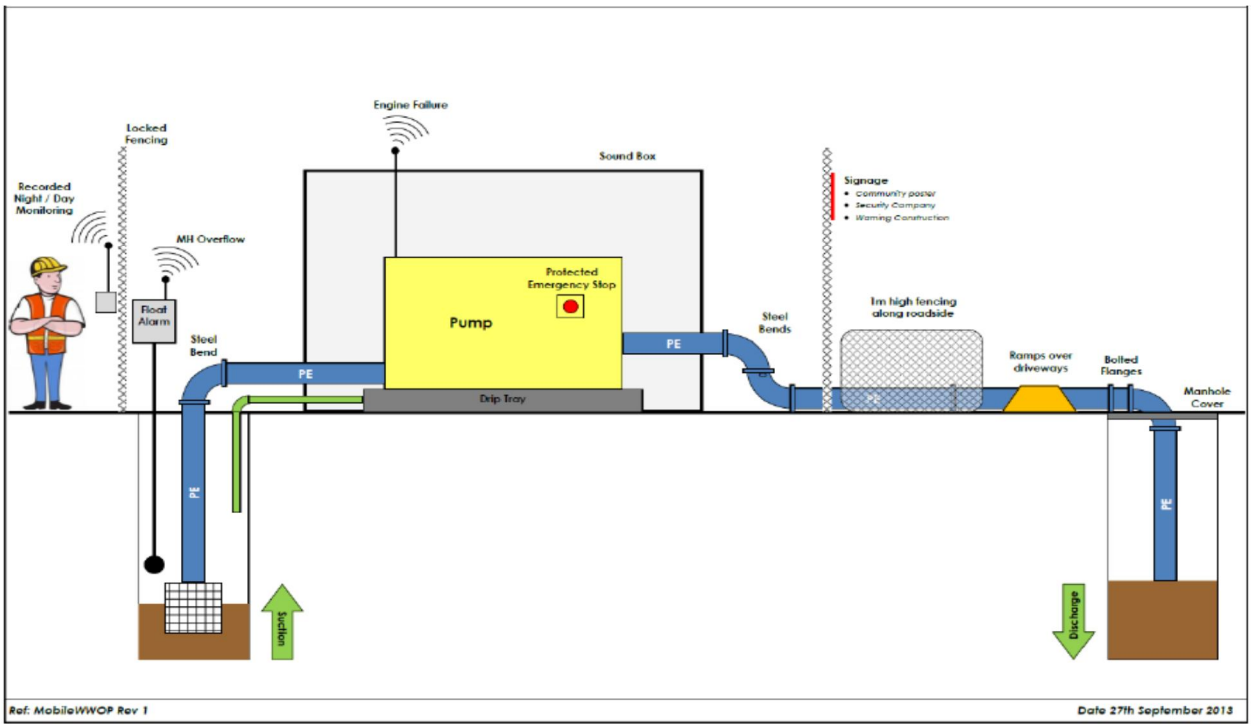
Christchurch City Council

BEST PRACTICE GUIDE:
WASTE WATER OVERPUMPING



Key Messages

Environment Canterbury requires the use of the 'Best Practicable Option' to minimise or prevent harm to the environment. This Guide should be considered the Best Practicable Option for Wastewater Overpumping (WWOP).

ELIMINATE: Plan your job to avoid WWOP

ISOLATE: Design and construct WWOP to avoid failure from wear and tear, traffic and vandalism

MINIMISE: Monitor all WWOP setups

RESPONSE: Know what to do in case of an overflow

Version	TRIM	Phase	Date	By
1	17/16420	Final	3 November 2016	SCIRT WWOP Best Practice Guide Version 4

Contents

1 Context

Overland wastewater overpumping with inadequate planning or risk assessment has resulted in several large wastewater overflows to streets and rivers.

The Natural Resources Regional Plan refers to the 'Best Practicable Option' meaning 'your best course of action' to prevent or minimise harm to the environment. In the case of Wastewater Overpumping, this Best Practice Guide sets the standard for the 'Best Practicable Option'.

2 Impacts of a Wastewater Overflow (WWOF)

The biggest risk from Wastewater Overpumping is an uncontrolled wastewater discharge to land or to stormwater resulting in a discharge to a watercourse. This can have negative effects on our workers, local residents, water users and the environment.

2.1 Health Impacts

- Construction workers can be exposed unnecessarily if wastewater overflows into the working trench or contaminates plant and material.
- Members of the public can be exposed unnecessarily if wastewater overflows onto the street or stormwater system.
- Recreational users of the watercourse or estuary e.g. kayakers, surfers or fishermen, can be exposed unnecessarily to wastewater.
- Businesses relying on the watercourse for work e.g. Antigua Boatsheds and Punting on the Avon, can have their businesses put at risk by wastewater overflows.

Picture 1: Wastewater ponded on street following an overflow

Picture 2: Wastewater sludge on a street following an overflow.

2.2 Environmental Impacts

Wastewater overflowing into a street can enter the stormwater system and contaminate waterways. Raw sewage in waterways will:

- increase microbiological activity and deplete oxygen availability for the ecosystem
- send contaminants (sediments, chemicals, detergents, etc) into the river.

Picture 3: Wastewater discharging to river through an overflow structure.

Picture 4: Polluted Water sign following an overflow to river.

2.3 Legislation and Risk for Business

Dry weather wastewater overflows to a watercourse are illegal under the Resource Management Act 1991 and are liable for enforcement action and prosecution.

The Proposed Land and Water Regional Plan Policy 4.9(a) and (e) requires that there are no direct discharges to surface water bodies of untreated sewage or wastewater.

In addition, the Environment Canterbury, Natural Environment Recovery Programme for Greater Christchurch 2013 states Project 8 as Act on Opportunities to Reduce Sewage Overflows and their Effects.

Potential business consequences of a wastewater overflow can be:

- Prosecution by Environment Canterbury (Canterbury Regional Council)
- Damage to image and reputation
- Delay in works
- Cost of clean-up and remediation.

Demonstration that this Best Practice Guide has been followed as the 'Best Practicable Option' will act as a defence in the case of a wastewater overflow.

Note: Certain controlled wastewater overflows may be authorised by Resource Consent CRC121092. However, this needs to be planned for and approval sought prior to overflow occurring. (https://ecan.govt.nz/data/consent-search/)

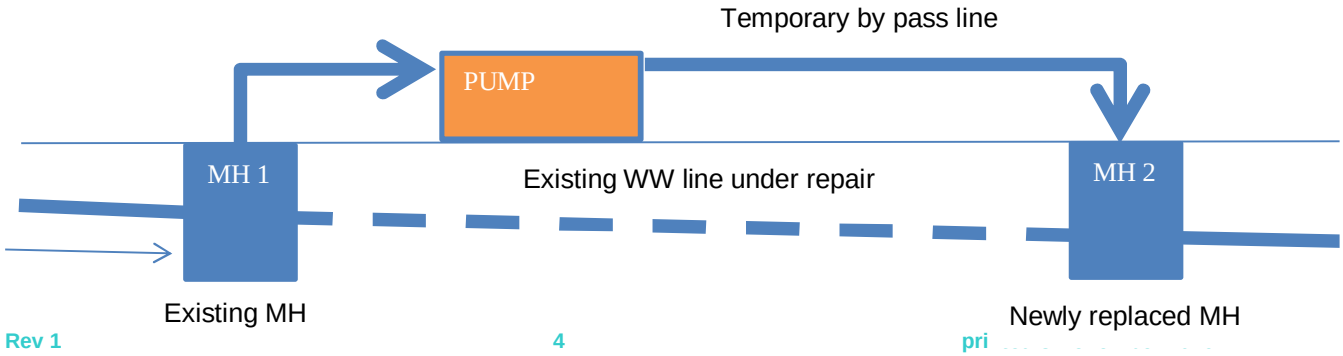
3 Wastewater Overpumping (WWOP) Scenarios

3.1 Working between two manholes (Mobile Wastewater Overpumping)

Mobile wastewater overpumping is used to maintain wastewater flows whilst working on a live wastewater line. This is typically done during works to replace damaged pipes between two manholes.

Mobile wastewater overpumping setups will move as work progresses. Depending on the catchment and flows these systems may pump wastewater from a few hours a day to 24 hours a day.

A typical setup is as follows:

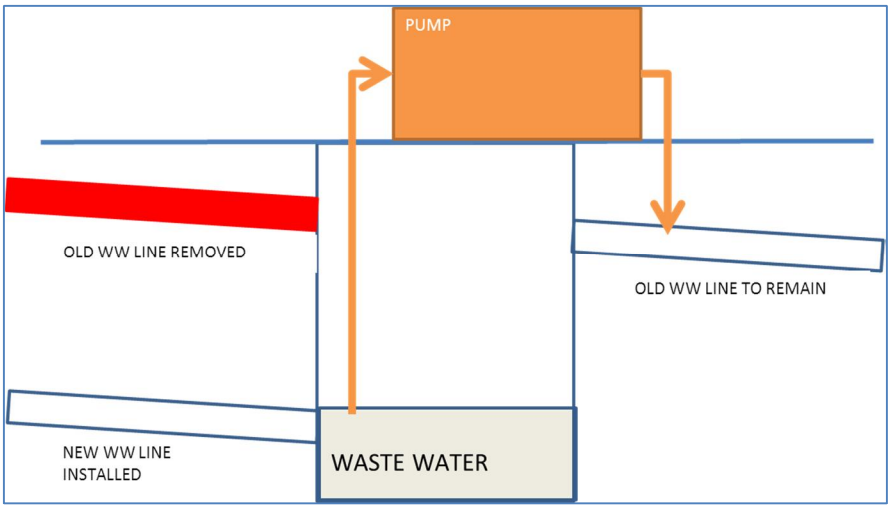


3.2 Temporarily lifting wastewater at a low point (Static Wastewater Overpumping)

Static wastewater overpumping is used when wastewater requires to be temporarily lifted from a low point on the catchment to a higher point. Typically this will be set up when awaiting the construction of a lift station or a pump station.

Static wastewater overpumping sites are often present for long periods of time (>3 months) and are usually required to run 24 hours a day.

