



van der meer

DETAILED STORMWATER MANAGEMENT PLAN

63 Redbank Creek Road, Adare – STAGE 2 and STAGE 3

Brisbane


Level 1, 51 Alfred Street
Fortitude QLD 4006

Melbourne

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Job No:	BR222162 & BR222174	

REVISION STATUS

Revision	Description of Revision	Date	Issued By:
A	For Approval	24/03/2023	Hannah Qiao

Recipients are responsible for eliminating all superseded documents in their possession.

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1. Introduction

1.1 Background

Van Der Meer consulting has been commissioned by Park Lake Adare Pty Ltd to prepare a Detailed Stormwater Management Plan in response to condition 56 (Application no. RL2022/0017) of Lockyer Valley Regional Council conditions for the lot reconfiguration proposed at *63 Redbank Creek Road, Adare QLD 4343*.

The purpose of this Stormwater Management Plan is to provide advice on the development regarding management with respect to water quantity and quality of the site runoff in accordance with the stormwater management plan prepared by Gilbert and Sutherland titled “Stormwater Management Plan 63 Redbank Creek Road, Adare, Queensland” dated February 2010 including amendments detailed in the letter from Gilbert and Sutherland to Urbis dated 5 October 2012. The required stormwater infrastructure will be subject to the conditions attached to the Development Approval to be provided by Lockyer Valley Regional Council (LVRC).

The following information and documents were utilised in this investigation:

- Lockyer Valley Regional Council Planning Scheme
- Queensland Urban Drainage Manual (QUDM) 2017
- State Planning Policy (2017)
- SEQ Water
- Australian Rainfall and Run-off 2016
- Dial Before You Dig
- Architectural plans defining proposed works and existing infrastructure

1.2 Existing Site

The site is in Adare and currently is a vacant rural lot. It occupies a total site area of 121.9ha. This stormwater management plan addresses stage 2 and stage 3 only which has a combined site area of 33.72ha. The site is bound by rural residential dwellings on the north and east, Adare Road on the west and Redbank Creek Road to the south.

Refer to Figure 1 below of a Nearthmaps aerial view of the site and its surroundings.



Figure 1: Site Location

1.2.1 Existing Topography

Based on the survey undertaken by Bplanned and Surveyed, the site had a high point of approximately 127m AHD at stage 3 site. The area to the southwest corner of the developable area of stage 2 has a low point of 100.5m AHD and to the 112.55m AHD. The site grades at an average grade of approximately 6.5% to towards southwest and at circa 5.3% towards southeast respectively.

Refer to the survey plan information in Appendix A for further details.

1.3 Proposed Works

Stage 2 and 3 of the proposed development consists of a 40-lot subdivision (reconfiguration of lots). This stage consists of new roads to service the lots and lots varying between 4,001m² to 7,567m² in site area.

For additional subdivision details, refer to Appendix B for the proposed reconfiguration plan.

2. Stormwater Management

The following guidelines will be followed as part of this stormwater strategy for both water quantity and quality management:

Water Quality

- Lockyer Valley Regional Council Planning Scheme 2006
- Queensland Urban Drainage Manual (QUDM) 2017
- Australian & Rainfall Runoff 2019 methods

Water Quality

- Lockyer Valley Regional Council Planning Scheme 2006
- State Planning Policy 2017
- MUSIC Modelling Guidelines November 2018 (Water by Design)
- Water by Design Construction & Establishment Guidelines: Swales, Bioretention Systems and Wetlands

The main objective for stormwater quantity and quality is to minimise the impacts on downstream properties and waterways.

2.1 Existing Approval

There was a Stormwater Management Plan (SWMP) prepared by Gilbert & Sutherland dated Feb 2010 which was submitted as part of the development approval for the full development. This has been reviewed and the following is of note:

- A combination of bioretention basins and rainwater tanks were used as part of the water quality treatment solution;
- Treatment had to achieve less strict requirements for pollutant reductions that were applicable at the time;
- Stormwater detention is only required for some catchments. Stage 2 of this development is located in Catchment A in the Master Plan. This catchment has been identified to not require detention
- Lots 89 to 100 of stage 3 are described as Catchment 4 in the Master Plan, a detention basin is proposed to mitigate the post development runoff
- Lots 135 to 142 of stage 3 are within Catchment B in the Master Plan. A 20 kL rainwater tank is proposed on each lot for detention and reuse purpose

As part of this report, both water quality and quantity will be assessed to reflect the latest standards in the following sections.

Refer to Appendix E for the Stormwater Management Plan (SWMP) prepared by Gilbert & Sutherland.

2.2 Existing Stormwater

There is currently no stormwater infrastructure contained within the immediate area of the site.

2.3 Lawful Point of Discharge (LPD)

The nominated lawful point of discharge for stage 2 is the dedicated area within the conservation zone on the west of stage 2 site.

Lots 89 to 100 of stage 3 will discharge to the dedicated conservation zone to the north of stage 3. Site runoff will be captured by a series of swales and then discharge via an outlet within the conservation areas to continue as surface flow.

Runoff from the lots 135 to 142 of stage 3 drains away from site frontage and will remain as sheet flow.

Refer to Appendix C for the full set of civil drawings which include the erosion and sediment control plans and the stormwater strategy arrangement.

3. Stormwater Quantity

According to the Conceptual Stormwater Assessment Proposed Development prepared by Gilbert and Sutherland titled “Stormwater Management Plan 63 Redbank Creek Road, Adare, Queensland” dated February 2010 including amendments detailed in the letter from Gilbert and Sutherland to Urbis dated 5 October 2012. The proposed development will increase the peak flows in Catchment 4 by 44%, thus requires attenuation devices to be installed. A detention basins will be provided in Stage 3 to mitigate stormwater quantity. The following information of the basin has been obtained from the master stormwater management plan for Catchment 4 in stage 3:

Table 6.3.1 Detention basin details

Catchment 4 Conceptual Detention Basin	
Storage Properties	
Basin level (m)	Storage volume (m ³)
0	0
0.2	160
0.4	320
0.6	480
0.8	640
1	800
1.2	960
Outlet 1 details	
Outlet type	Pipe
Number of pipes	1
Pipe diameter (mm)	550
Invert level (m)	0.0
Outlet 2 details	
Outlet type	Pipe
Number of pipes	2
Pipe diameter (mm)	400
Invert level (m)	0.5
Outlet 3 details	
Outlet type	Weir
Weir width (m)	1
Invert level (m)	1.0

Table 3-1 Adopted Detention Tank Parameters (Gilbert and Sutherland, 2010)

The detention basin adopted has been modelled as per below:

Basin Level (m)	Storage Volume (m ³)
0	0
0.2	79.707
0.4	518.019
0.6	666.614
0.8	757.488
1.0	853.638
1.2	955.067
1.5	1117.105

Lot 135- Lot 142 falls within Catchment B of the master stormwater management plan. This catchment grades away from the site frontage. Each lot will be provided with a 20kL rainwater tank comprising 5kL permanent storage and a further 15kL for peak flow attenuation. The entire roof area within each lot (assumed to be 450m²/lot) will drain to the tank.

Stage 2 falls within Catchment A of the master stormwater management plan. This catchment has been identified to not require detention.

4. Construction Phase Stormwater Quality

The State Planning Policy (2017) states that stormwater runoff during the construction phase must be in accordance within the concentration ranges shown in the following table.

Type	Description
Litter	Stockpile deterioration, rubbish, leftover materials
Hydrocarbons	Rubber, plastics, asphalt, concrete
Contaminants	Oils, slurry, other chemicals
Dispersive / pH Altering substances	Acid Sulphate Soils, loose cement

4.1 Potential Impacts

Potential harm to the receiving waterway and environment from pollutants (as provided above) is likely without proper control mechanisms; these pollutants would likely end up in the Logan River. These impacts can be mitigated and prevented by utilising a site-specific Stormwater Management Plan and Erosion and Sediment Control Plan.

4.2 Erosion and Sediment Control Measures

Control mechanisms will be derived using the following breakdown derived from the State Planning Policy (2017), Appendix 2 'Desired outcomes'.

4.3 Pre-construction

Prior to construction, the following sediment and erosion control measures will be implemented to meet the acceptable outcomes of the SPP:

- Set out transport routes to ensure minimal vegetation disturbance and concentrate pollutants (hydrocarbons and contaminants)
- Construct an entry/exit area that comprise of a designed gravel pad or placement of hardwood logs
- Install sediment fences around the proposed bulk earthworks site
- Install dust control fences adjacent to the proposed bulk earthworks site.

4.3.1 Earthworks

- Earthwork areas are to be protected against wind and water erosion
- Silt fences are to be erected around the base of the earthworks and material stockpiles
- Stockpiles and construction material are not permitted to be stored within the road reserves

- Stockpiles are to be kept clear of all overland flow paths.
- Field inlet gullies to be located within the property

4.3.2 Civil works

- Sediment fences to be erected at the base of all batters and stockpiles to prevent sediment transportation off site;
- Maintain vegetation in a healthy state during construction process
- Grass filter strips to be placed along all road verges;
- Re-vegetation of all disturbed areas within two weeks of completion;
- All sediment control structures to be maintained in an effective manner and inspected after each storm event. No structure is to accumulate sediment above 40% of its capacity;
- Dust producing areas to be swept to remove silt/dust and wetting of roads is only permitted where sweeping has failed;
- At least one bin or littler trap is to be provided for waste material.
- Sandbags to be located to prevent contaminates leaving the site

4.3.3 Landscaping

- Silt fences and water quality devices are to remain in place during the maintenance period and regularly inspected following storm events, or any other event that may result in degradation.
- Where required, silt fences are to be cleared of sediment when fence is 25% full
- Regular water quality samples must be taken where required and must satisfy relevant water quality measures.
- Water quality data must be stored on site, included by not limited to: rainfall dates, dates of testing and water release, any rectification work required.

5. Operational Phase Stormwater Quality

5.1 State Planning Policy

The SPP (2017) states that for receiving waters, a development application must achieve water quality objectives in the following scenarios:

1. a material changes of use for an urban purpose that involves premises 2500m² or greater in size and;
 - a. will result in six or more lots; or
 - b. will result in an impervious area greater than 25 per cent of the net developable area; or
2. reconfiguring a lot for an urban purpose that involves premises 2500m² or greater in size and will result in six or more lots; or
3. operational works for an urban purpose that involves disturbing a land area 2500m² or greater in size

As the development falls into category 1a from the above, the SPP water quality objectives will be required to be achieved.

5.2 SEQ Water

The SEQ Water standards requires water quality treatment when the following is triggered:

1. The subject site is within the Water Supply Buffer Area
2. The subject site is within the Water Resource Catchments

As the site lies within this area, the SEQ Water requirements must also be adhered to with regards to the water quality outcomes.

5.3 Water Quality Targets

As part of the site's stormwater solution, a water quality treatment strategy will be required to be implemented to achieve the pollutant reduction requirements outlined in the standards and policies noted above. The pollutant reduction targets have been outlined in Table 5-1 below.

Table 5-1: Water Quality Treatment Targets

Pollutant Types	SPP	SEQ Water
Total Suspended Solids (TSS)	80% reduction	85% reduction
Total Phosphorus (TP)	60% reduction	65% reduction
Total Nitrogen (TN)	45% reduction	45% reduction
Gross Pollutant (>5mm)	90% reduction	95% reduction

The percent reductions listed above are the target reductions for comparing mitigated site annual pollutant loads with unmitigated site annual pollutant loads. The SEQ Water treatment

targets are higher, these were used as the governing requirements for the stormwater quality treatment train.

5.4 Water Quality Strategy

The proposed treatment strategy that can achieve the SEQ Water quality objectives will incorporate the following:

Rainwater tank – A 5kL rainwater tank is assigned to each lot to capture runoff from the roof. Reuse parameters were adopted from MUSIC guideline Table 5.3

Vegetated buffer – A buffer is designed to treat runoff from the balance node and assumed to treat 50% of the upstream impervious area

Swales – Wide swales which captures more runoff in the design storm event. A mixture of turf and native grasses and sedges has been assumed to be used, therefore, 100mm vegetation height has been adopted.

Biobasin – A biobasin is also modelled in the treatment train to improve the treatment outcomes. Parameters from MUSIC guidelines have been implemented.

5.5 MUSIC Modelling Parameters

The rainfall data uses rainfall station 40082 (University of Queensland Gatton), 6-minute time step from 01/01/1980 to 31/12/1989 and all source and treatment nodes parameters have sourced from Water By Design's 'MUSIC Modelling Guidelines' (2018).

To better reflect the development type and scale, catchment properties and pollutant characteristics have been sourced from Water By Design's 'MUSIC Modelling Guidelines' (2018) to be typical of a rural residential development. The catchment parameters are shown below in Table 5-2 and Table 5-3.

Given the size of the lots, it was not appropriate to use urban residential nodes as the site mimics farmland more closely than an urban setting. Therefore, only rural residential parameters have been used.

Table 5-2: Source Node MUSIC Pollutant Export Parameters (Rural Residential)

Flow Type	Surface Type	TSS log10 VALUES		TP log10 VALUES		TN log10 VALUES	
		Mean	Std. Dev.	Mean	Std. Dev.	Mean	Std. Dev.
Baseflow Parameters	Rural Residential	0.53	0.24	-1.54	0.38	-0.52	0.39
Stormflow Parameters	Rural Residential	2.26	0.51	-0.56	0.28	0.32	0.30

Table 5-3: MUSIC Rainfall – Runoff Parameters

Parameter	Rural Residential
Rainfall Threshold(mm)	1
Soil Storage Capacity (mm)	98
Initial Storage (% Capacity)	10
Field Capacity (mm)	80
Infiltration Capacity Coefficient - a	84
Infiltration Capacity Exponent - b	3.3
Initial Depth	50
Daily Recharge Rate (%)	100
Daily Baseflow Rate (%)	22
Daily Deep Seepage Rate (%)	0

The proposed development areas have been split into the following catchments based on existing grades on site and the proposed road design grades for Stages 2 and Stage 3 also in accordance with the previous Gilbert & Sutherland report. Based on this report, each lot has assumed a developable area of 1,500m², the remaining area is identified as “undeveloped” and excluded from the treatment train.

The catchment area listed below has considered catchments A, B and 4 in both Stage 2 and Stage 3 area which discharges to different points of discharge.

Stage 2 – Discharge to basin

- Roof: Assumed 450m²/lot (100% imp)
- Balanced lot: 1,050m²/lot (10% imp)
- Road 1A: 3,910m² (40% imp)
- Road 1B: 3,790m² (40% imp)
- Road 1C: 2,520m² (40% imp)
- Road 1D: 3,050m² (40% imp)
- Road 1E: 2,580m² (40% imp)
- Road 1G: 780m² (40% imp)
- Road 2F: 1,860m² (40%imp)

Stage 3 – Discharge to basin

- Roof: Assumed 450m²/lot (100% imp)
- Balanced lot: 1,050m²/lot (10% imp)
- Road 2I: 2,820m² (40% imp)
- Road 2J: 2,570m² (40% imp)
- Road 2K: 2,360m² (40% imp)

- Road 2L: 2,100m² (40% imp)

Stage 3 – Bypass basin

- Roof: Assumed 450m²/lot (100% imp)
- Balanced lot: 1,050m²/lot (10% imp)

The catchment proposed above should be look at in conjunction with the Stormwater Catchment Sketches and MUSIC modelling snapshot present in Figure 5-1.

5.6 Stormwater Quality Treatment Train

The water quality treatment targets have changed since the report undertaken by Gilbert & Sutherland, *Conceptual Stormwater Assessment Proposed Development Redbank Creek Rd, Adare Queensland (Ref: VJ0112_SWA-RKT1D)* dated February 2010.

As the requirements have changed, revised MUSIC modelling has been undertaken with an altered treatment strategy to demonstrate that the water quality targets have been achieved for Stage 2 and 3.

The proposed stormwater quality treatment train consists of roadside swales that will convey flows generated from the road reserve catchment to the lawful points of discharge (LPOD). Refer to the Stormwater Catchment Sketches (vdM – BR222161- SK001) included in Appendix F.

After review of the suitability of a bioretention basin in a rural residential subdivision setting, it was determined that there was little to no benefit for introducing a bioretention basin on each individual lot for Lot 135-142. It is proposed to increase the size of both biobasins in stage 2 and 3 to overcompensate the area bypasses. The proposed stormwater treatment devices remove over and above the required pollutant by State Planning Policy (SPP) and SEQ Water guidelines (refer Figure 5-1 for more details).

The proposed swale parameters for the corresponding catchments adopted in the MUSIC model have been summarised in Table 5-4 below.

Table 5-4: Roadside Swale Parameters

Swale ID	Bed Slope (%)	Base Width (m)	Top Width (m)	Depth (m)	Vegetation Height (m)	Capacity (m ³ /s)	Exfiltration Rate (mm/hr)
A	3.9	0	4.4	0.55	0.1	3.017	0
B	5.6	0	5.6	0.7	0.1	3.868	0
C	8.0	0	4.5	0.55	0.1	5.039	0
D	2.2	0	5.6	0.7	0.1	3.755	0
E	9.1	0	4.5	0.55	0.1	6.192	0
F	2.4	0	4.5	0.55	0.1	1.887	0
G	0.6	0	4.5	0.55	0.1	0.458	0
I	1.8	0	4.5	0.55	0.1	1.532	0
J	2.1	0	4.5	0.55	0.1	1.714	0
K	7.3	0	4.5	0.55	0.1	4.739	0

L	2.1	0	4.5	0.55	0.1	1.714	0
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The parameters noted in Table 5-5, 5-6 and 5-7 below have been utilised for the biobasin node and will be the basis of the biobasin designs implemented for this design.

Table 5-5 – Biobasin node parameter inputs for MUSIC modelling – Stage 2

Biobasin Parameter	Value
Low Flow By-pass (m³/s)	0
High Flow By-pass (m³/s)	100
Extended Detention Depth (m)	0
Surface Area (m²)	65
Filter Area (m²)	65
Unlined Filter Media Perimeter (m)	0.01
Saturated hydraulic conductivity (mm/hr)	200
Filter Depth (m)	0.4
TN Content of Filter Media (mg/kg)	400
Orthophosphate Content of Filter Media (mg/kg)	30
Exfiltration Rate (mm/hr)	0
Base lined	No

Table 5-6 – Biobasin node parameter inputs for MUSIC modelling – Stage 3

Biobasin Parameter	Value
Low Flow By-pass (m³/s)	0
High Flow By-pass (m³/s)	100
Extended Detention Depth (m)	0
Surface Area (m²)	50
Filter Area (m²)	50
Unlined Filter Media Perimeter (m)	0.01
Saturated hydraulic conductivity (mm/hr)	200
Filter Depth (m)	0.4
TN Content of Filter Media (mg/kg)	400
Orthophosphate Content of Filter Media (mg/kg)	30
Exfiltration Rate (mm/hr)	0
Base lined	No

5.6.1 Results

The configuration of the model and results are shown in Figure 5-1 and 5-2 below. This demonstrates that the water quality objectives can be achieved by incorporating the proposed treatment strategy into the development.

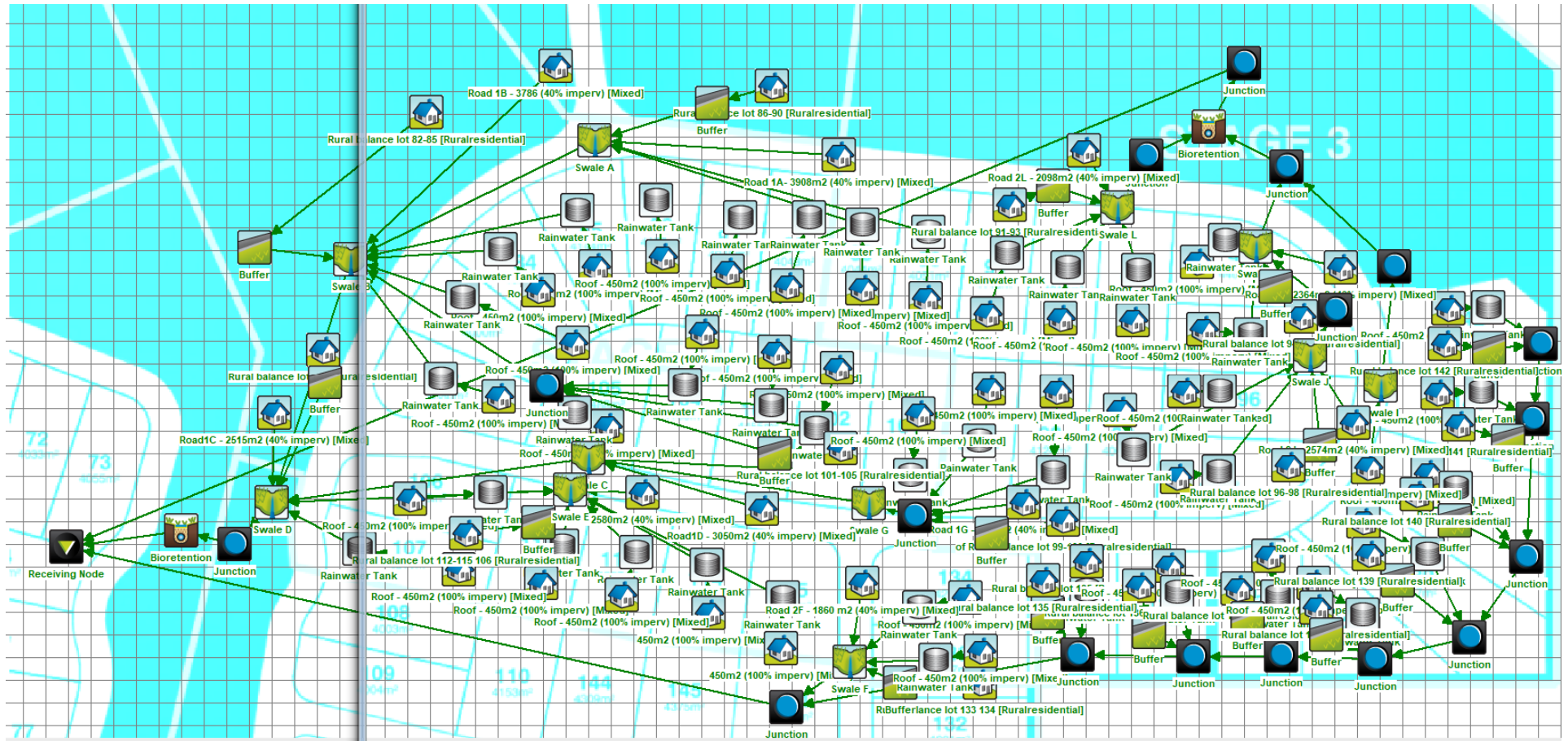


Figure 5-1 – MUSIC model treatment train

Treatment Train Effectiveness - Receiving Node

	Sources	Residual Load	% Reduction
Flow (ML/yr)	23.6	20.3	14.2
Total Suspended Solids (kg/yr)	5660	715	87.4
Total Phosphorus (kg/yr)	8.93	2.14	76.1
Total Nitrogen (kg/yr)	52.4	27.3	47.8
Gross Pollutants (kg/yr)	655	30	95.4

Print icons

Figure 5-2 – MUSIC model result

It was found through further detailed modelling that roadside swales and biobasin are sufficient in achieving the required SEQ Water quality targets.

5.6.2 Protection of SQID during Construction and Building Phase

In accordance with the Water by Design Construction & Establishment Bioretention guidelines (2010), measures should be in place for both the construction and building phases.

Construction Phase

During the construction phase of the development, the following can be implemented:

- Erosion and sediment control in accordance with IECA and local government standards; and
- Placing protective measures around and through the bioretention system (e.g. sediment fences around the bioretention basin, sacrificial turf over the bioretention area etc.)

Refer to Appendix C for the full set of drawings including the erosion and sediment control plans.

Building Phase

After the construction phase is completed, the building phase will commence (houses and/or buildings being erected). The following measures can be implemented to protect the SQID during the building phase:

- Sediment fencing around each bioretention basin;
- Sandbags upstream of gully pits to avoid sediment washing into the stormwater network; and
- General best practice erosion and sediment control measures by contractors onsite.

Once turf or hydromulching has been established on at least 80% of the site, these measures can be removed as this will be sufficient to prevent further erosion.

6. Operations Management and Maintenance Plan

Successful development of vegetation plays a crucial role in the on-going maintenance and viability of the filter media; therefore, the most important phase that determines long-term maintenance is successful establishment of vegetation/plants.

6.1 Maintenance Plan

Moderating asset condition and on-going maintenance to be undertaken using best practise; outlined in *Construction and Establishment Guidelines: Bioretention Systems by Water by Design*.

6.1.1 Watering Frequency

During the establishment period of the bioretention vegetation, frequent watering according to the following schedule should be undertaken:

Table 6-1 Watering Schedule Note: If rainfall occurs, reduce total litres accordingly.

Period of Time	Number of waterings (Per week)	Total Water (L) (Per week)
Week 1-6	5	3
Week 6-10	3	1.5
Week 11-15	2	1

After the establishment period ends, regular watering may still be required depending on the assessed condition from the landscaper and the *Maintenance Checklist* found in Appendix D.

6.1.2 Inspection Frequency and Defect Monitoring

Regular inspections to occur every fortnight during the establishment period outlined in *Table 6-1*. The *Maintenance Checklist* outlined in *Section 6.2* shall be used in accordance with the following table identifying types of defects:

Table 6-2 Identification of failures

Defects or failure type	Identification of defect
Blockages, reduced filtration and structural failure	<ul style="list-style-type: none"> • Ponding of water on filter media surface or poor filtration
Scour and short-circuiting of flows	<ul style="list-style-type: none"> • Scouring around outlet pit/pipe • Erosion of the bioretention batter • Scouring around the edge of filter cloth • Scouring around bioretention walls • Scouring around bioretention if adjacent to a nearby catchment • Failure of bioretention bunds
Failure of plants	<ul style="list-style-type: none"> • Excessive weed cover • Excessive watering • Lack of mulch or fertiliser during establishment • Poor plant cover, less than 5-6 plants per sqm

After the establishment period, bioretention systems should be inspected every 4 months in a tropical climate (Brisbane). Any failures identified should be rectified in accordance with *Table 3.12* of '*Construction and Establishment Guidelines: Bioretention Systems by Water by Design*'.

Refer to Appendix D for the maintenance checklist provided which should be completed as part of the maintenance inspections.

7. Conclusion

This Detailed Stormwater Management Report has assessed the treatment, construction, and maintenance for the proposed stormwater treatment devices for the proposed development at 63 Redbank Creek Road, Adare.

The nominated lawful point of discharge for stage 2 and stage 3 are the dedicated areas within the conservation areas; site runoff will be captured by a series of swales and then discharge via an outlet within the conservation area to continue as surface runoff.

It was found through further detailed modelling that roadside swales and biobasins are sufficient in achieving the required SEQ Water quality targets. The individual biobasins on Lot 135-142 that was incorporated into the stormwater quality treatment train originally approved in Gilbert & Sutherland (Ref: Conceptual Stormwater Assessment Proposed Development Redbank Creek Road, Adare Dated Feb 2010) is not required to meet the required SEQ Water quality targets.

The following stormwater quality management strategy will be implemented as part of this development:

- Roadside swales
- 5kL rainwater tank on each lot
- 20kL rainwater tank on lot 135-142 (5kL permanent storage volume)
- Biobasin which consists of min. 65m² of filter area for stage 2
- Biobasin which consists of min. 50m² of filter area for stage 3

The following stormwater quantity management strategy will be implemented as part of this development:

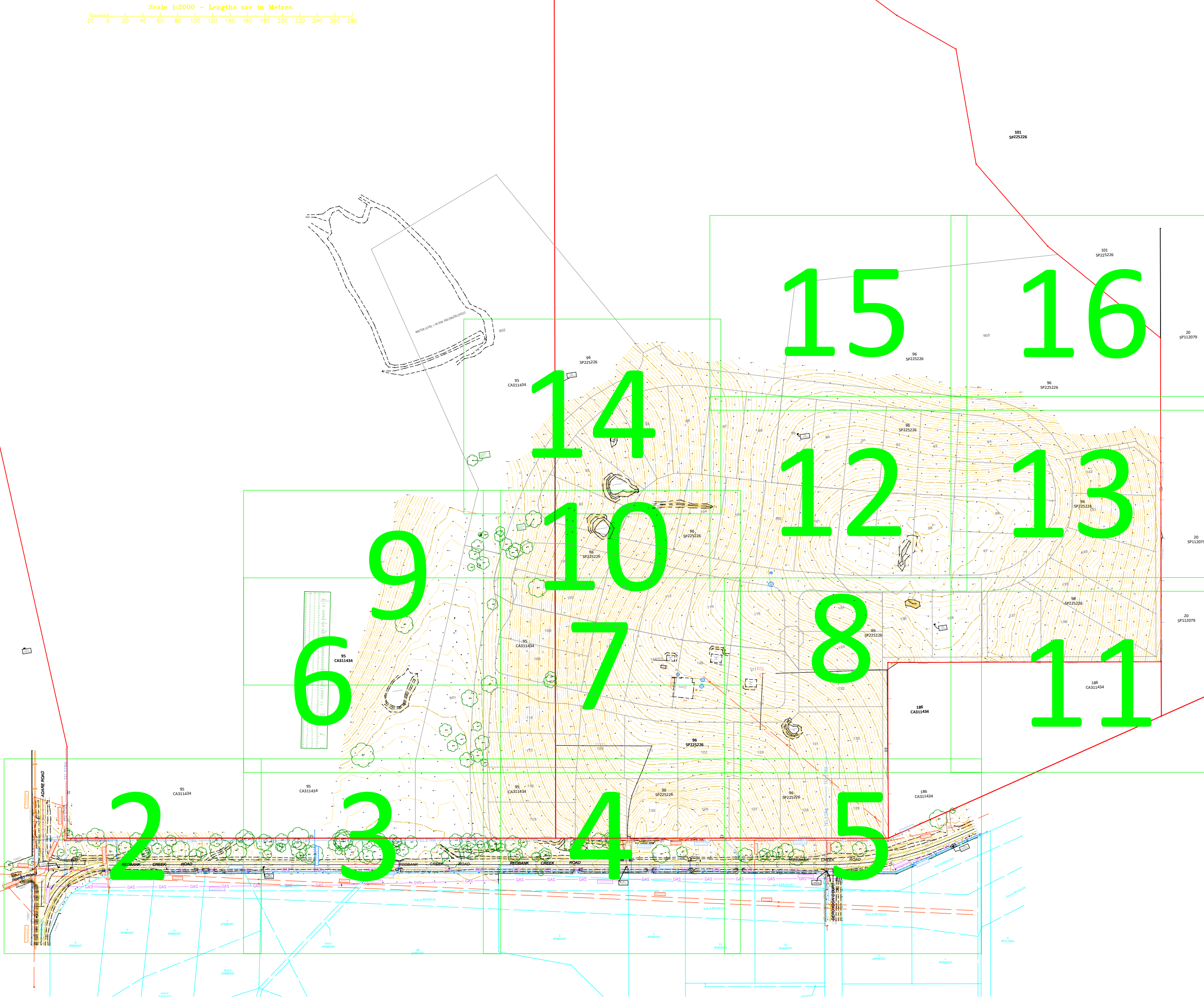
- A detention basin with min. 1,117m³ storage volume for stage 3 within the conservation area
- 20kL rainwater tank on lot 135-142 (15kL for peak flow attenuation)

Appendix A – Detailed Site Survey

Scale 1:2000 - Lengths are in Metres.



LEGEND	
	Water
	Sewer
	Fence
	Stormwater
	Vegetation
	Electrical (LV)
	Electrical (HV)



NOTE:
 This plan has been prepared for Park Lake Adare Pty Ltd affl Park Lake Adare Unit Trust, from a combination of field survey and existing records for the purpose of designing new constructions on the land and should not be used for any other purpose.
 The spot heights shown represent the existing features in general only.
 The title boundaries shown hereon were not marked at the time of the survey and have been determined by plan and field measurement.
 Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of underground services and detailed locations of all services.

This note is an integral part of this plan/ite

North Queensland Surveying
 P: 1300 275 266
 info@nqs.com.au
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DETAIL SURVEY
 Part of Lots 95 on CA311434 and Lot 96 on SP225226
 174 Adare Road, Adare
 Client - Park Lake Adare Pty Ltd affl Park Lake Adare Unit Trust.

L.A.	Lockyer Valley R. C.
LOCALITY	Adare
CONTOUR INT	0.2m
MERIDIAN	MGA 94 (Vide GPS)
LEVEL ORIGIN	OPM 100405
DATUM	RL 97.780m AHD
SURVEYOR	JIB
CHECKED BY	JAH
SCALE	1:2000 @ A1
DATE	20/07/2022
SHEET	1 of 16

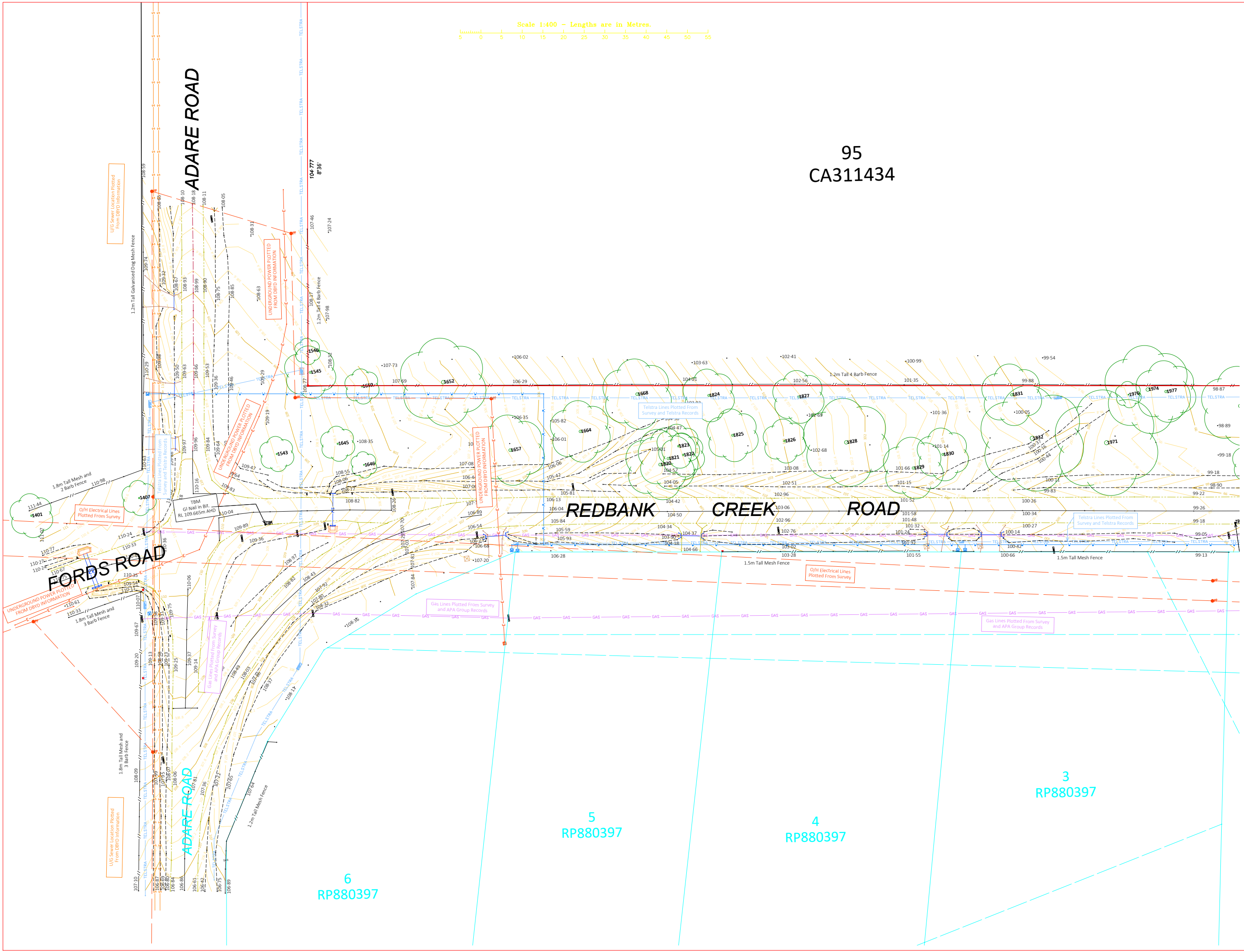
DRAWING No. 001762_detail
 REV B

Scale 1:400 - Lengths are in Metres.



LEGEND	
	Water
	Sewer
	Fence
	Stormwater
	Vegetation
	Electrical (U/G)
	Electrical (A/G)

95
CA311434



NOTE:
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DETAIL SURVEY
Part of Lots 95 on CA311434 and Lot 96 on SP225226
174 Adare Road, Adare
Client - Park Lake Adare Pty Ltd afft Park Lake Adare Unit Trust.

L.A. Lockyer Valley R. C.
LOCALITY Adare
CONTOUR INT 0.2m
MERIDIAN MGA 94 (Wide GPS)
LEVEL ORIGIN OPM 100405
DATUM RL 97.780m AHD
SURVEYOR JIB
CHECKED BY JAH
SCALE 1:400 @ A1
DATE 20/07/2022
SHEET 2 of 16

DRAWING No. 001762_detail
REV B

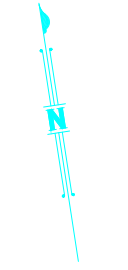
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RP880397

5
RP880397

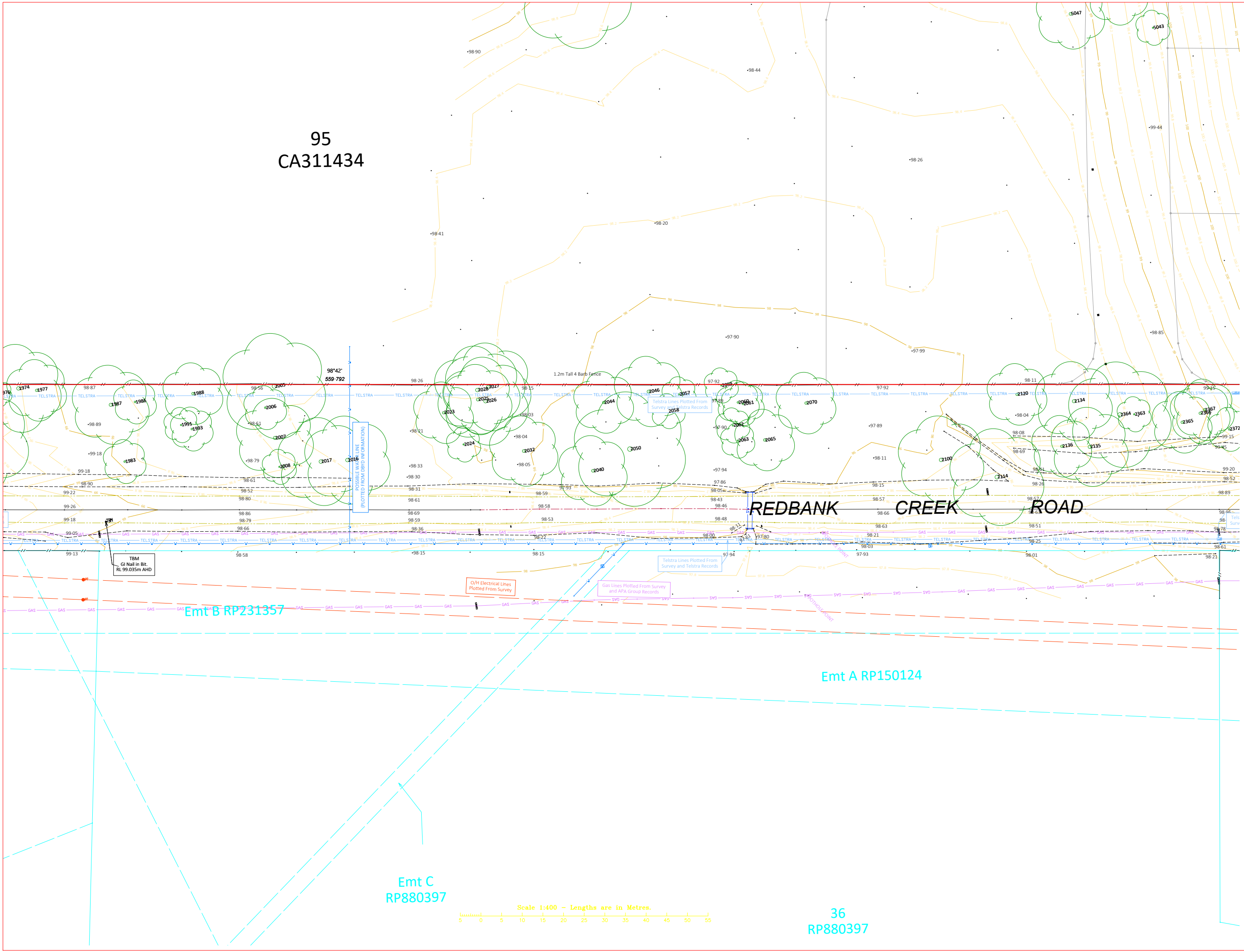
4
RP880397

3
RP880397

95
CA311434



LEGEND	
	Water
	Sewer
	Fence
	Stormwater
	Vegetation
	Electrical (LUG)
	Electrical (AVG)



POSSIBLE WALL LINE
(PLOTTED FROM DBVD INFORMATION)

TBM
GI Nail in Bit.
RL 99.035m AHD

O/H Electrical Lines
Plotted From Survey

Gas Lines Plotted From Survey
and APA Group Records

Telstra Lines Plotted From
Survey and Telstra Records

Emt B RP231357

Emt A RP150124

Emt C
RP880397

36
RP880397

Scale 1:400 - Lengths are in Metres.



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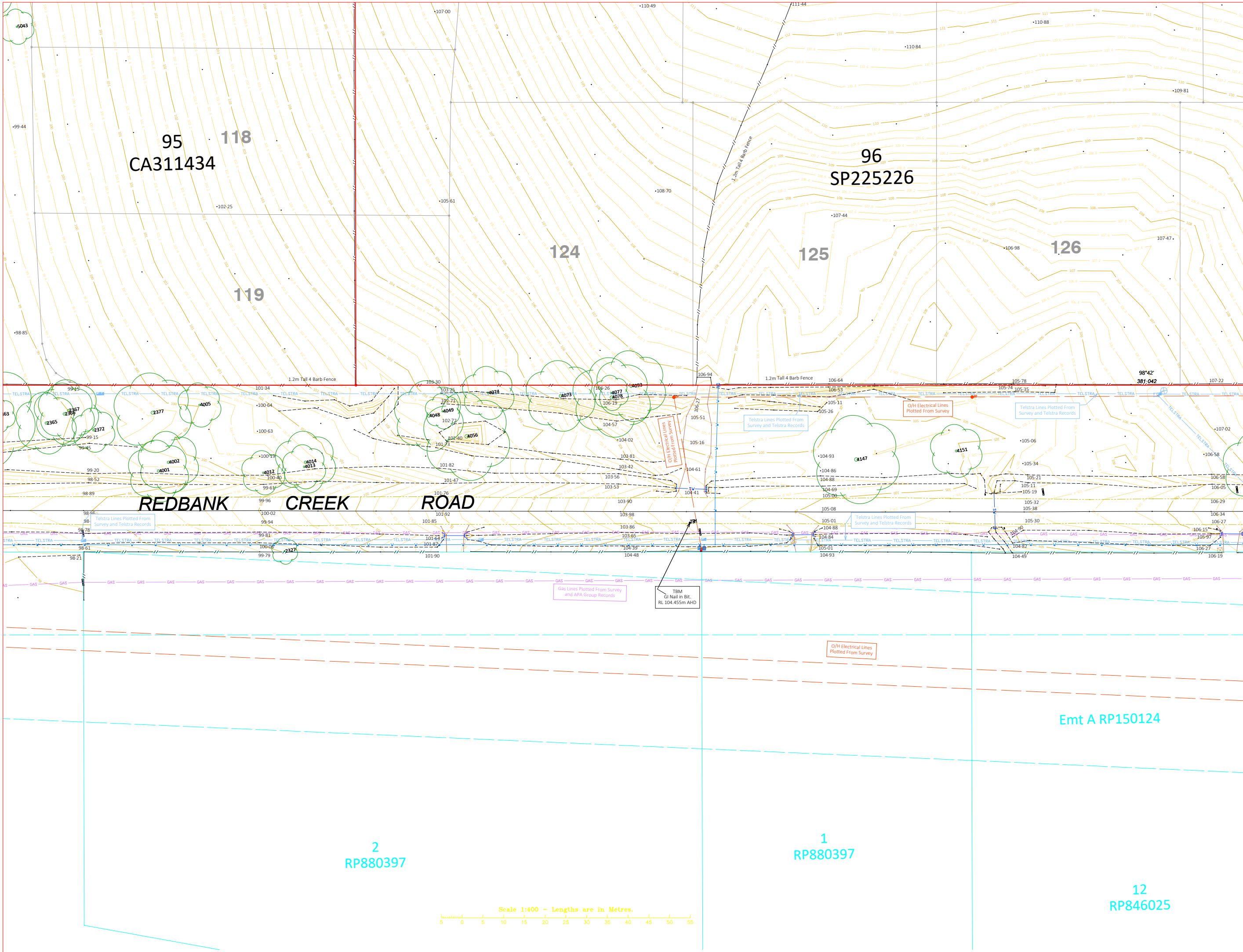
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L.A. Lockyer Valley R. C.
LOCALITY Adare
CONTOUR INT 0.2m
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LEVEL ORIGIN OPM 100405
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SURVEYOR JIB
CHECKED BY JAH
SCALE 1:400 @ A1
DATE 20/07/2022
SHEET 3 of 16

DRAWING No. 001762_detail
REV B



LEGEND

- Water
- Sewer
- Stormwater
- Vegetation
- Electrical (LUG)
- Electrical (AVG)

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P. 1300 275 266
 info@jpbplanned.com.au
 www.jpbplanned.com.au
JPB PLANNING & SURVEYING

DETAIL SURVEY
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 174 Adare Road, Adare
 Client - Park Lake Adare Pty Ltd a/c Park Lake Adare Unit Trust.

