

The background of the cover is a photograph of a rolling green landscape under a blue sky with light clouds. A semi-transparent blue triangle is overlaid on the right side of the image, pointing towards the top right. The text is overlaid on the lower half of the image.

SOUTHERN LINKS 1 INDUSTRIAL DEVELOPMENT

STORMWATER OPERATIONS & MAINTENANCE PLAN

PROJECT INFORMATION

PROJECT 298002

DOCUMENT CONTROL

DATE OF ISSUE 02/09/2026

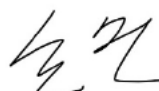
REVISION A

AUTHOR



Sean McDonald
Team Leader

REVIEWED BY



Min Shon
Team Leader

APPROVED BY



Dean Morris
Regional Director

© Maven Waikato Ltd
This document is and shall remain the property of Maven Ltd. The document may only be used for the purposes for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

19 Kaimiro Street, Pukete, Hamilton
New Zealand
Phone 07 242 0601
www.maven.co.nz

Contents

1. Statement of Experience	4
2. Introduction	5
2.1. Purpose of this report	5
2.2. Stormwater Assets	5
2.3. Contact Information	6
3. Stormwater System Description	8
3.1. Site Description	8
3.2. Design Standards	8
3.3. Stormwater Management Plan (SMP)	8
3.4. Capacity and Quality	9
3.5. Overland Flow	10
4. Stormwater System Devices	11
4.1. Wetland	11
4.2. Temporary Swales	14
4.3. Detention / Retention Tanks	15
5. Reporting and Scheduling	18
Appendix A – Auckland Council’s Wetlands Operation and Maintenance Guide	19
Appendix B – Recommended Maintenance Event and Frequency Checklists	20
Appendix C – Troubleshooting Guide	21

1. Statement of Experience

Author

My name is Sean McDonald. I am a Senior Engineer and Team Leader at Maven Waikato Ltd (“Maven”), a firm of consulting engineers and surveyors based in Hamilton. I have been employed by Maven since 2025. I hold a Bachelor of Engineering Technology (Highways) which I graduated from in 2006, hold a New Zealand Certificate of Engineering “Civil” (NZCE) and I am a member of Engineering New Zealand.

I have over 29 years of experience in the field of civil engineering including as a civil engineering technician, New Zealand army engineer, council engineer and consulting engineer, with over 20 years’ of experience post degree. Since obtaining my degree I have worked on a variety of civil projects including State Highway works, 3 Waters Infrastructure works, Residential Land Development, Commercial and Industrial Land Development and major Infrastructure projects such as the upgrade of the Port Boteny (Sydney) Naphtha Storage Facilities, the Transpower upgrade and extension of the Whakamuru Substation, the Central Government Rotorua Youth Justice Facility and Contact Energy’s new Tauhara Geothermal power station.

I confirm that I have read and understood the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023, and agree to comply with its requirements.

I acknowledge that, as an expert, I have an overriding duty to assist the decision-maker impartially on matters within my area of expertise. In preparing this report, I have exercised my independent professional judgement, and the opinions expressed in this report are my own. I understand that my duty as an expert is not to advocate for the interests of the applicant or any other party.

I confirm that the matters addressed in this report are within my area of expertise, except where I expressly identify that I have relied upon information, assessments or opinions provided by others. I have made all reasonable enquiries and have not knowingly omitted any material facts known to me that might alter or detract from the opinions expressed in this report.

Reviewer

I am Min Shon, a Senior Civil Engineer and Team Leader at Maven Waikato Ltd. I hold a Master of Civil Engineering from the University of Auckland and am a Chartered Professional Engineer (CPEng) registered with Engineering New Zealand. I have over six (6) years of professional experience in civil engineering, with particular experience in land development, including earthworks, roading, and three waters infrastructure design.

I confirm that I have read and understood the Code of Conduct for Expert Witnesses contained in the Environment Court Practice Note 2023, and agree to comply with its requirements.

I acknowledge that, as an expert, I have an overriding duty to assist the decision-maker impartially on matters within my area of expertise. In preparing this report, I have exercised my independent professional judgement, and the opinions expressed in this report are my own. I understand that my duty as an expert is not to advocate for the interests of the applicant or any other party.

I confirm that the matters addressed in this report are within my area of expertise, except where I expressly identify that I have relied upon information, assessments or opinions provided by others. I have made all reasonable enquiries and have not knowingly omitted any material facts known to me that might alter or detract from the opinions expressed in this report.