A typical setup is as follows:



4 Project Planning and Wastewater Overpumping

The following general steps are to be taken when project planning and wastewater overpumping:

Step 1: ECI (Early Contractor Involvement) Planning:
Project planned to avoid overpumping .

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Step 2: Construction Planning :
Consider work methodology , avoid peak flows and use network storage capacity.

↓

Step 3: Risk Assessment :
Determine design , controls , budget and monitoring requirements .

↓

Step 4: CCC Permit to Work:
Submitted and approved by CCC (Appendix G)

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Step 5: Wastewater Overpumping Set -Up Information Sheet :
Includes : contingency plan , emergency contacts, discharge points to watercourse and diagram of set -up. (Appendix F)

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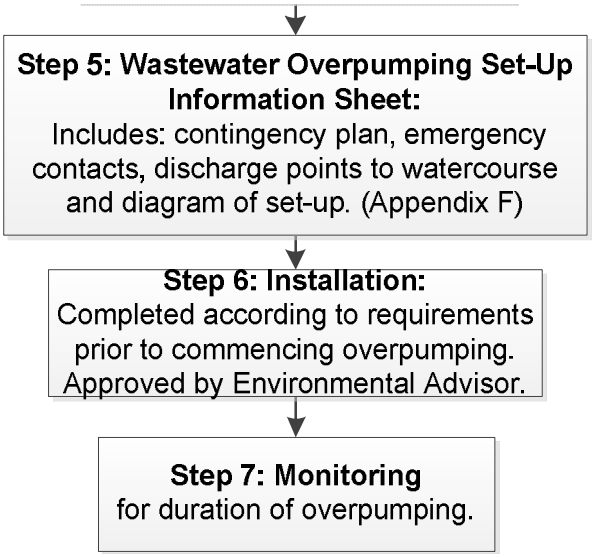
Step 6: Installation :



5 Step 1: ECI (Early Contractor Involvement) Planning

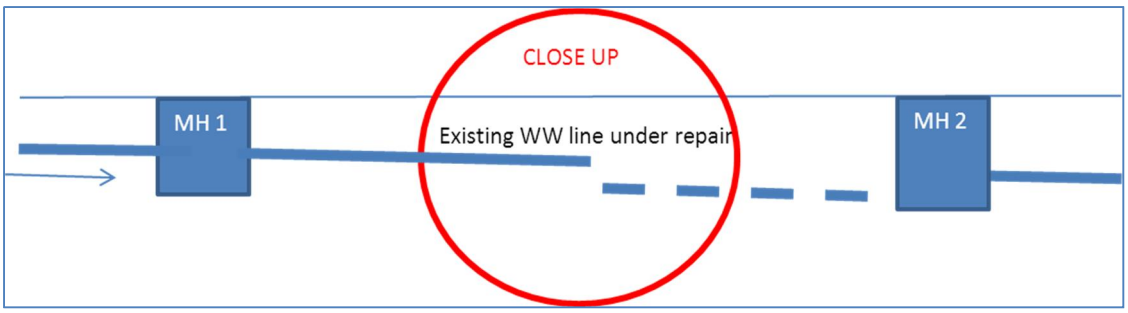
Planning and phasing of works can sometimes avoid wastewater overpumping.

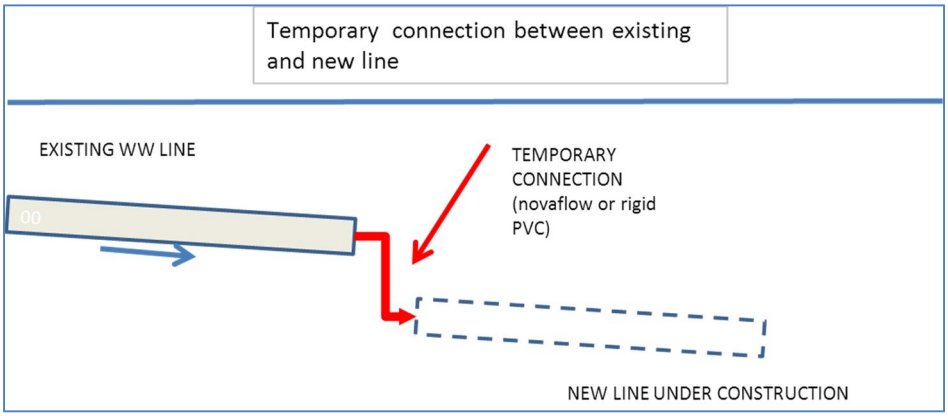
What	How	Advantage
Pump Stations and Lift Stations are built and operational in advance of the wastewater reticulation.	· Involvement in ECI (Early Contractor Involvement) to release Pump Station/ Lift Station design prior to reticulation design. · Phasing/planning of works.	**ELIMINATE.** Avoids static wastewater overpumping whilst the pump station or lift station is awaiting construction and/or commissioning.
Pressure Main is built in advance of the gravity network.	· ECI (Early Contractor Involvement) to release Pressure Main design before reticulation. · Commencing Pressure Main construction before the rest of the catchment.	**ELIMINATE.** Allows wastewater to be sent out of the catchment as work progresses and avoids static wastewater overpumping between two gravity lines.
Works are planned so wastewater always follows its existing flow direction.	· Works planning. · Works involving changing gradient of wastewater reticulation are left to the end.	**ISOLATE.** Facilitates temporary connections and may avoid static over pumping.
Using temporary manholes to reduce distance of wastewater overpumping.	· Additional new manhole is installed.	**MINIMISE.** Reduces length of pipe necessary for wastewater overpumping and subsequent cost and exposure to damage.
Divert wastewater flows to another catchment.	· Block the line at manhole, allowing flows to circulate to another catchment. **Note:** Monitor to ensure solids do not settle in pipe causing blockage and ensure catchment has capacity for additional flow.	**ELIMINATE / MINIMISE.** Avoids static and mobile wastewater overpumping.

6 Step 2: Construction Planning:

6.1 Example 1: New wastewater line is lower than the existing wastewater line

Option: Bung the line during the day and restore flow between manholes at night with a temporary connection. **(ELIMINATE)**





How:

- Use an inflatable bung to avoid entering manhole;
- Requires monitoring of flows/build up during the day;
- Requires temporary connection setup at the end of every day, using nova flow or rigid PVC connection;
- Requires notification to Council (Permit to work).

Advantages:

- Avoids 24/7 mobile wastewater overpumping.

Disadvantages:

- Not practical if lines exceed 225mm diameter or have high flows.

6.2 Example 2: New line is lower than the existing and either the upstream line is completed OR is well away from the low point in the main.

Options: Suitable option will be dependent on flows and catchment characteristics.

1. Wastewater overflows into the existing main by gravity **(ELIMINATE)**
2. Wastewater overpumping may not be required at night **(MINIMISE)**
3. Wastewater overpumping is required 24/7

How:

- Option 1: Assessment of flows, network capacity and levels of the new and existing lines to ensure wastewater will flow by gravity into the existing line and not surcharge elsewhere in the catchment or through an overflow to stormwater.
- Option 2: Low flows in catchment that can be stored in network overnight and pumped during the day only. Assessment of flows, network capacity and overflow structures to stormwater to ensure wastewater will not surcharge elsewhere in the catchment.
- Option 3: Due to high flows 24/7 overpumping is required.

Advantage:

- By making assessments and investigations into the catchment, 24/7 mobile wastewater overpumping can be eliminated or minimised.

Disadvantage:

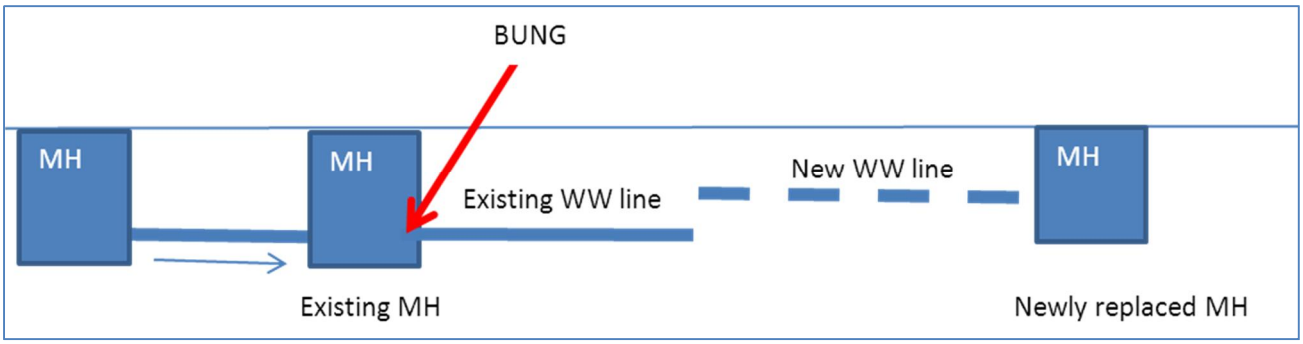
- Risk of solid build-up in line;
- Risk of sewage seeping through broken wastewater pipes.
- Risk of wastewater backing up property laterals.
- Option 1: May require a pump on site to deal with high flows during wet weather.
- Option 1 & 2: Will be dependent on the risk of wastewater surcharging through a low point or overflow structure in the catchment.

Warning: Rain events and peak flows in morning and evening need to be accounted for.

6.3 Example 3: New wastewater line is above the existing line.

Options:

1. Wastewater collects in upstream existing manhole and overflows into alternate line. **(ELIMINATE)**
2. Wastewater collects in upstream existing manhole and is cleared by sucker truck. **(ELIMINATE)**
3. Wastewater overpumping is required 24/7



How:

- Option 1: If flows are low bung can be placed in existing manhole and allow wastewater to back up into catchment and overflow into alternate line. Assessment of flows, network capacity and levels of existing lines to ensure wastewater will not surcharge elsewhere in the catchment or through an overflow to stormwater.
- Option 2: If flows are low bung can be placed in existing manhole and allow wastewater to back up into catchment and can be cleaned out when required with a sucker truck. Assessment of flows, network capacity and levels of existing lines to ensure wastewater will not surcharge elsewhere in the catchment or through an overflow to stormwater.
- Option 3: If flows are high and no alternate line to discharge into, mobile overpumping may be required.

Advantage:

- Options 1 & 2 will eliminate 24/7 mobile wastewater overpumping.

