

SOUTHERN LINKS 1
INDUSTRIAL DEVELOPMENT
STORMWATER MANAGEMENT PLAN

PROJECT INFORMATION

PROJECT 298002

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REVISION A

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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.

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2. Executive Summary

1. Purpose and Context

This Stormwater Management Plan (SMP) supports the resource consent application for the Southern Links 1 - Industrial Development, an approximately 60-hectare greenfield site located in the greater Southern Links 1 Growth Cell to the south of Hamilton City, located in the Waipā District, delivering 22 industrial lots of varying industrial lot sizes. The SMP has been prepared in accordance with Waikato Regional Council (WRC) guidelines, the Regional Infrastructure Technical Specifications (RITS V2, 2025) and the Hamilton City Council Draft Waitawhiriwhiri Integrated Catchment Management Plan (ICMP) and accompanies the Substantive Application under the Fast-Track Approvals Act 2024.

The site sits within the Waitawhiriwhiri catchment and is interspersed with several straight artificial farm drains. The site overall geology consists of low-lying areas comprised of Holocene peat deposits, with the peat being underlain by interbedded Silts and Sands of the Late Pleistocene alluvial deposits of the Hinuera formation.

2. Stormwater Management Objectives

The SMP sets out the best practice approach to stormwater management within the receiving catchment.

Proposed objectives of the SMP are outlined below:

- Manage stormwater runoff in a manner that maintains or improves the hydraulic and environmental performance of the receiving environment.
- Minimise adverse effects of the development on downstream properties, infrastructure, and receiving waters through appropriate stormwater quantity and quality management.
- Incorporate Water Sensitive Urban Design (WSUD) principles, where practicable, to promote sustainable stormwater management and enhance environmental outcomes.
- Provide a stormwater management system that complies with the WRC Stormwater Guidelines, RITS, HCC CoP, and resource consent conditions.
- Deliver an integrated stormwater network that supports the staged development of SL1 while achieving the assessed stormwater management outcomes.

The overall SMP creates a stormwater toolkit, which will guide future development of SL1 – Industrial Development. The toolkit will promote sustainable solutions including the integration of Water Sensitive Urban Design (WSUD) principles.

3. Design Philosophy and Statutory Framework

The SMP adopts an integrated treatment-train approach that addresses stormwater quality, quantity, flood management and hydraulic connectivity across the development. The design is outcome-focused and incorporates Water Sensitive Urban Design (WSUD) principles. Key statutory drivers include the Waikato Regional Policy Statement, the Waikato Regional Plan, the National Environmental Standards for Freshwater, the National Policy Statement for Freshwater Management 2020, RITS, and the WRC Stormwater Management Guidelines (TR20-07).

The core design targets are:

- Retention of the pre-development initial abstraction depth (10 mm) via on-lot retention and/or soakage;
- Water quality treatment through a treatment train achieving 75% TSS removal;
- Extended detention (ED) of the Water Quality Volume ($1.2 \times \text{WQV}$ over 24 hours);
- Attenuation of the 2-year and 10-year ARI events to pre-development discharge rates and

- Attenuation of the 100-year ARI climate change event to no more than 80% of pre-development discharge.

Climate change allowances use NIWA downscaled end-century SSP5-8.5 (RCP 8.5) projections.

4. The Treatment Train

An overview of treatment train design principles is described below.

Stage 1 — Initial Abstraction

On-Lot Retention

The first component of the treatment train for Stage 1A is the provision of on-lot retention tanks for the industrial lots. These tanks provide retention of the required initial abstraction volume and reduce the volume of runoff entering the downstream stormwater network.

Soakage

The first component of the treatment train for Stage 1B, 2, and 3 is the provision of roadside swales (road run-off) and unlined artificial stormwater wetland ponds for industrial lots. These devices provide the loss via soakage of the required initial abstraction volume and reduce the volume of runoff entering the downstream stormwater network. It is noted that the Stage 1A road network adopts this principle as well.

Stage 2 — Primary Conveyance

Runoff exceeding the on-lot retention and/or roadside swale capacity is conveyed via a piped stormwater network sized for the 10-year ARI climate change event. Flows beyond the piped system capacity are conveyed as overland flow within road corridors, designed to safely pass the 100-year ARI climate change event with maximum depths at or below 130 mm and “*Depth*” x “*Velocity*” products well within Austroads safety thresholds (< 0.4 m²/s for pedestrians).

Stage 3 — Treatment and Attenuation

Three (3) artificial wetlands (Wetlands 1 through 3) form the primary treatment and attenuation devices. Each wetland incorporates the following:

- A forebay (minimum 10% of wetland area per RITS, 15% of WQV per TR20-07) for sediment capture,
- 2.0m safety bench (1V:8H slope as per RITS)
- Internal bathymetry (as per RITS Table 69)
 - Shallow Marsh area approx. 40% of Permanent Storage Zone (PSZ) (+/- 5%)
 - Deep marsh area approx. 40% of PSZ (+/- 5%)
 - Intermediate deep pools approx. 10% of PSZ (+/- 2%)
- An extended detention zone (1.2 × WQV),
- Flood attenuation for the 100-year ARI CC Event
- A controlled outlet structure with a low-flow orifice and spillway.

Stage 4 — Controlled Discharge

Treated and attenuated flows discharge via controlled outlets to modified and enhanced drains and/or Hamilton City Council Stormwater drainage network. Backflow prevention devices are incorporated to prevent reverse flow from the receiving drainage network during elevated downstream water levels. The wetlands are designed to fully drain within 24 hours following the design storm event.