2. Introduction

2.1. Purpose of this report

The purpose of this operation and maintenance plan is to set out the procedures for the correct ongoing operation, monitoring and maintenance of the stormwater quality management devices of SL1 – Industrial. The information provided herein outlines the methodology associated with the stormwater infrastructure onsite. This plan is to be read in conjunction with the engineering drawings around stormwater management within the site.

Maintenance will be in generally accordance with this plan, WRC Stormwater Guidelines and HCC's SW Guidelines.

2.2. Stormwater Assets

The Public assets constructed which will require operation and maintenance are:

- Stormwater discharge from SL1 – Industrial Development will be conveyed via public piped networks, primary conveyance systems and overland flow paths to the proposed wetland systems.
- Stormwater discharge from road impervious areas will be conveyed via the primary stormwater network to the proposed wetlands, forebays.
- Detention / retention tanks will be provided for each industrial lot to retain the required initial abstraction volume a source. Overflow from the detention / retention tanks will discharge to the downstream stormwater network once the available storage volume has been exceeded.
- Roadside swales and/or unlined wetland ponds will provide soakage for the required initial abstraction volume where practical and reduce the volume of runoff entering the downstream stormwater network.
- Wetlands, forebays and swales constructed within the development form part of the overall treatment train. These devices provide water quality treatment, conveyance, extended detention, attenuation and flood storage.
- Primary stormwater networks, including public piped networks culvert crossings, diversion channels and overland flow paths, will maintain hydraulic connectivity through the site and convey stormwater to the proposed wetlands and existing streams/drains.
- Wetland 1 and Wetland 2 will be retained in private ownership, with the option to vest Wetland 1 to Council in the future. Wetland 3 will be vested to Council subject to compliance with the relevant approval process.
- Private stormwater infrastructure, such as detention / retention tanks, Wetland 1 and Wetland 2 will remain in private ownership with ongoing operation and maintenance responsibilities to be made available for eventual property owners.

2.3. Contact Information

A summary of the contact information relating to the ownership, maintenance manager, and designer for the stormwater system is included below.

Asset ID:		Resource Consent Number:	
Location:	160 Higgins Road, 20 Wickham Street and 24 Wickham Street, Frankton, Hamilton	Development Name / Legal Description:	
Asset Owner Details:			
Name:	Hamilton City Council	Postal Address: Hamilton City Council, Private Bag 3010, Hamilton 3240 Physical Address: 260 Anglesea St, Council Building Garden Place, Hamilton, 3204	
Telephone Number:	07 838 6699		
Email:	Refer to Online Contact Form		
Maintenance Manager Emergency Contact Details			
Name:	HCC call centre	Address: 260 Anglesea St, Council Building Garden Place, Hamilton, 3204	
Telephone Number: (Daytime)	07 838 6699		
Telephone Number: (Out-Of-Hours)	07 838 6699		
Email:	Relevant operational area inbox		

Designer Details:		
Name:	Dean Morris	19 Kaimiro Street, Pukete, Hamilton 3200
Telephone Number:		
Email:		
Applicant Details		
Name:	Industre Property Tahī Limited and South Park Agri Development Limited	Address: Level 1, 137 Alexandra Street, Central, Hamilton, 3210
Telephone Number		
Email:		
Landowner Details:		
Name:	Industre Property Tahī Limited and South Park Agri Development Limited	Address: Level 1, 137 Alexandra Street, Central, Hamilton, 3210
Telephone Number		
Email:		
Notes / Restrictions / Access		

3. Stormwater System Description

3.1. Site Description

The SL1 Industrial Development development forms part of the industrial component of the wider Southern Links 1 (SL1) growth cell, a circa 500ha block of land within Waipa District. The SL1 – Industrial Development area is a circa 60ha block of land and is contiguous with Hamilton City Council's southwestern boundary. The current site access is through Higgins Road and Wickham Street in Hamilton. The site adjoins with the Frankton Industrial area to the north, KiwiRail Corridor to the east and the remainder of the site is surrounded by agricultural land.

The site is utilised for the pastoral grazing, with land cover comprising maintained grassland consistent with agricultural use, with some gravel parking and storage areas off Wickham Street and uncontrolled fill stockpile area in the northwest corner, adjacent to the KiwiRail Corridor.