L.A.	Lockyer Valley R. C.
LOCALITY	Adare
CONTOUR INT	0.2m
MERIDIAN	MGA 94 (Wide GPS)
LEVEL ORIGIN	OPM 100405
DATUM	RL 97.780m AHD
SURVEYOR	JIB
CHECKED BY	JAH
SCALE	1:400 @ A1
DATE	20/07/2022
SHEET	4 of 16

DRAWING No. **001762_detail**
 REV B



2
 RP880397

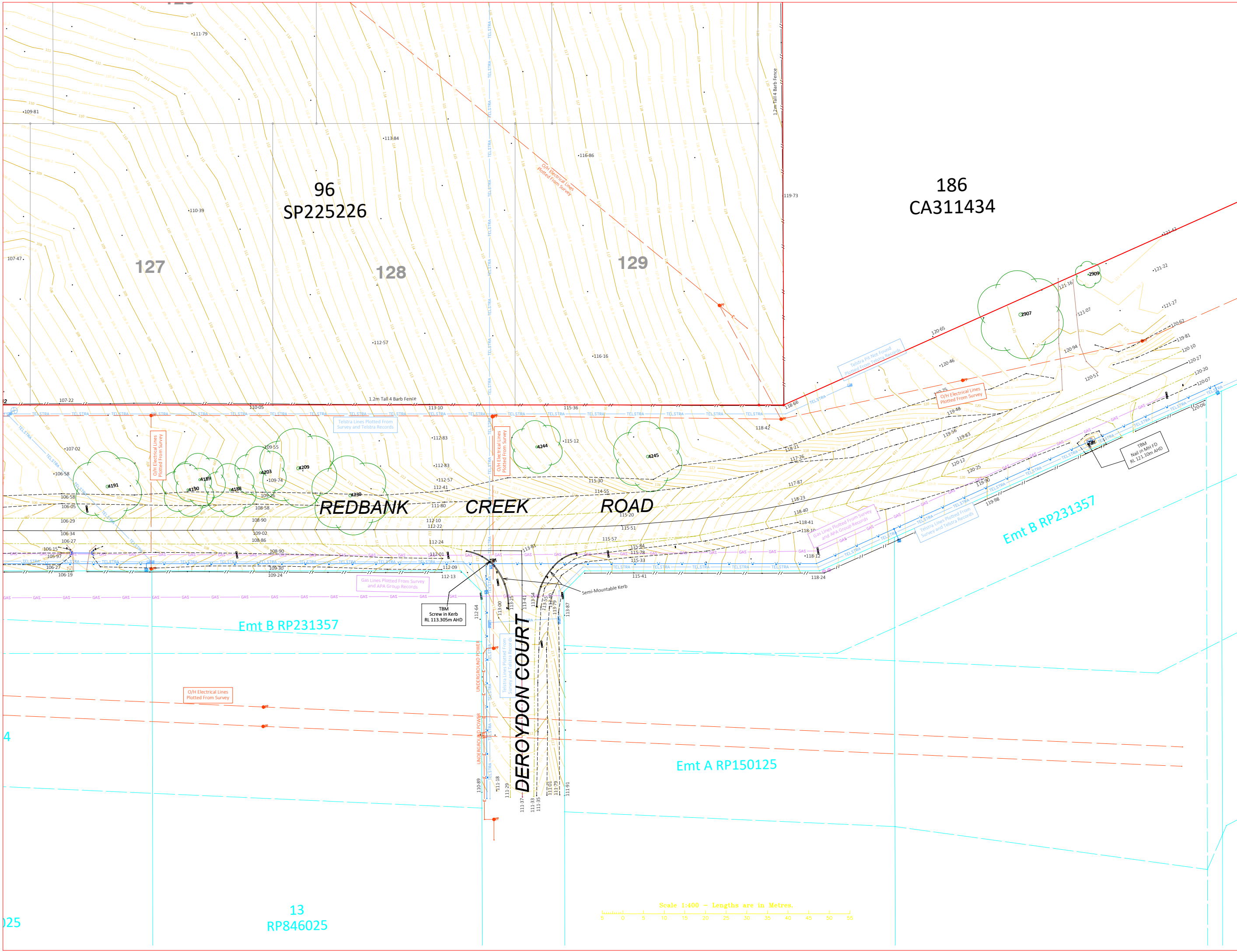
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 RP880397

Emt A RP150124

12
 RP846025



LEGEND	
	Water
	Sewer
	Stormwater
	Vegetation
	Electrical (LV)
	Electrical (HV)

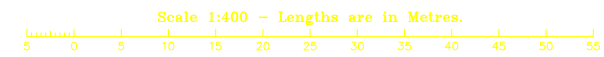


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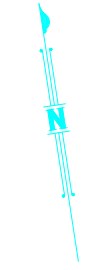
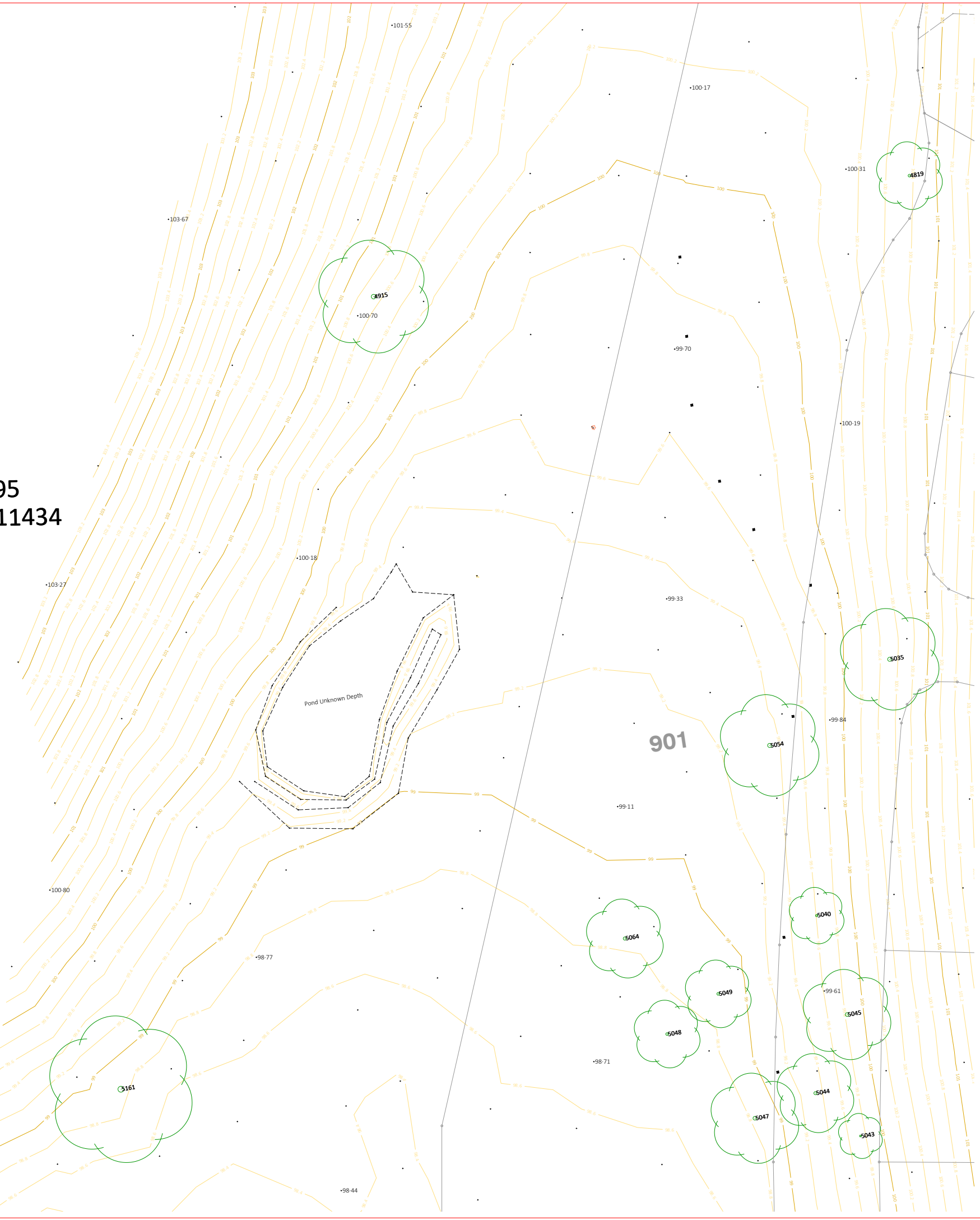
P: 1300 275 266
 info@jbplanned.com.au
 www.jbplanned.com.au
 JB PLANERS SURVEYING
 jbsurveying@surveymat.com

DETAIL SURVEY	
Part of Lots 95 on CA311434 and Lot 96 on SP225226	
174 Adare Road, Adare	
Client - Park Lake Adare Pty Ltd affl Park Lake Adare Unit Trust.	
L.A.	Lockyer Valley R. C.
LOCALITY	Adare
CONTOUR INT	0.2m
MERIDIAN	MGA 94 (Wide GPS)
LEVEL ORIGIN	OPM 100405
DATUM	RL 97.780m AHD
SURVEYOR	JIB
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SCALE	1:400 @ A1
DATE	20/07/2022
SHEET	5 of 16
DRAWING No. 001762_detail	
REV B	



Point Number	Spread Dia (m)	Height (m)	Trunk Dia (m)	Type
1401	10	6	0.5	
1407	8	6	0.4	
1543	8	8	0.25	
1545	12	10	0.3	GUM
1546	6	10	0.2	TWIN GUM
1645	6	8	0.2	QUADRUPLET GUM
1646	6	8	0.4	
1650	8	10	0.25	GUM
1652	20	12	1.2	
1657	16	16	0.6	GUM
1664	14	14	0.45	GUM
1668	16	16	0.45	
1820	16	15	0.7	
1821	14	15	0.4	GUM
1822	10	12	0.3	GUM
1823	10	12	0.3	GUM
1824	12	15	0.3	GUM
1825	12	15	0.3	GUM
1826	10	15	0.35	GUM
1827	12	15	0.3	GUM
1828	20	20	0.9	GUM
1829	14	18	0.3	TWIN GUM
1830	12	15	0.3	
1831	14	15	0.3	GUM
1832	24	20	0.35	TRIPLET GUM
1971	24	20	0.8	GUM
1974	20	20	0.8	GUM
1976	6	12	0.3	GUM
1977	14	12	0.3	GUM
1983	10	15	0.4	GUM
1986	10	15	0.3	GUM
1987	18	15	0.25	TRIPLET GUM
1988	14	10	0.3	TWIN GUM
1991	8	12	0.3	GUM
1993	10	12	0.45	
2005	24	20	0.8	GUM
2006	10	12	0.3	GUM
2007	18	15	0.4	GUM
2008	8	10	0.3	GUM
2016	20	15	0.3	
2017	20	15	1.0	
2023	14	15	0.3	GUM
2024	8	15	0.4	GUM
2025	16	15	0.4	
2026	20	20	0.7	
2027	20	12	0.6	GUM
2028	20	15	0.6	GUM
2032	16	15	0.7	GUM
2040	16	15	0.6	GUM
2044	14	12	0.4	GUM
2046	16	15	0.5	GUM
2050	26	20	1.1	GUM
2057	8	12	0.3	GUM
2058	8	12	0.35	GUM
2059	8	12	0.35	GUM
2060	10	15	0.5	GUM
2061	10	15	0.4	GUM
2062	8	15	0.4	GUM
2063	8	12	0.35	GUM
2065	14	15	0.5	GUM
2070	14	15	0.5	GUM
2100	20	15	0.5	GUM
2114	22	20	0.8	GUM
2120	14	12	0.4	GUM
2134	18	15	0.3	TWIN GUM
2135	18	15	0.3	GUM
2136	14	15	0.35	GUM
2327	6	8	0.3	GUM
2363	8	8	0.3	GUM
2364	24	20	1.0	GUM
2365	14	20	0.3	GUM
2366	14	20	0.3	GUM
2367	14	20	0.4	GUM
2372	10	15	0.3	GUM
2377	18	20	0.4	GUM
2907	20	18	0.5	GUM
2909	6	15	0.35	GUM
4001	14	15	0.3	TWIN
4002	14	15	0.3	TWIN GUM
4005	10	15	0.3	
4012	10	12	0.7	DEAD
4013	10	12	0.45	
4014	14	12	0.65	GUM
4048	16	15	0.7	GUM
4049	8	15	0.35	GUM
4056	20	15	0.6	GUM
4073	16	15	0.5	GUM
4074	12	12	0.9	DEAD
4077	8	10	0.3	GUM
4078	18	15	0.7	GUM
4093	16	15	0.6	GUM
4147	20	18	0.85	
4151	12	16	0.3	TWIN
4188	12	16	0.43	
4189	12	14	0.66	DEAD
4190	12	16	0.35	
4191	16	14	0.45	
4203	12	18	0.35	
4209	18	18	0.5	
4230	18	18	0.55	
4244	12	18	0.35	
4245	12	18	0.4	
4770	12	16	0.7	PROTECTED
4771	14	20	0.75	PROTECTED
4779	20	18	0.95	PROTECTED
4786	14	16	0.36	
4805	16	14	0.33	
4806	14	14	0.34	
4813	14	12	0.26	
4814	12	18	0.4	
4815	10	14	0.35	
4819	12	18	0.8	PROTECTED
4834	14	12	0.4	
4835	4	8	0.26	
4836	8	8	0.26	
4837	12	12	0.35	
4838	14	14	0.3	
4841	2	10	0.21	
4842	4	10	0.25	
4843	8	8	0.23	DEAD
4915	20	18	0.75	PROTECTED
5035	16	16	0.75	
5040	10	14	0.58	
5043	8	14	0.37	
5044	14	16	0.5	
5045	16	18	0.4	
5047	16	14	0.36	
5048	12	18	0.8	
5049	12	16	0.75	
5054	18	14	0.5	
5064	14	14	0.4	
5161	26	24	1.4	PROTECTED

95
CA311434



LEGEND

- Water (Blue line)
- Sewer (Black line with 'S')
- Fence (Black line with 'F')
- Stormwater (Blue line with 'SW')
- Vegetation (Green circle)
- Electrical (LUG) (Red line)
- Electrical (AVG) (Black line)



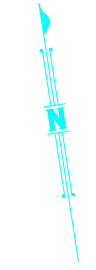
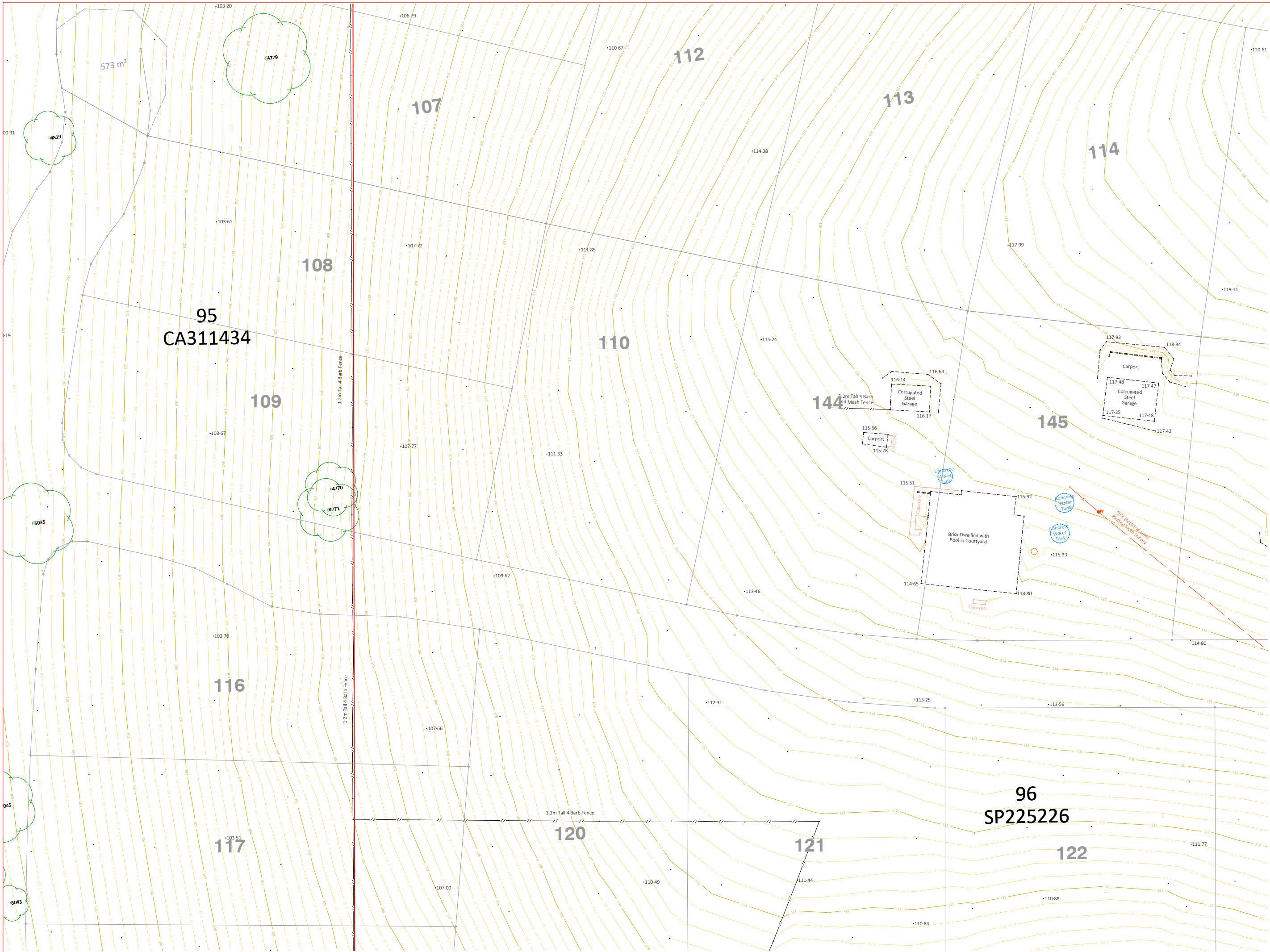
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www.jbplanned.com.au

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Client - Park Lake Adare Pty Ltd affil Park Lake Adare Unit Trust.

L.A. Lockyer Valley R. C.
LOCALITY Adare
CONTOUR INT 0.2m
MERIDIAN MGA 94 (Wide GPS)
LEVEL ORIGIN OPM 100405
DATUM RL 97.780m AHD
SURVEYOR JIB
CHECKED BY JAH
SCALE 1:400 @ A1
DATE 20/07/2022
SHEET 6 of 16

DRAWING No. **001762_detail**
REV B



LEGEND	
	Water
	Sewer
	Stormwater
	Vegetation
	Electrical (LV)
	Electrical (HV)

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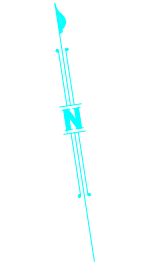
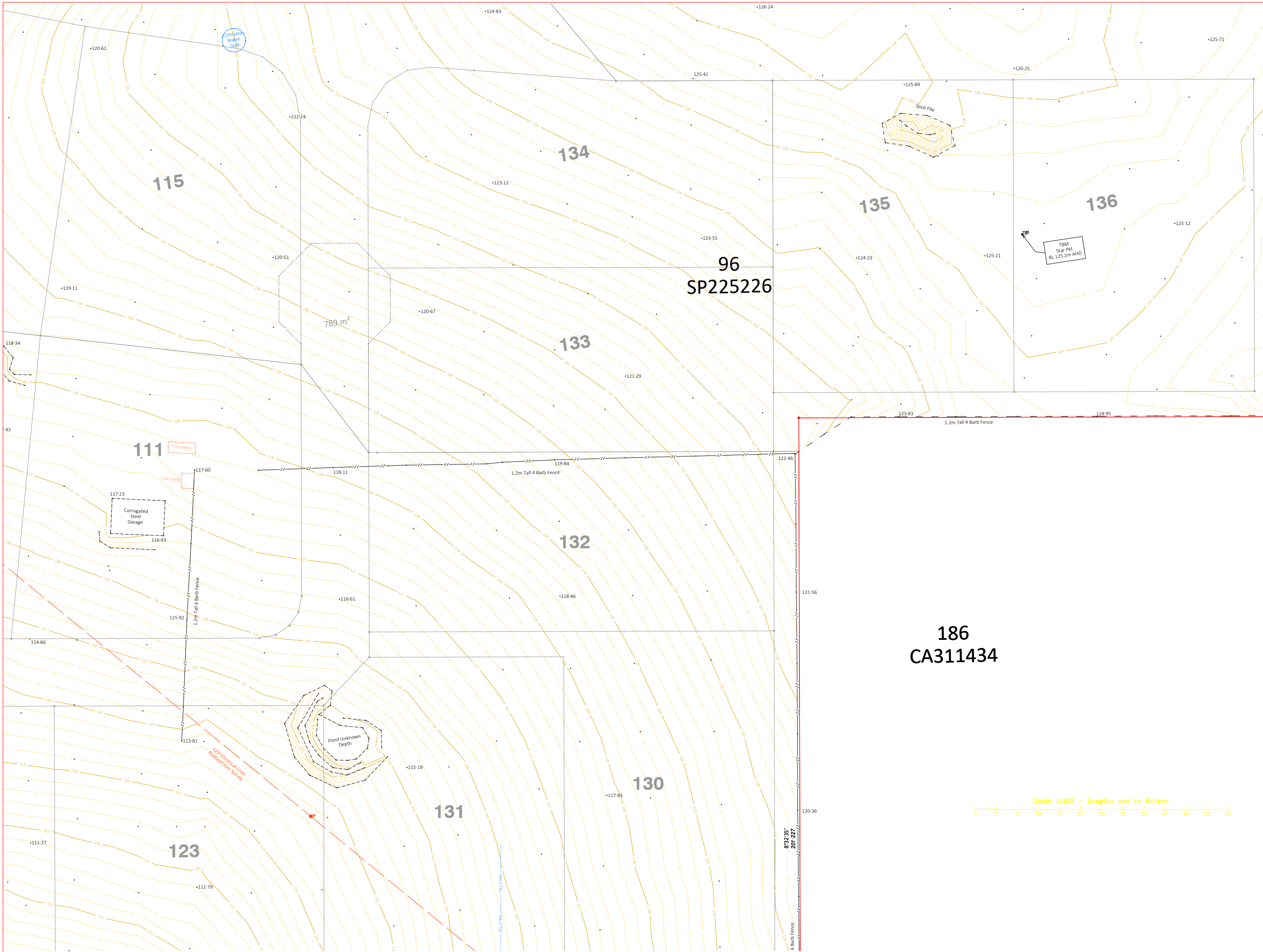
DETAIL SURVEY
 Part of Lots 95 on CA311434 and Lot 96 on SP225226
 174 Adare Road, Adare
 Client - Park Lake Adare Pty Ltd at Park Lake Adare Unit Trust

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LOCALITY	Adare
CONTOUR INT	0.2m
MERIDIAN	MGA 94 (Wide GPS)
LEVEL ORIGIN	RL 97.780m AHD
DATUM	RL 97.780m AHD
SURVEYOR	JIB
CHECKED BY	JAH
SCALE	1:400 @ A1
DATE	20/07/2022
SHEET	7 of 16

DRAWING No. 001762_detail
 REV B

Scale 1:400 - Lengths are in Metres.

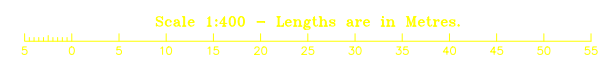




LEGEND

- Water
- Sewer
- Stormwater
- Vegetation
- Electrical (LUG)
- Electrical (AVG)

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L.A.	Lockyer Valley R. C.
LOCALITY	Adare
CONTOUR INT	0.2m
MERIDIAN	MGA 94 (Wide GPS)
LEVEL ORIGIN	OPM 100405
DATUM	RL 97.780m AHD
SURVEYOR	JIB
CHECKED BY	JAH
SCALE	1:400 @ A1
DATE	20/07/2022
SHEET	8 of 16

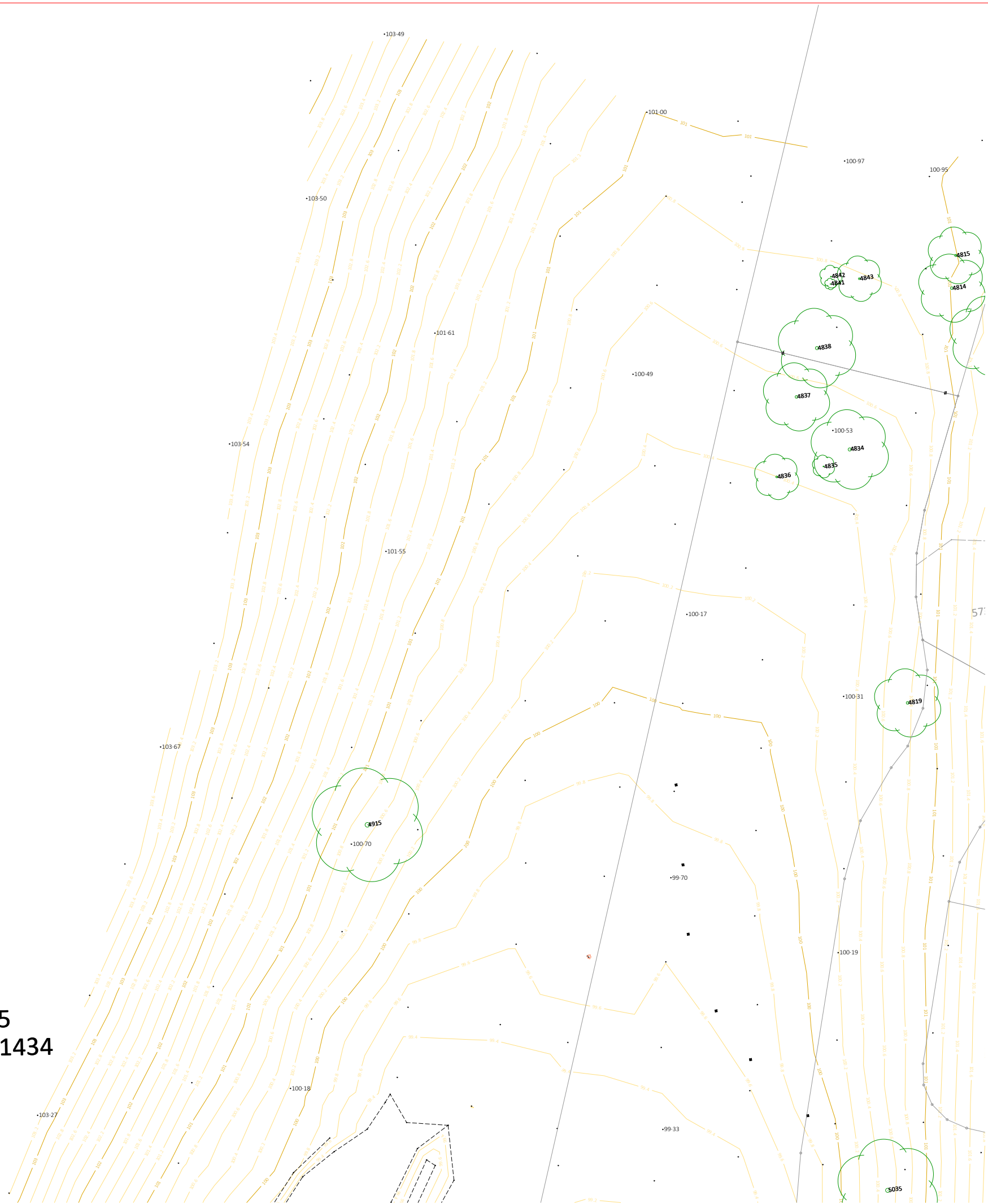
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 REV B



LEGEND	
	Water
	Sewer
	Fence
	Stormwater
	Vegetation
	Electrical (LUG)
	Electrical (AVG)

Scale 1:400 - Lengths are in Metres.

95
CA311434



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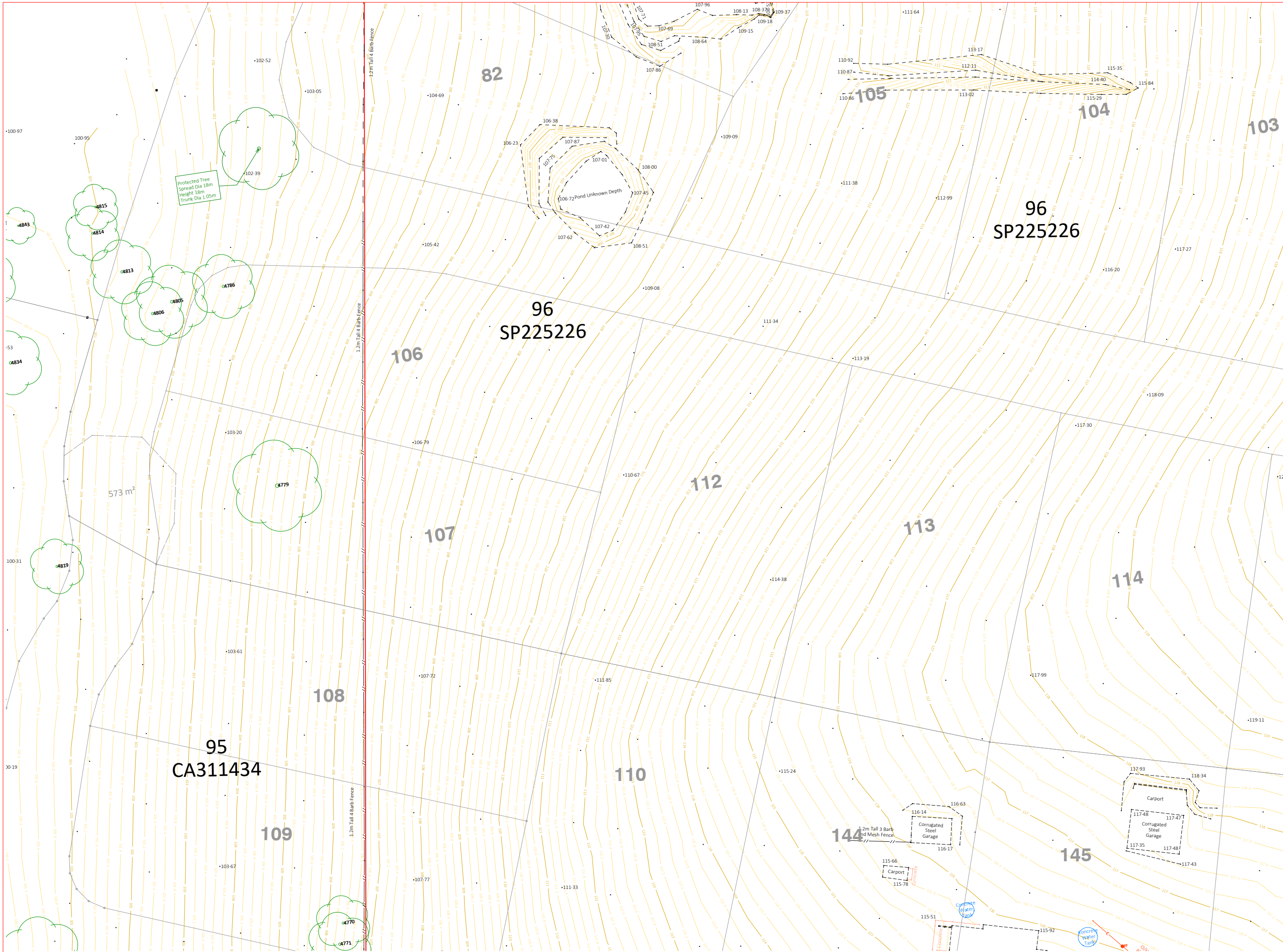
DETAIL SURVEY
Part of Lots 95 on CA311434 and Lot 96 on SP225226
174 Adare Road, Adare.
Client - Park Lake Adare Pty Ltd a/t Park Lake Adare Unit Trust.

L.A.	Lockyer Valley R. C.
LOCALITY	Adare
CONTOUR INT	0.2m
MERIDIAN	MGA 94 (Wide GPS)
LEVEL ORIGIN	OPM 100405
DATUM	RL 97.780m AHD
SURVEYOR	JIB
CHECKED BY	JAH
SCALE	1:400 @ A1
DATE	20/07/2022
SHEET	9 of 16

DRAWING No. 001762_detail
REV B



LEGEND	
	Water
	Sewer
	Fence
	Stormwater
	Vegetation
	Electrical (LUG)
	Electrical (AVG)



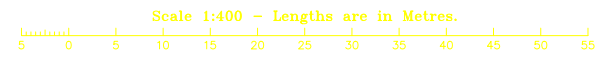
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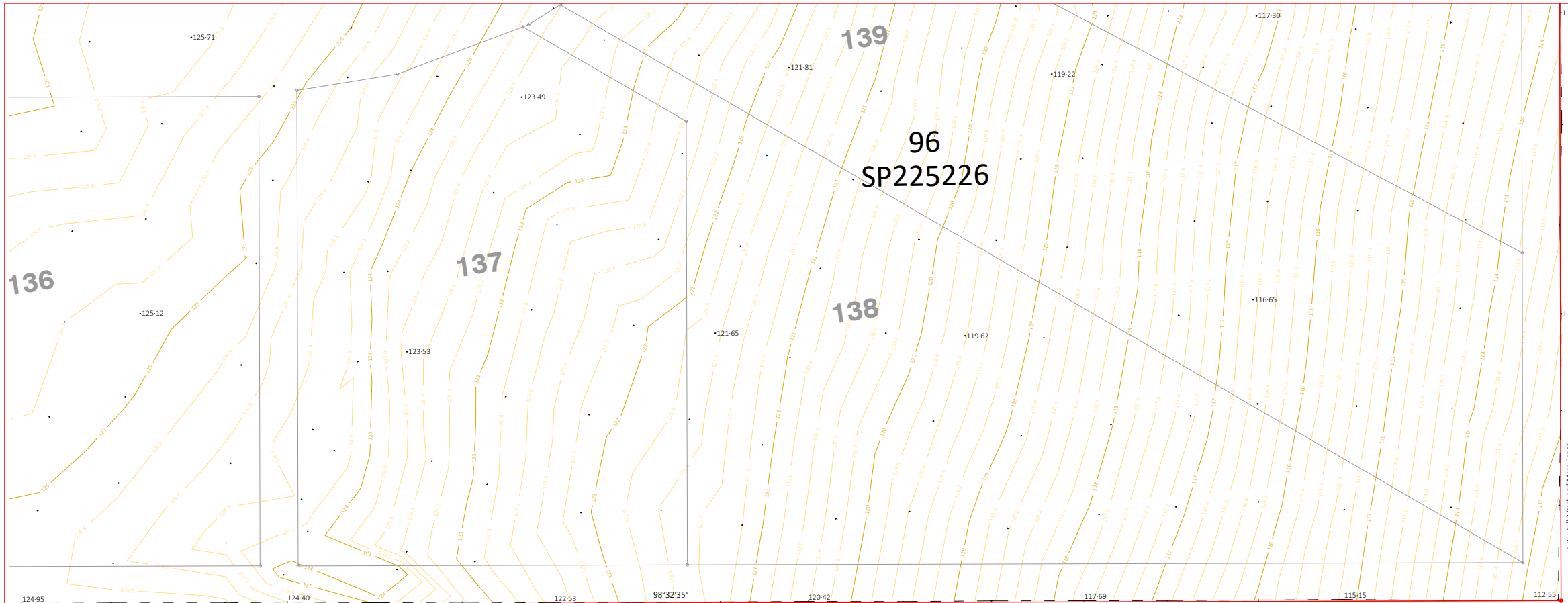
B
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 info@planned.com.au
 www.planned.com.au
 TERRAIN PLANNING & SURVEYING

DETAIL SURVEY
 Part of Lots 95 on CA311434 and Lot 96 on SP225226
 174 Adare Road, Adare
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LOCALITY	Adare
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MERIDIAN	MSA 94 (Wide GPS)
LEVEL ORIGIN	OPM 100405
DATUM	RL 97.780m AHD
SURVEYOR	JIB
CHECKED BY	JAH
SCALE	1:400 @ A1
DATE	20/07/2022
SHEET	10 of 16

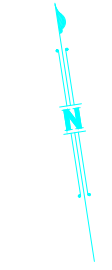
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 REV B





20
SP112079

186
CA311434



LEGEND	
	Water
	Sewer
	Stormwater
	Vegetation
	Electrical (LUG)
	Electrical (AVG)

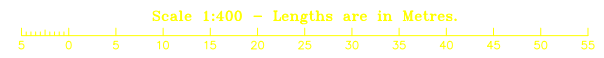
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DETAIL SURVEY
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174 Adare Road, Adare.
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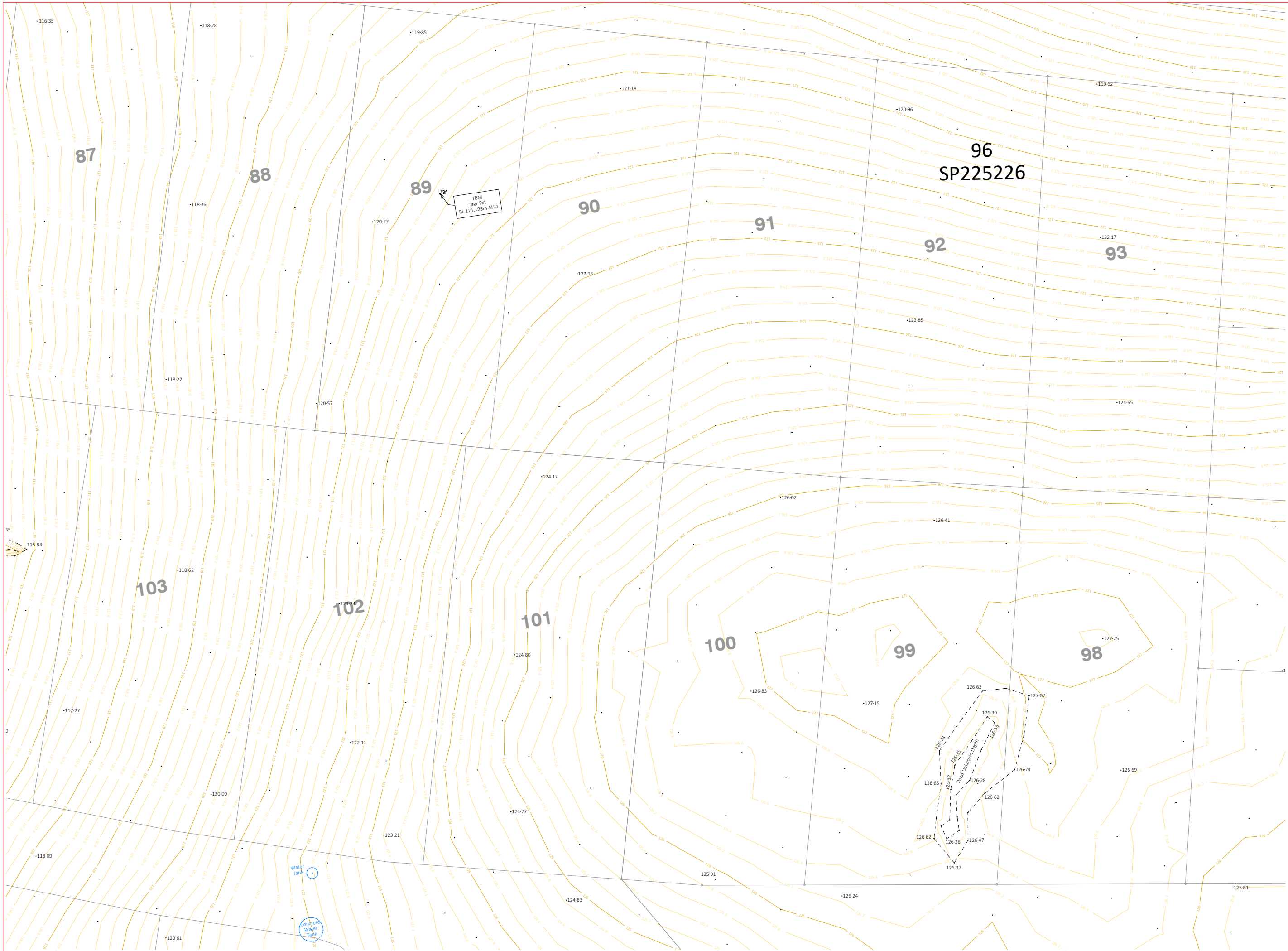
L.A. Lockyer Valley R. C.
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CHECKED BY JAH
SCALE 1:400 @ A1
DATE 20/07/2022
SHEET 11 of 16

DRAWING No. 001762_detail
REV B





LEGEND	
	Water
	Sewer
	Stormwater
	Vegetation
	Electrical (LVD)
	Electrical (AVG)



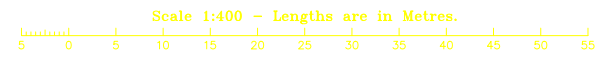
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DETAIL SURVEY
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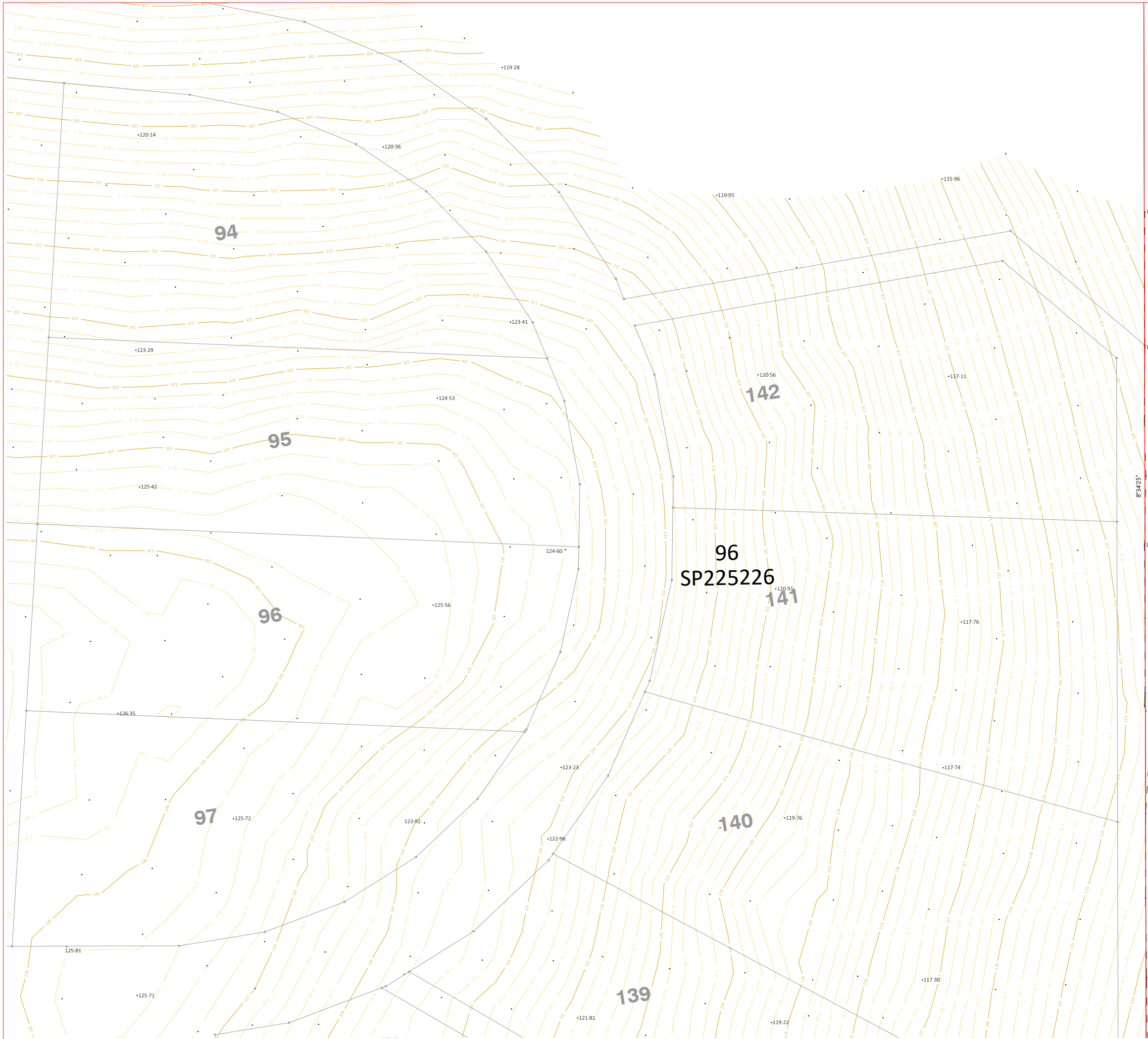
L.A. Lockyer Valley R. C.
 LOCALITY Adare
 CONTOUR INT 0.2m
 MERIDIAN MGA 94 (Wide GPS)
 LEVEL ORIGIN OPM 100405
 DATUM RL 97.780m AHD
 SURVEYOR JIB
 CHECKED BY JAH
 SCALE 1:400 @ A1
 DATE 20/07/2022
 SHEET 12 of 16

DRAWING No. 001762_detail
 REV B





LEGEND	
	Water
	Sewer
	Fence
	Stormwater
	Vegetation
	Electrical (LUG)
	Electrical (AVG)



112-43
113-35
114-42
113-88

1.2m Tall 3 Barb and Mesh Fence

8°34'25"

370.995

1.2m Tall 3 Barb and Mesh Fence

20
SP112079

NOTE:
This plan has been prepared for Park Lake Adare Pty Ltd affl Park Lake Adare Unit Trust, from a combination of field survey and existing records for the purpose of designing new constructions on the land and should not be used for any other purpose.
The spot heights shown represent the existing features in general only.
The title boundaries shown hereon were not marked at the time of the survey and have been determined by plan and field measurement.
Prior to any demolition, excavation or construction on the site, the relevant authority should be contacted for possible location of underground services and detailed locations of all services.