Disadvantage:

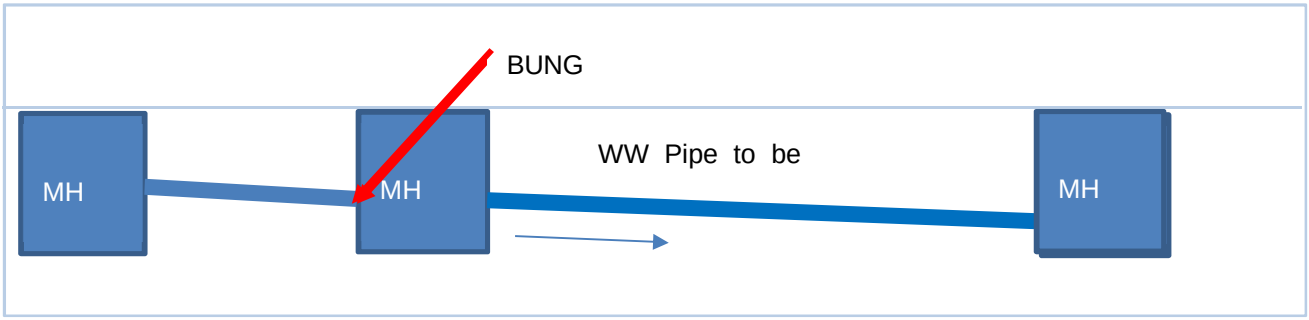
- Risk of solid build up in line;
- Risk of sewage seeping through broken wastewater pipes;
- Risk of wastewater backing up property laterals.

Warning: Rain events and peak flows in morning and evening need to be accounted for.

6.4 Example 4: Pipe Lining Works

Options:

1. Low volume lines: Bung **(ELIMINATE)**
2. High Volume Lines: wastewater overpumping during works (<1day) **(MINIMISE)**
3. High Volume Lines: Wastewater overpumping during works (>1day)



How:

- Option 1: If flows are low bung can be placed in existing manhole and allow wastewater to back up into catchment and overflow into alternate line. Assessment of flows, network capacity and levels of existing lines to ensure wastewater will not surcharge elsewhere in the catchment or through an overflow to stormwater.
- Option 2 & 3: If flows are high and no alternate line to discharge into, mobile overpumping may be required.

Advantage:

- Option 1 will eliminate mobile wastewater overpumping.

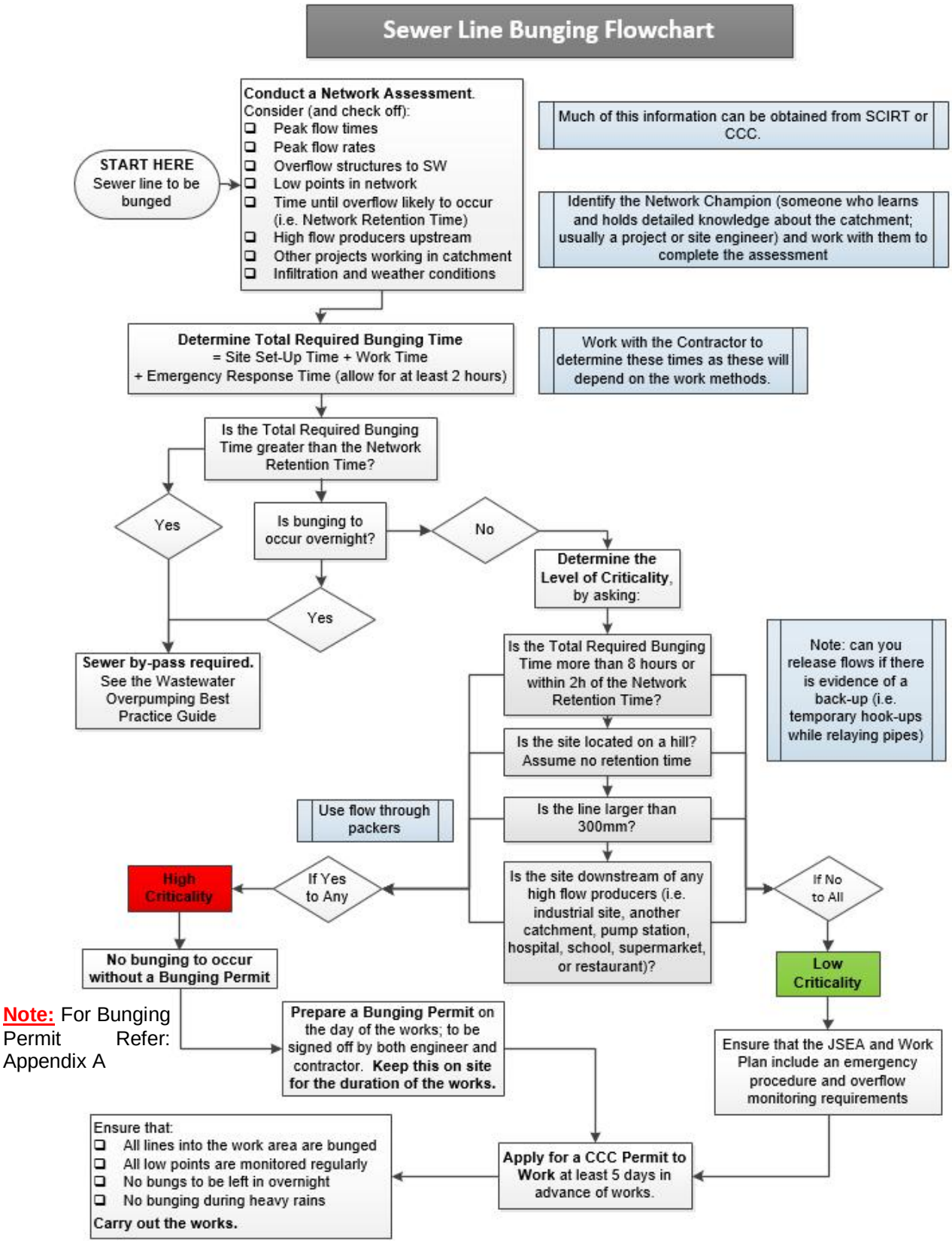
Disadvantage:

- Risk of solid build up in line;
- Risk of sewage seeping through broken wastewater pipes;
- Risk of wastewater backing up property laterals.

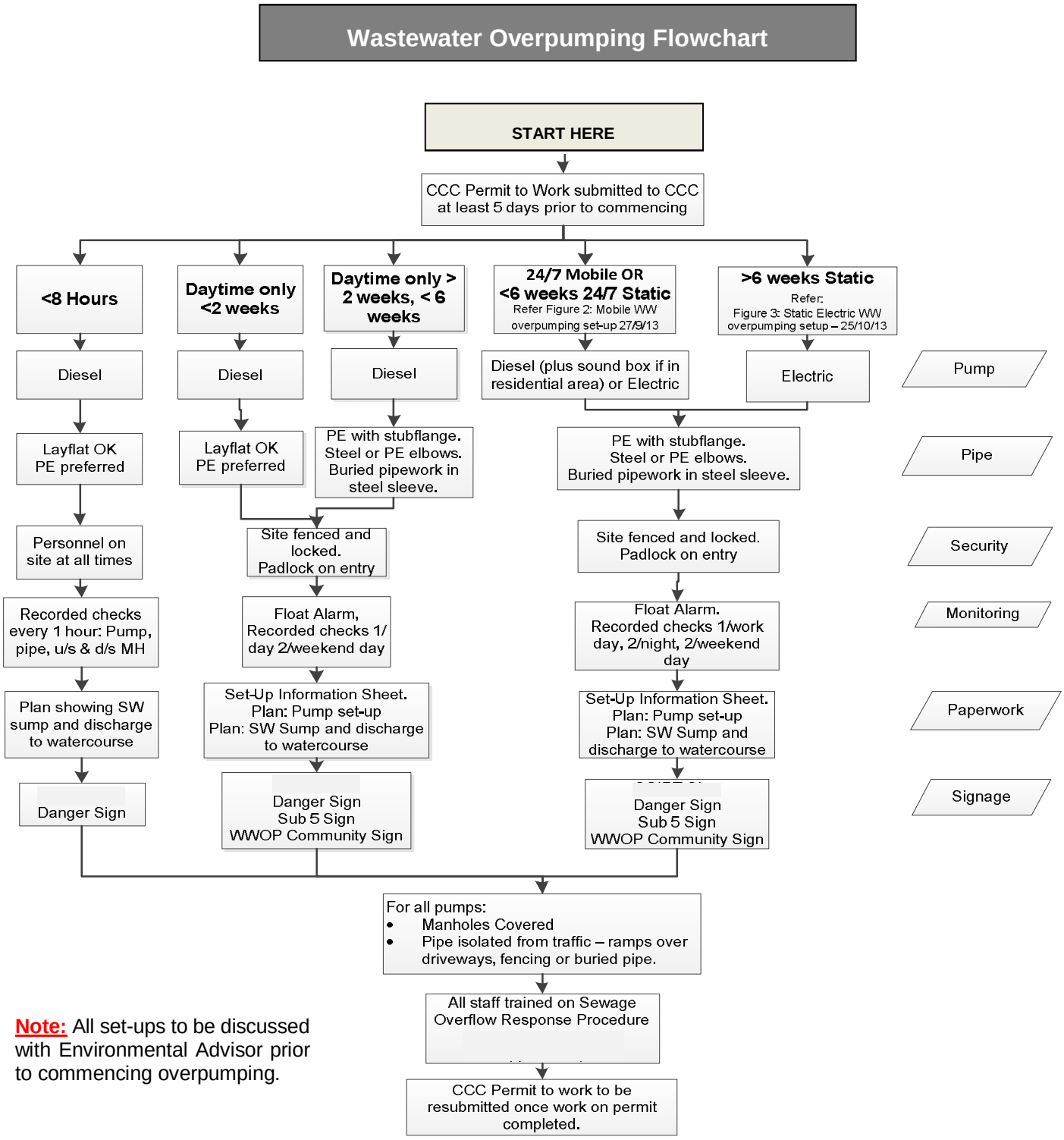
Warning: Rain events and peak flows in morning and evening need to be accounted for as well as high discharges in the catchment, pump stations and lift stations.

