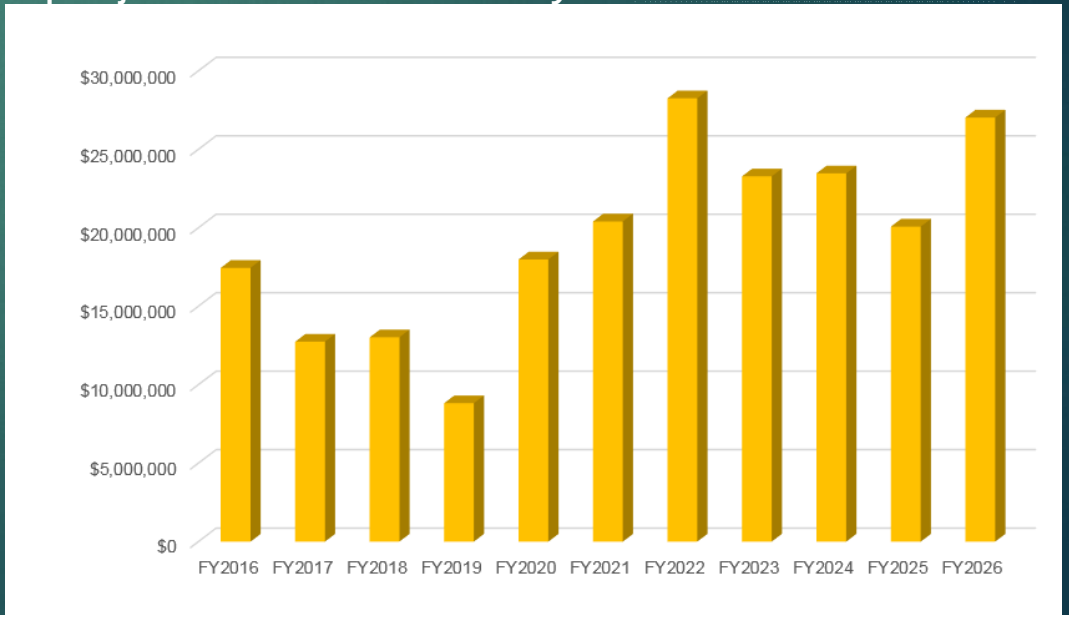


Heathcote River/Ōpāwaho
Water Quality Trends (2007 - 2013)



What is Council doing to improve waterways?

- Committed to improving the quality of our waterways, reflected in one of our healthy environment community outcomes:
  - *Water quality and quantity is protected.*
- Plan to spend over $212 million on projects in the next 10 years to improve water quality



What can you do to improve waterways?

- Only flush pee, poo and paper down the toilet. Wet wipes are not flushable, no matter what they say on the packaging. Flushing wet wipes and other items can cause blockages in the wastewater network, which can cause overflows.
- Do not put fat down the kitchen sink – put it in the green organics bin instead. Otherwise it congeals in the pipes and causes blockages and overflows.
- Don't feed the ducks. They are a major source of faecal contamination in our waterways.
- Choose roofing materials that don't contaminate our waterways – non-steel products or new condition powder coated steel are best. If you have a galvanised steel roof, make sure that it's painted, and that the paint is in good condition. Unpainted galvanised roofs are the biggest source of zinc in our waterways.
- Avoid copper spouting, downpipes and roofs. These are becoming a significant source of copper in our waterways.
- Next time your car needs new brakepads, ask for copper-free breakpads.
- If you're building a new house, make sure that there are good erosion and sediment control measures in place to stop sediment washing off your property into waterways.

Environment Canterbury Regional Council
Kaunihera Taiao ki Waitaha

Improving urban waterway health

Improving the water quality of Haytons and Paparua Streams and the Heathcote River in Southwest Christchurch

Information for businesses in the Haytons/Paparua catchment – June 2012

Everything is connected

Canterbury Water

Let's Clean the Stream!

Gutters and drains lead to rivers and streams

When rainwater falls onto hard, sealed surfaces like roofs, roads and driveways, it cannot soak into the ground. Instead, it runs off the surface. This runoff water is called stormwater. It flows via gutters and drains into a network of underground pipes and open waterways – our stormwater network. From here it flows, mostly untreated, into our streams and rivers, and eventually to the sea. On its journey, stormwater picks up harmful products, like oil from vehicles, cigarette butts, dog poo and general rubbish which then ends up in our streams and rivers.