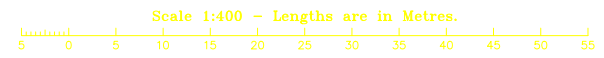
This note is an integral part of this plan/site



DETAIL SURVEY
Part of Lots 95 on CA311434 and Lot 96 on SP225226
174 Adare Road, Adare
Client - Park Lake Adare Pty Ltd affl Park Lake Adare Unit Trust

L.A. Lockyer Valley R. C.
LOCALITY Adare
CONTOUR INT 0.2m
MERIDIAN MGA 94 (Wide GPS)
LEVEL ORIGIN OPM 100405
DATUM RL 97.780m AHD
SURVEYOR JIB
CHECKED BY JAH
SCALE 1:400 @ A1
DATE 20/07/2022
SHEET 13 of 16

DRAWING No. 001762_detail
REV B



902

95
CA311434

96
SP225226



LEGEND	
	Water
	Sewer
	Fence
	Stormwater
	Vegetation
	Electrical (LV)
	Electrical (HV)

TBM
Star Pkt
RL 108.085m AHD

Protected Tree
Spread Dia 12m
Height 20m
Trunk Dia 1.1m Dead

NOTE:
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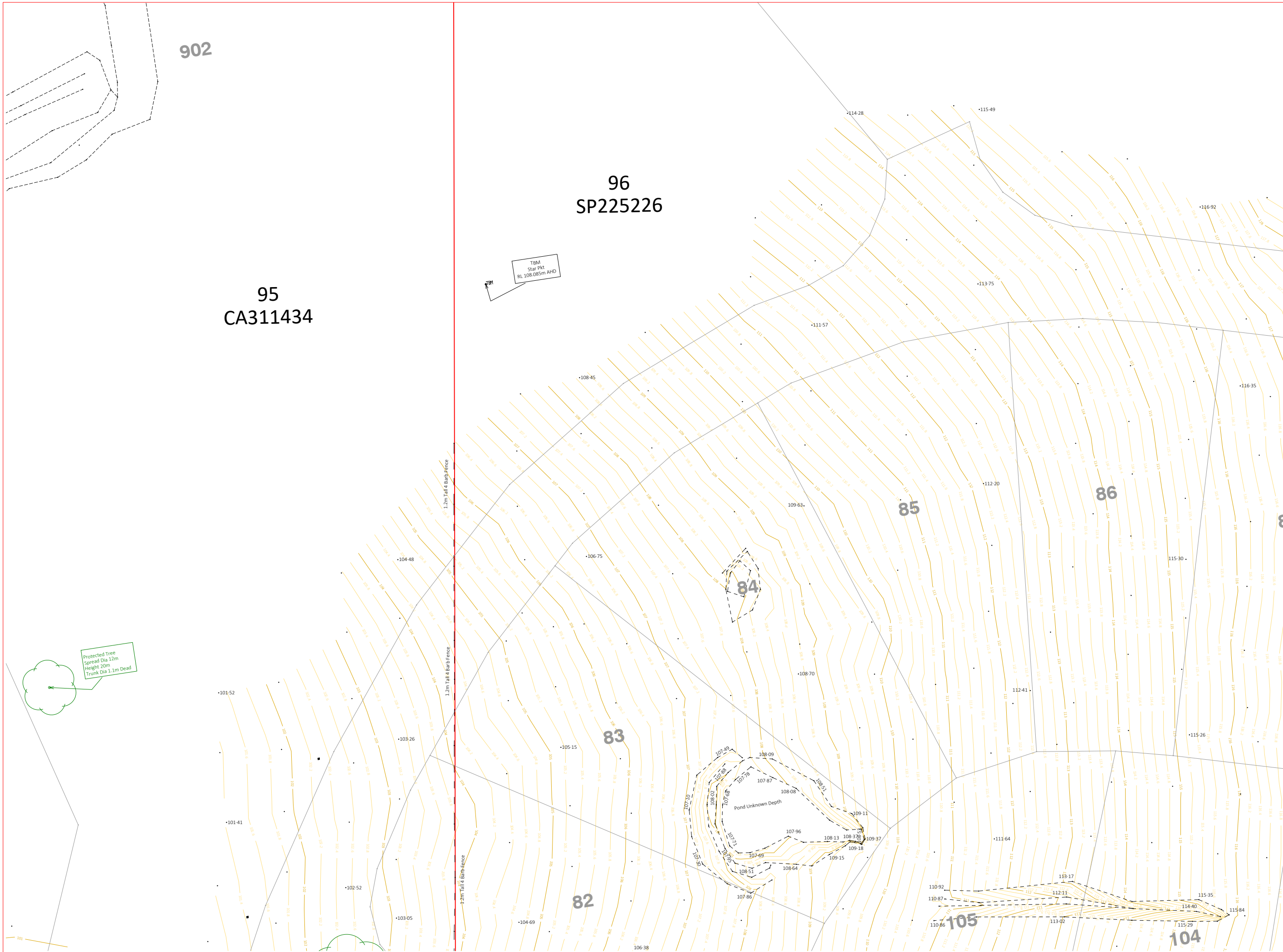
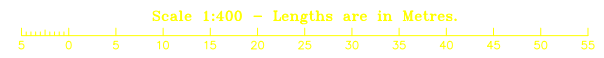
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DETAIL SURVEY
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174 Adare Road, Adare
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L.A. Lockyer Valley R. C.
LOCALITY Adare
CONTOUR INT 0.2m
MERIDIAN MGA 94 (Wide GPS)
LEVEL ORIGIN OPM 100405
DATUM RL 97.780m AHD
SURVEYOR JIB
CHECKED BY JAH
SCALE 1:400 @ A1
DATE 20/07/2022
SHEET 14 of 16

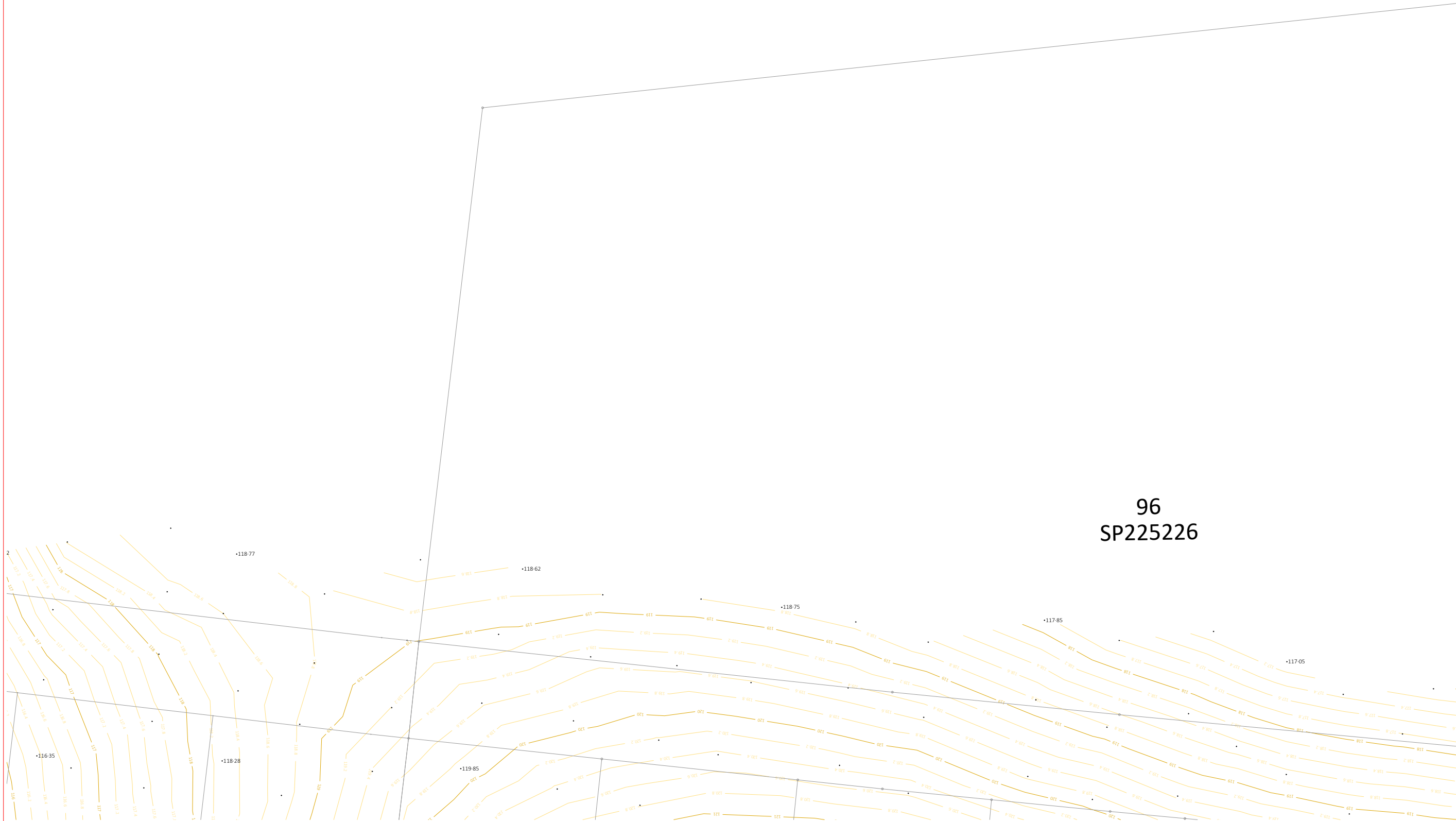
DRAWING No. 001762_detail
REV B





LEGEND	
	Water
	Sewer
	Fence
	Stormwater
	Vegetation
	Electrical (LV)
	Electrical (HV)

96
SP225226



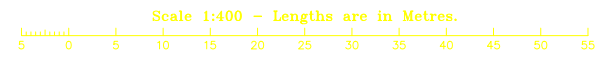
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174 Adare Road, Adare.
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LOCALITY Adare
CONTOUR INT 0.2m
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LEVEL ORIGIN OPM 100405
DATUM RL 97.780m AHD
SURVEYOR JIB
CHECKED BY JAH
SCALE 1:400 @ A1
DATE 20/07/2022
SHEET 15 of 16

DRAWING No. 001762_detail
REV B





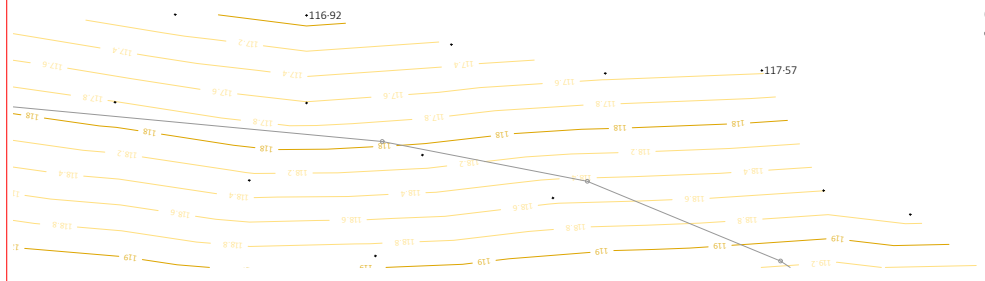
LEGEND	
	Water
	Sewer
	Fence
	Stormwater
	Vegetation
	Electrical (LUG)
	Electrical (AVG)

101
SP225226

903

20
SP112079

96
SP225226



NOTE:
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174 Adare Road, Adare.
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LEVEL ORIGIN OPM 100405
DATUM RL 97.780m AHD
SURVEYOR JIB
CHECKED BY JAH
SCALE 1:400 @ A1
DATE 20/07/2022
SHEET 16 of 16

DRAWING No. 001762_detail
REV B

Appendix B – Reconfiguration Plan

INDICATIVE YIELD

TOTAL NUMBER OF LOTS	145
MINIMUM LOT SIZE	4,000m ²
MAXIMUM LOT SIZE	27,028m ²

- STAGE BOUNDARIES
- GREEN SPACE / CONSERVATION
- LOTS
- EMERGENCY VEHICLE ACCESS EASEMENT

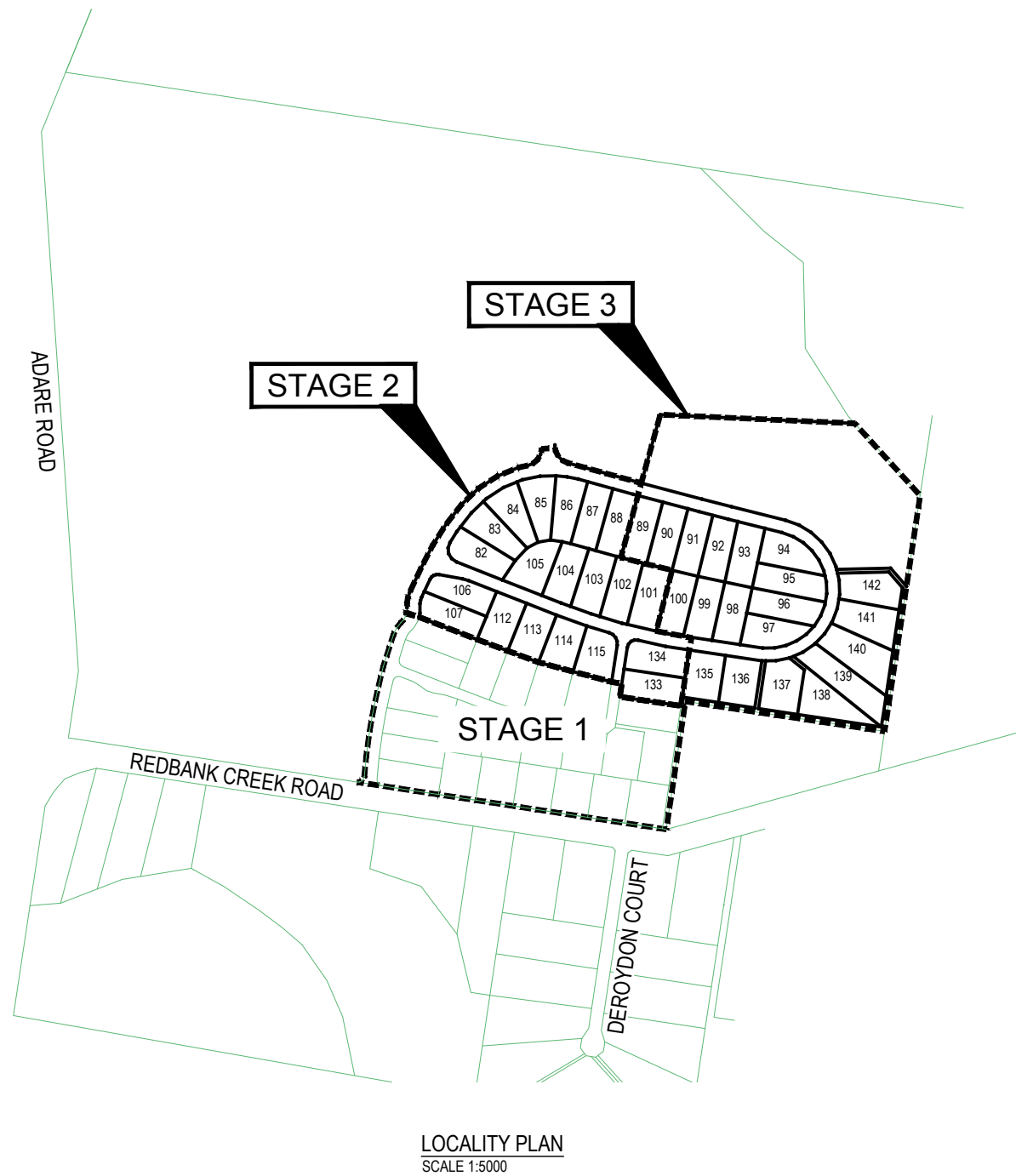


Appendix C – Civil Plans

PROPOSED SUBDIVISION

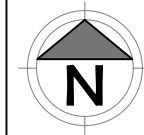
PARKLAKE, ADARE - STAGES 2 AND 3

174 ADARE ROAD, ADARE, QLD 4343



CIVIL ENGINEERING DRAWINGS		
SHEET NUMBER	SHEET TITLE	REVISION
C2000	COVER SHEET	A
C2001	STANDARD NOTES	A
C2002	SITE PLAN - SHEET 1	A
C2002	SITE PLAN - SHEET 2	A
C2100	EROSION AND SEDIMENT CONTROL PLAN - SHEET 1	A
C2101	EROSION AND SEDIMENT CONTROL PLAN - SHEET 2	A
C2190	EROSION AND SEDIMENT CONTROL DETAILS	A
C2191	EROSION AND SEDIMENT CONTROL NOTES	A
C2200	BULK EARTHWORKS PLAN - SHEET 1	A
C2201	BULK EARTHWORKS PLAN - SHEET 2	A
C2290	BULK EARTHWORKS DETAILS	A
C2300	PAVEMENT PLAN - SHEET 1	A
C2301	PAVEMENT PLAN - SHEET 2	A
C2400	ROADWORKS PLAN - SHEET 1	A
C2401	ROADWORKS PLAN - SHEET 2	A
C2430	SIGNS AND PAVEMENT MARKING PLAN - SHEET 1	A
C2431	SIGNS AND PAVEMENT MARKING PLAN - SHEET 2	A
C2450	ROAD LONGITUDINAL SECTION - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 1	A
C2451	ROAD LONGITUDINAL SECTION - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 2	A
C2452	ROAD LONGITUDINAL SECTION - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 3	A
C2453	ROAD LONGITUDINAL SECTION - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 4	A
C2454	ROAD LONGITUDINAL SECTION - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 5	A
C2455	ROAD CROSS SECTIONS - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 1	A
C2456	ROAD CROSS SECTIONS - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 2	A
C2457	ROAD CROSS SECTIONS - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 3	A
C2458	ROAD CROSS SECTIONS - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 4	A
C2459	ROAD CROSS SECTIONS - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 5	A
C2460	ROAD CROSS SECTIONS - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 6	A
C2461	ROAD LONGITUDINAL AND CROSS SECTIONS - AXFORD WAY	A
C2480	INTERSECTION DETAILS	A
C2490	ROADWORKS DETAILS	A
C2500	DRAINAGE CATCHMENT PLAN	A
C2501	DRAINAGE PLAN - SHEET 1	A
C2502	DRAINAGE PLAN - SHEET 2	A
C2510	DRAINAGE BIO RETENTION BASIN DETAILS - SHEET 1	A
C2511	DRAINAGE BIO RETENTION BASIN DETAILS - SHEET 2	A
C2550	DRAINAGE LONGITUDINAL SECTIONS - SHEET 1	A
C2560	DRAINAGE CALCULATIONS	A
C2600	WATER RETICULATION COVER SHEET	A
C2601	WATER RETICULATION PLAN - SHEET 1	A
C2602	WATER RETICULATION PLAN - SHEET 2	A
C2700	BUSHFIRE TRAIL PLAN	A
C2701	BUSHFIRE TRAIL 1 LONGITUDINAL SECTION - SHEET 1	A
C2702	BUSHFIRE TRAIL 1 LONGITUDINAL SECTION - SHEET 2	A
C2703	BUSHFIRE TRAIL 1 LONGITUDINAL SECTION - SHEET 3	A
C2704	BUSHFIRE TRAIL 1 CROSS SECTIONS - SHEET 1	A
C2705	BUSHFIRE TRAIL 1 CROSS SECTIONS - SHEET 2	A
C2706	BUSHFIRE TRAIL 1 CROSS SECTIONS - SHEET 3	A
C2707	BUSHFIRE TRAIL 2 LONGITUDINAL AND CROSS SECTIONS	A
C2708	BUSHFIRE TRAIL DETAILS	A

REVISIONS:			
No.	REVISION DESCRIPTION	MP	DATE
A	ISSUED FOR APPROVAL	MP	21/03/23



van der Meer Consulting

LEVEL 1, 51 ALFRED STREET
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P.R. 04/01/18 AKK

CLIENT
PARK LAKE ADARE PTY LTD
PO BOX 4107 SPRINGFIELD QLD 4300

SCALE
0 100 200 300 400 500m
SCALE 1:5000

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

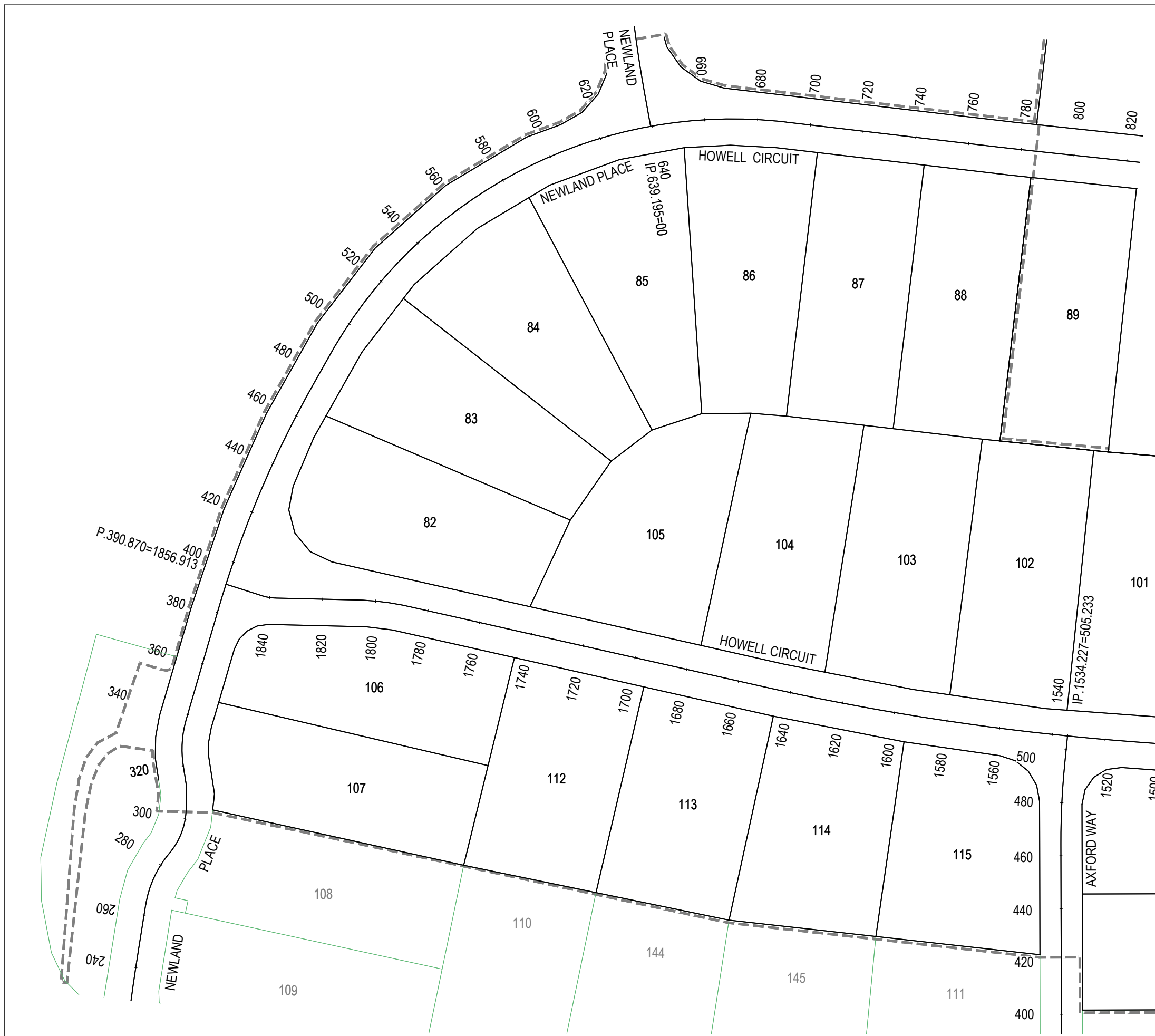
DRAWING TITLE
COVER SHEET

DRAWING STATUS
ORIGINAL ISSUE
FOR APPROVAL

PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEQ: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2000	REVISION A	

CONTROL LINE SETOUT - NEWLAND PLACE / HOWELL CIRCUIT							
PT	CHAINAGE	EASTING	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
IP 5	303.631	429943.369	6954311.485				
IP 6	303.631	429943.369	6954311.485				
TC	309.690	429944.402	6954317.352	9°59'16.21"			
IP 7	311.899	429944.804	6954319.633		R = -26.370	4.619	10°02'09.55"
CT	314.209	429944.802	6954321.948	359°57'06.66"			
TC	320.317	429944.797	6954328.057	359°57'06.66"			
IP 8	329.043	429944.789	6954336.924		R = 40.000	17.452	24°59'52.58"
CT	337.769	429948.530	6954344.963	24°56'59.24"			
TC	380.669	429966.626	6954383.859	24°56'59.24"			
IP 9	426.639	429986.103	6954425.724		R = 400.000	91.941	13°10'10.23"
CT	472.609	430014.606	6954462.050	38°07'09.47"			
TC	486.314	430023.066	6954472.832	38°07'09.47"			
IP 10	588.476	430094.539	6954563.922		R = 174.000	204.324	67°16'51.54"
CT	690.638	430206.164	6954533.175	105°24'01.02"			
TC	771.374	430284.001	6954511.734	105°24'01.02"			
IP 11	776.659	430289.096	6954510.331		R = -1000.000	10.570	0°36'20.31"
CT	781.944	430294.206	6954508.981	104°47'40.70"			
TC	894.815	430403.335	6954480.159	104°47'40.70"			
IP 12	901.217	430409.526	6954478.524		R = -1000.000	12.805	0°44'01.13"
CT	907.620	430415.736	6954476.969	104°03'39.57"			
IP 13	1015.374	430520.262	6954450.789				
IP 14	1091.343	430612.039	6954428.802		R = 101.268	151.938	85°57'48.99"
CC	1167.312	430596.566	6954335.705	189°28'10.82"			
IP 15	1243.280	430581.093	6954242.607		R = 101.268	151.938	85°57'48.99"
IP 16	1319.249	430487.138	6954251.489				
TC	1457.484	430350.433	6954271.998	278°31'55.73"			
IP 17	1469.050	430338.989	6954273.715		R = 300.000	23.132	4°25'04.27"
CT	1480.616	430327.712	6954276.308	282°57'00.00"			
TC	1508.227	430300.803	6954282.495	282°57'00.00"			
IP 18	1580.123	430230.607	6954298.637		R = 970.000	143.792	8°29'36.60"
CT	1652.019	430163.565	6954324.969	291°26'36.60"			
TC	1787.157	430037.782	6954374.373	291°26'36.60"			
IP 19	1797.091	430028.505	6954378.017		R = -100.000	19.868	11°22'59.69"
IP 20	1807.025	430018.692	6954379.758				
IP 21	1837.377	429988.806	6954385.061				
IP 22	1840.307	429985.886	6954385.542		R = 17.221	5.860	19°29'51.00"
IP 23	1843.238	429983.295	6954386.970				
IP 24	1856.913	429971.046	6954393.053	296°24'39.79"			

CONTROL LINE SETOUT - AXFORD WAY							
PT	CHAINAGE	EASTING	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFL.ANGLE
CT	367.904	430252.872	6954153.274	8°32'37.00"			
TC	464.420	430267.210	6954248.719	8°32'37.00"			
IP 8	479.929	430269.516	6954264.070		R = 300.000	31.019	5°55'26.75"
CT	495.438	430273.395	6954279.100	14°28'03.75"			
IP 9	505.233	430275.842	6954288.585	14°28'03.75"			



FOR CONTINUATION REFER DWG No. C2003

REVISIONS:			
No.	REVISION DESCRIPTION	MP	DATE
A	ISSUED FOR APPROVAL	MP	21/03/23



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van der meer
 LEVEL 1, 51 ALFRED STREET
 FORTITUDE VALLEY QLD 4006
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 van der Meer (QLD) Pty Ltd
 A.B.N. 63 609 812 615

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 IN A DOUBT, ASK

CLIENT
PARK LAKE ADARE PTY LTD
 PO BOX 4107 SPRINGFIELD QLD 4300

SCALE
 0 7.5 15 22.5 30 37.5m 75m
 SCALE 1:750

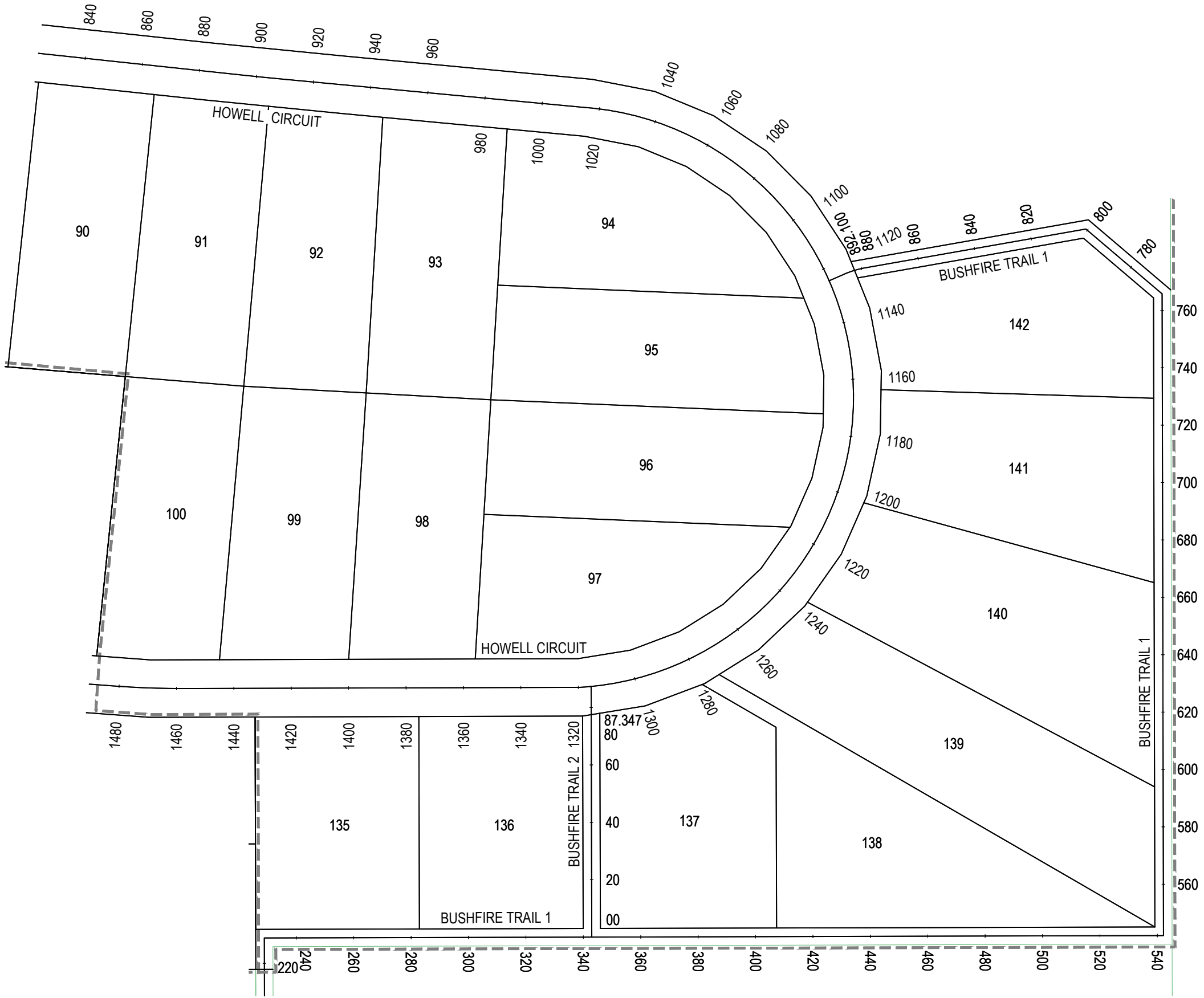
PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3

DRAWING TITLE
SITE PLAN
 SHEET 1

DRAWING STATUS
ORIGINAL ISSUE
 FOR APPROVAL

PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEQ: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2002	REVISION A	

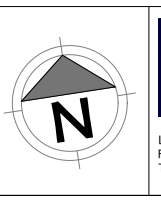
FOR CONTINUATION REFER DWG No. C2002



CONTROL LINE SETOUT - BUSHFIRE TRAIL 1							
PT	CHAINAGE	EASTING	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFLANGLE
IP 1	0.000	430331.367	6953955.462	8°32'36.49"			
IP 2	228.840	430365.364	6954181.762				
IP 3	542.127	430675.174	6954135.220				
IP 4	765.742	430708.521	6954356.335				
IP 5	800.620	430685.690	6954382.701				
TC	878.724	430607.606	6954380.952	268°42'59.30"			
IP 6	882.535	430603.778	6954380.866		R = -32.000	7.621	13°38'44.65"
CT	886.345	430600.078	6954379.880	255°04'14.65"			
IP 7	892.100	430594.518	6954378.397	255°04'14.65"			

CONTROL LINE SETOUT - BUSHFIRE TRAIL 2							
PT	CHAINAGE	EASTING	NORTHING	BEARING	RAD/SPIRAL	A.LENGTH	DEFLANGLE
IP 1	0.000	430478.199	6954164.811	8°32'37.00"			
IP 2	87.347	430491.175	6954251.188	8°32'37.00"			

REVISIONS:			
No.	REVISION DESCRIPTION	MP	DATE
A	ISSUED FOR APPROVAL	MP	21/03/23



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IF IN DOUBT, ASK

CLIENT
PARK LAKE ADARE PTY LTD
PO BOX 4107 SPRINGFIELD QLD 4300

SCALE
0 7.5 15 22.5 30 37.5m 75m
SCALE 1:750

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
SITE PLAN SHEET 2

DRAWING STATUS			
ORIGINAL ISSUE			
FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2003	REVISION	A

GENERAL NOTES:

1. THE CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS TO CONTROL EROSION AND SEDIMENTATION DURING ALL STAGES OF THE CONSTRUCTION ACTIVITIES UNTIL COMPLETION OF THE WORKS.
2. THE ADOPTED EROSION AND SEDIMENT CONTROL MEASURES ARE APPROPRIATELY AMENDED IF SITE CONDITIONS OR SCOPE OF WORKS SIGNIFICANTLY CHANGES, OR ARE EXPECTED TO SIGNIFICANTLY CHANGE FROM THOSE CONDITIONS ASSUMED DURING DEVELOPMENT OF THE ESCP.
3. ALL WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH COUNCIL'S AND THE INTERNATIONAL EROSION CONTROL ASSOCIATION (IECA) GUIDELINES 2008.
4. INSTALL EROSION AND SEDIMENT CONTROL MEASURES PRIOR TO GRUBBING WORKS.
5. WHERE KERB AND CHANNEL OR KERB ONLY IS INSTALLED, AN 800mm WIDE CONTINUOUS STRIP OF TURF WITH ADDITIONAL FILTER STRIPS AT 5.0m SPACING SHALL BE LAID BEHIND ALL KERBS. THE REMAINING UNSEALED VERGE AREA SHALL BE FILLED, GRADED AND GRASS SEED TO ACHIEVE 80% GRASS COVERAGE AT OFF MAINTENANCE.

CUT	FILL	DEPTH
		0.00m - 0.25m
		0.25m - 0.50m
		0.50m - 1.000m
		1.00m - 2.00m
		> 2.00m

LAND CLEARING AND VEGETATION MANAGEMENT:

1. CLEARING EXTENTS IS NOT TO EXCEED A DISTANCE OF 5.0m OUTSIDE OF THE CUT AND FILL HATCH EXTENTS. ALL VEGETATION IS TO BE REMOVED TO FACILITATE THE IDENTIFIED BULK EARTHWORKS.
2. LAND CLEARING SHOULD NOT OCCUR UNLESS PRECEDED BY THE INSTALLATION OF ALL NECESSARY DRAINAGE AND EROSION SEDIMENT CONTROL MEASURES.
3. WHEREVER PRACTICAL, RETAIN VEGETATION COVER ON SITE. LAND CLEARING IS TO BE STAGED TO MINIMISE THE EXTENT AND DURATION OF SOIL EXPOSURE. TIMING OF WORKS MUST BE CONSIDERED WHEN LAND CLEARING - BULK EARTHWORKS SHOULD BE CARRIED OUT DURING THE 'DRY SEASON' WHEN POSSIBLE.
4. RESTRICT MOVEMENT OF CONSTRUCTION EQUIPMENT TO AVOID UNNECESSARY SOIL COMPACTION.
5. AS WORKS PROCEED, DISTURBED AREAS SHOULD BE STABILISED, REHABILITATED, AND REVEGETATED AS SOON AS POSSIBLE AFTER EARTHWORKS HAVE BEEN COMPLETED.
6. CLEARING TO BE UNDERTAKEN NO MORE THAN 8 WEEKS AHEAD OF EARTHWORKS IN ACCORDANCE WITH TABLE 4.4.7 OF IECA GUIDELINE.
7. DISTURBED SOILS SURFACES TO BE STABILISED WITH 70% COVER WITHIN 30 DAYS (TABLE 4.4.7 OF IECA MANUAL).
8. REVEGETATION AND LANDSCAPING WORKS IS TO BE CARRIED OUT IN ACCORDANCE WITH DOCUMENTED PLANS.

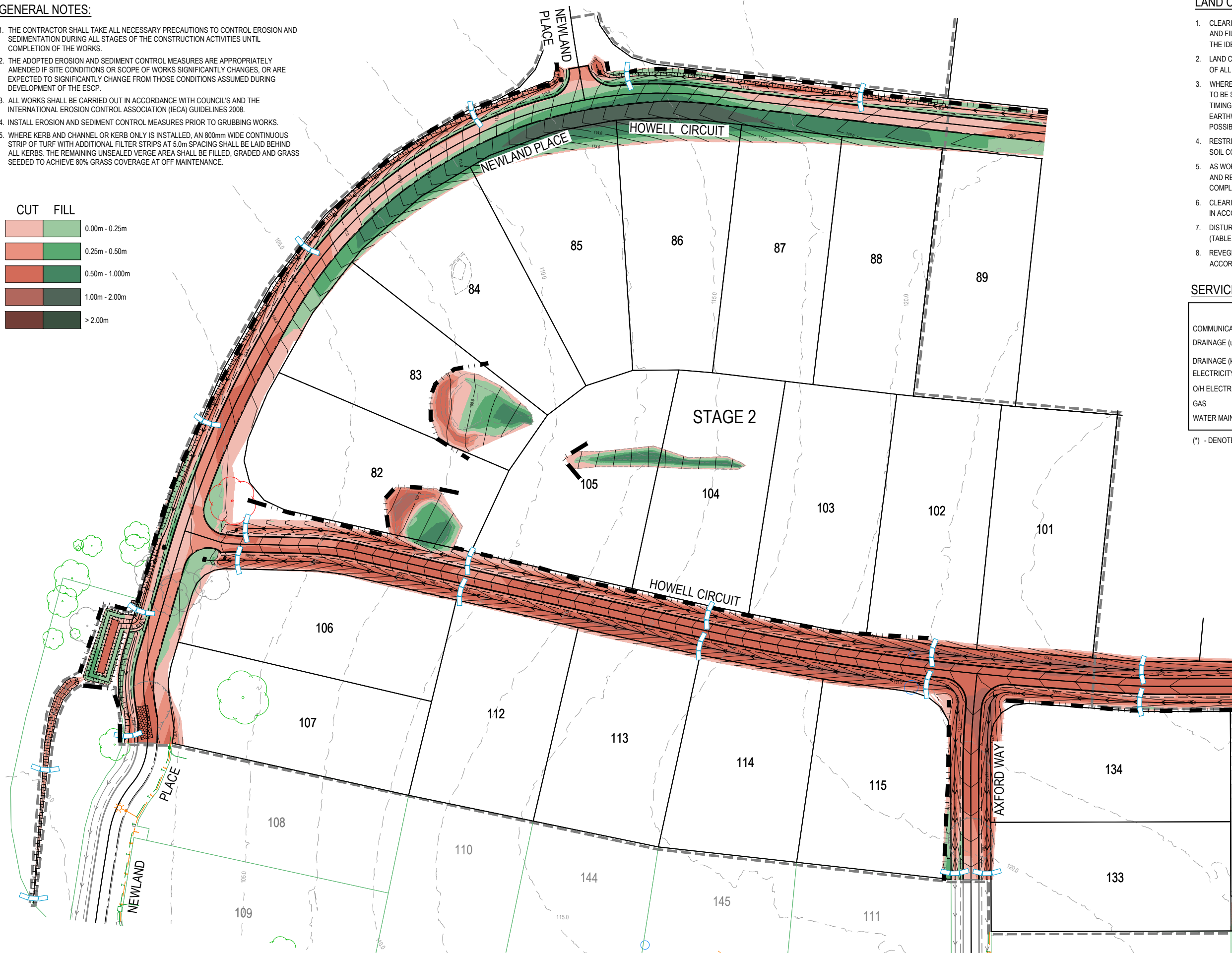
SERVICES (PUP) LEGEND

	EXISTING	PROPOSED
COMMUNICATIONS	C(*)	
DRAINAGE (unknown dia.)	D(*)	
DRAINAGE (known dia.)		
ELECTRICITY	E(*)	
O/H ELECTRICITY & POLE		
GAS	G(*)	
WATER MAIN	W(*)	

(*) - DENOTES QUALITY LEVEL AS PER A.S. 5488-2013.

LEGEND

	SEDIMENT FENCING
	CONSTRUCTION ENTRY / EXIT
	SANDBAG CHECK DAM
	STAGE BOUNDARY



FOR CONTINUATION REFER DWG No. C2101

REVISIONS:	
No.	REVISION DESCRIPTION
A	ISSUED FOR APPROVAL



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van der meer
 LEVEL 1, 51 ALFRED STREET
 FORTITUDE VALLEY QLD 4006
 Telephone +61 7 3021 6600

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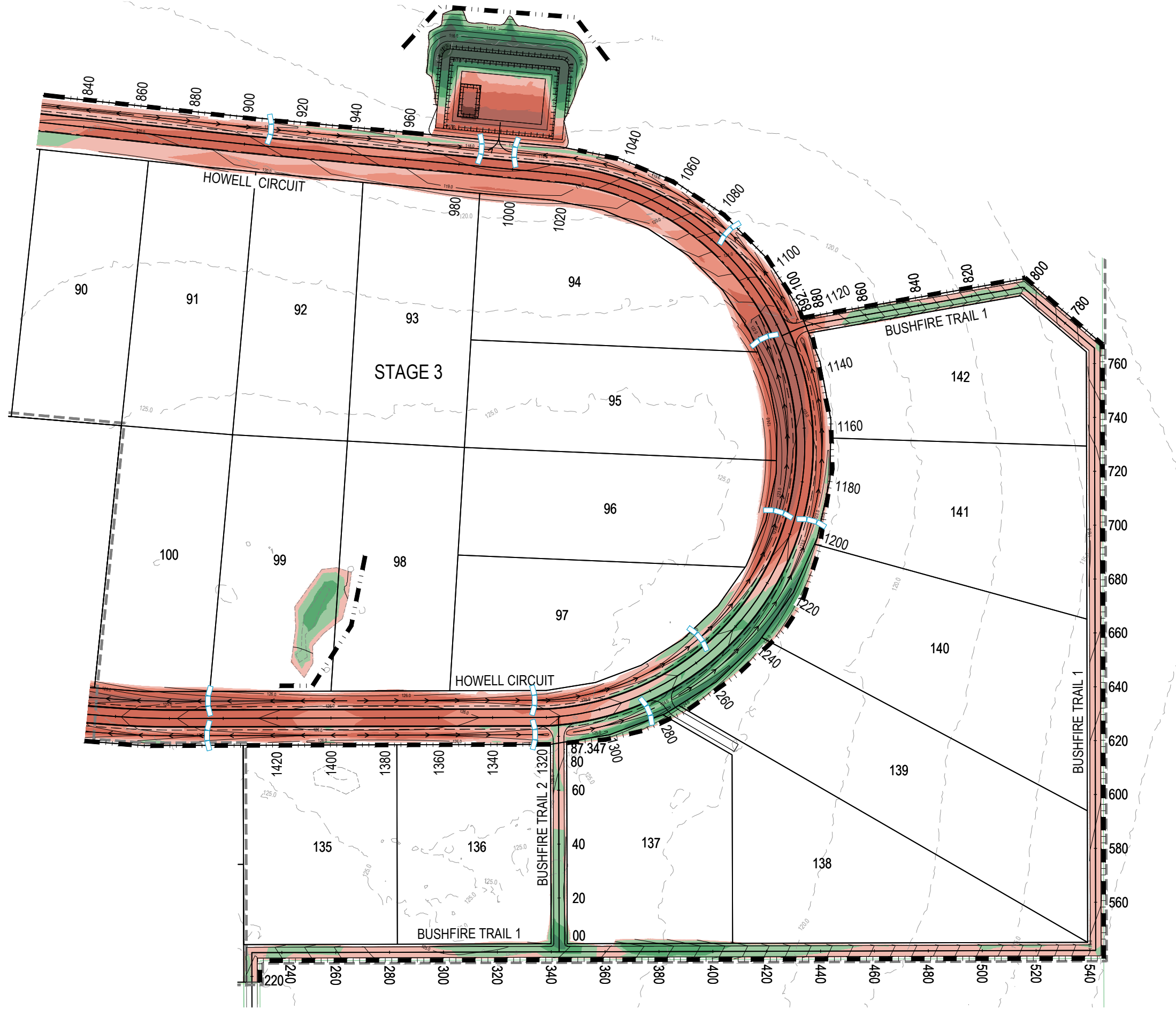
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PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3

DRAWING TITLE
EROSION AND SEDIMENT CONTROL
PLAN - SHEET 1

DRAWING STATUS			
ORIGINAL ISSUE			
FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2100	REVISION A	

FOR CONTINUATION REFER DWG No. C2100



LAND CLEARING AND VEGETATION MANAGEMENT:

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- RESTRICT MOVEMENT OF CONSTRUCTION EQUIPMENT TO AVOID UNNECESSARY SOIL COMPACTION.
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- REVEGETATION AND LANDSCAPING WORKS IS TO BE CARRIED OUT IN ACCORDANCE WITH DOCUMENTED PLANS.

SERVICES (PUP) LEGEND

	EXISTING	PROPOSED
COMMUNICATIONS	C(*)	
DRAINAGE (unknown dia.)	D(*)	
DRAINAGE (known dia.)		
ELECTRICITY	E(*)	
O/H ELECTRICITY & POLE		
GAS	G(*)	
WATER MAIN	W(*)	

(*) - DENOTES QUALITY LEVEL AS PER A.S. 5488-2013.

LEGEND

- SEDIMENT FENCING
- CONSTRUCTION ENTRY / EXIT
- SANDBAG CHECK DAM
- STAGE BOUNDARY

REVISIONS:

No.	REVISION DESCRIPTION	MP	DATE
A	ISSUED FOR APPROVAL	MP	21/03/23



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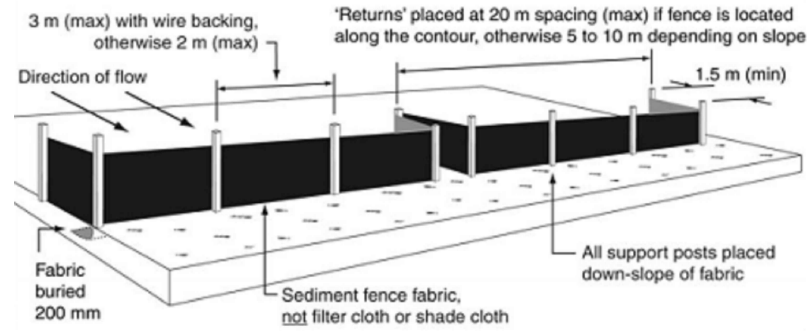
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SCALE
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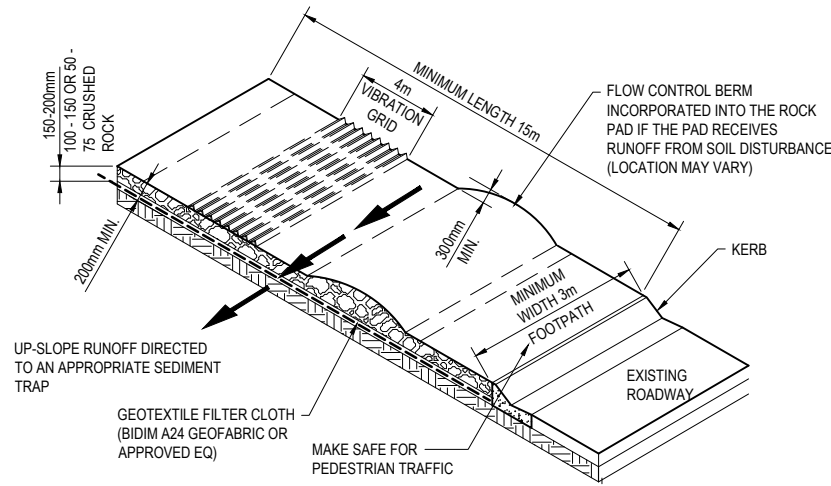
PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3

DRAWING TITLE
EROSION AND SEDIMENT CONTROL
PLAN - SHEET 1

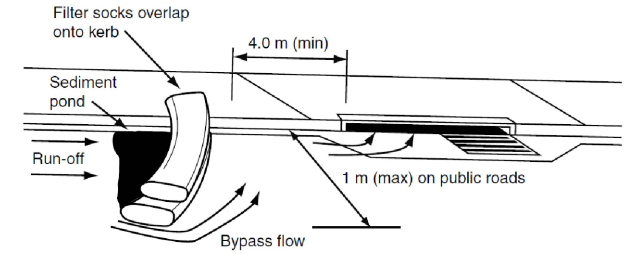
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ORIGINAL ISSUE			
FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2101	REVISION	A



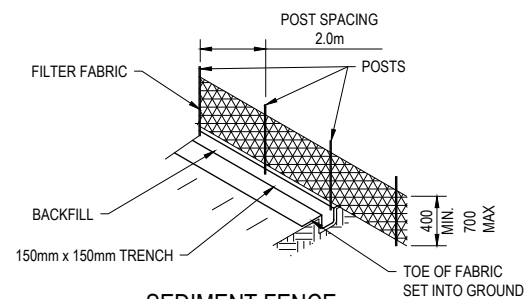
TYPICAL INSTALLATION OF A SEDIMENT FENCE
NOT TO SCALE



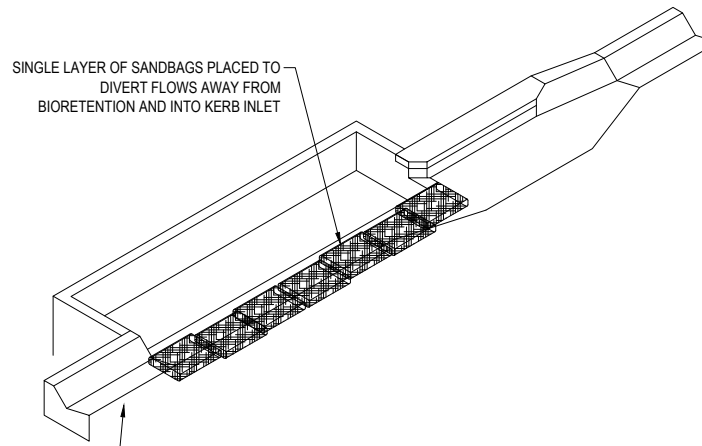
CONSTRUCTION ENTRY/EXIT POINT DETAIL
NOT TO SCALE



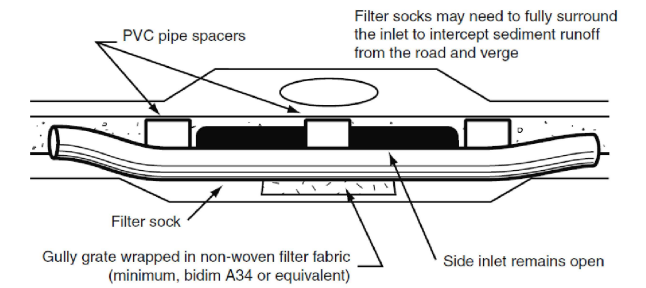
ON-GRADE KERB INLET SEDIMENT TRAP
NOT TO SCALE



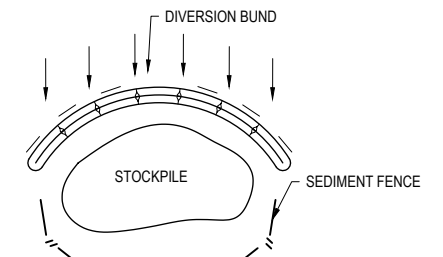
SEDIMENT FENCE
NOT TO SCALE



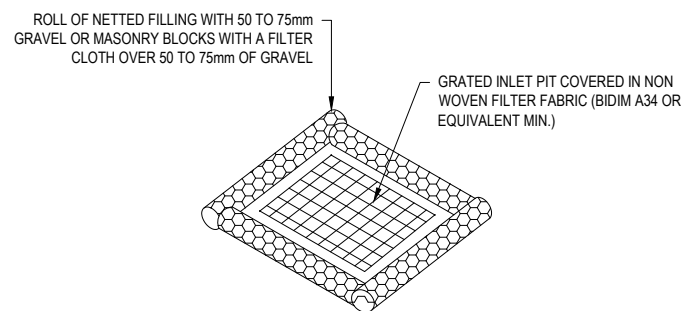
BIORETENTION INLET DIVERSION
NOT TO SCALE
INSTALL KERB INLET PROTECTION UPSTREAM OF BIORETENTION POD AS PER ADJACENT DETAIL



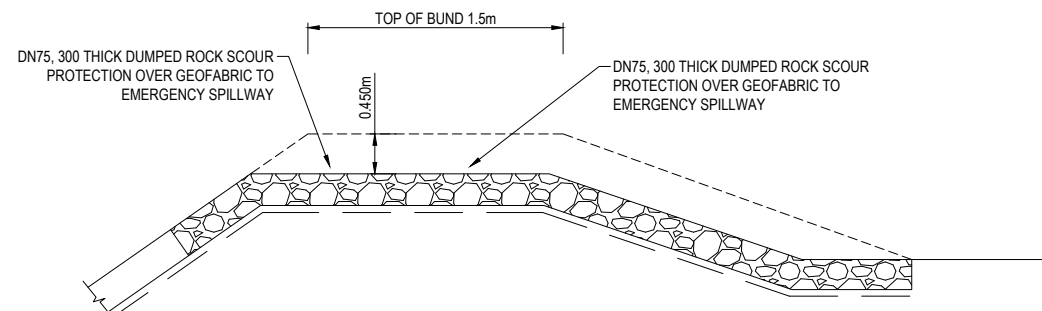
SAG INLET SEDIMENT TRAP
NOT TO SCALE



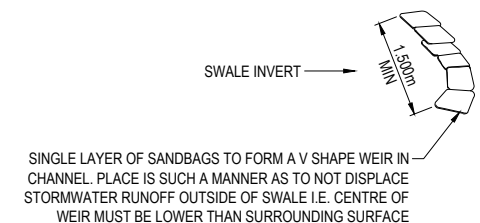
STOCKPILE SEDIMENT CONTROL
NOT TO SCALE



FIELD INLET SEDIMENT TRAP
NOT TO SCALE



SEDIMENT BASIN EMERGENCY SPILLWAY DETAIL
NOT TO SCALE



TYPICAL SAND BAG CHECK DAM
NOT TO SCALE
SINGLE LAYER OF SANDBAGS TO FORM A V SHAPE WEIR IN CHANNEL. PLACE IN SUCH A MANNER AS TO NOT DISPLACE STORMWATER RUNOFF OUTSIDE OF SWALE I.E. CENTRE OF WEIR MUST BE LOWER THAN SURROUNDING SURFACE

REVISIONS:	
No.	REVISION DESCRIPTION
A	ISSUED FOR APPROVAL
MP	21/03/23



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SCALE

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
EROSION AND SEDIMENT CONTROL DETAILS

DRAWING STATUS
ORIGINAL ISSUE
FOR APPROVAL

PROJECT LEADER	DESIGNER	SIGNATURE	DATE	SCALE	REVISION
CK	MP	C. KIRK	MAR 2023	AS SHOWN	A1
MP	AS SHOWN				
JOB No.	DRAWING No.				
BR222161	C2190				A

SEDIMENT FENCE

MATERIALS

- FABRIC: POLYPROPYLENE, POLYAMIDE, NYLON, POLYESTER OR POLYETHYLENE WOVEN OR NON-WOVEN FABRIC, AT LEAST 700mm IN WIDTH AND A MINIMUM UNIT WEIGHT OF 140GSM.
- SUPPORT POSTS/STAKES AND STEEL STAR PICKETS SUITABLE FOR ATTACHING FABRIC.

