

ATTACHMENT 6

Revised Stormwater Management Report

Prepared by:

Kehoe Myers Consulting Engineers

STORMWATER MANAGEMENT PLAN

FKG - FOUNDATION STREET - MIXED USE DEVELOPMENT
FOUNDATION ST WELLCAMP QLD

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1 INTRODUCTION AND EXECUTIVE SUMMARY

Kehoe Myers Consulting Engineers has been engaged to prepare a Conceptual Stormwater Management Plan (CSMP) as part of the design documentation in support of the Development Application with the Toowoomba Regional Council (TRC) at the corner of Foundation Street and O'Mara Road, described as Lots 14 and 19 on SP329688 in Wellcamp, Queensland.

The proposed development consists of multiple stages as outlined below.

- Reconfiguring a Lot (RAL) 2-into-3 subdivision, including reciprocal access easements. Works in this stage will include earthworks to create level site pads. Stormwater, sewer, water reticulation, power and telecommunication services will also be provided to each new lot. A layout of the proposed subdivision is provided below.

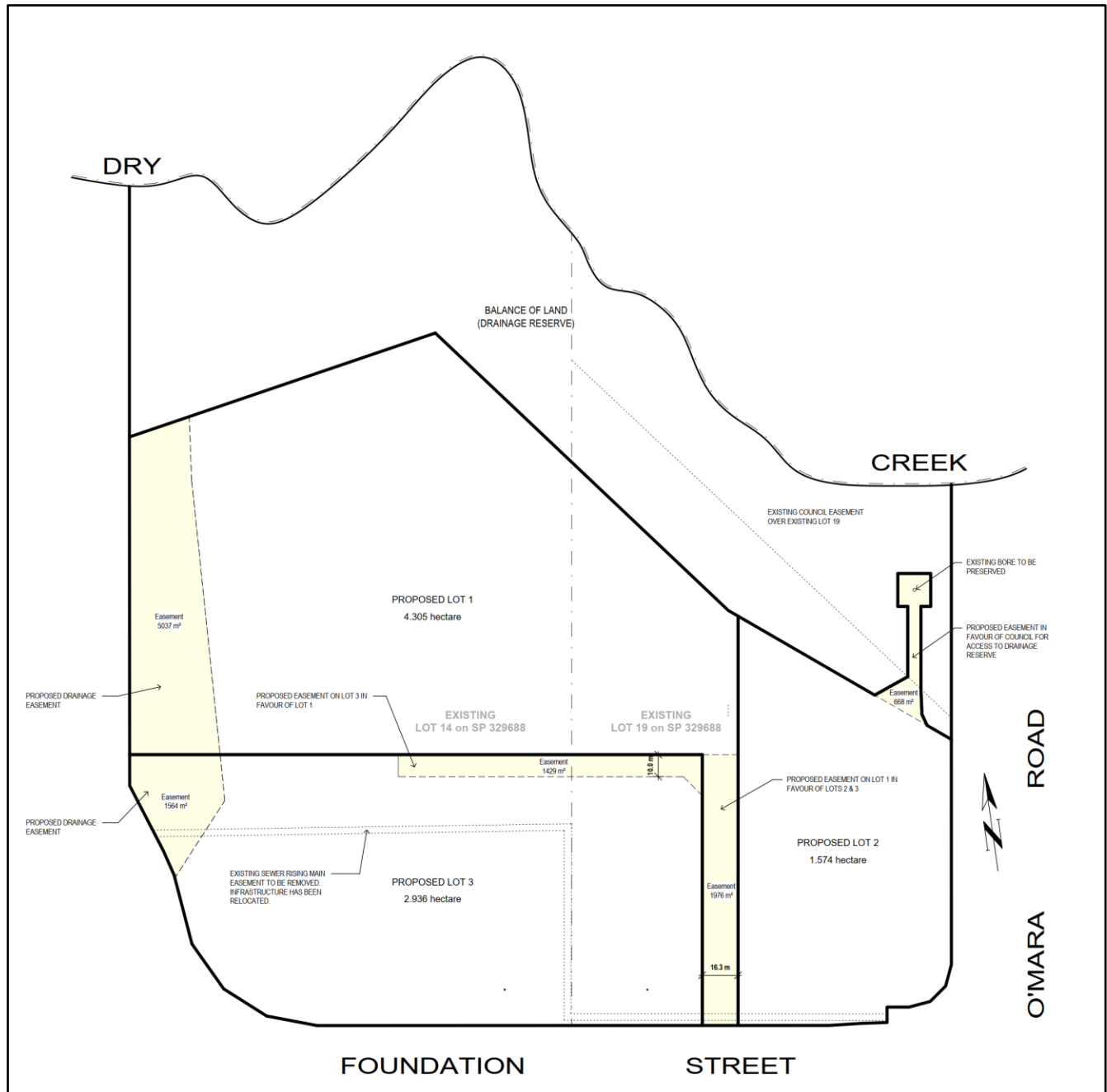


FIGURE 1 RAL CONFIGURATION (FKG DRAWING: 2570.002)

- Material Change of Use (MCU) over proposed Lot 1 – Medium Impact Industrial development over the to-be-created greenfield site. Works will include the construction of a large industrial workshop with an attached office building and a separate storage shed. External paved areas for carparking and extensive hardstand will also be constructed.
- Material Change of Use (MCU) over proposed Lot 2 – Medium Impact Industrial and Outdoor Sales development over the to-be-created greenfield site. Works will include the construction of a large heavy machinery mechanics workshop with an attached office building and separate wash bay. External paved areas for carparking, outdoor sales display and extensive hardstand will also be constructed.
- Material Change of Use (MCU) over proposed Lot 3 – Warehouse development over the to-be-created greenfield site. Works will include the construction of three large warehouses, each with an attached office building. External paved areas for carparking and extensive hardstand will also be constructed.

This report seeks to address onsite stormwater management for the proposed development. The following items will be addressed in this report:

- Hydraulic analysis to assess the required mitigation to ensure a case of ‘non-worsening’ or not incurring an actionable nuisance is achieved.
- Compliance with TRC’s pollutant reduction policy and the State Planning Policy (SPP).

From the below analysis, it was determined that stormwater discharge conditions from the site can achieve a case of ‘non-worsening’ or no ‘actionable nuisance’ at the lawful points of discharge.

As a result of this analysis, it is then shown that the proposed development complies with the guidelines set by both the TRC and Queensland Urban Drainage Manual (QUDM). The report below details the achievement of these lawful points of discharge requirements.

