Site Based Stormwater Management Plan

171-173 Upper Kedron Road, Ferny Grove, QLD, 4055

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Table of Contents

1. Introduction

Rodgers Consulting Services (RCS) have been engaged by Bonaventura Developments Pty Ltd to prepare a site-based stormwater management plan (SBSMP) as supporting information to the development application for a proposed subdivision at 171-173 Upper Kedron Road, Ferny Grove, QLD, 4055.

The proposed development involves the creation of 33 new allotments with associated access roads and stormwater treatment areas. The proposed development Reconfiguration of Lot plans are included within Appendix A.

This document has been prepared with the following objectives:

- Provide a stormwater treatment train which aims to protect receiving waters by limiting the quantity of key pollutants discharged in stormwater from urban developments.
- Prevent potential instream erosion downstream of urban developments by controlling the magnitude and duration of sediment transporting flows.
- Provide protection to instream ecosystems from significant effects of increased runoff frequency by capturing the initial portion of runoff from impervious areas. This approach aims to ensure the frequency of hydraulic disturbance to instream ecosystems in developed catchments is similar to that of the undeveloped catchment.
- Demonstrate compliance with non-worsening of stormwater quantity over any existing discharge points to the site.

Stormwater quality and quantity will be demonstrated in compliance with the following documents and planning schemes:

- Brisbane City Council City Plan v35/2025 **(Planning Scheme)**,
- Brisbane City Council City Plan - Stormwater Code,
- Queensland State Planning Policy July 2017 **(SPP 7/17)**,
- South-East Queensland Regional Plan 2009-2031,
- Queensland Urban Drainage Manual **(QUDM)**,
- Environmental Protection (Water and Wetland Biodiversity) Policy (2019),
- Water by Design MUSIC Modelling Guideline 2018 – Version 3, and
- Water by Design Bioretention Technical Design Guidelines 2014 – Version 1.1.

1.1 Site Location

The subject site is located at 171-173 Upper Kedron Road, Ferny Grove, QLD, 4055. The site is bounded by a public road to the South and residential properties to the North, East and West. The allotment details are as follows below:

Street Address:	171-173 Upper Kedron Road, Ferny Grove, QLD, 4055
RP Description:	LOTS 1 & 2 RP 185509
Site Area:	20,349m^2

Figure 1.1 below shows the location of the lot and the surrounding land uses.

Figure 1.1 | Proposed Development Site Location (Metro Maps)

1.2 Site Conditions

1.2.1 Existing

The subject site currently consists of two lots, each with a residential dwelling and shared driveway areas. The main residence on Lot 2 on RP185509 has associated sheds and a pool. The total area of the site is approximately 2.035ha.

1.2.2 Proposed

The proposed development includes the creation of 33 new residential allotments with associated onsite Council roads and stormwater treatment areas. All existing structures on the site are to be removed as part of the Proposed Development.

1.3 Topography

The average fall across the development site is generally 7% towards the North-Eastern corner of the site. The levels across the site vary from RL 78.50 at the Southern boundary of the property, adjacent to the existing driveway, to approximately RL 62.35 at the North-Eastern corner of the site.

Refer to detailed survey of the development in Appendix B.

1.4 Base Data

A detailed survey of the Proposed Development has been undertaken by Focus on Surveying. This information has been provided to Rodgers Consulting Services for determining the grades and elevations nominated in this report.

1.5 Lawful Discharge of Stormwater

Based on the available survey data, flows currently travel overland in a North-Eastern direction and discharge offsite into a mapped waterway that meanders through the neighbouring properties adjacent to the site, 169 Upper Kedron Road, 24 Persimmon Street and 26 McGinn Road. This waterway is the existing Lawful Point of Discharge for the development site.

1.6 Earthworks and Soils

To assist in stormwater management within the Proposed Development site, bulk earthworks are required. The proposed earthworks are required to manage surface flows and direct the runoff to a new internal stormwater system, Ultimately, flows will be directed to the sites lawful point of discharge (where possible).

All earthworks' batters will be limited where possible to 1 in 4 (V:H). Concept Earthworks can be seen within Appendix E of this report.

A detailed geotechnical investigation is yet to be undertaken for the Proposed Development site. Given the levels of the site, Acid Sulphate Soils have not been considered. Should acid sulfate soils be identified during the construction phase of this development an acid sulfate soils management plan is to be developed, and this stormwater management plan is to be revised.

1.7 Waterways

Stormwater runoff from the site currently flows to the North-East over the rear and side property boundaries, and into a BCC mapped waterway. The mapped waterway is Cedar Creek which is a tributary to Kedron Brook that ultimately outlets to Moreton Bay.

As part of the Proposed Development, stormwater quantity and quality are to be managed to ensure the likelihood of any potential adverse impacts to the downstream waterways are avoided.

1.8 Development Staging

Under the current plans there is no provision for staging of the development.

1.9 Vegetation

The site is predominantly grassed with a number of established trees and garden areas. All vegetation on the site is proposed to be cleared to facilitate the proposed development.

1.10 Upstream Catchments

No upstream catchment has been identified as part of the assessment of the subject site. Upstream catchment areas are diverted around the site by the existing road network and neighbouring developments.

1.11 Flooding

In accordance with BCC's Flood Awareness mapping and the Floodwise Property Report for the Site, no estimated flood levels, habitable floor level requirements, or flooding overlays impact the site. A copy of the Floodwise Report output is provided in Appendix C.

1.12 Asset Handover

Road widening within the side frontage, as shown in the concept sketch will be provided over to council. This includes a new footpath that runs along the site frontage.

The internal road and the combined stormwater detention and bio-retention basin will be handed over the Council also.

2. Stormwater Quantity Management

2.1 Proposed Catchment Hydrology

The proposed development includes creation of 33 residential allotments with associated Council Roads and Stormwater Treatment areas. Each lot is to be provided with a connection point to either the kerb and channel or directly into the underground stormwater system.

Roof and captured ground areas of the future dwellings on each lot will be collected via downpipes and internal drainage directed to the underground stormwater drainage networks which outlets to the combined Stormwater Bio-retention and Detention Basin located at the North-Eastern corner of the site.

The proposed stormwater infrastructure can be seen in Appendix D.

2.2 Detailed Assessment

2.2.1 Hydraulic Modelling

Peak stormwater discharge from the development site has been determined by using Urban Stormwater drainage modelling software "DRAINS" version 2025.01.9147.24925. This software is used for the design and analysis of urban stormwater drain systems which utilises the "ILSAX Method" hydrological loss model to convert Australian Rainfall and Runoff temporal patterns and rainfall data into runoff hydrographs. The ILSAX hydrological model has been adopted for the purposes of this analysis.

The ARR 2019 Procedures were adopted to undertake the assessment with input data specified by the ARR 2019 data hub. The model was set up with pre-and-post development catchments and simulations undertaken for a range of storm events, Q2 (0.5EY), Q5 (0.2EY), Q10 (10% AEP), Q20 (5% AEP), Q50 (2% AEP) & Q100 (1% AEP) storm events with varying storm durations from 5 minutes to 2 hours.

Table 2-1 | Adopted Hydraulic Model Parameters

Default Hydrological Model:	ILSAX
Paved area and Depression storage (mm):	1
Supplementary area and Depression storage (mm):	1
Grassed area and Depression storage (mm):	5
Continuing Loss (mm/hr):	2.1

2.2.2 *Pre-Development Information*

Sub-catchment area (ha): 2.0348
Hydrological Model: ILSAX
Time of Concentration (Impervious): 10 mins. (QUDM – Section 4.6)
Time of Concentration (Pervious): 10 mins. (QUDM – Section 4.6)

Table 2-2 | Pre-Development Hydrological Model

	PAVED	SUPPLEMENTARY	GRASSED
Percentage of area (%)	9	0	91
Time of Concentration (mins)	10	0	10

2.2.3 *Post-Development Information*

Sub-catchment area (ha): 2.0348
Hydrological Model: ILSAX
Time of Concentration (Impervious): 6 mins. (QUDM – Section 4.6)
Time of Concentration (Pervious): 6 mins. (QUDM – Section 4.6)

Table 2-3 | Pre-Development Hydrological Model

	PAVED	SUPPLEMENTARY	GRASSED
Percentage of area (%)	70	0	30
Time of Concentration (mins)	6	0	6

2.2.4 *Pre Vs Post Development Unmitigated Discharge*

The information presented in Table 2-8 below is a summary of the Pre-Development and Post-Development discharge presented in the Drains model

Table 2-4 | Pre vs Post Development Flow Rates

AEP (%)	Pre-Development Peak Flow Discharge (m^3/s)	Post-Development Peak Flow Discharge (m^3/s)	Difference in Discharge (m^3/s)
0.5EY	0.423	0.600	+ 0.177
0.2EY	0.568	0.779	+ 0.211
10%	0.691	0.942	+ 0.251
5%	0.821	1.090	+ 0.269
2%	0.989	1.260	+ 0.271
1%	1.120	1.400	+ 0.280

The above table shows an increase across all ARI storms.

2.3 Developed Mitigated Site

Analysis of the post-development peak flows indicated an increase from pre-development flows due to the increase in impervious area. To ensure non-worsening of pre-development peak flows discharged from the site, stormwater detention is required.

It is proposed to provide a detention basin at the North-Eastern corner of the site to ensure no increase in peak flow discharged from site.

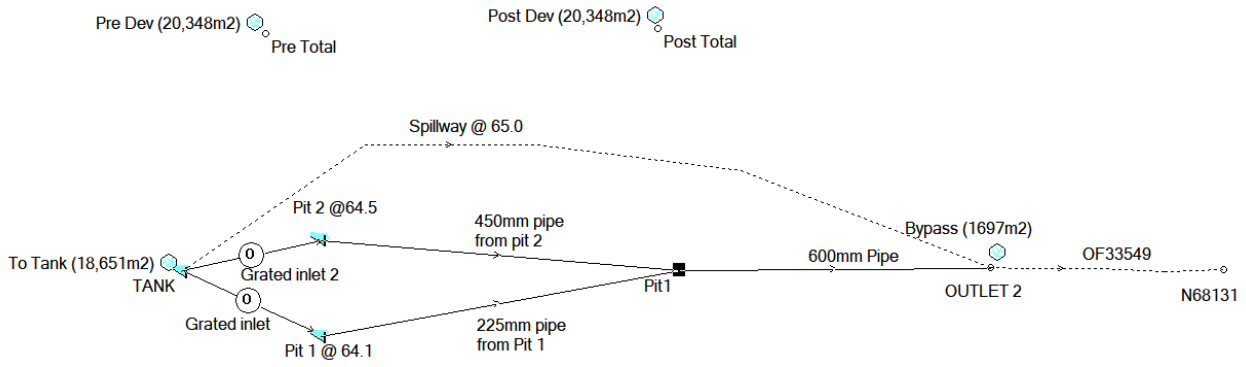

Figure 2-2 | Proposed Drains Model

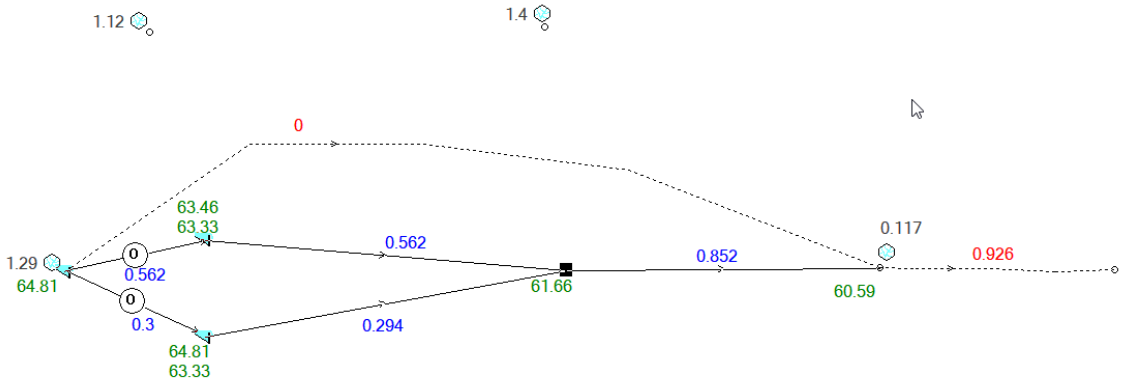

Figure 2-2 | Worst Case Storm (1% AEP Storm Event)

The On-Site Detention Basin has been sized to ensure that the pre-development peak discharge shall not be exceeded for the 0.5EY to 1%AEP events. The Detention Basin is to have the following characteristics:

Detention Basin Parameters	
Base Area	480m^2 at RL 64.10
Area at Spillway Level	750m^2 at RL 65.00
Area at Top of Bank	840m^2 at RL 65.30
Height of Detention Area	0.90m (to spillway)
Volume	800m^3 to top of bank (Approx. 550m^3 to top of Operational Storage Area / Spillway Level)
Outlet 1	Grated Inlet into Outlet Pit 1 at RL 64.10
Outlet 2	Grated Inlet into Outlet Pit 2 at RL 64.50
Emergency Spillway	4.00m wide spillway constructed at RL 65.00
Pit 1 Piped Outlet	225 diameter PE Pipe
Pit 2 Piped Outlet	450 diameter RCP

Additional information regarding the On-Site Detention Basin can be seen within Appendix D. A summary of the detention basin performance in mitigating the post-development flow is presented in Table 2-5 below:

Table 2-5 | Pre vs Mitigated Development Flow Rates

AEP (%)	Pre-Development Peak Flow Discharge (m^3/s)	Post-Development Mitigated Peak Flow Discharge (Including Bypass) (m^3/s)	Difference in Discharge (m^3/s)
0.5EY	0.423	0.309	-0.114
0.2EY	0.568	0.395	-0.173
10%	0.691	0.529	-0.162
5%	0.821	0.669	-0.152
2%	0.989	0.803	-0.186
1%	1.120	0.926	-0.194

The information presented in the above table demonstrates non-worsening of pre-development peak flows. As shown, the introduction of onsite detention has mitigated the post-development peak flows to level at or below pre-development flows.