5. Flood Modelling and Downstream Effects

A comprehensive 2D flood model was developed using HEC-RAS, with hydrology generated in HEC-HMS using the SCS Curve Number method. The model extends from the upstream contributing catchments through the development site to the downstream Hamilton City Council drainage network, capturing the full hydraulic system that influences flood behaviour on site.

The existing-condition modelling confirms that the site is currently subject to widespread shallow flooding and poorly defined flow paths.

Post-development modelling demonstrates that the proposed stormwater measures effectively mitigate flood impacts. Peak flow rates are reduced at all assessed sections under the 2-year, 10-year and 100-year climate change events.

Catchment	PRE Development Flows (m ³ /s)			POST Development Flows (m ³ /s)		
	2YR	10YR	100YR	2YR	10YR	100YR
A	0.140	0.2803	0.5339	0.061	0.081	0.3783
C	0.113	0.2265	0.4316	0.031	0.5428	0.8479
D	0.312	0.6274	1.1998	0.293	0.383	0.6975
E	0.695	1.3961	2.6704	0.691	0.98	1.6495
	1.2603	2.5303	4.8357	1.076	1.9868	3.5732

Table 1 – Pre & Post Development Flows

The results indicate that the proposed wetland systems are capable of achieving substantial attenuation of post-development runoff prior to discharge into the existing drainage network.

6. Conclusion

The SL1 – Industrial Development SMP provides a robust, integrated stormwater management framework that addresses the full spectrum of design responses required by this site. The treatment-train approach achieves compliance with WRC and RITS requirements for both water quality and quantity.

Hydraulic modelling confirms that post-development peak discharges are reduced relative to pre-development conditions across all design events, and overland flow paths safely convey extreme events within road corridors. The system operates entirely by gravity and is structured to be delivered incrementally alongside the staged development programme. Residual matters for detailed design include detailed refinement of wetland bathymetry, confirmation of soakage rates beyond perched layers, finalisation of culvert design details and ongoing engagement with WRC, HCC, WDC and local Iwi. None of these are considered impediments to the feasibility of the stormwater strategy.

3. Introduction

3.1. Overview

This Stormwater Management Plan (SMP) outlines the proposed management of stormwater for the proposed development of the SL1 – Industrial Development located at 160 Higgins Road, 20 Wickham Street and 24 Wickham Street, Frankton, Hamilton.

This SMP is intended to be read in conjunction with the Stormwater Assessment Report (SAR) that covers the overall details of the stormwater management principles, compliance with relevant technical and legal requirements and overall effects of the proposed stormwater flood modelling results on the

proposed development and surrounding environment. This SMP shall also be read in accordance with Engineering drawings, particularly Stormwater C400 series, and engineering calculations.

This SMP provides more overview information on the technical aspects of the SAR prepared and providing philosophy and demonstrates how the stormwater-related resource consent conditions will be implemented and complied with during the development of the site.

3.2. Objectives

The SMP sets out the best practice approach to stormwater management within the receiving catchment.

Proposed objectives of the SMP are outlined below:

- Manage stormwater runoff in a manner that maintains or improves the hydraulic and environmental performance of the receiving environment.
- Minimise adverse effects of the development on downstream properties, infrastructure, and receiving waters through appropriate stormwater quantity and quality management.
- Incorporate Water Sensitive Urban Design (WSUD) principles, where practicable, to promote sustainable stormwater management and enhance environmental outcomes.
- Provide a stormwater management system that complies with the WRC Stormwater Guidelines, RITS, Hamilton City Council (HCC) Code of Practice (CoP), and resource consent conditions.
- Deliver an integrated stormwater network that supports the staged development of SL1 while achieving the assessed stormwater management outcomes.

The overall SMP creates a stormwater toolkit, which will guide future development of SL1 – Industrial Development. The toolkit will promote sustainable solutions including the integration of Water Sensitive Urban Design (WSUD) principles.

3.1. Site.

The SL1 – Industrial area is a circa 60ha block of land within the Waipa District and it 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 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 also located either side of the Hamilton Southern Links (HSL) roading designation, an NZ Transport Agency / Hamilton City Council project. The site is utilised for pastoral grazing, with land cover comprising maintained grassland consistent with agricultural use, with some gravel "parking" and "storage" areas off Wickham Street and an uncontrolled fill stockpile area in the northwest corner, adjacent to the KiwiRail Corridor.