Additionally, the developed site was assessed for water quality requirements as per the TRC Planning Scheme and the Queensland State Planning Policy. As detailed in this report, the site's stormwater quality can be managed by the provision of a treatment train incorporating rainwater tanks and a theoretical bio-retention basin. This treatment train was developed to calculate the required equivalent bio-retention basin size to apply Toowoomba Regional Council’s offset rate. By contributing the equivalent offset to TRC’s water quality scheme, the development is seen to comply with TRC’s pollutant reduction policy and the State Planning Policy (SPP).

2 SITE DESCRIPTION

The proposed development is located on a 124,240 m² site located over two titles at the corner of Foundation Street and O'Mara Road, Wellcamp. The real property descriptions are Lots 14 and 19 on SP329688. A Locality Plan highlighting the proposed development site is shown below.

Refer to **FIGURE 2** below for site location with respect to adjoining roads and lots.



FIGURE 2 AERIAL PHOTOGRAPH OF THE PROPOSED DEVELOPMENT SITE (QUEENSLAND GLOBE 2026)

2.1 EXISTING SITE CONDITIONS

From the available elevation data of the subject allotment, the site is currently an open and gently graded allotment. The current allotment is vacant and features an existing creek to the North which is situated outside the development area. The development site has road frontage to O'Mara Road to the East, but has no current or proposed access from these from this road.

The site falls from the South-East to the North-West. The average gradient of the subject site is approximately 3%.

A current aerial image of the proposed development site is shown below in **FIGURE 3**.



FIGURE 3 EXISTING SITE CONTOURS (TRC INFRASTRUCTURE MAPS 2026)

2.2 PROPOSED DEVELOPMENT

The proposed development layout has been developed by the Client. Based on the proposed site layout, conceptual engineering design was undertaken to provide a compliant stormwater network for the proposed development.

A snapshot of the Site Layout for the development is shown below in **FIGURE 4** and a full plan of the proposed site is attached in **APPENDIX A**.

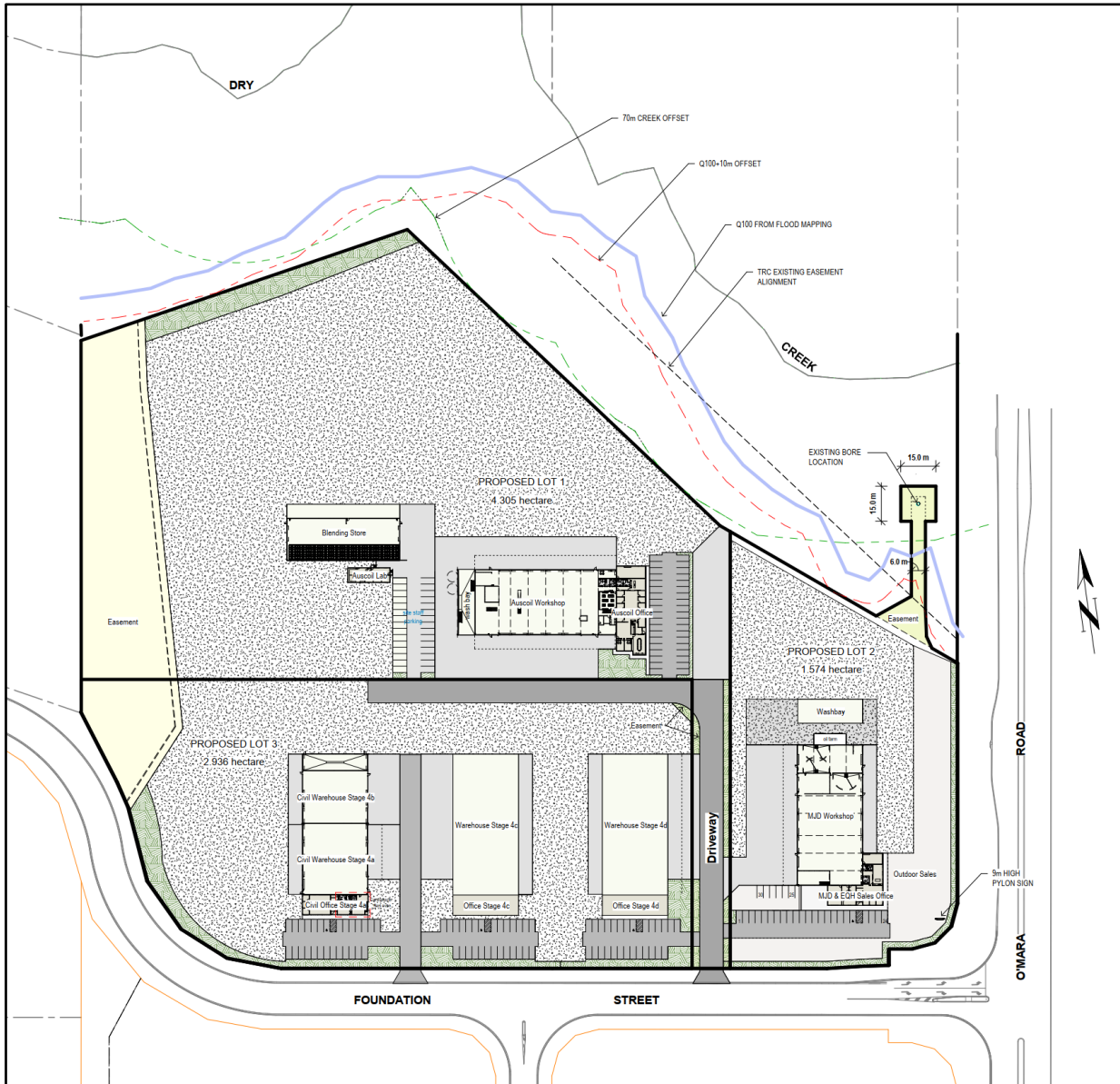


FIGURE 4 SITE PLAN (FKG DRAWING: 2570-001)

3 HYDROLOGY

3.1 EXISTING SITE INFRASTRUCTURE

As shown below in **FIGURE 5**, there is an existing creek to the North of the development site. The site is also encumbered by a drainage easement along the Western boundary. The drainage infrastructure network within the upstream network to the South drains Northward via an open channel within this easement before discharging to a tributary of Dry Creek.