INSTALLATION

- WHERE POSSIBLE INSTALL SEDIMENT FENCE AT LEAST 2m FROM THE TOE OF ANY FILLING OPERATIONS THAT MAY RESULT IN SHIFTING SOIL/FILL DAMAGING THE FENCE.
- ENSURE THE EXTREME ENDS OF THE FENCE ARE TURNED UP THE SLOPE AT LEAST 1.5m OR AS NECESSARY TO MINIMISE WATER BYPASSING AROUND THE FENCE.
- ENSURE THE SEDIMENT FENCE IS INSTALLED IN A MANNER THAT AVOIDS THE CONCENTRATION OF FLOW ALONG THE FENCE AND THE UNDESIRABLE DISCHARGE OF WATER AROUND THE ENDS OF THE FENCE.
- IF THE SEDIMENT FENCE IS TO BE INSTALLED ALONG THE EDGE OF THE EXISTING TREES, ENSURE CARE IS TAKEN TO PROTECT THE TREES AND THEIR ROOT SYSTEMS DURING INSTALLATION OF THE FENCE.
- UNLESS DIRECTED BY THE SITE SUPERVISOR OR THE APPROVED PLANS, EXCAVATE A 200mm WIDE BY 200mm DEEP TRENCH ALONG THE PROPOSED FENCE LINE, PLACING THE EXCAVATED MATERIAL ON THE UP-SLOPE SIDE OF THE TRENCH.
- ALONG THE LOWER SIDE OF THE TRENCH, APPROPRIATELY SECURE THE STAKES INTO THE GROUND SPACED NO GREATER THAN 3m IF SUPPORTED BY A TOP SUPPORT WIRE OR WEIR MESH BACKING, OTHERWISE NO GREATER THAN 2m.
- WHEREVER POSSIBLE, CONSTRUCT THE SEDIMENT FENCE FROM A CONTINUOUS ROLL OF FABRIC. TO JOIN FABRIC ATTACH EACH END OF TWO OVERLAPPING STAKES WITH THE FABRIC FOLDING AROUND THE ASSOCIATED STAKE ONE TURN AND WITH TWO STAKES TIED TOGETHER WITH THE WIRE METHOD OR OVERLAP THE FABRIC TO THE NEXT ADJACENT SUPPORT POST.
- SECURELY ATTACH THE FABRIC TO THE SUPPORT POSTS USING 25 X 12.5mm STAPLES, OR TIE WIRE AT MAXIMUM 150mm SPACING.
- SECURELY ATTACH THE FABRIC TO THE SUPPORT WIRE/MESH (IF ANY) AT A MAXIMUM SPACING OF 1m.
- ENSURE THE COMPLETED SEDIMENT FENCE IS AT LEAST 450mm, BUT NOT MORE THAN 700mm HIGH. IF A SPILL THROUGH WEIR IS INSTALLED, ENSURE THE CREST OF THE WEIR IS AT LEAST 300mm ABOVE GROUND LEVEL.
- BACKFILL THE TRENCH AND TAMP THE FILL TO FIRMLY ANCHOR THE BOTTOM OF THE FABRIC AND MESH TO PREVENT WATER FROM FLOWING UNDER THE FENCE.
- IF IT IS NOT POSSIBLE TO ANCHOR THE FABRIC IN AN EXCAVATED TRENCH, THEN USE A CONTINUOUS LAYER OF SAND OR AGGREGATE TO HOLD THE FABRIC FIRMLY ON THE GROUND.

MAINTENANCE

- INSPECT THE SEDIMENT FENCE AT LEAST WEEKLY AND AFTER ANY SIGNIFICANT RAIN. MAKE NECESSARY REPAIRS IMMEDIATELY.
- REPAIR ANY TORN SECTIONS WITH A CONTINUOUS PIECE OF FABRIC FROM POST TO POST.
- WHEN MAKING REPAIRS, ALWAYS RESTORE THE SYSTEM TO ITS ORIGINAL CONFIGURATION UNLESS AN AMENDED LAYOUT IS REQUIRED OR SPECIFIED.
- IF THE FENCE IS SAGGING BETWEEN STAKES, INSTALL ADDITIONAL SUPPORT POSTS.
- REMOVE ACCUMULATED SEDIMENT IF THE SEDIMENT DEPOSIT EXCEEDS A DEPTH OF 1/3 THE HEIGHT OF THE FENCE.
- DISPOSE OF SEDIMENT IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.

SEDIMENT BASINS

GENERAL

- SEDIMENT BASIN TO BE LOCATED ABOVE THE 5YR FLOOD LINE. INSTALL SEDIMENT BASINS FOR ALL CATCHMENTS ACROSS THE PROJECT AREA.
- MATERIALS USED IN THE CONSTRUCTION OF SEDIMENT BASINS SHOULD NOT HAVE AN EMERSON NUMBER OF 3 OR ABOVE (I.E. DISPERSIVE SOILS SUCH AS THE SUBSOILS THAT CAN BE ENCOUNTERED AT THE SITE CANNOT BE USED TO CONSTRUCT SEDIMENT BASINS).
- A " FULL OF SEDIMENT" MARKER MUST BE PLACED IN THE SEDIMENT BASIN TO SHOW THE DESIGN DEPTH OF THE SOIL/STORAGE ZONE VOLUME AND TO INDICATE WHEN REMOVAL OF THE SEDIMENT IS TO BE CARRIED OUT.
- CONSTRUCTED SEDIMENT BASINS TO BE FULLY OPERATIONAL THROUGHOUT THE CONSTRUCTION PERIOD AND UNTIL THE BASINS CATCHMENT AREA ACHIEVES 70% GROUND COVER ON ALL SOIL SURFACES.
- FLOCCULATION REQUIREMENTS TO BE IN ACCORDANCE WITH TABLE B17 OF THE IECA GUIDELINES. IN GENERAL 32kg OF GYPSUM TO BE ADDED TO 100m³ OF STORED WATER.

MAINTENANCE

- INSPECT THE SEDIMENT BASIN DURING THE FOLLOWING PERIODS AS STATED WITHIN PAGE B.52 OF THE IECA GUIDELINES:
 - DURING CONSTRUCTION TO DETERMINE WHETHER MACHINERY, FALLING TREES OR CONSTRUCTION ACTIVITY HAS DAMAGED ANY COMPONENT OF THE SEDIMENT BASIN. IF DAMAGE HAS OCCURRED, REPAIR IT.
 - AFTER EACH RUNOFF EVENT. INSPECT THE EROSION DAMAGE AT FLOW ENTRY AND EXIT POINTS. IF DAMAGE HAS OCCURRED, MAKE THE NECESSARY REPAIRS.
 - AT LEAST WEEKLY DURING THE NOMINATED WET SEASON (IF ANY) OTHERWISE AT LEAST FORTNIGHTLY.
 - PRIOR TO, AND IMMEDIATELY AFTER, PERIODS OF "STOP WORK" OR SITE "SHUTDOWN".
- CLEAN OUT ACCUMULATED SEDIMENT WHEN IT REACHES THE MARKER BOARD/POST, AND RESTORE THE ORIGINAL STORAGE VOLUME. PLACE SEDIMENT IN A DISPOSAL AREA OR, IF APPROPRIATE, MIX WITH DRY SOIL ON THE SITE.
- DO NOT DISPOSE OF SEDIMENT IN A MANNER THAT WILL CREATE AN EROSION OR POLLUTION HAZARD.
- CHECK ALL VISIBLE PIPE CONNECTIONS FOR LEAKS, AND REPAIR AS NECESSARY.
- CHECK FILL MATERIAL IN THE DAM FOR EXCESSIVE SETTLEMENT, SLUMPING OF THE SLOPES OR PIPING BETWEEN THE CONDUIT AND THE EMBANKMENT. MAKE ALL NECESSARY REPAIRS.
- REMOVE ALL TRASH AND OTHER DEBRIS FROM THE BASIN AND RISER.
- SUBMERGED INFLOW PIPES MUST BE INSPECTED AND DE-SILTED (AS REQUIRED) AFTER EACH INFLOW EVENT.

REMOVAL OR CONVERSION OF SEDIMENT BASIN

- WHEN GRADING AND CONSTRUCTION IN THE DRAINAGE AREA ABOVE A TEMPORARY SEDIMENT BASIN IS COMPLETED AND THE DISTURBED AREAS ARE ADEQUATELY STABILISED, THE BASIN MUST BE REMOVED OR OTHERWISE INCORPORATED INTO THE PERMANENT STORMWATER DRAINAGE SYSTEM. IN EITHER CASE, SEDIMENT SHOULD BE CLEARED AND PROPERLY DISPOSED OF AND THE BASIN AREA STABILISED.
- BEFORE STARTING ANY MAINTENANCE WORK ON THE BASIN OR SPILLWAY, INSTALL ALL NECESSARY SHORT-TERM SEDIMENT CONTROL MEASURES DOWNSTREAM OF THE SEDIMENT BASIN.
- ALL WATER AND SEDIMENT MUST BE REMOVED FROM THE BASIN PRIOR TO THE DAM'S REMOVAL. DISPOSE OF SEDIMENT AND WATER IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION HAZARD.
- BRING THE DISTURBED AREA TO A PROPER GRADE, THEN SMOOTH, COMPACT AND STABILISE OR REVEGETATE AS REQUIRED TO ESTABLISH A STABLE LAND SURFACE.

MATERIAL STOCKPILING:

- THE CONSTRUCTION CONTRACTOR IS TO ADHERE TO THE FOLLOWING SOIL AND STOCKPILE MANAGEMENT PRACTISES. STOCKPILES OF ERODIBLE MATERIAL THAT HAS THE POTENTIAL TO CAUSE ENVIRONMENTAL HARM IF DISPLACED MUST BE:
 - APPROPRIATELY PROTECTED FROM WIND, RAIN, CONCENTRATED SURFACE FLOW AND EXCESSIVE UP-SLOPE STORMWATER SURFACE FLOWS.
 - LOCATED AT LEAST 2m FROM ANY HAZARDOUS AREA, RETAINED VEGETATION, OR CONCENTRATED DRAINAGE LINE.
 - LOCATED UP-SLOPE OF AN APPROPRIATE SEDIMENT CONTROL SYSTEM.
 - PROVIDED WITH AN APPROPRIATE PROTECTIVE COVER (SYNTHETIC, MULCH OR VEGETATIVE) IF THE MATERIALS ARE LIKELY TO BE STOCKPILED FOR MORE THAN 28 DAYS.
 - PROVIDED WITH AN APPROPRIATE PROTECTIVE COVER (SYNTHETIC, MULCH OR VEGETATIVE) IF THE MATERIALS ARE LIKELY TO BE STOCKPILED FOR MORE THAN 10 DAYS DURING THOSE MONTHS THAT HAVE A HIGH EROSION RISK.
 - PROVIDED WITH AN APPROPRIATE PROTECTIVE COVER (SYNTHETIC, MULCH OR VEGETATIVE) IF THE MATERIALS ARE LIKELY TO BE STOCKPILED FOR MORE THAN 5 DAYS DURING THOSE MONTHS THAT HAVE A HIGH EROSION RISK.
- A SUITABLE FLOW DIVERSION SYSTEM MUST BE ESTABLISHED IMMEDIATELY UP-SLOPE OF A STOCKPILE OF ERODIBLE MATERIAL THAT HAS THE POTENTIAL TO CAUSE ENVIRONMENTAL HARM IF DISPLACED, IF THE UP-SLOPE CATCHMENT AREA DRAINING TO THE STOCKPILE EXCEEDS 1500m².

STABILISED ENTRY/EXIT NOTES

MATERIALS

- ROCK: WELL GRADED, HARD, ANGULAR, EROSION RESISTANT ROCK, NOMINAL DIAMETER OF 50mm TO 75mm (SMALL DISTURBANCES) OR 100 TO 150mm (LARGE DISTURBANCES). ALL REASONABLE MEASURES MUST BE TAKEN TO OBTAIN ROCK OF NEAR UNIFORM SIZE.
- FOOTPATH STABILISING AGGREGATE: 25 TO 50mm GRAVEL OR AGGREGATE.
- GEOTEXTILE FABRIC: HEAVY-DUTY, NEEDLE-PUNCHED, NON-WOVEN FILTER CLOTH ('BIDIM' A24 OR EQUIVALENT).

INSTALLATION

- REFER TO APPROVED PLANS FOR LOCATION AND DIMENSIONAL DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, DIMENSIONS, OR METHOD OF INSTALLATION, CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
- CLEAR THE LOCATION OF THE VIBRATION GRID, REMOVING STUMPS, ROOTS AND OTHER VEGETATION TO PROVIDE A FIRM FOUNDATION SO THAT THE ROCK IS NOT PRESSED INTO SOFT GROUND. CLEAR SUFFICIENT WIDTH TO ALLOW PASSAGE OF LARGE VEHICLES, BUT CLEAR ONLY THAT NECESSARY FOR THE EXIT. DO NOT CLEAR ADJACENT AREAS UNTIL THE REQUIRED EROSION AND SEDIMENT CONTROL DEVICES ARE IN PLACE
- IF THE EXPOSED SOIL IS SOFT, PLASTIC OR CLAYEY, PLACE A SUB-BASE OF CRUSHED ROCK OR A LAYER OF HEAVY-DUTY FILTER CLOTH TO PROVIDE A FIRM FOUNDATION.
- ENSURE THAT THE INSTALLATION OF THE VIBRATION GRID INCLUDES ADEQUATE SEDIMENT STORAGE VOLUME UNDER THE GRID. WHERE NECESSARY, INSTALL SUITABLE PRECAST SEDIMENT COLLECTION CHAMBERS.
- PLACE A ROCK PAD/RAMP FORMING A MINIMUM 200mm THICK LAYER OF CLEAN, OPEN-VOID ROCK OVER THE ROADWAY BETWEEN THE VIBRATION GRID AND THE SEALED STREET TO PREVENT TYRES FROM PICKING UP MORE SOIL AFTER THEY HAVE BEEN CLEANED.
- IF THE ASSOCIATED CONSTRUCTION SITE IS UP-SLOPE OF THE ROCK PAD, THUS CAUSING STORMWATER RUNOFF TO FLOW TOWARDS THE ROCK PAD, THEN FORM A MINIMUM 300mm HIGH FLOW CONTROL BERM ACROSS THE ROCK PAD TO DIVERT SUCH RUNOFF TO A SUITABLE SEDIMENT TRAP
- THE TOTAL LENGTH OF THE VIBRATION GRIP AND ROCK RAMPS SHOULD BE AT LEAST 15m WHERE PRACTICABLE, AND AS WIDE AS THE FULL WIDTH OF THE ENTRY OR EXIT AND AT LEAST 3m. THE ROCK RAMP SHOULD COMMENCE AT THE EDGE OF THE OFF-SITE SEALED ROAD OR PAVEMENT.
- FLARE THE END OF THE ROCK PAD WHERE IT MEETS THE PAVEMENT SO THAT THE WHEELS OF TURNING VEHICLES DO NOT TRAVEL OVER UNPROTECTED SOIL.

MAINTENANCE

- INSPECT VIBRATION GRID PRIOR TO FORECAST RAIN, DAILY DURING EXTENDED PERIODS OF RAINFALL, AFTER SIGNIFICANT RUNOFF-PRODUCING RAINFALL, OR OTHERWISE AT FORTNIGHTLY INTERVALS.
- IF SAND, SOIL, SEDIMENT OR MUD IS TRACKED OR WASHED ONTO THE ADJACENT SEALED ROADWAY, THEN SUCH MATERIAL MUST BE PHYSICALLY REMOVED, FIRST USING A SQUARE-EDGED SHOVEL, AND THEN A STIFF-BRISTLED BROOM, AND THEN BY A MECHANICAL VACUUM UNIT, IF AVAILABLE.
- IF NECESSARY FOR SAFETY REASONS, THE ROADWAY SHALL ONLY BE WASHED CLEAN AFTER ALL REASONABLE EFFORTS HAVE BEEN TAKEN TO SHOVEL AND SWEEP THE MATERIAL FROM THE ROADWAY.
- WHEN THE VOIDS BETWEEN THE ROCK BECOMES FILLED WITH MATERIAL AND THE EFFECTIVENESS OF THE ROCK RAMPS ARE REDUCED TO A POINT WHERE SEDIMENT IS BEING TRACKED OFF THE SITE, A NEW 100mm LAYER OF ROCK MUST BE ADDED AND/OR THE ROCK PAD MUST BE EXTENDED.
- ENSURE ANY ASSOCIATED DRAINAGE CONTROL MEASURES ARE MAINTAINED IN ACCORDANCE WITH THEIR DESIRED OPERATIONAL CONDITION.
- DISPOSE OF SEDIMENT AND DEBRIS IN A MANNER THAT WILL NOT CREATE AN EROSION OR POLLUTION HAZARD.

CHECK DAM SEDIMENT TRAPS

INSTALLATION

- REFER TO APPROVED PLANS FOR LOCATION AND INSTALLATION DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION OR METHOD OF INSTALLATION CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
 - PRIOR TO PLACEMENT OF THE SEDIMENT TRAP, ENSURE THE DRAINAGE CHANNEL IS DEEP ENOUGH TO PREVENT WATER BEING UNSAFELY DIVERTED OUT OF THE DRAIN ONCE THE CHECK DAMS ARE INSTALLED.
 - LOCATE EACH CHECK DAM SEDIMENT TRAP AS DIRECTED WITHIN THE APPROVED PLANS, OR OTHERWISE AT SUCH A SPACING TO ACHIEVE THE REQUIRED SEDIMENT TRAPPING OUTCOMES.
 - IF THE CHECK DAMS ARE ALSO BEING USED TO CONTROL EROSION WITHIN THE DRAINAGE CHANNEL, THEN LOCATE EACH SUCCESSIVE CHECK DAM SUCH THAT THE CREST OF THE IMMEDIATE DOWNSTREAM DAM IS LEVEL WITH THE CHANNEL INVERT AT THE IMMEDIATE UPSTREAM CHECK DAM.
 - ENSURE SAND BAGS EXTEND UP THE CHANNEL BANKS (WHERE PRACTICAL) TO A LEVEL AT LEAST 100mm ABOVE THE CREST LEVEL OF THE CHECK DAM.
- ### MAINTENANCE
- INSPECT EACH CHECK DAM AND THE DRAINAGE CHANNEL AT LEAST WEEKLY AND AFTER RUNOFF-PRODUCING RAINFALL.
 - CORRECT ALL DAMAGE IMMEDIATELY. IF SIGNIFICANT EROSION OCCURS BETWEEN ANY OF THE CHECK DAMS, THEN CHECK THE SPACING OF THE DAMS AND WHERE NECESSARY INSTALL INTERMEDIATE CHECK DAMS OR A SUITABLE CHANNEL LINER.
 - CHECK FOR DISPLACEMENT OF THE CHECK DAMS.
 - CHECK FOR SOIL SCOUR AROUND THE ENDS OF EACH CHECK DAM. IF SUCH EROSION IS OCCURRING, CONSIDER EXTENDING THE WIDTH OF THE CHECK DAM TO AVOID SUCH PROBLEMS.
 - IF SEVERE SOIL EROSION OCCURS EITHER UNDER OR AROUND THE CHECK DAMS, THEN SEEK EXPERT ADVICE ON AN ALTERNATIVE TREATMENT MEASURE.
 - DE-SILT SEDIMENT TRAP IF THE SEDIMENT LEVEL EXCEEDS 1/3 THE CREST HEIGHT.
 - DISPOSE OF COLLECTED SEDIMENT IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.

KERB INLET SEDIMENT TRAPS

FROM IECA (INTERNATIONAL EROSION SEDIMENT ASSOCIATION) AUSTRALASIA STANDARD DRAWING ESC-03 (DEC 09).

MATERIALS

- SOCKS: MINIMUM 200mm DIAMETER SYNTHETIC OR BIODEGRADABLE TUBES MANUFACTURED FROM NON-WOVEN OR COMPOSITE FABRIC SUITABLE FOR THE 'FILTRATION' OF COARSE SEDIMENTS.
- FILL MATERIAL: STRAW, CANE MULCH, COMPOSITE MATERIAL (AS4454), COARSE SAND, OR CLEAN AGGREGATE.
- STAKES: MINIMUM 25 x 25mm TIMBER.

INSTALLATION

- REFER TO APPROVED PLANS FOR LOCATION AND INSTALLATION DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, DIMENSIONS OR METHOD OF INSTALLATION CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
- ENSURE THE SOCKS ARE PLACED INDIVIDUALLY OR COLLECTIVELY (AS A SINGLE SEDIMENT TRAP) SUCH THAT:
 - LEAKAGE AROUND OR UNDER THE SOCKS IS MINIMISED.
 - ADJOINING SOCKS ARE TIGHTLY BUTTED OR OVERLAPPED AT LEAST 450mm.
 - THE SURFACE AREA OF POTENTIAL WATER PONDING UP-SLOPE OF EACH SEDIMENT TRAP IS MAXIMISED.
 - TO THE MAXIMUM DEGREE PRACTICAL, ALL SEDIMENT-LADEN WATER WILL PASS THROUGH THE FORMED POND BEFORE FLOWING OVER THE DOWN-SLOPE END OF THE SEDIMENT TRAP.
- WHEN PLACED ACROSS THE INVERT OF MINOR DRAINS, ENSURE THE SOCKS ARE PLACED SUCH THAT:
 - THE CREST OF THE DOWNSTREAM SOCK IS LEVEL WITH THE CHANNEL INVERT AT THE IMMEDIATE UPSTREAM SOCK (IF ANY);
 - EACH SOCK EXTENDS UP THE CHANNEL BANKS SUCH THAT THE CREST OF THE SOCK AT ITS LOWEST POINT IS LOWER THAN GROUND LEVEL AT EITHER END OF THE SOCK.
- IF STAKES ARE REQUIRED TO ANCHOR THE SOCKS, THEIR SPACING DOES NOT EXCEED 1.2m OR SIX TIMES THE SOCK DIAMETER (WHICHEVER IS THE LESSER). A MAXIMUM STAKE SPACING OF 0.3m APPLIES WHEN USED TO FORM CHECK DAMS.

MAINTENANCE

- INSPECT ALL FILTER SOCKS PRIOR TO FORECAST RAIN, DAILY DURING EXTENDED PERIODS OF RAINFALL, AFTER SIGNIFICANT RUNOFF PRODUCING STORMS OR OTHERWISE AT WEEKLY INTERVALS.
- REPAIR OR REPLACE DAMAGED SOCKS.
- THE BULK OF THE SEDIMENT COLLECTED BEHIND THE FILTER SOCKS SHOULD BE REMOVED BY SHOVEL AFTER EACH STORM EVENT.
- REMOVE COLLECTED SEDIMENT AND DISPOSE OF IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.

REMOVAL

- ALL SAND, SOIL, SEDIMENT OR MUD MUST BE PHYSICALLY REMOVED FROM SEALED SURFACES. FIRST USING A SQUARE-EDGED SHOVEL, AND THEN A STIFF-BRISTLED BROOM, AND THEN BY A MECHANICAL VACUUM UNIT, IF AVAILABLE.
- IF NECESSARY FOR SAFETY REASONS, THE SEALED SURFACE SHALL ONLY BE WASHED CLEAN AFTER ALL REASONABLE EFFORTS HAVE BEEN TAKEN TO SHOVEL AND SWEEP THE MATERIAL FROM THE SURFACE.
- DISPOSE OF COLLECTED SEDIMENT IN A SUITABLE MANNER THAT WILL NOT CAUSE AN EROSION OR POLLUTION HAZARD.
- ALL SYNTHETIC (PLASTIC) MESH OR OTHER NON READILY BIODEGRADABLE MATERIAL MUST BE REMOVED FROM THE SITE ONCE THE SLOPE OR DRAIN IS STABILISED, OR THE SOCKS HAVE DETERIORATED TO A POINT WHERE THEY ARE NO LONGER PROVIDING THEIR INTENDED DRAINAGE OR SEDIMENT CONTROL FUNCTION.

REVISIONS:			
No.	REVISION DESCRIPTION	MP	DATE
A	ISSUED FOR APPROVAL	MP	21/03/23



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 IF IN DOUBT, ASK

CLIENT
PARK LAKE ADARE PTY LTD PO BOX 4107 SPRINGFIELD QLD 4300
SCALE

PROJECT TITLE
PROPOSED SUBDIVISION 174 ADARE ROAD, ADARE, QLD 4343 STAGES 2 AND 3
DRAWING TITLE
EROSION AND SEDIMENT CONTROL NOTES

DRAWING STATUS			
ORIGINAL ISSUE FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3553220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2191	REVISION A	

EXISTING DAMS
 THE EXISTING DAMS WITHIN THE SITE ARE TO BE DE-WATERED. REMOVE ALL ORGANIC AND DELETERIOUS MATTER AND EXCAVATE WEAK, DISTURBED, WATER AFFECTED AND ORGANIC RICH SOILS. PROOF ROLL THE SITE USING SIX PASSES OF A 10 TONNE MINIMUM STATIC WEIGHT VIBRATORY PAD TYPE ROLLER UNDER THE SUPERVISION OF A GEOTECHNICAL ENGINEER. ANY SOFT SPOTS AND/OR LOOSE AREAS ARE TO BE EXCAVATED TO A DEPTH OF 300mm AND REPLACED WITH APPROVED BACKFILL. THESE AREAS ARE TO BE INSPECTED BY A GEOTECHNICAL ENGINEER TO ASSESS WHETHER FURTHER EXCAVATION IS REQUIRED. SELECT REPLACEMENT MATERIAL TO BE (MINIMUM CBR15) PLACED IN LAYERS NOT EXCEEDING 150mm COMPACTED THICKNESS, COMPACTED TO THE COMPACTION REQUIREMENTS.

LEVEL 1 COMPACTION
 ALL FILLING ON SITE TO BE LEVEL 1 COMPACTED FILL AS PER AS3798 UNLESS NOTED OTHERWISE.
 ALL FILLING OF EXISTING DAMS WITHIN INDIVIDUAL LOTS 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)

NOTE

- REFER TO CIVIL SPECIFICATIONS ON DRAWING C001 FOR SUBGRADE PREPARATION REQUIREMENTS.
- THIS PLAN IS TO BE READ IN CONJUNCTION WITH THE GEOTECHNICAL REPORT: 93323.00.R.01.REV01.
- DETAILED BULK EARTHWORKS MODELLING HAS NOT BEEN UNDERTAKEN FOR PIPE TRENCHING

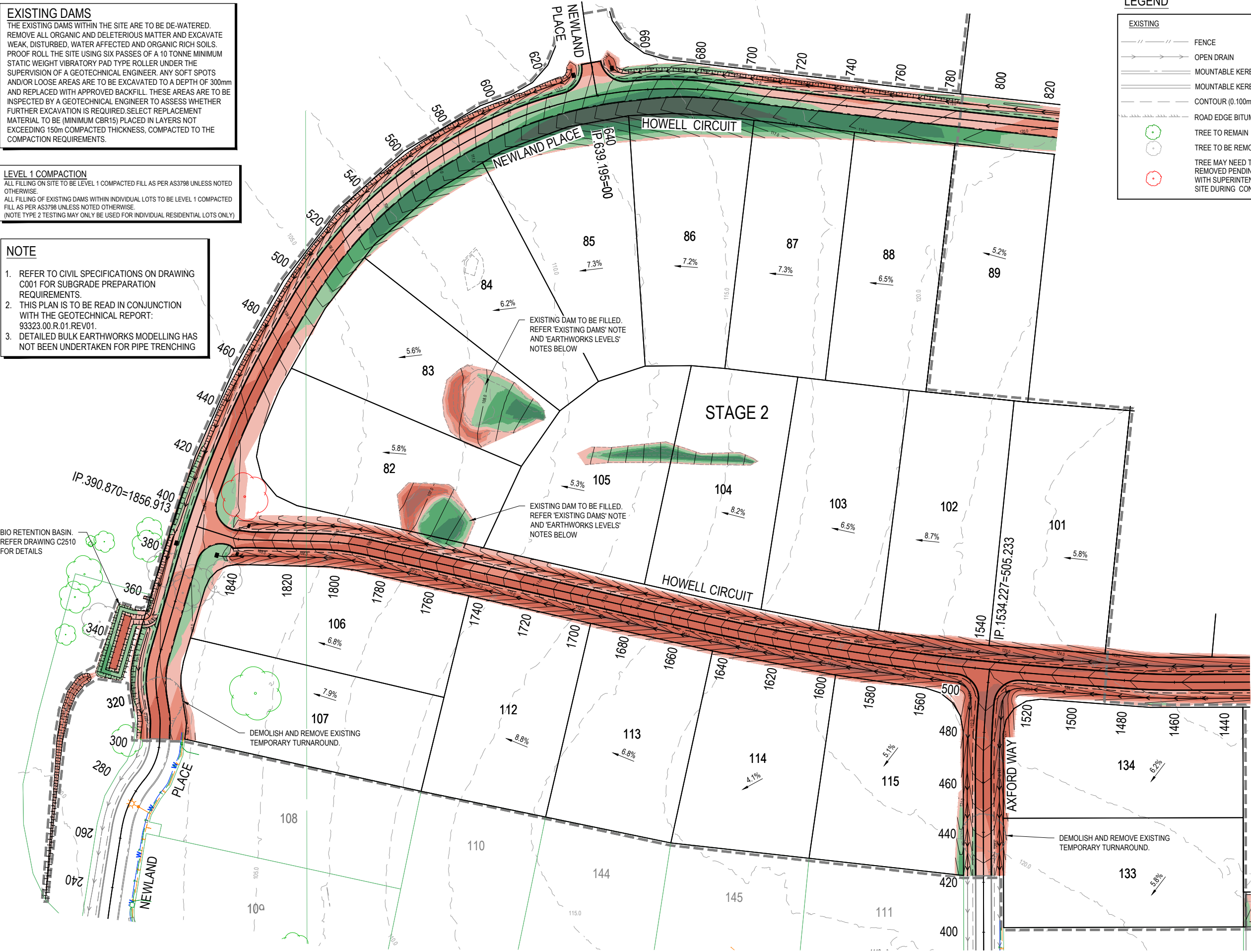
LEGEND	
EXISTING	PROPOSED
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--->---	--->---
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○	---
○	---
○	---

SERVICES (PUP) LEGEND	
	EXISTING
COMMUNICATIONS	C(*)
DRAINAGE (unknown dia.)	D(*)
DRAINAGE (known dia.)	○
ELECTRICITY	E(*)
O/H ELECTRICITY & POLE	∨
GAS	G(*)
WATER MAIN	W(*)

(*) - DENOTES QUALITY LEVEL AS PER A.S. 5488-2013.

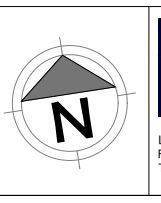
BULK EARTHWORKS QUANTITIES	
150mm STRIPPING:	6,516m ³
CUT VOLUME:	9,392m ³
FILL VOLUME:	7,087m ³
DAM FILL:	1,295m ³ (ASSUMPTION)
(2.0m DEPTH BENEATH WATER LEVEL)	

CUT FILL	
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



REVISIONS:	
No.	REVISION DESCRIPTION
A	ISSUED FOR APPROVAL

PARKLAKE
ADARE



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 SCALE 1:750

PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3
BULK EARTHWORKS PLAN SHEET 1

DRAWING STATUS			
ORIGINAL ISSUE FOR APPROVAL			
PROJECT LEADER	DESIGNER	SIGNATURE	RPEID: 19536 NER: 3053220
CK	MP	C. KIRK	
DRAFTSPERSON	SCALE	DATE	SHEET SIZE
MP	AS SHOWN	MAR 2023	A1
JOB No.	DRAWING No.	REVISION	
BR222161	C2200		A

FOR CONTINUATION REFER DWG No. C2201

FOR CONTINUATION REFER DWG No. C2200

LEVEL 1 COMPACTION
 ALL FILLING ON SITE TO BE LEVEL 1 COMPACTED FILL AS PER AS3798 UNLESS NOTED OTHERWISE.
 ALL FILLING OF EXISTING DAMS WITHIN INDIVIDUAL LOTS 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)

EXISTING		PROPOSED	
---	FENCE	→	OPEN DRAIN
→	OPEN DRAIN	====	KERB AND CHANNEL TYPE B1
====	MOUNTABLE KERB TYPE M4	====	MOUNTABLE KERB TYPE M4
====	MOUNTABLE KERB TYPE M6	====	MOUNTABLE KERB TYPE M6
- - - -	CONTOUR (0.100m)	---	CONTOUR
---	ROAD EDGE BITUMEN	---	ROAD EDGE BITUMEN
○	TREE TO REMAIN	---	ROAD SHOULDER
○	TREE TO BE REMOVED	---	DRAINAGE
○	TREE MAY NEED TO BE REMOVED PENDING AGREEMENT WITH SUPERINTENDENT ON SITE DURING CONSTRUCTION	---	STAGE BOUNDARY

SERVICES (PUP) LEGEND

	EXISTING
COMMUNICATIONS	C(*)
DRAINAGE (unknown dia.)	D(*)
DRAINAGE (known dia.)	○
ELECTRICITY	E(*)
O/H ELECTRICITY & POLE	⋈
GAS	G(*)
WATER MAIN	W(*)

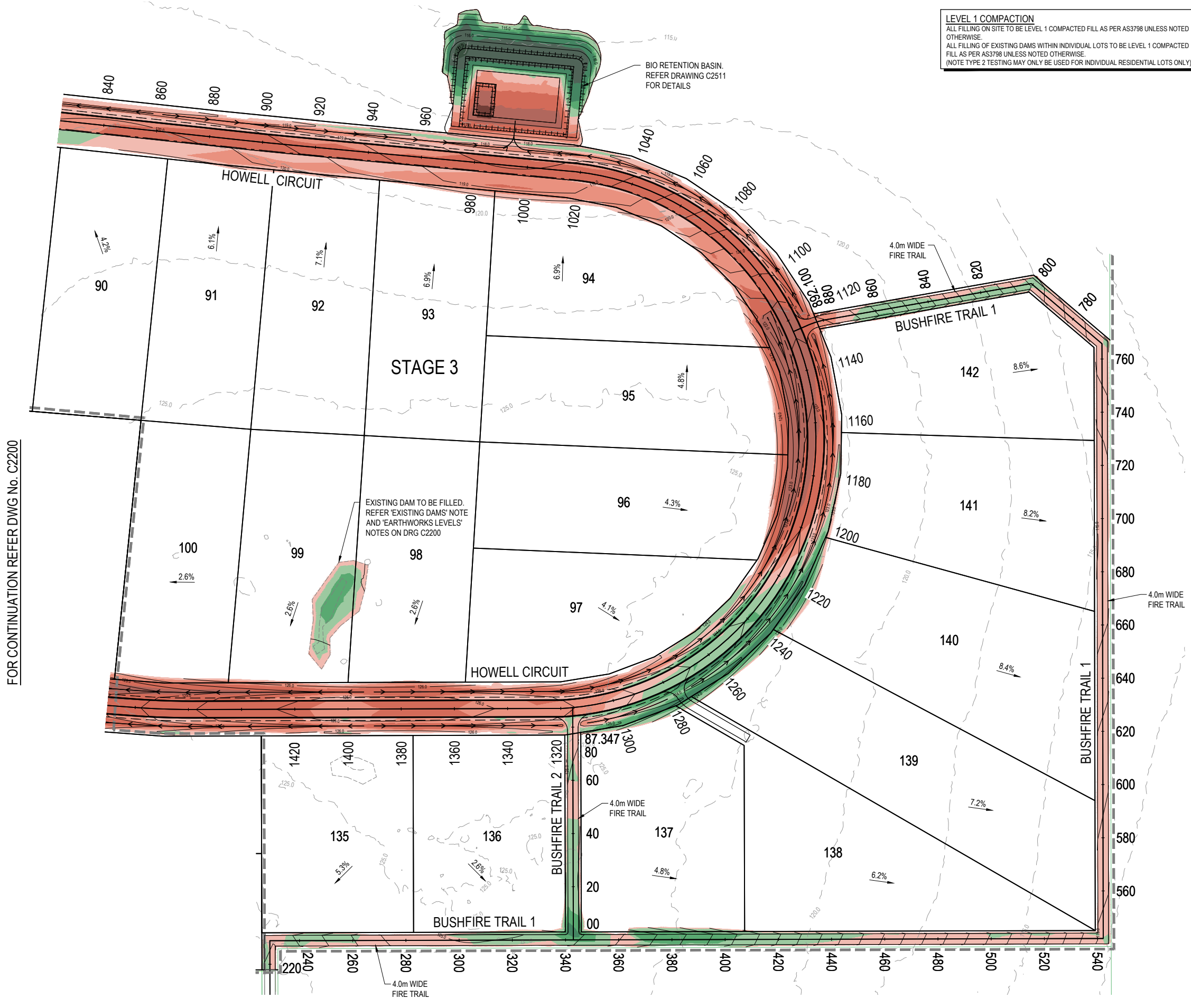
(*) - DENOTES QUALITY LEVEL AS PER A.S. 5488-2013.

CUT FILL

CUT	FILL	0.00m - 0.25m
CUT	FILL	0.25m - 0.50m
CUT	FILL	0.50m - 1.000m
CUT	FILL	1.00m - 2.00m
CUT	FILL	> 2.00m

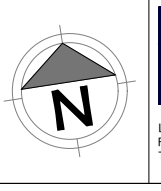
NOTE

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- DETAILED BULK EARTHWORKS MODELLING HAS NOT BEEN UNDERTAKEN FOR PIPE TRENCHING



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SCALE
 0 7.5 15 22.5 30 37.5m 75m
 SCALE 1:750

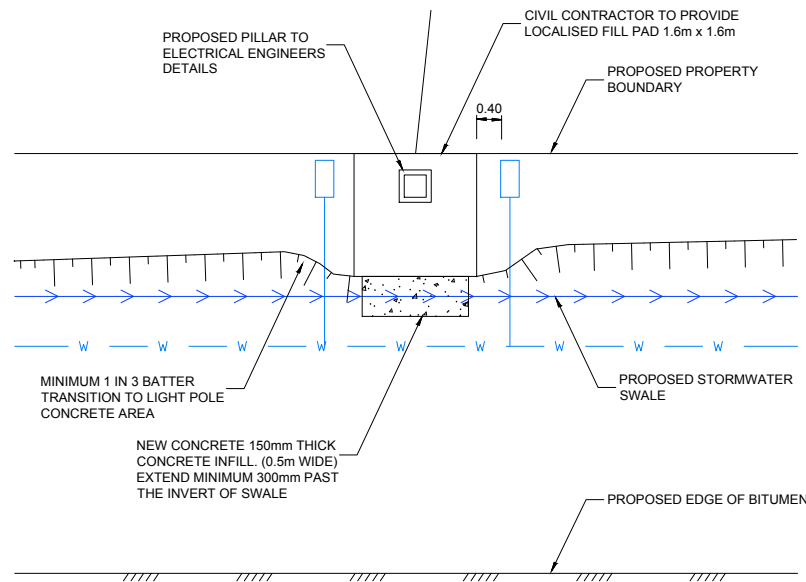
PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3

DRAWING TITLE
BULK EARTHWORKS PLAN
SHEET 2

DRAWING STATUS
ORIGINAL ISSUE
 FOR APPROVAL

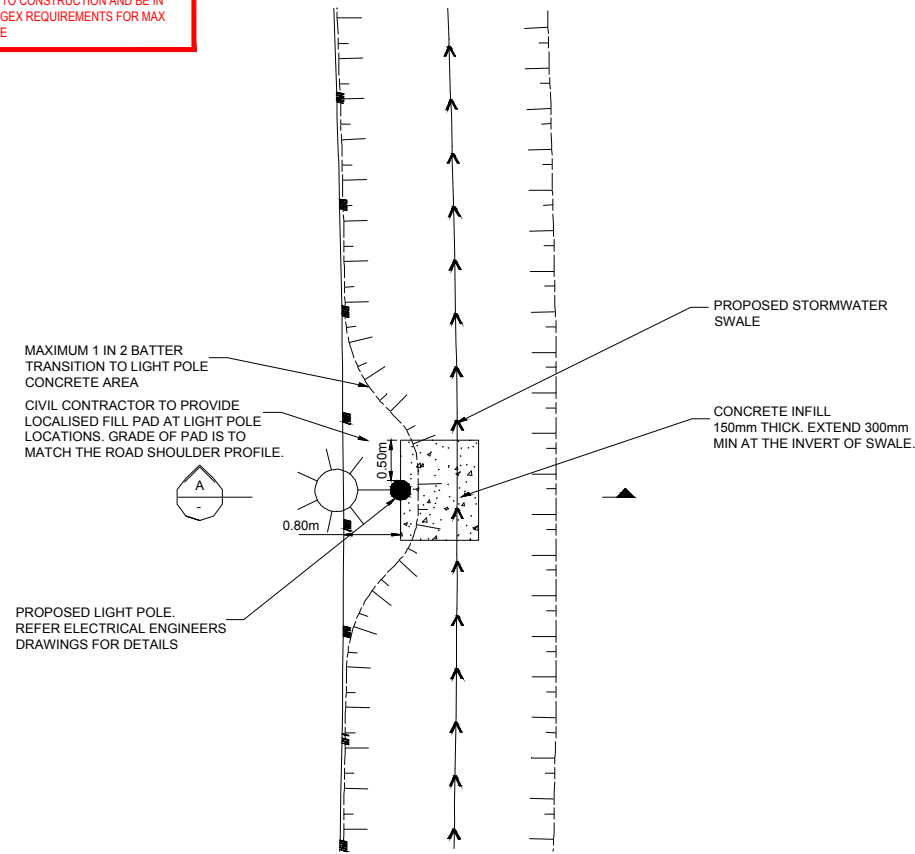
PROJECT LEADER	DESIGNER	SIGNATURE	RPEQ: 19536
CK	MP	C. KIRK	NER: 3053220
DRAFTSPERSON	SCALE	DATE	SHEET SIZE
MP	AS SHOWN	MAR 2023	A1
JOB No.	DRAWING No.	REVISION	
BR222161	C2201	A	

NOTE:
PMT SITE EARTHWORKS TO BE CONFIRMED WITH THE SUPERINTENDENT
PRIOR TO CONSTRUCTION AND BE IN CONSIDERATION OF ENERGEX
REQUIREMENTS FOR MAX CUT/FILL ACROSS PMT SITE

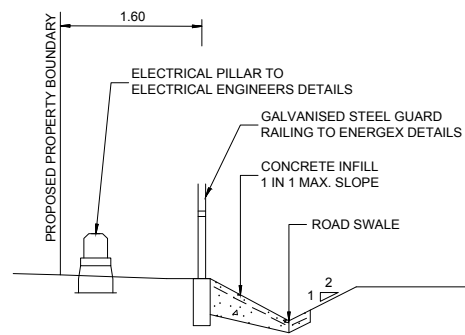


TYPICAL ELECTRICAL PILLAR PROTECTION DETAIL
SCALE 1:50

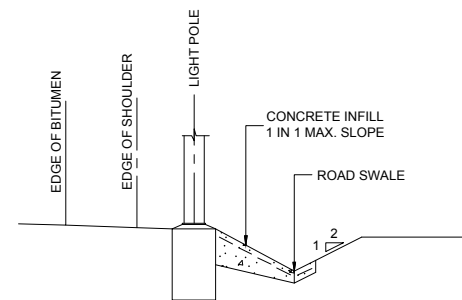
NOTE:
PMT SITE EARTHWORKS TO BE CONFIRMED WITH THE
SUPERINTENDENT PRIOR TO CONSTRUCTION AND BE IN
CONSIDERATION OF ENERGEX REQUIREMENTS FOR MAX
CUT/FILL ACROSS PMT SITE



TYPICAL LIGHT POLE PROTECTION DETAIL
SCALE 1:50



B TYPICAL ELECTRICAL PILLAR SECTION
SCALE 1:50



TYPICAL LIGHT POLE SECTION A
SCALE 1:50

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No.	REVISION DESCRIPTION	MP	DATE
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PO BOX 4107 SPRINGFIELD QLD 4300
SCALE
0 1 2 3 4 5m
SCALE 1:50

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3
DRAWING TITLE
BULK EARTHWORKS DETAILS

DRAWING STATUS			
ORIGINAL ISSUE			
FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2290	REVISION A	

SURFACE TREATMENT LEGEND:

- PAVEMENT 1 - ACCESS STREET - 1x10⁵
30mm ASPHALT CONCRETE EMUSION PRIME
125mm CBR 80
125mm CBR 45
220mm CBR 15
COMBIGRID 40/40 Q1 GEOCOMPOSITE
TOTAL PAVEMENT DEPTH = 500mm
- PAVEMENT 2 - ACCESS STREET - 1x10⁵
30mm ASPHALT CONCRETE EMUSION PRIME
150mm CBR 80
100mm CBR 45
220mm CBR 15
TOTAL PAVEMENT DEPTH = 500mm

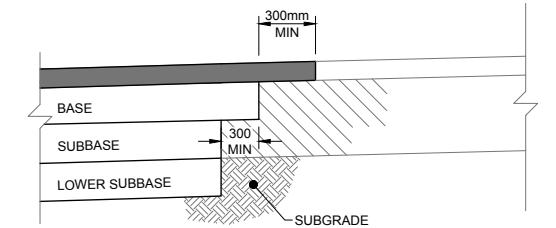
PAVEMENT NOTES

- FOR ANY PARTIALLY BUILT ASPHALT PAVEMENT, THE PAVEMENT SHOULD NOT BE LOADED (BY EITHER NON-ESSENTIAL CONSTRUCTION OR GENERAL TRAFFIC) UNTIL THE PARTIALLY BUILT ASPHALT PAVEMENT IS ≤ 60mm BELOW THE FINISHED SURFACE LEVEL.
- GENERAL TRAFFIC USE OF A PARTIALLY BUILT ASPHALT PAVEMENT SHOULD BE LIMITED, AS PROLONGED USE WILL RESULT IN A CONSIDERABLY REDUCED PAVEMENT LIFE.
- THE PROPOSED WORK SHOULD BE CUT IN TO EXPOSE THE EDGE OF THE EXISTING PAVEMENT AND NOT SIMPLY BUTTED AGAINST THE EDGE OF THE EXISTING SURFACE.
- A MINIMUM GRAVEL LAYER 150-200mm ABOVE THE GEOGRID SHALL BE ADHERED TO AS PER SUPPLIER (GLOBAL SYNTHETICS) REQUIREMENTS AND SPECIFICATIONS.

