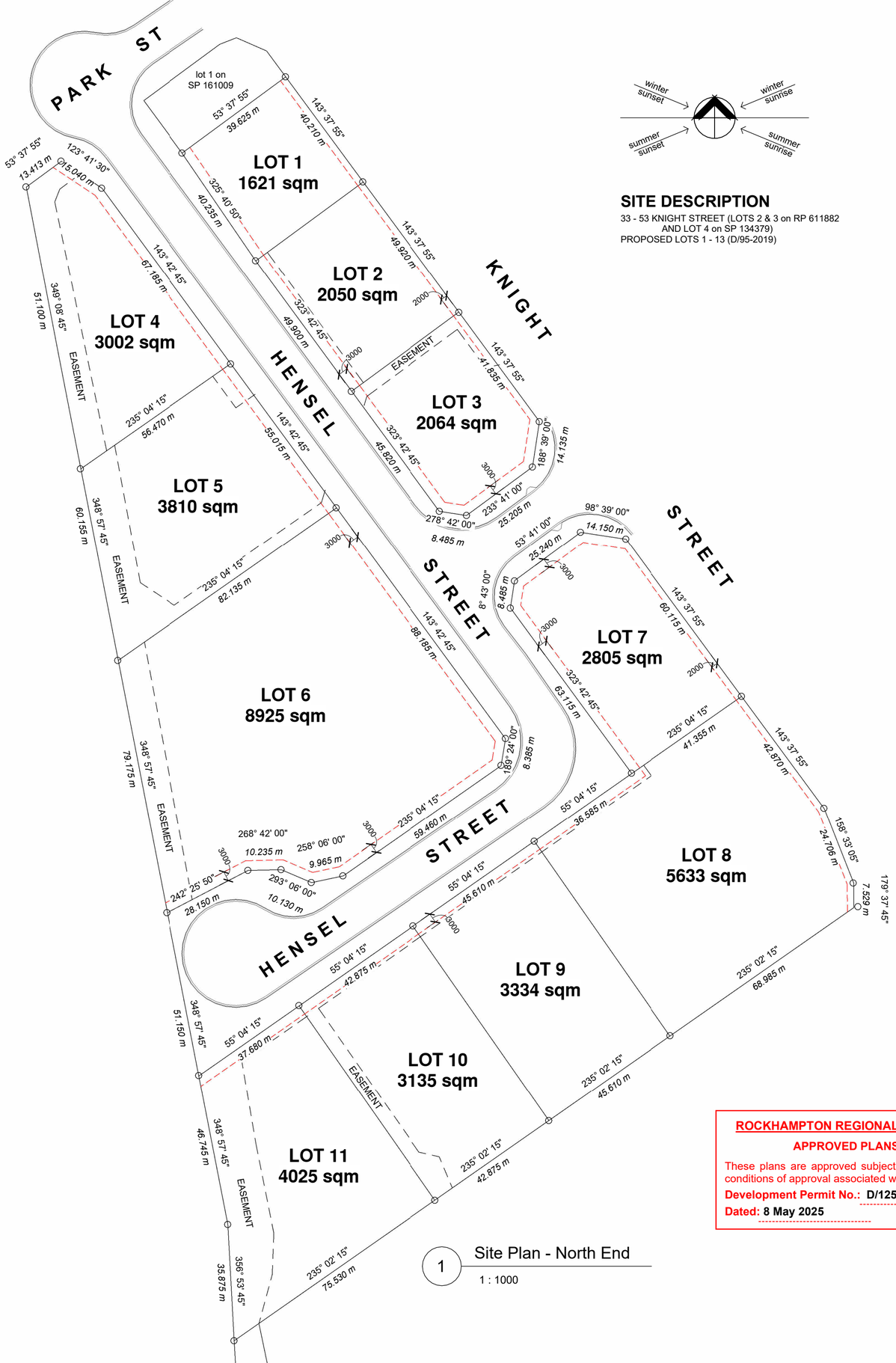
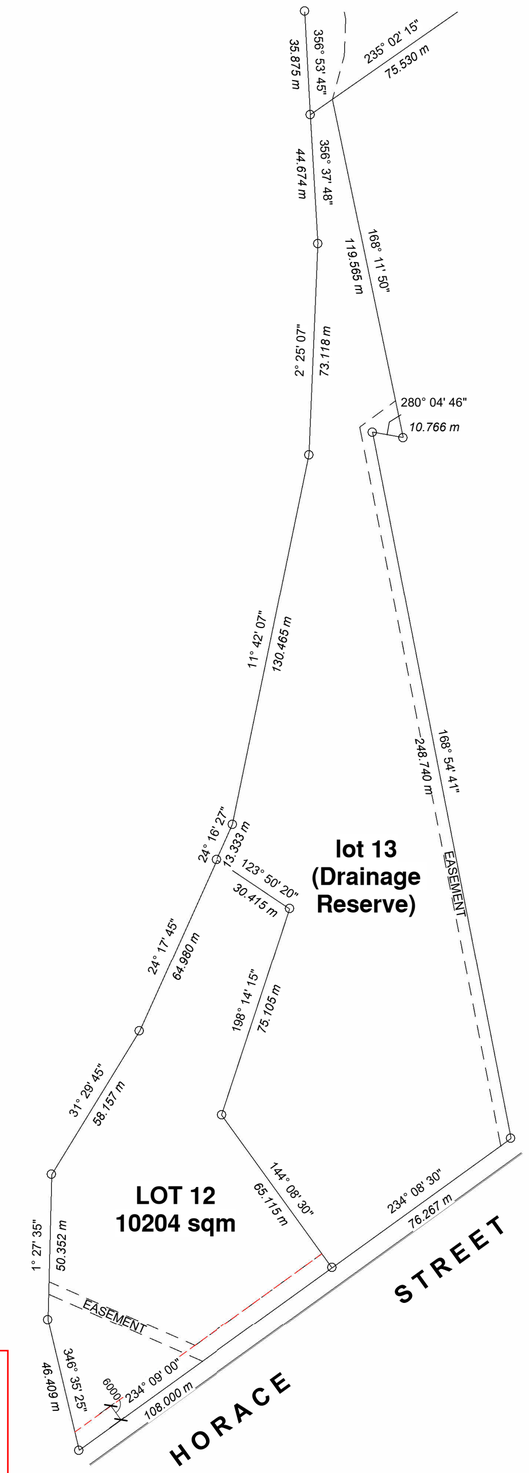


