

CONCEPTUAL STORMWATER MANAGEMENT PLAN

Proposed Residential Development

41 Kelburn Street, Upper Mount Gravatt

Lot 30 on RP119240


For Wucon Pty Ltd

27 March 2026

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Client Reference:	41 Kelburn Street, Upper Mount Gravatt
Synopsis:	This <i>Conceptual Stormwater Management Plan</i> describes the existing site characteristics, and corresponding stormwater quantity and quality management controls to be implemented during the construction and operational phase of the development.

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Andrew Pilkington	26707		27 March 2026

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1.0 INTRODUCTION

1.1 Background

OSKA Engineers has been commissioned by Wucon Pty Ltd to prepare a Conceptual Stormwater Management Plan (CSWMP) to support a Development Application for the proposed Residential Development development situated at 41 Kelburn Street, Upper Mount Gravatt.

The subject site is described as Lot 30 on RP119240 and has a total site area of 0.0612ha.

1.2 Scope

This CSWMP details the conceptual planning, layout and design of the stormwater management infrastructure for both the construction and operational phases of this development.

This CSWMP aims to:

- Establish the required performance criteria for the proposed stormwater quantity and quality improvement systems;
- Provide a conceptual design of stormwater infrastructure including stormwater quality improvement devices and stormwater quantity management controls;
- Demonstrate the modelled post-development stormwater quality discharging from the site does not adversely impact on the water quality and ecological values of downstream watercourses;
- Demonstrate stormwater runoff is conveyed through the site to a Lawful Point of Discharge (LPOD) in accordance with the Queensland Urban Drainage Manual (QUDM); and
- Provide reporting and monitoring mechanisms whereby the performance of this system can be measured enabling identification of corrective actions/alterations required to ensure the above mentioned objectives are maintained.

This CSWMP has been prepared in accordance with the IEAust Australian Runoff Quality: Guide to Water Sensitive Urban Design, Queensland State Planning Policy 2017, IPWEA Queensland Urban Drainage Manual (QUDM) Fourth Edition (2017), Water By Design MUSIC Modelling Guidelines V1 – 2010, and Brisbane City Council (BCC) City Plan 2014 – Planning Scheme Policy 6 – Infrastructure Design.

2.0 SITE DESCRIPTION

2.1 Location

The subject site is located at 41 Kelburn Street, Upper Mount Gravatt. The site fronts Mirimar Street to the west, Kelburn Street to the south and has existing residential properties to the south and east. The site covers a total combined area of 0.0612ha, with details as summarised in *Table 1* and as located in *Figure 1*.

Table 1: Site Description

Client	Lot and Property Description	Street Address
Wucon Pty Ltd	Lot 30 on RP119240	41 Kelburn Street, Upper Mount Gravatt

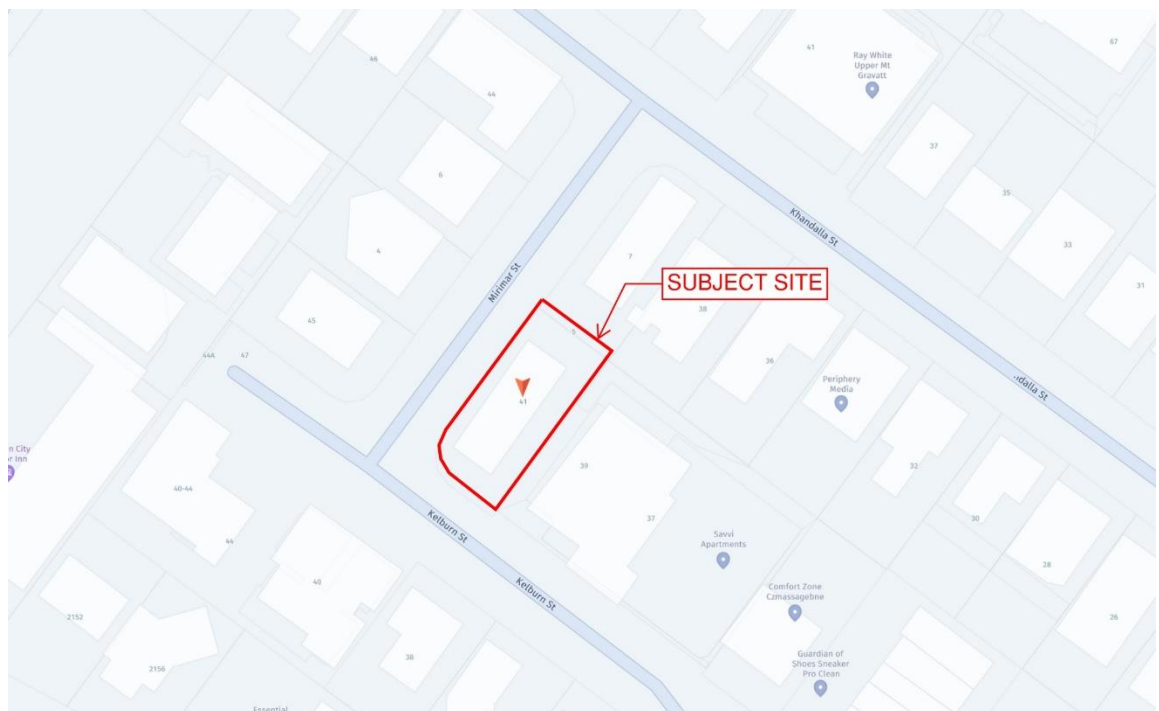


Figure 1: Locality Plan (Source: Nearmap)

2.2 Site Topography

The existing site generally grades to the north-east with spot heights ranging from approximately RL 54.36m AHD to 55.18m AHD. Based on the provided survey and aerial information, any stormwater runoff from the site ultimately drains to an existing easement (EMT A on SP292653) and private property (Lot 204 on SP292653) to the east of the subject site.

For further information, the site survey has been provided by Survey My Block; Detail and Level Survey (Ref: JN240340) included as Appendix A.

2.3 Vegetation and Land Use

The subject site currently consists of a single storey residential dwelling, a detached carport and a detached shed. There are grassed areas surrounding the dwelling with a number of trees along the western and southern boundaries. Access to the site is provided from Mirimar Street.

An aerial photograph taken on the 03 December 2025 of the subject site is included in *Figure 2*.

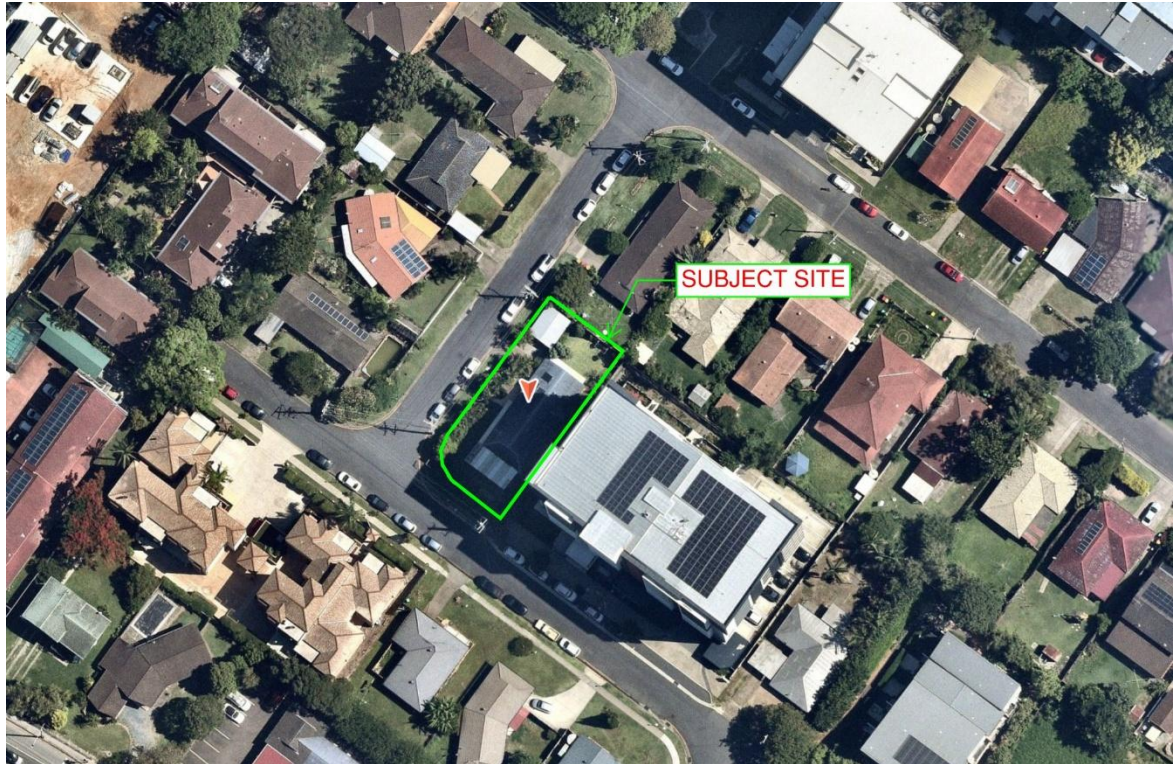


Figure 2: Aerial Image of the Site (Source: Nearmap – Image taken 03 December 2025)

2.4 Proposed Development

The proposed development comprises of five (5) three-storey townhouses with grassed/landscaped areas to the north and south of the dwellings. Driveway access to the site will be gained via Mirimar Street. Each dwelling will be contained within a standard format lot.

Refer to Appendix B for further proposed architectural and layout details prepared by Yata Architecture; Floor Plan – Ground Floor (Ref: 053_2025 – DA100) & Gaskell Planning Consultants, Reconfiguring A Lot (Ref: 25-2451-1A).

2.5 Proposed Conceptual Drainage

It is proposed that the site's captured stormwater be conveyed to a below ground detention tank. All captured flows within the tank are to be discharged to a proposed manhole within the subject site over the existing Ø450mm stormwater pipe, the site's Lawful Point of Discharge (LPOD).

It is proposed to divert the existing Ø450mm stormwater pipe around the townhouses within a 3.00m easement along the site's western and northern boundaries connecting into the existing manhole within the existing easement (EMT A on SP292653).

2.6 Rainfall Data

Rainfall intensity data has been obtained from the Australian Bureau of Meteorology's 2016 Design IFD Rainfall System. The data has been extracted for the nearest grid cell at Latitude 27.5625 (S) and Longitude 153.0875 (E). The IFD data and average rainfall intensities used in this report are in accordance with the procedures outlined in Geosciences Australia, Australian Rainfall and Runoff 2019.

3.0 DATA

Data which has been sourced or provided, in order to prepare this report for the site, was gathered from the following sources:

- Detailed site survey provided by Survey My Block; Detail and Level Survey (Ref: JN240340) included as Appendix A;
- Proposed site layout provided by Yata Architecture; Floor Plan – Ground Floor (Ref: 053_2025 – DA100) & Gaskell Planning Consultants, Reconfiguring A Lot (Ref: 25-2451-1A) included as Appendix B;
- LIDAR data for the subject site sourced from Australian Government Elevation and Depth Foundation Spatial Data (ELVIS), Date Source: 2014, DEM Data;
- Rainfall and Meteorological 2016 IFD Data by the Australian Bureau of Meteorology;
- Information Extracted from BCC Interactive Mapping – 2014; and
- Aerial Imagery by Nearmap (Accessed on 11 March 2026).

4.0 SITE HYDROLOGY

4.1 Background

The following sections define the method and parameters utilised within the hydrologics of the site, in order to establish a simulation of the anticipated flow regime and peak discharge at the Lawful Point of Discharge (LPOD). A Rational Method calculation has been provided for comparison of the pre and post-development peak flow rates.

The Rational Method (Section 4.3 of the Queensland Urban Drainage Manual - QUDM 2017) is a suitable estimation technique, given its flexibility in its data requirements and is able to produce satisfactory estimates of peak site discharges based on the following data input:

Specific intensity frequency duration (IFD) data;

- length/type of flow path;
- contributing catchment areas; and
- coefficient of discharge.

4.2 Pre-Development

4.2.1 Catchment Definition and Lawful Point of Discharge

The pre-development site has been analysed as a singular internal catchment and has a contributing area of 612m².

Any stormwater from the subject site is ultimately conveyed as sheet flow through the site to the north-east towards an existing easement (EMT A on SP292653) and private property (Lot 204 on SP292653). The Existing Point of Discharge (EPOD) for the subject site (for analysis in accordance with QUDM), is the existing easement (EMT A on SP292653) to the east of the site.

The catchment area and LPOD for the subject site are shown on OSKA Consulting Group, Pre-Development Catchment Plan (Ref: OSK7131/P001/A) included as Appendix C.

4.2.2 Coefficient of Runoff

The pre-development coefficient of runoff (C year) was determined based on the fraction impervious method specified in QUDM. The pre-development catchment, based on the provided survey information, has 326m² of impervious surfaces, which equates to a fraction impervious (fi) of 0.53. Using a one hour, ten-year rainfall intensity (¹I₁₀) of 63.9 mm/hr, a C₁₀ value of 0.76 has been adopted for the pre-development catchment.

The following pre-development coefficients of runoff (as shown in *Table 2*) have been adopted in accordance with QUDM Table 4.5.2, which apply the frequency factors for the standard Annual Exceedance Probability (AEP) design storms of 39%, 18%, 10%, 5%, 2% and 1% (corresponding to the 2, 5, 10, 20, 50 and 100-year Average Recurrence Interval (ARI) storms).

Table 2: Pre-Development Coefficient of Runoff

Catchment	C ₂	C ₅	C ₁₀	C ₂₀	C ₅₀	C ₁₀₀
Pre	0.65	0.72	0.76	0.80	0.87	0.91

4.2.3 Time of Concentration

The Time of Concentration for the pre-developed catchment has been calculated in accordance with QUDM Table 4.6.3 – Recommended roof drainage system travel times.

In accordance with Table 4.6.3 of QUDM, the pre-development catchment will have a time of concentration that will incorporate five (5) minutes of the roof to downpipes time plus one (1) minute of pipe flow. This equates to a total travel time of six (6) minutes.

4.2.4 Design Flow Rates

Pre-development peak flow rates have been estimated for the adopted storms using design rainfall intensities from the Bureau of Meteorology IFD Data. The Rational Method ($Q = 2.78 \times 10^{-3}$ CIA) has been used to estimate the subject site's design peak flow rates. The pre-development peak flows for the subject site are presented in *Table 3*.