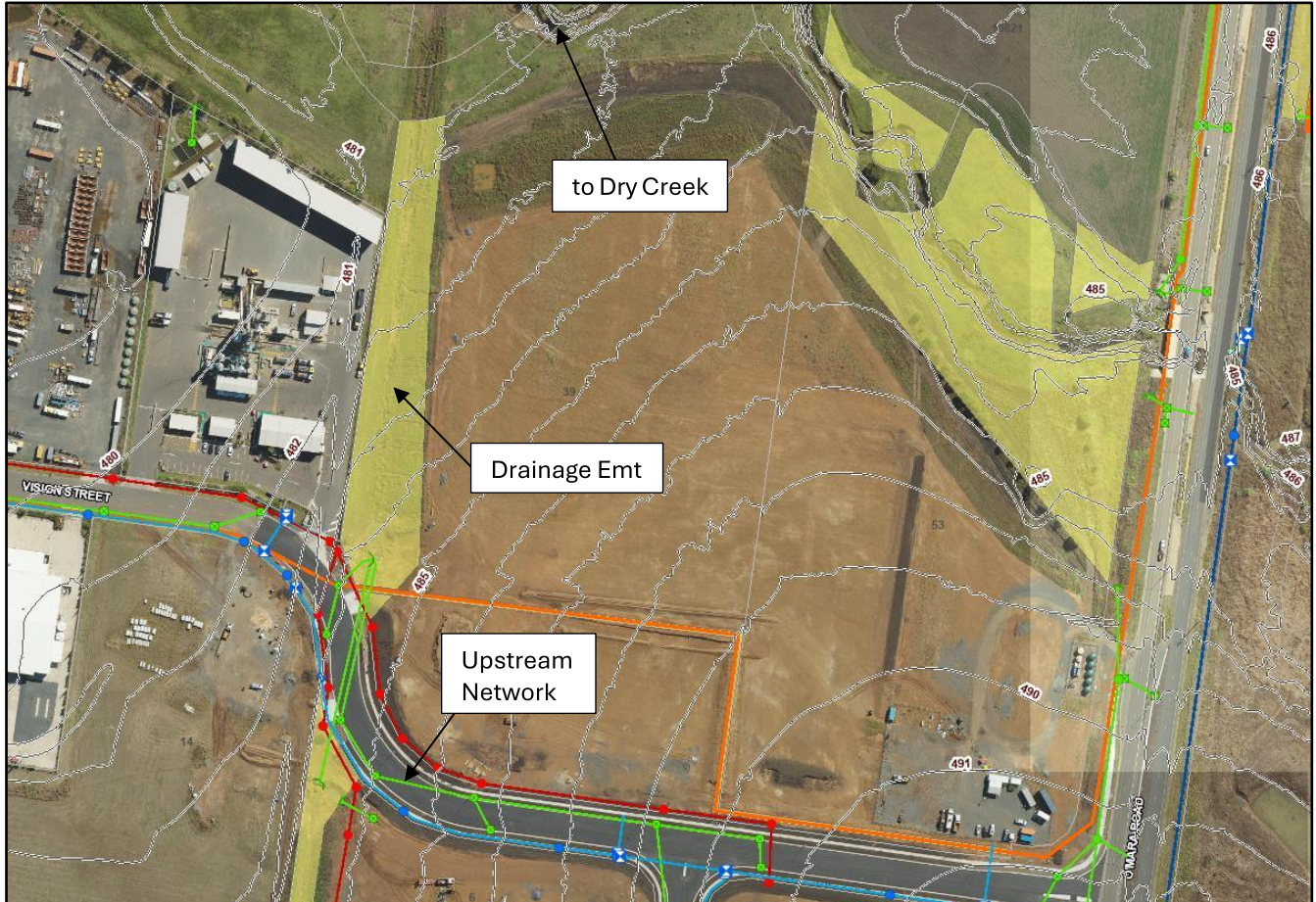


FIGURE 5 EXISTING STORMWATER NETWORK (TRC INFRASTRUCTURE MAPS 2026)

3.2 EXISTING DISCHARGE CONDITIONS

Under the current conditions, the subject site discharges as overland sheet flow to Dry Creek to the North. The development site is within the catchment identified in the approved Stormwater Management Plan (SWMP) for the master planned industrial subdivision, forming Council Approval number RAL/2022/2513. This approved master SWMP, prepared by I³ Consulting, maintains Dry Creek as the discharge location for the subject development site. A snapshot of the approved catchments from the approved plans accompanying SWPM no. 21-059-CSR (Version 1.2) is provided below in **FIGURE 6**.

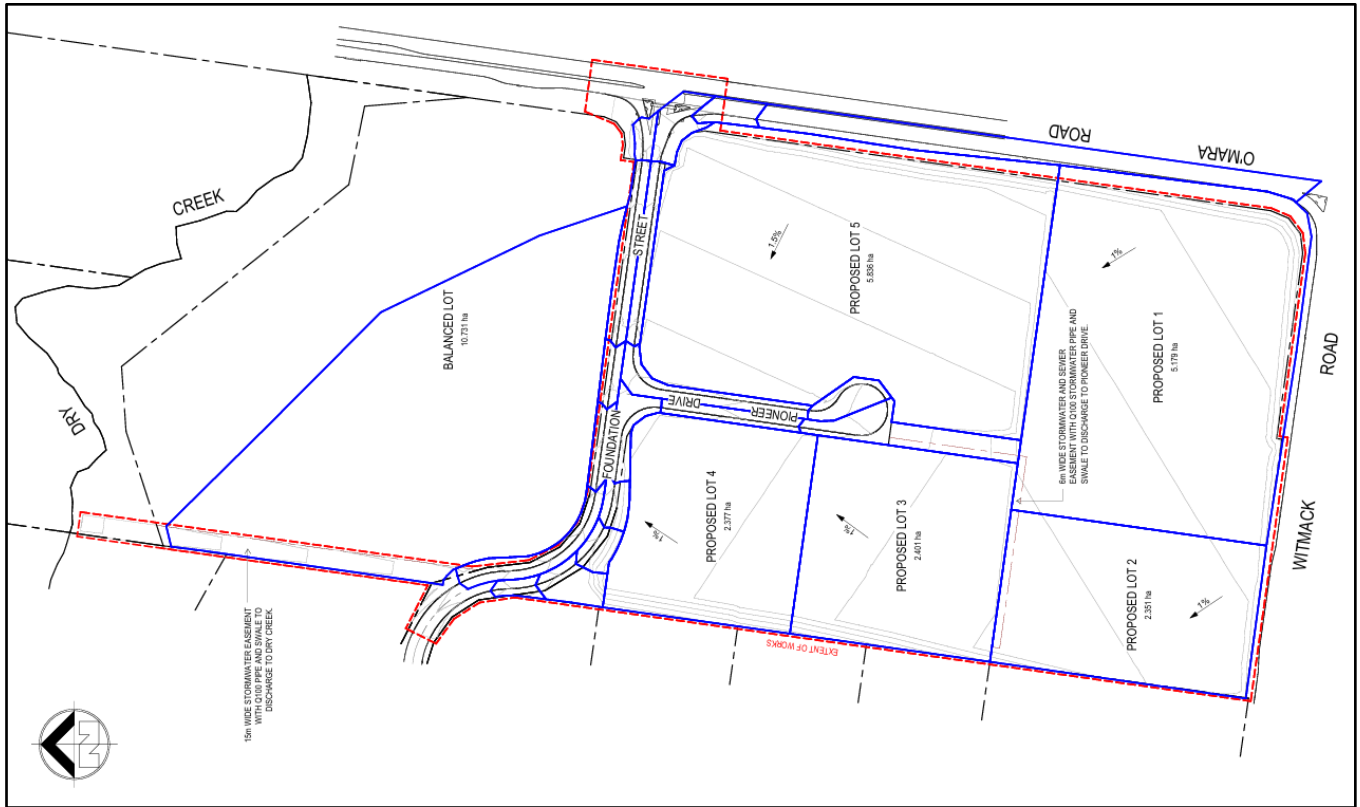


FIGURE 6 EXISTING STORMWATER CATCHMENT PLANS (I3 DRAWING NO. 21-059-C32/B)