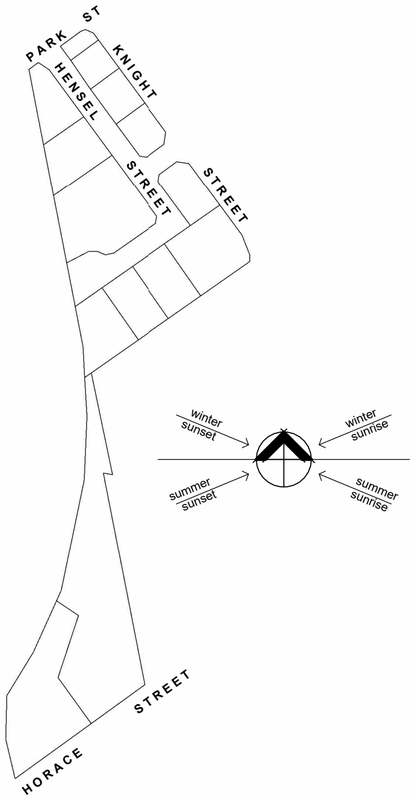
SITE DESCRIPTION

33 - 53 KNIGHT STREET (LOTS 2 & 3 on RP 611882
AND LOT 4 on SP 134379)
PROPOSED LOTS 1 - 13 (D/95-2019)

1 Site Plan - North End
1 : 1000



3 Site Plan - South End
1 : 1500



2 Site Plan - Overall
1 : 5000

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/125-2024

Dated: 8 May 2025

REVISIONS

NO.	DATE	DESCRIPTION

MATERIAL CHANGE OF USE FOR LOW IMPACT INDUSTRY AND WAREHOUSE AT 33 -53 KNIGHT STREET, PARK AVENUE

SHEET NAME
SITE PLANS

DW Building DESIGN
QBCC LICENCE NUMBER 1256997
P : 0434 644 047 E : dale@dwbuildingdesign.au

DRAWN : DWebb
CHECKED :
CAD FILE : 24043 ASM

WIND SPEED C1
PLAN SIZE: A2

PROJECT NUMBER 24043 - 01
SHEET 01 OF 01 SHEETS
REVISION

PRINT DATE : 14/11/2024 10:44:49 AM

MCE
McMurtrie Consulting Engineers

Engineering reimagined.

ROCKHAMPTON REGIONAL COUNCIL

APPROVED PLANS

These plans are approved subject to the current conditions of approval associated with

Development Permit No.: D/125-2024

Dated: 8 May 2025

Technical Memorandum

Lot 12 Stormwater

1 Introduction

This is an addendum to previously submitted Stormwater Management Plan dated 24 January 2020, Revision C completed by McMurtrie Consulting Engineers (MCE), and the subsequent Addendum dated 18/01/2024.