The Industrial Development includes circa 22 industrial lots of varying industrial lot sizes which have been proposed to meet the growing and changing needs of the cities industrial market, together with infrastructure devices including wetlands and roading.

The key feature of the development is an integrated stormwater treatment train approach utilising detention / retention tanks, wetlands, forebays, diversion channels, culvert crossings and flood storage areas to convey, treat and attenuate stormwater runoff from the road and lot areas prior to discharge into the Waitawhiriwhiri drainage network.

The proposal includes substantial enabling works to establish developable land, including bulk earthworks across the site. An integrated stormwater management system including detention / retention tanks, roadside swales, artificial wetlands, forebays, outlet structures and primary conveyance systems will be provided to manage stormwater quality, conveyance, extended detention, attenuation and flood storage.

3.2. Design Standards

The Regional Infrastructure Technical Specification (RITS) set out design and construction standards for stormwater and requires all land development projects to be provided with a means of stormwater disposal.

Stormwater systems have been designed in accordance with RITS and other relevant standards including the Waikato Regional Council guidelines. The system caters for the primary pipe system up to the 10-year event as well as the secondary system and overland flow paths to manage excess runoff that cater for events exceeding the capacity of the primary piped system for events exceeding the 10-year event.

The stormwater quantity control standards include extended detention for WQV, attenuation of the 2-year and 10-year ARI storm back to pre-development flow, and attenuation of the 100-year ARI storm back to 80% of pre-development flow.

3.3. Stormwater Management Plan (SMP)

The planned development forms part of the Waitawhiriwhiri Stream Catchment.

The overarching stormwater strategy has been derived from the Stormwater Management Plan which sets out the high-level, best practice approach to stormwater management within the Southern Links 1 Industrial Development site. The SMP outlines the overarching stormwater management principles which will form the basis of stormwater design to support future development on the proposed site.

Furthermore, the stormwater management strategy, as detailed within the SMP, establishes a robust long term stormwater solution, which integrates desired industrial development outcomes, with the mitigation of flooding, flood plains and OLFPs, and consideration of best-practice design outcomes as detailed within relevant Waikato guidance documents.

The key components of the Southern Links 1 Industrial Development stormwater management strategy are as follows:

- Retention of the required initial abstraction volume through distributed detention / retention tanks provided for each industrial lot within stage 1A.
- Retention of the first 10mm of stormwater and/or the initial abstraction volume required for new road surfaces through soakage via roadside swale and/or unlined wetland ponds where practical.
- Stormwater conveyance for the 10-year event through the primary stormwater network to the proposed wetlands.
- Overland flow paths for the 100-year event to be accommodated within the site and conveyed through the roading network, roadside primary networks, retained drainage corridors, diversion channels and proposed wetlands.
- Treatment of runoff prior to discharge into the receiving environment in accordance with the Waitawhiriwhiri ICMP, RITS and Waikato Regional Council guidelines.
- Use of an integrated treatment train approach incorporating detention / retention tanks, conveyance systems, wetlands forebays, high-flow bypass systems, diversion channels, culvert crossings and flood storage areas.
- Usage of Soakage where possible and where practical to replenish groundwater and minimum runoff volume.

3.4. Capacity and Quality

Water Quality Mitigation

Water quality mitigation is achieved through a combination of distributed source control measures and centralised wetland treatment systems. Initial abstraction is provided through on-lot retention tanks and/or grass lined roadside swales with check dams (as required) to achieve 9mins of resident time for each swale, reducing the volume of runoff entering the downstream stormwater network and providing retention and/or loss of the first flush of stormwater.

Stormwater generated from roads and developed areas is conveyed through the primary stormwater network and directed toward a series of constructed wetlands. The wetlands incorporate forebays and treatment zones designed to capture sediment and improve stormwater quality prior to discharge to the receiving environment. The proposed wetland system forms the primary water quality treatment mechanism for the development and has been configured in accordance with the objectives of the Waitawhiriwhiri (Draft) ICMP.

Water Volume Attenuation

The site is influenced by significant upstream catchments and existing drainage channels traversing the development area. Accordingly, the stormwater strategy has been designed to manage both development-generated runoff and external catchment flows while maintaining hydraulic connectivity through the site.

Existing drainage corridors are retained and supplemented by diversion channels, drain culvert crossings, wetlands, and associated storage areas. These elements work together to maintain

conveyance of external flows, reduce flood risk within the development, and provide attenuation of post-development runoff prior to discharge.