3.3 PROPOSED DISCHARGE CONDITIONS

The proposed development will follow the approved master planned SWMP under Council approval RAL/2022/2513. Proposed Lots 1 and 2 lot will each be provided with a new connection manhole with outlet pipe and headwall discharging directly to Dry Creek. Lot 3 will similarly be provided with a new connection manhole; however, the outlet pipe and headwall will discharge to the existing drainage easement along the Western side of the site. A layout showing the proposed discharge arrangements for the site is shown in **FIGURE 7** below and included as **APPENDIX B**.

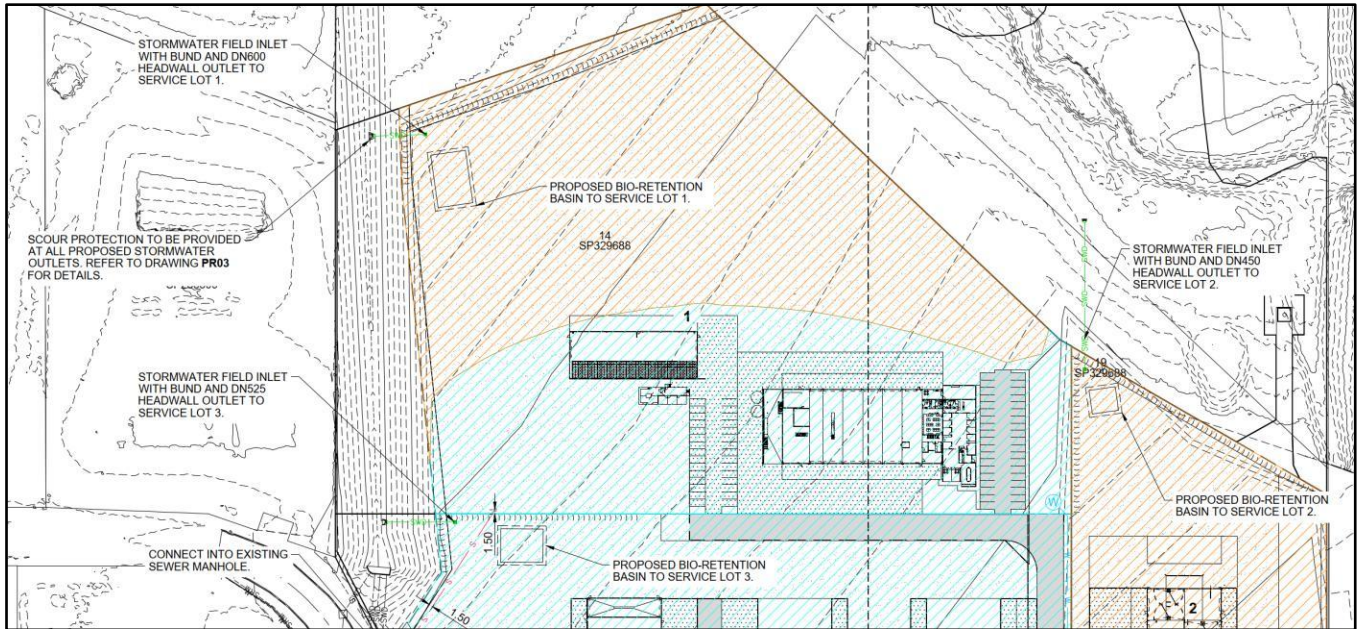


FIGURE 7 PRELIMINARY SERVICES LAYOUT (KEHOE MYERS DRAWING: C2526235-PR02)

In accordance with the master SWMP (RAL/2022/2513), stormwater quantity management (i.e. detention) is not to be provided for the development. Runoff from the site should be discharged as quickly as possible, as attenuating the developed flows would align the peak discharge with that of Dry Creek.

4 STORMWATER OUTLET ANALYSIS

4.1 DRAINS MODEL RESULTS

Preliminary stormwater analysis has been undertaken using DRAINS. DRAINS is an engineering software package for designing urban stormwater drainage systems. To enable the modelling of the proposed system, the 'Extended Rational Method' hydrology loss model has been used to convert Australian Rainfall and Runoff (AR&R) Temporal Patterns and rainfall data into runoff Hydrographs.

A range of rainfall event durations were analysed from the 5- to 120-minute storm duration. Analyses have been conducted within the catchments to determine post-development flows for the 39% AEP (0.5EY) to the 1% AEP rainfall events in each allotment. Post-development median peak flow results are provided in **TABLE 1** below.

For this DRAINS model, catchments were assigned to each allotment. Catchment areas were determined using the allotment area, excluding the easement area. A fraction impervious of 90% was also assumed for all 3 allotments as per QUDM's Table 4.5.1. A field inlet is to be provided for each allotment and will define the lawful point of discharge for each allotment.

Peak discharge from each site was then calculated and presented below in **TABLE 1**.

TABLE 1 MEDIAN PEAK STORMWATER FLOWS (m³/s) - NODE A

LOCATION	39% AEP (0.5EY) (m ³ /s)	18% AEP (0.2EY) (m ³ /s)	10% AEP (m ³ /s)	5% AEP (m ³ /s)	2% AEP (m ³ /s)	1% AEP (m ³ /s)
LOT 1	0.724	1.021	1.250	1.512	1.885	2.099
LOT 2	0.285	0.402	0.498	0.607	0.749	0.835
LOT 3	0.537	0.757	0.934	1.132	1.404	1.566
TOTAL	1.546	2.180	2.682	3.251	4.038	4.500

4.2 DRAINS MODEL VALIDATION

From the QUDM guidelines, it is recommended that computer models are calibrated to flow data or "be 'compared' with the peak discharge derived for the same catchment using the Rational Method" (QUDM 2013).

As this report utilises the "Extended Rational Method" hydrology loss model, all 'peak discharge' catchment flows are derived directly from the Rational Method and as such, a direct 'comparison' back to the 'Rational Method' can be assumed.