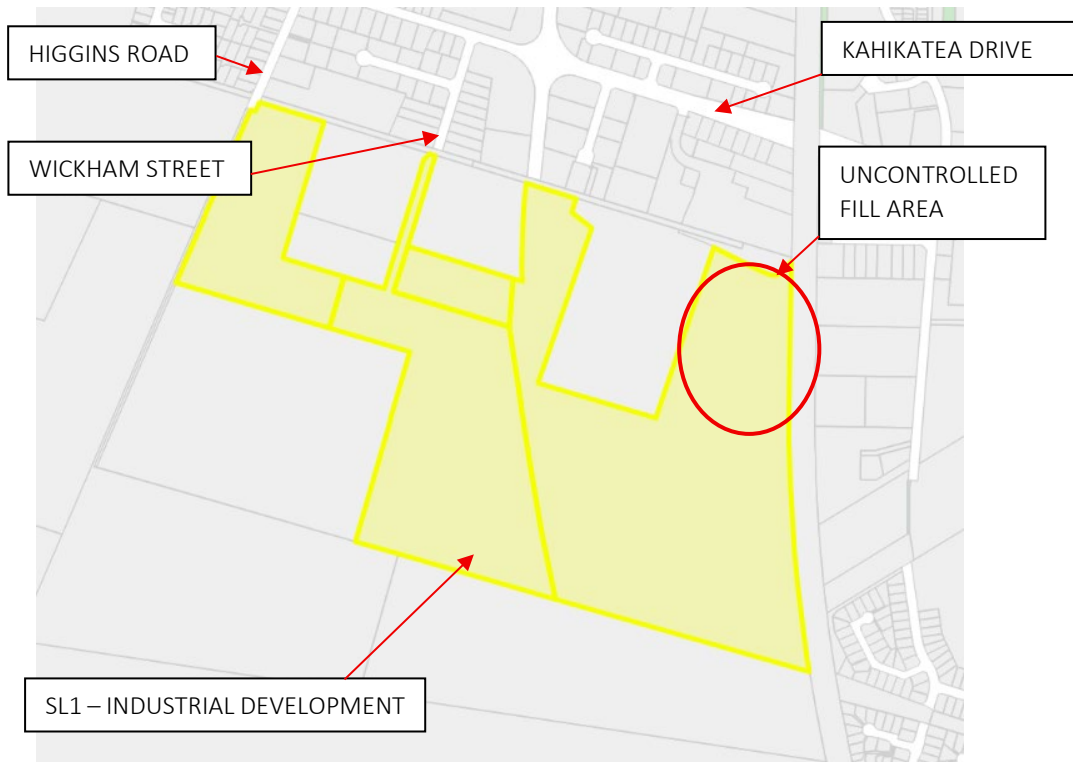


Figure 1: Site Locality

3.2. Catchment

The Project forms a part of wider SL1 area. The SL1 area is a circa 500ha block of land within Waipa District. The Industrial Development area has a northwest to southeast orientation from Higgins Road in the northwest to the KiwiRail Corridor to the southwest and borders the HCC boundary to the north and west. The SL1 – Industrial Development encompasses approx. 60ha of land. Most of the catchment is low-lying flat farmland, interspersed with straight artificial farm drains and connects to the HCC drainage network to the north which discharges into the Waitawhiriwhiri drainage network.

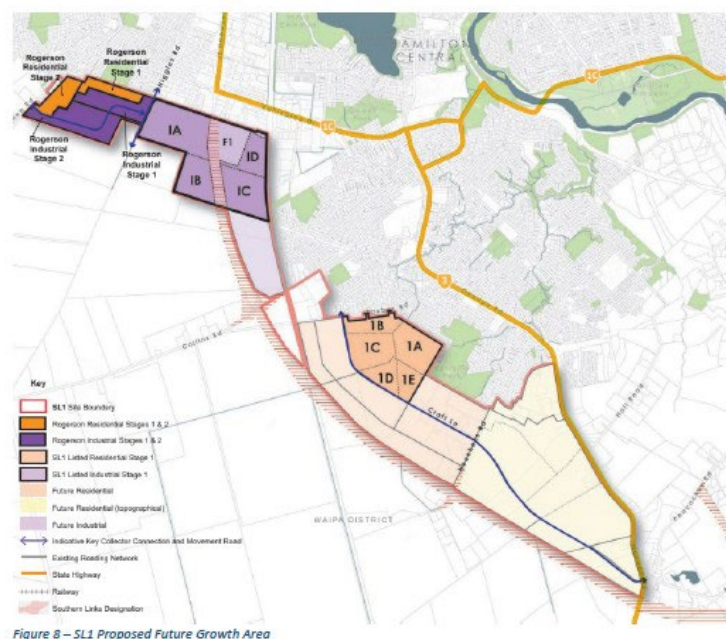


Figure 2: ICMP Excerpt Showing Proposed SL1 Future Growth Area

4. Industrial

The wider SL1 area comprises both residential and industrial development areas; however, this SMP relates solely to the Industrial area. The Industrial Development area has been divided into several stormwater catchments and sub-catchments to support the assessment of stormwater quality, quantity, hydraulic connectivity, and flood management requirements.

This section of the SMP provides further details of the proposed Industrial Development, and the stormwater strategies to meet regulatory requirements, RITS and ICMP.

Spanning approximately 60 ha, the SL1 – Industrial area includes 22 industrial lots of varying industrial lot sizes together with infrastructure devices including wetlands and roading.

The key feature of the development is an integrated stormwater treatment train approach utilising wetland, forebays, roadside swales and piped infrastructure to convey and attenuate overflows from the road and lot areas releasing at 80% of pre-development flows into the Waitawhiriwhiri drainage network. Lot areas will be treated via a combination of “at source” and within artificial stormwater wetlands, while road impervious areas are to be treated via a combination of grass lined swales and artificial stormwater wetlands.

The artificial stormwater wetland catchments have been designed to facilitate different treatment outcomes for each of the proposed catchments as outlined below in table 2 below:

Stage	Artificial Stormwater Wetland	Catchment	Catchment Type	Ownership
1A	Wetland 1	A	Road Corridor Only	Private – with the option to Vest in the future
1B	Wetland 2	B	Lot Area Only	Private
2 & 3	Wetland 3	C	Road Corridor & Lot Area Combined	Public

Table 2: SW Wetland Catchments Break-down

4.1. STAGING, TIMING, RESPONSIBILITY AND FUNDING

Key stormwater infrastructure elements, including on-lot tanks, artificial wetlands, forebay and primary conveyance system (swales, pipes or overland), forms the stormwater management system proposed. The proposed infrastructures provide both treatment (quality), conveyance and flow control in line with ICMP requirements.

The development will be undertaken in stage phases, with each stage designed to operate independently while maintaining consistency with the overall stormwater management strategy outlined in this SMP.