Additional information regarding the proposed stormwater network can be seen within Appendix D.

2.3.1 Overflow Scenarios

The detention basin may overflow in situations where:

- The downstream connection point is flowing part full/ full, or
- The detention orifice outlets or downstream lines become blocked, or
- Flows exceed the 1% AEP capacity of the detention pipework.

In these situations, surcharging flows will discharge to the ground surface and over the rear Property boundary to the neighbouring properties as per the pre-developed scenario.

2.4 Changes to Flow Characteristics

As detailed above, and except for overflow situations, peak stormwater discharges are mitigated in the post-development scenario by the introduction of On-Site Detention. There is no intention to alter the sites lawful point of discharge, it is therefore considered that there are no expected changes to the flow characteristics.

3. Stormwater Quality Management

3.1 Environmental Values and Water Quality Objectives

Development of the site will involve land disturbance for a residential development on a land parcel 2.0349 ha in size.

3.1.1 Construction Phase

During the construction phase, the most significant water quality objective will be that of suspended solids.

To ameliorate any environmental harm that may occur during construction, the proposed erosion and sediment control strategy, in accordance with Best Practice Erosion and Sediment Control (IECA Australasia, Nov 2008) is to:

- Enclose the site with a sediment fence,
- Provide a series of protection bunds around stormwater inlets,
- Review the requirements for level 1 or 2 sediment mitigation measures and install as requires (filter dams, sedimentation basins, mulch berms etc)

3.1.2 Post Construction Phase

To determine whether compliance with the State Planning Policy 2017 (SPP) is required a checklist has been developed identifying the assessment benchmarks. If any of the benchmarks below are triggered the SPP is applicable. If none of the benchmarks are triggered, then a stormwater quality best practice approach is to be adopted.

3.1.3 State Planning Policy Assessment

Table 3-1 | State Planning Policy – February 2017 Assessment Benchmarks

Development Application Types			
Material Change in Use (MCU)	Yes/ No or N/A?	Reconfiguration of Lots (ROL)	Yes/ No?
A material change of use for an urban purpose that involves premises 2500m2 or greater in size? **AND**, If yes:	NA	Reconfiguring a lot for an Urban purpose that involves premises 2500m2 or greater in size AND will result in six or more lots?	YES
Will result in six or more dwellings; **OR**	NA		
Will result in an impervious area greater than 25% of the NET development area?	NA		

As the development triggers one or more of the State Planning Policy's checklist criteria, compliance with DERM's State Planning Policy is required, therefore a Local Authority Assessment will not be carried out, and the development is required to provide formal stormwater quality treatment in accordance with the Water by Design guidelines.

3.1.4 Pollutant Concerns

The pollutants of concern are summarised below. These pollutants can have adverse environmental impacts within downstream catchments. It is proposed to adopt Site-Based Water Sensitive Urban Design to provide capture and treatment of the below mentioned pollutants.

Table 3-2 | Typical Pollutants

Pollutant	Source
Litter	Paper, Construction Packaging, Food Waste, Cement, Off - Cuts
Sediment	Unprotected Exposed Soils, Stockpiles, Erosion
Hydrocarbons	Fuel and Oil Spills, Leaks from Machinery
Toxic Materials	Cement Slurry, Asphalt Primer, Solvents, Cleaning Agents
Ph Altering Substances	Acid Sulphate Soils, Cement Slurry, Wash Water
Thermal Pollution	Vehicles and Machinery, Increased Impervious Areas

3.1.5 Water Quality Objectives

Table 3-3 | Summary Water Quality Objectives

Indicators	% Reduction Required to Meet WQO's
Total Suspended Solid (TSS)	80%
Total Phosphorus (TP)	60%
Total Nitrogen (TN)	45%
Gross Pollutants (GP)	90%

4. Music Modelling

MUSIC X Version V1.50.0 was used to assess pollutants and the performance of the proposed stormwater treatment train to be adopted for this development. Modelling was undertaken in accordance with "Water by Design – Music Modelling Guidelines Version 3 – 2018"

Table 4-1 Rainfall Data

Rainfall Data & Modelling Parameters Entire % Reduction	
Council	Brisbane City council (BCC)
Station ID	40214
Station Name	Brisbane Regional Office
Climate Period for MUSIC	01/01/1980 to 31/12/1989
Time Step Adopted	6mins

The following Mean Potential Evapotranspiration Values were obtained from 'Water by Design – Music Modelling Guidelines November Version 3.0 2018' and the below table represented the values adopted for this MUSIC model.

Table 4-2 Mean Potential Evapotranspiration Values

Mean Potential Evapo-Transpiration (Mm) (Climate of Australia)											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
188	146	146	107	74	63	65	84	111	144	171	192

4.1 Rainfall Runoff Parameters

The following recommended MUSIC rainfall run-off parameters were obtained from 'Water by Design – Music Modelling Guidelines Version 3.0 – 2018' and the below table represented the values adopted for this MUSIC model.

Table 4-3 Rainfall Runoff Parameters

Parameter	Urban Residential	Commercial & Industrial	Rural Residential	Forested
Rainfall Threshold (mm)	1	1	1	1
Soil Storage Capacity (mm)	500	18	98	120
Initial Storage (% Capacity)	10	10	10	10
Field Capacity (mm)	200	80	80	80
Infiltration Capacity Coefficient a	211	243	84	200
Infiltration Capacity Exponent b	5.0	0.6	3.3	1.0
Initial Depth (mm)	50	50	50	50
Daily Recharge Rate (%)	28	0	100	25
Daily Baseflow Rate (%)	27	31	22	3
Daily Deep Seepage Rate (%)	0	0	0	0

NOTE: The highlighted columns represent the rainfall runoff parameters adopted for the development.

4.2 Pollutant Export Parameters

The following pollutant export parameters were obtained from 'Water by Design – Music Modelling Guidelines Version 3.0 – 2018' and the below table represented the values adopted for this MUSIC model.

Table 4-4 Pollutant Generation Inputs

Land Use	Flow Type	Surface Type	Total Suspended Solids (Log10 mg/L)		Total Phosphorus (Log10 mg/L)		Total Nitrogen (Log10 mg/L)	
			Mean	Std Deviation	Mean	Std Deviation	Mean	Std Deviation
URBAN RESIDENTIAL	Baseflow Parameters	Roof	N/A	N/A	N/A	N/A	N/A	N/A
		Roads	1.00	0.34	-0.97	0.31	0.20	0.20
		Ground Level	1.00	0.34	-0.97	0.31	0.20	0.20
	Stormflow Parameters	Roof	1.30	0.39	-0.89	0.31	0.26	0.23
		Roads	2.43	0.39	-0.30	0.31	0.26	0.23
		Ground Level	2.18	0.39	-0.47	0.31	0.26	0.23
INDUSTRIAL	Baseflow Parameters	Roof	N/A	N/A	N/A	N/A	N/A	N/A
		Roads	0.78	0.45	-1.11	0.48	0.14	0.20
		Ground Level	0.78	0.45	-1.11	0.48	0.14	0.20
	Stormflow Parameters	Roof	1.30	0.44	-0.89	0.36	0.25	0.32
		Roads	2.43	0.44	-0.30	0.36	0.25	0.32
		Ground Level	1.92	0.44	-0.59	0.36	0.25	0.32
COMMERCIAL	Baseflow Parameters	Roof	N/A	N/A	N/A	N/A	N/A	N/A
		Roads	0.78	0.39	-0.60	0.50	0.32	0.30
		Ground Level	0.78	0.39	-0.60	0.50	0.32	0.30
	Stormflow Parameters	Roof	1.30	0.38	-0.89	0.34	0.37	0.34
		Roads	2.43	0.38	-0.30	0.34	0.37	0.34
		Ground Level	2.16	0.38	-0.39	0.34	0.37	0.34

NOTE: The highlighted columns represent the pollutant export parameters adopted for the development.

4.3 Stormwater Quality Management Strategy

The below MUSIC model seeks to meet the applicable Water Quality Objectives by selecting and testing various stormwater management methods. The adopted 'stormwater treatment train' for this development is illustrated below:

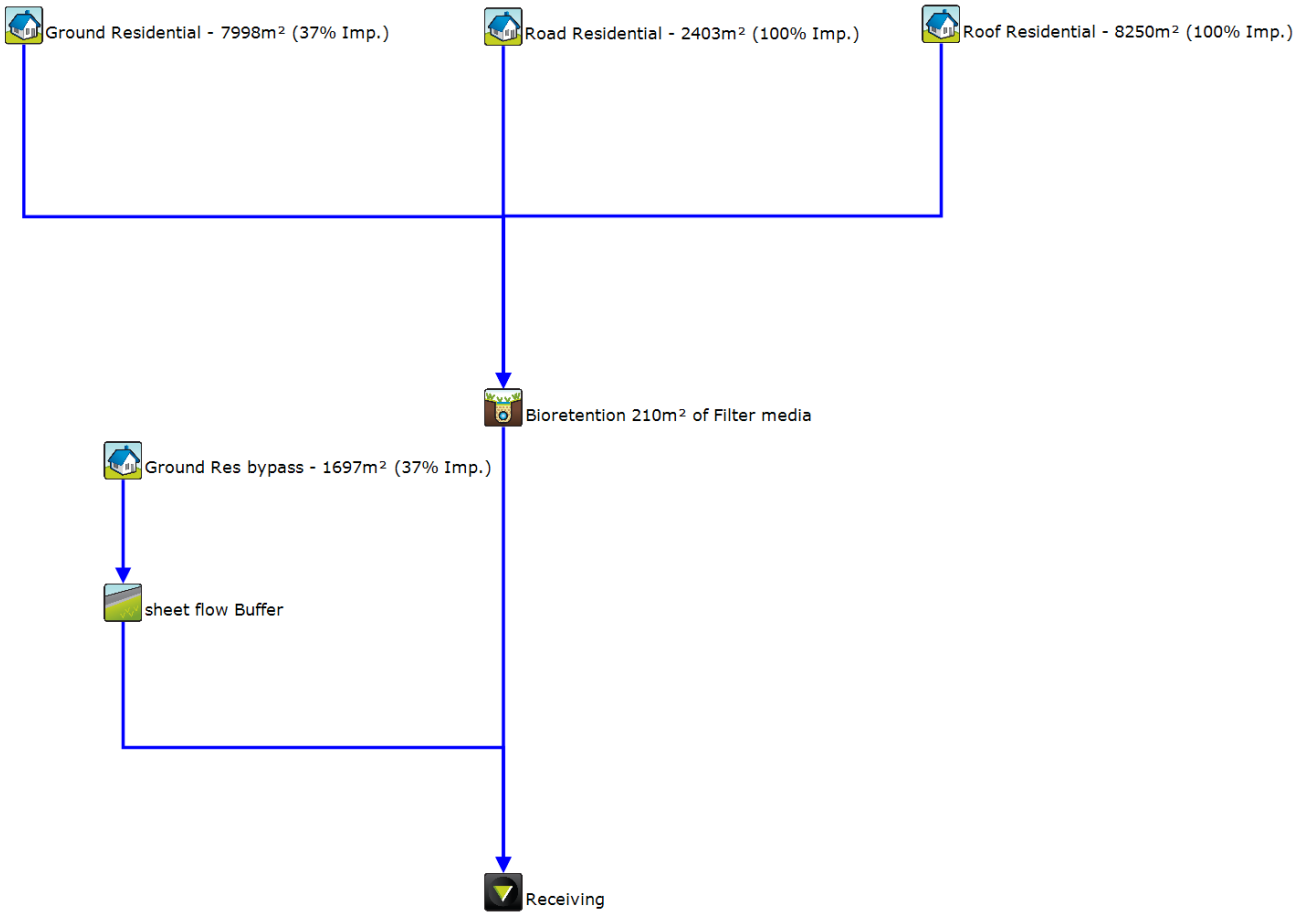

Figure 4-1 Music Model – Treatment Train

The proposed stormwater treatment train will consist of:

- All future roof areas and captured ground areas are to be collected and discharged to the internal drainage system. The internal stormwater drainage directs the flows to the Bio-Retention Basin located within Detention Basin at the North-Eastern Corner of the site.
- All Council Road areas are collected via the underground drainage system which directs flows to the Bio-Retention Basin located within Detention Basin at the North-Eastern Corner of the site.
- The flows once treated by the Bio-Retention Basin are outlet to the sites Lawful Point of Discharge.

4.4 Music Analysis and Results

A MUSIC analysis was carried out on the proposed development site based on the "treatment train" shown in Figure 3. The results of the annual pollutant load reductions based on the above design calculations are shown below.

Table 4-5 Summary of Pollutant Targets for Treatment Train

Indicator	WQO's Target	WQO's Achieved	Objectives Met
TSS (Total Suspended Solids)	80%	81.3%	YES
TP (Total Phosphorus)	60%	72.2%	YES
TN (Total Nitrogen)	45%	51.4%	YES
GP (Gross Pollutants)	90%	94.1%	YES

Figure 4-2 Treatment Train Effectiveness

4.5 Music Analysis and Results

Regular maintenance of the proposed stormwater quality devices is required to minimise the potential for dirty stormwater being discharged from the site. The stormwater treatment devices shall be maintained using the following:

- Manufacturers specifications for proprietary stormwater management devices,
- Water by Design's "Maintaining Vegetated Stormwater Assets" Manual,

Maintenance checklists and operational manuals are attached within Appendix E.

4.6 Construction Phase Erosion and Sediment Control

The works shall be conducted in accordance with the following Construction Phase Water Quality Management Plan.

As previously specified, the major stormwater pollutant during the construction phase will be that of suspended solids. To ensure adverse impacts to downstream waterways are mitigated during the construction phase, best practice erosion and sediment control measures are required.