Things you can do to make our rivers cleaner!

- If you do some DIY painting, wash your paint brushes in the laundry tub so the wash water doesn't go through stormwater drains into our waterways.
- Wash your car on the grass. The grass acts as a natural filter, trapping the pollutants.
- Pick up your dog poo and dispose of it properly.
- Don't drop cigarette butts and other rubbish into drains and gutters.
- When doing improvements around your home, consider things like permeable paving, rain gardens or rain tanks to reduce stormwater run-off from your property.

Call the Pollution Hotline if you see someone polluting stormwater near you on 0800 76 55 88.

Six values of waterways

- Recreation
- Cultural
- Heritage
- Ecology
- Landscape
- Drainage

- What do you value about the waterways where overflows occur?

What is Council planning to do to reduce overflows?

- Optimisation project underway to identify the suite of projects that give the best bang for buck in reducing overflows
  - Comparing costs for containing wastewater for 6 month, 1 year and 3 year Annual Recurrence Interval storms
  - Capital costs, operating and maintenance costs, and 50 year life cycle costs
  - Based on 2068 medium population projections
- This work will be essential to support the overflow consent application

Why do wet weather overflows occur?

- Stormwater and groundwater gets into the wastewater network through cracked pipes, flooded manholes and gully traps, and cross-connections (e.g. downpipe accidentally connected to wastewater)
- This can cause the capacity of the wastewater network to be overwhelmed in a large storm
- Constructed overflow points are safety valves in the wastewater network, to prevent overflows on properties and on the street
- Wet weather overflows - less frequent but larger volume and much more dilute than dry weather overflows
  - Generally occur from larger pipes at designed overflow points
  - Can predict occurrence through modelling
  - A foreseen event in a large rain event - therefore require consent
- For 3 year Annual Recurrence Interval storm:
  - 125 manholes overflow, total volume lost is 42,000 m^3
  - 22 constructed overflows operate, total volume lost is 36,000 m^3

Why do dry weather overflows occur?

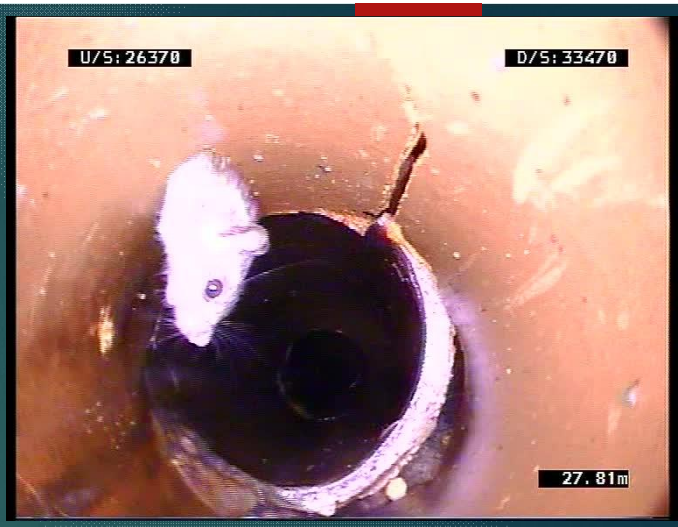
- Dry weather overflows are due to:
  - Blockage due to fat, oil, grease, wet wipes
  - Blockage due to tree roots
  - Blockage at broken pipes that collapse
  - Blockage caused by dips in grade that accumulate solids
  - Contractors mismanaging work on the wastewater network

- Dry weather overflows:
  - More frequent than wet weather overflows but smaller in volume (1 to 10m^3)
  - Typically occur in small pipes
  - Drive the maintenance effort (repairs, CCTV, root spraying, renewals)
  - Occur at low flow times in rivers – higher concentration of contaminants

Why do we have wastewater overflow points?