The proposed wetland systems also provide flood storage and attenuation benefits during larger storm events. Collectively, these measures contribute to the achievement of the stormwater quantity objectives established within the ICMP while supporting the wider flood management strategy for the development.

3.5. Overland Flow

Additional branches of OLFPs will be created as roading corridors are formed. The following measures will be adopted to mitigate their effects of these overland flowpaths on the proposed development.

- Identify and maintain natural overland flow/watercourse locations to convey concentrated stormwater from the site. Utilise existing culverts (where possible) to maintain the same discharge locations, post development.
- Identify and retain any upstream OLFPs and/or watercourses to avoid any upstream flooding.
- Ensure OLFPs are to be designed where possible within the roading network and discharge into watercourses and 100-year detention devices.

The preliminary OLFP design is shown in Maven Associates drawings C460 contained within Appendix A.

An assessment of the post development OLFPs has been carried out to evaluate the behaviour of surface runoff in the road carriageway under the proposed stormwater management system. The design scenario is based on the 2081-2100 RCP8.5 climate change scenario, incorporating all proposed devices and the assessment is done through HEC-RAS 2D. The OLFPs represents the conveyance of surface runoff because of the proposed system during the 100-year storm event.

Flow depths and velocities were assessed at key locations throughout the development covering all the various road/accessway typologies ensuring and confirming conveyance of the OLFP is viable through proposed carriageway. See below table showing results at the key locations.

More than 80% road areas comply with standard design thresholds. However, these are isolated areas recorded maximum water depths above the 150mm guideline. Note these depths are likely to be reduced at further refined modelling at later stage.

- Road 3: max depth = 200mm
- Road 4: max depth = 350mm
- Road 5: max depth = 200mm

Highest velocity depth of 0.15 (m²/s) values remain below critical safety thresholds defined in Austroads 2012 Part 5, which specify:

- < 0.4m²/s for pedestrian safety
- < 0.6m²/s for vehicle safety

The highest recorded value was 0.15m²/s (Road 3) confirming safe flow conveyance for both pedestrians and vehicles under design conditions. Flow is primarily routed along proposed roads conveyed into roadside primary networks for the 10-year conveyance to the proposed wetlands.

It is noted that a separate flood sensitivity analysis has been completed using HEC-RAS 2D modelling assuming all stormwater devices are fully blocked. The assessment detailed in section 7 of SMP, evaluates overland flow behaviour under worst case flooding conditions within and surrounding the site.

4. Stormwater System Devices

4.1. Wetland

Wetlands have been designed to provide stormwater treatment, extended detention, attenuation and flood storage prior to discharge to the existing stream, council/farm drain network or downstream stormwater network.

The Industrial Development includes the construction of three (3) stormwater wetlands. The wetlands will form part of the overall treatment train system, including forebays, outlet structures and primary conveyance systems.

Wetland 1 is proposed for Stage 1A and Catchment A and will receive road corridor runoff only. Wetland 2 is proposed for Stage 1B and Catchment B and will receive lot area runoff only. Wetland 3 is proposed for Stage 2 and 3 and Catchment C and will receive combined road corridor and lot area runoff.

Runoff from roads and developed areas will be conveyed through the primary stormwater network and directed to the proposed wetland systems. The forebays will provide sediment capture and energy dissipation prior to stormwater entering the wetlands. The wetlands will provide water quality treatment, extended detention and attenuation prior to discharge to the existing stream, council/farm drain network or downstream stormwater network.

The wetlands will be designed to treat the full water quality volume including storage and slow release of the extended detention to protect the downstream receiving environment, and to attenuate the 1 in 100 ARI event to 80% of predevelopment flows. To achieve extended detention, an orifice is to be designed and placed at the permanent water level within the wetland zone to allow slow release of WQV ED storage within 24 hours existing drainage channels. An overflow in the form of a weir or similar will be located above the 1 in 100 ARI event storage level for higher flow events into the existing adjacent drainage network.

Once water levels within the receiving stream recede, stored stormwater within the wetlands will progressively discharge through the primary outlet structure, comprising a low-flow orifice and spillway arrangement. A backflow prevention device will be incorporated within the outlet structure to prevent reverse flow from the receiving stream entering the wetland system during periods of elevated downstream water levels.

The outlet structures have been configured to achieve the required attenuation and drawdown performance, with the wetlands designed to fully drain within 48 hours following the design storm event, subject to receiving water levels returning to normal operating conditions.