Each stage will incorporate the required/necessary proposed infrastructure to manage its runoff generated within that stage without reliance on future stages, while also maintaining continuity of flow from upstream catchment runoff conveyed through the site and existing drains.

Where practicable, key elements of the primary stormwater network, including diversion channels and downstream artificial wetlands, will be constructed early to support both interim and eventual main stormwater management.

Interim stormwater management measures, such as temporary swales, bunds conveyance routes for flows, will be implemented during construction to maintain existing drain and direct flows through and around the site during earthworks. These measures will be progressively replaced by permanent infrastructure as development proceeds.

The proposed staging approach has been developed to align with both regional and district standards along with the ICMP, which are detailed in the Stormwater Assessment Report.

4.2. COSTS, FUNDING AND VESTING ASSETS

The construction of the stormwater management devices will be undertaken by the consent holder. The proposed stormwater infrastructure includes on lot retention tanks, public piped networks, swales, artificial stormwater wetlands, and private property devices.

The public assets will be vested to council at the appropriate time as the development progresses.

Private assets will remain in private ownership where appropriate legal instruments will be set up to ensure ongoing operation and maintenance responsibilities are with the owners.

Public stormwater assets, including primary pipe networks, and artificial stormwater wetland 3 will be vested to council, subject to compliance with the engineering approval process. Artificial stormwater wetlands 1 & 2 will be retained in private ownership, with the option to vest wetland 1 to council in the future.

The final detailed design, location and function of all stormwater infrastructure will be confirmed during detailed design stage and subject to engineering approval process.

4.3. OPERATION, MAINTENANCE AND MONITORING PLAN

A Stormwater Operations and Maintenance Plans is provided for all stormwater management devices that will be vested to Council(s). Refer to Maven's SL1 - Industrial SW Device Operations and Maintenance Plan report.

4.4. GEOTECHNICAL ASSESSMENT

Various site-specific geotechnical investigations have been conducted, and a geotechnical investigation report has been prepared by CMW, to support the Fast-track application.

The report identifies the approximate distribution of prevailing landforms and geologies for the local area. The site geology consists of low-lying areas comprised of Holocene peat deposits. The peat is underlain by interbedded Silts and Sands of the Late Pleistocene alluvial deposits of the Hinuera formation, which is underlain by Early Pleistocene, fluvially reworked igneous silt/clay of the Walton Subgroup Formation which also form the base of the nearby hills outside the site. The exception is the imported gravel fill in the yard areas, the uncontrolled fill in the existing green waste site and the construction waste site in the north-eastern corner of the site.¹

¹ Please refer to the CMW "Geotechnical Investigation Report" for more information.

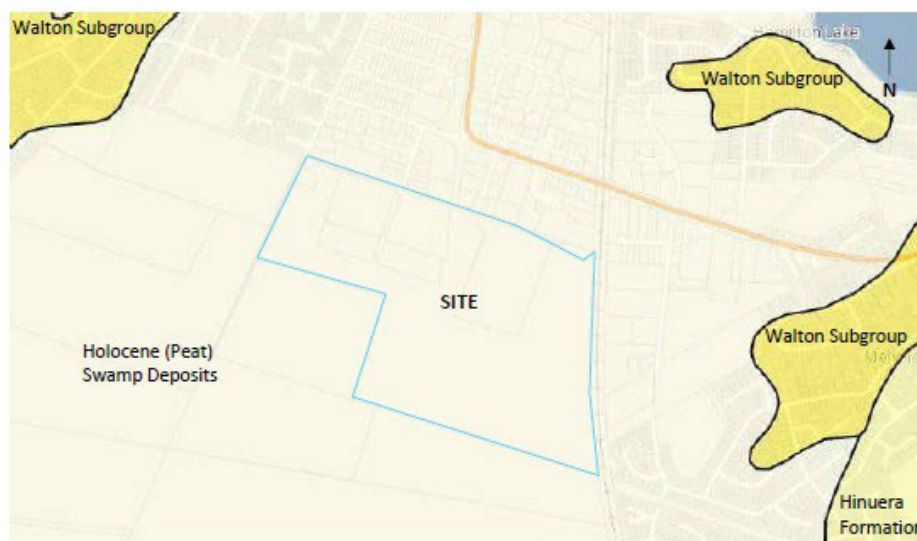


Figure 3: Excerpt from Geotech Report

Groundwater was encountered at depths ranging from 0m to 3.7m below existing ground levels. Additionally, ongoing groundwater monitoring carried out by WGA has produced results between 1.74 and 4.85m in depth.

The geotechnical investigation indicates that subsurface conditions vary across the site, with predominantly peat underlain by sandy and silty soils. These findings will be considered during detailed design of infrastructure and stormwater management devices to ensure appropriate treatment of local soil and groundwater conditions.

5. Existing Catchment

5.1. EXISTING CALCULATION PARAMETERS

The design and calculation assumptions used for pre-development are outlined in the table 3 below. These values were established using the available GIS/aerial view, topographical site survey, geotechnical report, and NIWA-HIRDS.

Pre-Development CN (Runoff Curve Number)	
Pervious	Impervious
74	N/A
Pre-Development 24hr Rainfall Depth (mm)	
10yr	100 yr
99.2	152
Climate change RCP 8.5 24hr Rainfall Depth (mm)	
10yr CC	100 yr CC
131	204

Table 3: Design Parameters

With respect to rainfall data, two predevelopment scenarios have been adopted in this stormwater Management Plan, depending on the purpose of the assessment:

1. **Design and sizing of stormwater mitigation devices** (Section 6). Pre-development data used when designing and sizing of proposed devices uses historical rainfall event data without climate change. Refer to table 3 above.
2. **Flood sensitivity Analysis** (Stormwater Assessment Report). The assessment of effects on the surrounding environment adopts RCP8.5 climate change projections for the existing scenario, consistent with the proposed (post-development) scenario. This enables a like-for-like comparison of impacts using the same design events to quantify relative effects.