It should be noted that erosion and sediment control has not been investigated as part of this stormwater management plan. It is proposed that as part of the operational works application for the Proposed Development, an erosion and sediment control plan is compiled in accordance with the IECA best practices for erosion and sediment control.

It shall be the responsibility of the developer, through their principal contractor, to ensure that temporary sediment and erosion controls are installed and maintained correctly as detailed below.

Internal catchments where surface disturbance and earthworks are occurring are to incorporate temporary sediment basin(s) for construction phase erosion and sediment control in accordance with the Best Practice Erosion and Sediment Control (IECA Australasia, Nov 2008).

Sediment control should be able to be achieved by applying the following best practice sediment and erosion control management measures during the construction phase:

1. Establish a single stabilised entry/exit point for the site works.
2. Construct a shake-down grid at the entrance to facilitate the removal of sediment from vehicles leaving the site. The access road extending from the end of existing road or kerb to the grid should comprise a 150-200mm deep pad of 40mm crushed rock.
3. Install sediment fences along the lower boundary of the development works.
4. Maintain on site spare materials necessary for the emergency repair of all erosion control devices. This includes silt fences, clean crushed rock for reapplication to the entrance road and for replacement of rock within temporary drainage channels.
5. Following each days' construction works, ensure that any material on road surfaces is swept from the road, and not permitted to be washed down the gutters and piped drainage systems.

While the above provides general guidance on the management of stormwater during the construction phase, detailed Erosion and Sediment Control Management Plans will be required during the operation works application stage for each precinct/stage in accordance with International Erosion Control Association Australia (IECA) Guidelines.

5. Conclusion

The stormwater management plan for the site, 171-173 Upper Kedron Road, Ferny Grove, has been prepared to support a development application and provide recommendations for the management of stormwater quality and quantity.

The various methods recommended as part of this stormwater management plan are considered best practices for a development of this type.

5.1 Stormwater Quantity

As part of this report, pre-development and post-development stormwater quantity scenarios have been modelled.

In accordance with BCC's Planning Scheme Policies a non-worsening outcome is required. To meet this requirement, on-site detention is proposed as detailed below.

The On-Site Detention Basin has been sized to ensure that the pre-development peak discharge shall not be exceeded for the 0.5EY to 1% AEP events. The detention basin is to have the following characteristics:

Detention Basin Parameters	
Base Area	480m^2 at RL 64.10
Area at Spillway Level	750m^2 at RL 65.00
Area at Top of Bank	840m^2 at RL 65.30
Height of Detention Area	0.90m (to spillway)
Volume	800m^3 to top of bank (Approx. 550m^3 to top of Operational Storage Area / Spillway Level)
Outlet 1	Grated Inlet into Outlet Pit 1 at RL 64.10
Outlet 2	Grated Inlet into Outlet Pit 2 at RL 64.50
Emergency Spillway	4.00m wide spillway constructed at RL 65.00
Pit 1 Piped Outlet	225 diameter PE Pipe
Pit 2 Piped Outlet	450 diameter RCP

Additional information regarding the On-Site Detention Basin can be seen within Appendix D. A summary of the detention Basin performance in mitigating the post-development flow is presented in Table 2-5.

5.2 Stormwater Quality

Stormwater quality for the Proposed Development was assessed against the Queensland State Planning Policy and the Local Government assessment benchmarks. It was found that the proposed development triggers one or more of the State Planning Policy's checklist criteria, and compliance with DERM's State Planning Policy is required. Therefore, the development is required to provide formal stormwater quality treatment in accordance with the Water by Design guidelines

The proposed stormwater treatment train will consist of:

- All future roof areas and captured ground areas are to be collected and discharged to the internal drainage system. The internal stormwater drainage directs the flows to the Bio-Retention Basin located within Detention Basin at the North-Eastern Corner of the site.

- All Council Road areas are collected via the underground drainage system which directs flows to the Bio-Retention Basin located within Detention Basin at the North-Eastern Corner of the site.

- The flows once treated by the Bio-Retention Basin are outlet to the sites Lawful Point of Discharge.

During the construction phase, a series of sediment fences and bunds are proposed to achieve compliance with the suspended solids limit in addition to a review for the requirements for level 1 or 2 sediment mitigation measures (filter dams, sedimentation basins, mulch berms etc). It is proposed that the sediment controls will be monitored and maintained during construction of the development in accordance with BCC's standards. Uncontaminated stormwater from soil disturbance will be directed around bunded areas where possible, and sediment fencing will be installed around the site to protect the receiving waterways and general environment.

Overall, the proposed stormwater quality and quantity treatment measures for the Proposed Development are predicted to ensure non-worsening of pre-development median peak flows and provide appropriate stormwater quality treatment.

6. Appendices

6.1 Appendix A – Proposed ROL Plan

6.2 Appendix B – Detailed Survey

6.3 Appendix C – BCC Floodwise Property Report

6.4 Appendix D – Concept Civil Plans

6.5 Appendix E – Bio-Retention Maintenance

APPENDIX A
PROPOSED ROL PLAN

RCS

CONSULTANTS
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LOT SCHEDULE

LOT	LOT WIDTH	Area	LOT	LOT WIDTH	Area
1	11m	410 m²	18	12.5m	482 m²
2	11m	410 m²	19	12.5m	482 m²
3	CORNER	522 m²	20	17m	658 m²
4	CORNER	534 m²	21	15m	540 m²
5	11m	408 m²	22	15m	540 m²
6	10.5m	457 m²	23	12.5m	482 m²
7	CORNER	473 m²	24	10m	386 m²
8	10m	386 m²	25	10m	386 m²
9	10.5m	405 m²	26	10m	386 m²
10	10.5m	405 m²	27	12.5m	482 m²
11	12.5m	482 m²	28	10m	386 m²
12	10m	386 m²	29	10m	386 m²
13	10.5m	405 m²	30	12.5m	482 m²
14	12.5m	482 m²	31	CORNER	460 m²
15	10m	386 m²	32	12m	402 m²
16	10m	386 m²	33	12.5m	421 m²
17	10m	386 m²			

PLANS BY
WINK + CO
07 3060 5089
projects@winkandco.com.au
WINKANDCO.COM.AU
QBCC 1194316 | TAS - CC7004

BONAVENTURA DEVELOPMENTS
LAND | VISION | COMMUNITY

CLIENT: BONAVENTURA DEVELOPMENTS

DRAWING TITLE: SITE PLAN

SCALE: 1 : 500

PROJECT: 33x LOT DEVEOPMENT
LOT 1 & 2 [RP185509]
171-173 UPPER KEDRON RD, FERNY GROVE, QLD 4055

PAGES: 1 of 3
SHEET SIZE: A2
JOB No: TBA
WINK + CO
Job No: 094-26
Date: 17/07/2026

REV	COMMENTS	DATE	DRWN	CKD
A	SITE LAYOUT	17/07/26	EK	SW
B	AMENDMENTS	04/08/26	TD	SW
C	AMENDMENTS	06/08/26	TD	SW
D				
E				
F				
G				

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BONAVENTURA DEVELOPMENTS
LAND | VISION | COMMUNITY

CLIENT: BONAVENTURA DEVELOPMENTS

DRAWING TITLE: SITE PLAN WITH OVERLAY
SCALE: 1 : 500

PROJECT: 33x LOT DEVEOPMENT
LOT 1 & 2 [RP185509]
171-173 UPPER KEDRON RD, FERNY GROVE, QLD 4055

PAGES: 2 of 3 | SHEET SIZE: A2
JOB No: TBA
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REV	COMMENTS	DATE	DRWN	CKD
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07 3060 5089
projects@winkandco.com.au
WINKANDCO.COM.AU
QBCC 1194316 | TAS - CC7004

BONAVENTURA DEVELOPMENTS
LAND | VISION | OWNERSHIP

CLIENT: BONAVENTURA DEVELOPMENTS

DRAWING TITLE: SITE PLAN WITH OVERLAY @ A1
SCALE: 1 : 600

PROJECT: PROP. NEW RESIDENCE
LOT 1 & 2 [RP185509]
171-173 UPPER KEDRON RD,
FERNY GROVE, QLD 4055

PAGES: 3 of 3 | SHEET SIZE: A1
JOB No: TBA
WINK + CO
Job No: 094-26
Date: 17/07/2026

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B	AMENDMENTS	04/08/26	TD	SW
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D				
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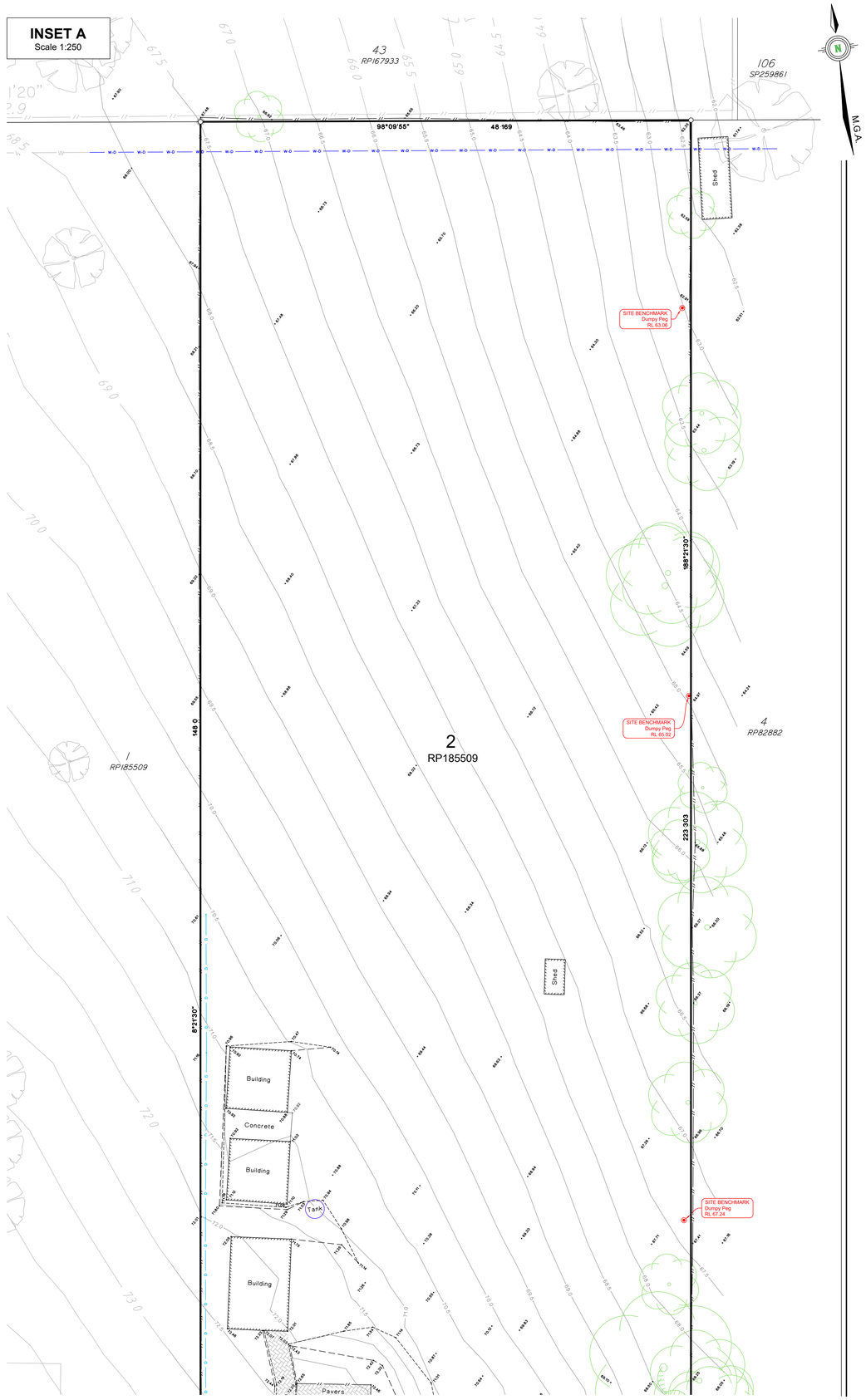
G				