Inspection requirements

- Embankment & Emergency Spillway
 - Level of spillway
 - Vegetation and ground cover
 - Freeboard
 - No evidence of embankment erosion
 - Removal of debris on emergency spillway
- Riser & Service Spillway
 - No low flow orifice obstructed
 - No excessive sediment accumulation inside the riser
 - Function of outfall channels
 - Slope protection

- No rip-rap failures
- Wetland
 - No undesirable vegetation growth
 - Removal of floating debris
 - No visible pollution
 - No evidence of edge erosion
 - No algal bloom or fish kill observed
- Sediment Forebays
 - Sediment is not accumulated more than 50%
 - Provision of access of maintenance
 - No blockage at inlet or outlet
 - No evidence of scour or erosion around inlet structure

Maintenance procedures

Timing	Component	Action
Following storms / Monthly	Inlet	Inspect and remove rubbish and debris from inlets.
	Trash racks and debris screens	Inspect and clear all litter, including leaves, rubbish, branches, and any other materials.
	Sediment forebay	Check the forebay for accumulated sediment. Test sediments for contaminants prior to dredging and dispose of sediment to landfill or similar, suitable for contaminant levels.
	Risers, control structures, grates, outlet pipes, skimmers, weirs, and orifices	Inspect control structures, weirs, orifices, outfall pipes for leaks and blockages. Clear and remove all blockages to avoid local flooding. Inspect outflow pipes for leaky joints or soil piping erosion. Check if anti-seep collars need repair or replacement. Check outfall and water discharge areas for erosion and restore and stabilise erosion.
	Emergency overflow or spillway	Check emergency overflow path remains clear of debris and blockages and remove any blockages. Check flow paths for erosion and repair as necessary.
	Erosion and bank stability	Inspect banks for settlement, erosion, scouring, cracking, sloughing, seepage and rilling.
	Water body	Remove rubbish and other floating debris from wetland pond.
	Wildlife	Remove dead animals to prevent disease spread.
	Soil	Inspect for loss of soil on wetland banks from erosion.
Annually	Valves and pumps	Check pumps and valves. Check moving parts for corrosion and lubricate.
2+ years	Wetland liners	Inspect liner for leaks and fix as per manufacturers or design specifications.

	Sediment forebay	Check the forebay for accumulated sediment. Test sediment for contaminants prior to dredging and dispose of sediment to landfill or similar suitable for contaminant levels.
--	------------------	--

Troubleshooting

Symptom	Possible problems	Solutions
Wetland water levels remain high	The outlet riser openings may be too narrow to allow fast draining after a storm	Unless water levels remain high for more than two days or flooding is a threat, action may not be necessary,
	Outlets structures are clogged	Check outlet structures and openings for blockage by debris or sediment, and clean as necessary.
Wetland is dry	Invasive plants	Remove plants by hand. (no herbicide)
	A maintenance valve is open	Check drain valves and shut if open
	Water leaking from cracks in outlet structure	Inspect for cracks and repair as necessary. Inspect for leaky joints at outlet pipes and repair.
	Wetland in area of changing groundwater levels	Pond will remain dry as long as groundwater levels are low. Design for pond should have taken this into account, so this may be normal for this wetland.
Stormwater discharging from the wetland looks dirty, muddy, or dark	High concentration of sediments washing into wetland, especially silts and clays, due to erosion or construction in the catchment area	Check catchment for erosion areas, including construction works. Check erosion controls are in place.
	Forebay full of sediment	Forebay usually needs more frequent clearing of sediment than wetland pond.
	Local works disturbing soils, with rain washing these into wetland	Check erosion and sediment controls in place on local construction sites.
Pond banks are eroding	Water flowing down pond banks is eroding soils	Minor erosion can be repaired by replacing soil and stabilising with planting or other methods.
	Stormwater outlet pipes direct flow at banks	Cause of erosion from direct discharge may need to be identified, for example, by extending pipes down into pond. Extensive erosion due to continuing discharge may require erosion protection.
Water is leaking from the wetland and through the banks along pipes	Leak collars around pipes have failed or have not been fitted correctly.	Qualified contractors should make immediate repairs. It usually requires pond to be drained, banks excavated, leak collars repaired, and pond banks reinstated.
Backflow into wetland occurs	Backflow prevention device is blocked, damaged or not operating	Inspect backflow prevention device and repair or replace as necessary.