5.2. EXISTING OVERALL CATCHMENT

Most of the catchment for the Industrial Development is low-lying flat farmland, interspersed with straight artificial farm drains and connects to the HCC drainage network to the north which discharges into the Waitawhiriwhiri drainage network.

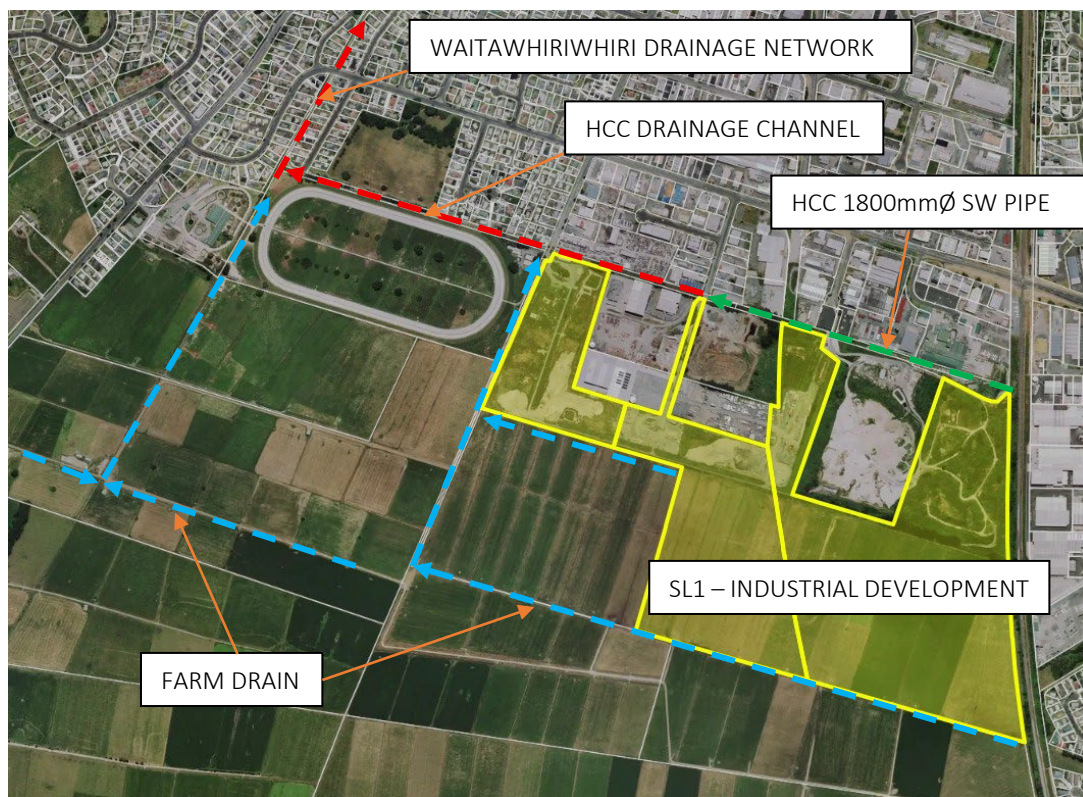


Figure 4: Existing Drainage Network

The catchment above has been delineated using HEC-HMS V3.12 based on a 1m grid from LINZ data as detailed below.

Maven's desktop study of the Catchment identifies that there are 6 main discharge points, discharging downstream of the Industrial site. These outlet points and discharge rates are detailed in the table below.

The existing catchment comprises a combination of local site runoff and significant upstream contributing catchments draining through the Waitawhiriwhiri Stream and associated drainage channels. Understanding these existing flow paths and discharge locations is critical to ensuring future development does not adversely affect upstream or downstream flooding. Accordingly, catchment

delineation and hydrological modelling were undertaken to establish baseline flow conditions and inform the proposed stormwater management strategy.

Existing flows through HEC-HMS software were established with aid of TR20 Sheets; see the below summary table. These flows are directly discharging into the HCC drainage network. Runoff from external catchments has not been included in the assessment, as these flows are outside the development catchment and continue to discharge directly to the existing drainage system.

