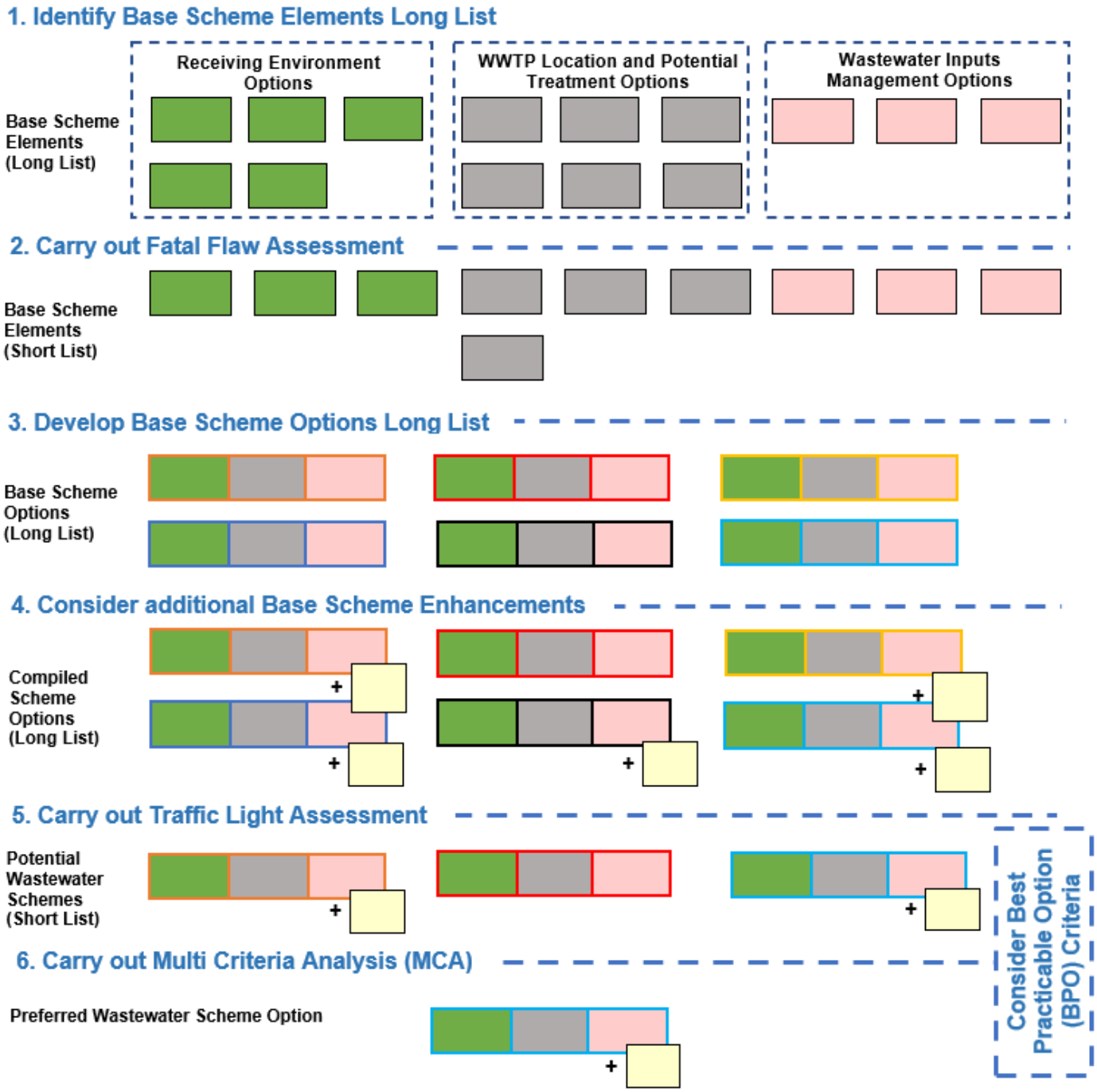
Hokitika Wastewater Upgrade Project

Base Scheme Elements - Short List (following Fatal Flaw Assessment)