Table 3: Pre-Development Peak Flow Estimation – Rational Method

Pre-Development							
Annual Exceedance Probability	AEP	39%	18%	10%	5%	2%	1%
Coefficient of Runoff	C	0.65	0.72	0.76	0.80	0.87	0.91
Area of Catchment (ha)	A	0.061	0.061	0.061	0.061	0.061	0.061
Average Rainfall Intensity (mm/h)	I	134	168	194	223	262	291
Peak Flow Rate (m³/s)	Q	0.015	0.021	0.025	0.030	0.039	0.045

4.3 Post-Development

4.3.1 Catchment Definition and Lawful Point of Discharge

The post-development scenario has been analysed as described in the pre-development scenario as a single internal catchment with a total contributing area of 612m².

Stormwater collected from the roof, carpark and ground areas shall be conveyed via an internal network of pits and pipes, sized to capture up to the 1% AEP event, and conveyed to the proposed underground stormwater tank. The captured flows within the tank are piped to the proposed stormwater manhole within the subject site (the site's LPOD).

The internal building drainage design to facilitate this stormwater strategy is to be coordinated with the building hydraulic engineer at the detailed design phase.

The post-development catchment area and LPOD are detailed on OSKA Consulting Group, Post-Development Catchment Plan (Ref: OSK7131/P002/A) & External Catchment Plan (Ref: OSK7131/P003/A) included as Appendix D.

4.3.2 Coefficient of Runoff

The post-development coefficients of runoff (C year) were determined using the fraction impervious method as specified in QUDM.

Based on the supplied architectural plans, the post-development catchment has approximately 429m² of impervious surfaces which equates to a fraction impervious (fi) of 0.70. Using a one-hour, ten-year rainfall intensity (¹I₁₀) of 63.9 mm/hr, a C₁₀ value of 0.81 has been adopted for the post-development catchment.

The following post-development Coefficients of Runoff (as shown in *Table 4*) have been adopted in accordance with QUDM Table 4.5.2, which apply the frequency factors for the standard Annual Exceedance Probability (AEP) design storms of 39%, 18%, 10%, 5%, 2% and 1% (corresponding to the 2, 5, 10, 20, 50 and 100-year ARI storms).

Table 4: Post-Development Coefficient of Runoff

Catchment	C ₂	C ₅	C ₁₀	C ₂₀	C ₅₀	C ₁₀₀
Post	0.69	0.77	0.81	0.85	0.93	0.97

4.3.3 Time of Concentration

The Time Of Concentration (TOC) for the post-development catchment has been calculated in accordance with QUDM Table 4.6.3 – Recommended roof drainage system travel times.

In accordance with Table 4.6.3 of QUDM, the post-development catchment will have a time of concentration that will incorporate five (5) minutes of the roof to downpipes time. This equates to a total travel time of five (5) minutes.

4.3.4 Design Flow Rates

Post-development peak flow rates have been calculated for the adopted storms using design rainfall intensities from the Bureau of Meteorology 2016 IFD Data. The Rational Method ($Q = 2.78 \times 10^{-3} CIA$) has been used to estimate the required design peak flow rates for the subject site. The post-development peak flows for the subject site are presented in *Table 5*.

Table 5: Post-Development Peak Flow Estimation – Rational Method

Post-Development							
Annual Exceedance Probability	AEP	39%	18%	10%	5%	2%	1%
Coefficient of Runoff	C	0.69	0.77	0.81	0.85	0.93	0.97
Area of Catchment (ha)	A	0.061	0.061	0.061	0.061	0.061	0.061
Average Rainfall Intensity (mm/h)	I	139	175	203	234	275	306
Peak Flow Rate (m ³ /s)	Q	0.016	0.023	0.028	0.034	0.044	0.051

4.4 Change in Flow Rates

The difference in peak flow rates calculated from the total pre and post-developed site as estimated via The Rational Method, is detailed in *Table 6*.

Table 6: Change in Peak Flow Rates Estimation – Rational Method

LPOD							
Annual Exceedance Probability	AEP	39%	18%	10%	5%	2%	1%
Pre-Developed Peak Flow Rate (m ³ /s)	Q	0.015	0.021	0.025	0.030	0.039	0.045
Post-Developed Peak Flow Rate (m ³ /s)	Q	0.016	0.023	0.028	0.034	0.044	0.051
Change in Peak Flow Rate (m ³ /s)	Q	+0.001	+0.002	+0.003	+0.004	+0.005	+0.006

The Rational Method assessment has demonstrated that an increase in peak flow rates is anticipated due to the proposed development. Therefore, On-Site Detention (OSD) will be required to mitigate flows to the pre-development rates.

4.5 External Catchments

The subject site and the surrounding area were examined to determine if any external catchments will contribute to the subject site. The site was deemed to contain one (1) influencing external catchment to the west of the subject site. The development will propose to convey the excess external catchment flows that are unable to be conveyed within the existing underground stormwater network via a concrete box channel along the northern site boundary. The captured flows within the channel will discharge to the existing easement (EMT A on SP292653) to the north-east of the site.

The neighbouring property (35 Kelburn Street) to the east where the existing easement (EMT A on SP292653) runs through, does not appear to have made any allowance for the overland flow from the subject site despite the development conditions for the easement stating that it is to be designed to allow for all pipe and overland flows. Despite there being no apparent stormwater infrastructure within the easement to allow for the overland flow, it is proposed to convey the excess overland flows via a concrete box channel along the northern boundary and discharge the flows into the easement.

Further information on the external catchments' area, flows and the proposed drainage strategy will be explained in the sections below.

4.5.1 Catchment Definition and Lawful Point of Discharge

The external catchment has been analysed as a singular catchment with a total contributing area of 0.965ha. Any stormwater runoff from the external catchment is conveyed as pipe and overland flow to the existing sag gully pit at the front of the site. All minor flows are captured and conveyed within the existing pipe network that runs through the site with any excess flows to pond in Mirimar Street before overtopping the kerb and flowing through the subject site as overland flow.

The external catchment area and LPOD are shown on the OSKA Consulting Group, Post-Development Catchment Plan (Ref: OSK7131/P002/A) & External Catchment Plan (Ref: OSK7131/P003/A) included as Appendix D.

4.5.2 Coefficient of Runoff

The coefficient of runoff (C_{year}) was determined based on the fraction impervious (f_i) method as specified in QUDM. Using the latest aerial imagery of the site and surrounding area, the external catchment has been estimated to contain approximately 0.676ha of impervious surfaces which equates to a fraction impervious (f_i) of 0.70. Using a one-hour, ten-year rainfall intensity (I_{10}) of 63.9 mm/hr, a C_{10} value of 0.84 has been adopted for the external catchment.

It is to be noted that the properties within the external catchment are zoned either as *high density* or *principal centre* which would typically correspond to a higher fraction impervious value however, the external catchment assessment is based on the existing catchment conditions. Any future development within the external catchment would be required to provide stormwater detention devices to ensure the peak flows rates from the site are not increased compared to the pre-development scenario.

The following external catchment Coefficients of Runoff (as shown in *Table 7*) have been adopted in accordance with QUDM Table 4.5.2, which apply the frequency factors for the standard Annual Exceedance Probability (AEP) design storms of 39%, 10%, 5% and 1% (corresponding to the 2, 10, 20 and 100-year ARI storms).

Table 7: External Catchment Coefficient of Runoff

Catchment	C ₂	C ₁₀	C ₂₀	C ₁₀₀
EXT	0.69	0.81	0.85	0.97

4.5.3 Time of Concentration

The Time of Concentration for the external catchment has been calculated in accordance with QUDM Table 4.6.2 – Recommended standard inlet times.

In accordance with Table 4.6.2 of QUDM, the external catchment will have an inlet time of 10 minutes for urban residential areas with a grade of 6-10% at the top of the catchment. This equates to a total travel time of ten (10) minutes.

4.5.4 Design Flow Rates

Design storm flow rates have been calculated for standard storms with an ARI of 2, 10, 20 and 100 years for the external catchment using design rainfall intensities from the Bureau of Meteorology. The Rational Method ($Q = 2.78 \times 10^{-3} CIA$) has been used to calculate the design flow rates. The peak flow rates for the external catchment is presented in Table 8.

Table 8: External Catchment Peak Flow Rates

External Catchment					
Annual Exceedance Probability	AEP	0.5EY	10%	5%	1%
Coefficient of Runoff	C	0.69	0.81	0.85	0.97
Area of Catchment (ha)	A	0.965	0.965	0.965	0.965
Average Rainfall Intensity (mm/h)	I	115	166	190	245
Peak Flow Rate (m³/s)	Q	0.212	0.360	0.433	0.638

4.5.5 External Catchment Conveyance

The external catchment flows are to be conveyed via a combination of pipe and overland flow conveyed within a concrete box channel along the northern boundary to direct flows around the development and into the existing easement (EMT A on SP292653).

According to the BCC Community Maps, the existing stormwater pipe that runs through the site is a Ø450mm pipe at approximately 1.10% grade and based on a Manning’s pipe capacity calculation, has a capacity of 0.321m³/s. Therefore, the excess external catchment flows of approximately 0.317m³/s are conveyed overland through the subject site and the proposed concrete box channel will need to be sized to convey the excess flows.

To demonstrate that the proposed concrete box channel is capable of conveying the excess external catchment 1% AEP flow rates around the site, the proposed channel has been sized utilising the Manning’s equation (9.1), $Q = \frac{A}{n} \times R^{\frac{2}{3}} \times S^{\frac{1}{2}}$, from QUDM to ensure that it is sized to an adequate capacity to accommodate and safely convey the external flows.

Refer to Table 9 for the calculated concrete box channel capacity.

Table 9: Concrete Box Channel Flow Capacity

Channel Parameters	External Catchment
Channel Depth, d (m)	0.325
Freeboard (m)	0.050
Base Width, W (m)	0.750
Top Width (m)	0.750
Bank Slope (Ratio of V:H)	Vertical Sides
Manning's Roughness, n	0.013
Longitudinal Grade, S	0.50% (0.005m/m)
Velocity (m/s)	1.593
Q - Flow Rate Capacity (m ³ /s)	0.329
Design Flow Rate – Required (m ³ /s)	<u>0.317</u>

For further information on the external catchment stormwater network, refer to the OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK7131/P004/A) & Conceptual Stormwater Management Details (Ref: OSK7131/P005/A) in *Appendix E*.

It is to be noted that overland flow modelling has not been undertaken as part of this assessment and hydraulic modelling of the external catchment will be required to be undertaken as part of detailed design undertaken in conjunction with the earthworks design for the development to confirm the overland flow extents. The assessment within this report has undertaken a conceptual design of the concrete box channel only and overland flow modelling is required to confirm that the proposed arrangement is sufficient in conveying the excess overland flows around the development as well as to ensure the excess overland flows are directed around the townhouses and ensure townhouses have adequate freeboard.

5.0 STORMWATER QUANTITY ASSESSMENT

5.1 Background

The proposed development will increase peak flow rates from the subject site due to increased impervious areas and a reduction in the surface roughness of the site. Accordingly, the following section provides preliminary details of a proposed On-Site Detention (OSD) system to demonstrate no increase in nuisance flows or adverse impacts as a result of potential increased post-development runoff, on neighbouring properties and/or authorities stormwater infrastructure.

5.2 Objective

In accordance with BCC's requirements and typical industry-standard practices, the following objective has been set for post-development stormwater discharge from the site:

- No net increase in peak flows from the subject site, for all events up to the 1% AEP design storm event, during the post-developed scenario.

This objective shall be demonstrated via a suitable hydrologic and hydraulic modelling package, by detaining site runoff from the subject site within proposed below ground detention tanks.

5.3 Hydraulic Model

An estimation of the required detention volume to mitigate any increase in total site discharge rates has been undertaken using the DRAINS software programme.

A DRAINS model has been adopted at the preliminary planning stage to ensure that the below ground detention tanks volume is estimated with a higher degree of confidence. As finished site levels and internal pipe levels are still preliminary, this initial calculation is an estimate, however, it has the required level of accuracy to progress the design with confidence.

The model was developed by simulating the pre, post and mitigated catchment layouts and comparing the peak flow rates generated from each scenario.

The mitigated catchment consists of the 1% AEP runoff generated from the upper roof (330m²) and the ground areas along the southern and western boundary (185m²) being conveyed to the proposed below ground detention tank with a small amount of lower roof and ground (courtyard) areas (97m² total) bypassing the proposed tank. This catchment arrangement provides enough mitigation to demonstrate no increase in the peak flow rates exiting the site when compared to the pre-development scenario. The adopted sub-catchment areas for the site, time of concentration and fraction imperviousness, for the pre and post-development have been tabulated in *Table 10*.

Note that roof gutters are to be designed to convey the major event (up to the 1% AEP) into the detention tank.

The pre and post-development catchment area and LPOD are detailed on OSKA Consulting Group, Pre-Development Catchment Plan (Ref: OSK7131/P001/A) and on OSKA Consulting Group, Post-Development Catchment Plan (Ref: OSK7131/P002/A) & External Catchment Plan (Ref: OSK7131/P003/A) included respectively as *Appendix C and D*.

Table 10: Adopted Sub-catchment Parameters

Pre-Development Sub-Catchments			
<i>DRAINS Sub-Catchment ID</i>	<i>Total Area (ha)</i>	<i>Time of Concentration (mins)</i>	<i>Fi (%)</i>
Pre	0.0612	6	53.27
Post-Development Sub-Catchments			
<i>DRAINS Sub-Catchment ID</i>	<i>Total Area (ha)</i>	<i>Time of Concentration (mins)</i>	<i>Fi</i>
Post (Total)	0.0612	5	70.10
Post (to tank)	0.0515	5	76.70
Post (bypass)	0.0097	5	35.05

The TOC values calculated in the Rational Method calculations in Section 4 for the pre and post-development scenarios were adopted. The 39%, 18%, 10%, 5%, 2% and 1% AEP design storm events were analysed for all standard durations ranging from 5 minutes to 120 minutes. The critical durations for the combined peak site discharges were determined to be the 10 and 5 minute storms for the pre-development and post-development scenarios respectively.

The peak discharge rates for the site calculated by the DRAINS model are shown in *Table 11*.

Table 11: Anticipated Peak Site Discharge Rate – Extracted from DRAINS Model (m³/s)

Design AEP Events	Peak Flow Rate Discharge (m ³ /s)					
	39%	18%	10%	5%	2%	1%
Pre-development	0.015	0.020	0.024	0.029	0.036	0.042
Post-development (unmitigated)	0.017	0.024	0.029	0.035	0.044	0.050

The DRAINS assessment results shown in *Table 11* supports the Rational Method in Section 4 in confirming that an increase in peak flow rates discharging from the site is anticipated. Therefore, On-Site Detention is required to mitigate flows to pre-development conditions.

5.4 Detention Volume

The following detention storage parameters were adopted to achieve the target pre-development flow rates, via mitigation of the post-development flow rates.