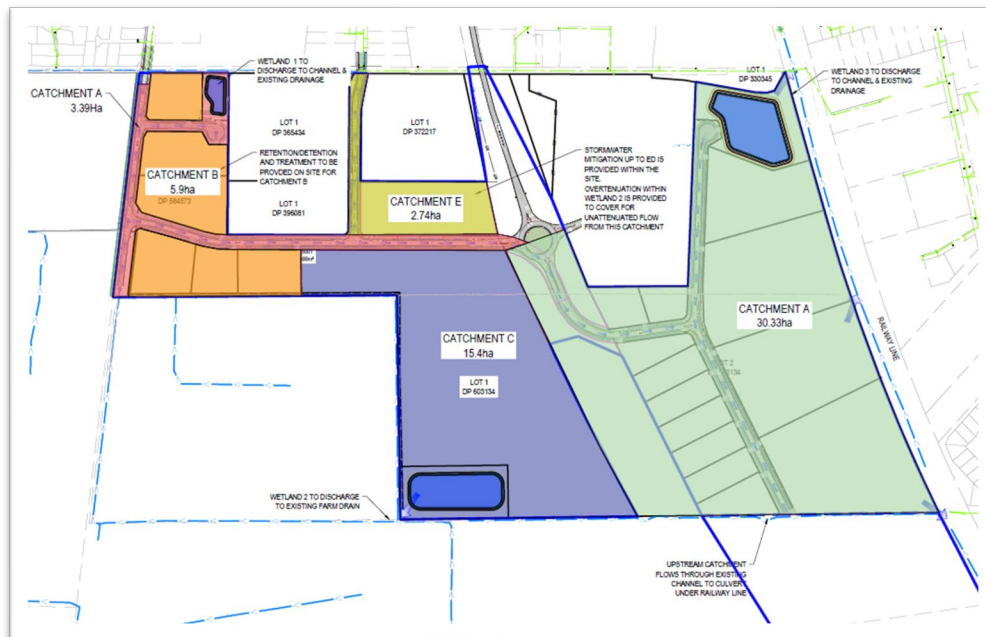


Figure 5: Proposed Catchments

Catchment Areas

Catchments	Area (Ha)	Area (km ²)
Wetland 1 - Catchment A	3.39	0.0339
Wetland 2 - Catchment D	15.4	0.154
Wetland 3 - Catchment E	30.33	0.3033
Catchment B - Assumed Mitigated On-Lot	5.9	0.059
Catchment C - Assumed Mitigated On-Lot	2.74	0.0274

Table 4 – Catchments Pre Development

Table 5 – Pre Development Flows

Catchment	Pre Development Flows Discharge (m³/s)		
	2YR	10YR	100YR
A	0.1399	0.2803	0.5339
C	0.1131	0.2265	0.4316
D	0.3124	0.6274	1.1998
E	0.6949	1.3961	2.6704
	1.2603 m³/s	2.5303 m³/s	4.8354 m³/s

6. Design Approach

The design approach provides for the conveyance of stormwater through the site and discharge at the target rates summarised below.

- Retention of the initial abstraction depth (10 mm) shall be provided via on-lot retention tanks for Stage 1A industrial lots, and via soakage (through roadside swales and/or unlined wetland ponds).
- Water Quality Volume (WQV) shall be treated through the artificial stormwater wetlands in accordance with RITS requirements.
- Extended detention (ED) of the WQV shall be provided within the artificial wetlands in accordance with RITS requirements.
- The 2-year and 10-year Annual Recurrence Interval (ARI) events shall be conveyed via the piped stormwater network and attenuated within the proposed artificial wetlands.
- The 100-year ARI event shall be conveyed via road corridors as overland flow and directed to the proposed artificial wetlands, where it shall be attenuated to no more than 80% of the pre-development discharge rate.

6.1. DESIGN PARAMETERS

Rainfall information from the NIWA High Intensity Rainfall Design System V4 (HIRDS) has been used for the site location including an allowance for climate change.

The design shall be based on the following parameters.

- Rainfall Data – NIWA cc adjusted using RITS RCP8.5 2100-2120 (climate change 4 degrees)
- Rainfall data distribution – using Normalised 24hr temporal rainfall intensity (Climate change 3.8degrees)
- Runoff Method: SCS CN – CN used as advised by Geotech and as per Geotech Report.
- Design Events assessed: 2, 10 and 100year existing/historical and RCP8.5 2100-2120

Table 6 – HIRDS hydrology Data

Rainfall Event	Historical Rainfall Depth	RCP 8.5 Rainfall Depth	RCP8.5 Rainfall Intensity
2 Year ARI	65.6mm	84mm	-
WQV		28mm	-

10 Year ARI	99.2mm	131mm	137mm/hr
100 Year ARI	152mm	204mm	-

Table 7 – CN Values

Scenario	Impervious (CN)	Pervious (CN)
Pre Development	N/A	74
Post Development (Catchment A & C)	98	74
Post Development (Catchment B)	89.8	74

The proposed Industrial Area has assumed the following = 85% impervious and 15% pervious as per the Hamilton City Council District Plan and RITS standards for Industrial Areas.

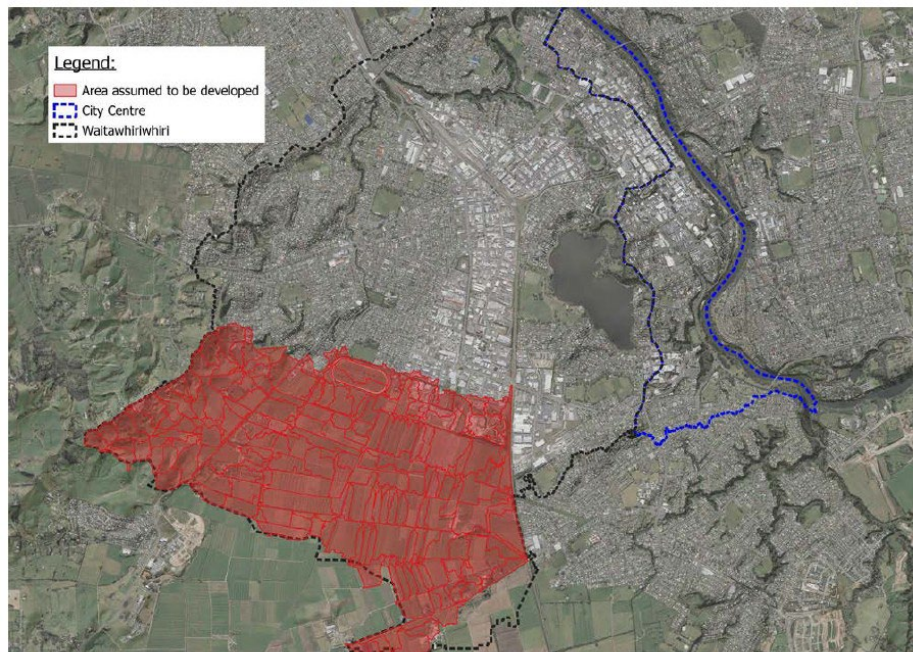


Figure 47 – Area of Upper Catchment Assumed to be Developed Under the Greenfield Development Scenario