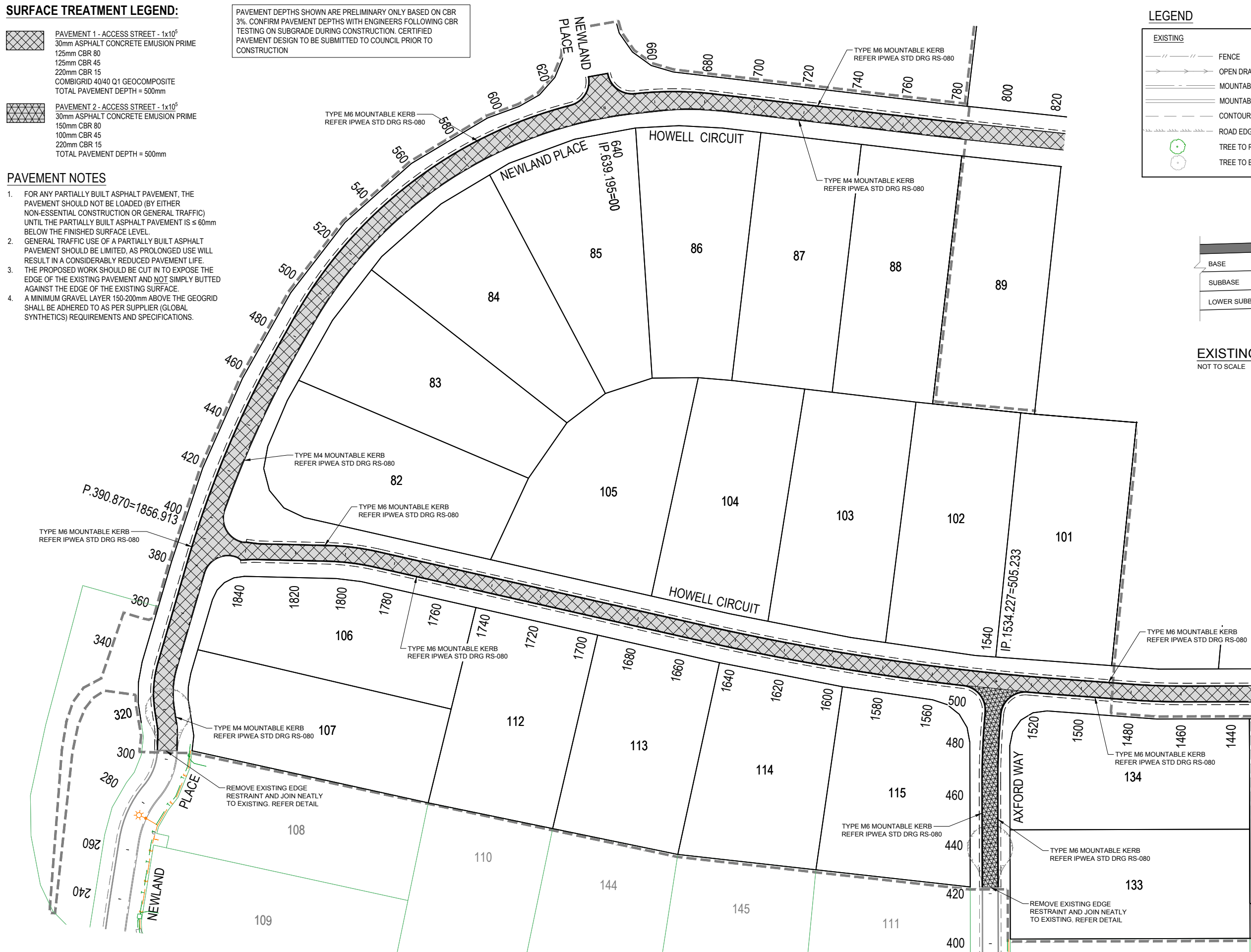
PAVEMENT DEPTHS SHOWN ARE PRELIMINARY ONLY BASED ON CBR 3%. CONFIRM PAVEMENT DEPTHS WITH ENGINEERS FOLLOWING CBR TESTING ON SUBGRADE DURING CONSTRUCTION. CERTIFIED PAVEMENT DESIGN TO BE SUBMITTED TO COUNCIL PRIOR TO CONSTRUCTION

LEGEND

EXISTING	PROPOSED
--- FENCE	→ OPEN DRAIN
→ OPEN DRAIN	≡ KERB AND CHANNEL TYPE B1
≡ MOUNTABLE KERB TYPE M4	≡ MOUNTABLE KERB TYPE M4
≡ MOUNTABLE KERB TYPE M6	≡ MOUNTABLE KERB TYPE M6
- - - CONTOUR (0.100m)	≡ ROAD EDGE BITUMEN
≡ ROAD EDGE BITUMEN	≡ ROAD SHOULDER
○ TREE TO REMAIN	≡ DRAINAGE
○ TREE TO BE REMOVED	



EXISTING PAVEMENT JOINT DETAIL
NOT TO SCALE



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A	ISSUED FOR APPROVAL	MP	21/03/23



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IF IN DOUBT, ASK

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PO BOX 4107 SPRINGFIELD QLD 4300
SCALE
0 7.5 15 22.5 30 37.5m 75m
SCALE 1:750

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3
DRAWING TITLE
PAVEMENT PLAN SHEET 1

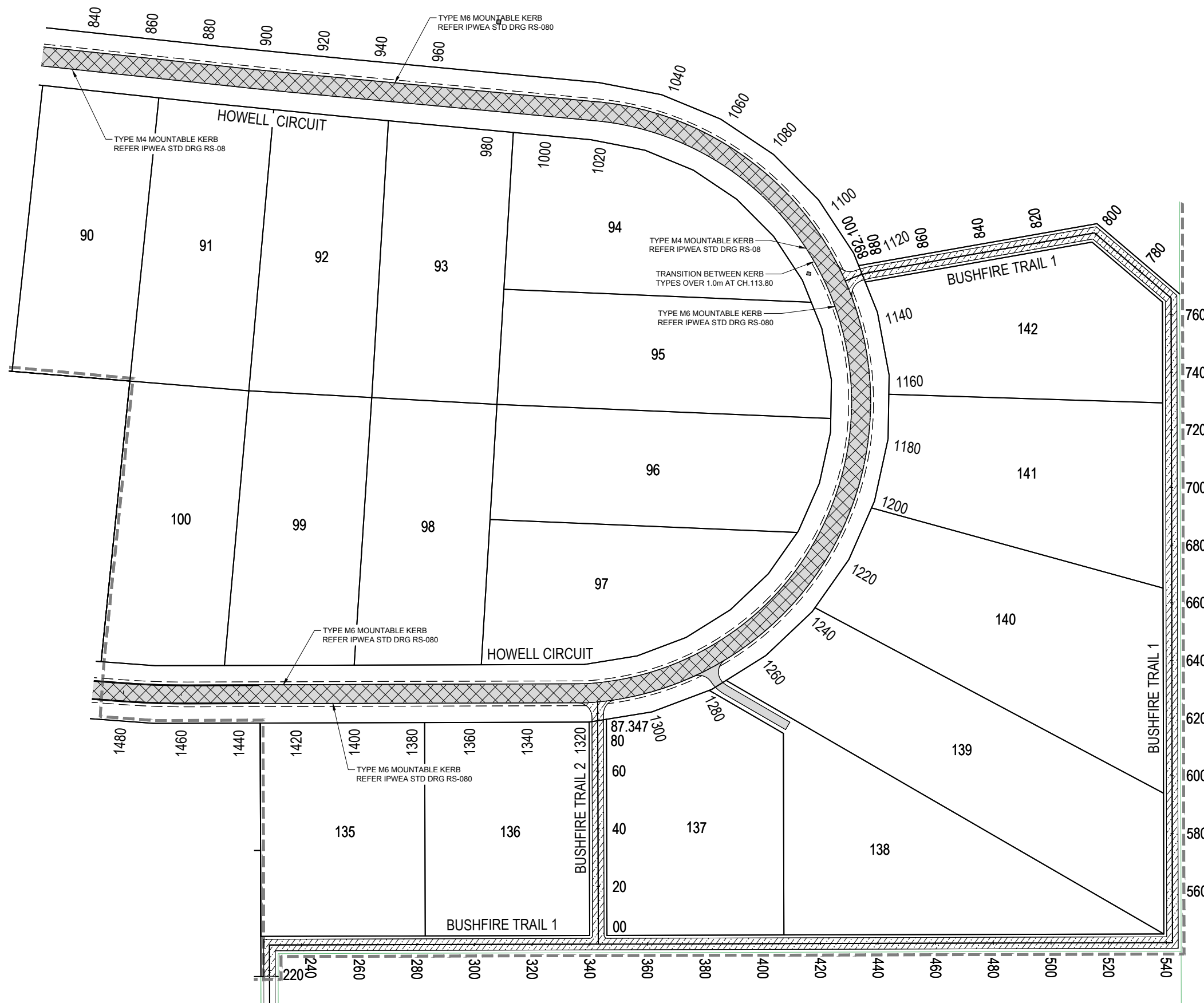
DRAWING STATUS
ORIGINAL ISSUE
FOR APPROVAL

PROJECT LEADER	DESIGNER	SIGNATURE	RPEID
CK	MP	C. KRK	19536 NER-3053220
DRAFTSPERSON	SCALE	DATE	SHEET SIZE
MP	AS SHOWN	MAR 2023	A1
JOB No.	DRAWING No.	REVISION	REVISION
BR222161	C2300		A

LEGEND

EXISTING	PROPOSED

FOR CONTINUATION REFER DWG No. C2301



SURFACE TREATMENT LEGEND:

	PAVEMENT 1 - ACCESS STREET - 1x10 ⁵ 30mm ASPHALT CONCRETE PRIMER SEAL 100mm CBR 80 150mm CBR 45 150mm CBR 15 TOTAL PAVEMENT DEPTH = 430mm
	BUSHFIRE TRAIL REFER DRG'S C2700-C2708
	DRIVEWAY REFER IPWEA STD DRG RS-056

PAVEMENT NOTES

- FOR ANY PARTIALLY BUILT ASPHALT PAVEMENT, THE PAVEMENT SHOULD NOT BE LOADED (BY EITHER NON-ESSENTIAL CONSTRUCTION OR GENERAL TRAFFIC) UNTIL THE PARTIALLY BUILT ASPHALT PAVEMENT IS ≤ 60mm BELOW THE FINISHED SURFACE LEVEL.
- GENERAL TRAFFIC USE OF A PARTIALLY BUILT ASPHALT PAVEMENT SHOULD BE LIMITED, AS PROLONGED USE WILL RESULT IN A CONSIDERABLY REDUCED PAVEMENT LIFE.
- THE PROPOSED WORK SHOULD BE CUT IN TO EXPOSE THE EDGE OF THE EXISTING PAVEMENT AND NOT SIMPLY BUTTED AGAINST THE EDGE OF THE EXISTING SURFACE.

PAVEMENT DEPTHS SHOWN ARE PRELIMINARY ONLY BASED ON CBR 3%. CONFIRM PAVEMENT DEPTHS WITH ENGINEERS FOLLOWING CBR TESTING ON SUBGRADE DURING CONSTRUCTION. CERTIFIED PAVEMENT DESIGN TO BE SUBMITTED TO COUNCIL PRIOR TO CONSTRUCTION

REVISIONS:	
No.	REVISION DESCRIPTION
A	ISSUED FOR APPROVAL



van der Meer Consulting

van der meer

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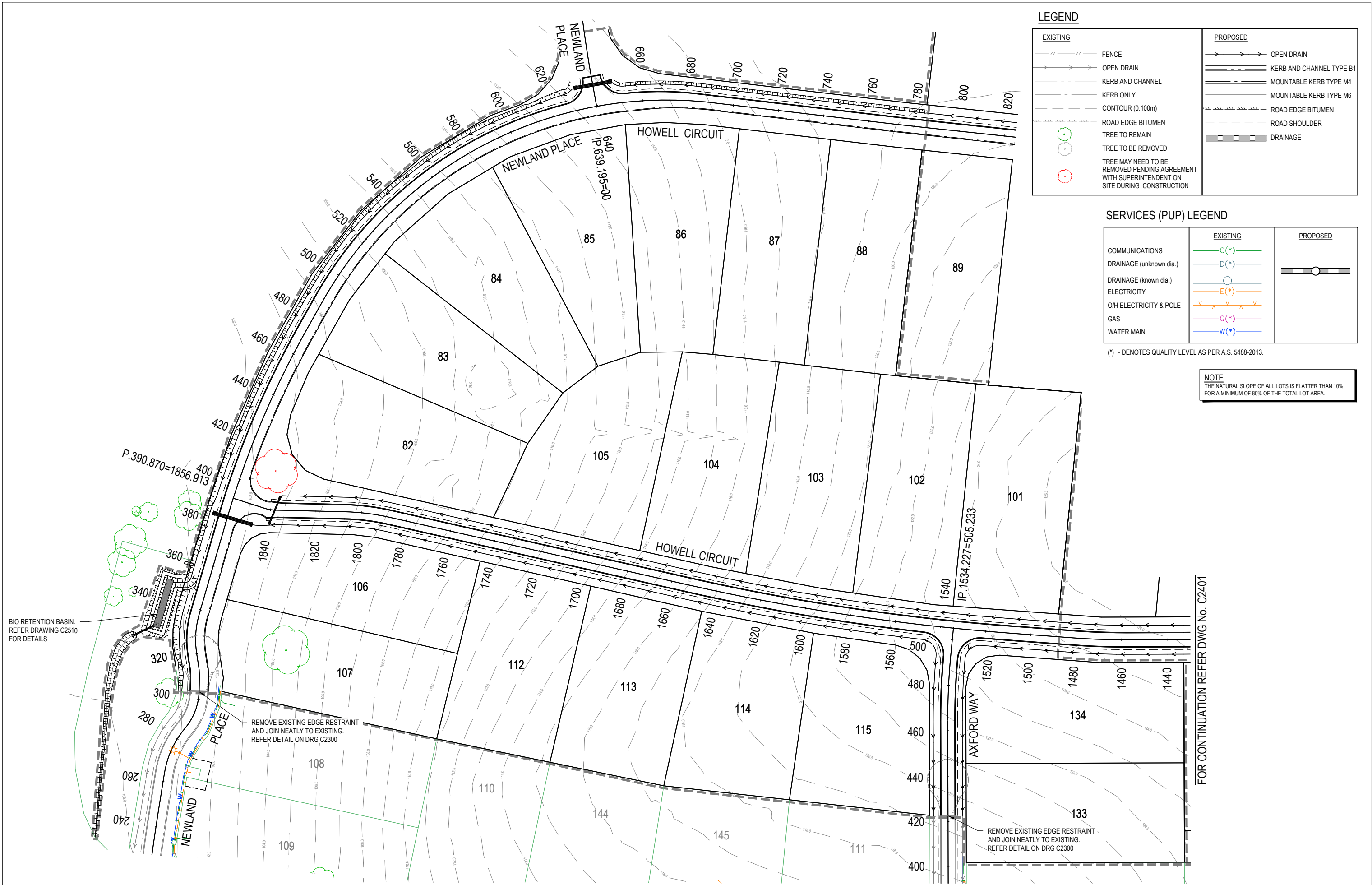
CLIENT
PARK LAKE ADARE PTY LTD
PO BOX 4107 SPRINGFIELD QLD 4300

SCALE
0 7.5 15 22.5 30 37.5m 75m
SCALE 1:750

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
PAVEMENT PLAN SHEET 2

DRAWING STATUS			
ORIGINAL ISSUE			
FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2301	REVISION	A



EXISTING		PROPOSED	
	FENCE		OPEN DRAIN
	OPEN DRAIN		KERB AND CHANNEL TYPE B1
	KERB AND CHANNEL		MOUNTABLE KERB TYPE M4
	KERB ONLY		MOUNTABLE KERB TYPE M6
	CONTOUR (0.100m)		ROAD EDGE BITUMEN
	ROAD EDGE BITUMEN		ROAD SHOULDER
	TREE TO REMAIN		DRAINAGE
	TREE TO BE REMOVED		
	TREE MAY NEED TO BE REMOVED PENDING AGREEMENT WITH SUPERINTENDENT ON SITE DURING CONSTRUCTION		

SERVICES (PUP) LEGEND		
	EXISTING	PROPOSED
COMMUNICATIONS		
DRAINAGE (unknown dia.)		
DRAINAGE (known dia.)		
ELECTRICITY		
O/H ELECTRICITY & POLE		
GAS		
WATER MAIN		

(*) - DENOTES QUALITY LEVEL AS PER A.S. 5488-2013.

NOTE
THE NATURAL SLOPE OF ALL LOTS IS FLATTER THAN 10% FOR A MINIMUM OF 80% OF THE TOTAL LOT AREA.

BIO RETENTION BASIN. REFER DRAWING C2510 FOR DETAILS

REMOVE EXISTING EDGE RESTRAINT AND JOIN NEATLY TO EXISTING. REFER DETAIL ON DRG C2300

REMOVE EXISTING EDGE RESTRAINT AND JOIN NEATLY TO EXISTING. REFER DETAIL ON DRG C2300

FOR CONTINUATION REFER DWG NO. C2401

REVISIONS:	
No.	REVISION DESCRIPTION
A	ISSUED FOR APPROVAL



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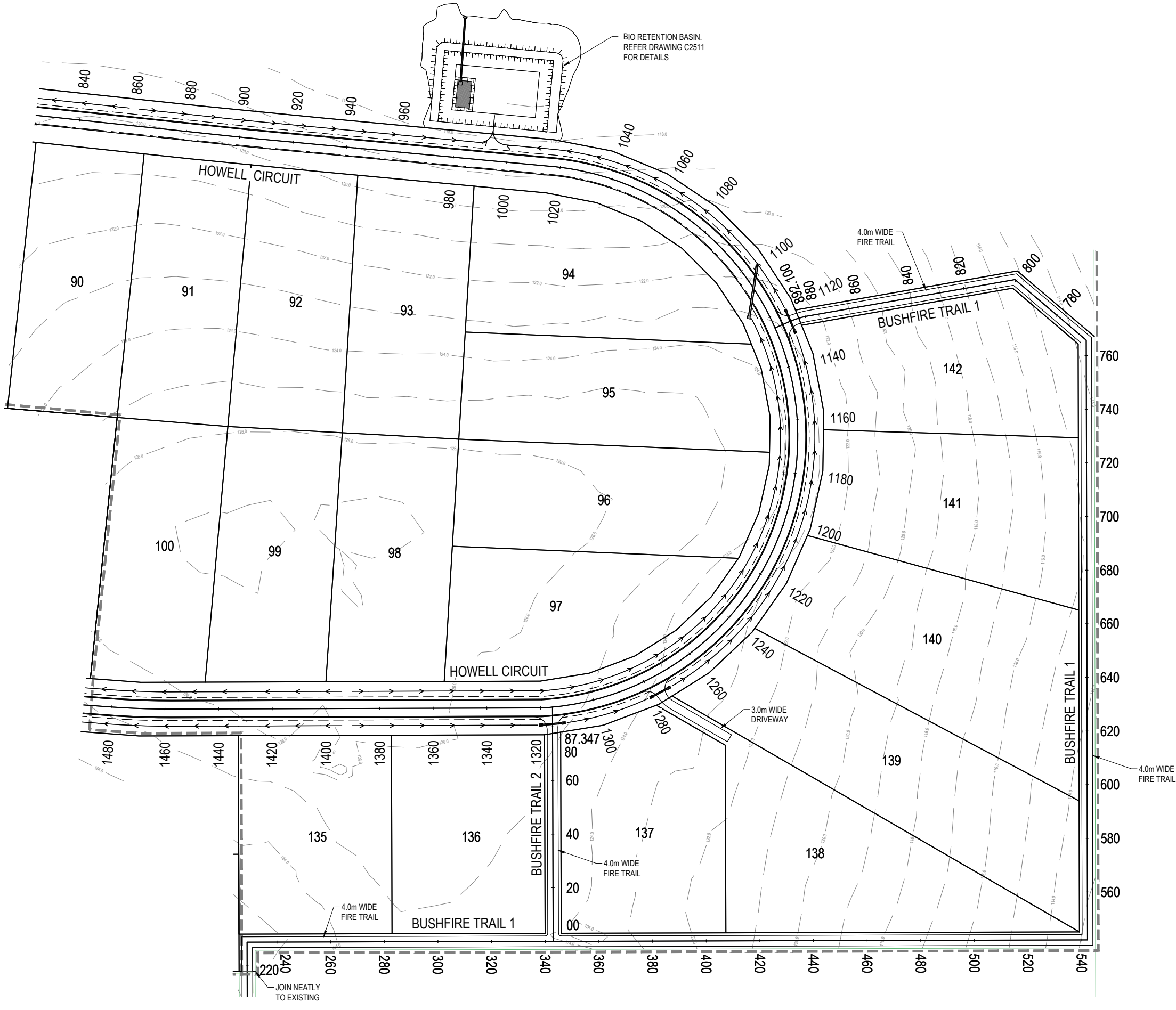
CLIENT
PARK LAKE ADARE PTY LTD
 PO BOX 4107 SPRINGFIELD QLD 4300
 SCALE

 SCALE 1:750

PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3
 DRAWING TITLE
ROADWORKS PLAN SHEET 1

DRAWING STATUS			
ORIGINAL ISSUE FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEQ: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2400	REVISION	A

FOR CONTINUATION REFER DWG No. C2400



EXISTING		PROPOSED	
	FENCE		OPEN DRAIN
	OPEN DRAIN		KERB AND CHANNEL TYPE B1
	KERB AND CHANNEL		MOUNTABLE KERB TYPE M4
	KERB ONLY		MOUNTABLE KERB TYPE M6
	CONTOUR (0.100m)		ROAD EDGE BITUMEN
	ROAD EDGE BITUMEN		ROAD SHOULDER
	TREE TO REMAIN		DRAINAGE
	TREE TO BE REMOVED		
	TREE MAY NEED TO BE REMOVED PENDING AGREEMENT WITH SUPERINTENDENT ON SITE DURING CONSTRUCTION		

SERVICES (PUP) LEGEND		
	EXISTING	PROPOSED
COMMUNICATIONS		
DRAINAGE (unknown dia.)		
DRAINAGE (known dia.)		
ELECTRICITY		
O/H ELECTRICITY & POLE		
GAS		
WATER MAIN		

(*) - DENOTES QUALITY LEVEL AS PER A.S. 5488-2013.

NOTE
THE NATURAL SLOPE OF ALL LOTS IS FLATTER THAN 10% FOR A MINIMUM OF 80% OF THE TOTAL LOT AREA.

REVISIONS:			
No.	REVISION DESCRIPTION	MP DRAWN	21/03/23 DATE
A	ISSUED FOR APPROVAL	MP	21/03/23



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P/N: D0017 - AM

CLIENT
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PO BOX 4107 SPRINGFIELD QLD 4300

SCALE
0 7.5 15 22.5 30 37.5m 75m
SCALE 1:750

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

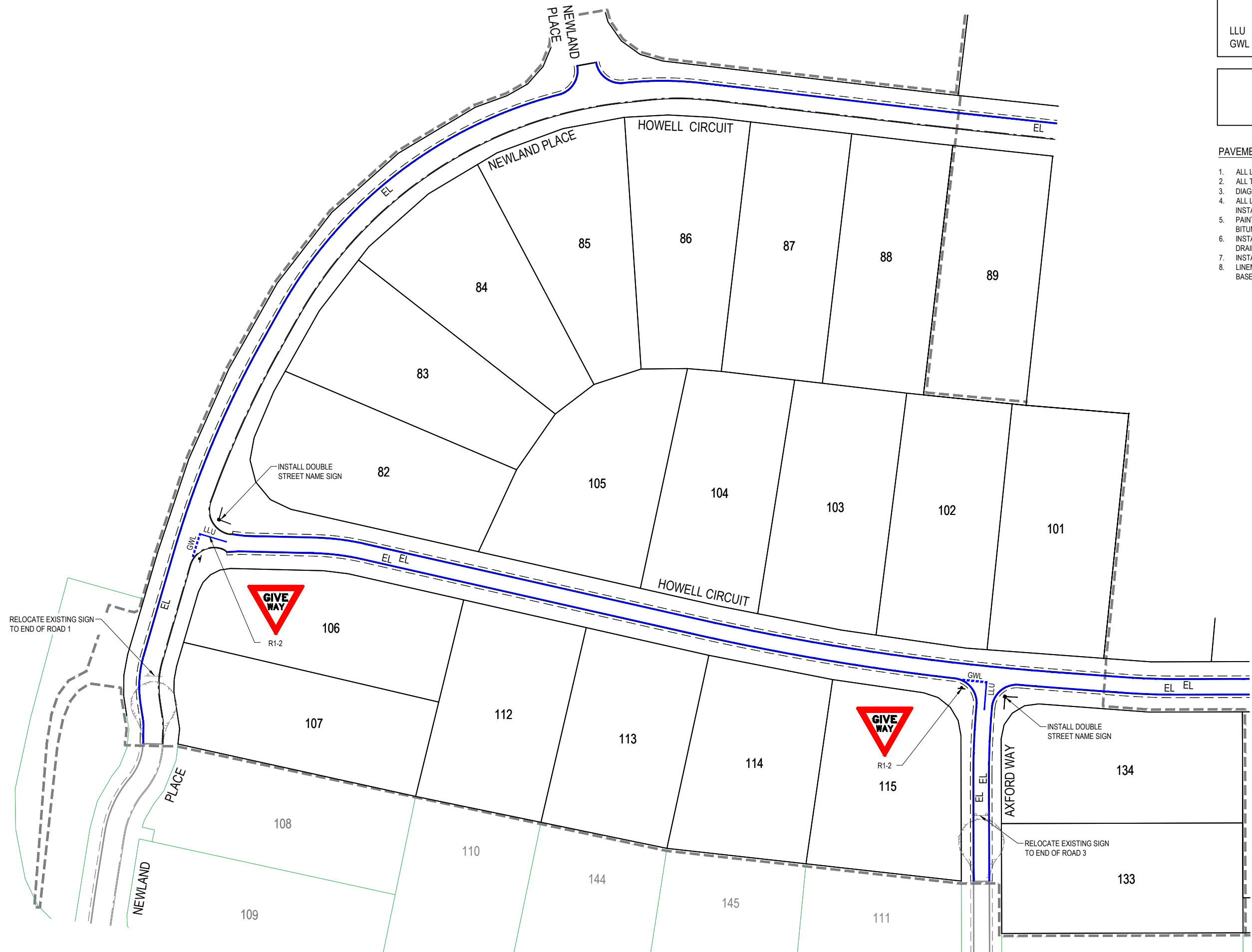
DRAWING TITLE
ROADWORKS PLAN SHEET 2

DRAWING STATUS			
ORIGINAL ISSUE			
FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEQ: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2401	REVISION A	

PAVEMENT MARKING LEGEND	
LLU	SEPARATION LINE UNBROKEN (150mm)
GWL	GIVE WAY LINE (300mm)

SIGNS LEGEND	
	NEW SIGN

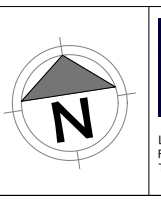
- PAVEMENT MARKING NOTES**
- ALL LONGITUDINAL LINES AS PER MUTCD SECTION 5.2.
 - ALL TRANSVERSE LINES AS PER MUTCD SECTION 5.4.
 - DIAGONAL AND CHEVRONS AS PER MUTCD SECTION 5.5.
 - ALL LINWORK TO HAVE RAISED REFLECTIVE MARKERS INSTALLED AS PER MUTCD SECTION 5.6.
 - PAINT FULL WIDTH EDGE LINE (EL) 200mm FROM EDGE OF BITUMEN AS SHOWN.
 - INSTALL GUIDE POSTS TO EDGE OF BITUMEN ALONG TABLE DRAINS IN ACCORDANCE WITH TMR STD DRG SD1356.
 - INSTALL GUIDE POSTS TO BOTH SIDES OF ALL DRIVEWAYS.
 - LINEMARKING SHALL BE DULUX ROADMASTER WATER BASED PAVEMENT MARKING OR APPROVED EQUIVALENT.



FOR CONTINUATION REFER DWG No. C2431

REVISIONS:	
No.	REVISION DESCRIPTION
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PARKLAKE
ADARE



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SCALE
0 7.5 15 22.5 30 37.5m 75m
SCALE 1:750

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
SIGNS AND PAVEMENT MARKING PLAN - SHEET 1

DRAWING STATUS			
ORIGINAL ISSUE			
FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2430	REVISION A	

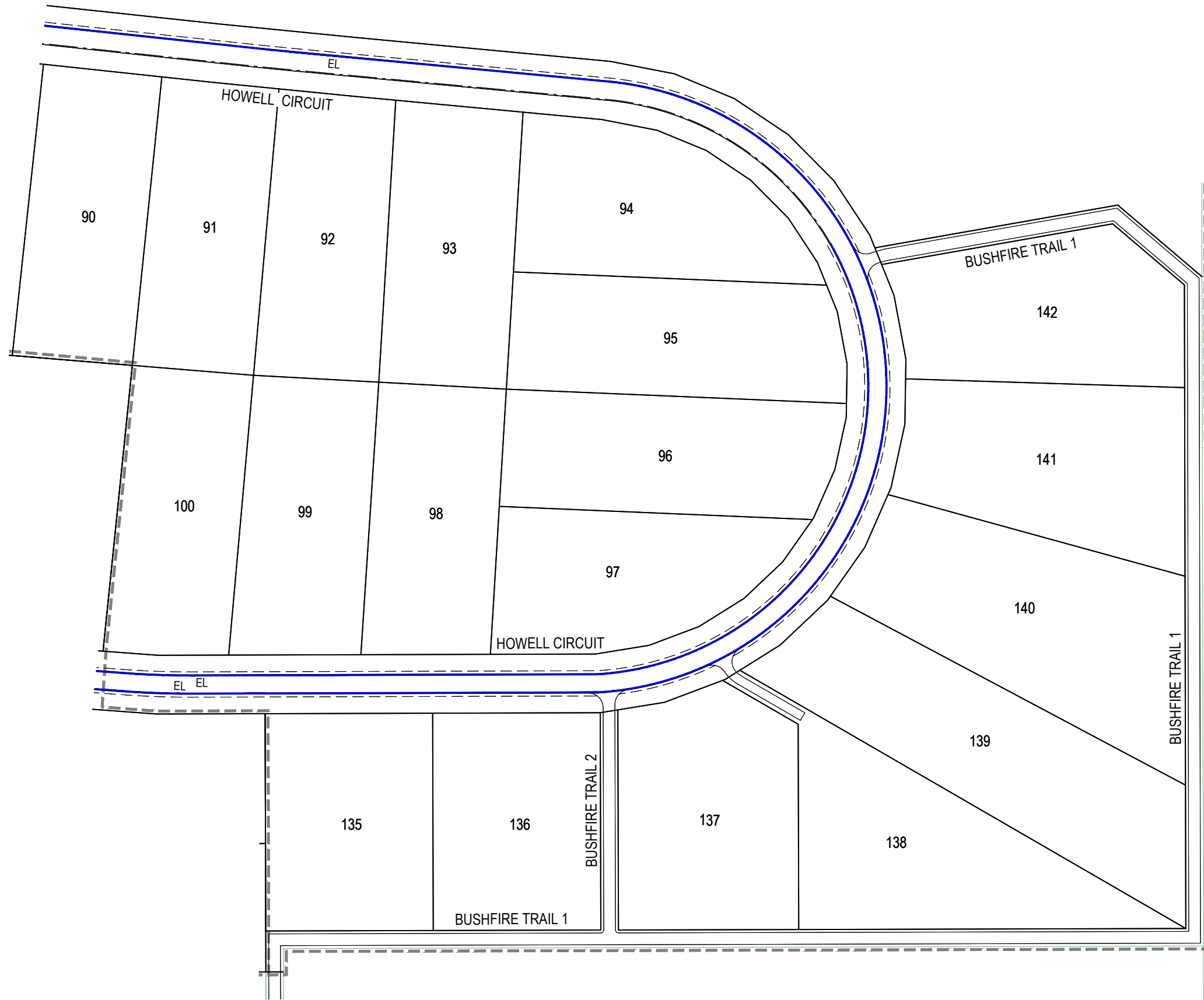
PAVEMENT MARKING LEGEND	
LLU	SEPARATION LINE UNBROKEN (150mm)
GWL	GIVE WAY LINE (300mm)

SIGNS LEGEND	
	NEW SIGN

PAVEMENT MARKING NOTES

1. ALL LONGITUDINAL LINES AS PER MUTCD SECTION 5.2.
2. ALL TRANSVERSE LINES AS PER MUTCD SECTION 5.4.
3. DIAGONAL AND CHEVRONS AS PER MUTCD SECTION 5.5.
4. ALL LINEWORK TO HAVE RAISED REFLECTIVE MARKERS INSTALLED AS PER MUTCD SECTION 5.6.
5. PAINT FULL WIDTH EDGE LINE (EL) 200mm FROM EDGE OF BITUMEN AS SHOWN.
6. INSTALL GUIDE POSTS TO EDGE OF BITUMEN ALONG TABLE DRAINS IN ACCORDANCE WITH TMR STD DRG SD1356.
7. INSTALL GUIDE POSTS TO BOTH SIDES OF ALL DRIVEWAYS.
8. LINEMARKING SHALL BE DULUX ROADMASTER WATER BASED PAVEMENT MARKING OR APPROVED EQUIVALENT.

FOR CONTINUATION REFER DWG No. C2430



REVISIONS:			
No.	REVISION DESCRIPTION	MP DRAWN	DATE
A	ISSUED FOR APPROVAL	MP	21/03/23



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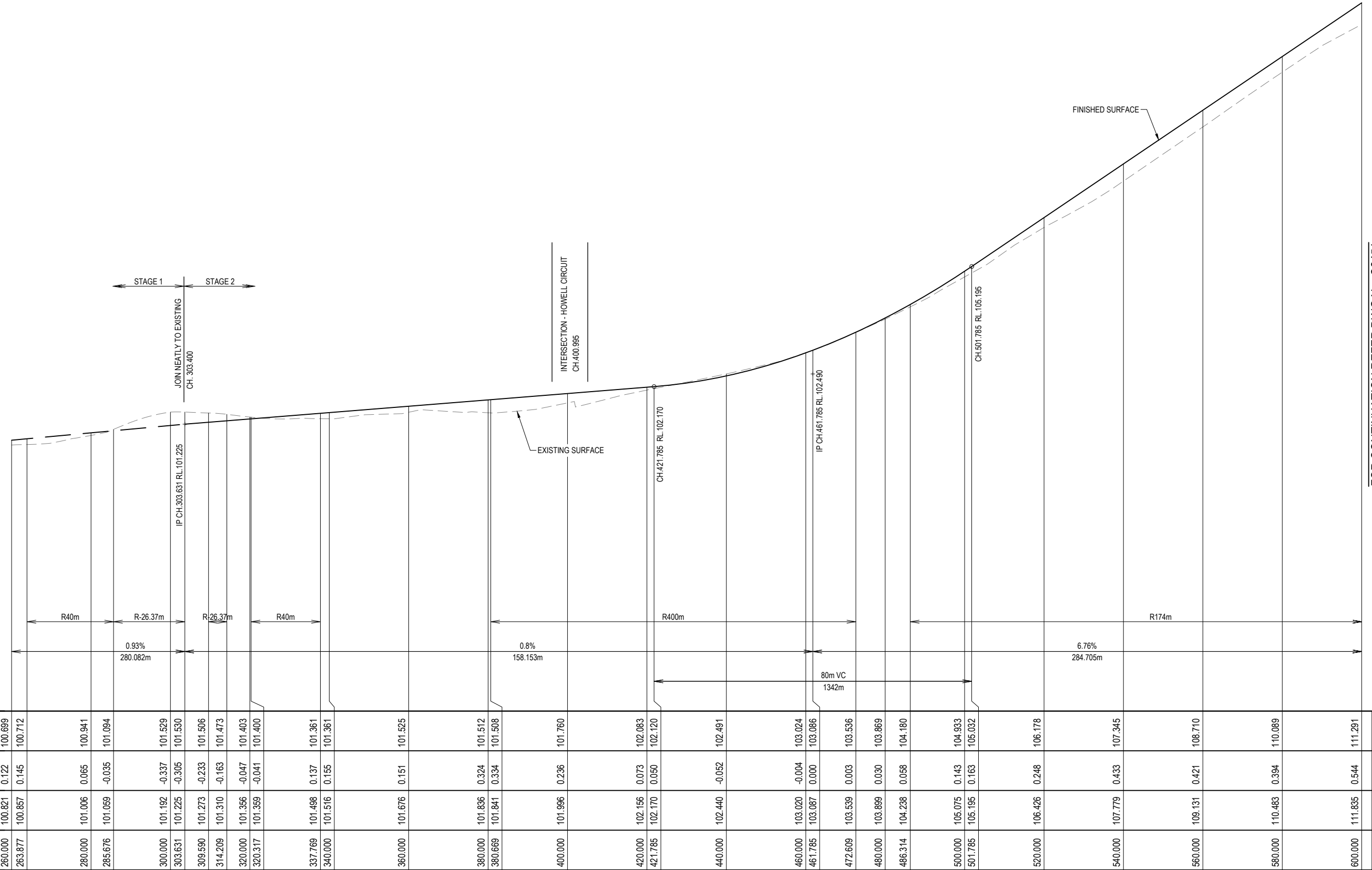
SCALE

 SCALE 1:750

PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3

DRAWING TITLE
SIGNS AND PAVEMENT MARKING PLAN - SHEET 2

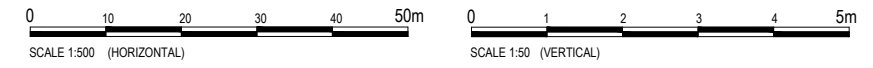
DRAWING STATUS			
ORIGINAL ISSUE FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2431	REVISION A	



Horiz Curve Data
 Vertical Geometry Grade (%)
 Vertical Grade Length (m)
 Vertical Curve Length (m)
 Vertical Curve Radius (m)
 DATUM R.L.94.000

NATURAL SURFACE LEVELS	260.000	263.877	280.000	285.676	300.000	303.631	309.590	314.209	320.000	320.317	337.769	340.000	360.000	380.000	380.669	400.000	420.000	421.785	440.000	460.000	461.785	472.609	480.000	486.314	500.000	501.785	520.000	540.000	560.000	580.000	600.000
CUT / FILL DEPTH	0.122	0.145	0.065	-0.035	-0.337	-0.305	-0.233	-0.163	-0.047	-0.041	0.137	0.155	0.151	0.324	0.334	0.236	0.073	0.050	-0.052	-0.004	0.000	0.003	0.030	0.058	0.143	0.163	0.248	0.433	0.421	0.394	0.544
DESIGN SURFACE LEVELS	100.821	100.857	101.006	101.059	101.192	101.225	101.273	101.310	101.356	101.359	101.498	101.516	101.676	101.836	101.841	101.996	102.156	102.170	102.440	103.020	103.087	103.539	103.899	104.238	105.075	105.195	106.426	107.779	108.131	110.483	111.835
CHAINAGE	260.000	263.877	280.000	285.676	300.000	303.631	309.590	314.209	320.000	320.317	337.769	340.000	360.000	380.000	380.669	400.000	420.000	421.785	440.000	460.000	461.785	472.609	480.000	486.314	500.000	501.785	520.000	540.000	560.000	580.000	600.000

LONGITUDINAL SECTION - NEWLAND PLACE / HOWELL CIRCUIT
 HORIZONTAL SCALE 1:500
 VERTICAL SCALE 1:50



REVISIONS:	
No.	REVISION DESCRIPTION
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 PO BOX 4107 SPRINGFIELD QLD 4300

SCALE

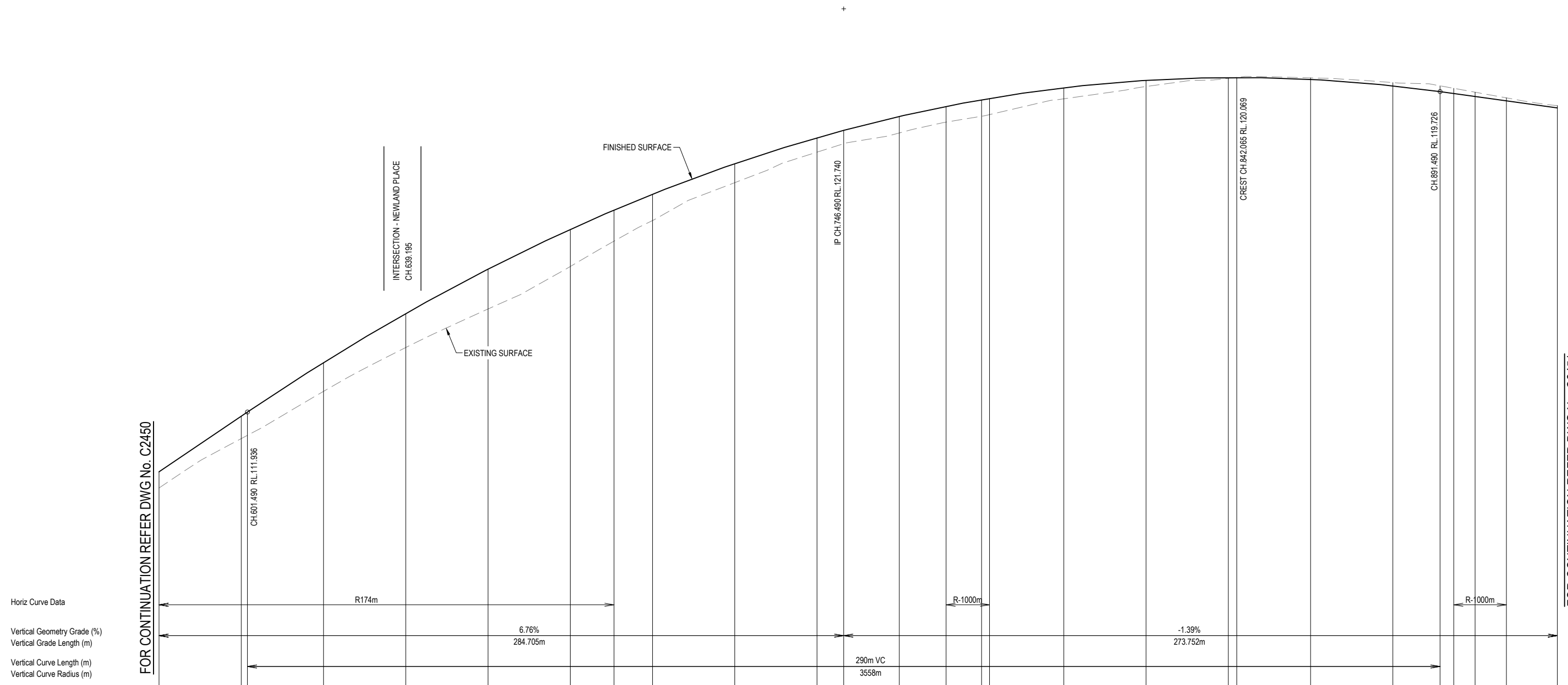
PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3

DRAWING TITLE
ROAD LONGITUDINAL SECTION - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 1

DRAWING STATUS
ORIGINAL ISSUE
 FOR APPROVAL

PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEQ: 19536 NER: 3553220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2450	REVISION A	

FOR CONTINUATION REFER DWG No. C2451



CHAINAGE	580.000	600.000	601.490	620.000	640.000	660.000	680.000	690.638	700.000	720.000	740.000	746.490	760.000	771.374	780.000	781.944	800.000	820.000	840.000	842.065	860.000	880.000	891.490	894.615	900.000	907.620	920.000
NATURAL SURFACE LEVELS	110.089	111.291	111.370	112.439	113.505	114.442	115.474	116.091	116.591	117.513	118.254	118.460	118.721	118.985	119.127	119.167	119.551	119.850	120.050	120.073	120.060	119.946	119.867	119.807	119.712	119.574	119.386
CUT / FILL DEPTH	0.394	0.544	0.566	0.701	0.826	0.969	0.904	0.756	0.642	0.462	0.351	0.326	0.401	0.382	0.401	0.394	0.269	0.150	0.018	-0.004	-0.037	-0.079	-0.142	-0.128	-0.105	-0.072	-0.057
DESIGN SURFACE LEVELS	110.483	111.835	111.936	113.140	114.332	115.411	116.378	116.847	117.233	117.975	118.605	118.785	119.123	119.367	119.528	119.561	119.820	120.001	120.068	120.069	120.024	119.867	119.726	119.680	119.608	119.502	119.330

Horiz Curve Data
Vertical Geometry Grade (%)
Vertical Grade Length (m)
Vertical Curve Length (m)
Vertical Curve Radius (m)
DATUM R.L.105.000

LONGITUDINAL SECTION - NEWLAND PLACE / HOWELL CIRCUIT
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:50



REVISIONS:	
No.	REVISION DESCRIPTION
A	ISSUED FOR APPROVAL



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van der meer
LEVEL 1, 51 ALFRED STREET
FORTITUDE VALLEY QLD 4006
Telephone +61 7 3021 6600

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IF IN DOUBT, ASK

CLIENT
PARK LAKE ADARE PTY LTD
PO BOX 4107 SPRINGFIELD QLD 4300

SCALE

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
ROAD LONGITUDINAL SECTION - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 2

DRAWING STATUS
ORIGINAL ISSUE
FOR APPROVAL

PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3553220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161		DRAWING No. C2451	REVISION A