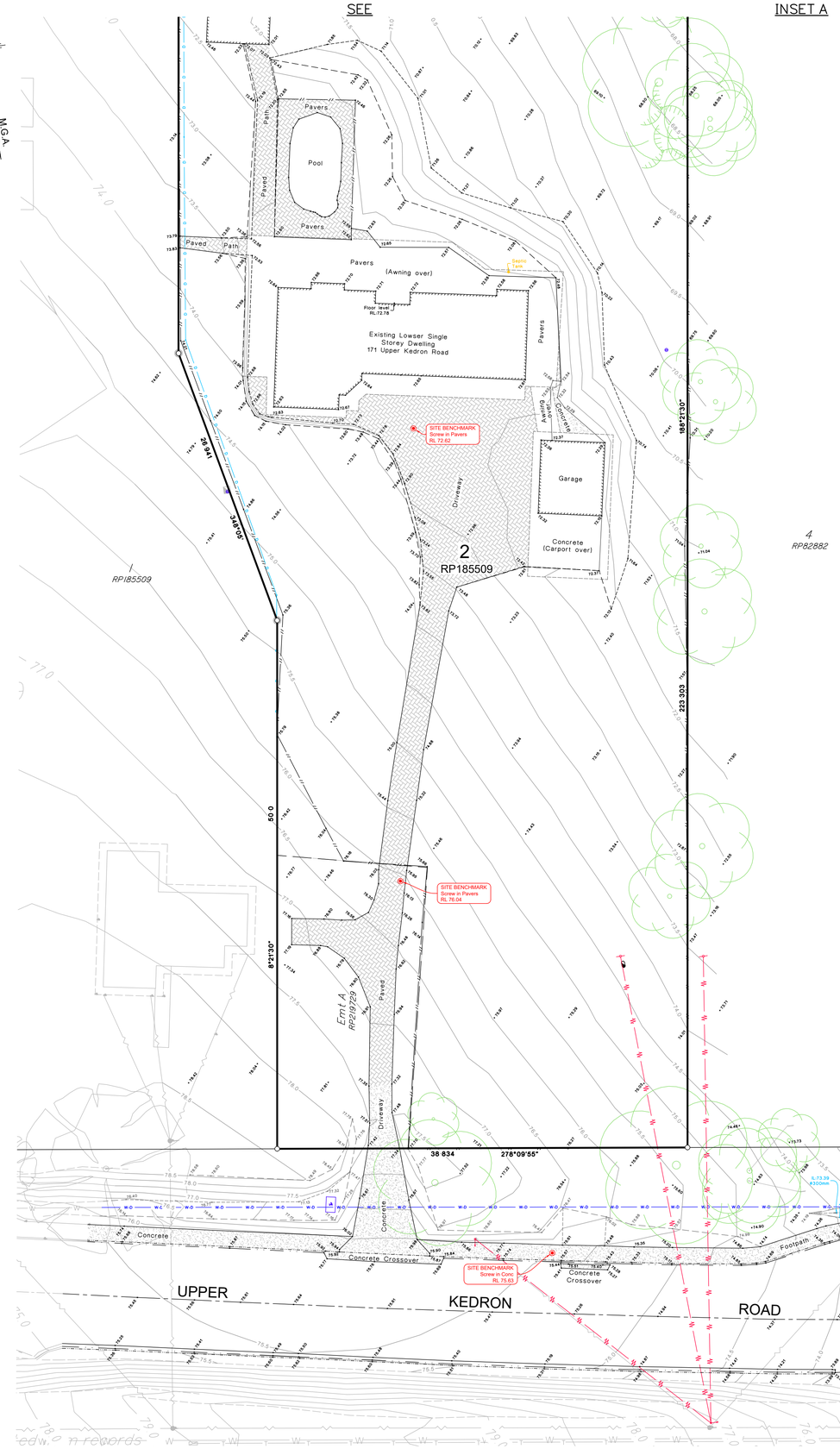
APPENDIX B
DETAILED SURVEY

RCS

CONSULTANTS
YOU CAN TRUST

Rodgers Consulting Services Pty Ltd
ABN: 13 689 623 354
Email: adrian@rcs.net.au
Mob: 0401338071





Client

Bonaventura Developments Pty Ltd

Project

Detail Survey of 171 Upper Kedron Road, Ferny Grove

Described as Lot 2 on RP185509

Scale: 1:250 at A1

Datum: See plan by Land Surveying Dynamics drawing 12777-VEG-01 B
Dated 20/08/20
Contour Int: 0.5m

Locality: Ferny Grove
LGA: Brisbane City
Cadfile: SOL-411.DET.01

Issue	Description	Drw	Date	Appd
A	INITIAL ISSUE	SSD	23.06.26	MP

Notes

The title boundaries shown hereon were not marked at the time of survey and have been compiled from previous survey.
Services shown hereon have been located where possible by field survey. Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of further underground services and detailed locations of all services.

LEGEND

AWN	Awning / eave	
BU	Building	
BW	Bottom of wall	
CG	Change of grade	
EBX	Electricity Box	
EBX	Light Pole	
FHY	Fire Hydrant	
FNC	Fence	
IOT	Sewer inspection opening	
KCL	Kerb lip	
KIN	Kerb invert	
KTB	Kerb top back	
TAP	Tap	
TEP	Telstra Pit	
TW	Top of wall	
WMT	Water Meter	

UNDERGROUND SERVICES - ALPHA CLASSIFICATION AS PER AUSTRALIAN STANDARD AS5488.

Sewer main	S-O
Stormwater drainage	SW-O
Water main	W-O
Telstra service	T-O
NBN service	NBN-O
Gas supply	G-O
Electricity supply	E-O
Communication Service	C-O

Detail survey by others completed over #173 Upper Kedron Rd shown as below

0 7.5 15 m

SCALE 1:250 (A1)

FOCUS ON SURVEYING
w www.focussurvey.com.au
e info@focussurvey.com.au ph 3338 5095
a Suite 6, 214 Waterworks Road. Ashgrove . QLD . 4060
a Unit 4b, 115a Point Cartwright . Buddina . 4575

Sheet No.	Surveyed By:	Date Surveyed:
1 of 1	RWB	10.06.26

Dwg. No. **SOL-411.DET.01** Issue **A**

Client

Bonaventura Developments Pty Ltd

Project

Detail Survey of 171 Upper Kedron Road, Ferny Grove

Described as Lot 2 on RP185509

Scale: 1:250 at A1

Datum: See plan by Land Surveying Dynamics drawing 12777-VEG-01 B
Dated 20/08/20
Contour Int: 0.5m

Locality: Ferny Grove
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Electricity supply	E.O
Communication Service	C.O

Detail survey by others completed over #173 Upper Kedron Rd shown as below

Imagery ©Aerometrex

0 7.5 15 m

SCALE 1:250 (A1)

FOCUS ON SURVEYING
w www.focussurvey.com.au
e info@focussurvey.com.au ph 3338 5095
a Suite 6, 214 Waterworks Road. Ashgrove . QLD . 4060
a Unit 4b, 115a Point Cartwright . Buddina . 4575

Sheet No.	Surveyed By:	Date Surveyed:
1 of 1	RWB	10.06.26

Dwg. No. SOL-411.DET.01-IMAGE Issue A

APPENDIX C
BCC Floodwise Report

RCS

CONSULTANTS
YOU CAN TRUST

Rodgers Consulting Services Pty Ltd
ABN: 13 689 623 354
Email: adrian@rcs.net.au
Mob: 0401338071

FloodWise Property Report

171 UPPER KEDRON RD, FERNY GROVE 4055
Lot 2 on RP185509

Dedicated to a better Brisbane

THE PURPOSE OF THIS REPORT IS FOR BUILDING AND DEVELOPMENT

Brisbane City Council's FloodWise Property Report **provides technical flood planning information** including estimated flood levels, habitable floor level requirements and more. **This report uses the adopted flood planning information in Brisbane City Plan 2014**, that guides how land in Brisbane is used and developed for the future. Find out more about planning and building. To understand how to be **resilient and prepare for floods**, visit Council's Be Prepared webpage. Find more information about how to read a FloodWise Property Report.

This property has no flood levels

Brisbane City Council has not assigned flood level information for this property however it may be affected by one or more flood or property development flags. Please refer to the Flood Planning and Development Information below for details. The property may have 0.2% AEP flood level which will appear on the Flood Planning Information table if applicable. For professional advice or detailed assessment of a property contact a Registered Professional Engineer of Queensland.

Visit the Be Prepared page to find more information on how to prepare your home or business for potential flooding.

Combined 1% AEP for river, creek and storm tide flood extent (if applicable) from the adopted Brisbane City Plan 2014.
Read more about Brisbane City Plan 2014.

Are you resilient and ready for flood?

- Sign up to the Brisbane Severe Weather Alert at **brisbane.qld.gov.au/beprepared**
- Visit bom.gov.au for the latest weather updates.
- Have an evacuation plan, emergency kit and important phone numbers ready.
- Observe where water flows from and to during heavy rain.
- Consider how flood-resilient building techniques will have you home faster and with less damage.

Life threatening emergencies **000** Police/fire/ambulance (mobiles **000** and **112**)	State Emergency Service (SES) **132 500** Energex **13 19 62** Brisbane City Council **3403 8888**

Technical Summary

This section of the FloodWise Property Report contains more detailed flood information for this property so **surveyors, builders, certifiers, architects, and engineers can plan and build** in accordance with Council's planning scheme.

Find more information about **planning and building** in Brisbane or talk to a Development Services Planning Information Officer via Council's Contact Centre on (07) 3403 8888.

Flood Planning and Development Information

This section of the FloodWise Property Report contains information about Council's planning scheme overlays. Overlays identify areas within the planning scheme that reflect distinct themes that may include constrained land and/or areas sensitive to the effects of development.

Flood overlay code

The Flood overlay code of Council's planning scheme uses the following information to provide guidelines when developing properties. The table below summarises the flood planning areas (FPAs) that apply to this property. Development guidelines for the FPAs are explained in **Council's planning scheme**.

Flood planning areas (FPA)		
River	**Creek / waterway**	**Overland flow**
		Not Applicable

To find more information about Council's flood planning areas (FPAs) for Brisbane River and Creek/waterway flooding to guide future building and development in flood prone areas, please review **Council's Flood Planning Provisions**.

Coastal hazard overlay code

The Coastal hazard overlay code of Council's planning scheme uses the following information to provide guidelines when conducting new developments. The table below summarises the coastal hazard categories that apply to this property. Development guidelines for the following Coastal hazard overlay sub-categories are explained in Council's **planning scheme**.

Coastal hazard overlay sub-categories
There are currently no Coastal hazard overlay sub-categories that apply to this property.

Note: Where land is identified within one for more flood planning areas on the Flood overlay or is identified within one of the Storm tide inundation area sub-categories on the Coastal hazard overlay, the assessment criteria that provides the highest level of protection from any source of flooding applies.

Property development flags
Waterway corridor - This property may also be located within a mapped waterway corridor as identified in the Waterway corridors overlay map of Council's planning scheme. Please consider this in conjunction with Council's planning scheme requirements.
Large allotment - This property is either a Large Allotment of over 1000 square metres or is located within a Large Allotment. Flood levels may vary significantly across allotments of this size. Further investigations may be warranted in determining the variation in flood levels and the minimum habitable floor level across the site. For more information or advice, please consult a Registered Professional Engineer of Queensland (RPEQ).

Useful Flood Information Definitions

Australian Height Datum (AHD) - The reference level for defining ground levels in Australia. The level of 0.0m AHD is approximately mean sea level.

Annual Exceedance Probability (AEP) - The probability of a flood event of a given size occurring in any one year, usually expressed as a percentage annual chance.

- **0.2% AEP** - A flood event of this size is considered rare but may still occur. A flood of size or larger has a 1 in 500 chance or a 0.2% probability of occurring in any year.
- **1% AEP** - A flood of this size or larger has a 1 in 100 chance or a 1% probability of occurring in any year.
- **2% AEP** - A flood of this size or larger has a 1 in 50 chance or a 2% probability of occurring in any year.
- **5% AEP** - A flood of this size or larger has a 1 in 20 chance or a 5% probability of occurring in any year.
- **20% AEP** - A flood of this size or larger has a 1 in 5 chance or a 20% probability of occurring in any year.

Data quality

- **Data Quality Code A** - Level data based on recent surveyor report or approved as-constructed drawings.
- **Data Quality Code B** - Level data based on ground-based mobile survey or similar.
- **Data Quality Code C** - Level data derived from Airborne Laser Scanning or LiDAR information.

Defined Flood Level (DFL) - The DFL is used for commercial and industrial development. The Defined flood level (DFL) for Brisbane River flooding is a level of 3.7m AHD at the Brisbane City Gauge based on a flow of 6,800 m/s. DFL is only applicable for non-residential uses affected by Brisbane River flooding.

Flood planning area (FPA) - Council has developed five Flood planning areas (FPAs) as part of Brisbane City Plan 2014 Flood overlay mapping for Brisbane River, Creek/waterway flooding and Overland flow to guide future building and development in flood prone areas. Storm tide flooding is mapped separately. The FPAs are designed to recognise the flood hazard for different flooding types. Flood hazard is a combination of frequency of flooding, the flood depth, and the speed at which the water is travelling. **Find more information here**.

Maximum and minimum ground level - Highest and lowest ground levels on the property based on available ground level information. A Registered Surveyor can confirm exact ground levels.

Minimum habitable floor level (dwelling house) - The minimum level in metres AHD at which habitable areas of development (generally including bedrooms, living rooms, kitchen, study, family, and rumpus rooms) must be constructed as required by the Brisbane City Plan 2014.

Indicative existing floor level - The approximate level in metres AHD of the lowest habitable floor in the existing building (excluding apartments). The data is sourced from a range of sources with varying accuracy levels.

Property - A property will contain 1 or more lots. The multiple lot warning is shown if you have selected a property that contains multiple lots.

Residential flood level (RFL) - This flood level for the Brisbane River equates to the 1% annual exceedance probability (AEP) flood level.

To learn more, visit **Brisbane City Council's Flood Information Hub**

Brisbane City Council's Online Flood Tools

Council provides several online flood tools:

- to guide planning and development
- to help residents and businesses understand their flood risk and prepare for flooding.

Council's online flood tools for planning and development purposes indude:

- **FloodWise Property Report**
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For more information on Council's planning scheme and online flood tools for planning and development:

- phone (07) 3403 8888 and ask to talk to a Development Services Planning Information Officer

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Council's Planning Scheme - The Brisbane City Plan 2014 (planning scheme) has been prepared in accordance with the Sustainable Planning Act as a framework for managing development in a way that advances the purpose of the Act. In seeking to achieve this purpose, the planning scheme sets out the Council's intention for future development in the planning scheme area, over the next 20 years.

Disclaimer

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Planning to build or renovate?

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FloodWise Property Report

173 UPPER KEDRON RD, FERNY GROVE 4055
Lot 1 on RP185509

Dedicated to a better Brisbane

THE PURPOSE OF THIS REPORT IS FOR BUILDING AND DEVELOPMENT

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Combined 1% AEP for river, creek and storm tide flood extent (if applicable) from the adopted Brisbane City Plan 2014.
Read more about Brisbane City Plan 2014.