7 Step 3: Risk Assessment:

Flowchart 1



Flowchart 2



Note: All set-ups to be discussed with Environmental Advisor prior to commencing overpumping.

7.1 Controls Required for < 8 Hours Wastewater Overpumping

Scenario: One-off short term overpumping set-up e.g. for completion of 1 day pipelining operations.

Requirements: To be set up in accordance with Flowchart 2 and Table 1 below.

Table 1

Item	Requirements	Reference
Pump	Diesel	Figure 4
Pipe	PE preferred	Figure 12
	OR Layflat Pipe	Figure 8, 9 & 10
	Pipe Protected from traffic	Figure 11
Security	Personnel on site at all times	
Monitoring	Checks every hour during overpumping	Appendix C
Paperwork	Plans showing discharge to stormwater and river, high producers in catchment, pump stations, SW overflow structures.	Figure 24
Signage	Danger No Entry Sign	Figure 27
Additional	Set-up within site	
	Manholes covered	Figure 35, 36 & 37
	Ramps if required	Figure 39

7.2 Controls Required for Daytime Only <2 weeks Wastewater Overpumping

Scenario: Overpumping only required during the day for less than 2 weeks due to low flows.

Requirements: To be set up in accordance with Flowchart 2 and Table 2 below.

Table 2

Item	Requirements	Reference
Pump	Diesel	Figure 4
Pipe	PE preferred	Figure 12
	OR Layflat Pipe	
Security	Site fenced and panels locked together.	Figure 16 & 17
	Padlock on entry.	
Monitoring	Float Alarm (Suction or u/s manhole)	Figure 20 & 21
	Recorded checks: 1/work day	Appendix C
	2/weekend day – Security Guard	Figure 18 & 19 Appendix C
Paperwork	Set-Up Information Sheet	Appendix B
	Plans showing discharge to stormwater and river, high producers in catchment, pump stations, SW overflow structures.	Figure 24
Signage	Danger No Entry Sign	Figure 27
	Security Guard Sign	Figure 28
	Wastewater Overpumping Sign	Figure 29
Additional	Set-up within site if possible.	
	Manholes covered	Figure 35, 36 & 37
	Ramps if required	Figure 39

7.3 Controls Required for >2 weeks, <6 weeks Daytime Only Wastewater Overpumping

Scenario: Overpumping only required during the day less than 2 weeks but greater than 6 weeks due to low flows.

Requirements: To be set up in accordance with Flowchart 2 and Table 3 below.

Table 3

Item	Requirements	Reference
Pump	Diesel	Figure 4
Pipe	PE Pipe	Figure 12
Security	Site fenced and panels locked together.	Figure 16 & 17
	Padlock on entry	
Monitoring	Float Alarm (Suction or u/s manhole)	Figure 20 & 21
	Recorded checks: 1/work day	Appendix C
	2/weekend day – Security Guard	Figure 18 & 19 Appendix C
Paperwork	Set-Up Information Sheet	Appendix B
	Plans showing discharge to stormwater and river, high producers in catchment, pump stations, SW overflow structures.	Figure 24
Signage	Danger No Entry Sign	Figure 27
	Security Guard Sign	Figure 28
	Wastewater Overpumping Sign	Figure 29
Additional	Set-up within site if possible.	
	Manholes covered	Figure 35, 36 & 37
	Ramps if required	Figure 39

7.4 Controls Required for 24/7 Mobile OR < 6 Weeks 24/7 Static Wastewater Overpumping

Scenario: 24/7 Mobile overpump required when working along a street with high flows.

24/7 Static overpump required for less than 6 weeks to complete lift station or pump station commissioning.

Requirements: To be set up in accordance with Flowchart 2, Figures 2 & 3 and Table 4.

Table 4

Item	Requirements	Reference
Pump	Diesel	Figure 4
	OR Electric	Figure 5, 6 & 7
Pipe	PE Pipe	Figure 12
Security	Site fenced and panels locked together.	Figure 16 & 17
	Padlock on entry.	
Monitoring	Float Alarm (Suction manhole)	Figure 20 & 21
	Flow Switch (discharge pipe)	Figure 22 & 23

	Recorded checks: 1/work day	Appendix C
	2/night, 2/weekend day – Security Guard	Figure 18 & 19 Appendix C
Paperwork	Set-Up Information Sheet	Appendix B
	Plan showing pump set-up and discharge to stormwater and river, high producers in catchment, pump stations, SW overflow structures.	Figure 24 & 25
Signage	Danger Sign	Figure 27
	Security Guard Sign	Figure 28
	Wastewater Overpumping Sign	Figure 29
Additional	Set-up within site if possible.	
	Sound Box (if in residential area)	Figure 32
	Manholes covered	Figure 35, 36 & 37
	Ramps if required	Figure 39

7.5 Controls Required for > 6 Weeks Static Wastewater Overpumping

Scenario: Static Overpumping required for >6 weeks during construction or commissioning of pump station or lift station.

Requirements: To be set up in accordance with Flowchart 2, Figure 3 and Table 5.

Table 5

Item	Requirements	Reference
Pump	Electric	Figure 5, 6 & 7
Pipe	PE Pipe	Figure 12
Security	Site fenced and panels locked together.	Figure 16 & 17
	Padlock on entry.	
Monitoring	Float Alarm (Suction manhole)	Figure 20 & 21
	Flow Switch (discharge pipe)	Figure 22 & 23
	Recorded checks: 1/work day	Appendix C
	2/night, 2/weekend day – Security Guard	Figure 18 & 19
Paperwork	Set-Up Information Sheet	Appendix B
	Plan showing pump set-up and discharge to stormwater and river, high producers in catchment, pump stations, SW overflow structures.	Figure 24 & 25
Signage	Danger Sign	Figure 27
	Security Guard Sign	Figure 28
	Wastewater Overpumping Sign	Figure 29
Additional	Set-up within site if possible.	
	Manholes covered	Figure 35, 36 & 37
	Site Lighting	Figure 38
	Ramps if required	Figure 39

7.6 Control Details

Figure 3:

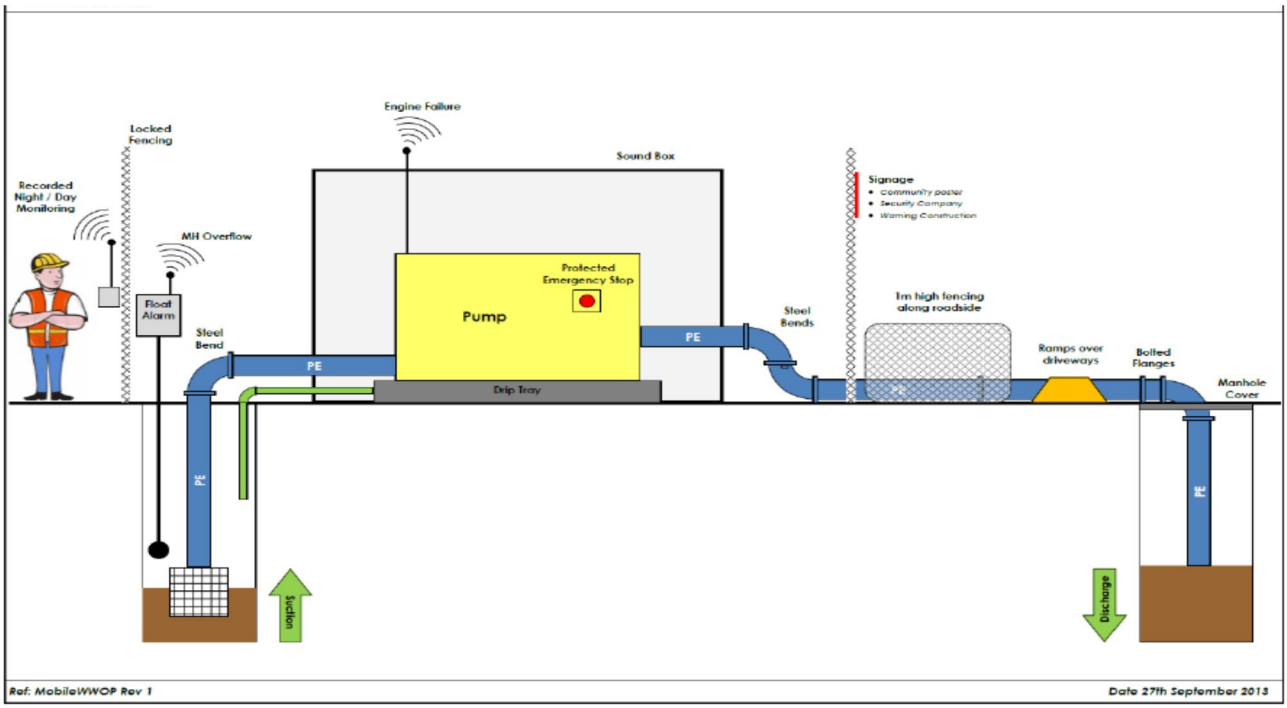
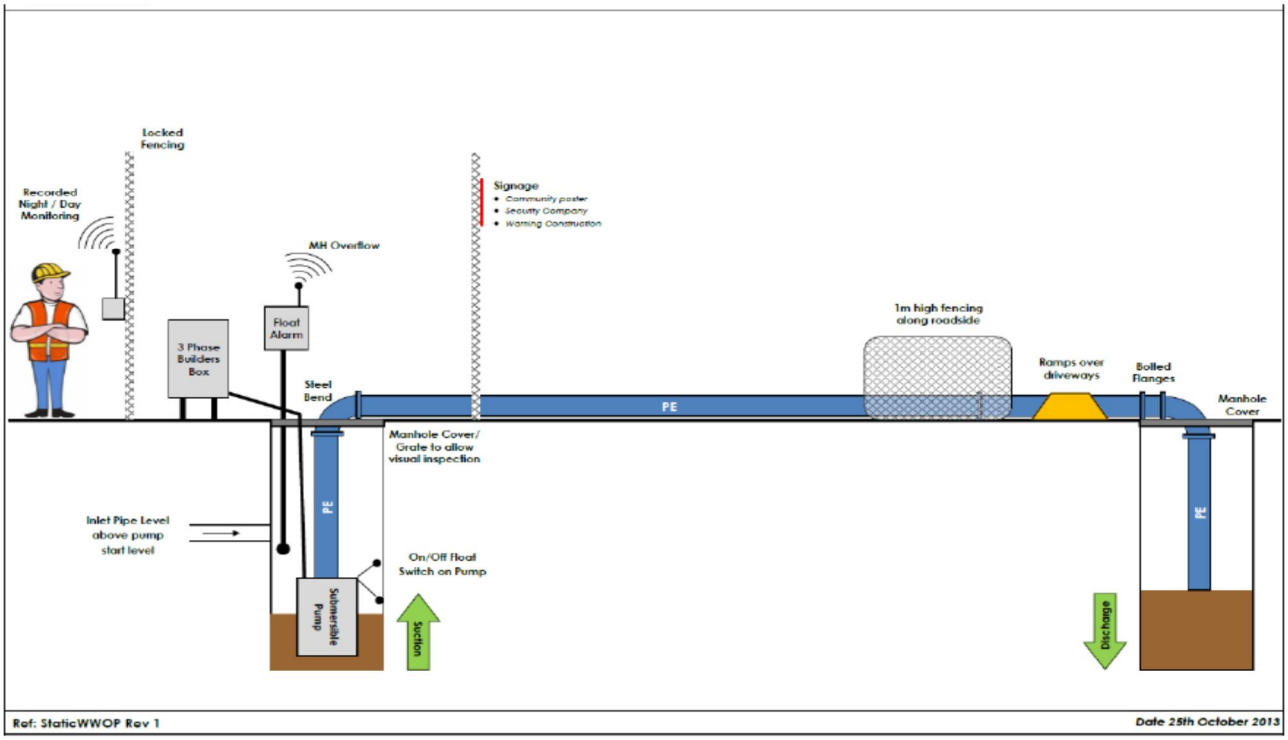