As part of the Operational Works construction process, it was determined that it was not possible to drain Lot 12 to the detention basin. This was partly due to the existing swale drain that serves to drain the Aurizon lot cutting Lot 12 off from the northern balance lot, and therefore the detention basin.

Given Lot 12 cannot be serviced by the detention basin, it was necessary to assess the impact of this on stormwater quantity and quality performance to ensure compliance with the State Planning Policy 2017 and ensure the proposal did not result in nuisance to downstream properties.

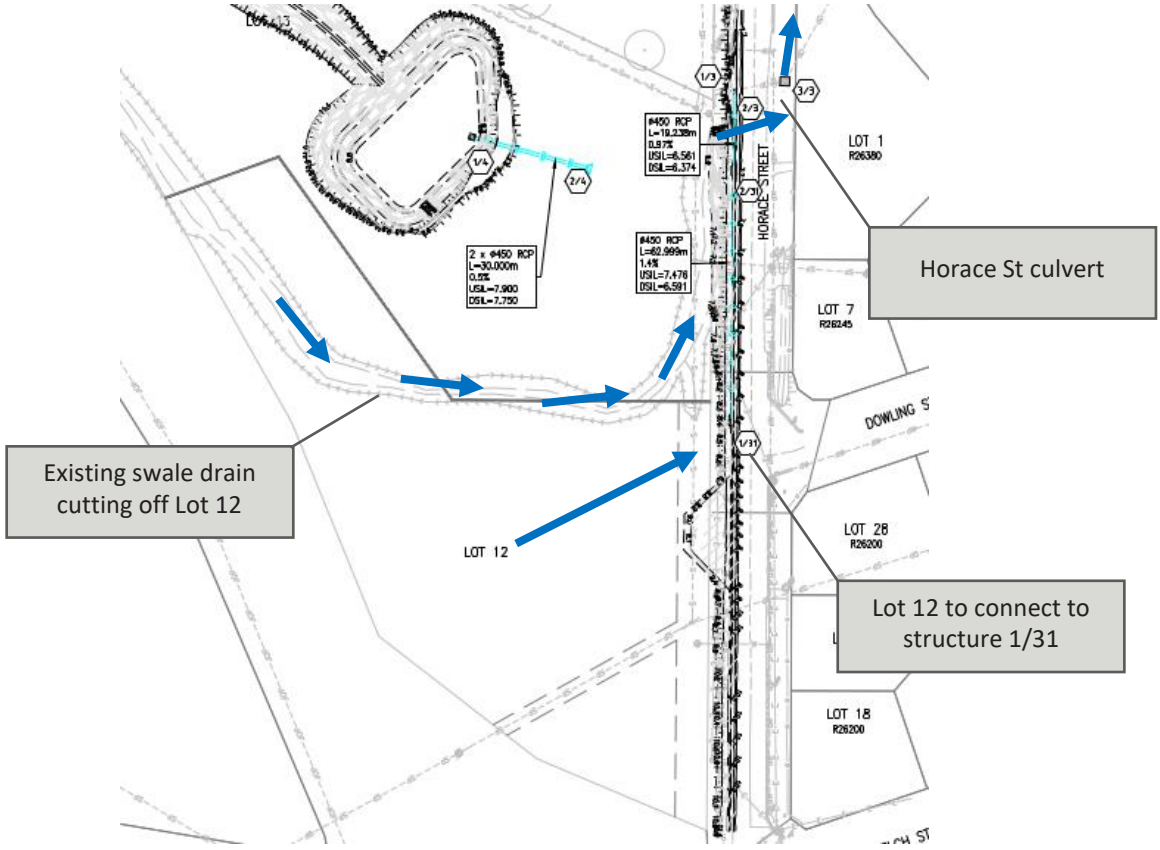


Figure 1 - Existing Stormwater Layout Plan

1.1 Lot 12 Quantity

As part of a future development application, Lot 12 will be developed. In order to allow for future use of the lot, a fraction impervious of 90% has been assumed.

To determine the impact of development of Lot 12, the peak runoff for a series of rainfall events was assessed using the rational method in accordance with the method set out by the Queensland Urban Drainage Manual.