Brisbane City Council | Includes material © State of Queensland (Department of Natural Resources and Mines, M… Powered by Esri

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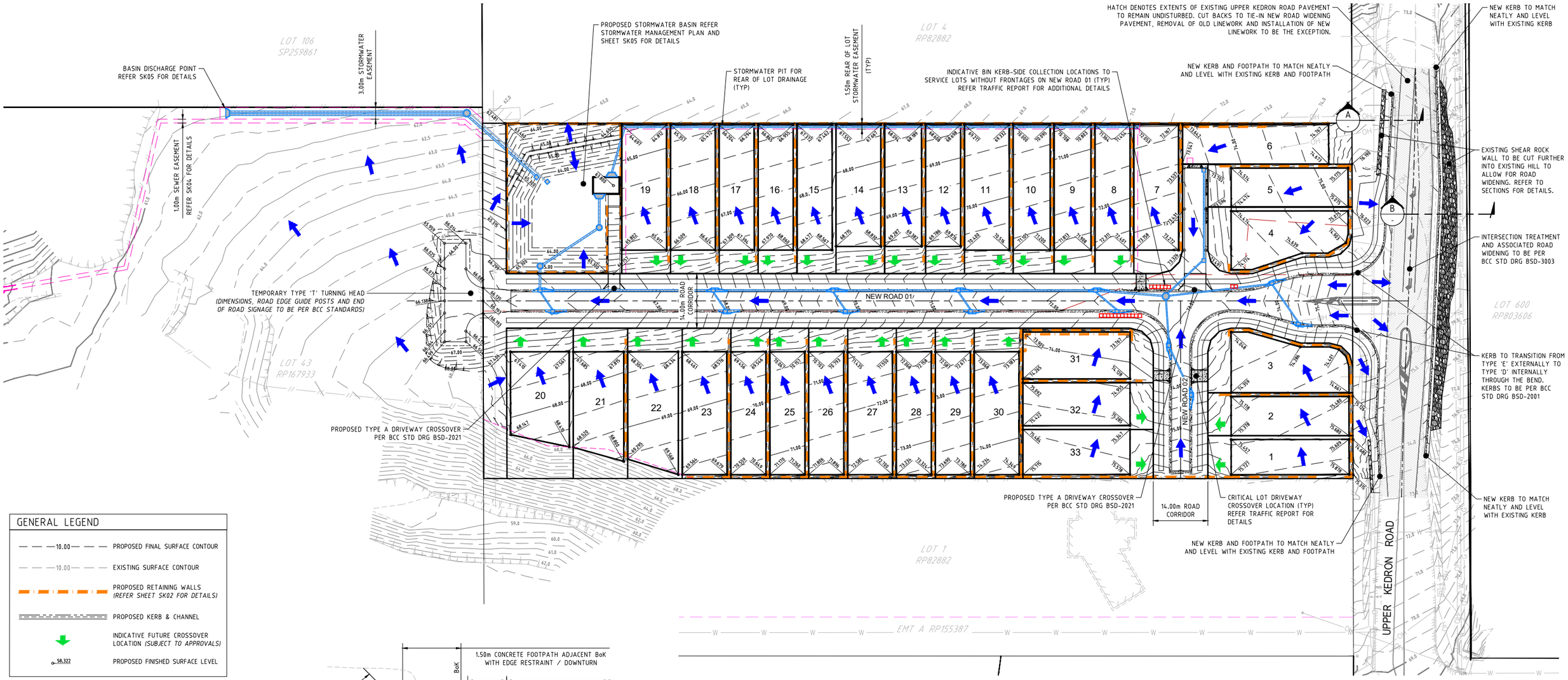
APPENDIX D
CONCEPT CIVIL PLANS

RCS

CONSULTANTS
YOU CAN TRUST

Rodgers Consulting Services Pty Ltd
ABN: 13 689 623 354
Email: adrian@rcs.net.au
Mob: 0401338071



GENERAL LEGEND

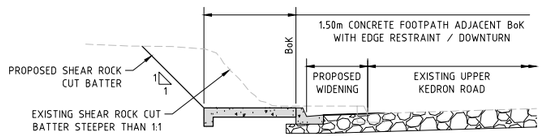
- PROPOSED FINAL SURFACE CONTOUR (10.00)
- EXISTING SURFACE CONTOUR (10.00)
- PROPOSED RETAINING WALLS *(REFER SHEET SK02 FOR DETAILS)*
- PROPOSED KERB & CHANNEL
- INDICATIVE FUTURE CROSSOVER LOCATION *(SUBJECT TO APPROVALS)*
- PROPOSED FINISHED SURFACE LEVEL (58.322)

EXISTING SERVICE LEGEND

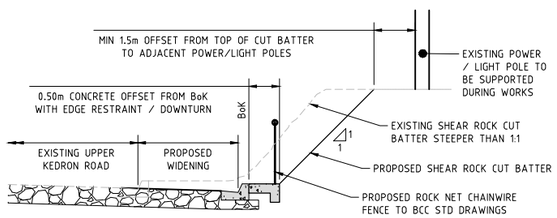
- G — GAS MAIN / VALVE
- SWD — STORMWATER MAIN / PIT
- W — WATER MAIN / VALVE & HYDRANT
- S — SEWER MAIN / MANHOLE
- OH — O/H ELECTRICITY / POWER POLE
- NBN — NBN / JUNCTION & PIT
- E — UNDERGROUND ELECTRICITY

PROPOSED STORMWATER LEGEND

- PROPOSED STORMWATER DRAINAGE
- PROPOSED STORMWATER STRUCTURES
- OVERLAND FLOW DIRECTION



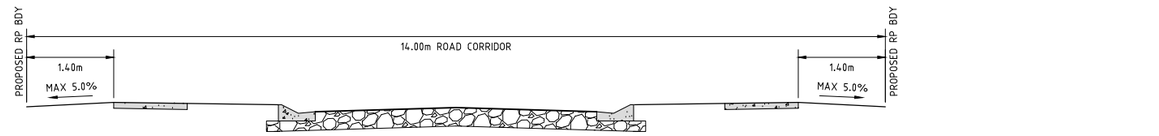
SECTION A - NORTH SIDE OF UPPER KEDRON ROAD



SECTION B - SOUTH SIDE OF UPPER KEDRON ROAD

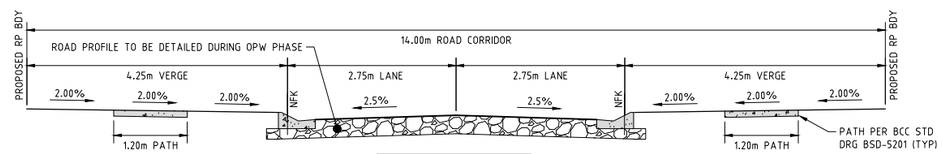
TYPICAL ROCK WALL DETAILS

SCALE 1:50 (A1)



ALTERED VERGE FRONTING LOTS 11-14 & 27-30

FOR ALL OTHER DETAILS REFER TO STANDARD PROFILE (BELOW)



STANDARD PROFILE

TYPICAL ROAD 01 & ROAD 02 SECTIONS

SCALE 1:50 (A1)

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ISSUE	DESCRIPTION	DATE	DRAWN	AUTH.
A	PRELIMINARY ISSUE	31.07.2026	KR	AR
B	PRELIMINARY ISSUE REVISED	06.08.2026	KR	AR
C	APPROVAL ISSUE	07.08.2026	KR	AR

ISSUE STAMP: **ISSUE FOR APPROVAL** — NOT FOR CONSTRUCTION WITHOUT COUNCIL APPROVAL

NORTH

CITY COUNCIL APPROVAL NUMBER: -

SURVEY INFORMATION: PM - RL -

SURVEYOR: FOCUS ON SURVEYING

FILE NAME: SOL-411.DET.01

RP DESCRIPTION: LOTS 1-2 ON RP185509

LAND SIZE: -

SCALE BAR: 0 10 20 30m — SCALE 1:500 @ A1

CLIENT: BONAVENTURA DEVELOPMENTS PTY LTD

PROJECT TITLE: PROPOSED MULTI-LOT SUBDIVISION AT 171 - 173 UPPER KEDRON ROAD, FERNY GROVE, QLD 4055

DRAWING TITLE: CONCEPT STORMWATER DRAINAGE PLAN

DESIGN:	DATE:	DESIGN CHECK:	DATE:
KR		AR	
DRAWN:	DATE:	DWG CHECK:	DATE:
KR		AR	

AUTHORISED FOR ISSUE: - RPEQ No. -

ORIG. SIZE: A1

PROJECT NUMBER / SHEET: C26062 SK01

ISSUE: C

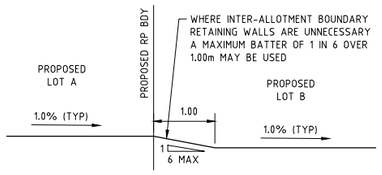
CONTRACTOR TO CONFIRM LOCATION OF ALL SERVICES TRAVERSING OR ADJACENT TO THE DEVELOPMENT SITE PRIOR TO UNDERTAKING WORKS.

REFER TO STRUCTURAL ENGINEER'S PLANS FOR:
- TEMPORARY SOIL RETENTION METHODS
- PROPOSED RETAINING WALL DETAILS
- WALL FOOTING SLAB DETAILS

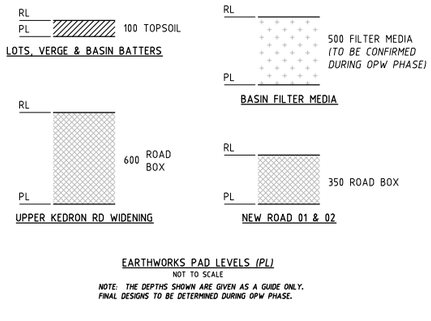
LEVEL 1 COMPACTION

ALL FILLING ON SITE TO BE LEVEL 1 COMPACTED FILL AS PER AS3798 UNLESS NOTED OTHERWISE
(NOTE TYPE 2 TESTING MAY ONLY BE USED FOR INDIVIDUAL RESIDENTIAL LOTS ONLY)

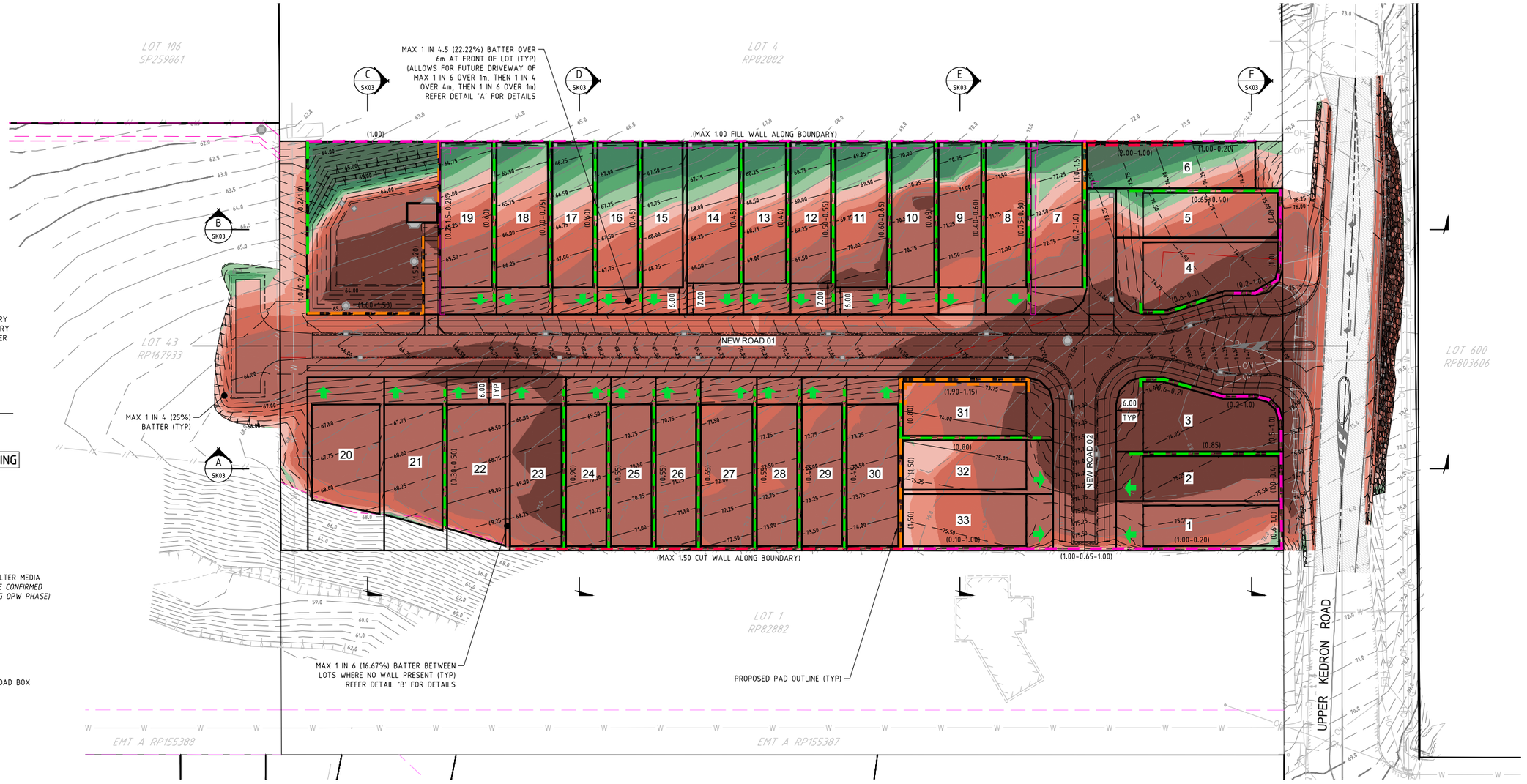
CONTRACTOR TO CONFIRM SOIL TYPE AND ACCEPTABLE TEMPORARY BATTER ANGLE WITH GEOTECHNICAL ENGINEER PRIOR TO UNDERTAKING EARTHWORKS



DETAIL B - TYPICAL INTER-ALLOTMENT GRADING
SCALE 1:50 (A1)



EARTHWORKS PAD LEVELS (PL)
NOT TO SCALE
NOTE: THE DEPTHS SHOWN ARE GIVEN AS A GUIDE ONLY. FINAL DESIGNS TO BE DETERMINED DURING OPW PHASE.