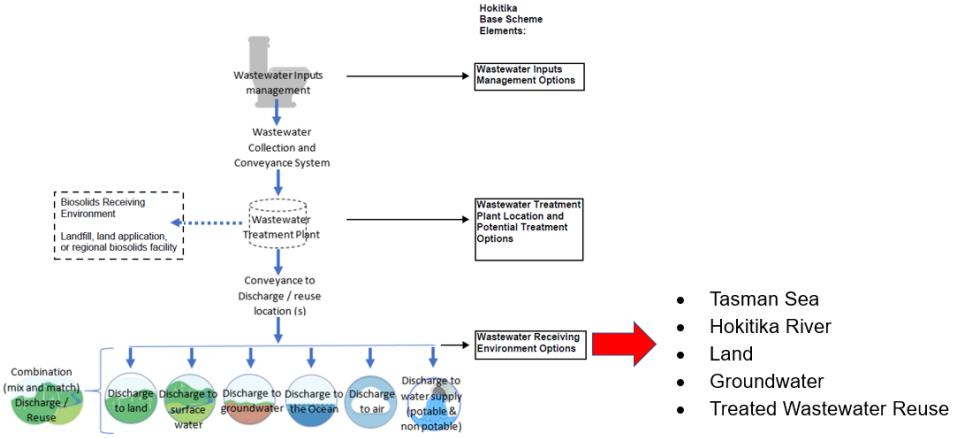
Record of: Project Working Group Fatal Flaw Assessment workshop – 18 May 2022.

Assessment Overview Diagram (as presented at Oversight Subcommittee mtg April 2022):



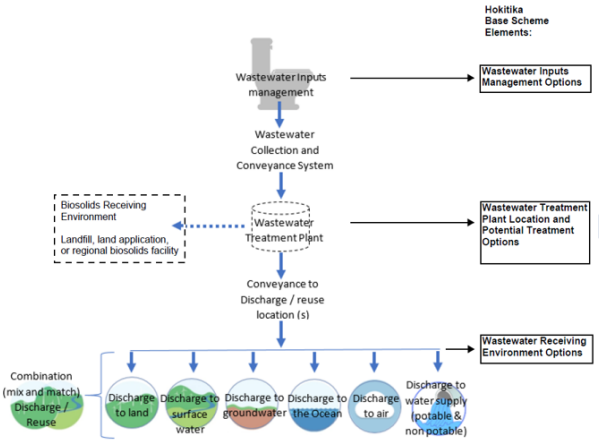
Overview Diagrams: (as presented at Oversight Subcommittee mtg April 2022):

1. Receiving Environment Options



- Tasman Sea
- Hokitika River
- Land
- Groundwater
- Treated Wastewater Reuse

2. Wastewater Treatment Plant Location and Potential Treatment Options

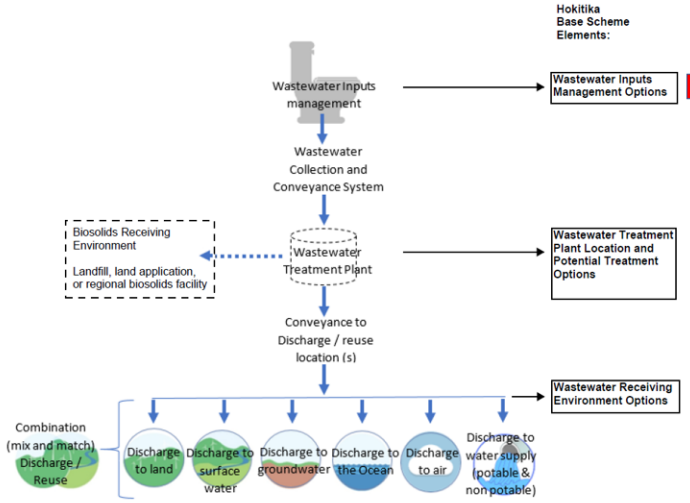


- Existing WWTP Location
- West of Airport
- Airport
- East of Airport
- Blue Spur Area
- Transfer Station
- South side of Hokitika River