4.2. Temporary Swales

Temporary swales for Industrial Development will be constructed as interim stormwater management measures during construction to maintain existing drain and direct flows through and around the site during earthworks.

The temporary swales will be progressively replaced by permanent infrastructure as development proceeds.

The temporary swales shall be inspected in line with the Waikato Stormwater Management Guideline 2020. This will include manual/mechanical prevention of undesired overgrowth from taking over the area (mowing/weeding), and manual debris and sediment removal from the temporary swales, outlets and associated conveyance routes.

Inspection requirements

- Debris cleanout
 - Removal of debris
 - No dumping of wastes into swales
 - Litter has been removed
- Vegetation
 - Plant height not less than design water depth
 - Fertilised per specifications
 - No evidence of erosion
 - Grass height not greater than 250mm
 - No placement of inappropriate plants
- Dewatering
 - Swales dewater between storms
 - No evidence of standing water

Maintenance procedures

Timing	Component	Action
Following storms	Inflow points	Check for scouring, channelling, and erosion and repair as necessary.
	Side slopes	Check for scouring, channelling, and erosion and repair by adding soil and replanting as necessary.
	Channel base	Check for scouring, channelling, and erosion and repair by adding soil and replanting as necessary.
	Plants and soil	Check stormwater is filtering through soil following stormwater runoff. Remove weeds.
Monthly	Outlet	Check for scouring or erosion and repair to suit.
	Inflow points	Remove rubbish and debris.
	Channel base	If grassed, mow channel no shorter than 150mm Re-seed bare patches of grass.
	Plants and soil	Replant gaps and water new plants in dry conditions until established.
Two yearly	Outlet	Remove rubbish and debris from outlet grate or catchpit.
	Channel base	Check for boggy patches and ponding water.

		Check soil is not compacted and aerate surface or tip up dips to repair.
	Grass, plants, and soil	Remove weeds, rubbish, and debris. Re-plant gaps and re-seed bare patches, and water if required to establish. Aerate soil to prevent natural compaction. Check Stormwater is filtering through soil.

Troubleshooting

Symptom	Possible problems	Solutions
Water not draining	Soil compacted	Aerate soil with rotating aerator or core.
	Soil clogged with fine sediments	Remove top layer of soil and replace, turning soil.
	Underdrain, if present, may be blocked	Re-build underdrain.
Water flowing straight to outlet	Soil not free draining	Aerate soil, replace top layer of soil, replace soil with free draining mix.
	Swale slope is too steep	If slope is over 5%, construct check dams to slow flows.
	Plants or grass is not dense enough	Leave grass longer, and re-seed to increase density.
Scouring / Channels appearing	Inflow is concentrated at inlets	Remove blockages including rubbish, debris, and sediment build up.

4.3. Detention / Retention Tanks

Detention / Retention Tanks will be constructed to capture surface water from roof areas and/or impervious areas and retain and detain stormwater on-lot for Stage 1A.

The detention / retention tanks form part of the overall stormwater management system and provide retention of the required initial abstraction volume at source and detention of stormwater flows prior to discharge to the downstream stormwater network. The detention / retention tanks will remain in private ownership. Ongoing operation and maintenance responsibilities will be with the property owners or occupiers.

Overflow from the detention / retention tanks will discharge to the downstream stormwater network once the available storage volume has been exceeded. Controlled discharge from the detention storage will be provided through the outlet pipe, orifice, flow control device or other approved outlet arrangement.

The detention / retention tanks shall be inspected in line with the Waikato Stormwater Management Guideline 2020 and Hamilton City Council.

The lot retention tanks shall be inspected in accordance with the Waikato Stormwater Management Guideline 2020 and Hamilton City Council HCC:05 Rainwater reuse and detention system practice note. This will include manual/mechanical removal of debris, sediment, leaves and vegetation from the gutters, downpipes, pre-screening devices, filters, outlet pipes, overflow pipes and other components associated with the detention and retention tanks.