EARTHWORKS TABLE

	CUT (m^3)	FILL (m^3)	NETT (m^3)
SITE STRIPPING (ASSUMED 100mm DEPTH)	-2177	-	-2177
BULK EARTHWORKS (FROM STRIPPED SURFACE)	-29383	1155	28228 (EXPORT)

NOTE: EARTHWORKS VOLUMES ARE TAKEN FROM STRIPPED EXISTING SURFACE LEVEL TO BULK EARTHWORKS PAD LEVELS.

DIAL BEFORE YOU DIG www.1100.com.au

"DIAL BEFORE YOU DIG" TO BE CONTACTED PH: 1100 FOR THE LOCATION OF EXISTING PUBLIC UTILITIES, PRIOR TO EXCAVATION.

GENERAL LEGEND

- 10.00 EARTHWORKS PAD CONTOUR
- 10.00 EXISTING SURFACE CONTOUR
- PROPOSED KERB & CHANNEL
- PROPOSED STORMWATER STRUCTURES
- INDICATIVE FUTURE CROSSOVER LOCATION *(SUBJECT TO APPROVALS)*

EXISTING SERVICE LEGEND

- G — GAS MAIN / VALVE
- SWD — STORMWATER MAIN / PIT
- W — WATER MAIN / VALVE & HYDRANT
- S — SEWER MAIN / MANHOLE
- OH — O/H ELECTRICITY / POWER POLE
- NBN — NBN / JUNCTION & PIT
- E — UNDERGROUND ELECTRICITY

PROPOSED RETAINING WALL LEGEND

- RETAINING WALL - SIDE OF LOT *(MAX RETAINED HEIGHT 1.00m)*
- RETAINING WALL - SIDE OF LOT *(MAX RETAINED HEIGHT 2.00m; WALL TO BE TIERED)*
- RETAINING WALL - REAR OF LOT *(MAX RETAINED HEIGHT 1.00m)*
- RETAINING WALL - REAR OF LOT *(MAX RETAINED HEIGHT 2.00m; WALL TO BE TIERED)*

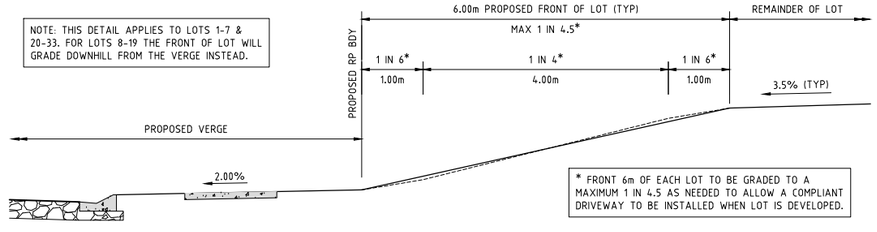
(1.8) / (0.2-1.8) RETAINED HEIGHT *(MAX / RANGE)*

CUT & FILL LEGEND

EXCAVATION	FILLING
0.00m - 0.25m	0.00m - 0.25m
0.25m - 0.50m	0.25m - 0.50m
0.50m - 1.00m	0.50m - 1.00m
1.00m - 2.00m	1.00m - 2.00m
>2.00m	>2.00m

NOTES:
- CUT AND FILL IS PROVIDED FOR GUIDANCE ONLY AND DENOTES LEVEL DIFFERENCE BETWEEN FINISHED DESIGN SURFACE AND EXISTING SURFACE *(NO BOX OUT OR SITE STRIPPING INCLUDED IN SHOWN VOLUMES)*
- AREAS NOT REQUIRING EARTHWORKS ARE TO REMAIN UNDISTURBED.
- FINAL EXTENTS OF CUT/FILL ARE TO BE DETERMINED BY THE CONTRACTOR ON SITE IN CONJUNCTION WITH THE EARTHWORKS DESIGN.

NOTE: THIS DETAIL APPLIES TO LOTS 1-7 & 20-33. FOR LOTS 8-19 THE FRONT OF LOT WILL GRADE DOWNHILL FROM THE VERGE INSTEAD.



DETAIL A - TYPICAL FRONT OF LOT GRADING
SCALE 1:50 (A1)

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ISSUE	DESCRIPTION	DATE	DRAWN	AUTH.
A	PRELIMINARY ISSUE	28.07.2026	KR	AR
B	PRELIMINARY ISSUE REVISED	31.07.2026	KR	AR
C	PRELIMINARY ISSUE REVISED - TURNING HEAD ADDED	03.08.2026	KR	AR
D	PRELIMINARY ISSUE REVISED	06.08.2026	KR	AR
E	APPROVAL ISSUE	07.08.2026	KR	AR

ISSUE STAMP
ISSUE FOR APPROVAL
NOT FOR CONSTRUCTION WITHOUT COUNCIL APPROVAL

NORTH

CITY COUNCIL APPROVAL NUMBER: -

SCALE BAR
0 10 20 30m
SCALE 1:500 @ A1

CLIENT: BONAVENTURA DEVELOPMENTS PTY LTD

PROJECT TITLE: PROPOSED MULTI-LOT SUBDIVISION AT 171 - 173 UPPER KEDRON ROAD, FERNY GROVE, QLD 4055

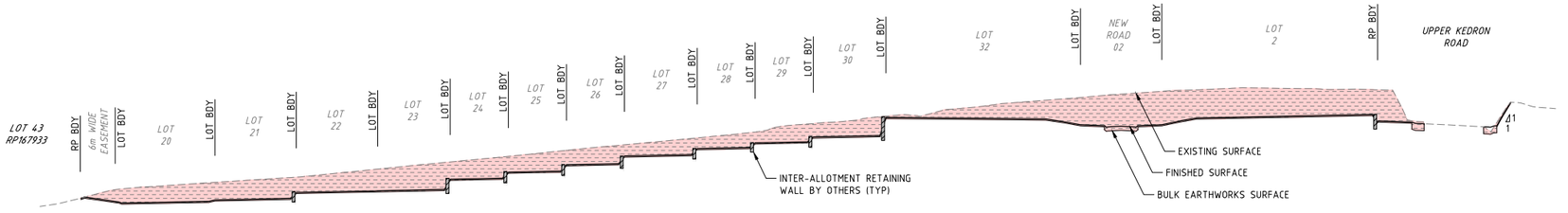
DRAWING TITLE: CONCEPT EARTHWORKS PLAN

SURVEY INFORMATION	SURVEYOR	FILE NAME
PM - RL -	FOCUS ON SURVEYING	SOL-411.DET.01
	RP DESCRIPTION LOTS 1-2 ON RP185509	**LAND SIZE** -

DESIGN: KR	DATE:	DESIGN CHECK: AR	DATE:
DRAWN: KR	DATE:	DWG CHECK: AR	DATE:
AUTHORISED FOR ISSUE -	RPEQ No. -		ORIG. SIZE A1
PROJECT NUMBER / SHEET C26062 SK02			ISSUE E

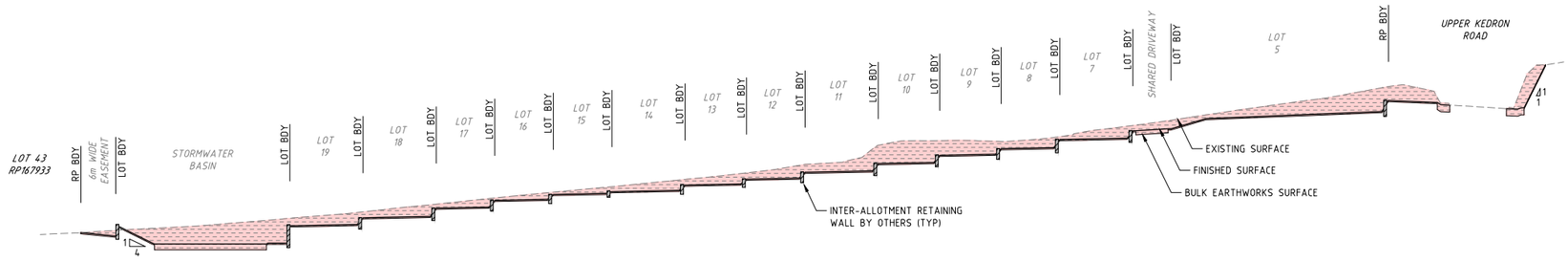
VERTICAL EXAGGERATION:

NOTE: FOR READABILITY THE VERTICAL SCALE HAS BEEN EXAGGERATED ON ALL SECTIONS. ACTUAL GRADES & DEPTHS ARE FLATTER / SHALLOWER THAN THEY APPEAR.



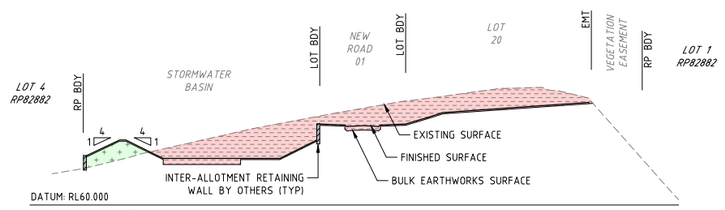
DATUM: RL64.000

SECTION A (SK02)
1:500 HORZ (A1)
1:250 VERT (A1)



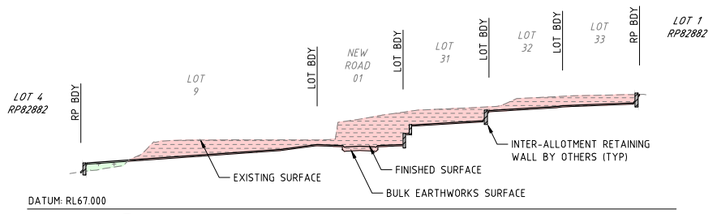
DATUM: RL58.000

SECTION B (SK02)
1:500 HORZ (A1)
1:250 VERT (A1)



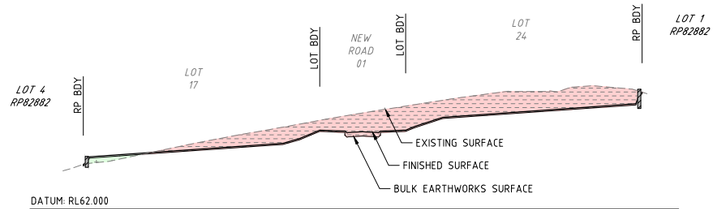
DATUM: RL60.000

SECTION C (SK02)
1:500 HORZ (A1)
1:250 VERT (A1)



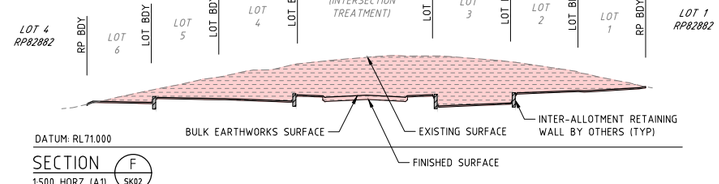
DATUM: RL67.000

SECTION E (SK02)
1:500 HORZ (A1)
1:250 VERT (A1)



DATUM: RL62.000

SECTION D (SK02)
1:500 HORZ (A1)
1:250 VERT (A1)



DATUM: RL71.000

SECTION F (SK02)
1:500 HORZ (A1)
1:250 VERT (A1)

0 5 10 15m
SCALE 1:250 @ A1
VERTICAL SCALE

0 10 20 30m
SCALE 1:500 @ A1
HORIZONTAL SCALE

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ISSUE	DESCRIPTION	DATE	DRAWN	AUTH.
A	PRELIMINARY ISSUE	06.08.2026	KR	AR
B	APPROVAL ISSUE	07.08.2026	KR	AR