Table 12: Adopted Detention Tank Parameters

Minimum Detention Area:	2.50m ²
Detention Tank Internal Height:	1.05m
Low Flow (at invert of tank)	Ø130mm Orifice
High Flow Weir	1.00m Long @ 0.90m above tank invert
Consolidated Outlet Pipe	Ø375mm @ 1% grade
1% AEP (Q100) Water Level:	0.92m
Required Detention Volume:	2.625m ³

The 10-minute design storm was determined as the critical storm duration for determining the required volume within the detention tank. A comparison of the pre-development and mitigated flow rates based on the above arrangement is shown in *Table 13*.

Table 13: Comparison of Pre-Development and Mitigated Flow Rates – Extracted from DRAINS

Annual Exceedance Probability	39%	18%	10%	5%	2%	1%
Pre-Development Peak Flow Rate (m ³ /sec)	0.015	0.020	0.024	0.029	0.036	0.042
Mitigated Peak Flow Rate (m ³ /sec)	0.015	0.020	0.024	0.029	0.035	0.042

The hydrograph for the critical duration of the Mitigated 1% AEP storm event compared against the pre and post-development is shown in *Figure 3*.

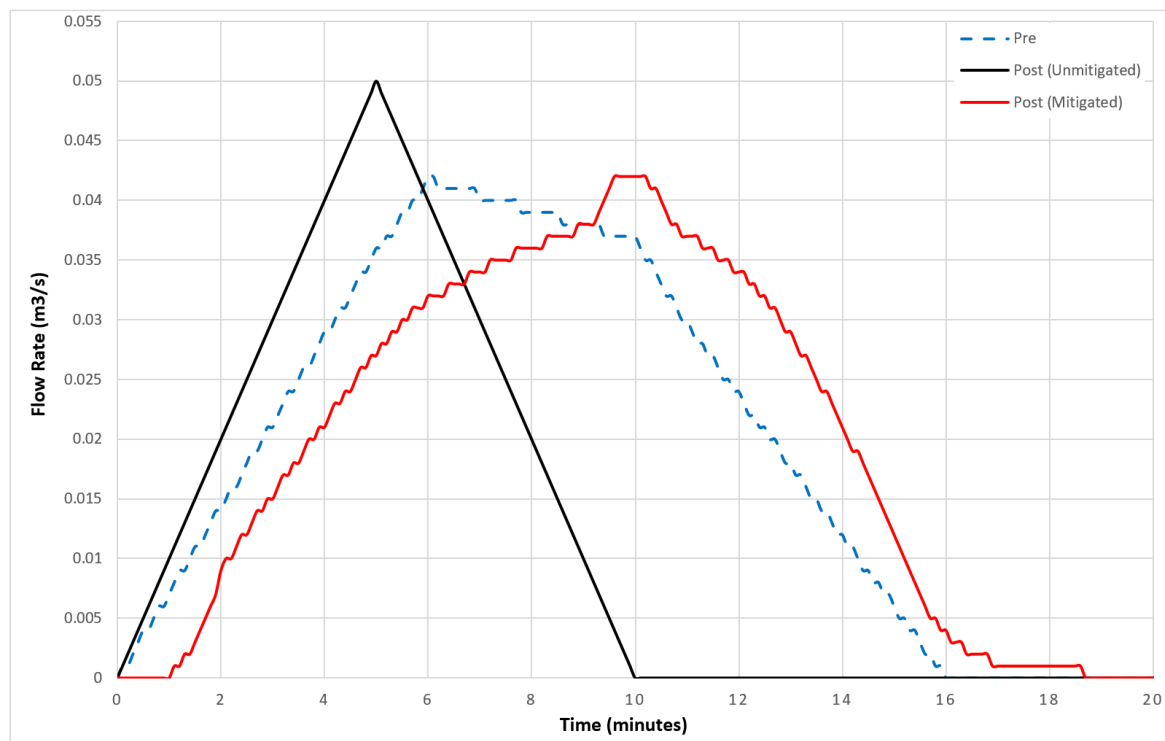


Figure 3: Pre, Post and Mitigated Flow Rates for the 1% AEP Design Storm Event

As demonstrated in the results displayed in *Table 13 and Figure 3*, the detention arrangement can be seen to effectively mitigate the post-development flows in the adopted critical design storm AEP events.

The hydraulic analysis using the DRAINS model has determined that a minimum total of 2.625m³ of storage is required for runoff attenuation and is to be provided in the form of a below ground detention tank. The below ground detention tank is to be fitted with an outlet configuration (low and high flow outlets) as detailed in Table 12 to satisfy the mitigation requirements. Refer to the OSKA Consulting Group, Conceptual Stormwater Management Plan (Ref: OSK7131/P004/A) & Conceptual Stormwater Management Details (Ref: OSK7131/P005/A) in *Appendix E* for details of the tank’s arrangement and indicative location. The final location onsite and construction levels will be determined at the detailed design stage.

A copy of DRAINS model used in this report can be made available to Council upon request.

6.0 STORMWATER QUALITY ASSESSMENT

6.1 Background

The development of the land has the potential to increase the pollutant loads within stormwater runoff and downstream watercourses. During the construction phase of the development, disturbances to the existing ground have the potential to significantly increase sediment loads entering downstream drainage systems and watercourses. The operational phase of the development will potentially increase the amount of sediments and nutrients washing from the site.

The following sections describe the construction and operational phase controls and water quality modelling of the proposed treatment train in compliance with Council guidelines.

6.2 Construction Phase

A high risk of stormwater pollution will occur from the site during the construction phase due to erosion and sediment transportation off-site to the receiving environment. The majority of this risk results from construction activities disturbing the site and exposing areas of soil to the direct erosive influence of the environment.

The following section outlines the procedures necessary to minimise erosion and control sediment during construction in accordance with the International Erosion Control Association (IECA) Best Practice ESC Document.

6.2.1 Key Pollutants

The key pollutants have been identified for the Construction Phase of this development.

Table 14: Key Pollutants, Construction Phase

Pollutant	Sources
Litter	Paper, construction packaging, food packaging, cement bags, material offcuts.
Sediment	Exposed soils and stockpiles during earthworks and building works.
Hydrocarbons	Fuel and oil spills, leaks from construction equipment and temporary car park areas.
Toxic Materials	Cement slurry, asphalt primer, solvents, cleaning agents, and wash waters (e.g., from tile works).
Acids or Alkaline substances	Acid sulphate soils, cement slurry and wash waters.

6.2.2 Sediment and Erosion Controls

Sediment and Erosion Control devices (S&EC) employed on the site shall be designed and constructed in accordance with the International Erosion Control Association (IECA) Best Practice ESC Document as shown on OSKA Consulting Group, Sediment and Erosion Control Plan (Ref: OSK7131/P006/A) & Sediment and Erosion Control Details (Ref: OSK7131/P007/A) included as Appendix F.

Pre-Construction

- Stabilised site access/exit onto Mirimar Street to the north-west;
- Sediment fences to be located around the perimeter of the site;
- Sediment trap to be installed if required;
- Dust fencing to be installed if required; and
- Educate site personnel to the requirements of Erosion and Sediment Control Plan.

Initial Construction

- Maintain construction access/exit, sediment fencing, dust fences and all other existing controls as required;
- Construct diversion drains to convey disturbed site run-off to the temporary sediment traps; and
- Confine construction activities to stages to minimise areas of disturbance at any given time.

Second Stage Construction

- Maintain construction access/exit, sediment fencing, dust fences, diversion drain and all other existing controls as required;
- Progressively revegetate finished areas where applicable;
- Divert runoff from undisturbed areas around disturbed areas; and
- Drainage structure protection around field inlets and gully pits.

During construction, all areas of exposed soils allowing dust generation are to be suitably treated. Treatments will include covering the soil and watering. Road accesses are to be regularly cleaned to prevent the transmission of soil on vehicle wheels and eliminate any build-up of typical road dirt and tyre dust from delivery vehicles.

Adequate waste disposal facilities are to be provided and maintained on the site to cater for all waste materials such as litter, hydrocarbons, toxic materials, acids or alkaline substances.

6.2.3 Water Quality Monitoring and Inspections

To ensure that the water quality objectives are being met during the construction phase of the development, water quality monitoring shall be conducted. Water quality monitoring shall use a calibrated probe or sampling and testing at a NATA registered laboratory.

Location: Monitoring Stations shown on OSKA Engineers, *Sediment and Erosion Control Plan* (Ref: OSK7131/P006/A).

Parameters: Site discharge criteria.

Frequency: Following at least 10mm of rainfall in a 24-hour period.

The contractor shall be responsible for the inspection and maintenance of all sediment and erosion control devices. Additional controls and review of existing controls shall be undertaken in response to the results of the above-mentioned monitoring program.

6.2.4 Reporting

An inspection report shall be written by a suitably qualified and experienced scientist/engineer following each water quality monitoring episode. The report shall include at least the following information:

- Name, address and real property description for the development site;
- Council file reference number (if known);
- Monitoring locations;
- Performance criteria;
- Results for each monitoring location, identifying any breaches of performance criteria;
- Recommended corrective actions to be taken and additional sediment and erosion controls, if required; and
- Inspection reports shall be provided to the contractor for their action and compilation in an on-site register.

If the above-mentioned performance criteria are exceeded and results from the downstream monitoring stations show significant deterioration from upstream results (if applicable), the contractor shall implement all recommendation of the inspection report within one (1) working day of receipt of the report.

6.3 Operational Phase

The proposed development will not require any permanent stormwater quality devices as the total site area for the proposed development is less than the 2,500m² required to trigger permanent stormwater quality improvement devices. This is in accordance with Brisbane City Council's City Plan – Section 9.4 Other Development Codes – Stormwater Code – Performance Outcome (PO15) where if the proposed development for the subject site does not propose to disturb an area greater than 2,500m², permanent stormwater quality devices are deemed not required for the operational phase of the development.

The criteria of the BCC Stormwater Code has been addressed within the OSKA Engineers, Response to Stormwater Code (Ref: OSK7131-0003) included as Appendix G.

Best Management Practices (BMP) are required to be demonstrated for all Development Applications within Brisbane City Council (BCC) and are recommended to be implemented by the developer.

7.0 ASSET HANDOVER

The proposed stormwater quantity device shall be dedicated to the owner/body corporate following the time of practical completion for the proposed development. An Asset Handover Checklist is provided as *Table 15* as a guideline for the necessary steps to be taken prior to the end of the maintenance period.

Table 15: Asset Handover Checklist

Asset Location:		
Construction By:		
Maintenance Period:		
Treatment:	Y	N
Actual treatment performance equivalent to design:		
Maintenance:		
Maintenance Plans Provided:		
Inspection and maintenance undertaken as per maintenance plan:		
Inspection and maintenance forms provided:		
Asset inspected for defects:		
Asset Information:		
Design assessment checklist provided:		
As constructed plans provided:		
Copies of all permits provided:		
Digital files provided:		

8.0 CONCLUSIONS

OSKA Engineers has been commissioned by Wucon Pty Ltd to prepare a Conceptual Stormwater Management Plan (CSWMP) to support a Development Application (DA) to Brisbane City Council (BCC) for the proposed Residential Development situated at 41 Kelburn Street, Upper Mount Gravatt. This CSWMP intends to provide an optimised stormwater management system that would be compatible and readily integrated into the proposed site use.

This CSWMP details the conceptual planning, layout and design of the stormwater management infrastructure for both the construction and operational phases of this development and satisfies the requirements of the Brisbane City Council City Plan 2014.

A hydrological analysis demonstrated that the anticipated post-development peak flow rates discharging from the site are higher than the pre-development flow rates. A hydraulic model was built using the DRAINS software program, to estimate the required detention volume and arrangement. The report and stormwater management plan define the preliminary size and layout of the proposed underground stormwater detention tank. The captured flows from the tank are to be piped to a proposed manhole over the existing Ø450mm pipe that runs through the site. A minimum total tank volume of 2.625m³ was modelled demonstrating adequate mitigation of post-developed flows resulting in no additional or actionable nuisance to downstream properties or infrastructure.

It is proposed to divert the existing Ø450mm stormwater pipe around the townhouses within a 3.00m easement along the site's western and northern boundaries. The diverted Ø450mm pipe will connect into the existing manhole to the north-east of the site within the existing easement (EMT A on SP292653).

The site is also impacted by an external catchment where excess major flows are conveyed overland through the site. It is proposed to convey the flows via a concrete box channel along the site's northern boundary and discharge flows into the existing easement (EMT A on SP292653). The proposed overland flow conveyance is conceptual, and is subject to confirmation via a hydraulic assessment to assess the overland flow extents that is to be undertaken in conjunction with the earthworks design for the development in the detailed design phase.

OSKA Engineers has adopted a Water Sensitive Urban Design (WSUD) approach, in accordance with the State Planning Policy and BCC City Plan, to managing the stormwater runoff from the proposed development. The proposed development will not require any permanent stormwater quality devices as the total developable site area for the proposed development is less than the 2,500m² to trigger for permanent stormwater quality improvement devices.

A monitoring and maintenance plan for the proposed infrastructure has been included. A concept sediment and erosion control plan is provided for the construction phase of the development and shall be implemented by the contractor and developer.

This stormwater quality strategy has defined the preliminary requirements and layout of the proposed development to demonstrate compliance with the State Planning Policy 2017 and the Brisbane City Council City Plan 2014 Planning Scheme.

APPENDIX

A

Survey My Block; Detail
and Level Survey (Ref: JN240340)

APPENDIX

B

Yata Architecture; Floor
Plan – Ground Floor (Ref: 053_2025 –
DA100) & Gaskell Planning Consultants,
Reconfiguring A Lot (Ref: 25-2451-1A)

MIRIMAR STREET

Emt E
33m²
(Drainage)

Emt A
10m²
(Access)

1
131m²

Emt B
10m²
(Access)

2
98m²

Emt C
10m²
(Access)

3
98m²
Existing Building
(to be removed)

Emt D
10m²
(Access)

4
98m²

5
188m²

Shed
(remove)

Existing Building

KELBURN ROAD



24 March 2026

PROJECT NAME:
41 KELBURN STREET
TOWNHOUSE & SUBDIVISION

CLIENT:
WUCON PTY LTD

ADDRESS:
41 KELBURN STREET,
UPPER MT GRAVATT

REAL PROPERTY DESCRIPTION:
LOT 30 ON RP119240

DRAWING:
RECONFIGURING A LOT
1 INTO 5 LOTS AND ACCESS EASEMENTS

NOTES:

- (1) This plan was prepared by Gaskell Planning Consultants for the purpose and exclusive use of Wuccon Pty Ltd to accompany an application to the Brisbane City Council for approval to reconfigure the land described in this plan and is not to be used for any other purpose or by any other person or corporation.
- (2) Gaskell Planning Consultants accepts no responsibility for any loss or damage suffered howsoever arising to any person or corporation who may use or rely on this plan in contravention of the terms of this clause or the following clauses.
- (3) This plan does not constitute a legal survey and should not be relied upon for determining property title, ownership, or legal boundaries. Users should consult a registered cadastral surveyor or legal professional for such matters.
- (4) This plan is intended for planning purposes only and should not be used for construction, engineering design, or other technical applications without further verification.
- (5) Planning scheme overlays, zones, and other regulatory data shown on this plan are subject to change. Users should verify current planning scheme provisions with the relevant local authority.