Figure 4:



Pumps

Figure 4: Diesel Pumps

Figure 5: Electric Pump

Figure 6: Electric Pump Builders Box

Figure 7: Electric Pump: Two Level Flow Switch

Pipework

Figure 8: Layflat Pipe: Couplings secured

Figure 9: Layflat Pipe: Kinks can obstruct flow

Figure 10: Layflat Pipe: Strainer for suction hose

Figure 11: Traffic protection for pipes

Figure 12: PE Pipe

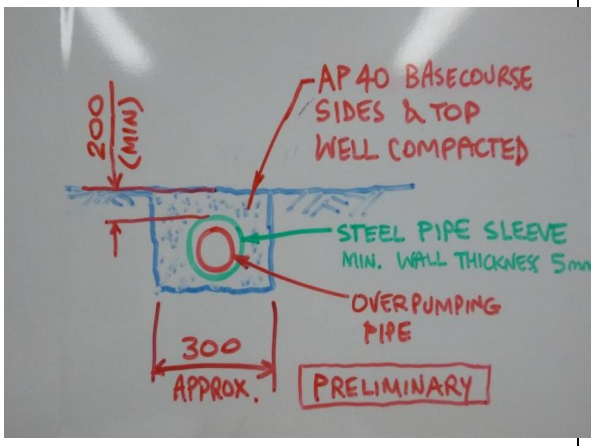


Figure 13: Pipe buried to be trafficable

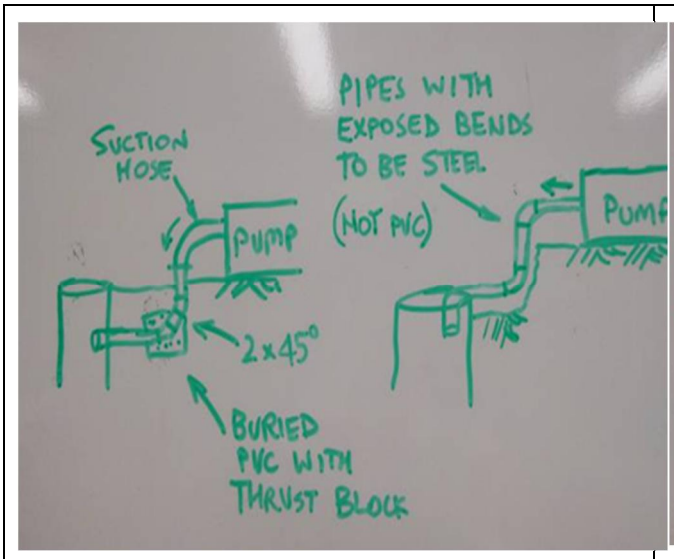


Figure 14: Discharge pipe setup (steel; PVC.)

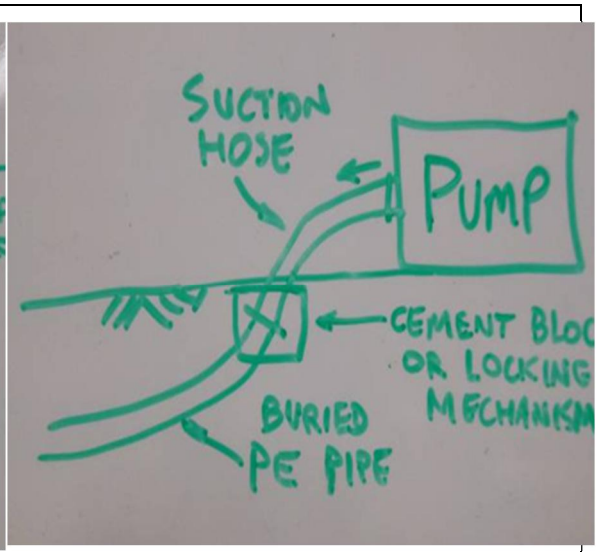


Figure 15: Discharge pipe setup (PE)

Site Security

Figure 16: Locked site fencing around pump

Figure 17: Wire ties to secure fence panels

Monitoring

Figure 18: Data logging stick

Figure 19: Proving checks are done using data logging system

Figure 20: Float Alarm in Suction Manhole

Figure 21: Solar Panel for Float Alarm

Figure 22: Flow Switch on Discharge Pipe

Figure 23: Flow Switch Unit for Discharge Pipe

Paperwork

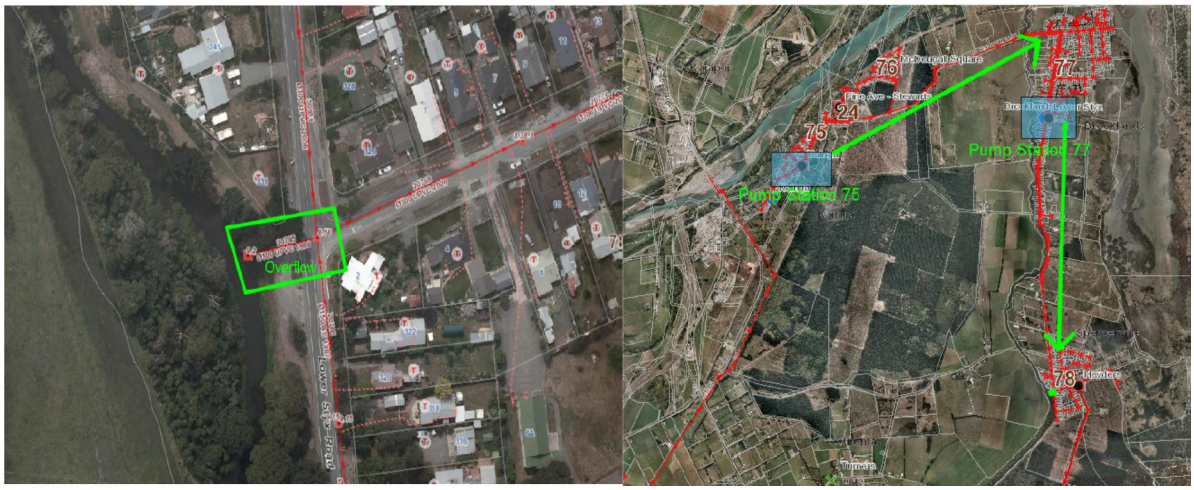


Figure 24: Plan showing potential entry into SW and River, High Producers, Pump stations & Overflow structures