4.3 PIPE SIZING

Flow values from the DRAINS model for a 10% AEP Storm were taken to determine the minimum size pipe required for each allotment's outlet. Utilising the Manning' Equation, the required pipe size can be determined based on the flow requirement from the DRAINS model. Preliminary pipe sizing attributes are provided in **TABLE 2** below.

TABLE 2 PIPE SIZING ATTRIBUTES

LOCATION	GRADE (m/m)	DRAINS FLOW RESULT (m ³ /s)	PIPE DIAMETER (mm)	PIPE CAPACITY (m ³ /s)	MAX. PIPE VELOCITY (m/s)
LOT 1	0.0499	1.250	600	1.433	4.904
LOT 2	0.0354	0.498	450	0.559	3.410
LOT 3	0.0473	0.934	525	0.973	4.363

As per **TABLE 2** above, the chosen pipe sizes have a calculated flow capacity sufficient for a 10% AEP storm event. Pipe velocities are also maintained below the 6.0m/s maximum as per QUDM's requirements for 'pipe full' conditions.

4.4 SCOUR PROTECTION

To prevent scouring in the adjacent stormwater channel, discharge velocities must be decreased in compliance with QUDM's requirements. Rock protection at pipe outlets was to be implemented, and thus, the rock protection area and median sizing for the rocks were to be determined. Scour protection for each allotment was determined separately, utilising the sizing chart in Figure 8.11 of QUDM. The location for the scour protection can be found in the services connection plan shown in **APPENDIX B**. Scour protection sizing attributes are provided in **TABLE 3** below:

TABLE 3 OUTLET SCOUR PROTECTION SIZING ATTRIBUTES

LOCATION	PIPE VELOCITY (m/s)	PIPE DIAMETER (mm)	ROCK PROTECTION LENGTH (m)	d ₅₀ (mm)
LOT 1 HEADWALL	4.904	600	2.40	400
LOT 2 HEADWALL	3.410	450	1.35	200
LOT 3 HEADWALL	4.363	525	2.10	300

As a result of the implemented scour protection, flows will enter the adjacent drainage channel at a velocity compliant to QUDM's requirements. As such, there will be no actionable nuisance resulting from the development at the lawful point of discharge.

5 STORMWATER QUALITY MANAGEMENT

5.1 STORMWATER QUALITY LEGISLATION

The State Planning Policy (SPP) released in July 2017 provides guidelines on the requirement for stormwater quality treatment. Further advice on stormwater quality is provided in the Toowoomba Regional Council's Planning Scheme Policy.

SPP states that the pollutant reduction design objectives for the Western Queensland climatic region are applicable to:

- A material change of use for an urban purpose that involves premises 2,500 m² or greater in size and;
 - will result in six or more dwellings; or
 - an impervious area greater than 25 per cent of the net developable area; or
- Reconfiguring a lot for an urban purpose that involves premises 2,500 m² or greater in size and will result in six or more lots; or
- Operational Works for an urban purpose that involves disturbing a land area 2,500 m² or greater in size.

Stormwater Quality Management is required for the proposed development based on the requirements of the Queensland State Planning Policy (SPP) and the Toowoomba Regional Council's Planning Scheme Policy. The following is provided to demonstrate that the proposed development will meet the requirements of the SPP.

5.2 DESIGN OBJECTIVES

The State Planning Policy describes Water Quality Objectives (WQO's) to reduce the pollutant loads discharged to receiving waters from the urban development. The following minimum reductions in total pollutant load have been adopted to develop a strategy to manage stormwater quality for the proposed development within the 'Western Queensland' climatic region:

- >= 85% reduction in total suspended solids load (TSS)
- >= 60% reduction in total phosphorus load (TP)
- >= 45% reduction on total nitrogen load (TN)
- >= 90% reduction in gross pollutant load.

5.3 METHODOLOGY

MUSIC Version 6 was used to evaluate the effectiveness of a proposed treatment train with respect to the water quality objectives and to indicate sizing requirements for a single bio-retention basin, with the intention to provide a voluntary contribution towards a regional solution for stormwater quality.

5.3.1 METEOROLOGICAL DATA

Meteorological data was taken as per the Water by Design's *MUSIC Modelling Guidelines* (2010). For this project, rainfall and evapotranspiration data was taken from the Toowoomba City rainfall station (Station ID 41467) and cover the historical region of 01/01/1961 – 31/12/1970. A full listing of the *MUSIC* model design parameters is given in **APPENDIX C**.

5.3.2 CATCHMENT CHARACTERISTICS

To determine the Water Quality catchments, the subject allotments were modelled individually, such that an appropriate treatment train can be provided separately for each lot. Preliminary site plans for the proposed MCU on each lot were used to obtain the developed roof catchment areas. The remainder of each lot was broken into sub-catchments for Roads and Ground level. The characteristics of the sub-catchments have been reproduced below in **TABLE 4**. Note that the existing drainage easement area remains untouched by the development and has been *excluded* from the water quality modelling.

TABLE 4 CATCHMENT CHARACTERISTICS

CATCHMENT NAME	AREA (HA)			LAND USE (SOURCE NODE)	FRACTION IMPERVIOUS (%)
	LOT 1	LOT 2	LOT 3		
Industrial – Roof	0.3890	0.2292	0.5762	Industrial	100%
Industrial – Roads	0.4746	0.6010	0.8865	Industrial	100%
Industrial – Ground	2.7984	0.6848	1.5912	Industrial	80%
Sum	3.6620	1.5150	3.0539		

5.3.3 RAINFALL-RUNOFF PARAMETERS

Rainfall runoff and pollutant export parameters for the land uses indicated above were adopted in accordance with Water by Design's *MUSIC Modelling Guidelines* (2010). These parameters have been reproduced and attached in **APPENDIX C**.

5.3.4 TREATMENT TRAIN STAGES+

The proposed treatment train will consist of several treatment types for stormwater quality control. These types work as a whole to manage stormwater quality from the site.

- **Rainwater Tanks.** Rainwater tanks will provide the ability to re-use captured stormwater and reduce the demand for the potable water supply. Rainwater tanks for re-use are generally mandatory for new developments, and the inclusion of tanks will provide fresh water for re-use.
- **Bio-retention Basin.** Bio-retention basins filter pollutants contained within stormwater through a vegetated filter media. Filtered stormwater is collected via drainage pipes beneath the filter media and delivers it to the stormwater drainage system.

5.4 QUALITY MODEL RESULTS

The results of the *MUSIC* modelling are presented below. As shown, the utilised treatment train will be effective in achieving the desired stormwater quality objectives.