- (6) This plan is based on available data at the time of preparation. Gaskell Planning Consultants does not guarantee the accuracy or completeness of the data and is not responsible for any changes or updates that may occur after the date of issue.
- (7) Existing property boundaries, easements, kerb, buildings and contours derived from Detail and Contour Survey Plan by Survey My Block and dated 25/5/2025.
- (8) If this plan is viewed or used in digital format, Gaskell Planning Consultants takes no responsibility for any distortion, scaling errors, or misinterpretation resulting from digital manipulation or printing. This plan may not be copied unless these notes are included.

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PLAN NUMBER:

25-2451-1A



MIRIMAR STREET

KELBURN STREET

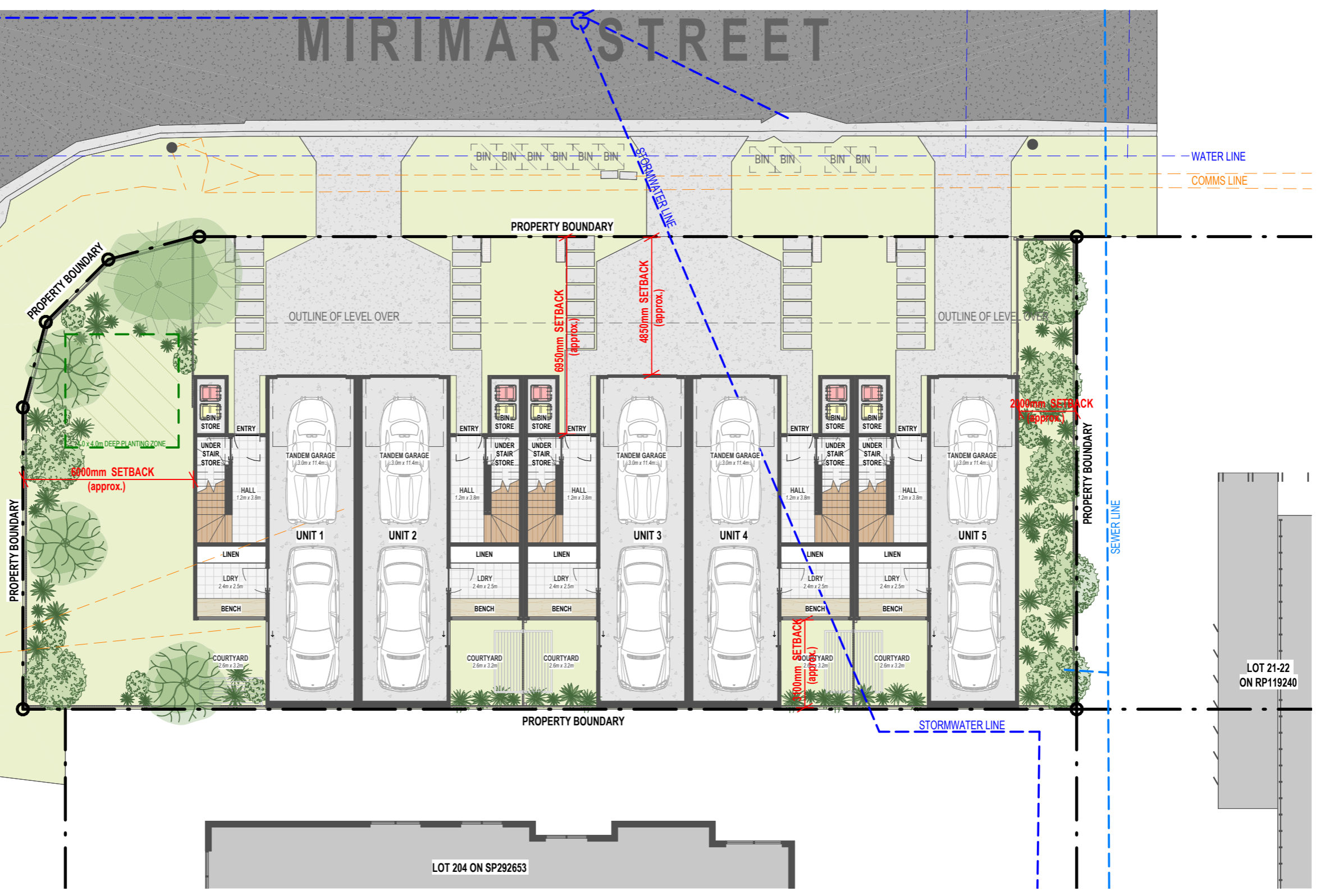
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DA300

DA201

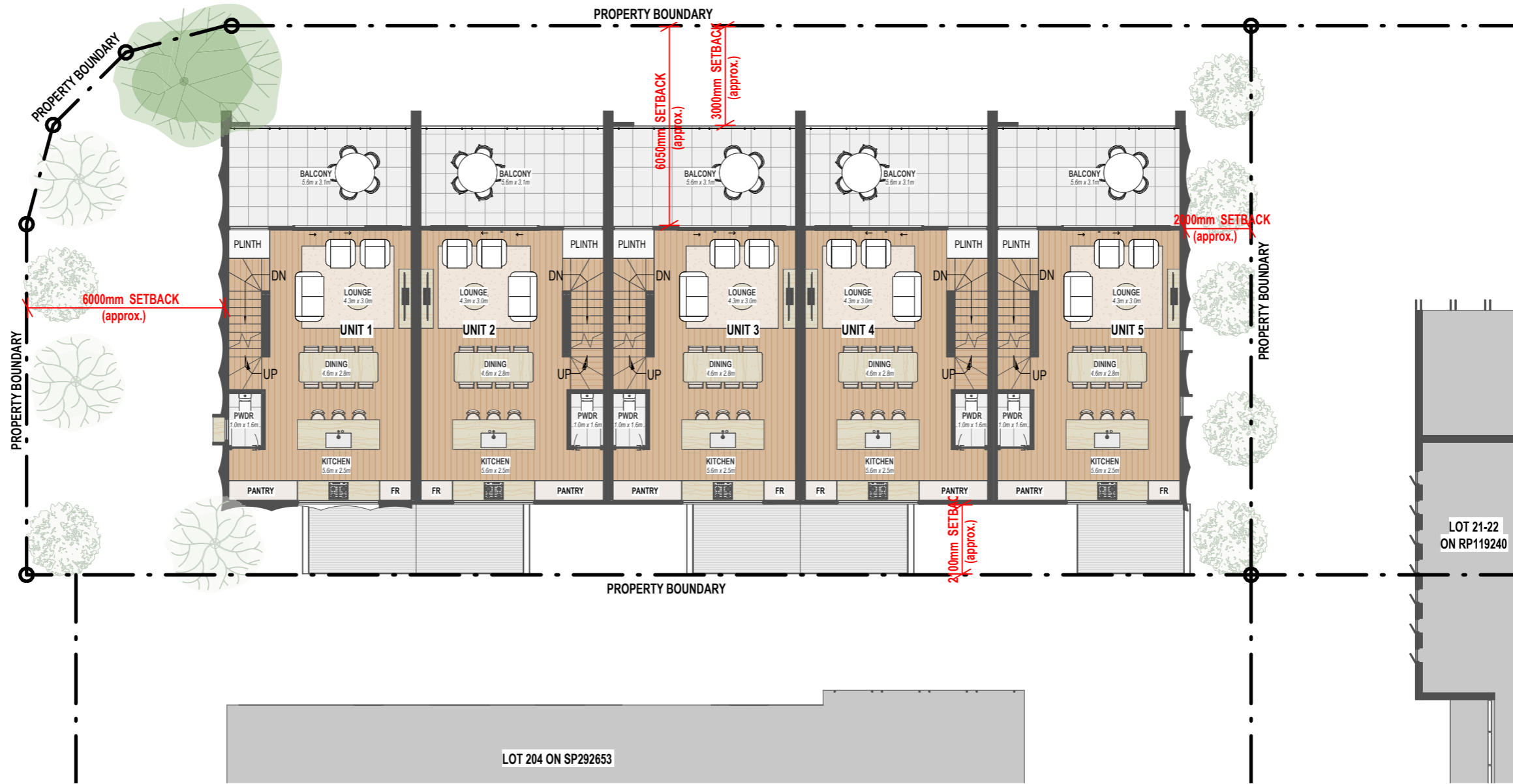
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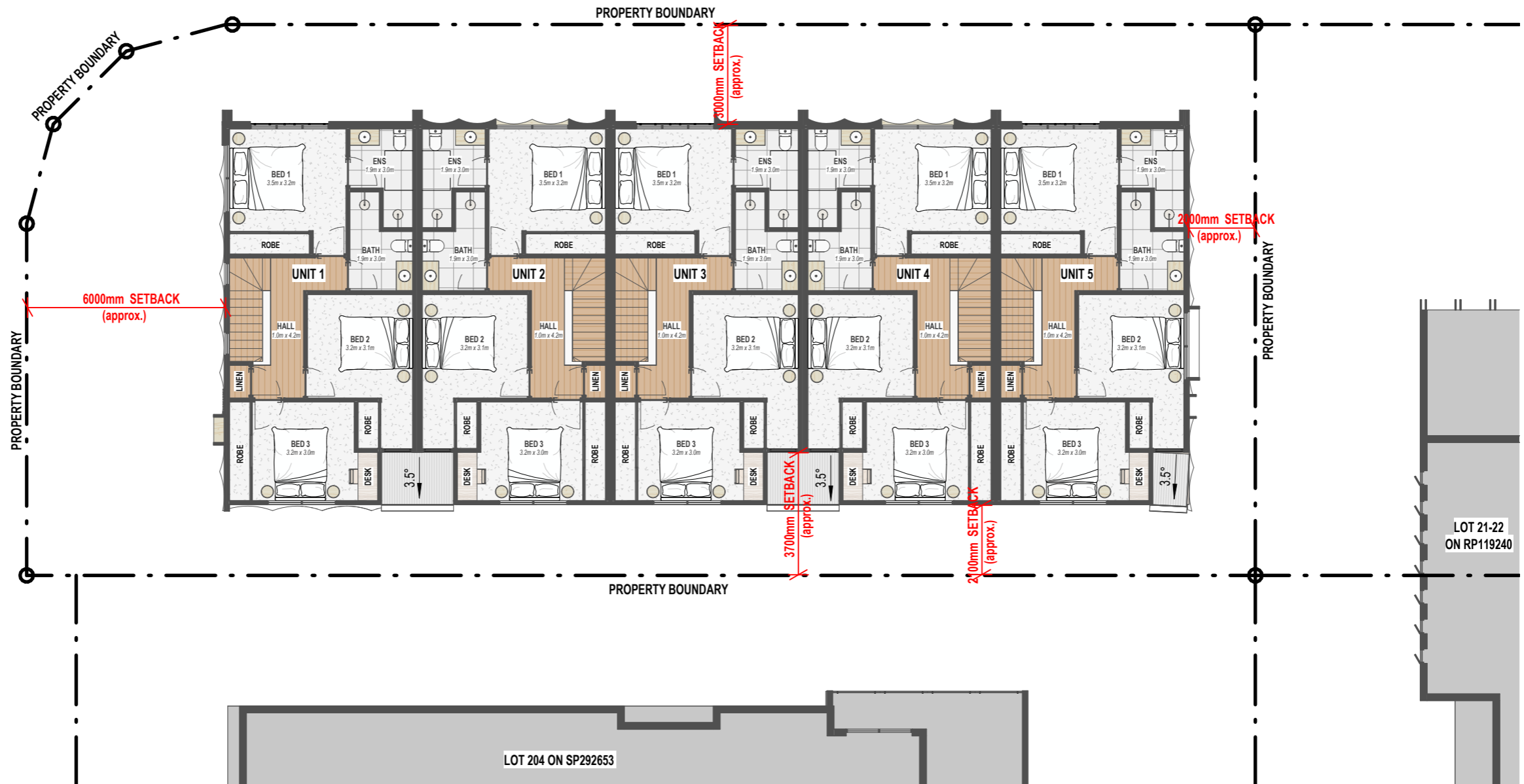
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KELBURN STREET