ISSUE STAMP
ISSUE FOR APPROVAL
NOT FOR CONSTRUCTION WITHOUT COUNCIL APPROVAL

NORTH

SURVEY INFORMATION
PM - RL -

SURVEYOR
FOCUS ON SURVEYING

FILE NAME
SOL-411.DET.01

RP DESCRIPTION
LOTS 1-2 ON RP185509

LAND SIZE
-

CITY COUNCIL APPROVAL NUMBER:
-

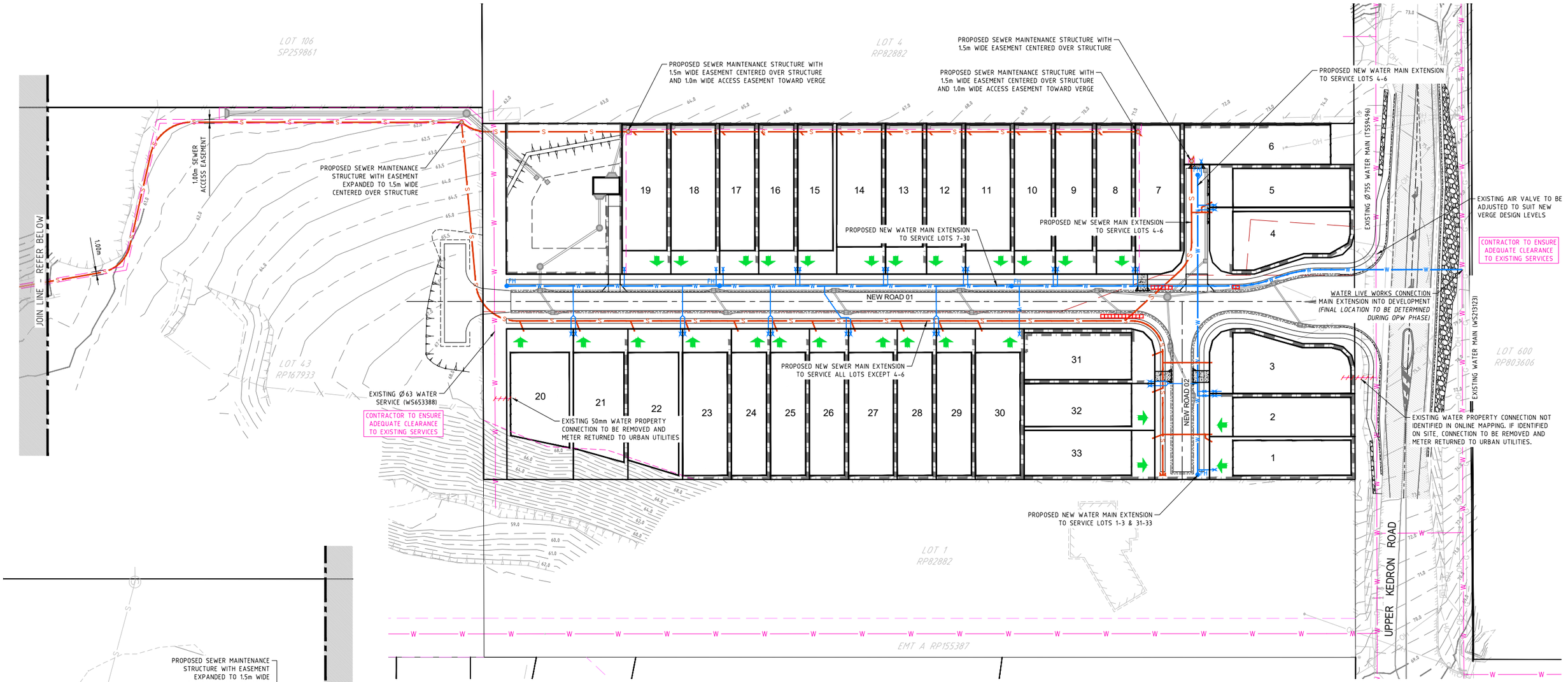
SCALE BAR

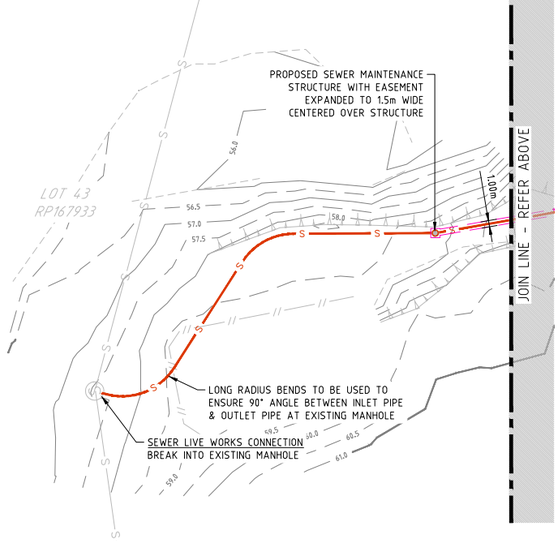
CLIENT:
BONAVENTURA DEVELOPMENTS PTY LTD

PROJECT TITLE:
PROPOSED MULTI-LOT SUBDIVISION
AT 171 - 173 UPPER KEDRON ROAD,
FERNY GROVE, QLD 4055

DRAWING TITLE:
CONCEPT EARTHWORKS SECTIONS

DESIGN: KR	DATE:	DESIGN CHECK: AR	DATE:
DRAWN: KR	DATE:	DWG CHECK: AR	DATE:
AUTHORISED FOR ISSUE -	RPEQ No. -	ORIG. SIZE A1	
PROJECT NUMBER / SHEET C26062 SK03		ISSUE B	





GENERAL LEGEND

- PROPOSED FINAL SURFACE CONTOUR
- EXISTING SURFACE CONTOUR
- PROPOSED RETAINING WALLS *(REFER SHEET SK02 FOR DETAILS)*
- PROPOSED KERB & CHANNEL
- PROPOSED STORMWATER STRUCTURES
- INDICATIVE FUTURE CROSSOVER LOCATION *(SUBJECT TO APPROVALS)*

EXISTING SERVICE LEGEND

- GAS MAIN / VALVE
- STORMWATER MAIN / PIT
- WATER MAIN / VALVE & HYDRANT
- SEWER MAIN / MANHOLE
- O/H ELECTRICITY / POWER POLE
- NBN / JUNCTION & PIT
- UNDERGROUND ELECTRICITY

PROPOSED SERVICES LEGEND

- PROPOSED SEWER RETICULATION
- PROPOSED SEWER MANHOLE
- PROPOSED WATER RETICULATION
- PROPOSED WATER SERVICE & METER
- PROPOSED FIRE HYDRANT

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ISSUE	DESCRIPTION	DATE	DRAWN	AUTH.
A	PRELIMINARY ISSUE	28.07.2026	KR	AR
B	PRELIMINARY ISSUE REVISED	06.08.2026	KR	AR
C	APPROVAL ISSUE	07.08.2026	KR	AR

ISSUE STAMP

ISSUE FOR APPROVAL
NOT FOR CONSTRUCTION WITHOUT COUNCIL APPROVAL

NORTH

CITY COUNCIL APPROVAL NUMBER: -

SCALE BAR
0 10 20 30m
SCALE 1:500 @ A1

CLIENT:
BONAVENTURA DEVELOPMENTS PTY LTD

PROJECT TITLE:
PROPOSED MULTI-LOT SUBDIVISION
AT 171 - 173 UPPER KEDRON ROAD,
FERNY GROVE, QLD 4055

DRAWING TITLE:
CONCEPT SERVICES PLAN

SURVEY INFORMATION
PM - RL -

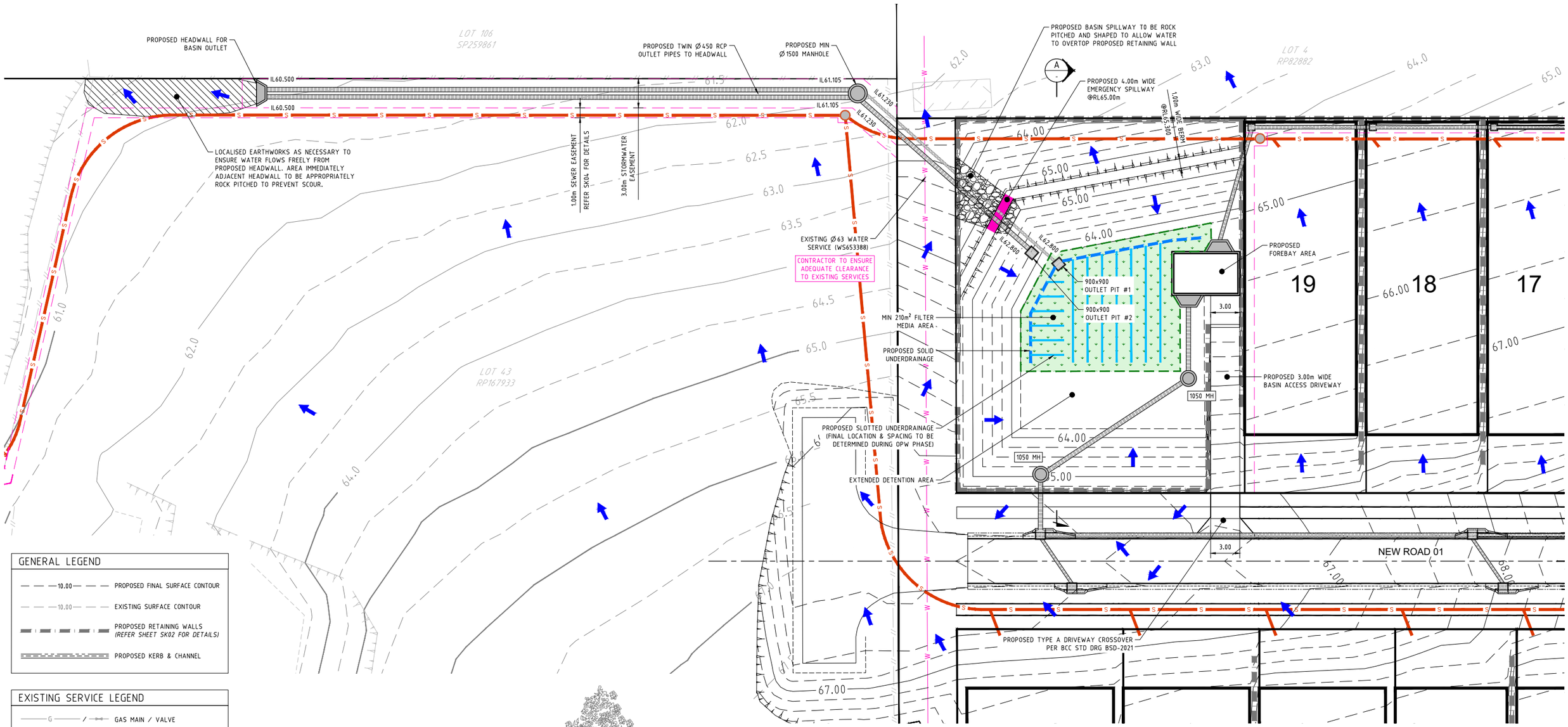
SURVEYOR
FOCUS ON SURVEYING

FILE NAME
SOL-411.DET.01

RP DESCRIPTION
LOTS 1-2 ON RP185509

LAND SIZE
-

DESIGN: KR	DATE:	DESIGN CHECK: AR	DATE:
DRAWN: KR	DATE:	DWG CHECK: AR	DATE:
AUTHORISED FOR ISSUE -	RPEQ No. -	ORIG. SIZE A1	
PROJECT NUMBER / SHEET C26062	SK04	ISSUE C	



GENERAL LEGEND

- 10.00 — PROPOSED FINAL SURFACE CONTOUR
- 10.00 — EXISTING SURFACE CONTOUR
- PROPOSED RETAINING WALLS *(REFER SHEET SK02 FOR DETAILS)*
- PROPOSED KERB & CHANNEL

EXISTING SERVICE LEGEND

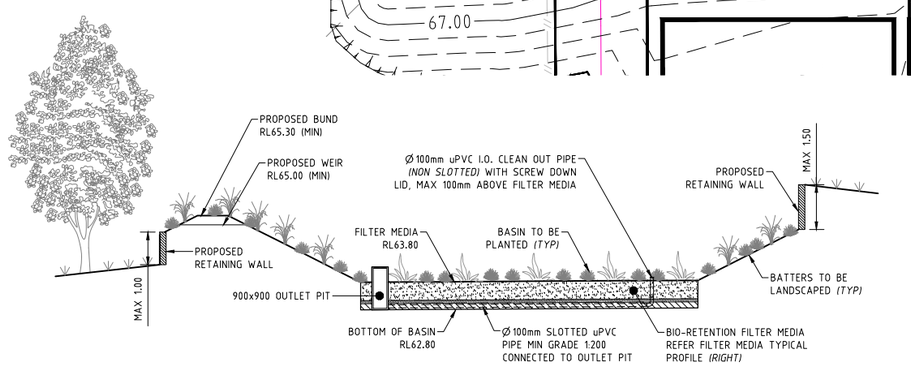
- G — GAS MAIN / VALVE
- SWD — STORMWATER MAIN / PIT
- W — WATER MAIN / VALVE & HYDRANT
- S — SEWER MAIN / MANHOLE
- OH — O/H ELECTRICITY / POWER POLE
- NBN — NBN / JUNCTION & PIT
- E — UNDERGROUND ELECTRICITY

PROPOSED STORMWATER LEGEND

- PROPOSED STORMWATER DRAINAGE
- PROPOSED STORMWATER STRUCTURES
- OVERLAND FLOW DIRECTION

DETENTION BASIN PARAMETERS

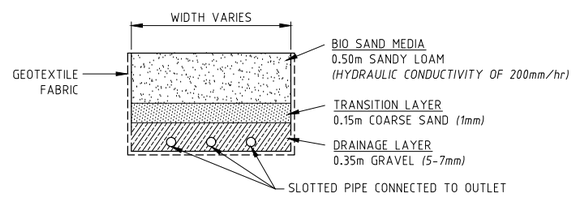
BASE AREA	480m² @RL64.10m
AREA AT SPILLWAY LEVEL	750m² @RL65.00m
AREA AT TOP OF BANK	840m² @RL65.30m
HEIGHT OF DETENTION AREA	0.90m *(TO SPILLWAY)*
VOLUME	800m³ TO TOP OF BANK *(APPROX. 550m³ TO TOP OF OPERATIONAL STORAGE AREA / SPILLWAY LEVEL)*
OUTLET 1	GRATED INLET INTO OUTLET PIT 1 @RL64.10m
OUTLET 2	GRATED INLET INTO OUTLET PIT 2 @RL64.50m
EMERGENCY SPILLWAY	4.00m WIDE SPILLWAY CONSTRUCTED @RL65.00m
PIT 1 PIPED OUTLET	Ø225mm POLYPROPELYENE PIPE
PIT 2 PIPED OUTLET	Ø450mm RCP



BIO-RETENTION BASIN SECTION A

NOT TO SCALE

(NOTE: BASIN DETAILS TO BE CONFIRMED DURING OPW PHASE)



FILTER MEDIA TYPICAL PROFILE

NOT TO SCALE

(NOTE: FILTER MEDIA DETAILS TO BE CONFIRMED DURING OPW PHASE)

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ISSUE	DESCRIPTION	DATE	DRAWN	AUTH.
A	PRELIMINARY ISSUE	06.08.2026	KR	AR
B	APPROVAL ISSUE	07.08.2026	KR	AR