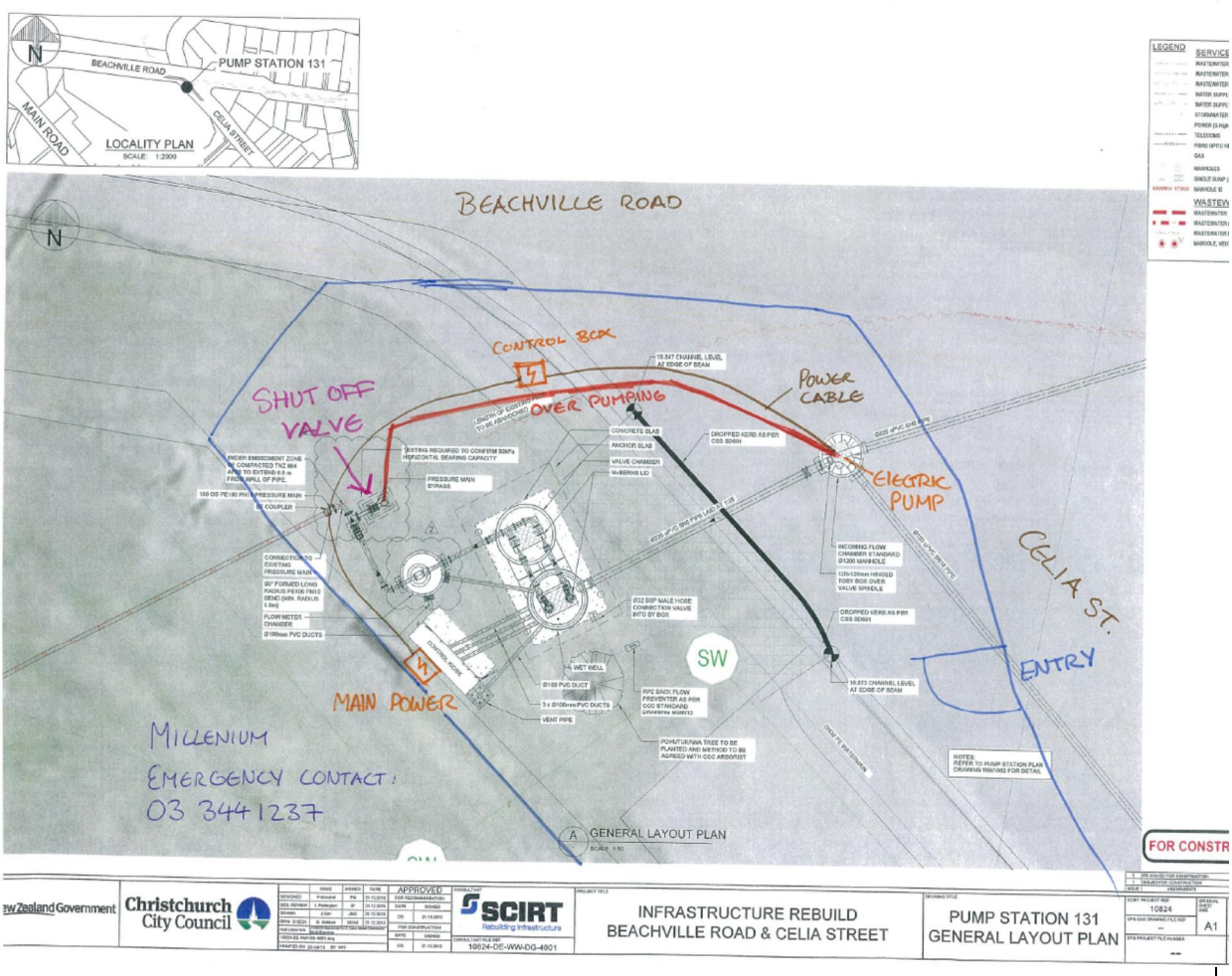


Figure 25: Plan showing pump set-up

Signage

Figure 27: Danger Keep Out Signs

Figure 28: Security Guard Sign

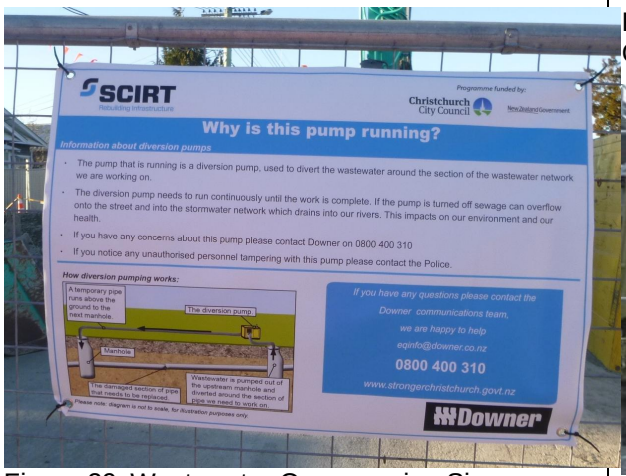


Figure 29: Wastewater Overpumping Sign

Figure 30: Additional (If vandalism a concern): CCTV Warning

Additional Requirements

Figure 31: Spill Mitigation: X TEX Fabric under pump

Figure 32: Noise Mitigation: Sound box

Figure 33: Noise Mitigation: Foam Mat and Plywood (to stop compression of foam)

Figure 34: Emergency STOP button with Perspex

Figure 35: Manhole lid with PVC inlet

Figure 36: Manhole cover: Steel

Figure 37: Manhole Grille

Figure 38: Site Lighting

Figure 39: Pipe Protection: Ramps in front driveways

7.7 Electric v Diesel Pumps for Static Overpumping

Electric pumps have proven safer and more cost-effective for static overpumping operations than using diesel pumps. This regularly occurs when constructing pump stations or lift stations.

An electric connection is required for electric pumps. This is an initial high cost but a power connection is required for the pump station or lift station so would always be a cost against the project. There is a 6 week lead in time to organise the power connection so forward planning is required.

Benefits for the use of Electric pumps:

- Cheaper to hire
- No refuelling cost
- No noise issues for local residents
- More reliable – fewer plant failures with electric pumps.
- Pump placed in manhole so out of sight – less risk of vandalism

Requirements for an electric pump:

Macerator	To handle rags and solids in the line
Pump capacity	Ensure it is sized to deal with flow rates in catchment
Power Supply	Builders box required to allow power connection from junction box to pump. Available from Orion or Millennium Electrical.
3-Phase powered pump	Recommended as allows motor a high starting torque and higher efficiency
Manual Stop/Start	On control board
Fuse/Circuit Breaker	Trip value must not exceed 250% of the pumps full load current.
Float Switch	Float Switch starts pump: Once pump is submerged. Float Switch stops pump: Approximately 100 – 150mm above discharge connection. Allow max 15 starts per hour.

	Fix floats to pipe/timber staff that reaches to manhole lid so adjustments can be made without entering confined space. **NOTE**: Must be suspended from manhole base to prevent damage to impeller

8 Step 4: CCC Permit to Work

Prior to any work occurring on the Christchurch City Council Wastewater Network, complete a Permit to Work and submit for approval (https://www.ccc.govt.nz/consents-and-licences/construction-requirements/permit-to-work/). Part 3 of the permit requires to be resubmitted to notify of 1) Commencement of shutdown, 2) Completion of Shutdown and 3) Reinstatement of Facilities.

Please ensure these permits are filed on site for reference.

9 Step 5: Wastewater Overpumping Set-Up Information Sheet

Prior to commencing Wastewater overpumping, a set-up information sheet is required to be completed (Appendix B). This sheet holds key information in the event of an emergency such as contact details, contingency plan, plans showing pump set-up and location of stormwater sumps and outfalls to watercourses.

A copy of this information sheet must be kept on site and with the Environmental Advisor.

10 Step 6: Installation

It is critical to ensure that the wastewater overpumping set-up is completed in accordance with the Best Practice requirements. The installation should be inspected and signed off prior to commencing overpumping. Responsibility for this check should sit with someone in your company, normally the Site Supervisor or Environmental Advisor.

11 Step 7: Monitoring

11.1 Preventive Maintenance

Preventive maintenance prevents failures of the setup from general wear and tear.

Table 5:

What	Responsibility	Frequency
Check constant pressure and RPM of the pump	Site Supervisor / Crew	Once per Day
Refuel	Pump Supplier	Once every 1-3 days
Cleaning Strainer on suction pipe	Site Supervisor / Crew	Once per Week and After a rain event
Removal of solids in suction manhole	Site Supervisor / Crew	Flow and catchment specific (e.g.: low flows = 1/ month and high flows = 1/ week)
Diesel Pump Servicing	Pump Supplier	Once per 10 Days

11.2 Regular Monitoring

The following monitoring is required on overpumping set-ups:

Table 6:

	Hourly recorded Checks	Daily 15-15 Inspection Sheet (Appendix C)	2 x Checks Overnight (Security Guard)	2 x Checks Weekend Days (Security Guard)
<8 Hours	Yes			
Daytime Only	Yes	Yes		
24/7 Mobile or <6 Weeks 24/7 Static		Yes	Yes	Yes
>6 Weeks 24/7 Static		Yes	Yes	Yes

11.3 Out of Hours Checks

Security Guards

Overnight and weekend checks should be arranged with a Security Guard Company. The contractor will be required to undertake the following prior to Security Guard starting on site:

- Contractor Induction;
- Site specific induction for every Security Guard patrolling on every overpumping set-up;
- On call phone number for the Security Guard to call if there is an issue on site.

Security Guards are able to undertake the following:

- Check pump is running
- Check levels in suction manhole
- Check pipework for any leaks
- Check site for signs of vandalism.

If an issue is found with any of the above, then Security Guards are not competent to carry out any repairs. They require an out-of-hours contact with the contractor to be able to attend site if required.

On Call Rota

An on-call system is required to complement the out-of-hours checks by Security Guards. This can be one member of staff e.g. one supervisor covering all sites or a member of staff per site. They need to be available to respond to calls, attend site if required and be trained in pump operations so they can undertake repairs.

They may be notified of an issue on site by:

- Security Guard
- Overflow Alarm – Monitoring Company
- Flow Switch Alarm – Monitoring Company

Having an on-call member of staff has prevented several overflow events as they are able to promptly respond to a problem on site prior to it becoming an incident.

11.4 Remote Monitoring

Remote monitoring systems have also proved very effective in preventing wastewater overflows.

High Level Overflow Alarm – (Suction Manhole)

High level overflow alarms are used in the suction manhole. A float alarm can be set at the required level for that pump set-up. If wastewater in the manhole reaches the float level it will trigger the alarm. All alarms are connected to a monitoring company, who send out message alerts and phone calls if the alarm is triggered. In addition they will send notification if signals are not received from the alarm due to power failure.

Overflow alarms require to be powered and this can be done using one of the following:

- Battery
- Connection to diesel pump
- Solar Panel
- Electric connection

High level alarms are able to quickly detect pump failures. The alarm level should be set to allow time for a staff member to attend site and make the repairs prior to an overflow occurring.

High level alarms have proved highly effective in early detection of pump failures and have prevented several overflows.

Refer Figures 20 & 21

Flow Switch – (Discharge Pipe)

One final point in the system to monitor is between the pump and the discharge manhole. If there is a pipe failure between the pump and discharge manhole, the pump may still be operational and the float alarm in the suction manhole may not detect an increase in level, but wastewater could be discharging onto the street through a broken pipe.

A flow switch has been developed as a way to monitor that there is flow in the discharge pipe. This should be placed as close to the discharge manhole as possible. If the pump is placed on a float switch e.g. like most electric pumps, the flow switch can be set to detect if there has been no flow after a set period of time. E.g. If the float switch means the pump normally pumps once every 5 minutes, the flow switch can be set to signal if there has been no flow after 10 minutes.

Signals from the flow switch are sent to the same monitoring company that monitors the high level overflow alarm.

Refer figures 22 and 23.