Figure 6: ICMP Excerpt Showing Assumed Upper Catchment Development

6.2. HYDRAULIC CONNECTIVITY

Hydraulic connectivity across the site is maintained through retention of the existing farm drain along the western side of the proposed Industrial Right of Way (road 02) that will maintain the connection for the farm drain network to the south to the HCC drainage channel along the northern edge of the proposed development.

Proposed artificial stormwater wetland systems will discharge as follows:

- Wetland 1, which serves Stage 1A and Catchment A, will discharge to the HCC drainage channel and/or the stormwater piped infrastructure located to the north.
- Wetland 2, which serves Stage 1B and Catchment D, will discharge to the existing farm drains to the south.
- Wetland 3, which serves Stages 2 and 3 and Catchment E, will discharge to the KiwiRail drainage channel and/or HCC stormwater piped infrastructure to the north

The roadside swales, stormwater piped infrastructure and artificial wetland ponds have been integrated into the drainage network to ensure flood conveyance and stormwater attenuation objectives are achieved without adversely affecting upstream or downstream hydraulic conditions.

Stormwater management for the developments will include several devices which are considered as water sensitive design elements. These include the following:

- Wetlands, forebay and spillway
- On-lot stormwater retention through tanks with overflow into the primary system.
- Planting of riparian areas.

The Water Quality Volume (WQV) is treated either at source for on Lot areas, or within the wetland ponds (refer to table 1, section 1.2 for more details). Overflows above the 2-year ARI cc event are directed to Wetlands. Existing runoff route is to be maintained with minimal impervious runoff being added. The proposed stormwater solution ensures stormwater is being treated before discharging into the receiving environment.

The General Layout and approach for stormwater design throughout the site is as shown below.

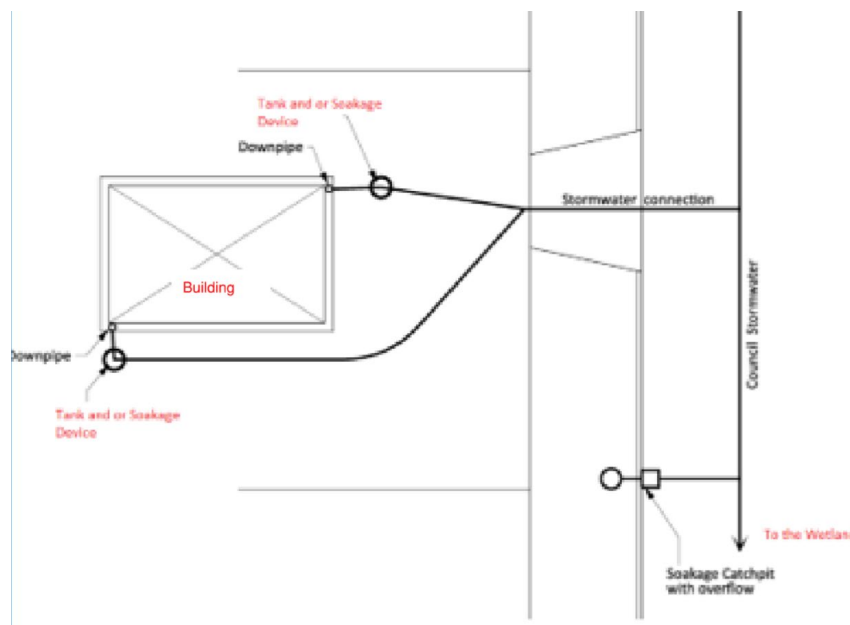


Figure 11: RITS excerpt. D4.5 Drawing with Added Mark up for Conceptual Purposes

On-lot stormwater soakage or rainwater harvesting tanks will be utilized to manage stormwater from roofs, accessways and parking areas for the Industrial Lots located within Stage 1A.

Retention of the first 10mm of stormwater, and/or the initial abstraction volume required for new road surfaces will be provided through soakage (via Roadside Swales and/or unlined Wetland Ponds).

Artificial wetlands are proposed to provide treatment and attenuation/storage for the required flows as specified in the RTIS and ICMP prior to entering the Existing Council/Farm drain networks.

6.3. IMPLEMENTATION PRINCIPLES

The stormwater management system shall be implemented in accordance with the approved engineering drawings and staging plan. Construction of stormwater infrastructure shall be undertaken in a manner that ensures adequate stormwater management is maintained throughout each stage of development. Temporary stormwater management measures shall be provided where permanent infrastructure is not yet operational.

Stormwater quality and quantity management ensures that urban development does not adversely affect downstream waterways by addressing both contaminant removal and runoff control. The strategy combines source control measures with centralised treatment and attenuation infrastructure to manage stormwater throughout the development lifecycle.

Stormwater design considers two complementary objectives:

Water Quality – Removing sediments, nutrients, hydrocarbons, metals, and other urban contaminants before discharge.

Water Quantity – Replicating natural runoff behaviour by reducing peak flows, delaying runoff timing, and providing temporary storage during storm events.