Treatment options

- Ponds / Lagoons
- Biological Trickling Filter (BTF)
- Conventional activated sludge
- Other options

3. Wastewater Inputs Management Options



Wastewater inputs management

Industrial (SFF)

- Status Quo
- Enhanced Pre-Treatment
- Diversion to Combined Ocean Outfall
- Diversion to Separate Ocean Outfall

Community:

- Water meters/ user pays
- Subsidising water efficient measures e.g., water efficient shower heads
- Infiltration and Inflow reduction programmes
- Pressure control/reduction in the reticulated water supply
- Low pressure wastewater collection schemes

1. Receiving Environment Options

Receiving Environment Options

Receiving Environment		Option Description	Secondary Receiving Environment	Fatal Flaw / Reason Why
Ocean (Tasman Sea)				
O1	**Existing Outfall**	Keep and use the existing outfall. As is.	N/A	3 – significant natural hazards. 4 – public health risk. 9 – not acceptable. 10 – effect on environment.
O2	**Extend existing Outfall**	Keep and use the existing outfall, with upgrade to extend further and increase the resilience of the structure.	N/A	3 - significant natural hazards. 9 – not acceptable. 10 – effect on environment.
O3	**Westland Milk Products Ocean Outfall**	Connect to Westland Milk Products' (WMP) new ocean outfall which extends 800m out to sea. Was completed in mid-2021, with provision for WDC to use the pipeline if needed as part of any future upgrade to WDC's WWTP.	N/A	
O4	**New WDC Ocean Outfall**	Construct a new sub-surface ocean outfall, like has been constructed by WMP.	N/A	
O5	**Coastal Rapid Infiltration Basins**	Rapid Infiltration Basins (RIBs), like those constructed at the Franz Josef WWTP, but constructed in the coastal zone. This provides a diffuse passage to the marine environment. RIBs operate on a rotational basis, providing rest and recovery of basins between doses.	N/A	3 - significant natural hazards.
O6	**Coastal Infiltration Wetland**	An unlined infiltration wetland, constructed in the coastal zone. Similar to O5, but within a continually used area (no rotation).	N/A	3 - significant natural hazards.
River				
R1	**Hokitika River**	**A. River Outfall** Construct an outfall to the river. Options include either a simple pipe discharge, or a diffuser style to provide optimal mixing and dilution. [WMPs treated wastewater discharge was to a river outfall prior to moving to their new ocean outfall.]	None L1 L2 L3 L4	9 – not acceptable.

Receiving Environment		Option Description	Secondary Receiving Environment	Fatal Flaw / Reason Why
			L5	
			L6	
		B. Rapid Infiltration Basins Rapid Infiltration Basins (RIBs), like those constructed at the Franz Josef WWTP, constructed near to or beside the river. This provides a diffuse passage to the river environment. RIBs operate on a rotational basis, providing rest and recovery of basins between doses.	None	
			L1	
			L2	
			L3	
			L4	
			L5	
			L6	
		C. Infiltration Wetland Infiltration wetland constructed adjacent to the river – diffuse discharge into river via groundwater.	None	
			L1	
			L2	
			L3	
			L4	
			L5	
			L6	
R2	**Arahura River**	**A. River Outfall** Construct an outfall to the river. Options include either a simple pipe discharge, or a diffuser style to provide optimal mixing and dilution.[	None	
			L1	
			L2	
			L3	
			L4	
			L5	9 – not acceptable.
			L6	
		B. Rapid Infiltration Basins Rapid Infiltration Basins (RIBs), like those constructed at the Franz Josef WWTP, constructed near to or beside the river.	None	
			L1	
			L2	
			L3	