Time of Concentration					Catchment Info					
t_c	14.048	mins	*Time of concentration*		**Area**	1.26	ha	*Catchment area*		
Friend's Equation					f_i	0	decimal	*Fraction impervious*		
L	80	m	*Sheet flow length*		$^1I_{10}$	65.4	mm/hr	*10% AEP 1hr rainfall intensity*		
n	0.035	unitless	*Horton's Roughness*		C_{10}	0.66	unitless	*Discharge coefficient*		
S	2	%	*Slope of surface*		**Climate Change Factor**			N/A		
t	14.048	min	*Overland travel time*		**Urbanisation**		Urban			

Rational Method										
Event		63.21%	0.5EY	0.2EY	10%	5%	2%	1%	1% + CC	
F_y		0.80	0.85	0.95	1.00	1.05	1.15	1.20	1.20	factor
^tI_y		84.966	105.24	128	147.57	169.33	200.09	223.86	223.86	mm/hr
C_y		0.528	0.561	0.627	0.66	0.693	0.759	0.792	0.792	factor
Q_y		0.157	0.2066	0.2809	0.3409	0.4107	0.5315	0.6205		m^3/s

Figure 2 - Pre-development rational method analysis

Time of Concentration					Catchment Info					
t_c	9.1667	mins	*Time of concentration*		**Area**	1.26	ha	*Catchment area*		
TOC					f_i	0.9	decimal	*Fraction impervious*		
t	5	min	*Roofwater*		$^1I_{10}$	65.4	mm/hr	*10% AEP 1hr rainfall intensity*		
length	250	m	*at 1m/s velocity*		C_{10}	0.88	unitless	*Discharge coefficient*		
t	4.1667	min	*Pipe travel time*		**Climate Change Factor**			N/A		
					Urbanisation		Urban			

Rational Method										
Event		63.21%	0.5EY	0.2EY	10%	5%	2%	1%	1% + CC	
F_y		0.80	0.85	0.95	1.00	1.05	1.15	1.20	1.20	factor
^tI_y		99.417	123	149.83	172.5	198.33	233.33	261	261	mm/hr
C_y		0.704	0.748	0.836	0.88	0.924	1	1	1	factor
Q_y		0.245	0.322	0.4384	0.5313	0.6414	0.8167	0.9135		m^3/s

Figure 3 - Post-development rational method analysis

The key events relevant to the site were the 10% AEP and the 1% AEP, as they relate to the downstream road (Horace Street) cross drainage performance.

As a result of development of the lot, the peak runoff rates increased by 190 L/s and 293 L/s for the 10% AEP and 1% AEP events respectively.

The ultimate discharge from the industrial development has been taken as the basin runoff rate given in the parent Stormwater Management Plan, and the net increase in runoff from Lot 12. This flow was then assessed using HY-8, which is an industry standard culvert analysis tool made available by the United States Army Corps of Engineers. The culvert under Horace Street was modelled along with accurate road vertical geometry to determine the impact of discharging an un-detained Lot 12 development to the road reserve. The results of the analysis are summarised in Figure 4.

As can be seen, the cross drainage under Horace St is immune for the 39% AEP event, with minor increases across the 10% AEP, 5% AEP and 1% AEP events. It is noted that the road sag level was at 7.75m AHD, which should be considered the datum for headwater elevation assessment, meaning the post-development 1% AEP event overtops the road by 150mm for example.

Headwater Elevation (m)	Discharge Names	Total Discharge (cms)	Culvert 1 Discharge (cms)	Roadway Discharge (cms)	Iterations
7.17	39pct_pre	0.78	0.78	0.00	1
7.21	39pct_post	0.90	0.90	0.00	1
7.82	10pct_pre	1.87	1.78	0.08	6
7.83	10pct_post	2.06	1.80	0.25	9
7.87	5pct_pre	2.69	1.83	0.85	7
7.88	5pct_post	2.92	1.84	1.08	5
7.89	1pct_pre	3.34	1.85	1.49	5
7.90	1pct_post	3.63	1.85	1.77	4
7.75	Overtopping	1.72	1.72	0.00	Overtopping

Figure 4 - HY-8 results

As a result of not providing detention to Lot 12, the road experiences minor increases to overtopping levels – typically 10mm across all design events. This increase is considered negligible and is not expected to constitute 'nuisance' to downstream properties, nor materially decrease the level of service provided by the infrastructure.

In order to determine the safety of the proposed increased overtopping levels, the road overtopping area was determined using AutoCAD analysis of the vertical profile, and is summarised in Table 1.

Table 1 - Summary of overtopping safety

	Overtopping Level (m AHD)	Area of Overtopping (m2)	Overtopping Flow (m3/s)	Overtopping Velocity (m/s)	D.V. Product
10pct_pre	7.82	0.1921	0.08	0.4165	0.029
10pct_post	7.83	0.268	0.25	0.9328	0.075
5pct_pre	7.87	2.0323	0.85	0.4182	0.05
5pct_post	7.88	2.466	1.08	0.438	0.057
1pct_pre	7.89	3.2147	1.49	0.4635	0.065
1pct_post	7.9	3.8003	1.77	0.4658	0.07

It was generally found that the hazard rating, as represented by the d.v. product, was low across all scenarios, typically indicative of H1 flooding or generally considered benign in nature. It was also found that the proposed development of Lot 12 did not increase this hazard rating by a magnitude that could be considered unacceptable, and therefore the proposal is considered reasonable.