TABLE 6 LOT 1 TREATMENT TRAIN EFFECTIVENESS

PARAMETER	SOURCES	RESIDUAL LOAD	% REDUCTION	
			REQUIRED	ACHIEVED
Flow (ML/yr)	26.7	25.5	N/A	4.5
Total Suspended Solids (kg/yr)	4560	679	85	85.1
Total Phosphorus (kg/yr)	10.5	3.82	60	63.5
Total Nitrogen (kg/yr)	62.2	28.4	45	54.4
Gross Pollutants (kg/yr)	748	0	90	100

TABLE 7 LOT 2 TREATMENT TRAIN EFFECTIVENESS

PARAMETER	SOURCES	RESIDUAL LOAD	% REDUCTION	
			REQUIRED	ACHIEVED
Flow (ML/yr)	11.5	10.4	N/A	8.9
Total Suspended Solids (kg/yr)	2900	436	85	85
Total Phosphorus (kg/yr)	5.42	1.77	60	67.3
Total Nitrogen (kg/yr)	26.9	12.3	45	54.5
Gross Pollutants (kg/yr)	320	0	90	100

TABLE 8 LOT 3 TREATMENT TRAIN EFFECTIVENESS

PARAMETER	SOURCES	RESIDUAL LOAD	% REDUCTION	
			REQUIRED	ACHIEVED
Flow (ML/yr)	22.9	21	N/A	8.3
Total Suspended Solids (kg/yr)	4840	714	85	85.2
Total Phosphorus (kg/yr)	9.92	3.39	60	65.8
Total Nitrogen (kg/yr)	53.1	23.9	45	55.1
Gross Pollutants (kg/yr)	641	0	90	100

From these results, it is then required that the bio-retention basins be installed for each allotment. A layout showing the indicative locations and sizing for bio-retention basins in each allotment is shown **APPENDIX B**.

5.5 CONSTRUCTION PHASE STORMWATER QUALITY MANAGEMENT

While the development will ultimately comply with the objectives of State Planning Policy - July 2017, Water Quality, Section 1, it is also required to comply with the requirements of Appendix 2 Table A: Construction Phase – Stormwater Management Design Objectives during the construction works.

Pollutants typically generated during the construction phase include:

- Litter
- Sediment
- Hydrocarbons
- Toxic Materials
- pH Altering Substances

During the detailed design and construction phase, an erosion and sediment control plan will be prepared for the site. The erosion and sediment control plan will be based on the ICEA document '*Best Practice Erosion and Sediment Control*', International Erosional Control Association (Australasia), to achieve compliance under the *Environmental Protection Act 1994*.

The erosion and sediment control plan shall address the following:

- Use and location of sediment control devices, including; sediment fencing and sediment traps for stormwater entry pits.
- Erosion control measures during earthworks, including any staging or sequencing of the works.

6 CONCLUSION

This report summarises the stormwater management practices proposed to manage the stormwater quantity and quality generated by the proposed development.

The development results in an increase in flows generated from the site. However, in accordance with the approved stormwater management plans for recent developments within the Witmack Industry Park, stormwater detention is not to be provided for the development. As such, the development will not incur actionable nuisance flows, worsening effects, or quantifiable loss to downstream properties.

The development will also result in an increase in the export of total suspended solids, total nitrogen and total phosphorus from the site. To achieve the reduction targets identified in the State Planning Policy (SPP), the proposed development of a treatment train was developed using MUSIC.

From the above analysis, a treatment train including rainwater reuse tanks and bio-retention basins was effective in reducing the site pollutants to the prescribed levels of the State Planning Policy. The development is hence seen to comply with Toowoomba Regional Council's pollutant reduction policy and the State Planning Policy.

As such, it is therefore seen that the proposed development will meet both the stormwater Quantity and Quality objectives as detailed within the Queensland State Planning Policy and the Toowoomba Regional Council's Planning Scheme.

7 REFERENCES

Text References

Toowoomba Regional Council, Toowoomba Regional Planning Scheme

<https://www.tr.qld.gov.au/planning-building/planning-scheme-strategies-tools/planning-scheme-new/13289-access-the-toowoomba-regional-planning-scheme-9>

Ball J, Babister M, Nathan R, Wees W, Weinmann E, Retallick M, Testoni I, (Editors) 2019, Australian Rainfall & Runoff: A Guide to Flood Estimation, © Commonwealth of Australia (Geoscience Australia)

Institute of Public Works Engineering Australasia, Queensland 2017, Queensland Urban Drainage Manual –Fourth Edition, 2016, Institute of Public Works Engineering Australasia, Queensland

Queensland Government 2017, State Planning Policy, July 2017, Department of Infrastructure, Local Government Planning, Brisbane, Australia

Water by Design 2010, MUSIC Modelling Guidelines, SEQ Healthy Waterways Partnership, Brisbane Qld, ISBN 978-0-9806278-4-8

Software Used

MUSIC by eWater

8 APPENDICES

APPENDIX A. SITE PLAN (FKG DRAWING: 2570.001)

TOTAL DEVELOPMENT SUMMARY

PROPOSED TOTAL DEVELOPMENT AREA = 8.815ha

PROPOSED LOT 1 - 4.73ha

STAGE 2a GFA = 1619m²
STAGE 2b GFA = 3059m²
TOTAL GFA LOT 1 = 4678m²
TOTAL LANDSCAPING LOT 1 - 1726m²
TOTAL IMPERVIOUS AREA LOT 1 - 36866m²
BUILDING SITE COVERAGE - 10.9% SITE AREA
CARPARKS PROVIDED - 68 TOTAL PROVIDED