- The main purpose of a wastewater network is to protect public health, but it is impossible to design a wastewater network that contains all of the wastewater all of the time
- Overflow points ensure the least public contact with raw sewage in any situation
- In order of priority, we aim to keep raw sewage:
  - Off private property
  - Off public roads
  - Out of waterways (and therefore in the pipes)
- Overflow points are used in an emergency caused by:
  - Power loss
  - Pump failure
  - Inadequate capacity of wastewater network
  - Natural disaster

Overview



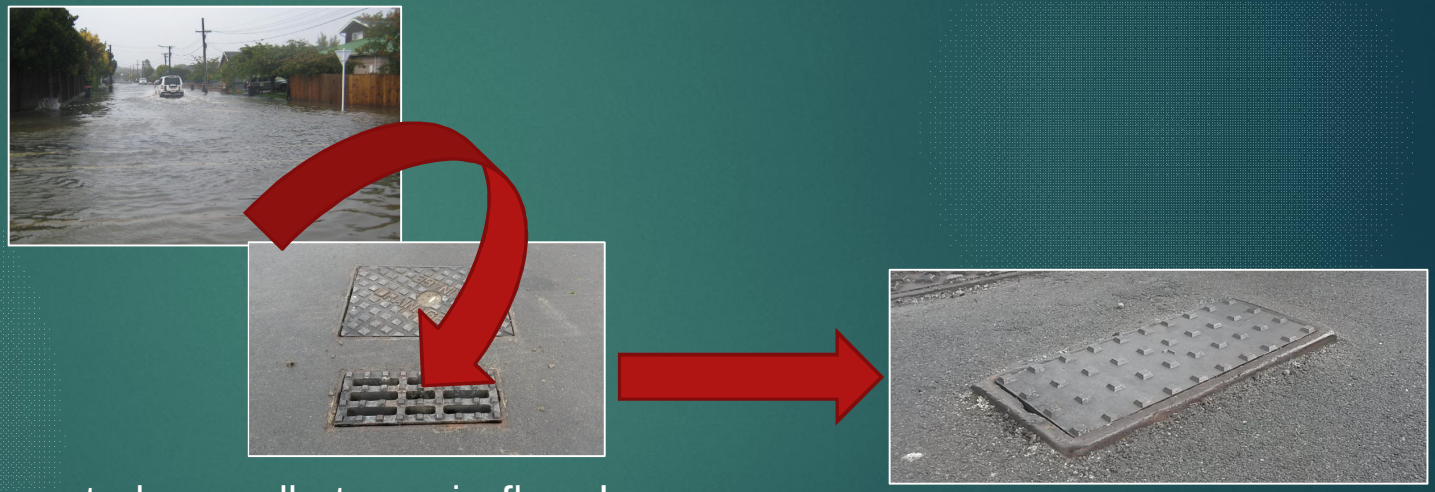
- A few myths and facts
- Current water quality compared to pre-earthquakes
- Why do we have wastewater overflow points designed into network?
- Why do overflows occur?
  - Dry weather overflows
  - Wet weather overflows
- What is the current state of the wastewater network?
- What is the impact of overflows?
- What is Council doing to reduce overflow frequency and volume?
  - Currently
  - Medium - long term
- New consent for wet weather overflows

Myths and Facts

- Christchurch now has a 21st Century wastewater network following the earthquakes – that is Myth 1.
- Our forefathers built the city on a swamp – that is Fact 1
- Christchurch is the only city on earth that has wet weather overflows – that is Myth 2.
- Eliminating ALL overflows is simply not affordable (now) – this is Fact 2.
- Wastewater discharges are the sole reason for degraded water quality in our rivers – this is Myth 3
- We all want to improve the water quality in our rivers – Fact 3.