Receiving Environment		Option Description	Secondary Receiving Environment	Fatal Flaw / Reason Why
		This provides a diffuse passage to the river environment. RIBs operate on a rotational basis, providing rest and recovery of basins between doses.	L4	
			L5	
			L6	
		C. Infiltration Wetland Infiltration wetland constructed adjacent to the river – diffuse discharge into river via groundwater.	None	
			L1	
			L2	
			L3	
			L4	
			L5	
			L6	
Land				
L1	**West of Airport**	**A. Slow rate irrigation** (e.g., spray irrigation, or dripline either surface or sub-surface): Discharge to land, in the general area between the airport and the ocean. A large land area (approximately 100ha–200ha not including a buffer zone, depending on soil types, soil water matrix and slope etc) and wet weather storage pond are anticipated as being needed, dependant on allowable application rate. Secondary receiving environment likely to be required (i.e., ocean or river) as land likely to be unable to accept flows for long periods during wet weather / winter.	None	6 – insufficient land area.
			O1	Refer earlier.
			O2	Refer earlier.
			O3	6 – insufficient land area.
			O4	6 – insufficient land area.
			O5	Refer earlier.
			O6	Refer earlier.
			R1	6 – insufficient land area.
			R2	Refer earlier.
		B. Rapid Infiltration Basins / Infiltration Trenches: A smaller land area is required, but this method requires freely draining soils, and reasonable depth to water table.	None	
L2	**Airport**	**A. Slow rate irrigation**: As for L1, but within the general airport land area.	None	6 – no provision for times when land not suitable.
			O1	Refer earlier.
			O2	Refer earlier.

Receiving Environment		Option Description	Secondary Receiving Environment	Fatal Flaw / Reason Why
			O3	6 – not acceptable at airport land.
			O4	6 – not acceptable at airport land.
			O5	Refer earlier.
			O6	Refer earlier.
			R1	Refer earlier.
			R2	Refer earlier.
		B. Rapid Infiltration Basins / Infiltration Trenches: As for L1, but within the general airport land area. Open ponds may be an issue in this area, due to airport requirements relating to bird strike regulations and clear runout areas.	None	
L3	**East of Airport**	**A. Slow rate irrigation**: As for L1, but in the general area to the east of the airport.	None	6 – no provision for times when land not suitable.
			O1	Refer earlier.
			O2	Refer earlier.
			O3	
			O4	
			O5	Refer earlier.
			O6	Refer earlier.
			R1	Refer earlier.
			R2	Refer earlier.
		B. Rapid Infiltration Basins / Infiltration Trenches: As for L1, but in the general area to the east of the airport.	None	
L4	**Blue Spur Area**	**A. Slow rate irrigation**: As for L1, but in the general hilly forestry area to the east of Hokitika.	None	6 – no provision for times when land not suitable.
			O1	Refer earlier.
			O2	Refer earlier.
			O3	
			O4	

Receiving Environment		Option Description	Secondary Receiving Environment	Fatal Flaw / Reason Why
			O5	Refer earlier.
			O6	Refer earlier.
			R1	Refer earlier.
			R2	Refer earlier.
		B. Rapid Infiltration Basins / Infiltration Trenches: As for L1, but within the Blue Spur area.	None	
L5	**Kaniere**	**A. Slow rate irrigation**: As for L1, but in the general undulating, previously mined, forestry area to the southeast of Hokitika. This area is typically old mine tailings (gravels).	None	6 – no provision for times when land not suitable.
			O1	Refer earlier.
			O2	Refer earlier.
			O3	
			O4	
			O5	Refer earlier.
			O6	Refer earlier.
			R1	Refer earlier.
			R2	Refer earlier.
		B. Rapid Infiltration Basins / Infiltration Trenches: As for L1, but within the Kaniere area.	None	
L6	**Southside / Adair Road**	**A. Slow rate irrigation**: As for L1, but in the general undulating, previously mined or pasture area on the south side of the Hokitika River.	None	6 – no provision for times when land not suitable.
			O1	Refer earlier.
			O2	Refer earlier.
			O3	
			O4	
			O5	Refer earlier.
			O6	Refer earlier.
			R1	Refer earlier.
			R2	Refer earlier.