PROPOSED LOT 2 - 1.574ha

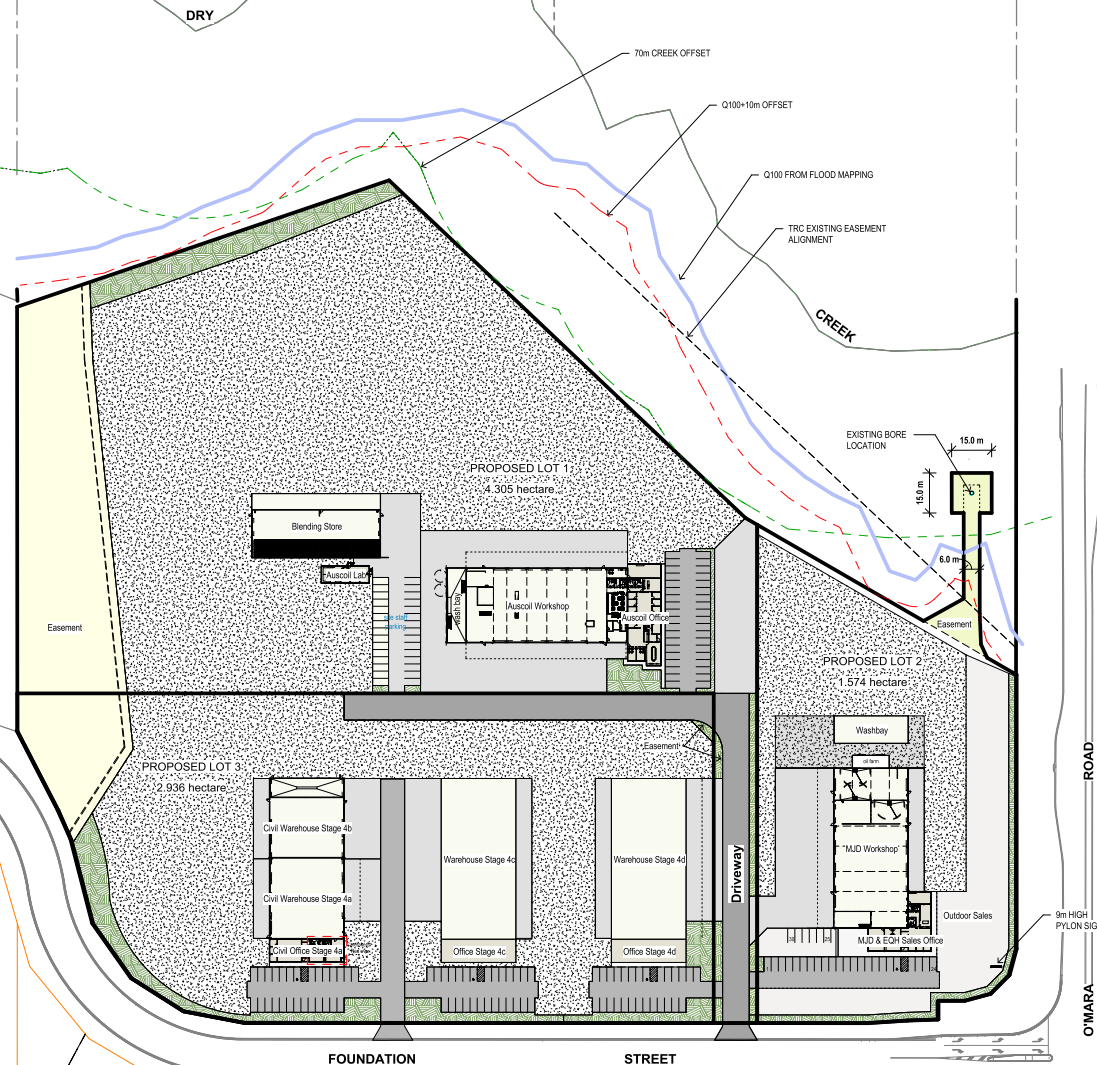
STAGE 3 GFA = 2440m²
OUTDOOR SALES (INCLUDED IN HARDSTAND) - 3266m²
GRAVEL HARDSTAND - 5055m²
LANDSCAPING - 966m²
TOTAL IMPERVIOUS AREA LOT 2 - 14248m²
BUILDING SITE COVERAGE - 15.5% SITE AREA
CARPARKS PROVIDED - 30 TOTAL PROVIDED

PROPOSED LOT 3 - 2.936ha

STAGE 4a GFA = 1189m²
STAGE 4b GFA = 834m²
STAGE 4c GFA = 1948m²
STAGE 4d GFA = 1948m²
TOTAL LOT 3 ASPHALT - 4446m²
TOTAL LOT 3 CONCRETE - 3278m²
TOTAL LOT 3 LANDSCAPING - 1995m²
TOTAL LOT 3 GRAVEL HARDSTAND - 12686m²
LOT 3 CARPARKS PROVIDED - 81

TOTAL COMBINED IMPERVIOUS AREA PROPOSED LOT 3 - 25806m²

TOTAL GFA ALL STAGES = 13037m²
TOTAL SITE COVERAGE - 14.7% SITE AREA
TOTAL SITE LANDSCAPING = 4687m² = 5.3% SITE COVERAGE



Combined Site Plan

1 : 1000

FKG GROUP

275 McDUGALL STREET
PO BOX 6441
TOOWOOMBA QLD 4350

07 4620 0500
www.fkg.com.au
design@fkg.com.au

This drawing may only be issued for approval or construction if signed by the licensed professional or consultant for who ever issued this drawing. Contractors to confirm dimensions on site prior to commencement of work.

FKG Garden & Stone Pty Ltd. Document and Design are not to be used for any other purpose, approved or construction, not designed or intended to be used for any other purpose.

PERFORMANCE BEYOND EXPECTATION

No.	Description	Date
A	CONSULTANT COORDINATION	28/04/2026
B	ISSUE FOR DA APPROVAL	28/04/2026
C	ISSUE FOR COORDINATION	12/06/2026