ISSUE STAMP: **ISSUE FOR APPROVAL** — NOT FOR CONSTRUCTION WITHOUT COUNCIL APPROVAL

NORTH

CITY COUNCIL APPROVAL NUMBER: -

SURVEY INFORMATION: PM - RL -

SURVEYOR: FOCUS ON SURVEYING

FILE NAME: SOL-411.DET.01

RP DESCRIPTION: LOTS 1-2 ON RP185509

LAND SIZE: -

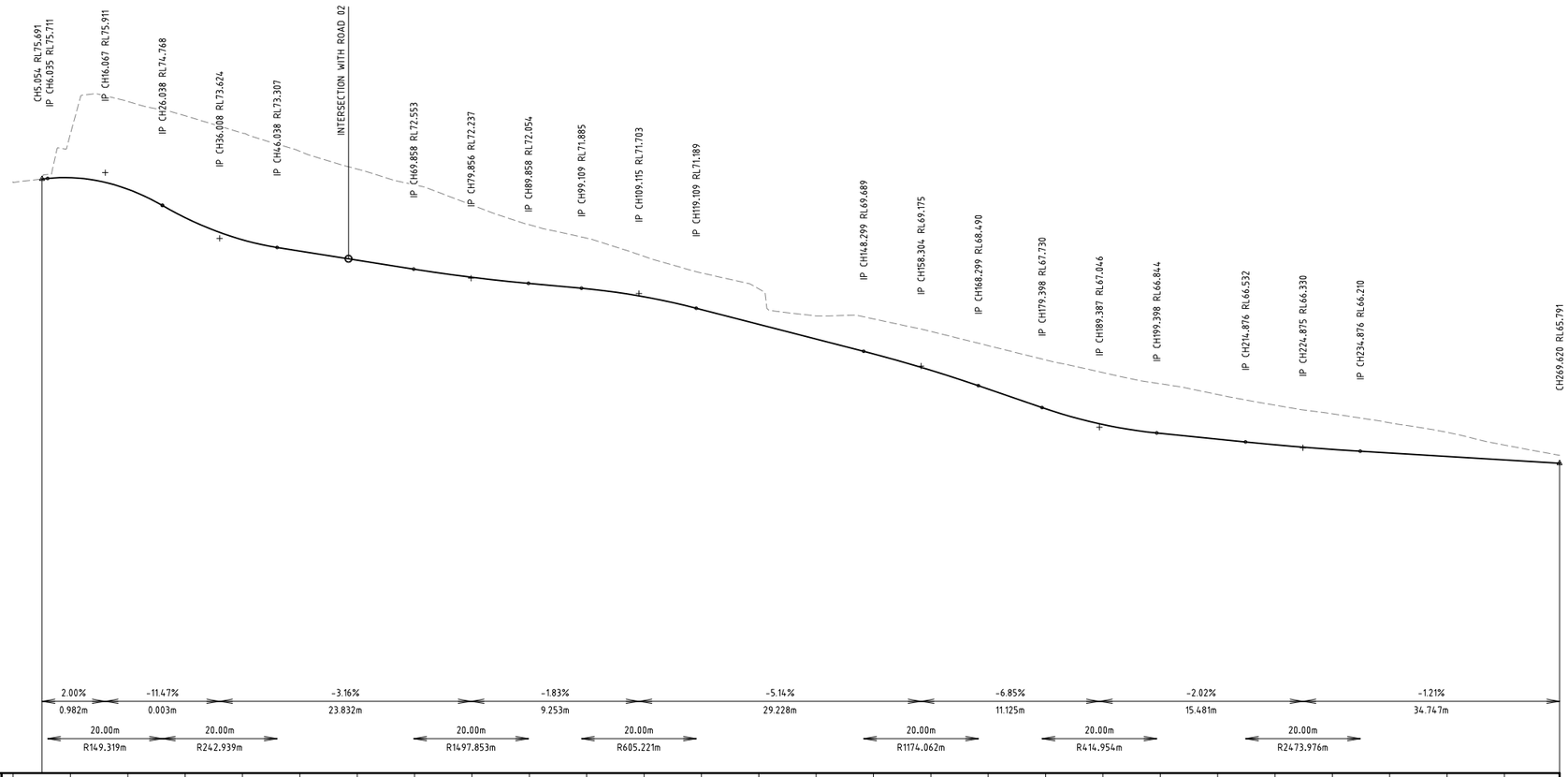
SCALE BAR: 0 4 8 12m — SCALE 1:200 @ A1

CLIENT: BONAVENTURA DEVELOPMENTS PTY LTD

PROJECT TITLE: PROPOSED MULTI-LOT SUBDIVISION AT 171 - 173 UPPER KEDRON ROAD, FERNY GROVE, QLD 4055

DRAWING TITLE: CONCEPT BASIN DETAILS

DESIGN: KR	DATE:	DESIGN CHECK: AR	DATE:
DRAWN: KR	DATE:	DWG CHECK: AR	DATE:
AUTHORISED FOR ISSUE: -		RPEQ No. -	ORIG. SIZE: A1
PROJECT NUMBER / SHEET: C26062	SK05		ISSUE: B



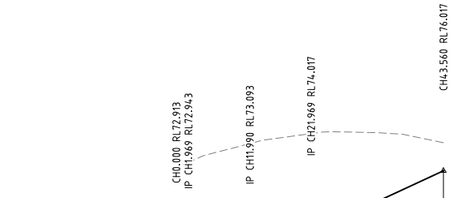
Horizontal Curve Data

Vertical Geometry Grade (%)	2.00%	-11.47%	-3.16%	-1.83%	-5.14%	-6.85%	-2.02%	-1.21%			
Vertical Grade Length (m)	0.982m	0.003m	23.832m	9.253m	29.228m	11.125m	15.481m	34.747m			
Vertical Curve Length (m)		20.00m	20.00m	20.00m	20.00m	20.00m	20.00m	20.00m			
Vertical Curve Radius (m)		R149.319m	R242.939m	R14797.853m	R605.221m	R1174.062m	R414.954m	R2473.976m			

DATUM: RL55.000

NAT. SURFACE ON ROAD CENTRELING (m)	75.570	77.263	78.391	77.892	77.290	76.655	76.035	75.488	74.784	74.098	73.633	72.997	72.418	71.867	70.923	70.819	70.383	69.886	69.390	68.947	68.559	68.186	67.814	67.514	67.202	66.866	66.425	66.065
CUT / FILL DEPTH (m) (+ve = cut) (-ve = fill)	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
DESIGN LEVELS ON ROAD CENTRELINE (m)	75.570	77.263	78.391	77.892	77.290	76.655	76.035	75.488	74.784	74.098	73.633	72.997	72.418	71.867	70.923	70.819	70.383	69.886	69.390	68.947	68.559	68.186	67.814	67.514	67.202	66.866	66.425	66.065
CHAINAGE (m)	-2.000	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	160.000	170.000	180.000	190.000	200.000	210.000	220.000	230.000	240.000	250.000	260.000	269.620

NEW ROAD 01 LONGITUDINAL SECTION



Horizontal Curve Data

Vertical Geometry Grade (%)	1.50%	9.26%
Vertical Grade Length (m)	1.970m	21.683m
Vertical Curve Length (m)	20.00m	
Vertical Curve Radius (m)	R259.018m	

DATUM: RL69.000

NAT. SURFACE ON ROAD CENTRELING (m)	76.116	76.801	77.176	77.272	77.081	76.931
CUT / FILL DEPTH (m) (+ve = cut) (-ve = fill)	0.000	0.000	0.000	0.000	0.000	0.000
DESIGN LEVELS ON ROAD CENTRELINE (m)	76.116	76.801	77.176	77.272	77.081	76.931
CHAINAGE (m)	-2.000	0.000	10.000	20.000	30.000	40.000	43.560

NEW ROAD 02 LONGITUDINAL SECTION

0 2 4 6m
SCALE 1:100 @ A1
VERTICAL SCALE

0 10 20 30m
SCALE 1:500 @ A1
HORIZONTAL SCALE

RCS
"CONSULTANTS YOU CAN TRUST"

ISSUE	DESCRIPTION	DATE	DRAWN	AUTH.
A	APPROVAL ISSUE	07.08.2026	KR	AR

ISSUE STAMP
ISSUE FOR APPROVAL
NOT FOR CONSTRUCTION WITHOUT COUNCIL APPROVAL

NORTH

CITY COUNCIL APPROVAL NUMBER:
-

SCALE BAR

SURVEY INFORMATION
PM - RL -

SURVEYOR
FOCUS ON SURVEYING

FILE NAME
SOL-411.DET.01

RP DESCRIPTION
LOTS 1-2 ON RP185509

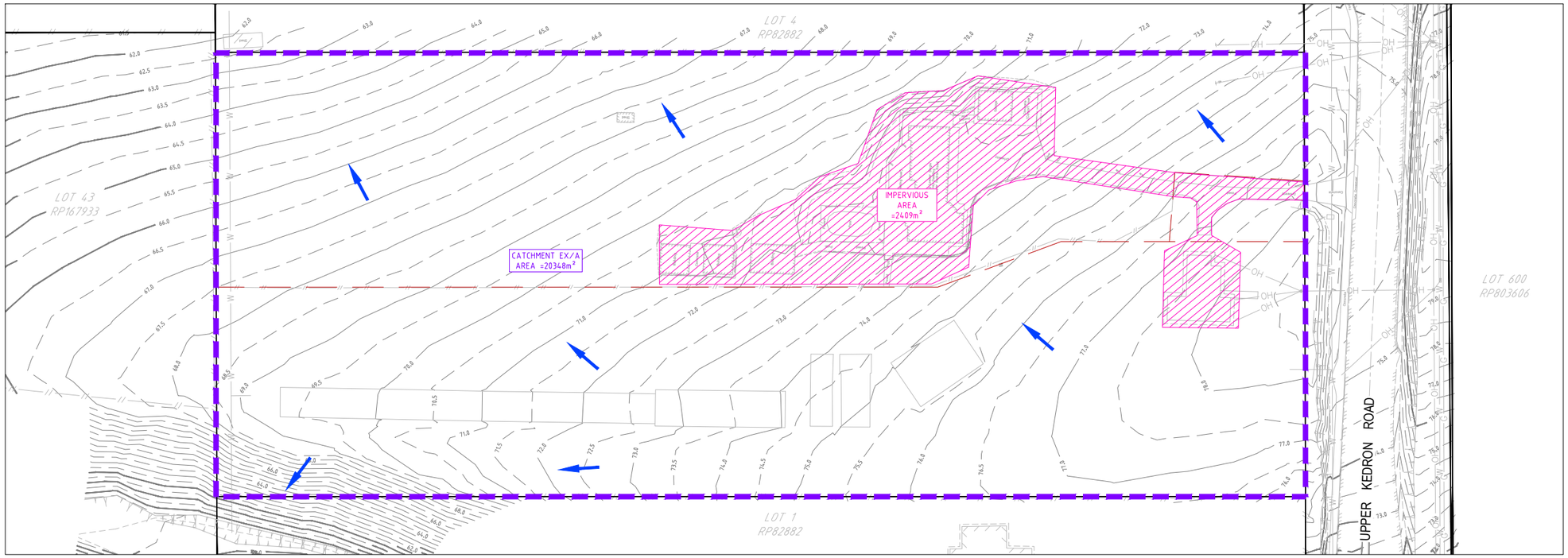
LAND SIZE
-

CLIENT:
BONAVENTURA DEVELOPMENTS PTY LTD

PROJECT TITLE:
PROPOSED MULTI-LOT SUBDIVISION
AT 171 - 173 UPPER KEDRON ROAD,
FERNY GROVE, QLD 4055

DRAWING TITLE:
CONCEPT ROAD 01 & ROAD 02 LONG SECTIONS

DESIGN: KR	DATE:	DESIGN CHECK: AR	DATE:
DRAWN: KR	DATE:	DWG CHECK: AR	DATE:
AUTHORISED FOR ISSUE -	RPEQ No. -	ORIG. SIZE A1	
PROJECT NUMBER / SHEET C26062	SK06	ISSUE A	



PRE-DEVELOPMENT CATCHMENT

SCALE 1:500 (A1)

POST-DEVELOPMENT CATCHMENT

SCALE 1:500 (A1)

CATCHMENT LEGEND

- PROPOSED FINAL SURFACE CONTOUR
- EXISTING SURFACE CONTOUR
- STORMWATER CATCHMENT AREA
- GROUND IMPERVIOUS CATCHMENT AREA
- LANDSCAPING CATCHMENT AREA
- ROOF CATCHMENT AREA
- STORMWATER FLOW ARROWS

RCS

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ISSUE	DESCRIPTION	DATE	DRAWN	AUTH.
A	APPROVAL ISSUE	07.08.2026	KR	AR

ISSUE STAMP

ISSUE FOR APPROVAL

NOT FOR CONSTRUCTION WITHOUT COUNCIL APPROVAL

NORTH

CITY COUNCIL APPROVAL NUMBER:
-

SURVEY INFORMATION
PM - RL -

SURVEYOR
FOCUS ON SURVEYING

FILE NAME
SOL-411.DET.01

RP DESCRIPTION
LOTS 1-2 ON RP185509

LAND SIZE
-

SCALE BAR
0 10 20 30m
SCALE 1:500 @ A1

CLIENT:
BONAVENTURA DEVELOPMENTS PTY LTD

PROJECT TITLE:
PROPOSED MULTI-LOT SUBDIVISION
AT 171 - 173 UPPER KEDRON ROAD,
FERNY GROVE, QLD 4055

DRAWING TITLE:
CONCEPT STORMWATER CATCHMENT PLAN

DESIGN:	DATE:	DESIGN CHECK:	DATE:
KR		AR	
DRAWN:	DATE:	DWG CHECK:	DATE:
KR		AR	

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-
RPEQ No. -

ORIG. SIZE
A1

PROJECT NUMBER / SHEET
C26062 SK07

ISSUE
A

APPENDIX E
BIO-RETENTION MAINTENANCE

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Email: adrian@rcs.net.au
Mob: 0401338071

BIORETENTION BASIN INSPECTION and MAINTENANCE CHECKLIST

SQID:	
Location:	
Date:	
Time:	
Inspector:	
Weather Conditions:	

	Condition Acceptable			
Maintenance Item	**Yes**	**No**	**N/A**	**Comments**
1. Basin Surface				
Clear of sediment build−up				
Check for erosion, scour, vehicle & other damage				
Check for dead or damaged vegetation				
2. Filter Media				
Check for erosion, scour, vehicle & other damage				
Check for isolated soft patches				
3. Subsoil Drainage				
Visually check subsoil drainage through cleanout inspection openings for build−up of sediment				
Check for blockages to subsoil drainage using other methods (eg. CCTV or flush−out)				
Additional Comments				
Actions to be taken				