Receiving Environment		Option Description	Secondary Receiving Environment	Fatal Flaw / Reason Why
		B. Rapid Infiltration Basins / Infiltration Trenches: As for L1, but in the Southside / Adair Road area.	None	
Groundwater				
G1	**Managed Aquifer Recharge**	Process of supplementing a water aquifer, in this situation with highly treated wastewater. Could suit a water sensitive dry area.	N/A	6 – no driver for this. 8 – unproven.
G2	**Bore Injection**	Disposal of the treated wastewater via injection into a bore.	N/A	8 – unproven.
Water Reuse				
W1	**Potable Recycled Water Scheme**	For domestic community use - drinking.	None	5 – regulatory barriers. 6 – no driver for this. 8 – not easily operated on the West Coast (high complexity). 9 – not acceptable.
			O1	
			O2	
			O3	
			O4	
			O5	
			O6	
			R1	
			R2	
			L1	
			L2	
			L3	
			L4	
			L5	
			L6	
W2	**Non-Potable Recycled Water Scheme**	For domestic community use – toilets, gardens etc.	None	4 – cross-connection risk, and risk of people entering sprinkler zones. 6 – no driver for this.
			O1	
			O2	
			O3	

Receiving Environment		Option Description	Secondary Receiving Environment	Fatal Flaw / Reason Why
			O4	
			O5	
			O6	
			R1	
			R2	
			L1	
			L2	
			L3	
			L4	
			L5	
			L6	
W3	**Periodic Non-Potable Recycled Water Reuse**	For irrigation of parks, reserves, golf courses, industrial reuse, and agriculture. Typically used on demand when beneficial.	None	6 – no driver for this.
			O1	
			O2	
			O3	
			O4	
			O5	
			O6	
			R1	
			R2	
			L1	
			L2	
			L3	
			L4	
			L5	
			L6	

2. Wastewater Treatment Plant Location and Potential Treatment Options

Potential Treatment Options (main treatment options)

A.	Ponds/Lagoons (e.g. Hokitika)
B.	Biological Trickling Filter (e.g. Greymouth)
C.	Conventional Secondary Treatment Process (e.g. Westport)
D.	Membrane Bioreactor (e.g. Pukehohe, Rotorua)
E.	Scheme Enhancements Related to Receiving Environment

Wastewater Treatment Plant Location Options (and Potential Treatment Options)

Location Option		Potential Treatment Option	Fatal Flaw / Reason Why
TP1	**Existing WWTP Location**	**A. Ponds/Lagoons** (e.g. Hokitika)	3 - significant natural hazards.
		B. Biological Trickling Filter (e.g. Greymouth)	
		C. Conventional Secondary Treatment Process (e.g. Westport)	
		D. Membrane Bioreactor (e.g. Pukehohe, Rotorua)	
		E. Scheme Enhancements Related to Receiving Environment	
TP2	**West of Airport**	**A. Ponds/Lagoons** (e.g. Hokitika)	6 – insufficient land area and/or incompatible land use activity (open water near airport).
		B. Biological Trickling Filter (e.g. Greymouth)	
		C. Conventional Secondary Treatment Process (e.g. Westport)	
		D. Membrane Bioreactor (e.g. Pukehohe, Rotorua)	
		E. Scheme Enhancements Related to Receiving Environment	
TP3	**Airport**	**A. Ponds/Lagoons** (e.g. Hokitika)	6 – incompatible land use activity (open water near airport).
		B. Biological Trickling Filter (e.g. Greymouth)	

Location Option		Potential Treatment Option	Fatal Flaw / Reason Why
		C. Conventional Secondary Treatment Process (e.g. Westport)	
		D. Membrane Bioreactor (e.g. Pukehohe, Rotorua)	
		E. Scheme Enhancements Related to Receiving Environment	
TP4	**East of Airport**	**A. Ponds/Lagoons** (e.g. Hokitika)	
		B. Biological Trickling Filter (e.g. Greymouth)	
		C. Conventional Secondary Treatment Process (e.g. Westport)	
		D. Membrane Bioreactor (e.g. Pukehohe, Rotorua)	
		E. Scheme Enhancements Related to Receiving Environment	
TP5	**Blue Spur Area**	**A. Ponds/Lagoons** (e.g. Hokitika)	
		B. Biological Trickling Filter (e.g. Greymouth)	
		C. Conventional Secondary Treatment Process (e.g. Westport)	
		D. Membrane Bioreactor (e.g. Pukehohe, Rotorua)	
		E. Scheme Enhancements Related to Receiving Environment	
TP6	**Transfer Station**	**A. Ponds/Lagoons** (e.g. Hokitika)	6 – insufficient land area.
		B. Biological Trickling Filter (e.g. Greymouth)	6 – constructability.
		C. Conventional Secondary Treatment Process (e.g. Westport)	
		D. Membrane Bioreactor (e.g. Pukehohe, Rotorua)	
		E. Scheme Enhancements Related to Receiving Environment	
TP7	**South side of Hokitika River**	**A. Ponds/Lagoons** (e.g. Hokitika)	
		B. Biological Trickling Filter (e.g. Greymouth)	
		C. Conventional Secondary Treatment Process (e.g. Westport)	