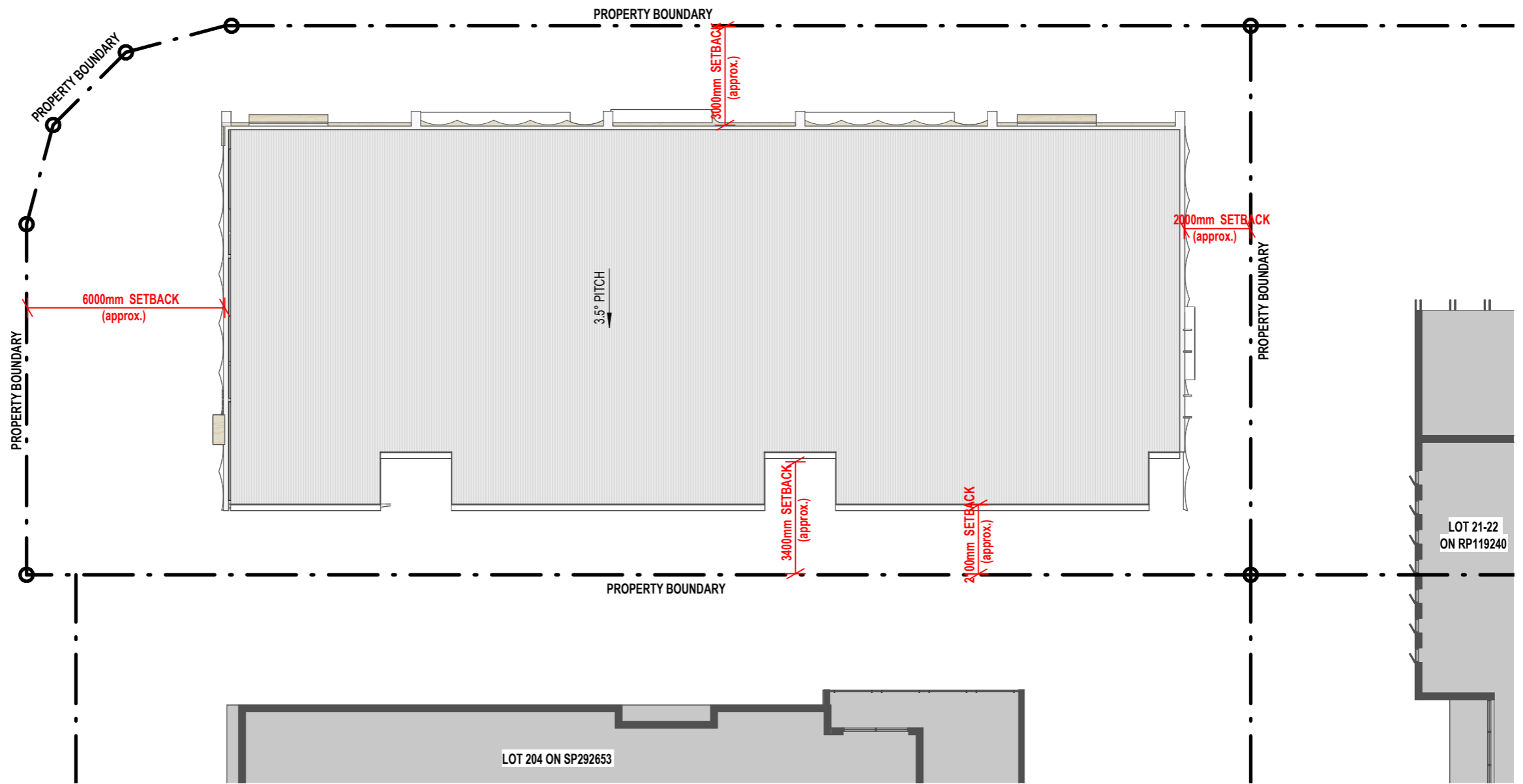
MIRIMAR STREET

KELBURN STREET



MIRIMAR STREET

KELBURN STREET





PROPERTY BOUNDARY

PROPERTY BOUNDARY

2580
 2985
 2800

▼ ROOF LEVEL
RL 63365

▼ LEVEL 2
RL 60785

▼ LEVEL 1
RL 57800

▼ GROUND FLOOR
RL 55000



2580
 2985
 2800

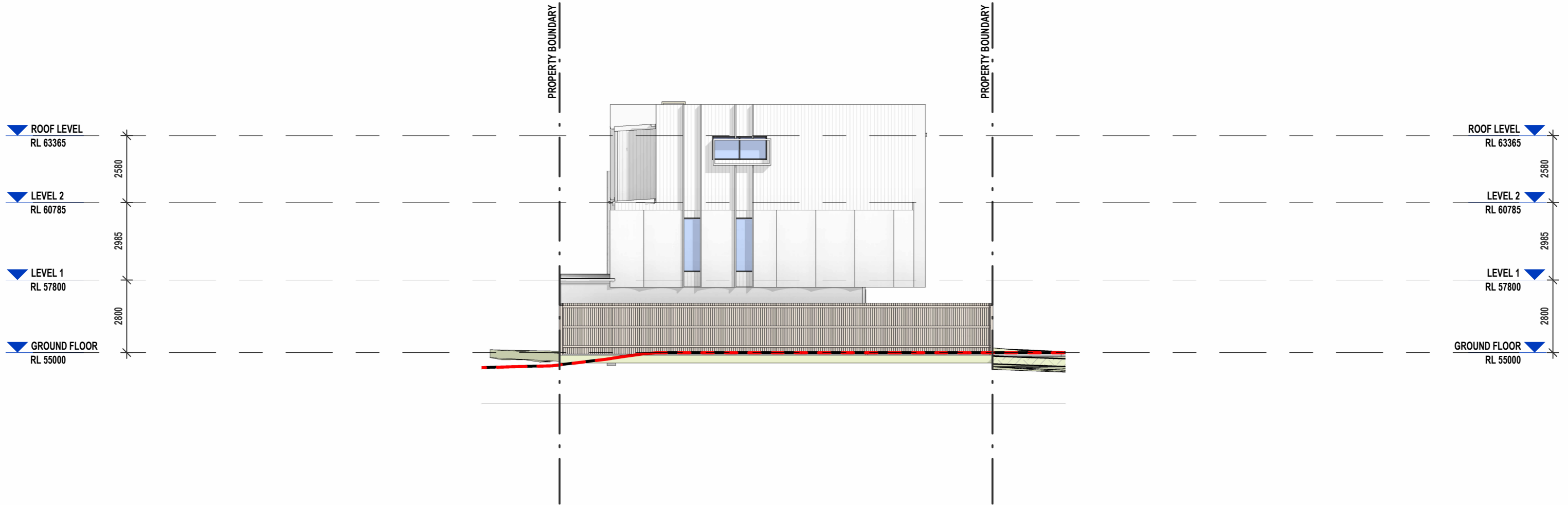
▼ ROOF LEVEL
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▼ LEVEL 2
RL 60785

▼ LEVEL 1
RL 57800

▼ GROUND FLOOR
RL 55000





APPENDIX

C

OSKA Consulting Group,
Pre-Development Catchment Plan (Ref:
OSK7131/P001/A)

LEGEND

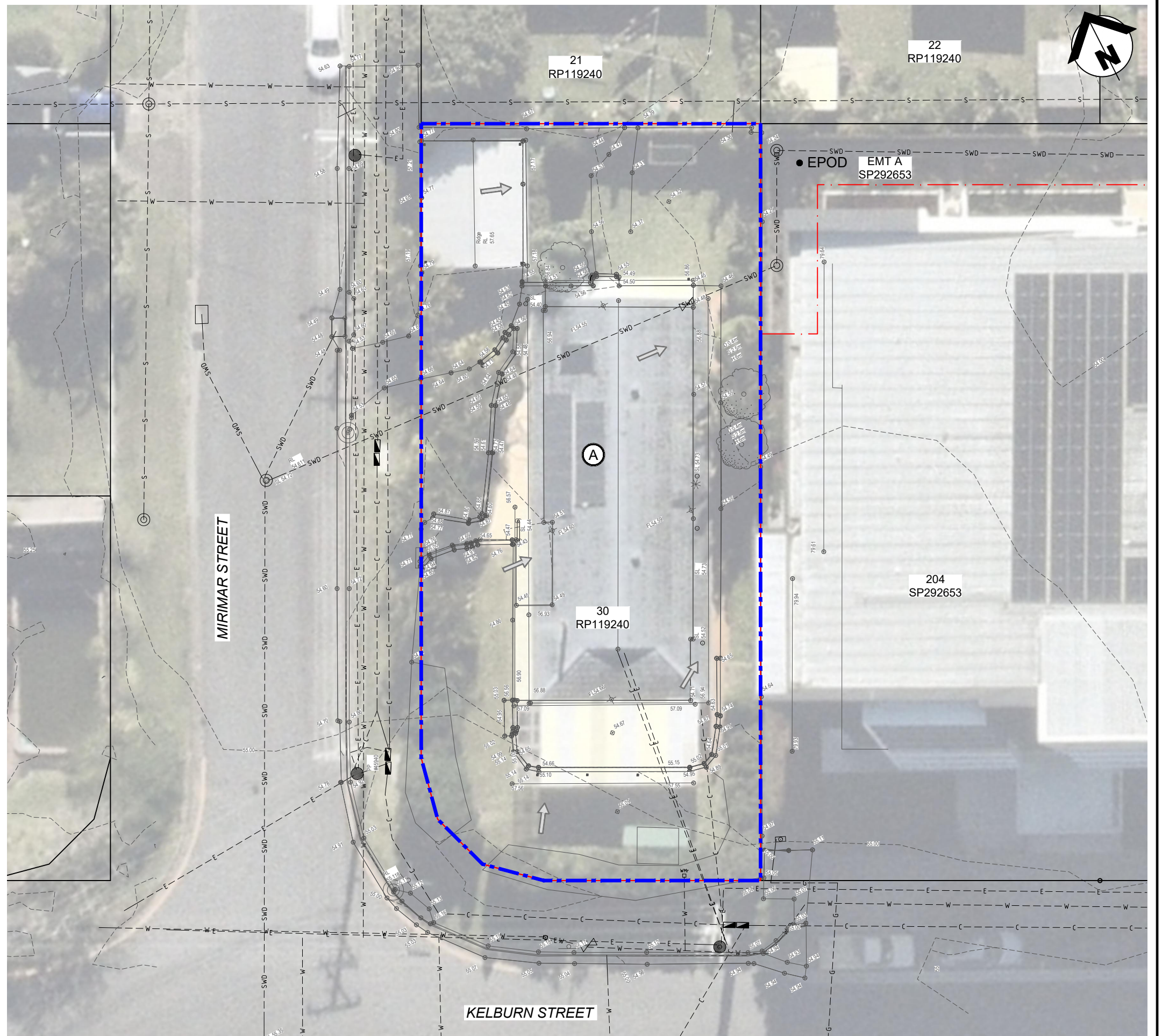
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- — — — — SITE BOUNDARY
- A STORMWATER CATCHMENT I.D.
- - - - - 80.0 EXISTING SURFACE CONTOURS
- EPOD EXISTING POINT OF DISCHARGE
- ➔ FLOW DIRECTION
- - - - - EXISTING EASEMENT

EXISTING SERVICES LEGEND

- - - - - S EXISTING SEWER MAIN
- - - - - W EXISTING WATER MAIN
- - - - - E EXISTING ELECTRICAL CABLE
- - - - - SWD EXISTING STORMWATER PIPE
- - - - - C EXISTING COMMUNICATIONS CABLE

STORMWATER CATCHMENT TABLE

STORMWATER CATCHMENT I.D.	AREA (m ²)
A	612
TOTAL	612



CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS

	DRAWN MS	DESIGN BG	APPROVED				
A	ISSUED FOR REPORT	BG	27-03-26	SIGNED			
REV	DESCRIPTION	DRAWN	DATE	DATE			



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DRAWING IS NOT TO BE SCALED

SCALE
1:100 AT A1
1:200 AT A3

CLIENT
WUCON PTY LTD

PROJECT
**PROPOSED RESIDENTIAL DEVELOPMENT
41 KELBURN STREET
UPPER MOUNT GRAVATT QLD 4122**

STAGE / PHASE
FOR INFORMATION ONLY NOT FOR CONSTRUCTION

TITLE
PRE-DEVELOPMENT CATCHMENT PLAN

DRAWING NUMBER
OSK7131-P001

REVISION
A

APPENDIX

D

OSKA Consulting Group,
Post-Development Catchment Plan (Ref:
OSK7131/P002/A) & External Catchment
Plan (Ref: OSK7131/P003/A)

LEGEND

- — — — — STORMWATER CATCHMENT BOUNDARY
- - - - - EXTERNAL STORMWATER CATCHMENT BOUNDARY
- — — — — SITE BOUNDARY
- A STORMWATER CATCHMENT I.D.
- A EXTERNAL STORMWATER CATCHMENT I.D.
- - - - - EXISTING SURFACE CONTOURS
- LPOD LAWFUL POINT OF DISCHARGE
- ➔ FLOW DIRECTION

EXISTING SERVICES LEGEND

- - - - - S - - - - - EXISTING SEWER MAIN
- - - - - W - - - - - EXISTING WATER MAIN
- - - - - E - - - - - EXISTING ELECTRICAL CABLE
- - - - - SWD - - - - - EXISTING STORMWATER PIPE
- - - - - C - - - - - EXISTING COMMUNICATIONS CABLE

STORMWATER CATCHMENT TABLE

STORMWATER CATCHMENT I.D.	AREA (m ²)
EXT A	9654
A	612
TOTAL	10266



CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS

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 SCALE: 1:500 AT A1, 1:1000 AT A3

CLIENT: WUCON PTY LTD

PROJECT: PROPOSED RESIDENTIAL DEVELOPMENT
 41 KELBURN STREET
 UPPER MOUNT GRAVATT QLD 4122

 STAGE / PHASE: FOR INFORMATION ONLY NOT FOR CONSTRUCTION

TITLE: EXTERNAL CATCHMENT PLAN

 DRAWING NUMBER: OSK7131-P003


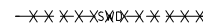










 REVISION: A

APPENDIX




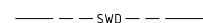
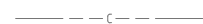
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OSKA Consulting Group,
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OSK7131/P004/A) & Conceptual Stormwater
Management Details (Ref: OSK7131/P005/A)

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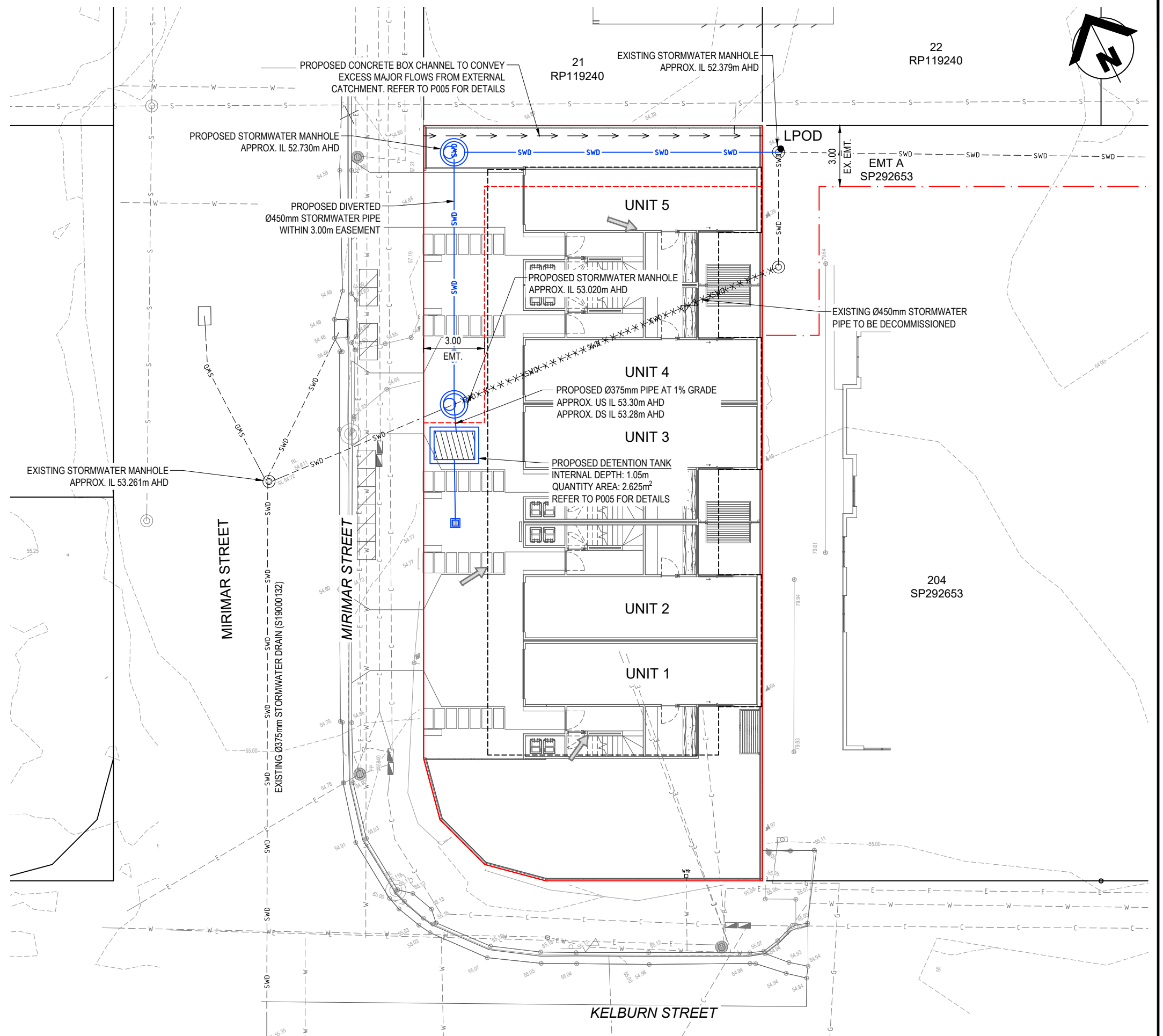
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-  EXISTING STORMWATER PIPE TO BE DECOMMISSIONED
-  SITE BOUNDARY
-  EXISTING SURFACE CONTOURS
-  LPOD
-  FLOW DIRECTION
-  PROPOSED STORMWATER MANHOLE
-  PROPOSED FIELD INLET
-  PROPOSED CONCRETE BOX CHANNEL
-  PROPOSED STORMWATER DETENTION TANK
-  EXISTING EASEMENT
-  PROPOSED EASEMENT