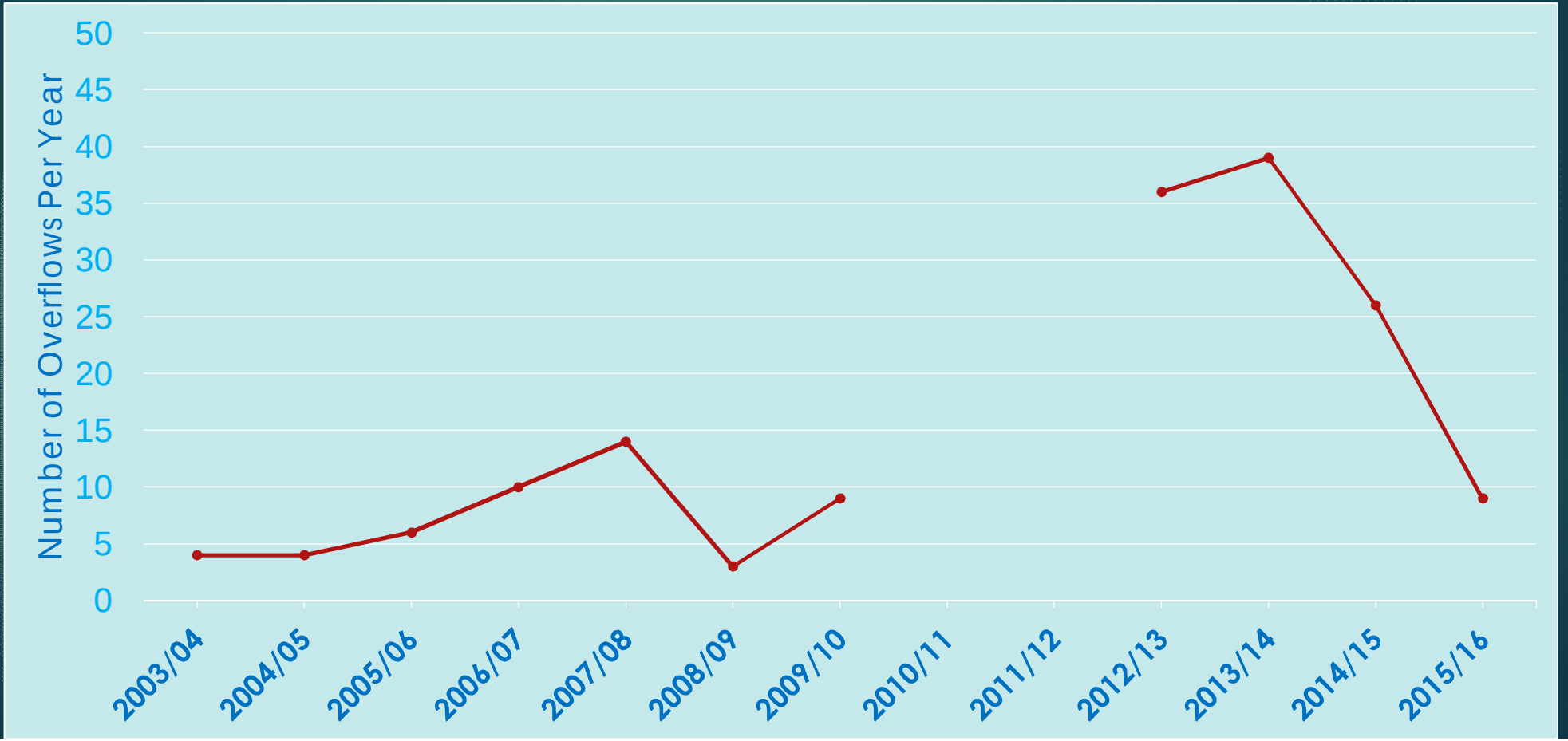
What is Council doing now to reduce overflow frequency and volume?