Inspection requirements

- Debris cleanout
 - Removal of debris
 - No dumping of wastes into tanks
 - Litter has been removed
- Gutter and Downpipe
 - No blockage within gutters and downpipes
 - No evidence of damage or leakage
 - No disconnection from the detention / retention tank
 - Only roof water and approved stormwater runoff is directed to the detention / retention tank
- Pre-screening devices and filters
 - Screens and filters are clean
 - No excessive sediment or organic matter accumulation
 - No damaged or missing screens
 - First flush diverter, if provided, is operating as intended
- Outlet and flow control device
 - No blockage within outlet pipe, orifice or flow control device
 - Outlet pipe is operating as intended
 - No excessive sediment or debris accumulation around the outlet
 - No evidence of damage to the outlet pipe, orifice or flow control device
 - Controlled discharge from the detention storage is operating as intended
- Overflow
 - No blockage within overflow pipe
 - Overflow pipe is operating as intended
 - No evidence of erosion or scour at the overflow discharge point
 - No stormwater surcharge back into the tank from the downstream stormwater system
- Pump and non-portable water supply
 - Pump is operating as intended
 - No evidence of damage to pipework or electrical components
 - Non-potable water taps are clearly marked
 - Backflow prevention device is maintained and tested where required
- Tank
 - No evidence of cracks or damage
 - No evidence of leakage
 - No excessive sludge or sediment build up
 - Access lid is secure
 - Access to the tank, pump, screens and filters is maintained

Maintenance procedures

Timing	Component	Action
Following storms	Gutters and downpipes	Check for leaves, litter, sediment and debris and remove as necessary
	Pre-screening devices and filters	Check for blockage and clean as necessary.
	Overflow pipe	Check overflow pipe is clear and operating as intended.

	Overflow discharge point	Check for erosion or scour and repair as necessary.
3 Monthly	Pre-screening devices and filters	Inspect and clean pre-screening devices, leaf guards, first flush diverters and filters.
	Gutters and downpipes	Remove leaves, litter, sediment and other debris.
6 Monthly	Gutters	Inspect and clean gutters.
	Downpipes	Check for blockage, damage or leakage and repair as necessary.
	Overflow pipe	Check overflow pipe is clear and remove any blockage.
	Tank inlet and outlet	Check for blockage, damage or leakage and repair as necessary.
Yearly	Tank	Check for sludge and sediment build up. Remove sludge and sediment if required.
	Surrounding vegetation	Clear surrounding vegetation and overhanging trees from roof areas.
	Access lid	Check access lid is secure and safe.
	Backflow prevention device	Inspect and test by certified inspector where required.
5 Yearly	Tank structure	Inspect tank structural integrity by qualified professional.
	Pipework	Inspect pipework by qualified professional.
	Pump and electrical components	Inspect pump and electrical components by qualified professional.

Troubleshooting

Symptom	Possible problems	Solutions
Tank not filling	Gutters or downpipes are blocked	Remove leaves, litter, sediment and debris from gutters and downpipes.
	Pre-screening devices or filters are blocked	Clean pre-screening devices and filters.
	Downpipe is disconnected from tank	Reconnect downpipe to the tank.
Non-potable water supply not operating	Tank is empty	Check tank water level.
	Pump is not operating	Check power supply and pump operation.
	Electrical or pump fault	Arrange inspection by qualified professional.
Poor water quality	Sediment or sludge accumulated in tank	Inspect tank and remove sediment or sludge if required.
	Leaves or organic matter entering tank	Clean gutters, screens, filters and first flush diverter.
	Stagnant water or odour from tank	Clean tank and remove organic matter.
Overflow not operating	Overflow pipe is blocked	Remove blockage from overflow pipe.
	Overflow discharge point is blocked	Remove debris and sediment build up.
	Stormwater is surcharging back into tank	Check downstream stormwater connection and repair as necessary.
	Tank wall or fittings damaged	Inspect tank and repair as necessary.

Water leaking from tank	Pipe connection is leaking	Repair or replace damaged pipe connection.
Mosquitoes or pests	Damaged or missing insect screens	Repair or replace insect screens.
	Access lid not secure	Secure access lid
	Organic matter accumulated in tank	Clean tank, gutters and filters

5. Reporting and Scheduling

Recording and Reporting of Operation and Maintenance activities to the WRC

Recording of information and device tracking are important components of the maintenance of stormwater system devices. It is important that site operator and/or owners track maintenance by use of database as it assists inspectors to understand what devices need to be inspected, when they need to be inspected, and when was the last maintenance. Established checklists will be used during the inspection and maintenance activities, and the activities will never rely on the memory of any one individual.

Appendix A – Auckland Council’s Wetlands Operation and Maintenance Guide

Appendix B – Recommended Maintenance Event and Frequency Checklists

Appendix C – Troubleshooting Guide