12 Overflow Response and Reporting Requirements

12.1 Wastewater Overflow Emergency Response

Appendix E – Wastewater Overflow Response Flowchart

In the event of a Wastewater Overflow, prompt action can limit the extent of the impact. Below are general guidelines of the steps to be taken on site:

1. Identify cause of over flow;
2. Stop source (often = stop the pump);
3. Contain wastewater and protect stormwater sumps;
4. Divert pedestrians / public;
5. Notify Council Control Room (03 941 5727) and ECAN Hotline (0800 76 55 88) if >50L discharged to stormwater;

6. Clean site promptly using a sucker truck and disinfectant.

Picture 5. Wastewater overflow onto street due to pump station failure.

12.2 Wastewater Overflow Reporting Requirements

All contractors are required to report wastewater overflows >50L that enter waterways to Christchurch City Council and Environment Canterbury.

The Wastewater Overflow Response Flowchart in **Appendix E** lists the reporting requirements, timeframes and responsibilities.

In the event of an overflow, it is very important to accurately record times discharges commenced and ceased and times notifications were made to Christchurch City Council and Environment Canterbury.

Once the initial response has been dealt with, the overflow ceased and cleaned up, a full investigation (such as an **ICAM: Incident Cause Analysis Method**) should be undertaken by the relevant contractor.

Sewage Overflow Report – (Appendix F)

A draft **Sewage Overflow Report** is required to be submitted to the Christchurch City Council Resource Consent Compliance Coordinator within **72 hours of the incident**. Within **10 working days** the final report should be submitted to Council.

Council is then required to submit this to Environment Canterbury who will make the final decision in regards to enforcement action.

It is key to demonstrate in this report that Wastewater Overpumping was undertaken in accordance with the Best Practice Guide and that the Wastewater Overflow Response Flowchart was followed.

13 Appendices:

Appendix A. Bunging Permit for Highly Critical Lines

<table>
<tr><td colspan="4">This permit is (only) required for Highly Critical Lines (see Sewer Line Bunging Flowchart). One permit is to be issued per sewer line segment (manhole to manhole) being bunged. To be prepared and issued on the first day of the works and to be available on site for the duration of the works.</td></tr>
<tr><td>Project No.:</td><td>Permit No.:</td><td>Catchment:</td><td>Location:</td></tr>
<tr><td colspan="2">Contractor:</td><td>Foreman:</td><td>Network Champion:</td></tr>
<tr><td colspan="2">Start Date:</td><td>End Date:</td><td>No. of sites/bungs:</td></tr>
<tr><td colspan="4">Network and Risk Assessment</td></tr>
<tr><td colspan="2">Was a Network Assessment Completed?
• Yes • No</td><td colspan="2">Why is this line assessed as Highly Critical? (Select those that apply)
• Total Required Bunging time is greater than 8 hours
• Total Required Bunging Time is within 2 hours of Network Retention Time
• Line is larger than 300 mm
• Site is located downstream of a high flow producer (Identify: _____)
• Site is located on a hill • Other: _____</td></tr>
<tr><td colspan="4">Hours
Network Retention Time:
- Emergency Response Time (at least 2 hours):
= Available Work Time:

Hours
Time Works Started:
+ Available Work Time:
= Time Works Need to Be Completed By:</td></tr>
<tr><td colspan="4">Monitoring Plan</td></tr>
<tr><td colspan="2">Person Responsible for Monitoring:</td><td colspan="2">Frequency of Monitoring:</td></tr>
<tr><td colspan="4">Key Monitoring Location(s):</td></tr>
<tr><td colspan="4">Emergency Response Plan (select method to be used)</td></tr>
<tr><td>• Sucker Truck
Mandatory on site stand-by when working on hills</td><td colspan="3">Insert list of suppliers, emergency phone numbers, and truck availability:</td></tr>
<tr><td rowspan="3">• Standby By-Pass (Off-site)</td><td>Supplier:</td><td colspan="2">Confirmed Availability? • Yes • No</td></tr>
<tr><td>Contact Person:</td><td colspan="2">Number:</td></tr>
<tr><td>Discharge Manhole:</td><td colspan="2">Receiving Manhole:</td></tr>
<tr><td>• By-Pass (On Site)</td><td colspan="3">Follow the procedures in the Wastewater Overpumping Best Practice Guide</td></tr>
</table>

Permit Issue and Receipt

- I have checked with Council if there have been any changes within the network since the Network Assessment.
- I have verified that the Emergency Response Plan is in place.

Permit Issuer: _____ (print name) _____ (sign) _____ (date)

(Engineer)

- I agree to the works and conditions included in this Permit.
- I acknowledge that the Emergency Response Plan as described in this Permit is in place.
- I acknowledge that this permit is no longer valid if conditions of the site change.

Permit Receiver: _____ (print name) _____ (sign) _____ (date)

(Foreman)

Permit Closure

- I acknowledge that this permit is closed and no longer valid. Reason for closure: • Complete • Cancelled

Permit Issuer: _____ (print name) _____ (sign) _____ (date)

(Engineer)

Permit Receiver: _____ (print name) _____ (sign) _____ (date)

(Foreman)

Permit Issue and Receipt

- I have checked with Council if there have been any changes within the network since the Network Assessment.
- I have verified that the Emergency Response Plan is in place.

Permit Issuer: _____ (print name) _____ (sign) _____ (date)

(Engineer)

- I agree to the works and conditions included in this Permit.
- I acknowledge that the Emergency Response Plan as described in this Permit is in place.
- I acknowledge that this permit is no longer valid if conditions of the site change.

Permit Receiver: _____ (print name) _____ (sign) _____ (date)

(Foreman)

Permit Closure

- I acknowledge that this permit is closed and no longer valid. Reason for closure: • Complete • Cancelled

Permit Issuer: _____ (print name) _____ (sign) _____ (date)

(Engineer)

Permit Receiver: _____ (print name) _____ (sign) _____ (date)

(Foreman)

Appendix B. Wastewater Overpumping Set-Up Information Sheet

GENERAL

Overpumping setup location	Street Address
Project #	10101
Overpumping Manager	Name, phone
Council Permit to Work	Permit no. and approval date
SWMS Reviewed and Accepted by Environment Team?	SWMS Title, date of approval

OVERPUMPING DESCRIPTION (attach plan)

Justification for over pumping	What work needs to be carried out before pump can be removed?
Date Installed	Date
Expected end date of Overpumping	Date
Mobile pump or static pump	If mobile description of what area it will cover eg. Road and direction of movement
Suction location	Description of location plus provide plan
Discharge Location	Description of location plus provide plan
Pipework	Type of pipe, approx. length, overland or buried, driveway ramps, couplings secured, buried as per WWOP BPG

NETWORK RECONNAISSANCE

Overflow structures (Where, How Far)	Description of location, How does it affect storage? plus provide plan
Lift Stations/ Pump Stations in catchment	Description of location, effect it has on area being overpumped? plus provide plan
High flow producers in catchment (e.g hospitals, supermarkets, industrial)	Description of location, effect it has on area being overpumped? plus provide plan
Low Points in catchment	Where are the low points in the network, Have calculations been made on storage levels? Provide plan on areas of risk

PUMP MAINTENACE

Pump Supplier	Stella/Pump Hire/Sykes etc
Pump model /size	6” pump
Maximum pump flow rate	Volume e.g. 6” pump has max capacity of 76l/s
Average pump flow rate	Estimated l/s
Who refuels the pump? (daily)	Contractor name, phone
Who conducts pump maintenance? (every 10 days)	Contractor name, phone
Who conducts pipe maintenance? (every 10 days)	Contractor name, phone

BY PASS SETUP MONITORING

Who monitors the pump during the day?	Person name, phone
Who monitors the pump over weekends?	Person name, phone
Who is called if emergency work is needed on the setup week days?	Person name, phone
Who is called if emergency work is needed on the setup after hours?	Supervisor On-Call phone 027 838 6331

SITE SPECIFIC EMERGENCY PLAN

1. PUMP FAILURE (attach plan)

Storage capacity in the WW system	Hours
Potential discharge points	Manholes/overflow structures
Potential discharge points to SW	Description of location plus provide plan
Potential discharge points to River	Description of location plus provide plan

2. PIPEWORK FAILURE (attach plan)

Location of discharge to SW	Description of location plus provide plan
Location of discharge to River	Description of location plus provide plan
In emergency can the pump be turned off? (>3hours storage)	Yes/No If Yes how long can it be safety turned off for?

3. CONTINGENCY PLAN

e.g If pump fails actions required: 1. 2 If pipework fails actions required: 1. 2. Attach additional sheet if needed – detail site specific risks eg. Overflow, TM required

PLANS REQUIRED

1) Pump Set-Up: Suction manhole, discharge manhole, bypass pipe
2) Location overflow would enter SW in event of incident
3) Location overflow would reach waterway in event of incident
4) Location of High Producers on line: Pump stations, lift stations, industrial discharges
5) Location of low points in catchment
6) Location of Overflow structures to Stormwater and/or River

REVIEW REQUIREMENTS

- Information to be reviewed monthly by Pump Manager
- Any changes to the information above must be updated **IMMEDIATELY**

Date completed:	01/02/13	By:	Pump manager
Date of next Review (1 month):	01/03/13	By:	Pump manager

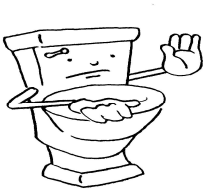
Environment Team (approval of plans)	Print & sign name	Date:	01/02/13
Supervisor: (approval of set-up))	Print & sign name	Date:	01/02/13
Project Manager (proposal approved)	Print & sign name	Date:	01/02/13

Appendix C. Daily Wastewater Overpumping Inspection Sheet

PROJECT: PUMP LOCATION:

CHECK BY: DATE: TIME:

	Environmental Check	Y/N/ N-A	If "No": Immediate action taken
1	Is there a Warning Sign On Fence?		
2	Is there a Sub5 Sign on Fence?	,	
3	Is there a Over pumping Poster Sign on fence?		
4	Are all the Fence Panels cable tied or wire tied together?		
5	Is the Entrance Padlocked?		
6	Pipework/ Hoses inside fences where possible?		
7	When Lay flat/ Pipework cross over driveways are Hose ramps in place to allow vehicles access?		
8	Are Hose couplings cable tied?		
9	Is pump running?		
10	Is there flow?(Listen for discharge into manhole)		
11	Are the Suction & Discharge Man Holes Covered? The Date Suction M/H was visually checked (Occurring Weekly if located in live lane)?		
12	Is the Emergency Stop Button Connected and Protected?		
13	No Oil or Diesel leaking from Pump?		
14	Is noise from Pump Acceptable?		
15	Any Change to set up?		If **Yes** Notify Environment Team



How long did this check take you? (note: should be no more than 15 minutes): _____

Provide copy to Site Engineer and Environmental Advisor on completion

Appendix D. Significant Hazard Control Plan: Wastewater Overpumping

Hazard: Wastewater discharge to the environment from overpumping activity.