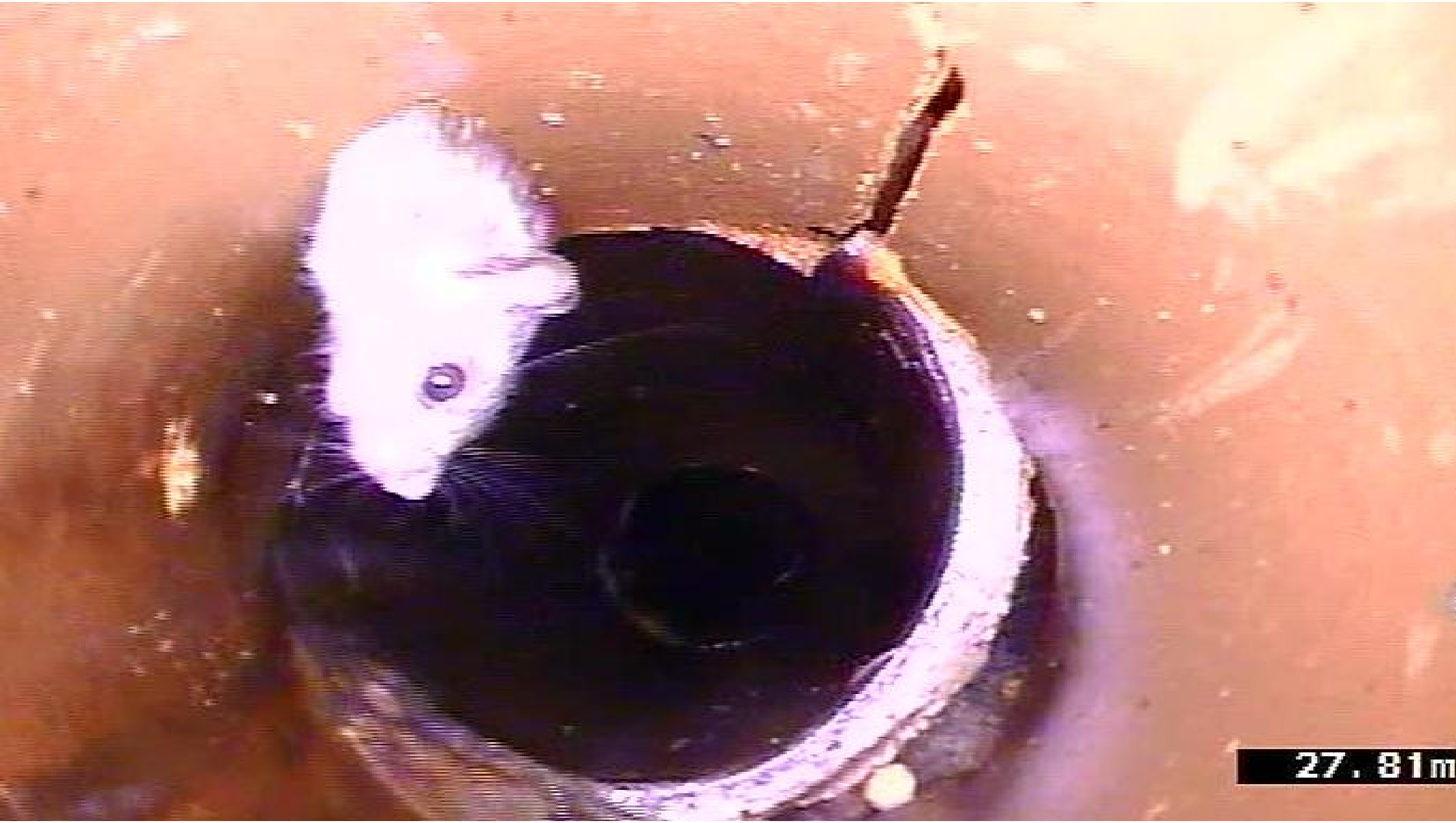
- Backflow prevention – non return valves installed on all overflows to stop river water entering the wastewater network
- Sealing manhole vents



- Sealing private property low gully traps in flood prone areas
- Monitoring approximately 20 overflow sites
- Increasing maintenance effort, root cutting, pole cam, blokaid .

Number of Dry Weather Overflows Per Year




27.81m

What impact from dry weather overflows

- Culturally UNACCEPTABLE
- Short term localised impact on bacteriological quality of the river
- Sometimes some “unsightly debris” needs to be removed
- Generally small volumes so high level of dilution
- No lasting environmental impacts
- Rivers well flushed in one day

What is the impact of wet weather overflows?

- Culturally UNACCEPTABLE
- Small localised impact on bacteriological quality of the river
- Sometimes some “unsightly debris” needs to be removed
- Larger overflow volumes but usually high river flows with low water quality due to stormwater
- Ongoing monitoring has found no lasting ecological impacts
- Rivers well flushed in less than one day

- The ACTUAL ecological impacts are immeasurable (already impacted)
- The ACTUAL bacteriological impacts are small and short lived