Location Option		Potential Treatment Option	Fatal Flaw / Reason Why
		D. Membrane Bioreactor (e.g. Pukehohe, Rotorua)	
		E. Scheme Enhancements Related to Receiving Environment	

3. Wastewater Inputs Management Options

Wastewater Inputs Management Options

Option		Description	Fatal Flaw / Reason Why
Silver Fern Farms (SFF) Inputs:			
SFF1	**<u>All</u> to Council WWTP - Status Quo**	**All SFF wastewater**: • Sent to the new Council WWTP. • Current level of on-site pre-treatment by SFF.	
SFF2	**<u>All</u> to Council WWTP - Enhanced Pre-Treatment**	**All SFF wastewater**: • Sent to the new Council WWTP. • Enhanced level of on-site pre-treatment by SFF.	
SFF3	**<u>Human wastewater and some process wastewater</u> to Council WWTP** ***Remainder of SFF process wastewater treated by SFF.*** ***SFF discharge options:*** • *Combined with WDC* • *Separate to WDC*	**SFF Human wastewater** (toilets and staff amenities): • Sent to the new Council WWTP. **SFF Process wastewater**: • <u>Some</u> (spilt approach for different waste streams) sent to the the new Council WWTP (with appropriate level of on-site pre-treatment by SFF). • Remainder is treated by SFF.	
		Discharge options (for the SFF treated wastewater): **A.** Combined with Council WWTP outflow into a **combined discharge.** **B.** To SFF **own separate discharge**.	
SFF4	**<u>Human wastewater</u> to Council WWTP** ***Process wastewater treated by SFF.*** ***SFF discharge options:*** • *Combined with WDC* • *Separate to WDC*	**SFF Human wastewater** (toilets and staff amenities): • Sent to the new Council WWTP. **SFF Process wastewater**: • All is treated by SFF.	
		Discharge options (for the SFF treated wastewater): **A.** Combined with Council WWTP outflow into a **combined discharge.** **B.** To SFF **own separate discharge**.	

Option		Description	Fatal Flaw / Reason Why
Wastewater Network Inputs:			
NI1	**Trade Waste Bylaw**	Bylaw and management thereof.	
NI2	**Wastewater Bylaw**		
NI3	**Septage (septic tank waste)**	Dedicated septage receival station. Location options: **A. Existing WWTP location** **B. New WWTP location** **C. Other location**	
NI4	**Stock Truck Effluent**	Dedicated receival station. Location options: **A. Existing location** **B. New location**	
NI5	**Campervan Waste**	Dedicated receival station. Location options: **A. Existing location** **B. New location**	
NI6	**Water Demand Management Methods – resulting in Reduction in Wastwewater Production**	**A. Water Meters**	
		B. Water Efficient Devices Examples include: low flush toilets, efficient appliances.	
		C. Pressure Management in Water Supply Network To reduce pressure at properties, resulting in less water use, hence less wastewater production.	
NI7	**Infiltration and Inflow Reduction**	Reducing groundwater and rainwater entering the wastewater network.	
NI8	**Low Pressure / Grinder Pump Wastewater Collection**	Pressure network (as opposed to gravity) resuting in significantly reduced wet weather flows into the wastewater network.	
NI9	**Domestic Food Waste Disposal Units**	These add contaminant load to the wastewater flow.	