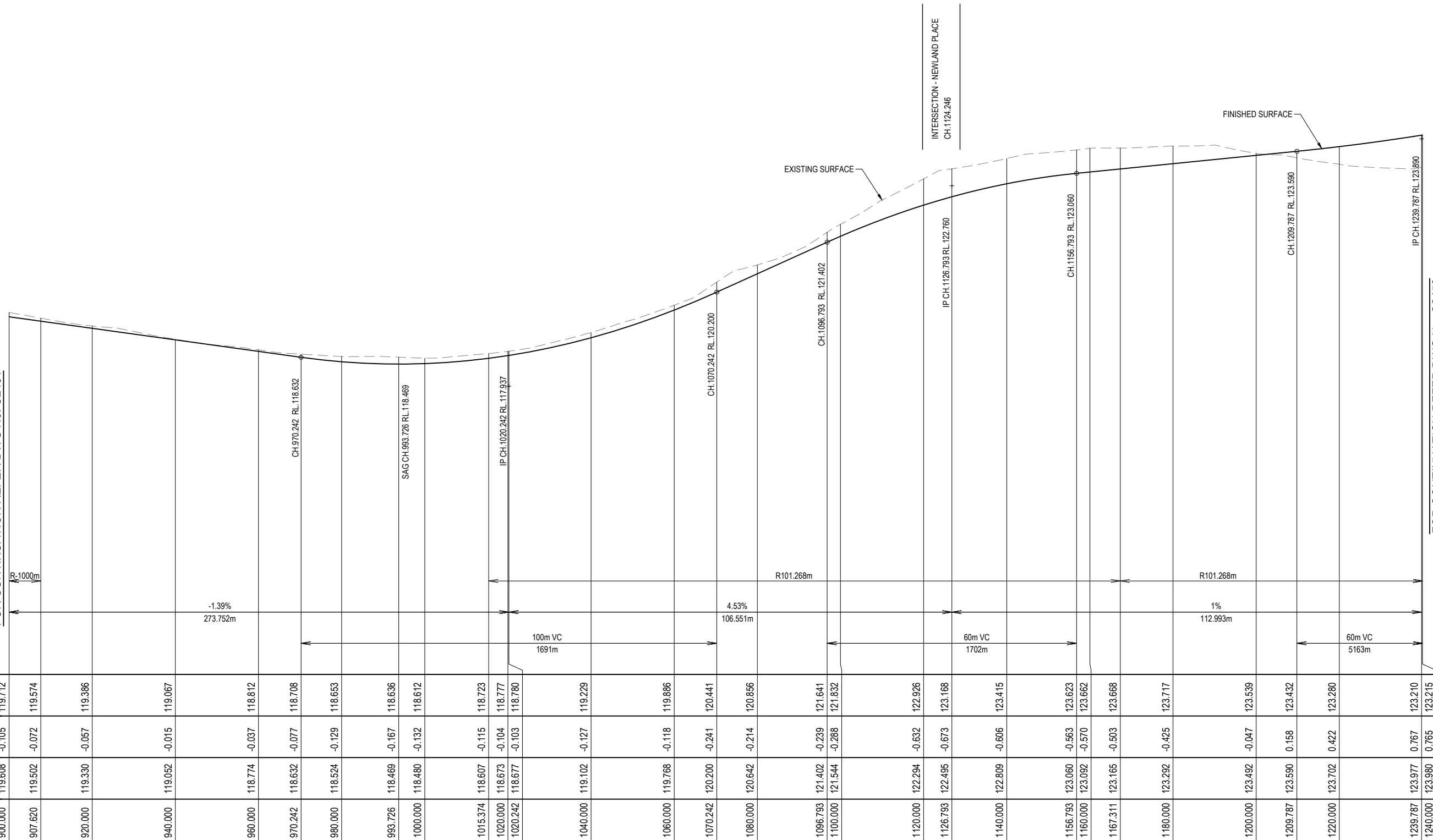
FOR CONTINUATION REFER DWG No. C2450

FOR CONTINUATION REFER DWG No. C2451

FOR CONTINUATION REFER DWG No. C2451

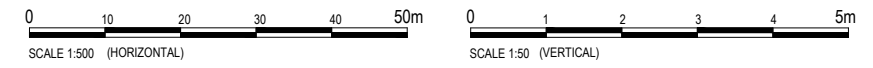
FOR CONTINUATION REFER DWG No. C2453

Horiz Curve Data
 Vertical Geometry Grade (%)
 Vertical Grade Length (m)
 Vertical Curve Length (m)
 Vertical Curve Radius (m)
 DATUM R.L. 111.000



CHAINAGE	900.000	907.620	920.000	940.000	960.000	970.242	980.000	993.726	1000.000	1015.374	1020.000	1020.242	1040.000	1060.000	1070.242	1080.000	1096.793	1100.000	1120.000	1126.793	1140.000	1156.793	1160.000	1167.311	1180.000	1200.000	1209.787	1220.000	1239.787	1240.000
NATURAL SURFACE LEVELS	119.712	119.574	119.386	119.067	118.812	118.708	118.653	118.636	118.612	118.607	118.777	118.780	119.229	119.886	120.441	120.856	121.641	121.832	122.926	123.168	123.415	123.623	123.662	123.668	123.717	123.539	123.432	123.280	123.210	123.215
CUT / FILL DEPTH	-0.105	-0.072	-0.057	-0.015	-0.037	-0.077	-0.129	-0.167	-0.132	-0.115	-0.104	-0.103	-0.127	-0.118	-0.241	-0.214	-0.239	-0.288	-0.632	-0.673	-0.606	-0.563	-0.570	-0.503	-0.425	-0.047	0.158	0.422	0.767	0.765
DESIGN SURFACE LEVELS	119.608	119.502	119.330	119.052	118.774	118.632	118.524	118.469	118.480	118.607	118.673	118.677	119.102	119.768	120.200	120.642	121.402	121.544	122.294	122.495	122.809	123.060	123.092	123.165	123.292	123.492	123.590	123.702	123.977	123.980

LONGITUDINAL SECTION - HOWELL CIRCUIT
 HORIZONTAL SCALE 1:500
 VERTICAL SCALE 1:50



REVISIONS:			
No.	REVISION DESCRIPTION	MP	DATE
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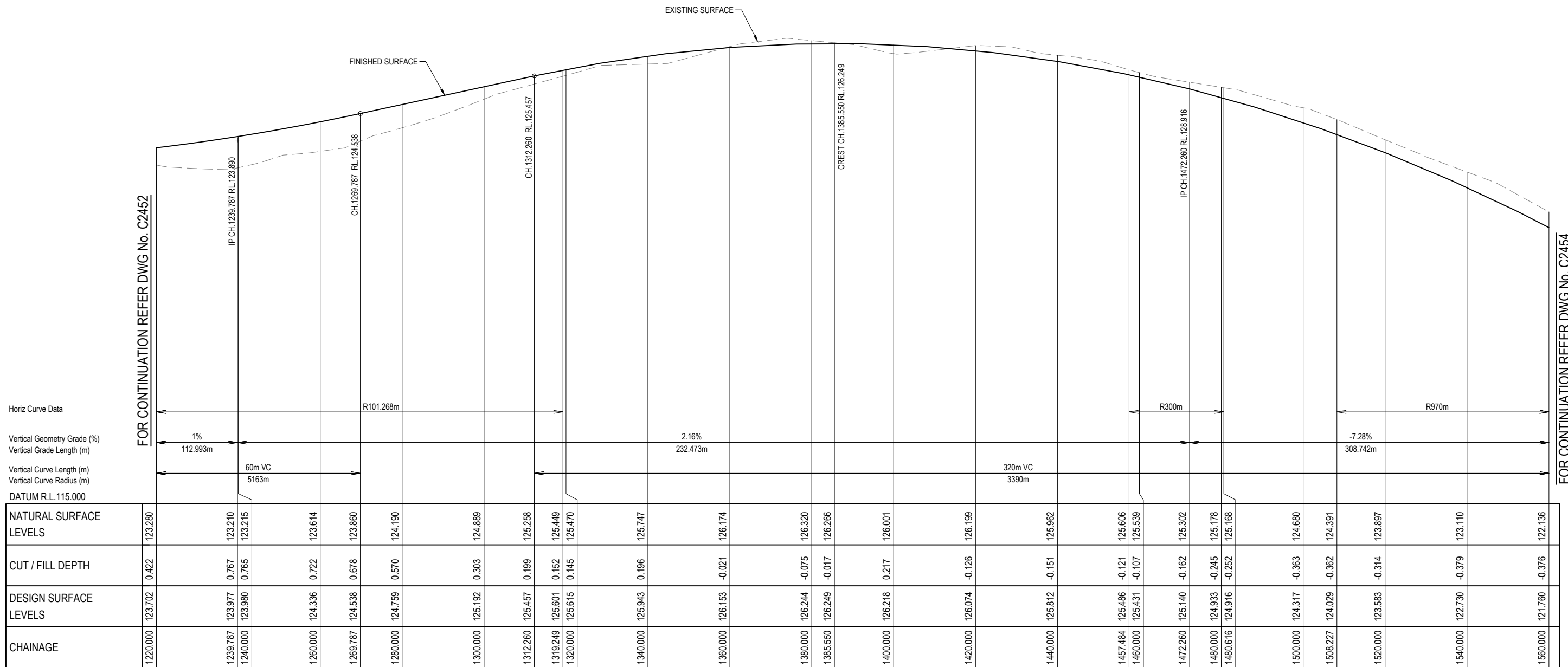
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PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3
 DRAWING TITLE
ROAD LONGITUDINAL SECTION - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 3

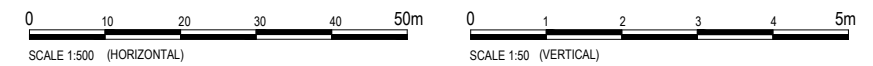
DRAWING STATUS
ORIGINAL ISSUE
 FOR APPROVAL
 PROJECT LEADER: CK
 DESIGNER: MP
 SIGNATURE: C. KIRK
 RPEID: 19536
 NER: 3053220
 DRAFTSPERSON: MP
 SCALE: AS SHOWN
 DATE: MAR 2023
 SHEET SIZE: A1
 JOB No.: BR222161
 DRAWING No.: C2452
 REVISION: A



Horiz Curve Data
 Vertical Geometry Grade (%)
 Vertical Grade Length (m)
 Vertical Curve Length (m)
 Vertical Curve Radius (m)
 DATUM R.L. 115.000

NATURAL SURFACE LEVELS	123.280	123.210	123.215	123.614	123.860	124.190	124.889	125.258	125.449	125.470	125.747	126.174	126.320	126.266	126.001	126.199	125.962	125.606	125.539	125.302	125.178	125.168	124.680	124.391	123.897	123.110	122.136
CUT / FILL DEPTH	0.422	0.767	0.765	0.722	0.678	0.570	0.303	0.199	0.152	0.145	0.196	-0.021	-0.075	-0.017	0.217	-0.126	-0.151	-0.121	-0.107	-0.162	-0.245	-0.252	-0.363	-0.362	-0.314	-0.379	-0.376
DESIGN SURFACE LEVELS	123.702	123.977	123.980	124.336	124.538	124.759	125.192	125.457	125.601	125.615	125.943	126.153	126.244	126.249	126.218	126.074	125.812	125.486	125.431	125.140	124.933	124.916	124.317	124.029	123.583	122.730	121.760
CHAINAGE	1220.000	1239.787	1240.000	1260.000	1269.787	1280.000	1300.000	1312.260	1319.249	1320.000	1340.000	1360.000	1380.000	1385.550	1400.000	1420.000	1440.000	1457.484	1460.000	1472.260	1480.000	1480.616	1500.000	1508.227	1520.000	1540.000	1560.000

LONGITUDINAL SECTION - HOWELL CIRCUIT
 HORIZONTAL SCALE 1:500
 VERTICAL SCALE 1:50



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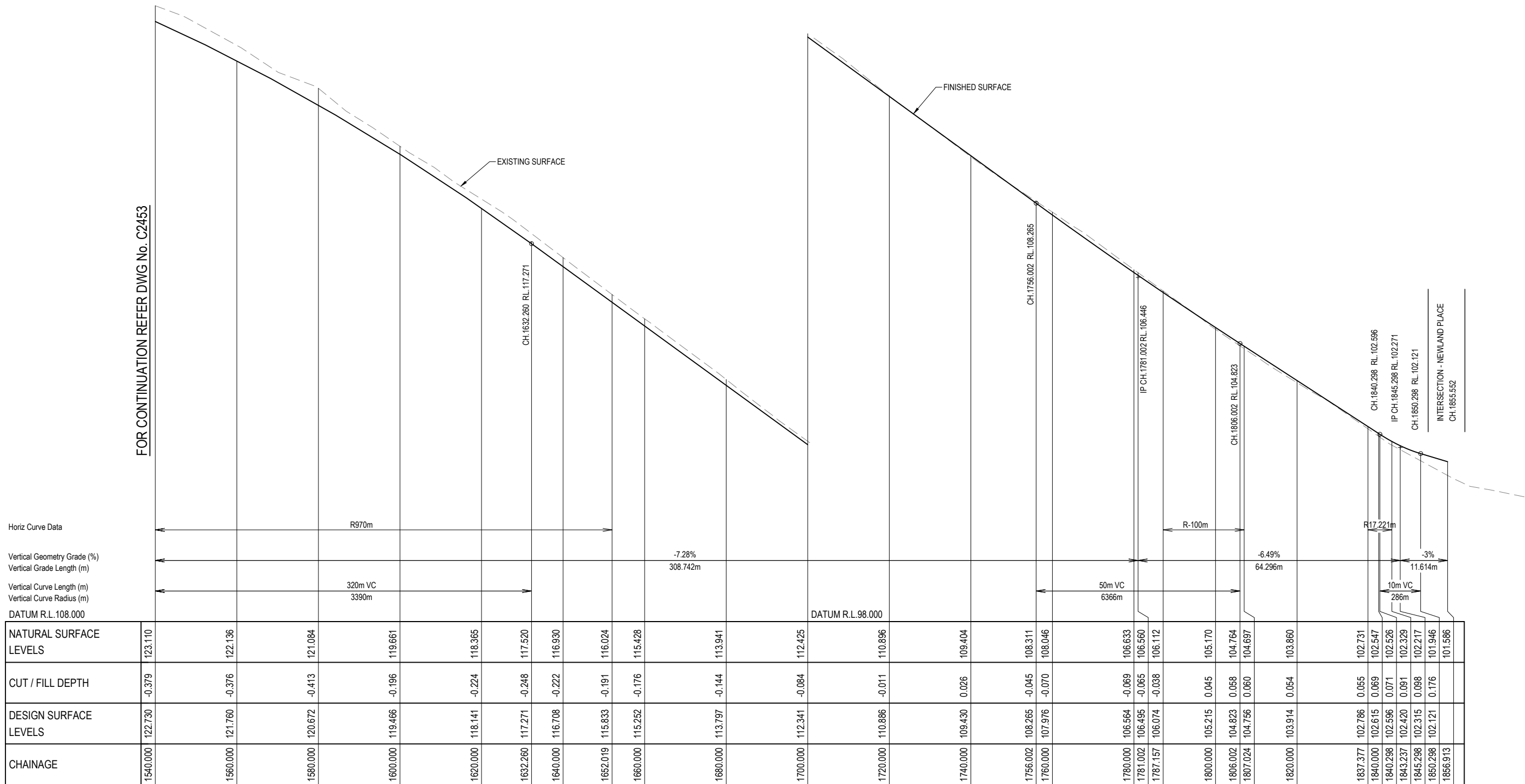
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PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3
 DRAWING TITLE
ROAD LONGITUDINAL SECTION - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 4

DRAWING STATUS
ORIGINAL ISSUE
 FOR APPROVAL
 PROJECT LEADER: CK
 DESIGNER: MP
 SIGNATURE: C. KIRK
 DATE: MAR 2023
 SHEET SIZE: A1
 JOB No: BR222161
 DRAWING No: C2453
 REVISION: A

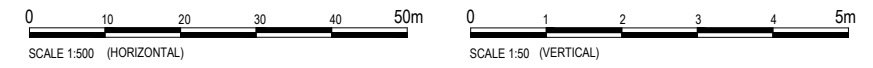
FOR CONTINUATION REFER DWG No. C2453



Horiz Curve Data
 Vertical Geometry Grade (%)
 Vertical Grade Length (m)
 Vertical Curve Length (m)
 Vertical Curve Radius (m)
 DATUM R.L. 108.000

	1540.000	1560.000	1580.000	1600.000	1620.000	1632.260	1640.000	1652.019	1660.000	1680.000	1700.000	1720.000	1740.000	1756.002	1760.000	1780.000	1781.002	1787.157	1800.000	1806.002	1807.024	1820.000	1837.377	1840.000	1840.298	1843.327	1845.298	1850.298	1856.913
NATURAL SURFACE LEVELS	123.110	122.136	121.084	119.661	118.365	117.520	116.930	116.024	115.428	113.941	112.425	110.896	109.404	108.311	108.046	106.633	106.560	106.112	105.170	104.764	104.697	103.860	102.731	102.547	102.526	102.329	102.217	101.946	101.586
CUT / FILL DEPTH	-0.379	-0.376	-0.413	-0.196	-0.224	-0.248	-0.222	-0.191	-0.176	-0.144	-0.084	-0.011	0.026	-0.045	-0.070	-0.069	-0.065	-0.038	0.045	0.058	0.060	0.054	0.055	0.069	0.071	0.091	0.098	0.176	
DESIGN SURFACE LEVELS	122.730	121.760	120.672	119.466	118.141	117.271	116.708	115.833	115.252	113.797	112.341	110.886	109.430	108.265	107.976	106.564	106.495	106.074	105.215	104.823	104.756	103.914	102.786	102.615	102.596	102.420	102.315	102.121	101.586
CHAINAGE	1540.000	1560.000	1580.000	1600.000	1620.000	1632.260	1640.000	1652.019	1660.000	1680.000	1700.000	1720.000	1740.000	1756.002	1760.000	1780.000	1781.002	1787.157	1800.000	1806.002	1807.024	1820.000	1837.377	1840.000	1840.298	1843.327	1845.298	1850.298	1856.913

LONGITUDINAL SECTION - HOWELL CIRCUIT
 HORIZONTAL SCALE 1:500
 VERTICAL SCALE 1:50



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No.	REVISION DESCRIPTION	MP	DATE
A	ISSUED FOR APPROVAL	MP	21/03/23



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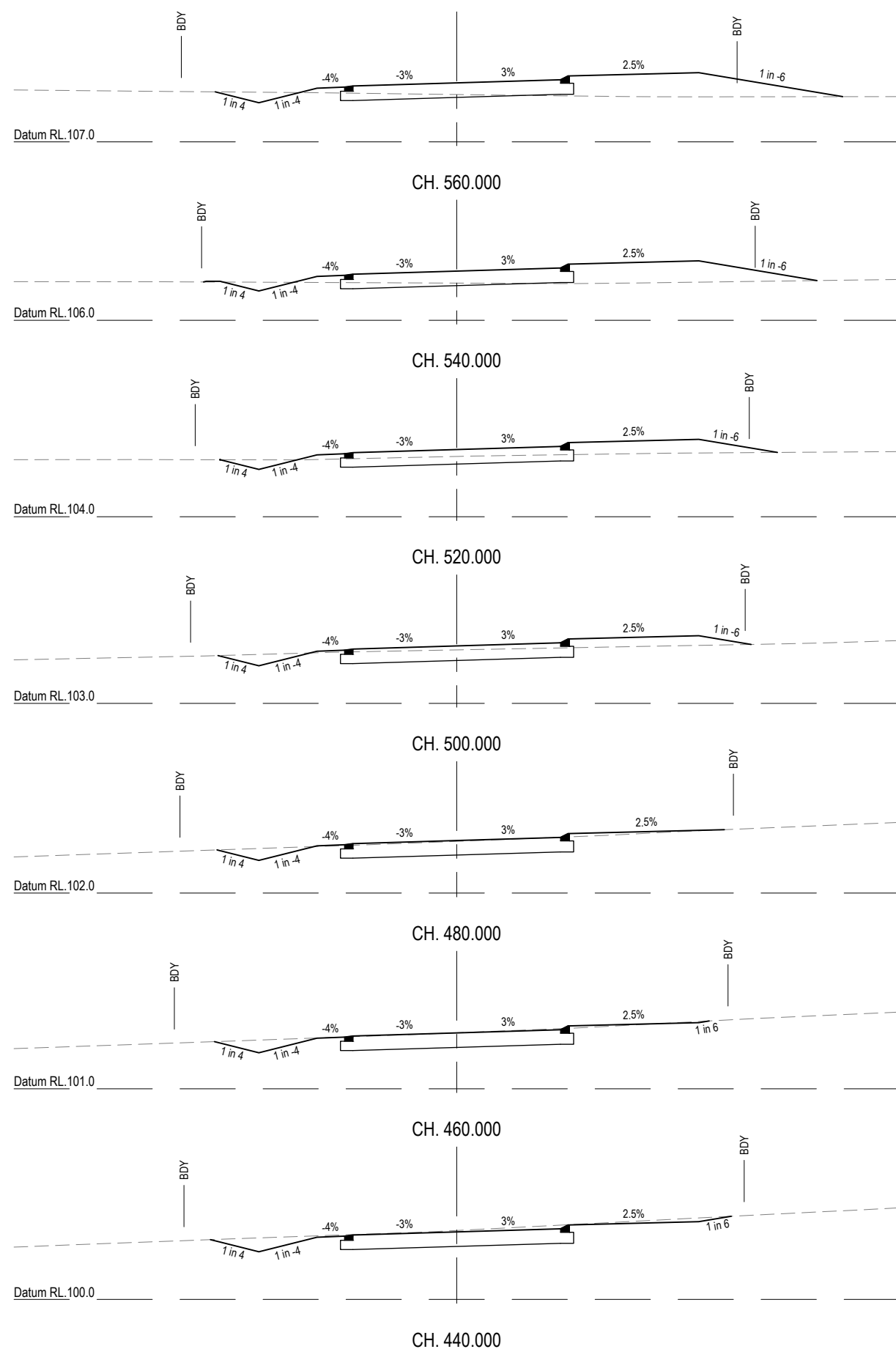
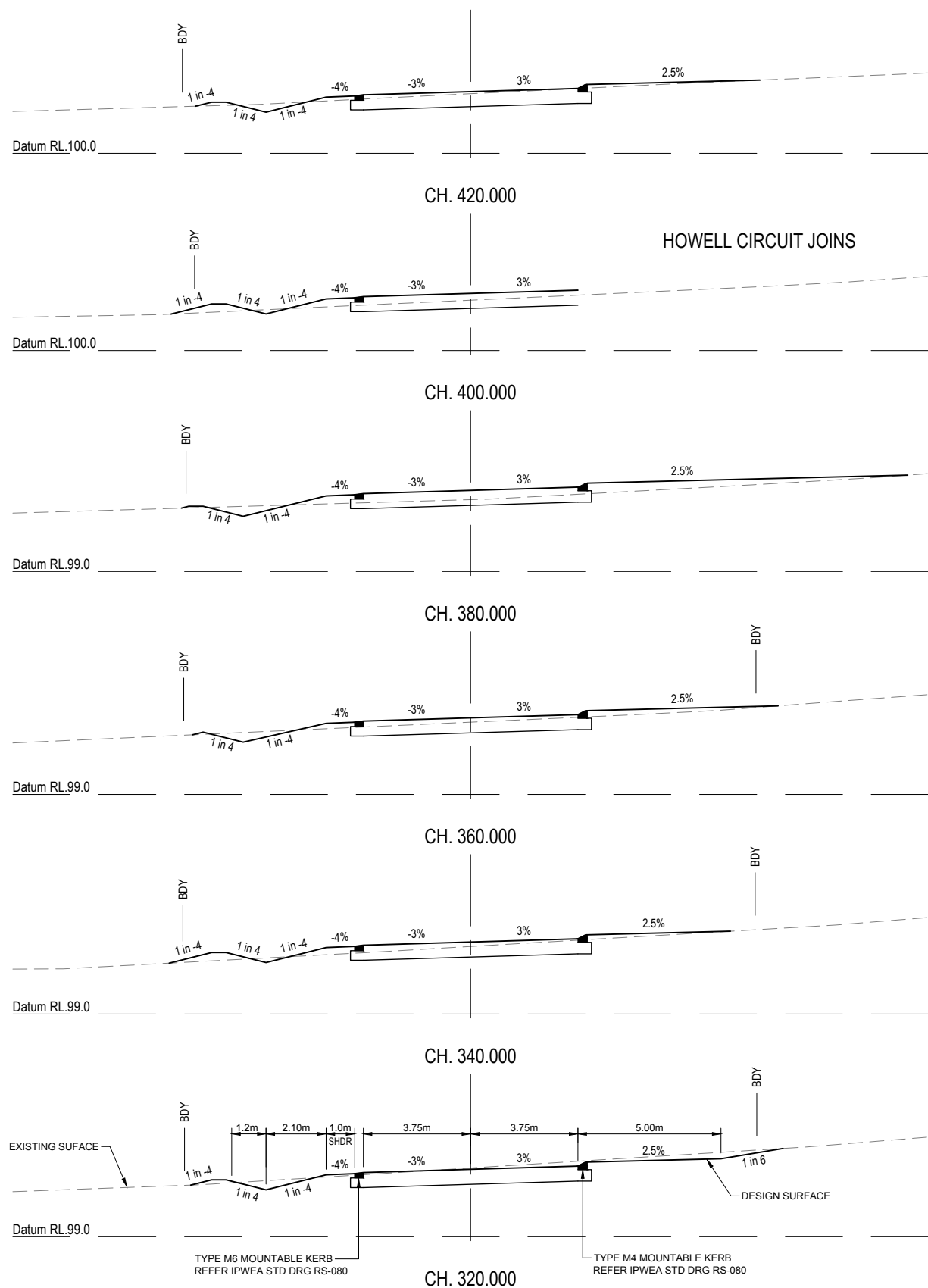
SCALE

PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3

DRAWING TITLE
ROAD LONGITUDINAL SECTION - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 5

DRAWING STATUS
ORIGINAL ISSUE
 FOR APPROVAL

PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 353220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2454	REVISION A	



REVISIONS:

No.	REVISION DESCRIPTION	MP	DATE
A	ISSUED FOR APPROVAL	MP	21/03/23



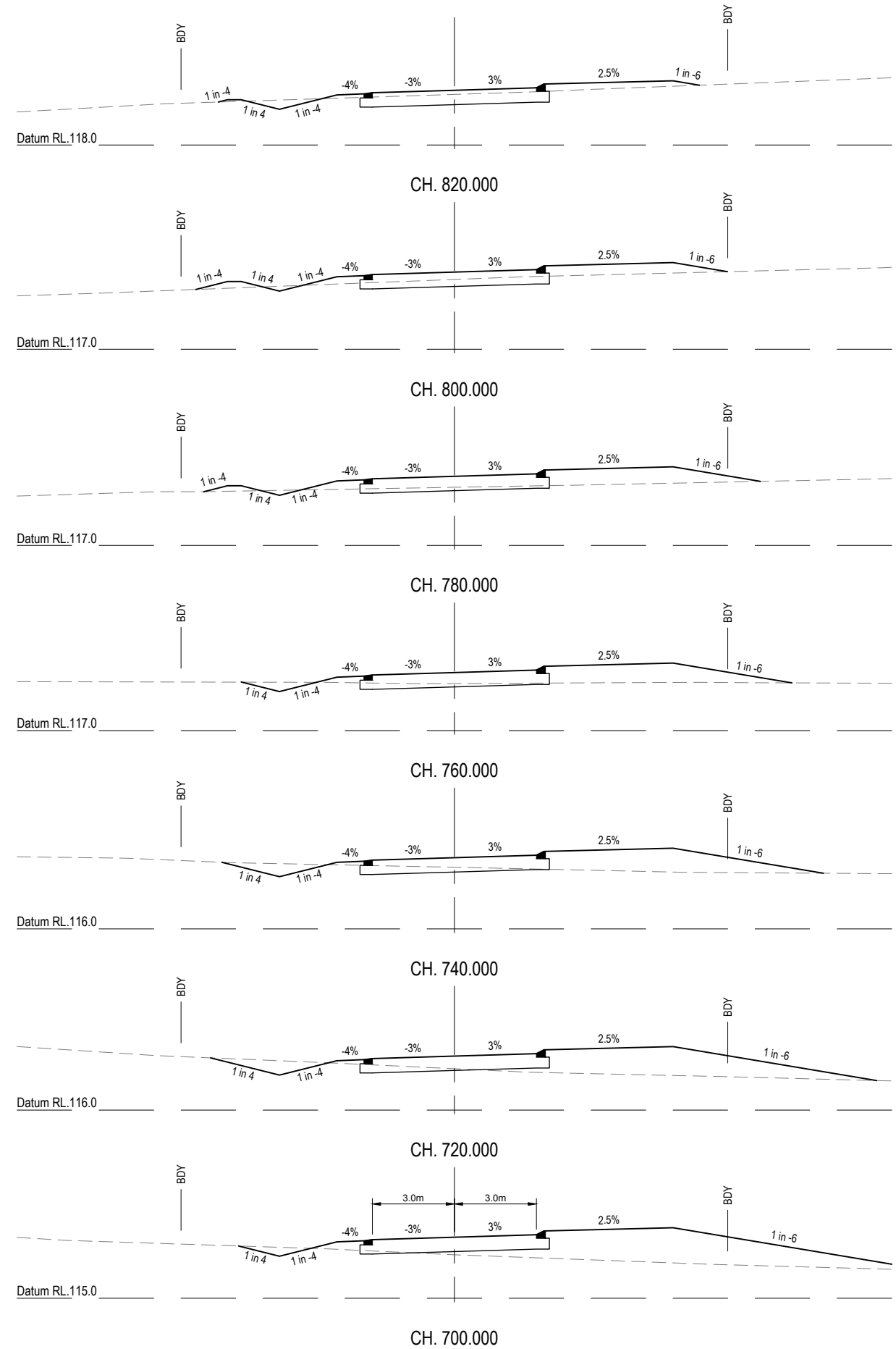
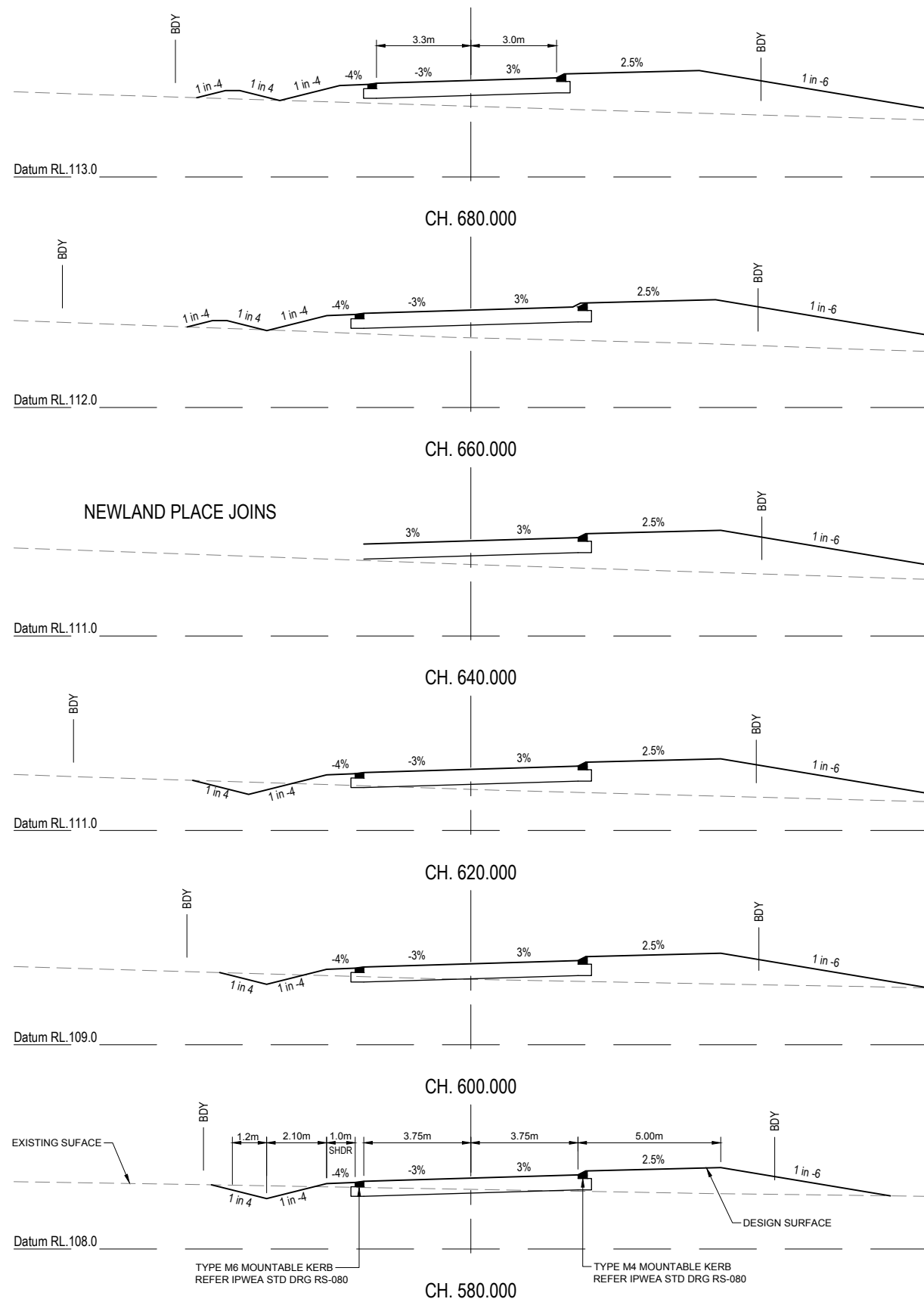
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 SCALE
 0 1 2 3 4 5m 10m
 SCALE 1:100

PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3
 DRAWING TITLE
ROAD CROSS SECTIONS - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 1

DRAWING STATUS			
ORIGINAL ISSUE FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2455	REVISION	A



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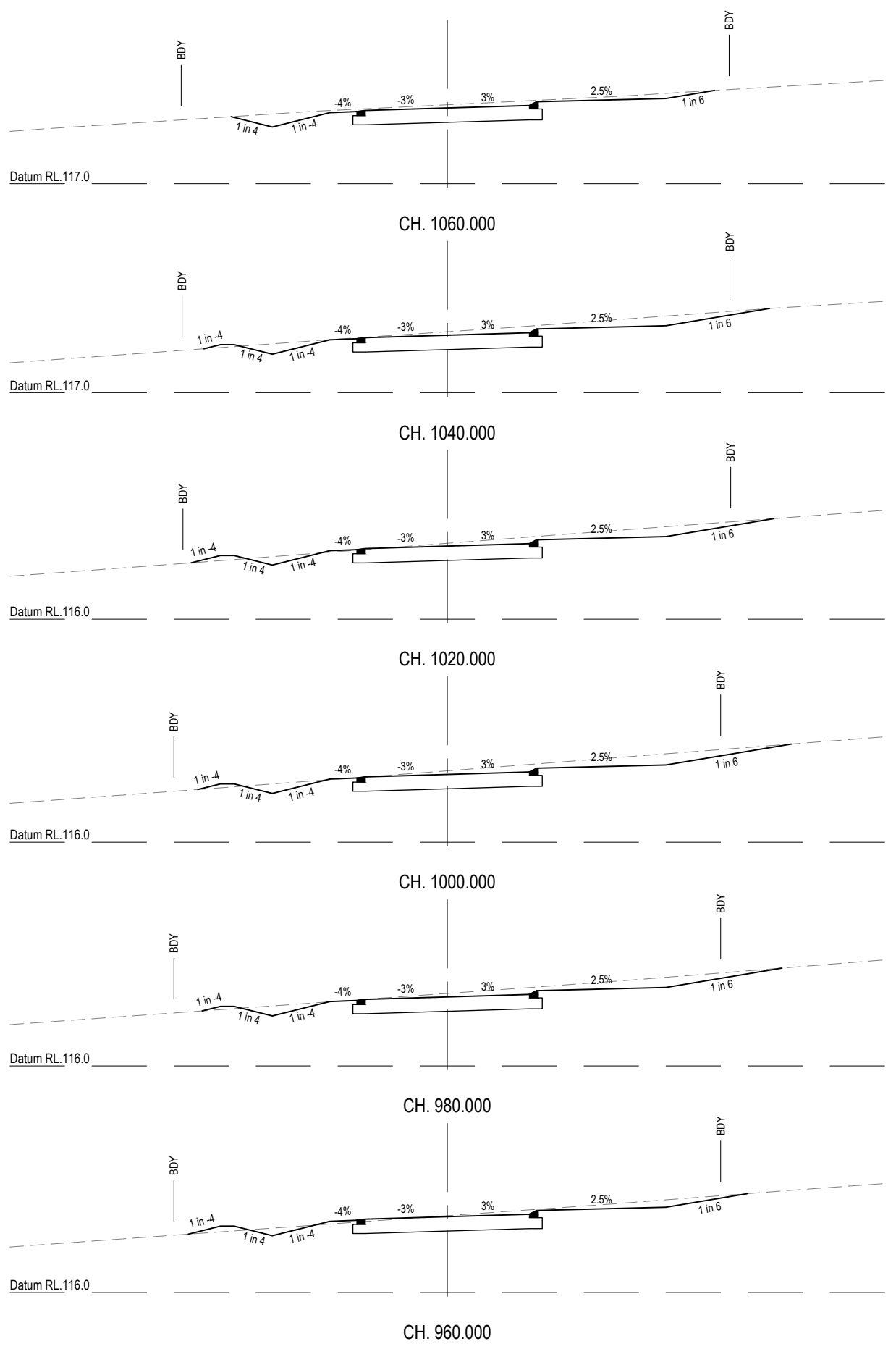
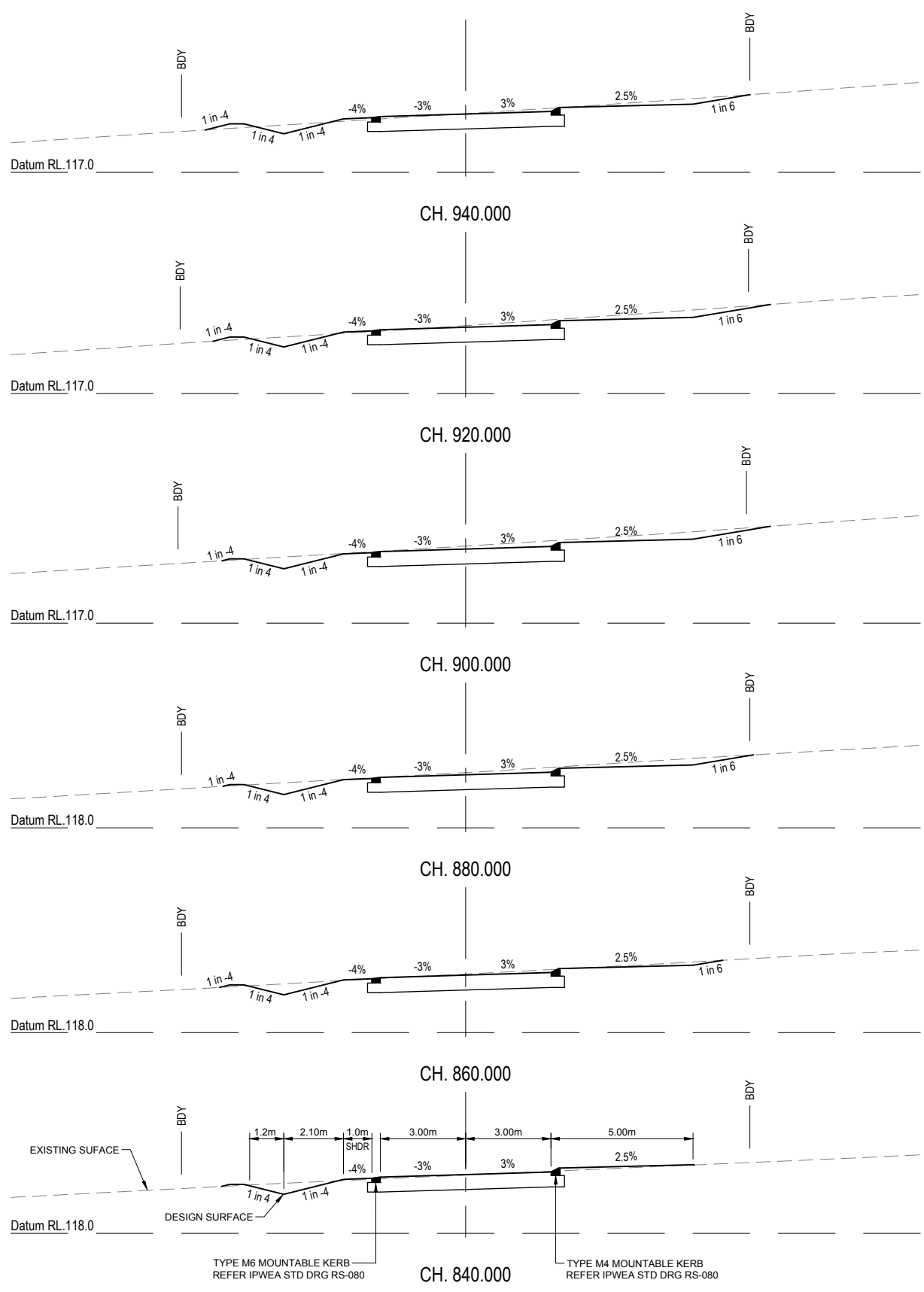
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SCALE
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SCALE 1:100

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
ROAD CROSS SECTIONS - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 2

DRAWING STATUS			
ORIGINAL ISSUE			
FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2456	REVISION A	



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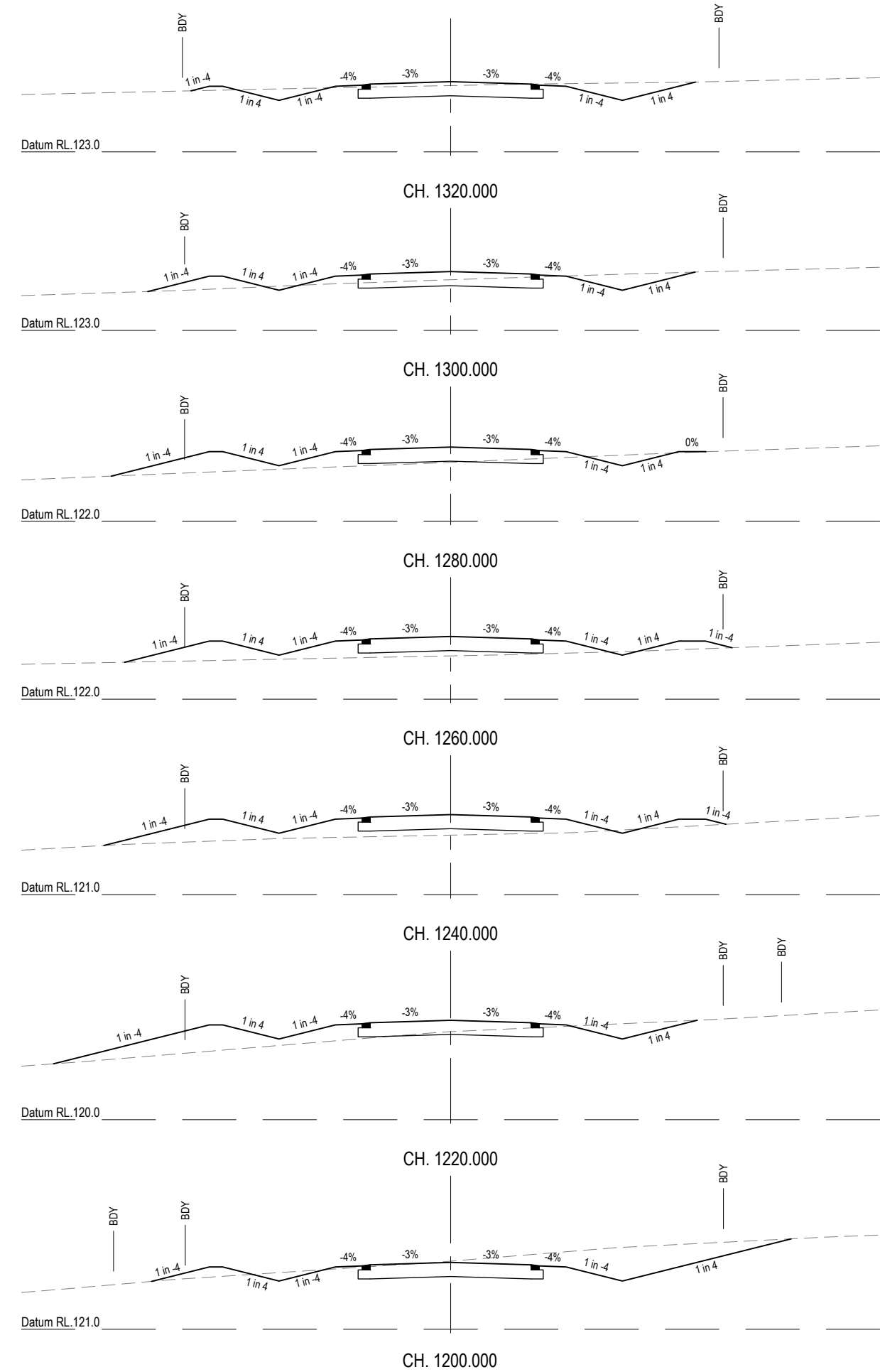
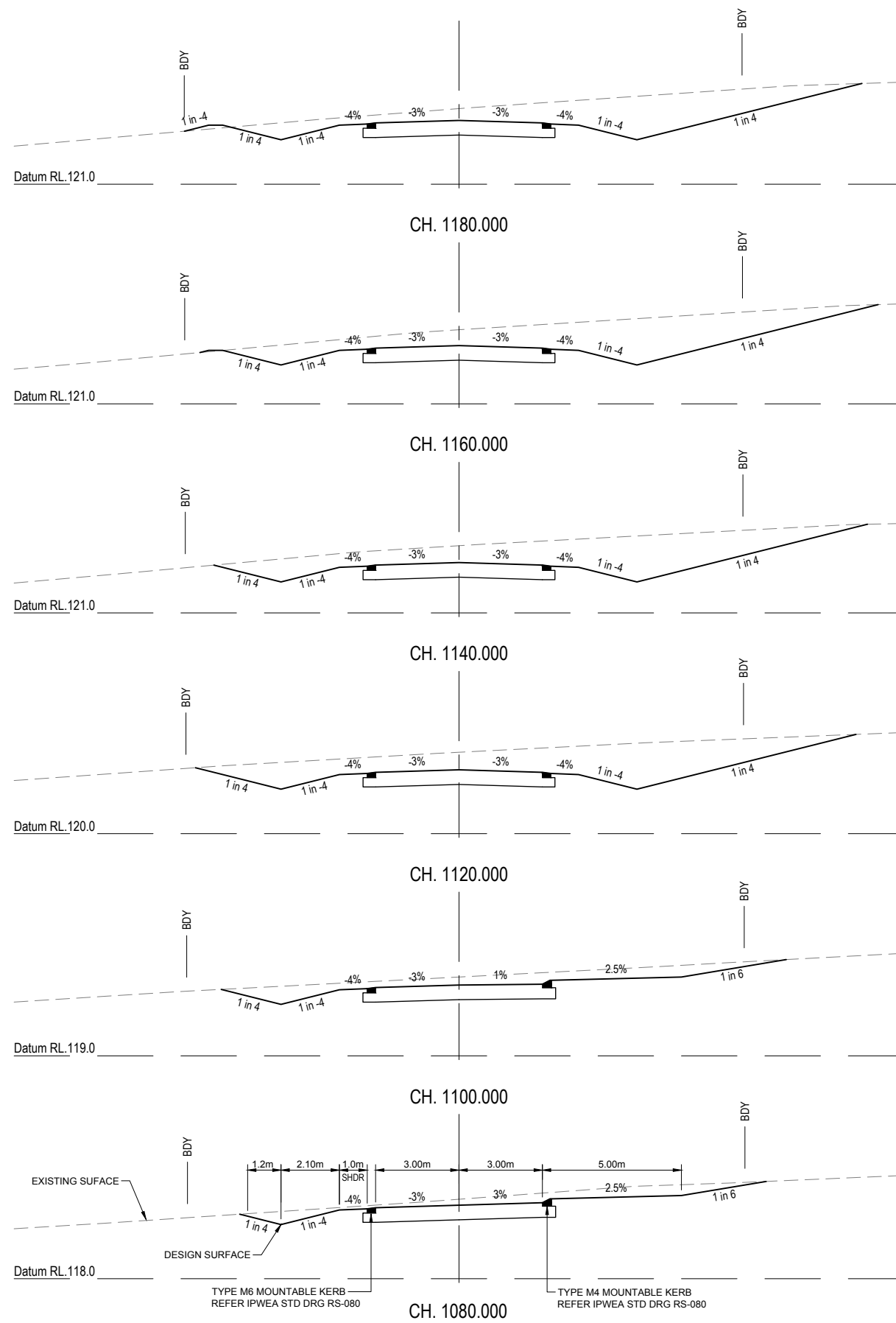
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PO BOX 4107 SPRINGFIELD QLD 4300