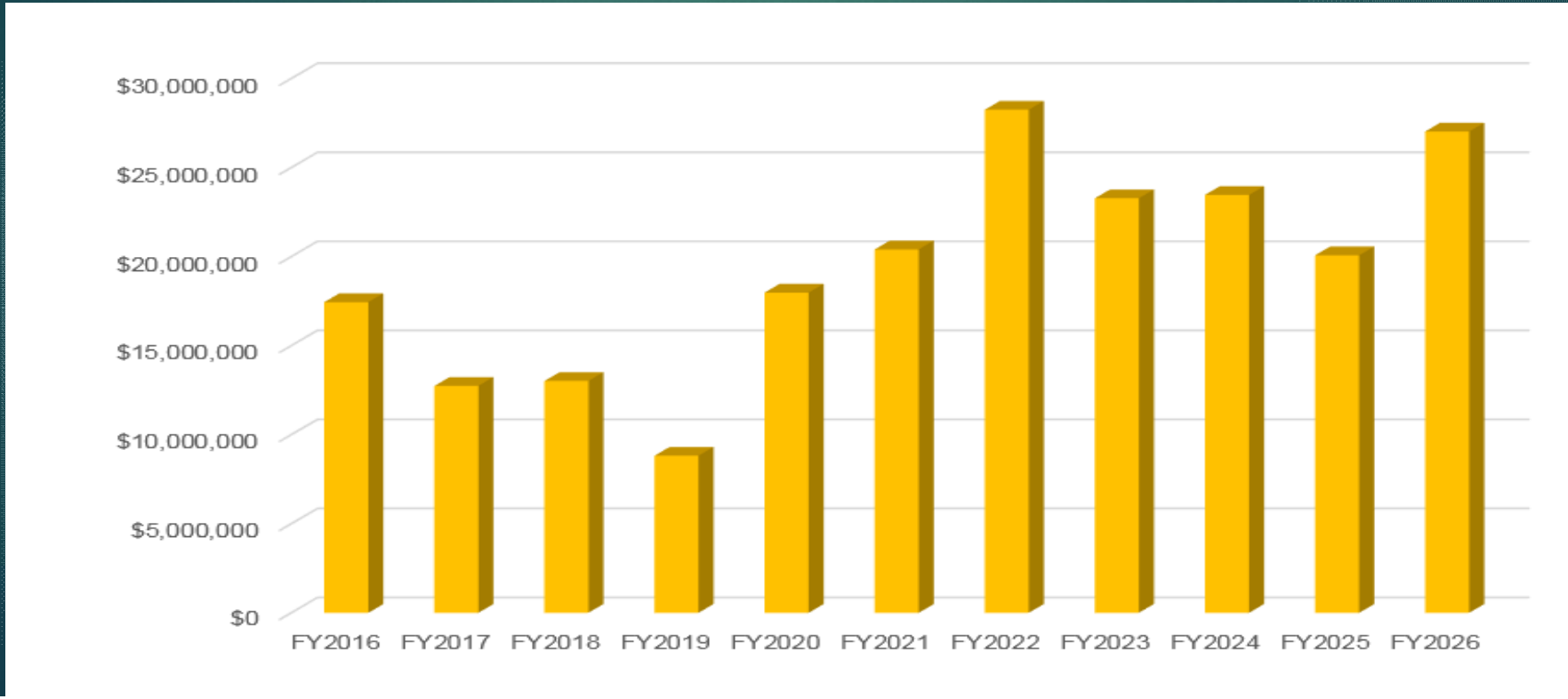
- The cultural and public perception impacts are significant.

Optimisation Project

- Alternatives to pipe upgrades considered:
  - Storage facilities
  - Pump station upgrades
  - Diverting flow to catchments with capacity
  - Reducing inflow and infiltration
- Cloud computing to run hundreds of thousands of combinations of upgrades to find the most cost effective suite of upgrades – savings of 20-30% typically achieved

What is Council planning to do to improve river water quality?

CCC plan to spend over $212M on projects over the next ten years to improve water quality and the six values of Recreation, Cultural, Heritage, Ecology, Landscape and Drainage