	ELIMINATE	ISOLATE	MINIMISE
General controls	· Avoid WWOP through planning, design, · Avoid WWOP with construction work methodologies (temporary connections, etc)	· Keep WWOP setup within locked fence area · WW over flow contingency plan aims at directing discharge to trench where possible · Check storage capacity of upstream WW network at peak hours · Check upstream for overflow structures	· Door knock residents · Follow good practice design for setting up WWOP · Identify discharge SW points to waterways · Automatic alarm system on high risk sites · Monitoring day, night, weekends (to be recorded) · Overflow response plan · Training staff to proper setup and emergency response
Wear and tear	· Preventive maintenance plan includes: quick check every refuel operation (2 days) + full maintenance check (10 days) · Reduce couplings and fittings by using PE pipe	·	· Daily monitoring includes checking for air leaks, kinks, leaks, condition of pipes, damage.. · PE pipe used for long duration WWOP
Pump/ pipes blocked	· Check WW main is not obstructed downstream (CCTV, jetting) · Preventive maintenance: sucker truck MH's and flush lines 1 -2/ month depending on flows	· Fencing around sites prevents objects falling in MH · Lids prevents foreign objects entering MH's	· Sewage specific strainers (not dewatering strainers) ·
Risk of vandalism	· No pumps running unsupervised ; · Electric pump placed in MH	· Site fenced off and locked + wire ties; · Security signs up on fence	· Emergency buttons protected with perspex · Couplings secured with cable ties · Security patrol weekends and nights; · Movement detector lighting; ·
Damage from traffic	· All pipes within locked fenced area; · Pipes buried under road surface are trafficable (metal sleeve)	· Pipes placed on berm; · Pipes physically protected in kerbs (fence, PVC sleeve..)	·

	· Electric pump placed in MH	· Physical protection across driveways (ramps) . .	
H&S public and staff	· Stop work immediately within vicinity · Divert pedestrians from area	· PPE (gloves) long sleeves, etc ·	· Clean area and disinfect · Door knock closest neighbours
Adverse weather increasing flows	· Pump capacity takes account catchment size and highest flows · Monitor weather alerts · Temporary connections	·	· Extra monitoring · Emergency pump available .

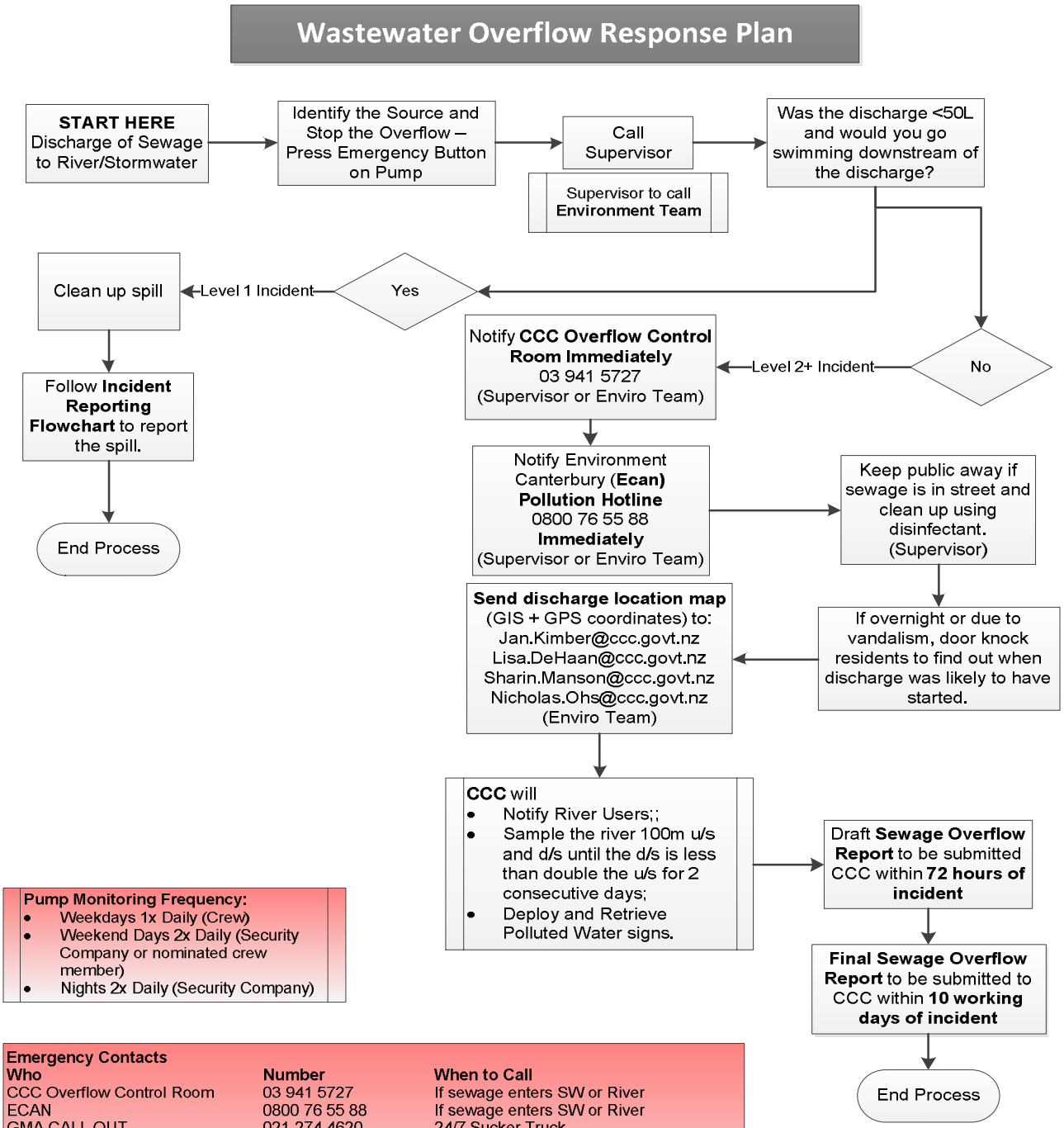
Hazard: Noise levels affecting neighbours

	ELIMINATE	**ISOLATE**	**MINIMISE**
Noise Impact to Residents	· Electric submersible pump · Turn off pumps at night · Evacuate neighbours	·	· Sound box · Noise pad

Hazard: Oil or fuel spill from diesel pumps discharging to environment.

	ELIMINATE	**ISOLATE**	**MINIMISE**
Discharge of hazardous substance to environment	· Preventive maintenance: quick check every refuel operation (2 days) + full maintenance check (10 days)	· Containment placed around pump (eg: plant nappy, X tex cloth..)	· Spill kit on site · Training refuelling contractor

Appendix E. Wastewater Overflow Response Flowchart



Emergency Contacts		
Who	**Number**	**When to Call**
CCC Overflow Control Room	03 941 5727	If sewage enters SW or River
ECAN	0800 76 55 88	If sewage enters SW or River
GMA CALL OUT (Ebbe Humrich)	021 274 4620	24/7 Sucker Truck
GMA Manager (Michael Lee Grand)	021 224 6211	If above not reachable
DOWNER Maintenance	0800 922 473	
ITS CALL OUT	0800 723 348	Emergency Traffic Management
CITY CARE ON CALL	027 247 9145	
CITY CARE HOTLINE	03 337 6150	Emergency City Care

Appendix F. Sewage Overflow Response Report

Location			Affected water body	
Overflow type	Wet weather		Start date	
	Dry weather			

Summary

Context

Consequences

Cause

Actions:

Details

Required for comment	Comment
Location	
Start date & time*	
Duration*	
Time signs went out	
Time signs were brought in	
Party and time 1st notified	
Party and time of final notification	
Is there any direct contact between sewage and food sources used by humans? (Need to be aware of cattle grazing contaminated pastures, also less obvious sources of food such as puha or watercress).	
Is there direct contact between sewage and drinking water supply sources?	
Is there contact between sewage and surface or ground water systems?	
Is there contact between the discharge and human recreational activities? Consider both land and water uses e.g. football field, swimming lagoon.	
What is the volume of waste discharged (has the discharge ceased or is it continuing)?*	
What is the degree of dilution or mixing in receiving waters?*	

Describe the weather at the time of discharge?	
Describe the proximity of people to the discharge (odour or other nuisance may result).	
Is there any substantial change to the existing situation as a result of the discharge?	

**Please note: These figures are from raw data. A quarterly report from the software provider will provide processed data and figures will then be confirmed to ECAN.*

Include:

Eg. Plans, photos, sample reports, monitoring reports, evidence of best practice, evidence of following reporting requirements

Appendix G. Useful and Emergency Contacts

Who	Number	When to Call
Council Team leader Water reticulation	03 941 8327	Council Procedures for WW overflow management. Major OF only
Council Senior supervisor – WW reticulation	027 505 9947	On site Council response for WW overflows. For identified existing blockages on WW system.
Council Resource Consent Compliance Coordinator	03 941 8615	In event of a reportable sewage overflow
Council Lab	03 941 5706	For sampling results
Alarm Services	09 309 5707 Info@alarmservices.co.nz	Supplier of Float Alarms
Sub 5	03 356 1200	Security Guards to undertake out of hours monitoring of set-ups
Emergency Contacts		
Council Control Room	03 941 5727	If sewage enters SW or River
Environment Canterbury – Pollution Hotline	0800 76 55 88	If sewage enters SW or River
GMA Call Out (Ebbe Humrich)	021 274 4620	24/7 Sucker Truck
GMA Manager (Michael Lee Grand)	021 224 6211	If above not reachable
Downer Maintenance On Call	0800 922 473	
ITS On Call	0800 723 348	Emergency Traffic Management
City Care On Call	027 247 9145	
City Care Hotline	03 337 6150	Emergency City Care