SCALE
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SCALE 1:100

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
ROAD CROSS SECTIONS - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 3

DRAWING STATUS			
ORIGINAL ISSUE			
FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2457	REVISION A	



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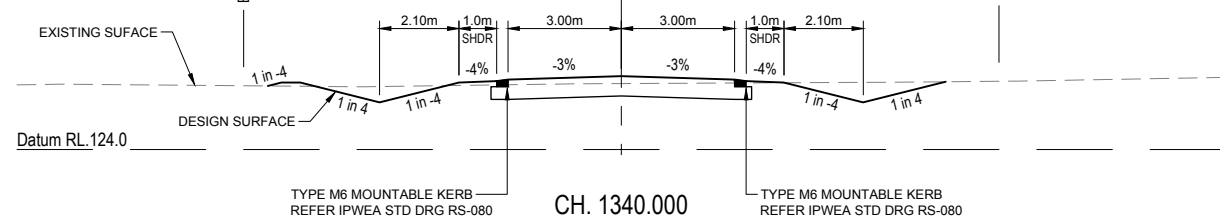
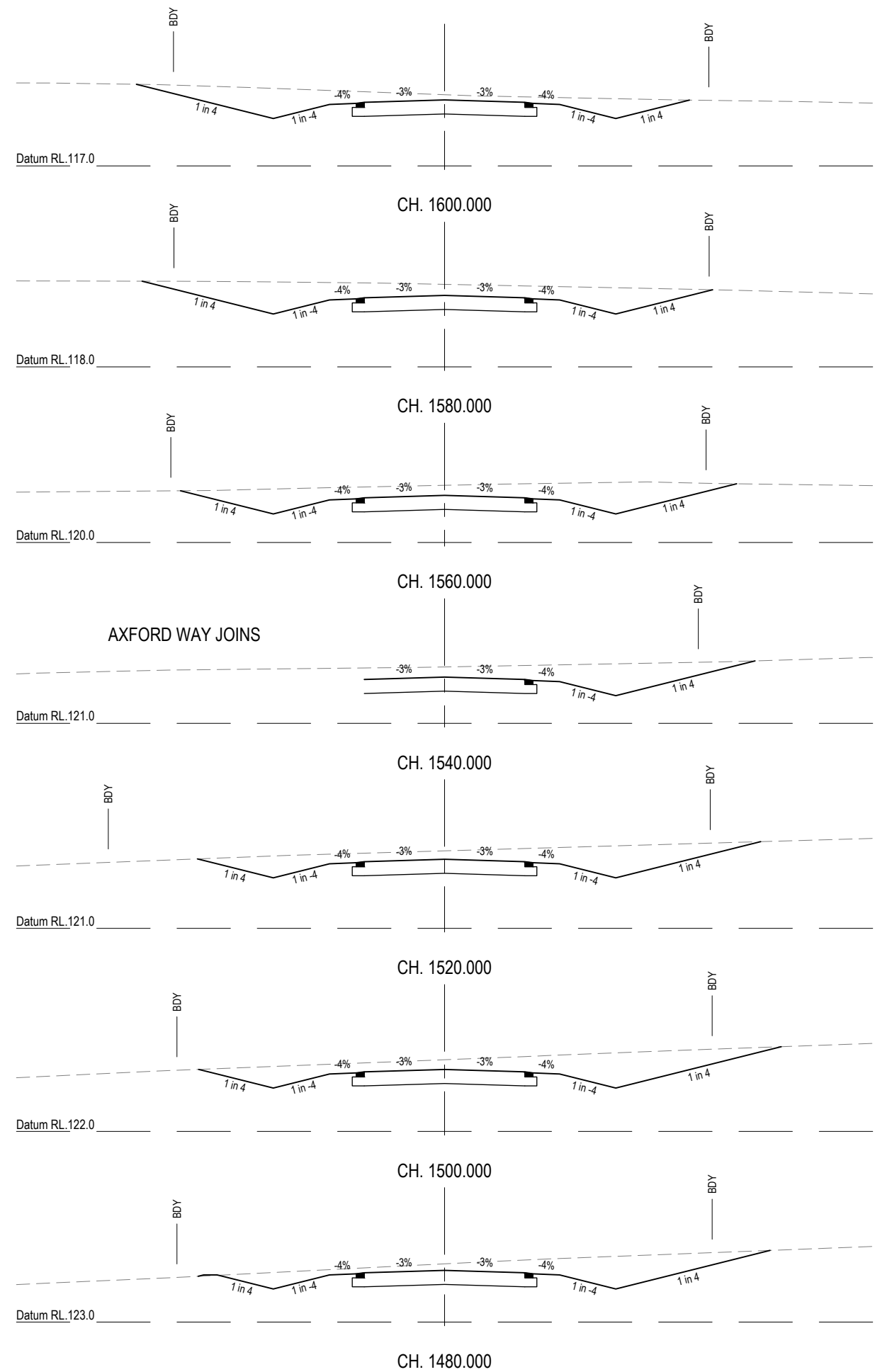
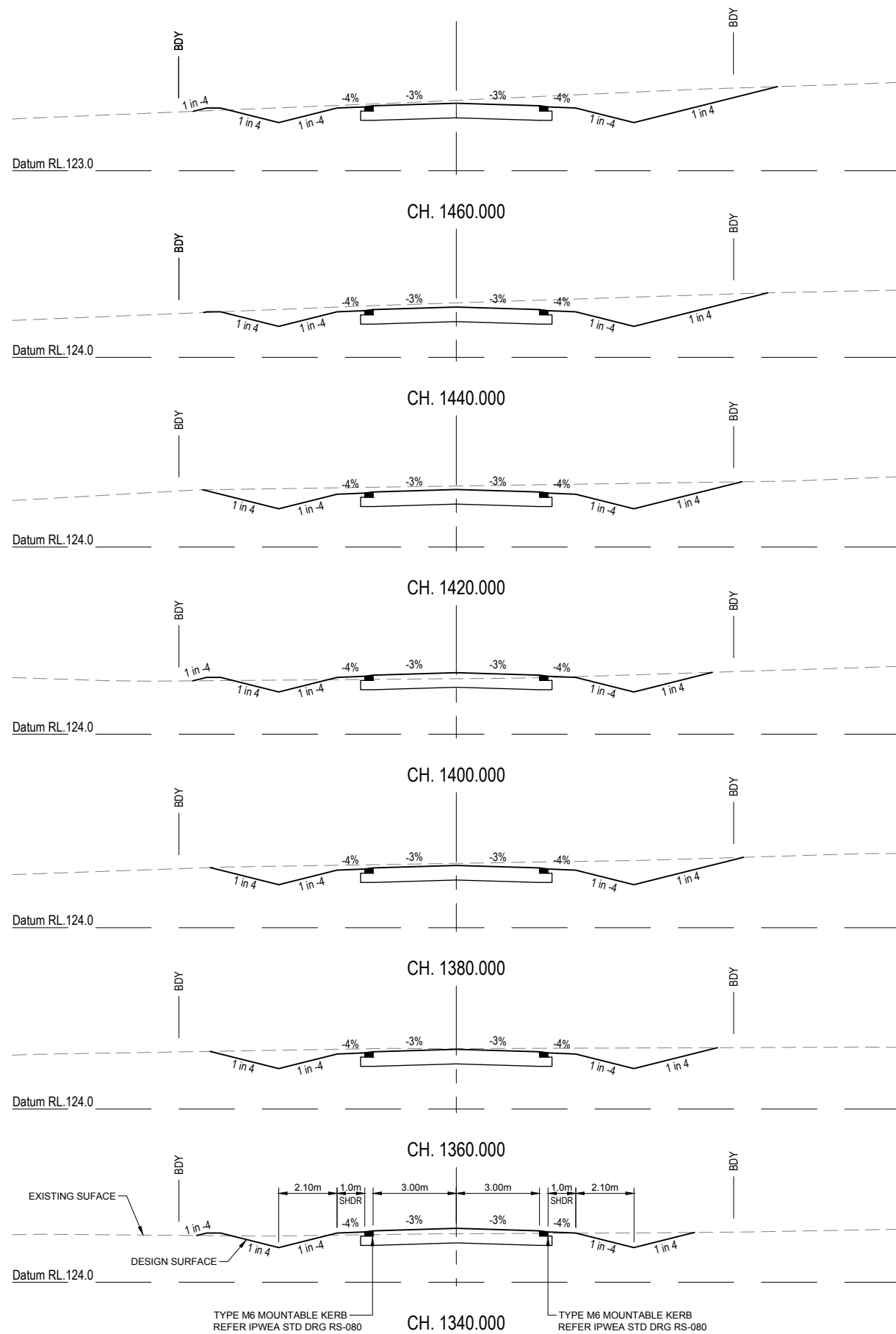
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PO BOX 4107 SPRINGFIELD QLD 4300

SCALE 1:100

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
ROAD CROSS SECTIONS - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 4

DRAWING STATUS			
ORIGINAL ISSUE			
FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2458	REVISION A	



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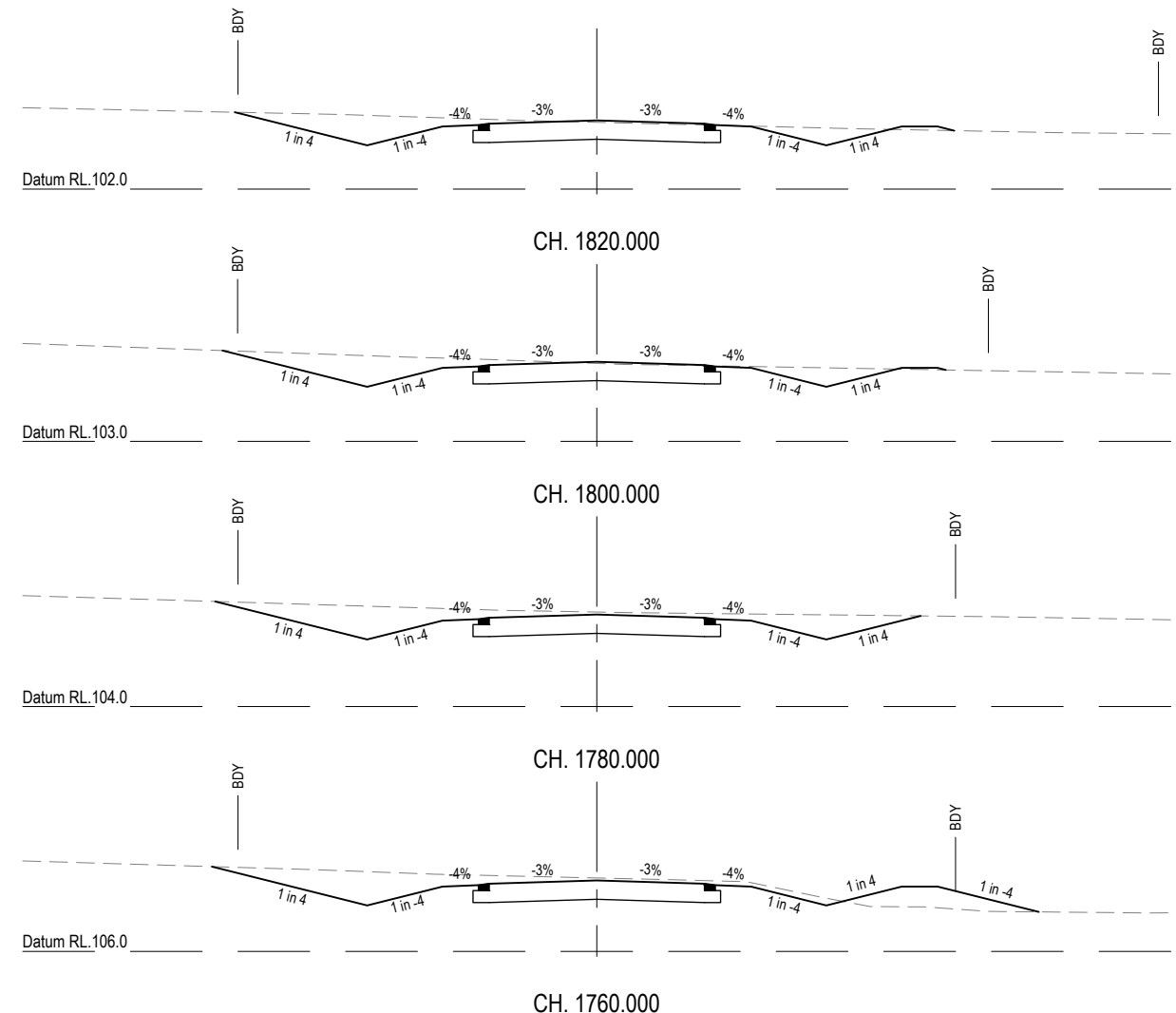
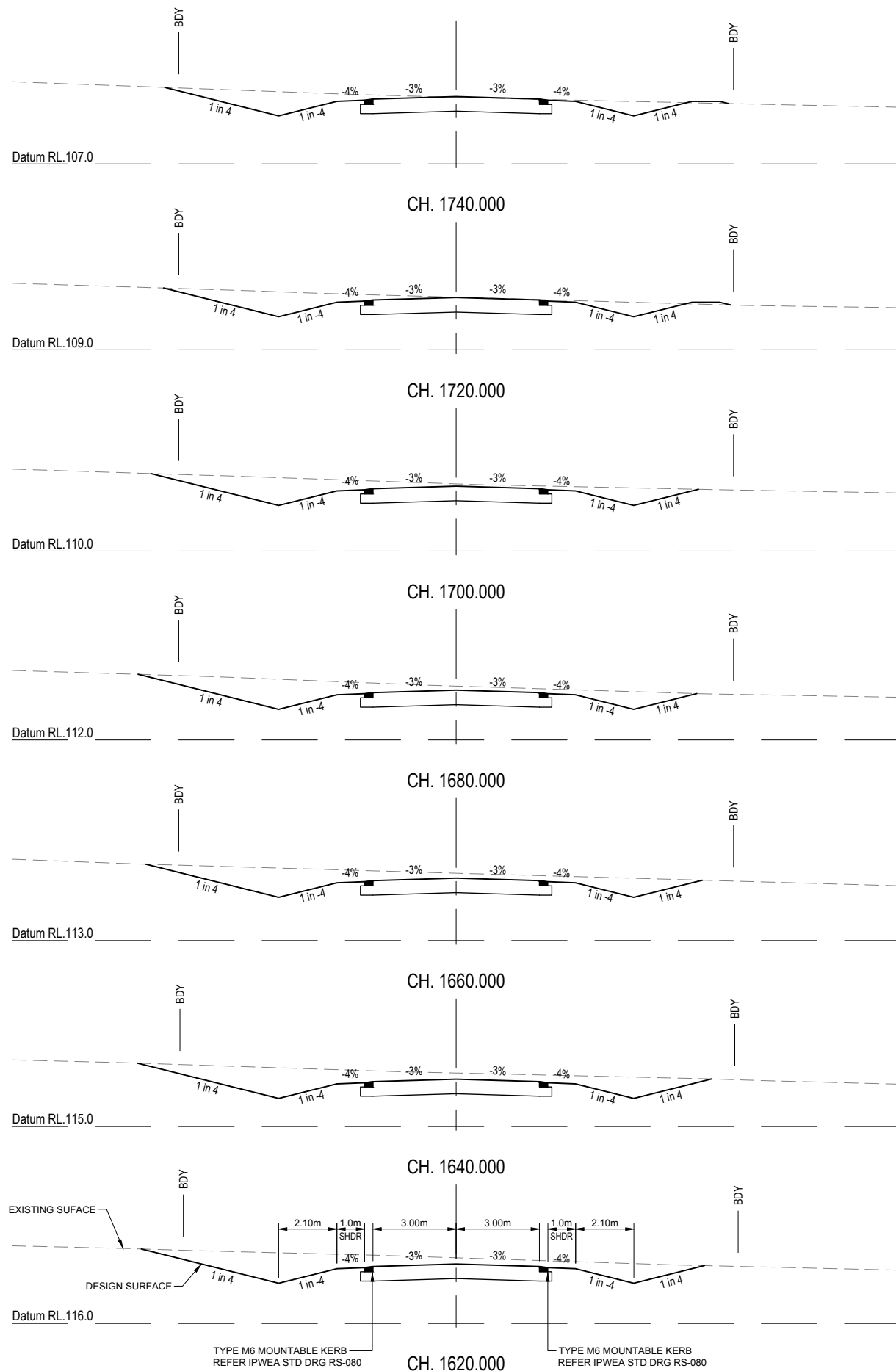
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 SCALE

 SCALE 1:100

PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3
 DRAWING TITLE
ROAD CROSS SECTIONS - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 5

DRAWING STATUS			
ORIGINAL ISSUE FOR APPROVAL			
PROJECT LEADER	DESIGNER	SIGNATURE	RPEID: 19536 NER: 3053220
CK	MP	C. KIRK	
DRAFTSPERSON	SCALE	DATE	SHEET SIZE
MP	AS SHOWN	MAR 2023	A1
JOB No.	DRAWING No.	REVISION	
BR222161	C2459	A	



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 P/N: DUBT: AM

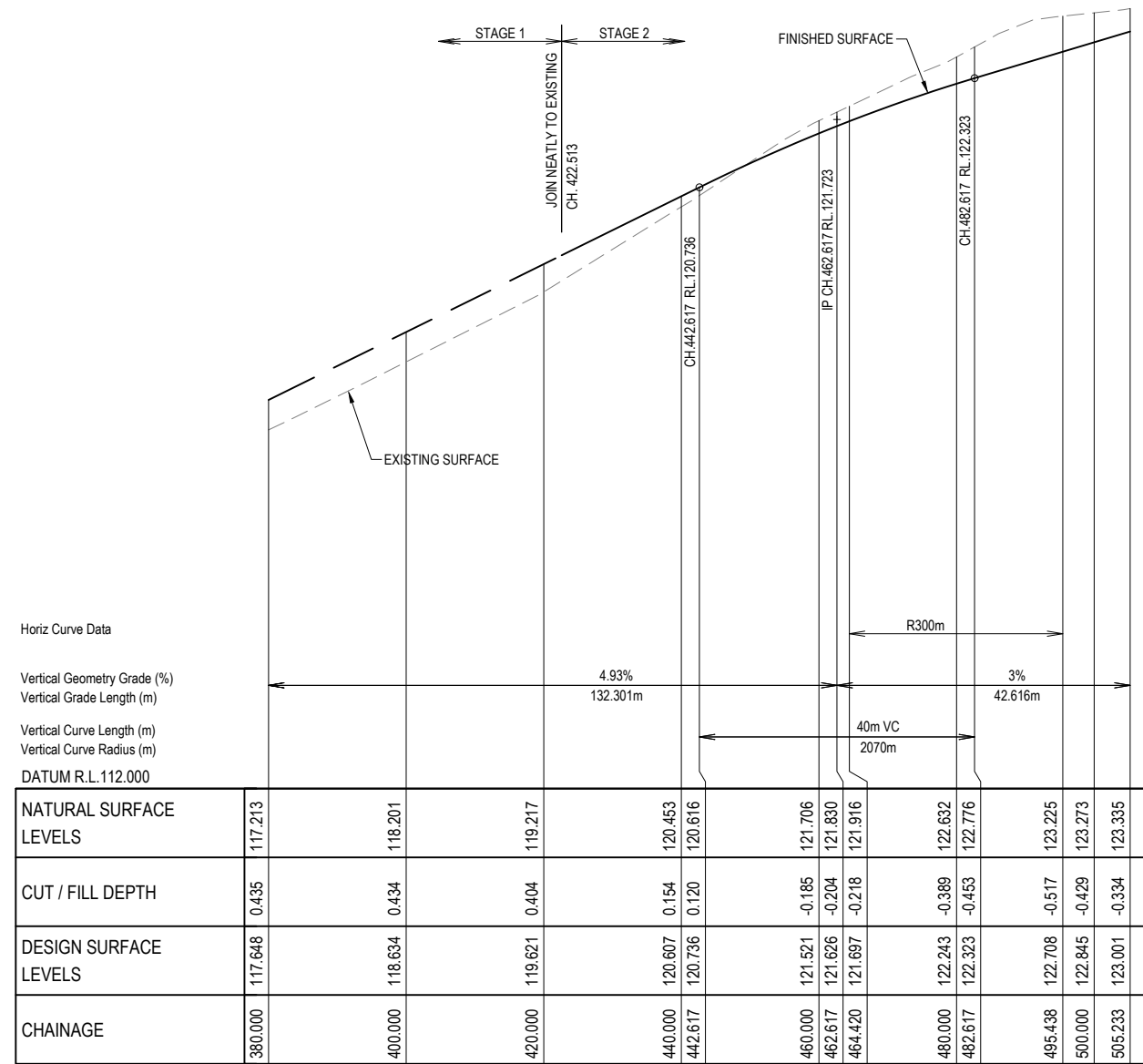
CLIENT
PARK LAKE ADARE PTY LTD
 PO BOX 4107 SPRINGFIELD QLD 4300
 SCALE

 SCALE 1:100

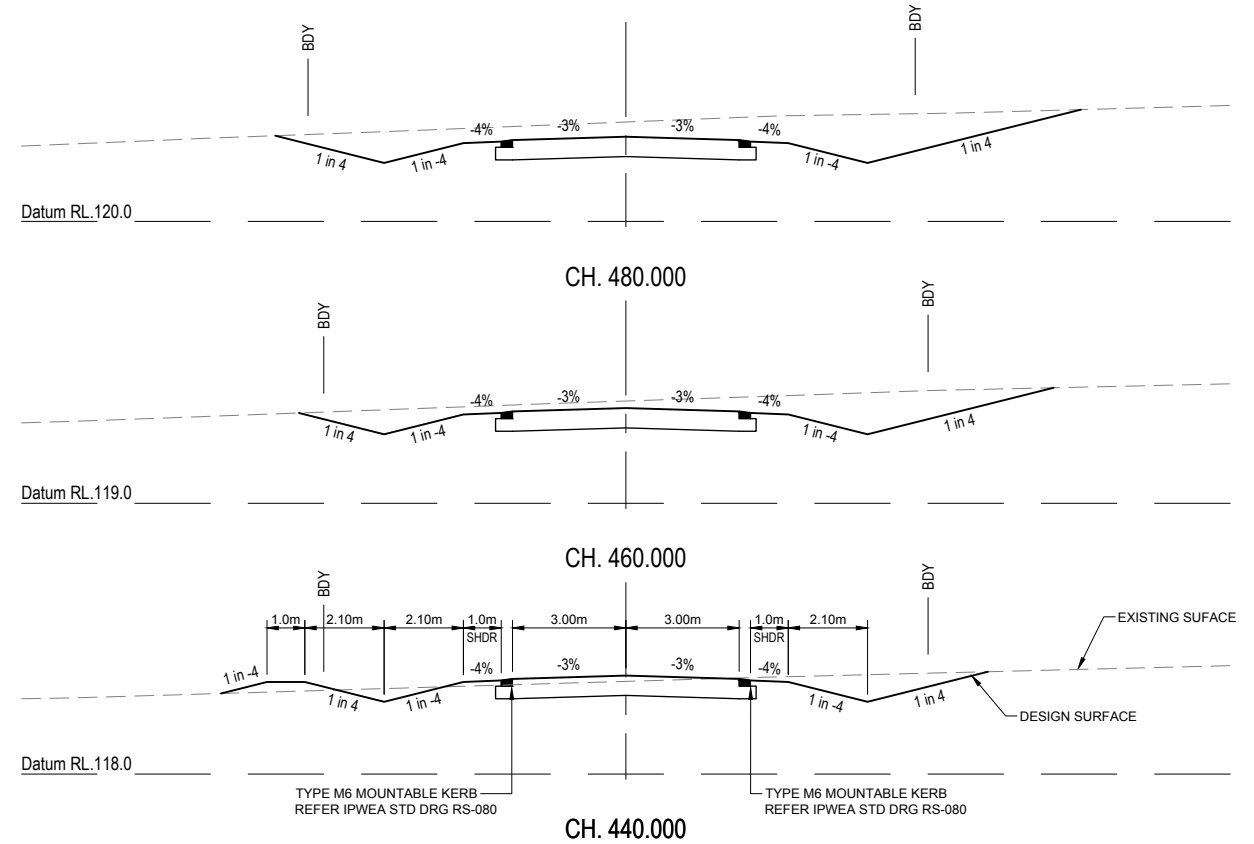
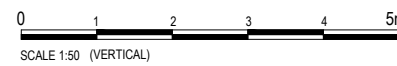
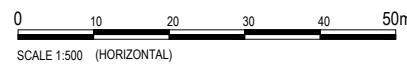
PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3
 DRAWING TITLE
ROAD CROSS SECTIONS - NEWLAND PLACE / HOWELL CIRCUIT - SHEET 6

DRAWING STATUS			
ORIGINAL ISSUE FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2460	REVISION A	

INTERSECTION - HOWELL CIRCUIT
CH.505.233



LONGITUDINAL SECTION - AXFORD WAY
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:50



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SCALE
0 1 2 3 4 5m 10m
SCALE 1:100

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
ROAD LONGITUDINAL AND CROSS SECTIONS - AXFORD WAY

DRAWING STATUS			
ORIGINAL ISSUE FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2461	REVISION A	

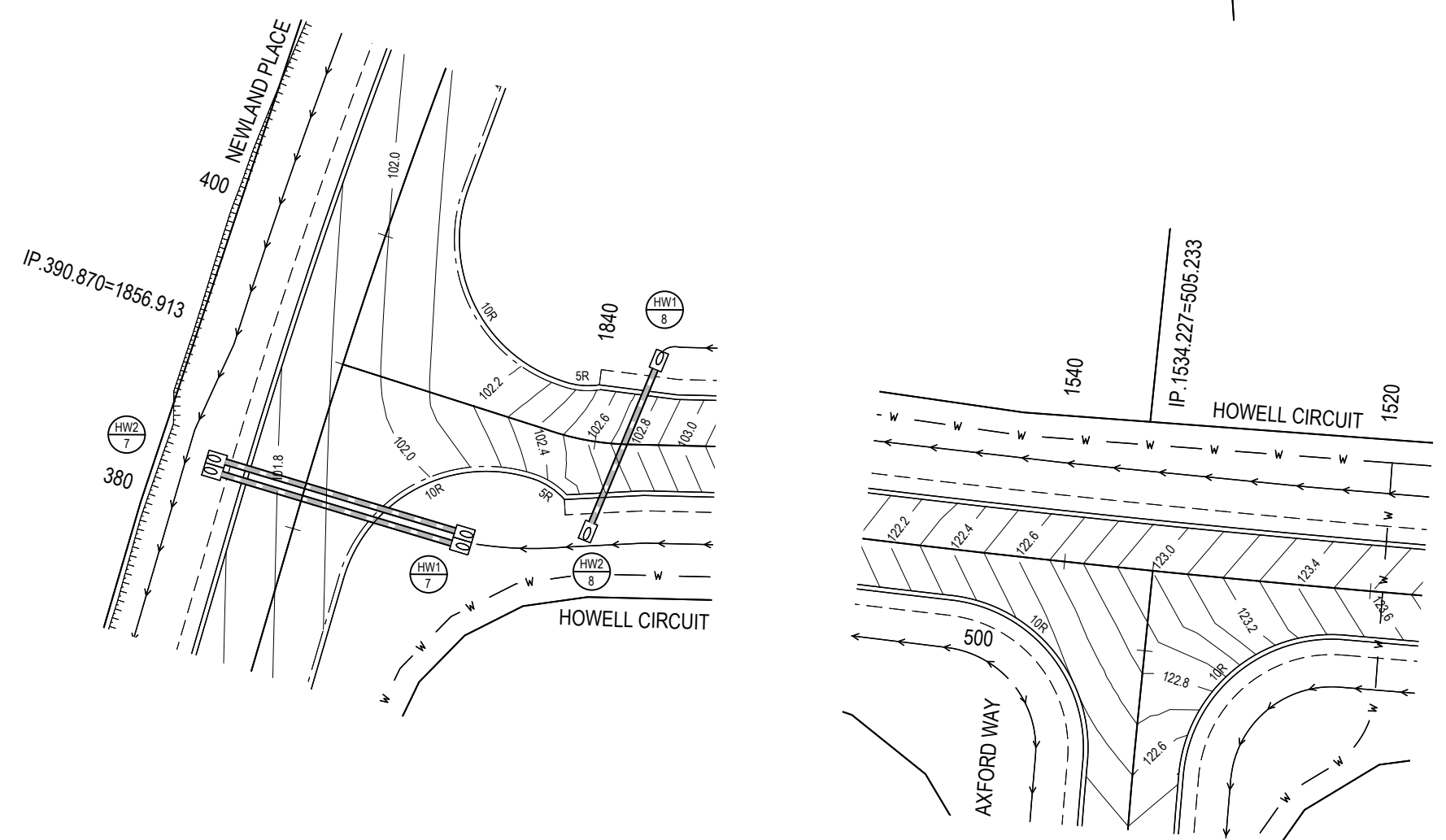
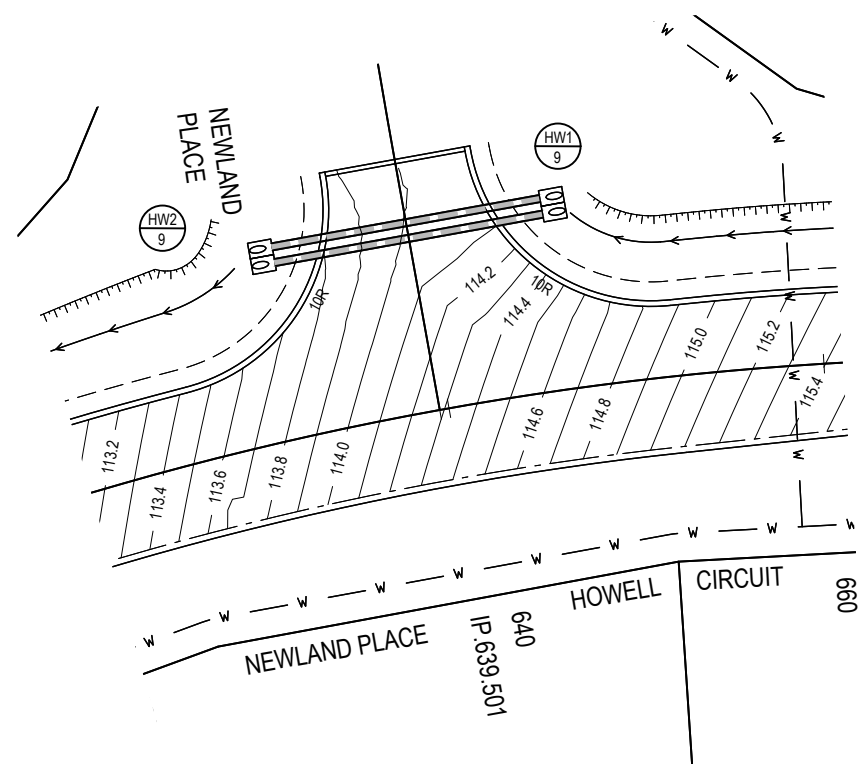
LEGEND

EXISTING	PROPOSED

SERVICES (PUP) LEGEND

	EXISTING	PROPOSED
COMMUNICATIONS		
DRAINAGE (unknown dia.)		
DRAINAGE (known dia.)		
ELECTRICITY		
O/H ELECTRICITY & POLE		
GAS		
WATER MAIN		

(*) - DENOTES QUALITY LEVEL AS PER A.S. 5488-2013.



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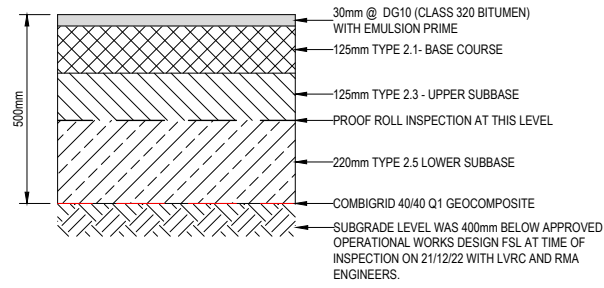
SCALE

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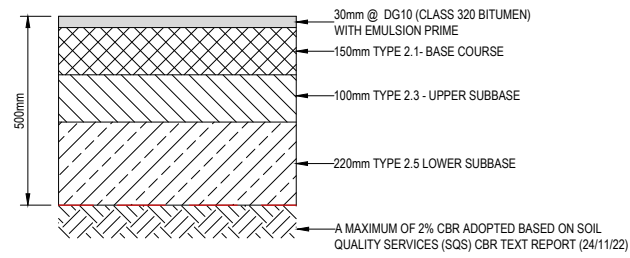
PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3

DRAWING TITLE
INTERSECTION DETAILS

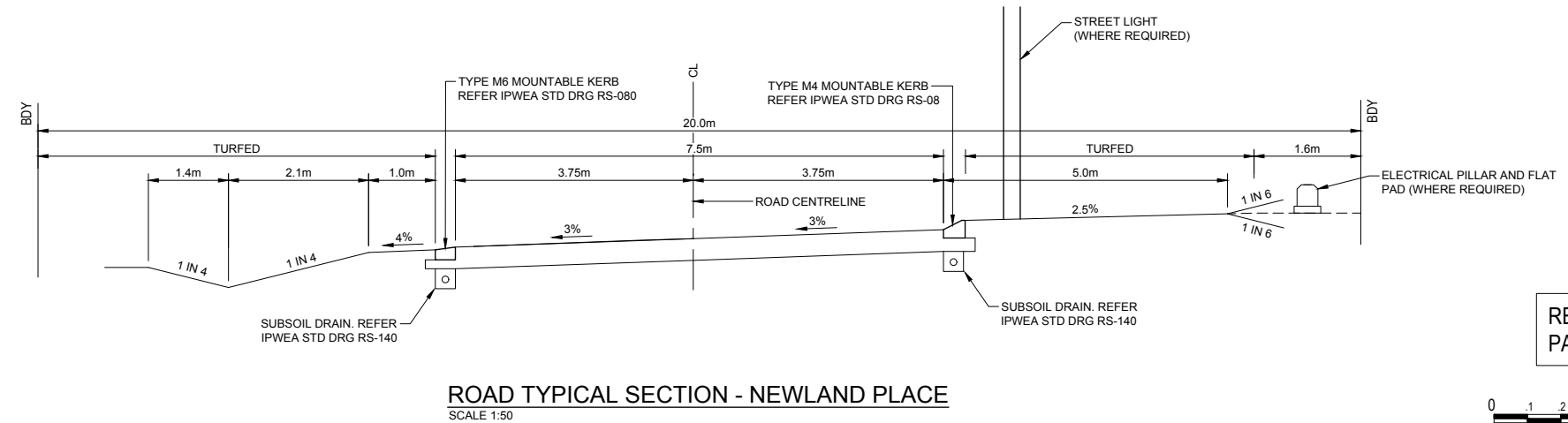
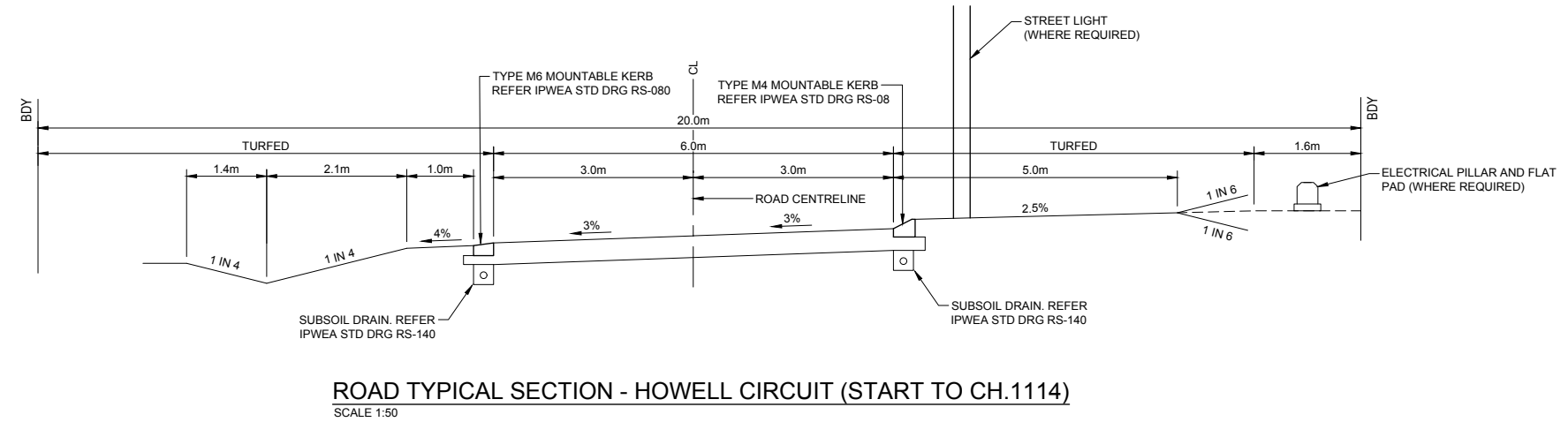
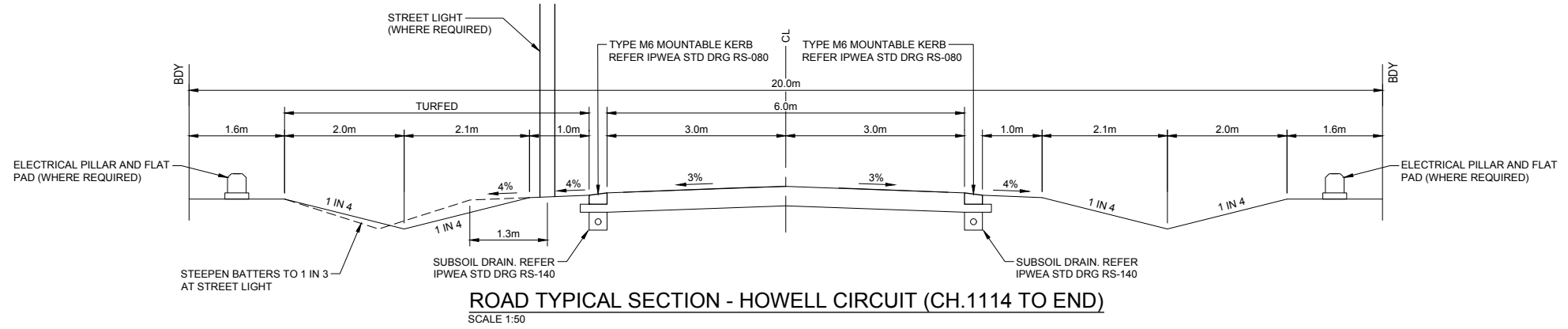
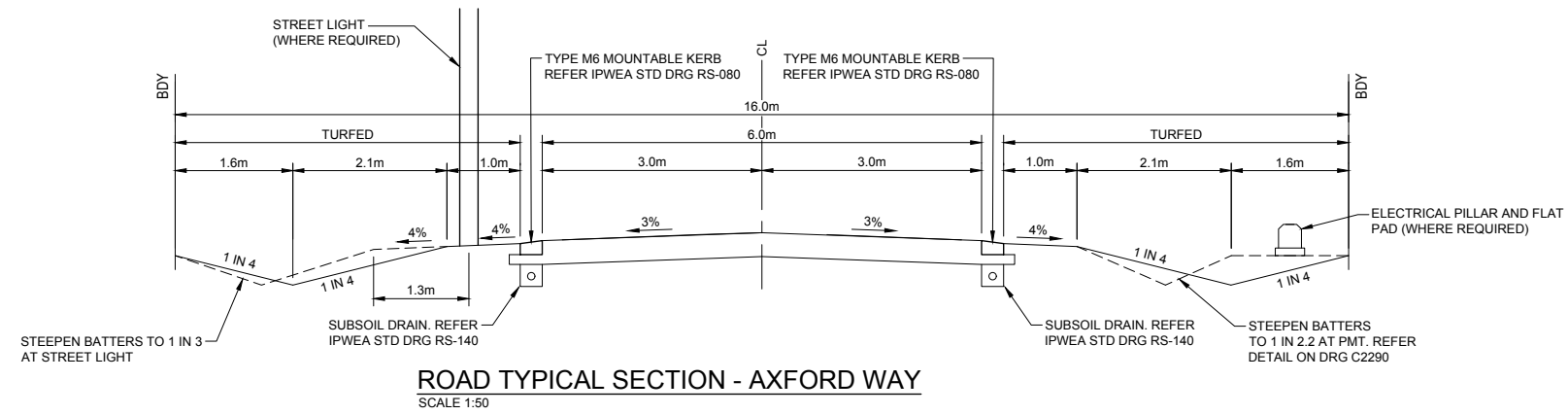
DRAWING STATUS			
ORIGINAL ISSUE			
FOR APPROVAL			
PROJECT LEADER	DESIGNER	SIGNATURE	RPEID: 19536 NER: 3053220
CK	MP	C. KIRK	
DRAFTSPERSON	SCALE	DATE	SHEET SIZE
MP	AS SHOWN	MAR 2023	A1
JOB No.	DRAWING No.	REVISION	
BR222161	C2480	A	



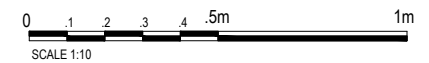
PAVEMENT 1 ACCESS STREET - 1 x 10⁵
NEWLAND PLACE / HOWELL CIRCUIT
500mm THICKNESS
SCALE 1:10



PAVEMENT 4 ACCESS STREET - 1 x 10⁵
AXFORD WAY
500mm THICKNESS
SCALE 1:10



REFER DRAWING C2300 FOR PAVEMENT TYPE LEGEND



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SCALE
0 1 2 3 4 5m
SCALE 1:50

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3
DRAWING TITLE
ROADWORKS DETAILS

DRAWING STATUS
ORIGINAL ISSUE
FOR APPROVAL
PROJECT LEADER: CK
DESIGNER: MP
SIGNATURE: C. KIRK
DATE: MAR 2023
JOB No: BR222161
DRAWING No: C2490
SHEET SIZE: A1
REVISION: A

TABLE DRAIN CALCULATIONS - LOCATION A
DESIGN STORM AS PER QUDM TABLE 7.3.1

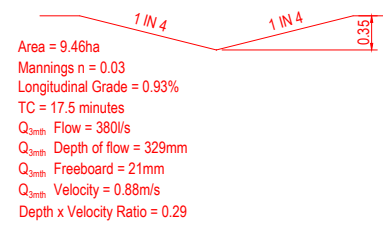


TABLE DRAIN CALCULATIONS - LOCATION B
DESIGN STORM AS PER QUDM TABLE 7.3.1

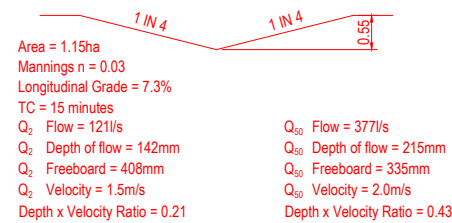


TABLE DRAIN CALCULATIONS - LOCATION C
DESIGN STORM AS PER QUDM TABLE 7.3.1

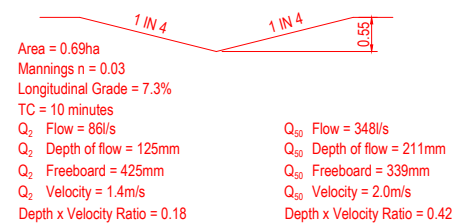


TABLE DRAIN CALCULATIONS - LOCATION D
DESIGN STORM AS PER QUDM TABLE 7.3.1

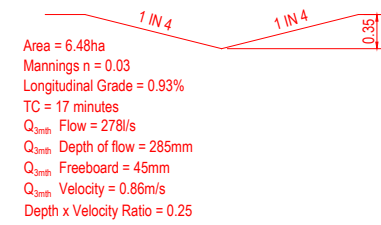


TABLE DRAIN CALCULATIONS - LOCATION E
DESIGN STORM AS PER QUDM TABLE 7.3.1

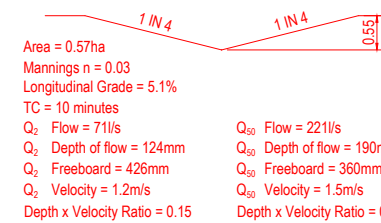


TABLE DRAIN CALCULATIONS - LOCATION F
DESIGN STORM AS PER QUDM TABLE 7.3.1

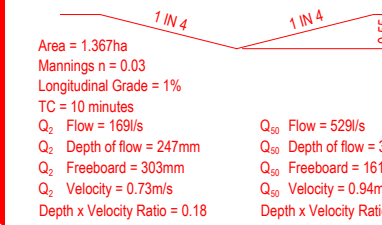
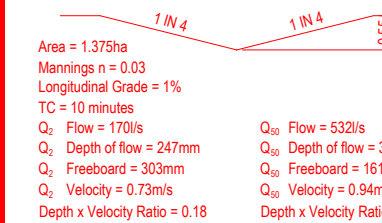
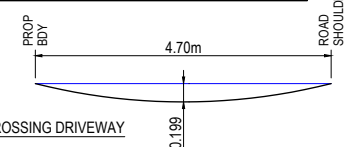


TABLE DRAIN CALCULATIONS - LOCATION G
DESIGN STORM AS PER QUDM TABLE 7.3.1



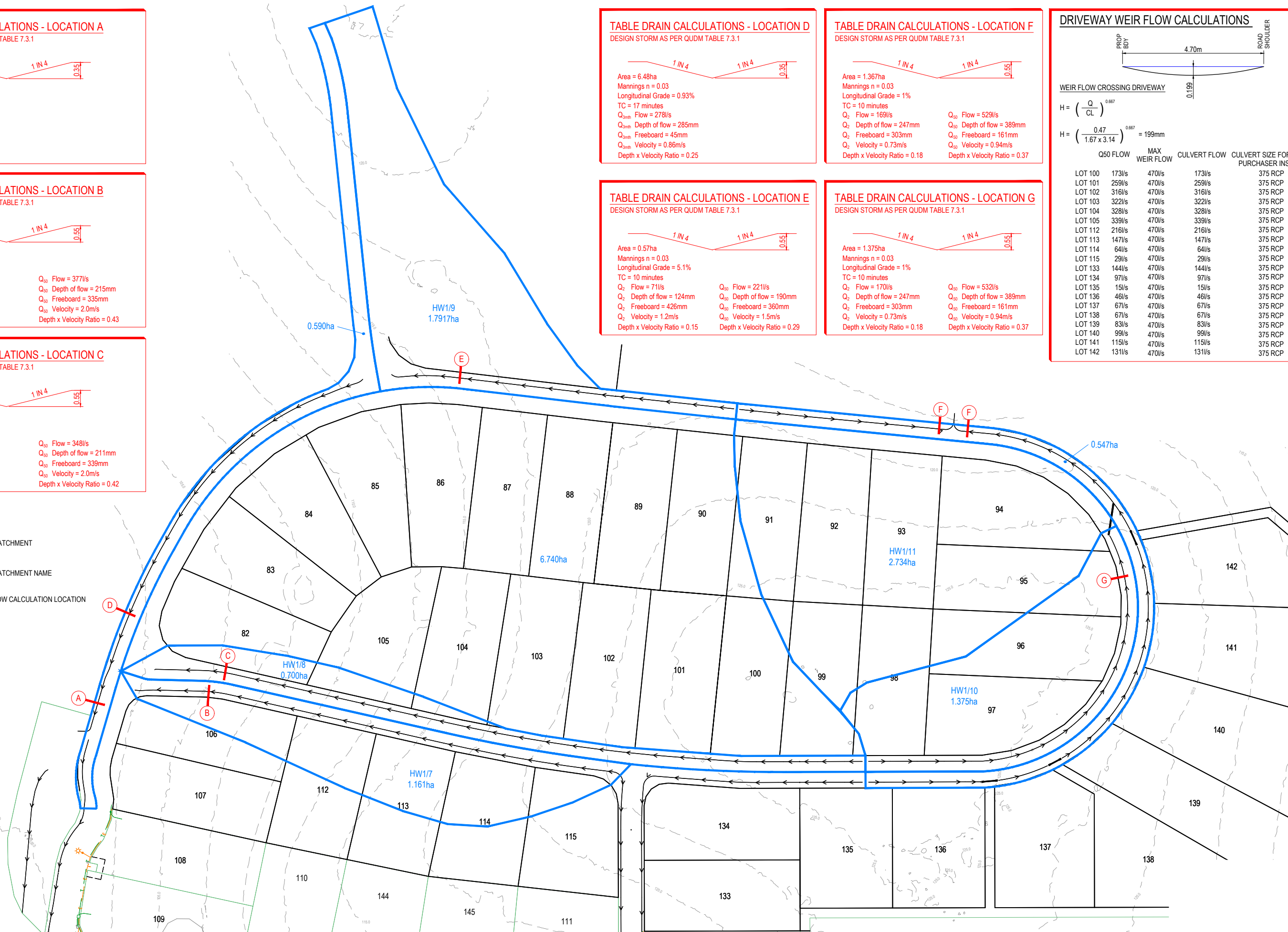
DRIVEWAY WEIR FLOW CALCULATIONS



WEIR FLOW CROSSING DRIVEWAY
 $H = \left(\frac{Q}{CL} \right)^{0.667}$
 $H = \left(\frac{0.47}{1.67 \times 3.14} \right)^{0.667} = 199\text{mm}$

Q50 FLOW	MAX WEIR FLOW	CULVERT FLOW	CULVERT SIZE FOR BLOCK PURCHASER INSTALL
LOT 100	173l/s	470l/s	173l/s
LOT 101	259l/s	470l/s	259l/s
LOT 102	316l/s	470l/s	316l/s
LOT 103	322l/s	470l/s	322l/s
LOT 104	328l/s	470l/s	328l/s
LOT 105	339l/s	470l/s	339l/s
LOT 112	216l/s	470l/s	216l/s
LOT 113	147l/s	470l/s	147l/s
LOT 114	64l/s	470l/s	64l/s
LOT 115	29l/s	470l/s	29l/s
LOT 133	144l/s	470l/s	144l/s
LOT 134	97l/s	470l/s	97l/s
LOT 135	15l/s	470l/s	15l/s
LOT 136	46l/s	470l/s	46l/s
LOT 137	67l/s	470l/s	67l/s
LOT 138	67l/s	470l/s	67l/s
LOT 139	83l/s	470l/s	83l/s
LOT 140	99l/s	470l/s	99l/s
LOT 141	115l/s	470l/s	115l/s
LOT 142	131l/s	470l/s	131l/s

- LEGEND:**
- STORMWATER CATCHMENT
 - HW1/2**
1.2713ha STORMWATER CATCHMENT NAME
 - TABLE DRAIN FLOW CALCULATION LOCATION



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SCALE

 SCALE 1:1000

PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3

DRAWING TITLE
DRAINAGE CATCHMENT PLAN

DRAWING STATUS
ORIGINAL ISSUE
 FOR APPROVAL

PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	SHEET SIZE A1	REVISION
JOB No. BR222161	DRAWING No. C2500	REVISION A	

LEGEND

EXISTING	PROPOSED
FENCE	OPEN DRAIN
OPEN DRAIN	KERB AND CHANNEL TYPE B1
KERB AND CHANNEL	MOUNTABLE KERB TYPE M4
KERB ONLY	MOUNTABLE KERB TYPE M6
CONTOUR (0.100m)	ROAD EDGE BITUMEN
ROAD EDGE BITUMEN	ROAD SHOULDER
TREE TO REMAIN	DRAINAGE
TREE TO BE REMOVED	
TREE MAY NEED TO BE REMOVED PENDING AGREEMENT WITH SUPERINTENDENT ON SITE DURING CONSTRUCTION	

SERVICES (PUP) LEGEND

	EXISTING	PROPOSED
COMMUNICATIONS	C(*)	T
DRAINAGE (unknown dia.)	D(*)	C
DRAINAGE (known dia.)	D	E
ELECTRICITY	E(*)	
O/H ELECTRICITY & POLE	E	
GAS	G(*)	
WATER MAIN	W(*)	

(*) - DENOTES QUALITY LEVEL AS PER A.S. 5488-2013.