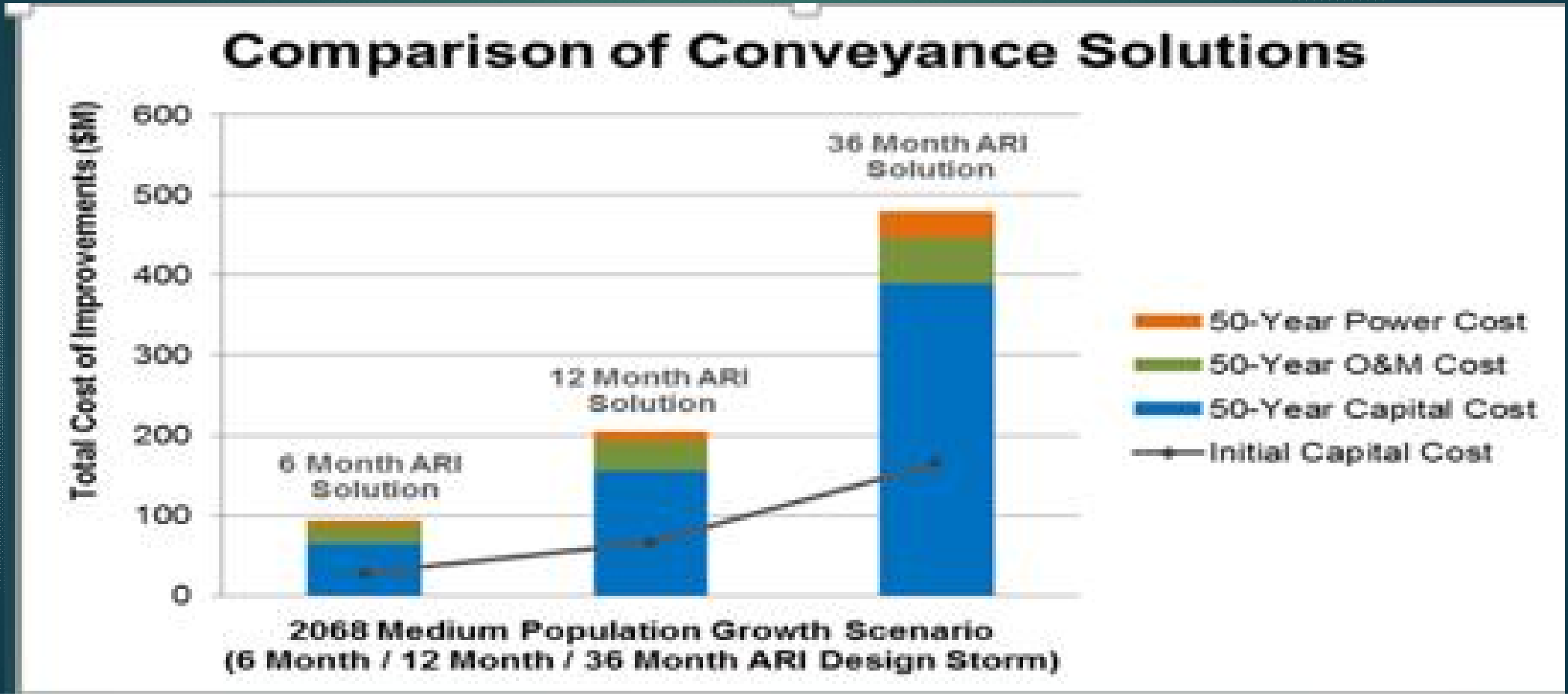


New Consent for Wet Weather Overflows

- Currently have a "Consent Compliance Strategy" as agreed with Ecan:
  - Expires in March 2017
  - New consent application required at that time, if current consent cannot be complied with
  - Current international trend is to seek an "effects" based consent, rather than containing overflows for a particular design storm

- *Elimination* of wet weather overflows *NOT* affordable (right now)
- Overflows necessary for public health function of wastewater network
- Improvements are possible

Results of Phase 1 of Optimisation Project – Pipe Upgrades Only



Return on Investment

(Cost Vs Overflow Volume Reduction)

New Consent for Wet Weather Overflows

- Draft Land and Water Plan aims to contain all wastewater during a 2 year Annual Recurrence Interval storm
- However, this does not take account of the effects of wastewater overflows on the receiving environment

- New consent application will take an effects based approach, consistent with the Resource Management Act:
  - Identify the values of the receiving environment (e.g. aesthetic, recreational, mahinga kai, ecological)
  - Propose measures to mitigate effects, depending on the values identified

- Other measures may include:
  - More stormwater treatment, as stormwater has the biggest impact on the rivers
  - First flush of stormwater to the wastewater network, to keep most of the contaminants out of the rivers
  - Treatment of wastewater overflows (e.g. screening, high rate treatment, wetlands)
  - Wastewater peak flow storage

Next Steps

- Further discussion to come with specific interests groups
  - Do you have a view on how these should be run?
  - We are going to suggest groups as follows
    - Recreational river users, rowers, paddlers, walkers etc
    - Statutory bodies, Ecan CDHB – MOH, DOC
    - Harbour Communities – Akaroa and Lyttelton

What are the important issues in your view - group discussion and feed back 10 minutes.

Any Questions?