EXISTING SERVICES LEGEND

-  EXISTING SEWER MAIN
-  EXISTING WATER MAIN
-  EXISTING ELECTRICAL CABLE
-  EXISTING STORMWATER PIPE
-  EXISTING COMMUNICATIONS CABLE

NOTE:

- ALL STORMWATER INVERT LEVELS SHOWN HAVE BEEN EXTRACTED FROM RECORDS AND WILL REQUIRE FURTHER DETAILED SURVEY TO CONFIRM INVERT LEVELS OF THE STORMWATER DIVERSION.
- ALL FINISHED FLOOR LEVELS FOR THE DEVELOPMENT MUST COMPLY WITH THE BCC CITY PLAN FOR THE MINIMUM FREEBOARD REQUIREMENTS FOR OVERLAND FLOW. THE OVERLAND FLOW LEVELS ARE SUBJECT TO A HYDRAULIC ASSESSMENT TO DETERMINE FLOW EXTENTS AND LEVELS.



CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS

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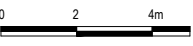


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SCALE

1:100 AT A1
1:200 AT A3



CLIENT

WUCON PTY LTD

PROJECT

**PROPOSED RESIDENTIAL DEVELOPMENT
41 KELBURN STREET
UPPER MOUNT GRAVATT QLD 4122**

STAGE / PHASE

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TITLE

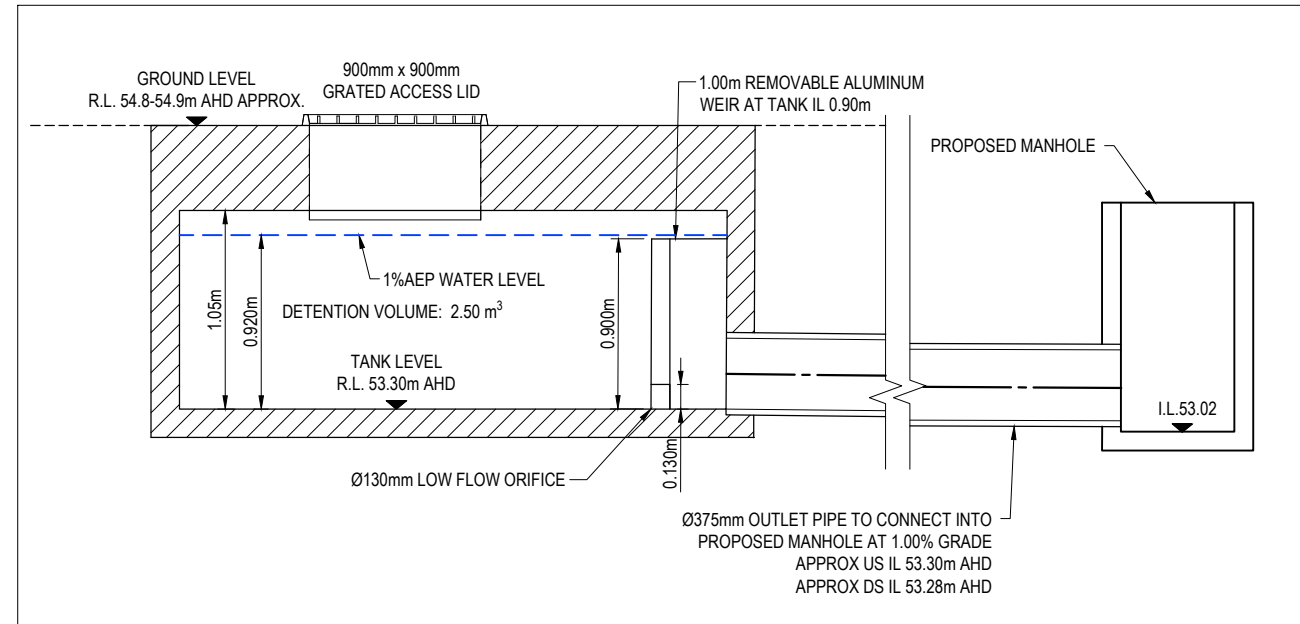
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DRAWING NUMBER

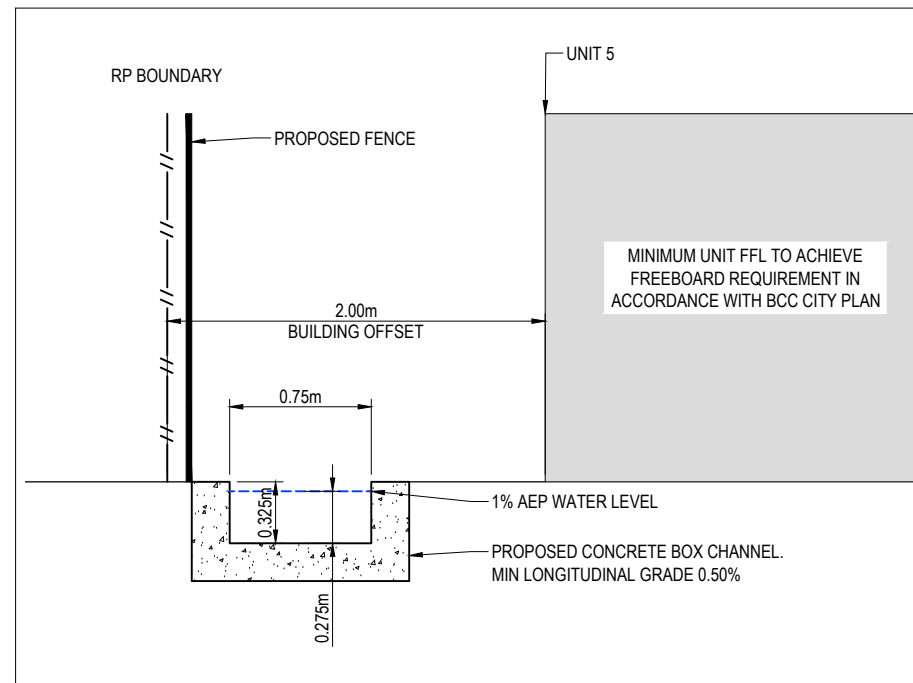
OSK7131-P004

REVISION

A



PROPOSED DETENTION TANK TYPICAL SECTION
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PROPOSED CONCEPTUAL CONCRETE BOX CHANNEL DETAIL
SCALE 1:20 AT A1

REV	DESCRIPTION	DRAWN	DATE	DATE
A	ISSUED FOR REPORT	BG	27-03-26	

DRAWN MS
 DESIGN BG
 APPROVED
 SIGNED

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 DRAWING IS NOT TO BE SCALED
 SCALE
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 1:40 AT A3

CLIENT
WUCON PTY LTD

PROJECT
**PROPOSED RESIDENTIAL DEVELOPMENT
 41 KELBURN STREET
 UPPER MOUNT GRAVATT QLD 4122**

STAGE / PHASE
FOR INFORMATION ONLY NOT FOR CONSTRUCTION



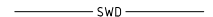








TITLE CONCEPTUAL STORMWATER MANAGEMENT DETAILS	
DRAWING NUMBER OSK7131-P005	REVISION A



APPENDIX

F

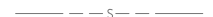
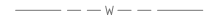

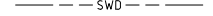

OSKA Consulting Group,
Sediment and Erosion Control Plan (Ref:
OSK7131/P006/A) & Sediment and Erosion
Control Details (Ref: OSK7131/P007/A)

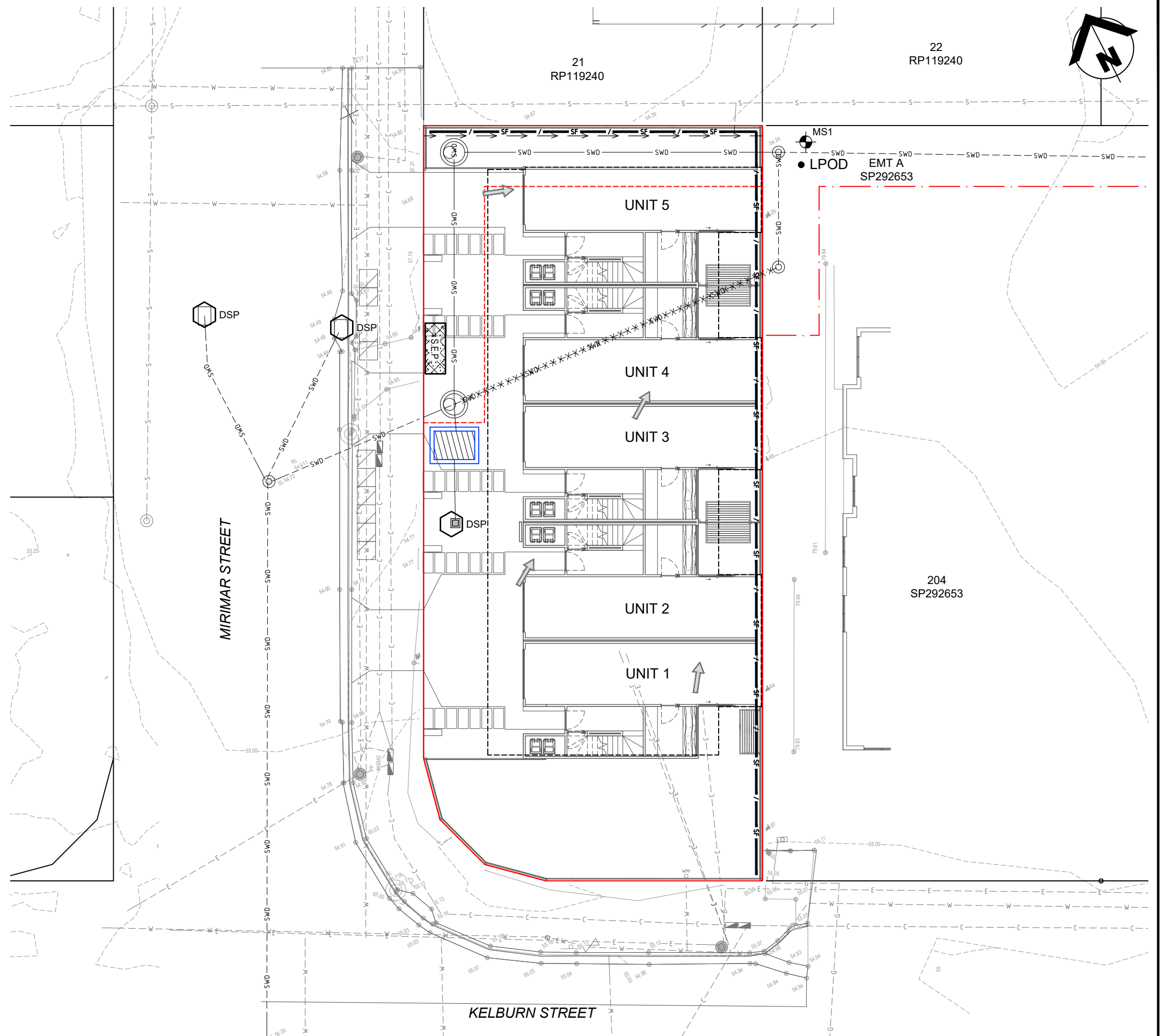
SEDIMENT & EROSION CONTROL LEGEND

-  SITE BOUNDARY
-  EXISTING STORMWATER PIPE TO BE DECOMMISSIONED
-  PROPOSED STORMWATER DRAINAGE PIPE
-  PROPOSED STORMWATER MANHOLE
-  PROPOSED STORMWATER DETENTION TANK
-  SEDIMENT FENCE
-  LOCATION OF STABILISED ENTRY/EXIT POINT
-  DRAINAGE STRUCTURE PROTECTION
-  WATER QUALITY MONITORING STATION
-  FLOW ARROW
-  LAWFUL POINT OF DISCHARGE

-  EXISTING EASEMENT
-  PROPOSED EASEMENT

EXISTING SERVICES LEGEND

-  EXISTING SEWER MAIN
-  EXISTING WATER MAIN
-  EXISTING ELECTRICAL CABLE
-  EXISTING STORMWATER PIPE
-  EXISTING COMMUNICATIONS CABLE



CONCEPT ONLY

IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN ADEQUATE SEDIMENT & EROSION CONTROL DURING ALL PHASES OF CONSTRUCTION TO THE SATISFACTION OF BOTH THE SUPERINTENDENT AND COUNCIL.

CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS

REV	DESCRIPTION	DRAWN	DATE
A	ISSUED FOR REPORT	BG	27-03-26

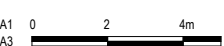
DRAWN	DESIGN	APPROVED
MS	BG	
SIGNED		
DATE		



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SCALE
1:100 AT A1
1:200 AT A3



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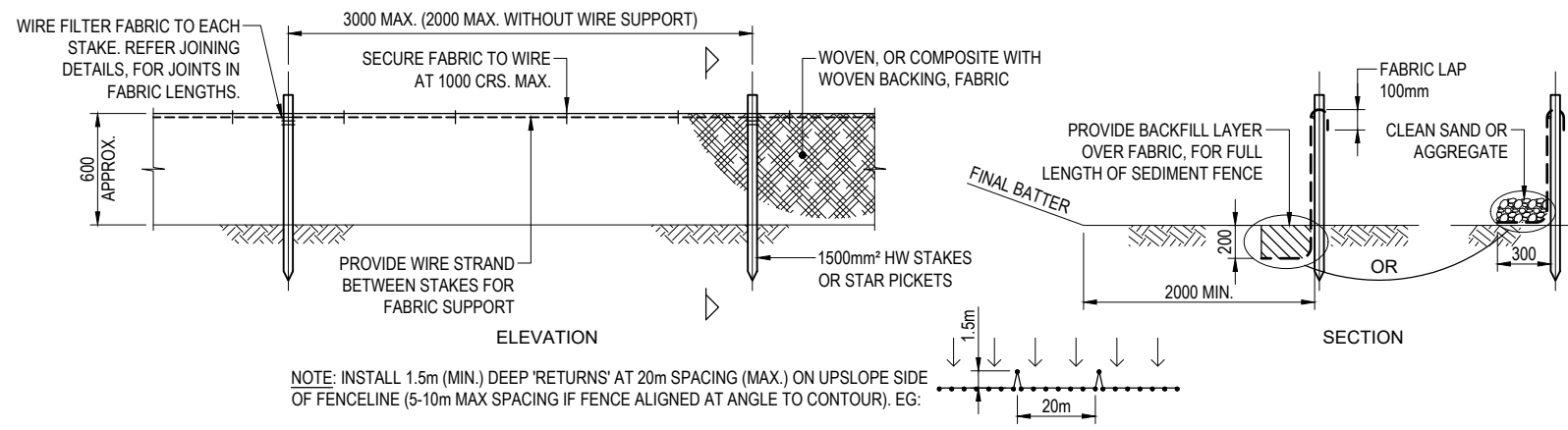
PROJECT
**PROPOSED RESIDENTIAL DEVELOPMENT
41 KELBURN STREET
UPPER MOUNT GRAVATT QLD 4122**

STAGE / PHASE
FOR INFORMATION ONLY NOT FOR CONSTRUCTION

TITLE
PRELIMINARY SEDIMENT & EROSION CONTROL PLAN

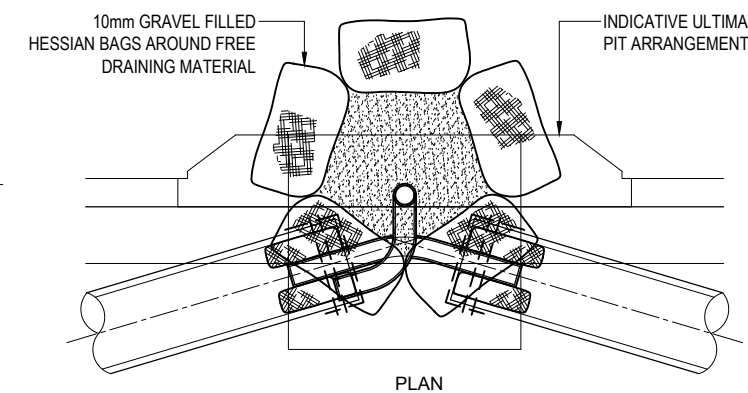
DRAWING NUMBER
OSK7131-P006

REVISION
A



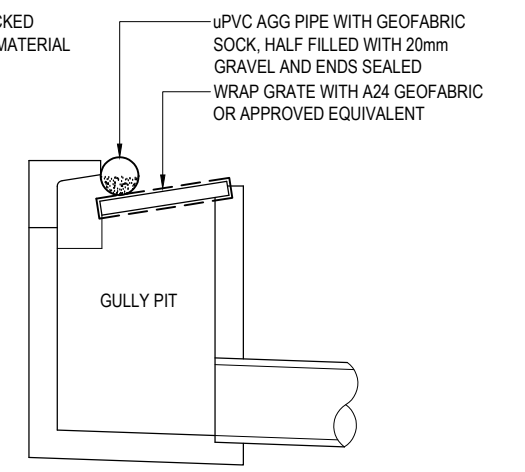
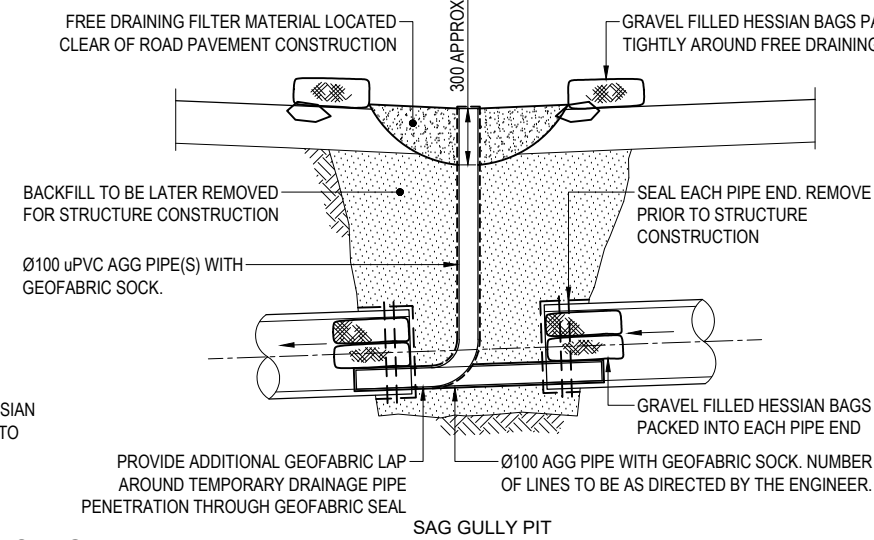
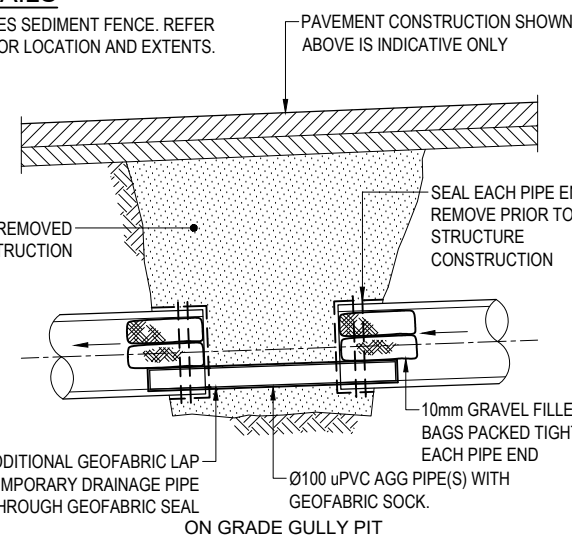
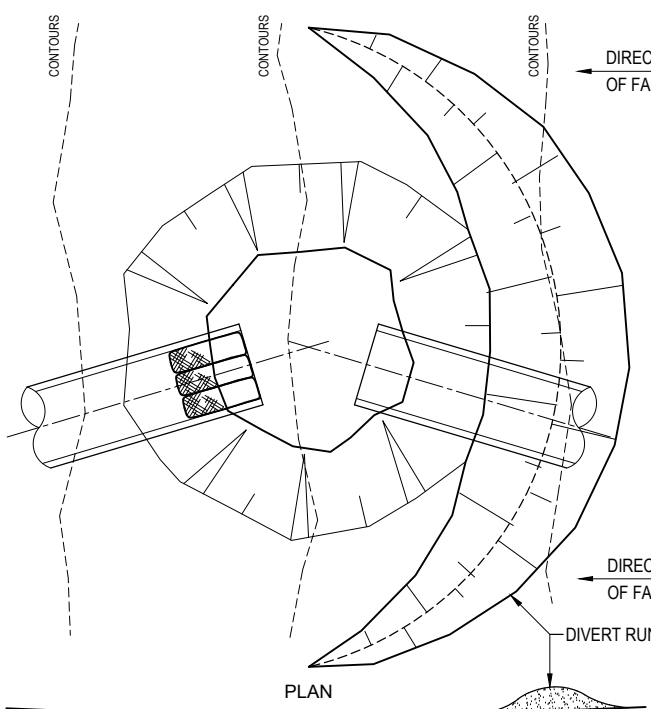
SEDIMENT FENCE DETAILS

N.T.S. DENOTES SEDIMENT FENCE. REFER PLAN FOR LOCATION AND EXTENTS.



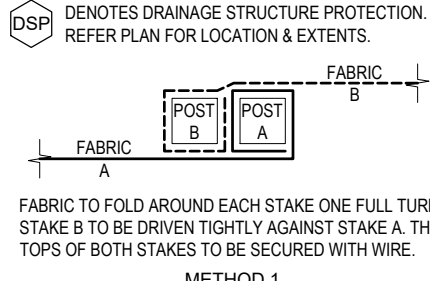
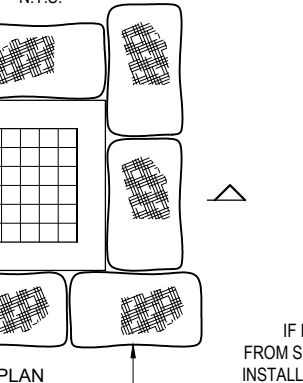
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CONTRACTOR TO DETERMINE AND LOCATE ALL EXISTING SERVICES PRIOR TO COMMENCEMENT OF WORKS

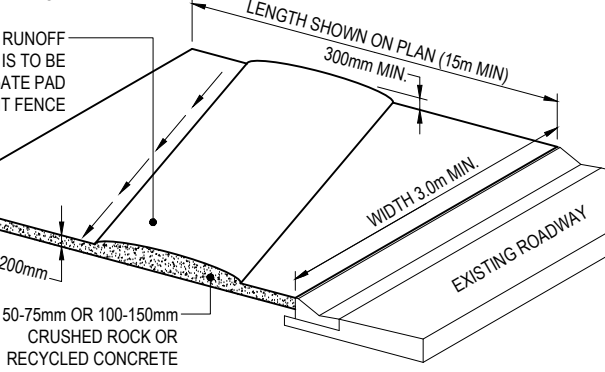


STAGE 1 EXCAVATION, PIPE INSTALLATION AND INTERIM BACKFILLING

ROADWAY GULLY PIT



SEDIMENT FENCE FABRIC JOINING DETAILS



STABILISED ENTRY/EXIT POINT

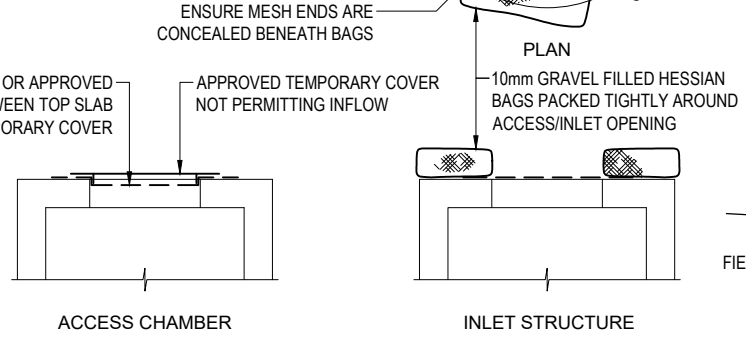
N.T.S. OR APPROVED EQUIVALENT



DENOTES STABILISED ENTRY/EXIT POINT, REFER PLAN FOR LOCATIONS.

ACCESS CHAMBER / INLET STRUCTURE

DSP DENOTES DRAINAGE STRUCTURE PROTECTION, REFER PLAN FOR LOCATION & EXTENTS.



STAGE 2 STRUCTURE COMPLETE UP TO TOP SLAB

STAGE 3 STRUCTURE COMPLETE

REV	DESCRIPTION	DRAWN	DATE
A	ISSUED FOR REPORT	BG	27-03-26

DRAWN	DESIGN	APPROVED
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PROJECT

**PROPOSED RESIDENTIAL DEVELOPMENT
41 KELBURN STREET
UPPER MOUNT GRAVATT QLD 4122**

STAGE / PHASE

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TITLE

PRELIMINARY SEDIMENT & EROSION CONTROL DETAILS

DRAWING NUMBER

OSK7131-P007

REVISION

A

APPENDIX

G

OSKA Engineers,
Response to Stormwater Code (Ref:
OSK7131-0003)

9.4.9 Stormwater code

9.4.9.3 Performance outcomes and acceptable outcomes

Table 9.4.9.3.A—Performance outcomes and acceptable outcomes

Performance outcomes	Acceptable outcomes	Comments
<p>Section A—If for a material change of use, reconfiguring a lot, operational work or building work Note—Compliance with the performance outcomes and acceptable outcomes in this section should be demonstrated by the submission of a site-based stormwater management plan for high risk development only.</p>		
<p>PO1 Development provides a stormwater management system which achieves the integrated management of stormwater to:</p> <ul style="list-style-type: none"> • minimise flooding; • protect environmental values of receiving waters; • maximise the use of water sensitive urban design; • minimise safety risk to all persons; • maximise the use of natural waterway corridors and natural channel design principles. <p>Editor’s note—The stormwater management system to be developed to address PO1 is not intended to require management of stormwater quality.</p>	<p>AO1 Development provides a stormwater management system designed in compliance with the Infrastructure design planning scheme policy.</p>	<p>AO - A Conceptual Stormwater Management Plan (CSWMP) has been prepared for the proposed development. The CSWMP details the proposed treatment measures to be implemented to ensure compliance with Infrastructure design planning scheme policy.</p> <p>For further information on the proposed stormwater management system, refer to OSKA Engineers, <i>Conceptual Stormwater Management Plan</i> (Ref: OSK7131-0005) prepared for 41 Kelburn Street, Upper Mount Gravatt.</p>

<p>PO2 Development ensures that the stormwater management system and site work does not adversely impact flooding or drainage characteristics of premises which are up slope, down slope or adjacent to the site.</p>	<p>AO2.1 Development does not result in an increase in flood level or flood hazard on up slope, down slope or adjacent premises.</p>	<p>PO – The development proposes one detention tanks to ensure the post-development flow rates are mitigated to pre-development rates and that there is no increased runoff on downstream properties in accordance with Infrastructure design planning scheme policy.</p> <p>For further information on the proposed stormwater management system, refer to OSKA Engineers, <i>Conceptual Stormwater Management Plan</i> (Ref: OSK7131-0005) prepared for 41 Kelburn Street, Upper Mount Gravatt.</p>
	<p>AO2.2 Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.</p>	<p>AO - The proposed drainage network shall be designed in accordance with the BCC Infrastructure Planning Scheme Policy.</p>
<p>PO3 Development ensures that the stormwater management system does not direct stormwater run-off through existing or proposed lots and property where it is likely to adversely affect the safety of, or cause nuisance to properties.</p>	<p>AO3.1 Development ensures that the location of the stormwater drainage system is contained within a road reserve, drainage reserve, public pathway, park or waterway corridor.</p>	<p>AO - A Conceptual Stormwater Management Plan (CSWMP) has been prepared for the proposed development. The CSWMP details the proposed treatment measures to be implemented to ensure compliance with Infrastructure design planning scheme policy.</p> <p>For further information on the proposed stormwater management system, refer to OSKA Engineers, <i>Conceptual Stormwater Management Plan</i> (Ref: OSK7131-0005) prepared for 41 Kelburn Street, Upper Mount Gravatt.</p>
	<p>AO3.2 Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.</p>	<p>AO - A Conceptual Stormwater Management Plan (CSWMP) has been prepared for the proposed development. The CSWMP details the proposed treatment measures to be implemented to ensure compliance with Infrastructure design planning scheme policy.</p>