On balance of the above analyses, the proposal to discharge Lot 12 directly to the road drainage network (and ultimately to the Horace Street cross drainage structure) is found to be acceptable, and well within the quantifiable limits imposed by CMDG and QUDM.

1.2 Lot 12 Quality

As the site cannot connect to the detention basin, which contains a bio-retention arrangement, additional measures are required to offset the unmitigated pollutant load generated by Lot 12.

A MUSIC model has been developed to assess the proposed treatment train, which incorporates 4x Atlan Stormsacks (or equivalent) to provide treatment to Lot 12. Given it has been determined that detention is not required for Lot 12, it is seen to be unreasonable to provide a higher level of treatment such as a secondary bio-retention basin. The exact arrangement of the treatment can be determined as part of a future Operational Works application.

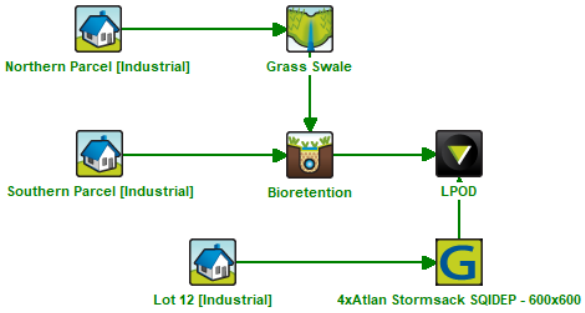
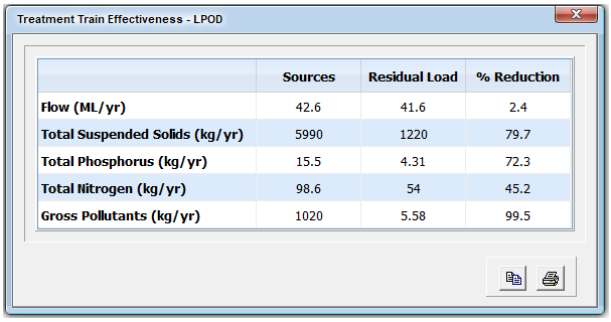


Figure 5 - Proposed treatment train

Figure 6 shows the treatment train effectiveness, as measured for the entire industrial development including Lot 12. All parameters comply with the SPP requirements, apart from Total Suspended Solids, which under-performs by 5%.



	Sources	Residual Load	% Reduction
Flow (ML/yr)	42.6	41.6	2.4
Total Suspended Solids (kg/yr)	5990	1220	79.7
Total Phosphorus (kg/yr)	15.5	4.31	72.3
Total Nitrogen (kg/yr)	98.6	54	45.2
Gross Pollutants (kg/yr)	1020	5.58	99.5

Figure 6 - Treatment train effectiveness

Dispensation is sought from Rockhampton Regional Council in regard to this technical non-compliance on the following grounds:

1. The recently constructed basin receives less runoff and therefore will require less maintenance as a result of the proposed discharge of Lot 12 to Horace Street via a simple 'filter basket' style treatment device. This is seen to be beneficial, and while not resulting in compliance due to the Total Suspended Solids, means that the as-constructed basin will perform at a higher efficiency for less maintenance.
2. Typically, the landscaped pervious land introduced in an industrial lot as part of development offers a significant improvement on soil infiltration capacity and biodiversity, offering 'intangible' treatment benefits that are not quantifiable by a MUSIC model analysis. Given the site is generally a moderately grassed 'monoculture' field, it is expected that landscaping will greatly improve this effect irrespective of a slightly under-performing TSS value.
3. Given Lot 12's proximity to existing industrial uses, as well as the rail corridor, it is likely that there is an existing pollutant load settling on the site from dust and rain which is leaving the site essentially untreated. As such any treatment provided on the site is likely to provide an improvement to the existing scenario.

2 Summary

This memorandum has sought to determine the likely impacts of discharging Lot 12 to the stormwater drainage infrastructure on Horace Street directly, without the provision for onsite detention. Further, the impact of providing a minimal approach to stormwater quality treatment has been assessed.

It has been seen that, from an engineering perspective, the minor increase to runoff is acceptable, as well as the minor (5%) underperformance of the treatment train to treat Total Suspended Solids.

Lachlan McMurtrie

RPEQ 15243