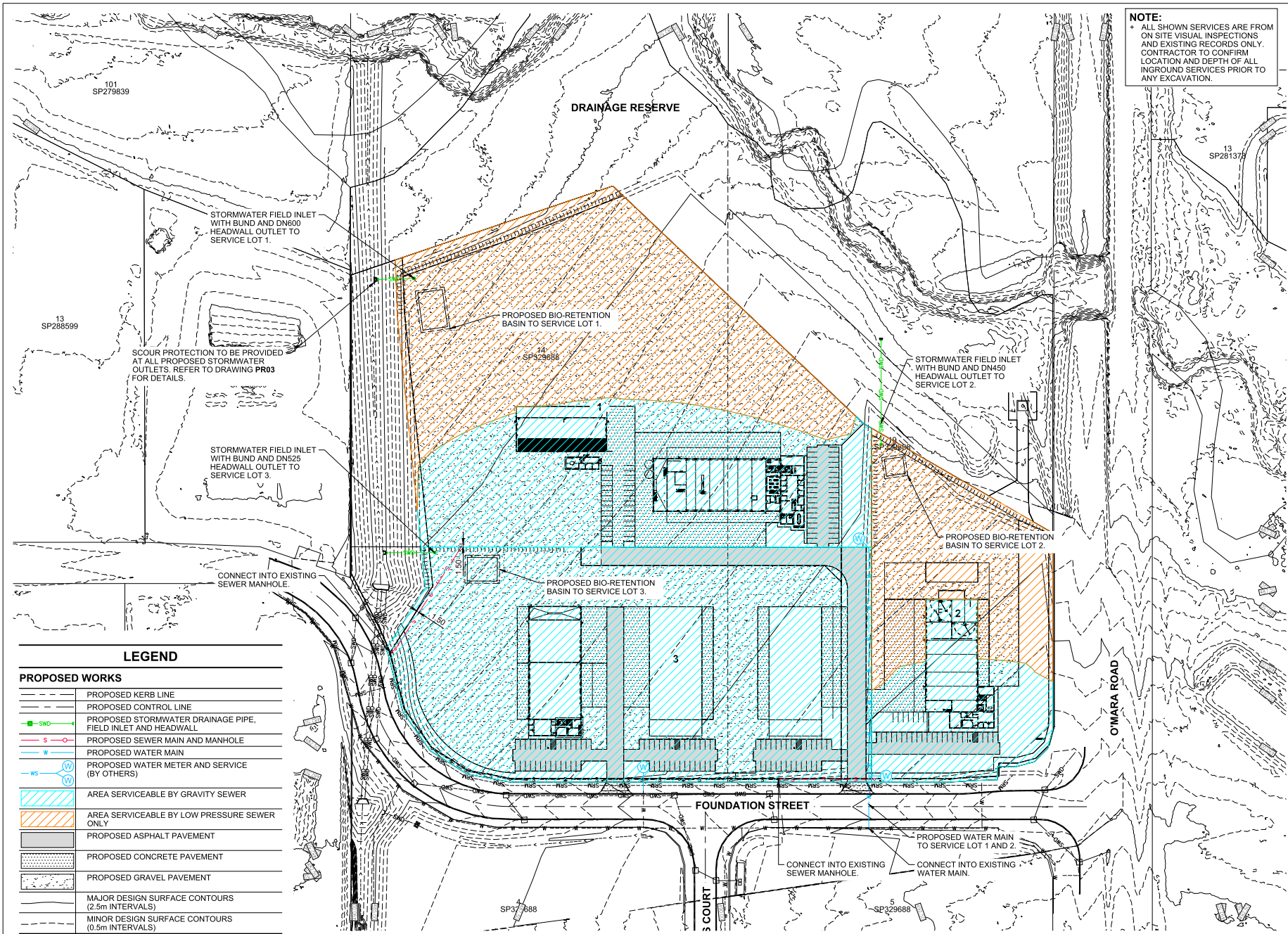
**PROPOSED
MEDIUM INDUSTRY
DEVELOPMENT**

SITE PLAN

Status	
Date	12/06/2026
Checked	Drawn
Project No.	2570.001
Scale	1 : 1000 @ A1

APPENDIX B.

PRELIMINARY SERVICES LAYOUT (KEHOE MYERS DRAWING: C2526235-PR02)

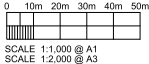


NOTE:
+ ALL SHOWN SERVICES ARE FROM ON SITE VISUAL INSPECTIONS AND EXISTING RECORDS ONLY. CONTRACTOR TO CONFIRM LOCATION AND DEPTH OF ALL INGROUND SERVICES PRIOR TO ANY EXCAVATION.

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DATUM

DRAWING ISSUE			
ISSUE	DATE	DETAILS	INITIAL
P1	23.04.26	FOR APPROVAL	NJK
P2	30.04.26	FOR APPROVAL	
P3	18.06.26	FOR APPROVAL	



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DATE 18.06.26 03:48 PM

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CLIENT

PROJECT

**FOUNDATION STREET
MIXED USE DEVELOPMENT**

DRAWING TITLE
SERVICES CONNECTION PLAN

DESIGN	AMR	ORIGINAL SIZE	A1
DRAWN	NJ	PROJECT NUMBER	C2526235
CHECKED	ADK	DRAWING NUMBER	PR02
APPROVED		ISSUE	P3
DATE	23.04.26		

LEGEND	
PROPOSED WORKS	
	PROPOSED KERB LINE
	PROPOSED CONTROL LINE
	PROPOSED STORMWATER DRAINAGE PIPE, FIELD INLET AND HEADWALL
	PROPOSED SEWER MAIN AND MANHOLE
	PROPOSED WATER MAIN
	PROPOSED WATER METER AND SERVICE (BY OTHERS)
	AREA SERVICEABLE BY GRAVITY SEWER
	AREA SERVICEABLE BY LOW PRESSURE SEWER ONLY
	PROPOSED ASPHALT PAVEMENT
	PROPOSED CONCRETE PAVEMENT
	PROPOSED GRAVEL PAVEMENT
	MAJOR DESIGN SURFACE CONTOURS (2.5m INTERVALS)
	MINOR DESIGN SURFACE CONTOURS (0.5m INTERVALS)
EXISTING WORKS	
	EXISTING KERB INVERT
	EXISTING CONTROL LINE
	EXISTING STORMWATER DRAINAGE PIPE, MANHOLE, GULLY AND HEADWALL
	EXISTING SEWER MAIN AND MANHOLE
	EXISTING SEWER RISING MAIN
	EXISTING WATER MAIN
	EXISTING TABLE DRAIN

SERVICES CONNECTION PLAN
SCALE:- 1:1,000 @ A1, 1:2,000 @ A3

APPENDIX C.

MUSIC MODELLING PARAMETERS

Table E1 Meteorological Data & Rainfall Data

Input	Data Used
Rainfall Station	Toowoomba City Council, ID 41467
Time Step	6 min
Modelling Period	01/01/1961 – 31/12/1970
Average Annual Rainfall (mm)	898
Evapotranspiration (mm)	1201

Table E2 Rainfall-Runoff Parameter Table

Parameter	Data Used
Landuse	Industrial
Rainfall Threshold (mm)	1
Soil Storage Capacity (mm)	18
Initial Storage (% of Capacity)	10
Field Capacity (mm)	80
Infiltration Capacity Coefficient – a	243
Infiltration Capacity Coefficient – b	0.6
Initial Depth (mm)	50
Daily Recharge Rate (%)	0
Daily Baseflow Rate (%)	31
Daily Deep Seepage Rate (%)	0

Table E3 Water Quality Parameters

Catchment	Flow Type	Total Suspended Solids		Total Phosphorus		Total Nitrogen	
		Mean (Log ₁₀ mg/L)	σ (Log ₁₀ mg/L)	Mean (Log ₁₀ mg/L)	σ (Log ₁₀ mg/L)	Mean (Log ₁₀ mg/L)	σ (Log ₁₀ mg/L)
Industrial - Ground Level	Base Flow	0.780	0.450	-1.110	0.480	0.140	0.200
	Storm Flow	1.920	0.440	-0.590	0.360	0.250	0.320
Industrial - Roof	Base Flow	N/A	N/A	N/A	N/A	N/A	N/A
	Storm Flow	1.300	0.440	-0.890	0.360	0.250	0.320
Industrial - Roads	Base Flow	0.780	0.450	-1.110	0.480	0.140	0.200
	Storm Flow	2.430	0.440	-0.300	0.360	0.250	0.320

Estimation Method: Stochastically Generated