		<p>For further information on the proposed stormwater management system, refer to OSKA Engineers, <i>Conceptual Stormwater Management Plan</i> (Ref: OSK7131-0005) prepared for 41 Kelburn Street, Upper Mount Gravatt.</p>
	<p>AO3.3 Development obtains a lawful point of discharge in compliance with the standards in the Infrastructure design planning scheme policy.</p>	<p>AO - A Lawful Point of Discharge (LPOD) has been demonstrated in accordance with BCC's Infrastructure Design Planning Scheme Policy (ID PSP), Section 7.6.</p> <p>Refer to OSKA Engineers, <i>Conceptual Stormwater Management Plan</i> (Ref: OSK7131-0005) prepared for 41 Kelburn Street, Upper Mount Gravatt.</p>
	<p>AO3.4 Where on private land, all underground stormwater infrastructure is secured by a drainage easement.</p>	<p>AO – The existing Ø450mm stormwater pipe that runs through the subject site is proposed to be diverted around the townhouses and encompassed within a 3.00m easement.</p> <p>For further information on the proposed stormwater diversion, refer to OSKA Engineers, <i>Conceptual Stormwater Management Plan</i> (Ref: OSK7131-0005) prepared for 41 Kelburn Street, Upper Mount Gravatt.</p>
<p>PO4 Development provides a stormwater management system which has sufficient capacity to safely convey run-off taking into account increased run-off from impervious surfaces and flooding in local catchments.</p>	<p>AO4.1 Development provides a stormwater conveyance system which is designed to safely convey flows in compliance with the standards in the Infrastructure design planning scheme policy.</p>	<p>AO - Refer Response to PO1</p>
	<p>AO4.2 Development provides sufficient area to convey run-off which will comply with the standards in the Infrastructure design planning scheme policy.</p>	<p>AO - Refer Response to PO1</p>

<p>PO5 Development designs stormwater channels, creek modification works, bridges, culverts and major drains to protect and enhance the value of the waterway corridor or drainage path for fauna movement.</p>	<p>AO5 Development ensures the design of stormwater channels, creek modifications or other infrastructure, permits terrestrial and aquatic fauna movement.</p>	<p>N/A</p>
<p>PO6 Development ensures that location and design of stormwater detention and water quality treatment:</p> <ul style="list-style-type: none"> • minimises risk to people and property; • provides for safe access and maintenance; • (c) minimises ecological impacts to creeks and waterways. 	<p>AO6.1 Development locates stormwater detention and water quality treatment: (a) outside of a waterway corridor; (b) offline to any catchment not contained within the development.</p> <p>AO6.2 Development providing for stormwater detention and water quality treatment devices are designed in compliance with the standards in the Infrastructure design planning scheme policy.</p>	<p>N/A</p> <p>AO – The development proposes a detention tank to ensure the post-development flow rates are mitigated to pre-development rates and that there is no increased runoff on downstream properties in accordance with Infrastructure design planning scheme policy.</p> <p>In accordance with Brisbane City Council City Plan Section 9.4.9 <i>Stormwater Code</i>, the development of the subject site does not trigger the design of permanent stormwater improvement devices as the developed site area is not greater than 2,500 m².</p> <p>Refer to OSKA Engineers, <i>Conceptual Stormwater Management Plan</i> (Ref: OSK7131-0005) prepared for 41 Kelburn Street, Upper Mount Gravatt.</p>

<p>PO7 Development is designed, including any car parking areas and channel works to:</p> <ul style="list-style-type: none"> • reduce property damage; • (b) provide safe access to the site during the defined flood event. 	<p>AO7.1 Development (including any ancillary structures and car parking areas) is located above minimum flood immunity levels in Table 9.4.9.3.B, Table 9.4.9.3.C, Table 9.4.9.3.D, Table 9.4.9.3.E and Table 9.4.9.3.F.</p> <p>Note—Compliance with this acceptable outcome can be demonstrated by the submission of a hydraulic and hydrology report identifying flood levels and development design levels (as part of a site-based stormwater management plan).</p>	N/A
	<p>AO7.2 Development including the road network provides a stormwater management system that provides safe pedestrian and vehicle access in accordance with the standards in the Infrastructure design planning scheme policy.</p>	AO – Yes.
<p>PO8 Development designs stormwater channels, creek modification works and the drainage network to protect and enhance the environmental values of the waterway corridor or drainage path.</p>	<p>AO8.1 Development ensures natural waterway corridors and drainage paths are retained.</p>	N/A
	<p>AO8.2 Development provides the required hydraulic conveyance of the drainage channel and floodway, while maximising its potential to maximise environmental benefits and minimise scour. Editor's note—Guidance on natural channel design principles can be found in the Council's publication Natural channel design guidelines.</p>	N/A
	<p>AO8.3 Development provides stormwater outlets into waterways, creeks, wetlands and overland flow paths with energy dissipation to minimise scour in compliance with the standards in the Infrastructure design planning scheme policy.</p>	N/A

	<p>AO8.4 Development ensures that the design of modifications to the existing design of new stormwater channels, creeks and major drains is in compliance with the standards in the Infrastructure design planning scheme policy.</p>	<p>PO - The proposed stormwater infrastructure will ensure compliance with this performance outcome.</p>
<p>PO9 Development is designed to manage run-off and peak flows by minimising large areas of impervious material and maximising opportunities for capture and re-use.</p>	<p>AO9 No acceptable outcome is prescribed.</p>	<p>PO - The proposed stormwater infrastructure will ensure compliance with this performance outcome.</p>
<p>PO10 Development ensures that there is sufficient site area to accommodate an effective stormwater management system. Note—Compliance with the performance outcome should be demonstrated by the submission of a site-based stormwater management plan for high-risk development only.</p>	<p>AO10 No acceptable outcome is prescribed.</p>	<p>PO - The proposed stormwater infrastructure has been sized and designed in accordance with the infrastructure design planning scheme. Refer to OSKA Engineers, <i>Conceptual Stormwater Management Plan</i> (Ref: OSK7131-0005) prepared for 41 Kelburn Street, Upper Mount Gravatt.</p>
<p>PO11 Development provides for the orderly development of stormwater infrastructure within a catchment, having regard to the:</p> <ul style="list-style-type: none"> • existing capacity of stormwater infrastructure within and external to the site, and any planned stormwater infrastructure upgrades; • safe management of stormwater discharge from existing and future up-slope development; • (c) implication for adjacent and down-slope development. 	<p>AO11.1 Development with up-slope external catchment areas provides a drainage connection sized for ultimate catchment conditions that is directed to a lawful point of discharge.</p>	<p>AO – The subject site is impacted by external catchments however the flows are conveyed through the site via pipe and overland flow from Mirimar Street. As the external flows are conveyed through the site from Mirimar Street, no additional drainage connection has been provided. It is to be noted that the properties within the external catchment are zoned either as <i>high density</i> or <i>principal centre</i> which would typically correspond to a higher fraction impervious value however, the external catchment assessment is based on the existing catchment conditions. Any future development within the external catchment would be required to provide stormwater detention devices to ensure the peak flows rates from the site</p>

		are not increased compared to the pre-development scenario. Refer to OSKA Engineers, <i>Conceptual Stormwater Management Plan</i> (Ref: OSK7131-0005) prepared for 41 Kelburn Street, Upper Mount Gravatt.
	AO11.2 Development ensures that existing stormwater infrastructure that is undersized is upgraded in compliance with the Infrastructure design planning scheme policy .	AO - The proposed stormwater infrastructure has been sized and designed in accordance with the infrastructure design planning scheme. Refer to OSKA Engineers, <i>Conceptual Stormwater Management Plan</i> (Ref: OSK7131-0005) prepared for 41 Kelburn Street, Upper Mount Gravatt.
PO12 Development provides stormwater infrastructure which: <ul style="list-style-type: none"> remains fit for purpose for the life of the development and maintains full functionality in the design flood event; can be safely accessed and maintained cost effectively; (c) ensures no structural damage to existing stormwater infrastructure. 	AO12.1 The stormwater management system is designed in compliance with the Infrastructure design planning scheme policy . AO12.2 Development provides a clear area with a minimum of 2m radius from the centre of an existing manhole cover and with a minimum height clearance of 2.5m.	AO - The proposed stormwater infrastructure has been designed in accordance with the infrastructure design planning scheme. Refer to OSKA Engineers, <i>Conceptual Stormwater Management Plan</i> (Ref: OSK7131-0005) prepared for 41 Kelburn Street, Upper Mount Gravatt. PO – The proposed manholes within the site will be encompassed within a 3.00m easement with a minimum height clearance above of 2.50m.
PO13 Development ensures that all reasonable and practicable measures are taken to manage the impacts of erosion, turbidity and sedimentation, both within and external to the development site from construction activities, including vegetation clearing, earthworks, civil construction, installation of services, rehabilitation, revegetation and landscaping to protect: <ul style="list-style-type: none"> the environmental values and water quality objectives of waters; waterway hydrology; 	AO13 No acceptable outcome is prescribed.	PO - Sediment and erosion control plans are to be developed during the detailed design phase. The plans will address devices and management measures to control erosion and sediment for the pre-construction, construction and post-construction phases of the development, in accordance with the Best Practice Erosion and Sediment Control: International Erosion Control Association, (IECA) 2008.

<ul style="list-style-type: none"> the maintenance and serviceability of stormwater infrastructure. <p>Note—The Infrastructure design planning scheme policy outlines the appropriate measures to be taken into account to achieve the performance outcome.</p>		
<p>PO14 Development ensures that:</p> <ul style="list-style-type: none"> unnecessary disturbance to soil, waterways or drainage channels is avoided; all soil surfaces remain effectively stabilised against erosion in the short and long term. 	<p>AO14 No acceptable outcome is prescribed.</p>	<p>PO - Refer Response PO13.</p>
<p>PO15 Development does not increase:</p> <ul style="list-style-type: none"> the concentration of total suspended solids or other contaminants in stormwater flows during site construction; run-off which causes erosion either on site or off site. 	<p>AO15 No acceptable outcome is prescribed.</p>	<p>PO - Refer Response PO13.</p>
<p>Section B—Additional performance outcomes and acceptable outcomes which apply to high-risk development, being one or more of the following:</p> <p>(a) - a material change of use for an urban purpose which involves greater than 2,500m² of land that:</p> <ul style="list-style-type: none"> will result in an impervious area greater than 25% of the net developable area; or will result in 6 or more dwellings. <p>(b) - reconfiguring a lot for an urban purpose that involves greater than 2,500m² of land and will result in 6 or more lots;</p> <ul style="list-style-type: none"> operational work for an urban purpose which involves disturbing greater than 2,500m² of land. 		
<p>PO16 Development ensures that the entry and transport of contaminants into stormwater is avoided or minimised to protect receiving water environmental values. Note—Prescribed water contaminants are defined in the Environmental Protection Act 1994.</p>	<p>AO16 Development provides a stormwater management system which is designed in compliance with the standards in the Infrastructure design planning scheme policy.</p>	<p>N/A.</p>

<p>Note—Compliance with the performance outcome should be demonstrated by the submission of a site-based stormwater management plan for high-risk development only.</p>		
<p>PO17 Development ensures that:</p> <ul style="list-style-type: none"> the discharge of wastewater to a waterway or external to the site is avoided; or if the discharge cannot practicably be avoided, the development minimises wastewater discharge through re-use, recycling, recovery and treatment. <p>Note—The preparation of a wastewater management plan can assist in demonstrating achievement of this performance outcome. Editor’s note—This code does not deal with sewerage which is the subject of the Wastewater code.</p>	<p>AO17 No acceptable outcome is prescribed.</p>	<p>N/A.</p>
<p>Section C—Additional performance outcomes and acceptable outcomes for assessable development for a material change of use or reconfiguring a lot</p>		
<p>PO18 Development protects stormwater infrastructure to ensure the following are not compromised:</p> <ul style="list-style-type: none"> the long term infrastructure for the stormwater network in the Long term infrastructure plans; the existing and planned infrastructure for the stormwater network in the Local government infrastructure plan; the provision of long term, existing and planned infrastructure for the stormwater network which: is required to service the development or an existing and future urban development in the planning scheme area; or 	<p>AO18 Development protects stormwater infrastructure in compliance with the following:</p> <p>(a) for long term infrastructure for the stormwater network, the Long term infrastructure plans;</p> <p>(b) for existing and planned infrastructure for the stormwater network, the Local government infrastructure plan;</p> <p>(c) the standards for stormwater drainage in the Infrastructure design planning scheme policy.</p>	<p>AO - The proposed stormwater management strategy does not propose to discharge site runoff to existing trunk infrastructure.</p> <p>Refer to OSKA Engineers, <i>Conceptual Stormwater Management Plan</i> (Ref: OSK7131-0005) prepared for 41 Kelburn Street, Upper Mount Gravatt.</p>

<ul style="list-style-type: none">• is in the interests of rational development or the efficient and orderly planning of the general area in which the site is situated. <p>Editor's note—A condition which requires a proposed development to keep permanent improvements and structures associated with the approved development clear of the area of long term infrastructure, may be imposed.</p>		
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<p>PO19 Development provides for the payment of extra trunk infrastructure costs for the following:</p> <ul style="list-style-type: none"> • for development completely or partly outside the priority infrastructure area in the Local government infrastructure plan; • for development completely inside the priority infrastructure area in the Local government infrastructure plan involving: • trunk infrastructure that is to be provided earlier than planned in the Local government infrastructure plan; • long term infrastructure for the stormwater network which is made necessary by development that is not assumed future urban development; • other infrastructure for the stormwater network associated with development that is not assumed future urban development which is made necessary by the development. <p>Editor's note—The payment of extra trunk infrastructure costs for development completely inside the priority infrastructure area in the Local government infrastructure plan is to be worked out in accordance with the Charges Resolution.</p> <p>Editor's note—See section 130 Imposing Development conditions (Conditions for extra trunk infrastructure costs) of the Planning Act 2016.</p>	<p>AO19 No acceptable outcome is prescribed.</p>	<p>PO - There is no trunk council infrastructure proposed as part of the development works.</p>
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