The proposed stormwater network manages runoff generated within the development while maintaining existing catchment flow paths through retained drainage corridors and conveyance systems. This integrated approach protects downstream waterways, supports ecological health, and reduces flood risk throughout the catchment.

6.4. Stormwater Infrastructure

The proposed stormwater management system for the SL1 Industrial Development comprises an integrated network of stormwater infrastructure designed to collect, convey, treat, attenuate, and discharge stormwater in accordance with the WRC Stormwater Guidelines, RTIS, and HCC CoP. The system incorporates both primary and secondary stormwater management measures to support the staged development while managing stormwater quantity and quality and protecting the downstream receiving environment. The key components of the proposed stormwater management system are outlined below:

Artificial Stormwater Wetlands

Artificial stormwater wetlands are proposed as the primary treatment and attenuation devices for runoff generated within the development. The artificial stormwater wetlands have been strategically located to receive stormwater from the each contributing catchment before discharge to the receiving environment and shall be constructed and made operational before receiving runoff from the contributing catchments, unless otherwise approved by the Consent Authority.

The locations and overall configuration have been established as part of the proposed development. Detailed design will refine engineering details such as internal bathymetry, planting layout and inlet/outlet structures without changing the assessed stormwater management outcomes.

On-lot Stormwater Management

On-lot stormwater management measures will be incorporated within individual Industrial lots to manage runoff at source. Rainwater harvesting tanks will be utilised to manage stormwater from roofs, accessways, and parking areas via over attenuation of the roof areas of each lot. These measures will contribute to stormwater quantity and quality management by retaining and treating runoff generated from impervious surfaces.

The final sizing and configuration details of the retention tanks and any associated soakage devices will be confirmed during detailed design in accordance with the parameters and objectives listed in the above sections.

Piped Stormwater Network

The proposed piped stormwater network will collect runoff from roads, lots, and other developed areas and convey flows to the artificial stormwater wetlands. The alignment and overall layout of the primary network have been established as part of the proposed development. Please refer to engineering drawings particularly C400-STORMWATER series drawings (Maven) for more details.

7. Inspection, Verification and Certification

Inspection, verification, and certification activities shall be undertaken throughout the delivery of the stormwater management system to demonstrate compliance with the approved engineering design and the applicable resource consent conditions. Inspections shall be carried out at key stages of construction to verify that stormwater infrastructure is installed in accordance with the approved plans and specifications. Any defects or non-conformances identified during construction shall be rectified prior to progression to subsequent construction stages or acceptance of the works.

Upon completion of each stage, the completed stormwater infrastructure shall be subject to verification by a suitably qualified engineer. Where required, as-built surveys and supporting documentation shall be provided to confirm that the works have been completed in accordance with the approved design. Engineer certification shall be submitted to the Consent Authority as required to demonstrate compliance with the relevant resource consent conditions and engineering approval requirements prior to the commencement of subsequent development stages or the vesting of public assets.

8. Conclusions

This SMP has been prepared to support the Industrial Development within the Southern Links 1 (SL1) development area and provides the overarching framework for stormwater management throughout the site. The SMP has been developed in accordance with the objectives and requirements of the Waitawhiriwhiri (Draft) Integrated Catchment Management Plan (ICMP), Waikato Regional Council guidelines, and the Regional Infrastructure Technical Specifications (RITS).

The site is influenced by significant upstream contributing catchments, existing drainage channels, overland flow paths, and flood-prone areas. Detailed catchment delineation and hydraulic modelling have been undertaken to refine the understanding of existing stormwater behaviour and to inform the proposed stormwater management strategy. The assessment confirms that maintaining hydraulic connectivity and accommodating external catchment flows are critical components of the overall design approach.

The proposed stormwater management system adopts a treatment train approach incorporating on-lot retention tanks, conveyance systems, wetlands, forebays and flood storage areas. Together, these components provide stormwater treatment, detention, attenuation, and conveyance functions in accordance with the objectives of the ICMP and RITS requirements.

Initial abstraction requirements will be achieved through distributed on-lot retention tanks provided for each industrial lot located within Stage 1A or through soakage (via Roadside Swales and/or unlined Wetland Ponds). The proposed tank provision exceeds the required 10 mm retention volume and forms the first component of the overall stormwater treatment train.

Flood modelling indicates that the site is currently subject to widespread shallow flooding and diffuse flow paths resulting from the flat topography and interaction with upstream catchments. The proposed development seeks to formalise these flow paths through retained drainage corridors, diversion channels, culvert crossings, wetlands, and flood storage areas. Subject to detailed design and implementation of the proposed mitigation measures, stormwater runoff from the development will be managed to achieve the required attenuation targets, including discharge of the 100-year event at 80% of pre-development flow rates.

The proposed staging strategy enables each development stage to function independently while maintaining continuity of upstream flows and providing the required stormwater management outcomes. Interim stormwater management measures will be progressively replaced by permanent infrastructure as development proceeds.

Modelling demonstrates that the proposed wetland systems are capable of achieving discharge rates below the adopted design targets, providing confidence in the proposed stormwater strategy while allowing opportunities for further optimisation during detailed design.

Overall, the proposed stormwater management framework provides a practical and integrated solution that supports future urban development while maintaining catchment function, managing flood risk, protecting receiving environments, and aligning with the long-term objectives of the Waitawhiriwhiri (draft) ICMP. Further detailed refinement of stormwater infrastructure, hydraulic modelling, wetland design, and flood mitigation measures will be undertaken during detailed design and engineering approval stages.

Appendix A – Stormwater Plans (Refer to Infrastructure Report Package)

Appendix B – HEC-RAS Results (100year Assessment)

HEC RAS RESULTS – PRE & POST