NOTE
PROVIDE A WEIR SHAPE TO ALL DRIVEWAYS AS DETAILED ON DRAWING C2500



FOR CONTINUATION REFER DWG No. C2502

REVISIONS:

No.	REVISION DESCRIPTION	MP	DATE
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SCALE
0 7.5 15 22.5 30 37.5m 75m
SCALE 1:750

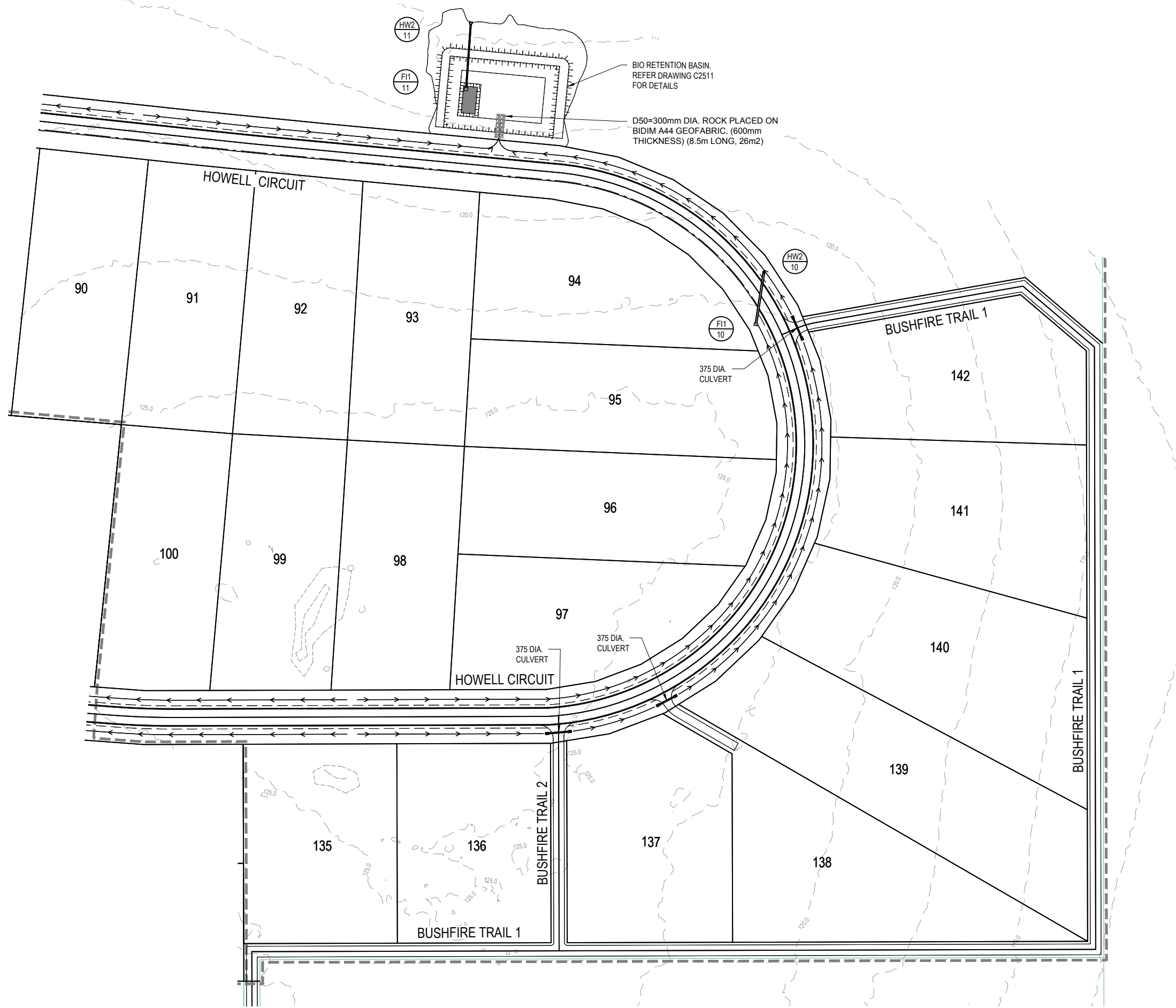
PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
DRAINAGE PLAN
SHEET 1

DRAWING STATUS
ORIGINAL ISSUE
FOR APPROVAL

PROJECT LEADER	DESIGNER	SIGNATURE	RPEID
CK	MP	C. KIRK	19536 NER-3053220
DRAFTSPERSON	SCALE	DATE	SHEET SIZE
MP	AS SHOWN	MAR 2023	A1
JOB No.	DRAWING No.	REVISION	
BR222161	C2501	A	

FOR CONTINUATION REFER DWG No. C2501



EXISTING		PROPOSED	
--- ---	FENCE	→→→	OPEN DRAIN
→→→	OPEN DRAIN	====	KERB AND CHANNEL TYPE B1
--- ---	KERB AND CHANNEL	--- ---	MOUNTABLE KERB TYPE M4
--- ---	KERB ONLY	====	MOUNTABLE KERB TYPE M6
---	CONTOUR (0.100m)	--- ---	ROAD EDGE BITUMEN
---	ROAD EDGE BITUMEN	---	ROAD SHOULDER
○*	TREE TO REMAIN	---	DRAINAGE
○	TREE TO BE REMOVED		
○*	TREE MAY NEED TO BE REMOVED PENDING AGREEMENT WITH SUPERINTENDENT ON SITE DURING CONSTRUCTION		

SERVICES (PUP) LEGEND		
	EXISTING	PROPOSED
COMMUNICATIONS	—C(*)—	—T—
DRAINAGE (unknown dia.)	—D(*)—	—○—
DRAINAGE (known dia.)	—○—	—○—
ELECTRICITY	—E(*)—	—E—
O/H ELECTRICITY & POLE	—V—	—E—
GAS	—G(*)—	
WATER MAIN	—W(*)—	

(*) - DENOTES QUALITY LEVEL AS PER A.S. 5488-2013.

NOTE
PROVIDE A WEIR SHAPE TO ALL DRIVEWAYS AS DETAILED ON DRAWING C2500


REVISIONS:			
No.	REVISION DESCRIPTION	MP DRAWN	DATE
A	ISSUED FOR APPROVAL	MP	21/03/23





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PARK LAKE ADARE PTY LTD
 PO BOX 4107 SPRINGFIELD QLD 4300
 SCALE

 SCALE 1:750

PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3
 DRAWING TITLE
DRAINAGE PLAN SHEET 2

DRAWING STATUS			
ORIGINAL ISSUE FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2502	REVISION	A

1.0m WIDE SURCHARGE CHANNEL AT RL.101.05 TO DIRECT MAJOR FLOWS TO THE WEST (1 IN 4 BATTERS)

1 IN 4 BATTER

SWALE INVERT RL.100.72

CONSTRUCT BIO RETENTION BASIN (22m LONG x 3m WIDE BASE) (0.4m DEEP FILTER MEDIA)

INSTALL 0.5m WIDE BUND TO DIRECT STORMWATER FLOWS INTO THE BIO RETENTION BASIN. (RL.101.10)

EXCAVATE OUTLET SWALE WITH 1 IN 4 BATTERS (0.2% MIN. GRADE)

1 IN 4 BATTER

NEWLAND PLACE

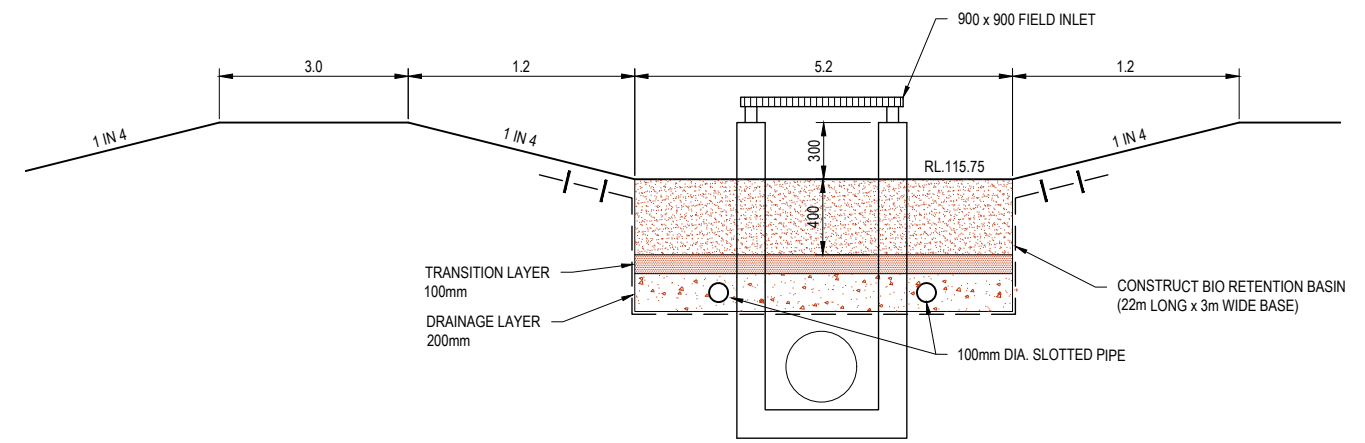
SERVICES (PUP) LEGEND

	EXISTING	PROPOSED
COMMUNICATIONS	C(*)	
DRAINAGE (unknown dia.)	D(*)	
DRAINAGE (known dia.)		
ELECTRICITY	E(*)	
O/H ELECTRICITY & POLE		
GAS	G(*)	
WATER MAIN	W(*)	

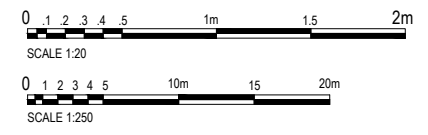
(*) - DENOTES QUALITY LEVEL AS PER A.S. 5488-2013.

LEGEND

EXISTING	PROPOSED
--- FENCE	→ OPEN DRAIN
→ OPEN DRAIN	== KERB AND CHANNEL TYPE B1
--- MOUNTABLE KERB TYPE M4	== MOUNTABLE KERB TYPE M4
--- MOUNTABLE KERB TYPE M6	== MOUNTABLE KERB TYPE M6
- - - CONTOUR (0.100m)	--- ROAD EDGE BITUMEN
--- ROAD EDGE BITUMEN	--- ROAD SHOULDER
○ TREE TO REMAIN	--- DRAINAGE
○ TREE TO BE REMOVED	



TYPICAL BIORETENTION BASIN SECTION
SCALE 1:20



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No.	REVISION DESCRIPTION	MP	DATE
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IF IN DOUBT, ASK

CLIENT
PARK LAKE ADARE PTY LTD
PO BOX 4107 SPRINGFIELD QLD 4300
SCALE
0 1 2 3 4 5 10m 15 20m
SCALE 1:250

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3
DRAWING TITLE
DRAINAGE BIO RETENTION BASIN DETAILS - SHEET 1

DRAWING STATUS			
ORIGINAL ISSUE FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2510	REVISION A	

SERVICES (PUP) LEGEND

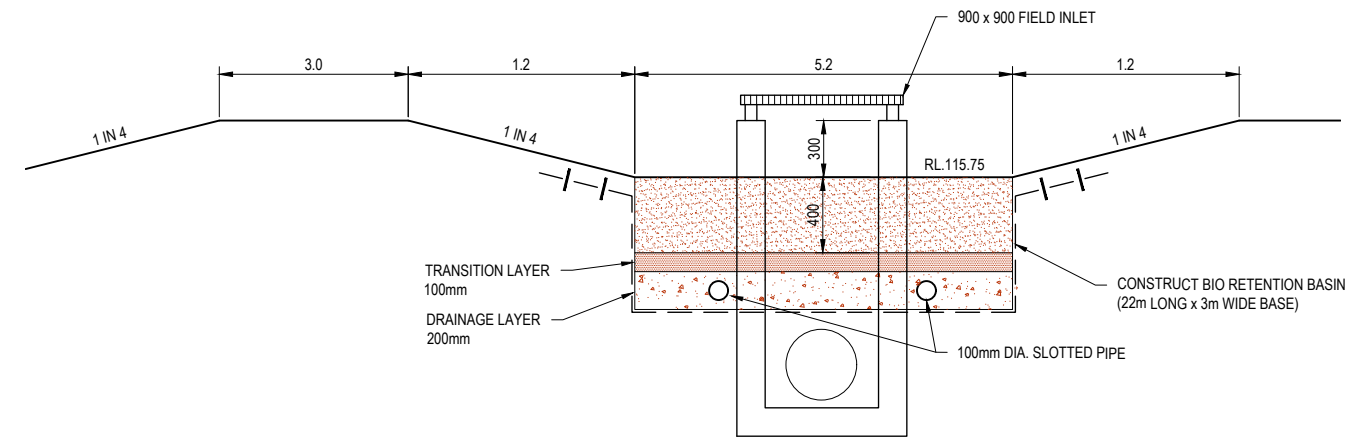
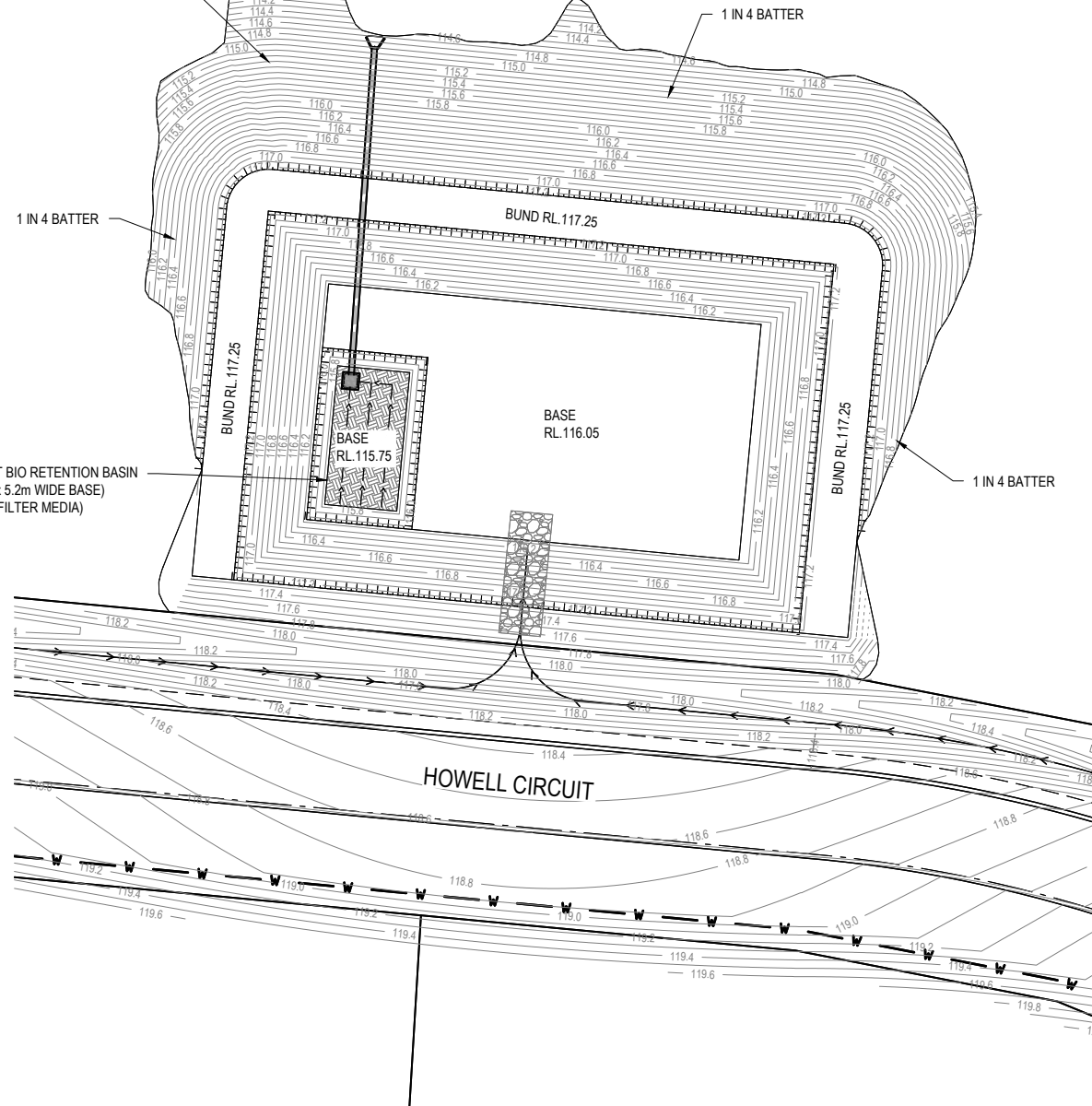
	EXISTING	PROPOSED
COMMUNICATIONS	C(*)	
DRAINAGE (unknown dia.)	D(*)	
DRAINAGE (known dia.)		
ELECTRICITY	E(*)	
O/H ELECTRICITY & POLE		
GAS	G(*)	
WATER MAIN	W(*)	

(*) - DENOTES QUALITY LEVEL AS PER A.S. 5488-2013.

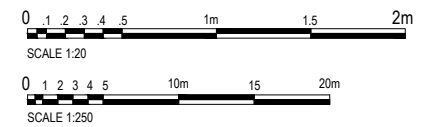
LEGEND

EXISTING	PROPOSED
--- FENCE	→ OPEN DRAIN
→ OPEN DRAIN	== KERB AND CHANNEL TYPE B1
--- MOUNTABLE KERB TYPE M4	== MOUNTABLE KERB TYPE M4
--- MOUNTABLE KERB TYPE M6	== MOUNTABLE KERB TYPE M6
- - - CONTOUR (0.100m)	--- ROAD EDGE BITUMEN
--- ROAD EDGE BITUMEN	--- ROAD SHOULDER
○ TREE TO REMAIN	--- DRAINAGE
○ TREE TO BE REMOVED	

D50=200mm DIA. ROCK PLACED ON BIDIM A44 GEOFABRIC (400mm THICKNESS) (1.2m LONG, 4m²)



TYPICAL BIORETENTION BASIN SECTION
SCALE 1:20



REVISIONS:			
No.	REVISION DESCRIPTION	MP	DATE
A	ISSUED FOR APPROVAL	MP	21/03/23



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P.N. DOUBT: AM

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SCALE
0 1 2 3 4 5 10m 15 20m
SCALE 1:250

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
DRAINAGE BIO RETENTION
BASIN DETAILS - SHEET 1

DRAWING STATUS			
ORIGINAL ISSUE			
FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2511	REVISION A	

STRUCTURE NAME	F11/6	HW2/6
STRUCTURE DESCRIPTION	900 x 900 FIELD INLET	CONCRETE HEADWALL

ALL PIPEWORK TO BE FIBRE REINFORCED CONCRETE TO THE SIZES NOMINATED.

ALL BEDDING AND BACKFILLING OF PIPE TRENCHES AS PER IPWEAQ STANDARD DRAWING DS-030

ALL DRAINAGE FIELD INLETS AS PER IPWEAQ STANDARD DRAWING DS-050

PIPE SIZE (mm)	3750
PIPE CLASS	4
PIPE GRADE (%)	0.40%
PIPE SLOPE (1 in X)	1 in 247
FULL PIPE VELOCITY (m/s)	1.12
PART FULL VELOCITY (m/s)	0.00
DATUM RL	88.0
H.G.L IN PIPE & W.S.E IN STRUCTURE	100.020
PIPE FLOW (Cumecs)	0.000
PIPE CAPACITY AT GRADE (Cumecs)	0.124
DEPTH TO INVERT	0.984
INVERT LEVEL OF DRAIN	99.846
DESIGN SURFACE LEVEL	100.830
SETOUT COORDINATES	E 429929.570 N 6954343.185
CHAINAGE	0.000

LINE 6

CONCRETE SLOPED HEADWALL	HW1/7
CONCRETE SLOPED HEADWALL	HW2/7

Q10 HGL

PIPE SIZE (mm)	(2x)3750
PIPE CLASS	4
PIPE GRADE (%)	2.21%
PIPE SLOPE (1 in X)	1 in 45
FULL PIPE VELOCITY (m/s)	2.36
PART FULL VELOCITY (m/s)	2.60
DATUM RL	89.0
H.G.L IN PIPE & W.S.E IN STRUCTURE	101.865
PIPE FLOW (Cumecs)	0.395
PIPE CAPACITY AT GRADE (Cumecs)	0.522
DEPTH TO INVERT	0.690
INVERT LEVEL OF DRAIN	101.200
DESIGN SURFACE LEVEL	101.890
SETOUT COORDINATES	E 429976.451 N 6954380.853
CHAINAGE	0.000

LINE 7

CONCRETE SLOPED HEADWALL	HW1/8
CONCRETE SLOPED HEADWALL	HW2/8

Q10 HGL

PIPE SIZE (mm)	3750
PIPE CLASS	4
PIPE GRADE (%)	1.80%
PIPE SLOPE (1 in X)	1 in 56
FULL PIPE VELOCITY (m/s)	2.13
PART FULL VELOCITY (m/s)	2.27
DATUM RL	90.0
H.G.L IN PIPE & W.S.E IN STRUCTURE	102.513
PIPE FLOW (Cumecs)	0.153
PIPE CAPACITY AT GRADE (Cumecs)	0.235
DEPTH TO INVERT	0.625
INVERT LEVEL OF DRAIN	102.015
DESIGN SURFACE LEVEL	102.640
SETOUT COORDINATES	E 429991.256 N 6954389.908
CHAINAGE	0.000

LINE 8

CONCRETE SLOPED HEADWALL	HW1/9
CONCRETE SLOPED HEADWALL	HW2/9

Q10 HGL

PIPE SIZE (mm)	(2x)4500
PIPE CLASS	4
PIPE GRADE (%)	3.12%
PIPE SLOPE (1 in X)	1 in 32
FULL PIPE VELOCITY (m/s)	3.17
PART FULL VELOCITY (m/s)	3.02
DATUM RL	101.0
H.G.L IN PIPE & W.S.E IN STRUCTURE	113.864
PIPE FLOW (Cumecs)	0.417
PIPE CAPACITY AT GRADE (Cumecs)	1.008
DEPTH TO INVERT	0.705
INVERT LEVEL OF DRAIN	113.340
DESIGN SURFACE LEVEL	114.045
SETOUT COORDINATES	E 430162.224 N 6954549.204
CHAINAGE	0.000

LINE 9

900 x 600 FIELD INLET	F11/10
CONCRETE HEADWALL	HW2/10

Q10 HGL

PIPE SIZE (mm)	600x3750
PIPE CLASS	BC
PIPE GRADE (%)	0.51%
PIPE SLOPE (1 in X)	1 in 195
FULL PIPE VELOCITY (m/s)	1.35
PART FULL VELOCITY (m/s)	1.67
DATUM RL	109.0
H.G.L IN PIPE & W.S.E IN STRUCTURE	121.356
PIPE FLOW (Cumecs)	0.339
PIPE CAPACITY AT GRADE (Cumecs)	0.304
DEPTH TO INVERT	0.669
INVERT LEVEL OF DRAIN	120.795
DESIGN SURFACE LEVEL	121.464
SETOUT COORDINATES	E 430585.581 N 6954383.730
CHAINAGE	0.000

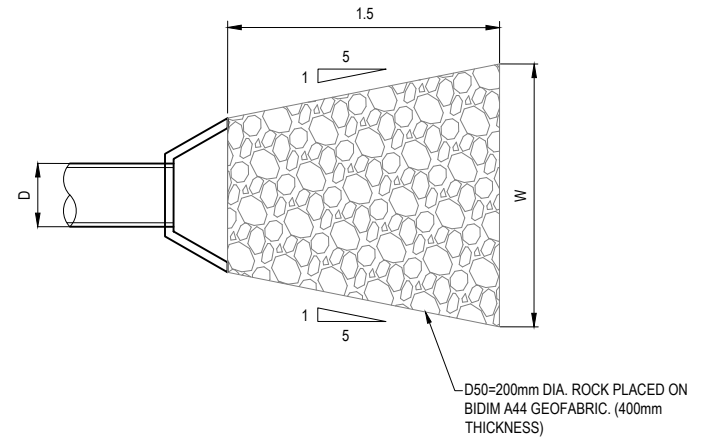
LINE 10

900 x 900 FIELD INLET	F11/11
CONCRETE HEADWALL	HW2/11

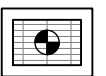
Q10 HGL

PIPE SIZE (mm)	3750
PIPE CLASS	2
PIPE GRADE (%)	0.71%
PIPE SLOPE (1 in X)	1 in 140
FULL PIPE VELOCITY (m/s)	1.030
PART FULL VELOCITY (m/s)	1.030
DATUM RL	103.0
H.G.L IN PIPE & W.S.E IN STRUCTURE	103.0
PIPE FLOW (Cumecs)	0.000
PIPE CAPACITY AT GRADE (Cumecs)	0.000
DEPTH TO INVERT	0.765
INVERT LEVEL OF DRAIN	99.800
DESIGN SURFACE LEVEL	100.565
SETOUT COORDINATES	E 429918.623 N 6954340.096
CHAINAGE	0.000

LINE 11

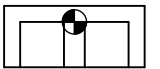


OUTLET PROTECTION DETAIL
PROVIDE TO ALL OUTLETS
N.T.S.



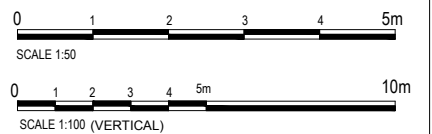
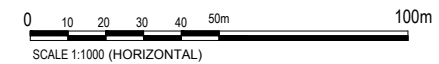
TYPICAL FIELD INLET SETOUT
SCALE 1:50

● DENOTES SETOUT POINT



TYPICAL HEADWALL SETOUT
SCALE 1:50

● DENOTES SETOUT POINT



REVISIONS:	No.	REVISION DESCRIPTION	MP	DATE
A	1	ISSUED FOR APPROVAL	MP	21/03/23



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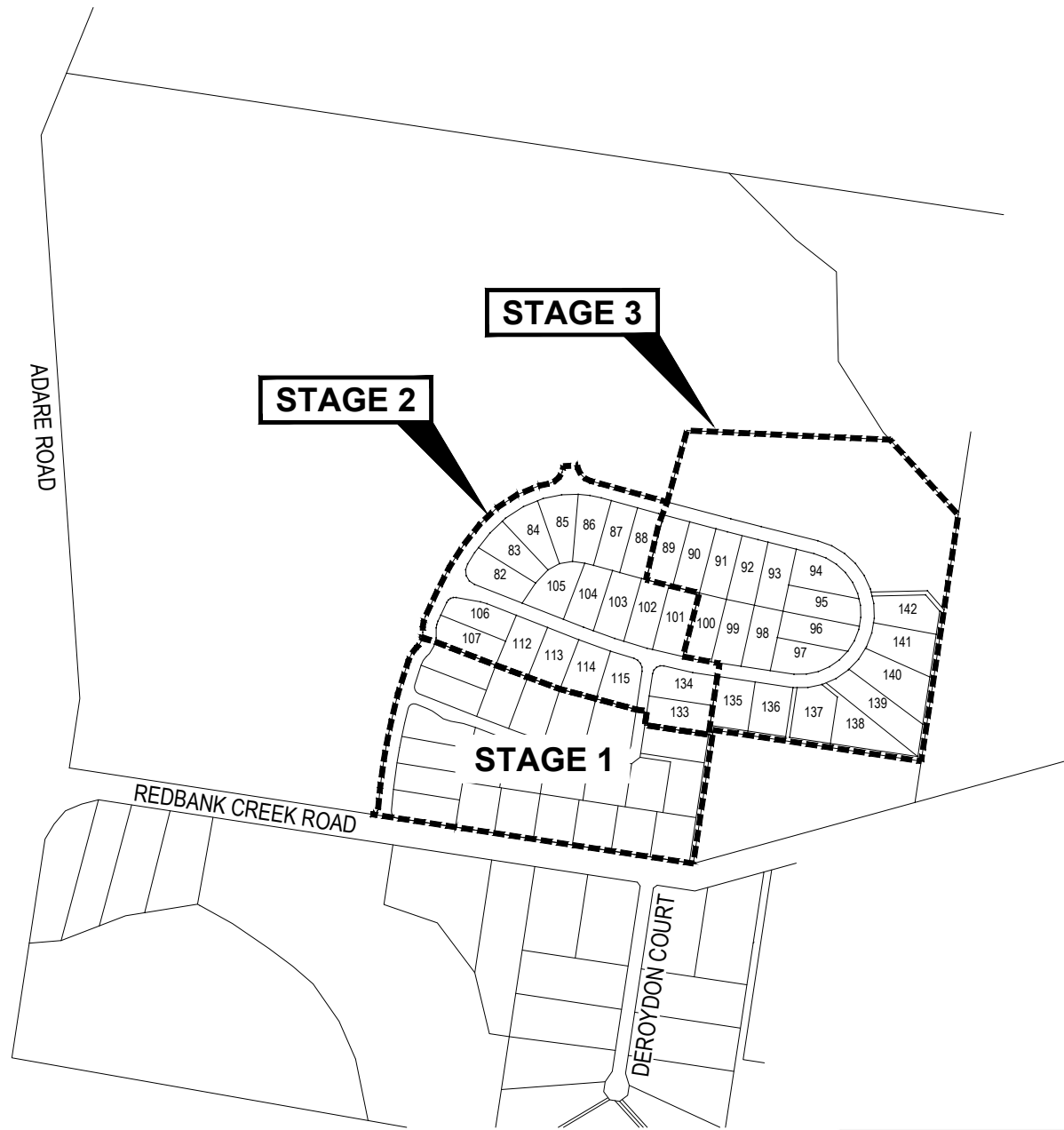
CLIENT
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PO BOX 4107 SPRINGFIELD QLD 4300
SCALE

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3
DRAWING TITLE
DRAINAGE LONGITUDINAL SECTIONS
SHEET 1

DRAWING STATUS
ORIGINAL ISSUE
FOR APPROVAL
PROJECT LEADER CK
DESIGNER MP
SIGNATURE C. KIRK
DATE MAR 2023
SCALE AS SHOWN
REVISION A1
JOB No. BR222161
DRAWING No. C2550
SHEET SIZE A1

ASSET REGISTER - WATER RETICULATION				
ESTATE/STAGE	STAGES 2 AND 3			
SITE ADDRESS	174 ADARE ROAD, ADARE			
FILE/APPLICATION				
DELEGATES APP. DATE				
CLIENT	PARK LAKE ADARE PTY LTD			
DRAWING/PLAN No.				
MAINS	DIA.	MATERIAL		LENGTH
		DESIGN	CONST.	DESIGN
	DN125	PE		1252m
	DN180	PE		406m
SERVICES	DIA.	MATERIAL		LENGTH
		DESIGN	CONST.	DESIGN
		20mm		
		25mm		
		32mm	PE100 PN16	48m
	40mm	PE100 PN16	70m	
METERS	DIA.	NUMBER		
		20mm	40	
		25mm		
		32mm		
		150mm		
		50mm		

SERVICE DETAILS		
NO	SIZE	LOT NUMBERS
28	DN25 PE	82-107, 133 AND 134
12	DN32 PE	112-115 AND 135 TO 142



LOCALITY PLAN
SCALE 1:5000

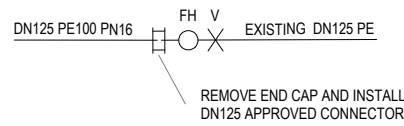


ALL ENVIRONMENTAL PROTECTION MEASURES SHALL BE IMPLEMENTED PRIOR TO ANY CONSTRUCTION WORK, INCLUDING CLEARING COMMENCING.

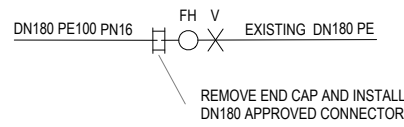
ALL WATER AND SEWER CONSTRUCTION WORK SHALL COMPLY WITH THE REQUIREMENTS OF THE QUEENSLAND WORKPLACE HEALTH AND SAFETY ACT 2011.

CONTACT THE DIVISION OF WORKPLACE HEALTH AND SAFETY FOR INFORMATION PHONE : 1300 362 128

SEQ CODE STANDARD DRAWING SCHEDULE	
SOIL CLASSIFICATION	SEQ-WAT-1200-1
EMBEDMENT AND TRENCH FILL	SEQ-WAT-1200-2
THRUST BLOCK DETAILS	SEQ-WAT-1205-1
VALVE THRUST BLOCKS	SEQ-WAT-1206-1
IDENTIFICATION MARKERS	SEQ-WAT-1300-1,2



LIVE CONNECTION DETAIL '2'
DIAGRAMMATIC



LIVE CONNECTION DETAIL '1'
DIAGRAMMATIC

ALL LIVE WORKS ON AC MAIN SHALL INCLUDE REMOVAL OF EXISTING AC MAIN FROM COLLAR TO COLLAR.

VALVE MARKERS, HYDRANT MARKERS AND PAVEMENT MARKINGS ARE TO BE INSTALLED/REINSTATED IN ACCORDANCE WITH SEQ-WAT-1300-1

AS CONSTRUCTED
AS CONSTRUCTED DOCUMENTATION IS TO BE PROVIDED IN ACCORDANCE WITH REQUIREMENTS AS SPECIFIED IN THE SEQ D&C CODE INCLUSIVE OF FULL ADAC COMPLAINT SURVEY

LIVE WORKS CONNECTION 1

STREET : NEWLAND PLACE
 INSTALLATION :
 TYPE OF MAIN : EXISTING DN180 PE
 DATE COMMENCED : DATE COMPLETED :
 SIGNATURE :

LIVE WORKS CONNECTION 2

STREET : AXFORD WAY
 INSTALLATION :
 TYPE OF MAIN : EXISTING DN125 PE
 DATE COMMENCED : DATE COMPLETED :
 SIGNATURE :

GENERAL NOTES

- ALL WORK AND MATERIALS SHALL BE IN ACCORDANCE WITH CURRENT SOUTH EAST QUEENSLAND WATER SUPPLY CODE SPECIFICATIONS AND STANDARDS.
- UNLESS SPECIFIED OTHERWISE ALL MATERIALS AND WORK SHALL COMPLY WITH THE RELEVANT AUSTRALIAN STANDARDS.
- ADOPT LIP OF KERB OR SHOULDER OF ROAD AS PERMANENT LEVEL.
- COVER ON MAINS FROM PERMANENT LEVEL TO BE AS SHOWN IN SEQ-WAT-1200-2.
- CONDUITS TO BE INSTALLED IN ACCORDANCE WITH THE STANDARD DRAWINGS.
- A WATER METER SUPPLIED AT THE DEVELOPER'S COST, IS TO BE INSTALLED AT THE SERVICE POINT OF EACH LOT IN ACCORDANCE WITH THE STANDARD DRAWING FOR THE SEQ-SP.
- ALL MATERIALS USED IN THE WORKS SHALL COMPLY WITH THE SEQ-SP'S ACCEPTED PRODUCTS AND MATERIALS LIST OR BE APPROPRIATELY SHOWN, LISTED AND DEFINED IN THE ENGINEERING SUBMISSION SO THAT THE ALTERNATIVE PRODUCT OR MATERIAL CAN BE ASSESSED AND IF APPROPRIATE, APPROVED BY THE SEQ-SP.
- ALL CONCRETE FOOTPATHS TO BE CLEAR OF WATER MAINS.
- TEST/CHLORINATION POINTS TO BE INSTALLED IN ACCORDANCE WITH STANDARD DRAWING NO.SEQ-WAT-1410-1.
- THE CONSTRUCTION OF THE WATER RETICULATION WORK SHOWN ON THIS DRAWING MUST BE SUPERVISED BY AN ENGINEER WHO HAS RPEQ REGISTRATION. WORKS NOT COMPLYING WITH THIS REQUIREMENT WILL NOT BE PERMITTED TO CONNECT TO THE RETICULATION SYSTEM.
- WATER MAIN ROAD CROSSING AND VALVE PAVEMENT MARKERS TO BE INSTALLED AS PER SEQ-WAT-1300-1.

WATER MAIN CONSTRUCTION NOTES

- DURING ANY CONSTRUCTION ACTIVITY AT LEAST ONE PERSON ON SITE MUST HAVE COMPLETED A PIPE LAYING TRAINING COURSE APPROVED BY THE PIPE SUPPLIER OR MANUFACTURER AND APPROPRIATE TO THE PIPELINE UNDER CONSTRUCTION. THE TRAINING COURSE MUST HAVE BEEN COMPLETED WITHIN THE LAST TEN YEARS.
- ALL SITE AND FACTORY PE WELDING SHALL BE CARRIED OUT BY A PERSON WHO HAS COMPLETED RELEVANT NATIONALLY ACCREDITED TRAINING COURSES FOR BUTT WELDING/ELECTROFUSION AND HOLD A VALID WELDING CERTIFICATE IN ACCORDANCE WITH AS/NZS 2033.
- THE CONTRACTOR SHALL PROVIDE DOCUMENTED EVIDENCE OF ACCEPTABLE QUALIFICATIONS TO URBAN UTILITIES.
- INSTALL DETECTABLE MARKER TAPE ON ALL WATER MAINS AND PROPERTY SERVICES.
- CONSTRUCT FIRE HYDRANTS AND STOP VALVES TO SEQ-WAT-1301-1, 1302-1, 1303-2, 1305-1, 1306-1 & 1409-1.
- ALL LIVE WORKS SHALL BE UNDERTAKEN BY THE DEVELOPER'S LICENSED CONTRACTOR IN ACCORDANCE WITH A VALID URBAN UTILITIES NETWORK ACCESS PERMIT, UNDER SUPERVISION OF URBAN UTILITIES, AT THE DEVELOPER'S EXPENSE.
- PROPOSED WORKS ARE LOCATED WITHIN FIRE ANT BIOSECURITY ZONE 2. ALL WORKS ARE TO BE TO DAFF REQUIREMENTS.

VEGETATION PROTECTION

- TREES LOCATED ALONG THE FOOTPATH SHALL BE, TRANSPLANTED PRIOR TO CONSTRUCTION, OR REPLACED IF DESTROYED.
- WHEN WORKING WITHIN 4m OF TREES, RUBBER OR HARDWOOD GIRDLES SHALL BE CONSTRUCTED WITH 1.8m BATTENS CLOSELY SPACED AND ARRANGED VERTICALLY FROM GROUND LEVEL. GIRDLES SHALL BE STRAPPED TO TREES PRIOR TO CONSTRUCTION AND REMAIN UNTIL COMPLETION.
- TREE ROOTS SHALL BE TUNNELLED UNDER, RATHER THAN SEVERED. IF ROOTS ARE SEVERED THE DAMAGED AREA SHALL BE TREATED WITH A SUITABLE FUNGICIDE. CONTACT RELEVANT COUNCIL ARBORIST FOR FURTHER ADVICE.
- ANY TREE LOPPING REQUIRED SHOULD BE UNDERTAKEN BY AN APPROVED ARBORIST.

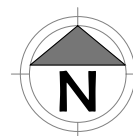
SOIL

- TOPSOIL AND SUBSOIL SHALL BE STOCKPILED SEPARATELY.
- CARE SHALL BE TAKEN TO PREVENT SEDIMENT FROM ENTERING THE STORMWATER SYSTEM. THIS MAY INVOLVE PLACING APPROPRIATE SEDIMENT CONTROLS AROUND STOCKPILES.
- IF ACID SULPHATE SOILS EXIST IN THE WORKS AREA THE OUTPUTS FROM THE RISK ASSESSMENT BASED ON THE QUEENSLAND ACID SULPHATE SOIL TECHNICAL MANUAL SHALL BE ADHERED TO.

REHABILITATION

- PRE-DISTURBANCE SOIL PROFILES AND COMPACTION LEVELS SHALL BE REINSTATED.
- PRE-DISTURBANCE VEGETATION PATTERNS SHALL BE RESTORED.
- ALL DISTURBED AREAS ASSOCIATED WITH CONSTRUCTION SHALL BE REHABILITATED. HEAVILY COMPACTED AREAS SHOULD BE RIPPED PRIOR TO TREATMENT
- ALL DISTURBED AREAS ARE TO BE LEFT IN STABLE CONDITION.
- ALL PLANTING/RE-VEGETATION WILL NEED TO BE MAINTAINED THROUGHOUT THE MAINTENANCE PERIOD.
- TRENCH REINSTATEMENT IS TO BE UNDERTAKEN IN ACCORDANCE WITH SEQ STANDARD REQUIREMENTS FOR EMBEDMENT AND TRENCH FILL. STANDARD DRAWINGS HAVE BEEN NOTED ON THIS PLAN.

REVISIONS:			
No.	REVISION DESCRIPTION	MP DRAWN	DATE
A	ISSUED FOR APPROVAL	MP	21/03/23



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CLIENT
PARK LAKE ADARE PTY LTD
 PO BOX 4107 SPRINGFIELD QLD 4300
 SCALE
 0 100 200 300 400 500m
 SCALE 1:5000

PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3
 DRAWING TITLE
WATER RETICULATION COVER SHEET

DRAWING STATUS
ORIGINAL ISSUE
 FOR APPROVAL
 PROJECT LEADER: CK
 DESIGNER: MP
 SIGNATURE: C. KIRK
 RPEQ: 19536
 NER: 3053220
 DRAFTER/PERSON: MP
 SCALE: AS SHOWN
 DATE: MAR 2023
 SHEET SIZE: A1
 JOB No.: BR222161
 DRAWING No.: C2600
 REVISION: A

ABBREVIATION LEGEND

AC - ASBESTOS CEMENT	DS - DOUBLE SOCKET
CICL - CAST IRON CEMENT LINED	DSP - DOUBLE SPIGOT
CISL - CAST IRON SPUN LINED	EW - EARTHENWARE
CR - CONCRETE REINFORCED	FH - FIRE HYDRANT
CTS - CUT TO SUIT	F&S - FLANGE & SOCKET
CUR - CONCRETE UN-REINFORCED	F&SP - FLANGE & SPIGOT
DF - DOUBLE FLANGE	RTS - ROTATE TO SUIT
DI - DUCTILE IRON	S&SP - SOCKET & SPIGOT
DICL - DUCTILE IRON CEMENT LINED	

SYMBOLS LEGEND

PROPOSED FIRE HYDRANT	FH ●
PROPOSED VALVE	X
PROPOSED SCOUR VALVE	X
PROPOSED DEAD END	J
PROPOSED REDUCER	>
PROPOSED CONNECTOR	=
PROPOSED WATER METER	X
EXISTING FH	○ FH
EXISTING VALVE	X
EXISTING SCOUR	J
EXISTING DEADEND	J
EXISTING REDUCER	>
EXISTING ZONE VALVE	⊗
EXISTING WATER METER	X SC
DISUSED FH	● FH
DISUSED VALVE	·
DISUSED SCOUR	J
DISUSED METER	X SC

LEGEND

EXISTING	PROPOSED
--- KERB AND CHANNEL	==== KERB AND CHANNEL TYPE B1
--- KERB ONLY	==== MOUNTABLE KERB TYPE M4
--- MOUNTABLE KERB TYPE M4	==== MOUNTABLE KERB TYPE M6
--- MOUNTABLE KERB TYPE M6	--- ROAD EDGE BITUMEN
--- CONTOUR (1.0m)	--- ROAD SHOULDER
--- ROAD EDGE BITUMEN	--- DRAINAGE
	○ R40 HYDRANT SPACING
	■ R90 HYDRANT COVERAGE

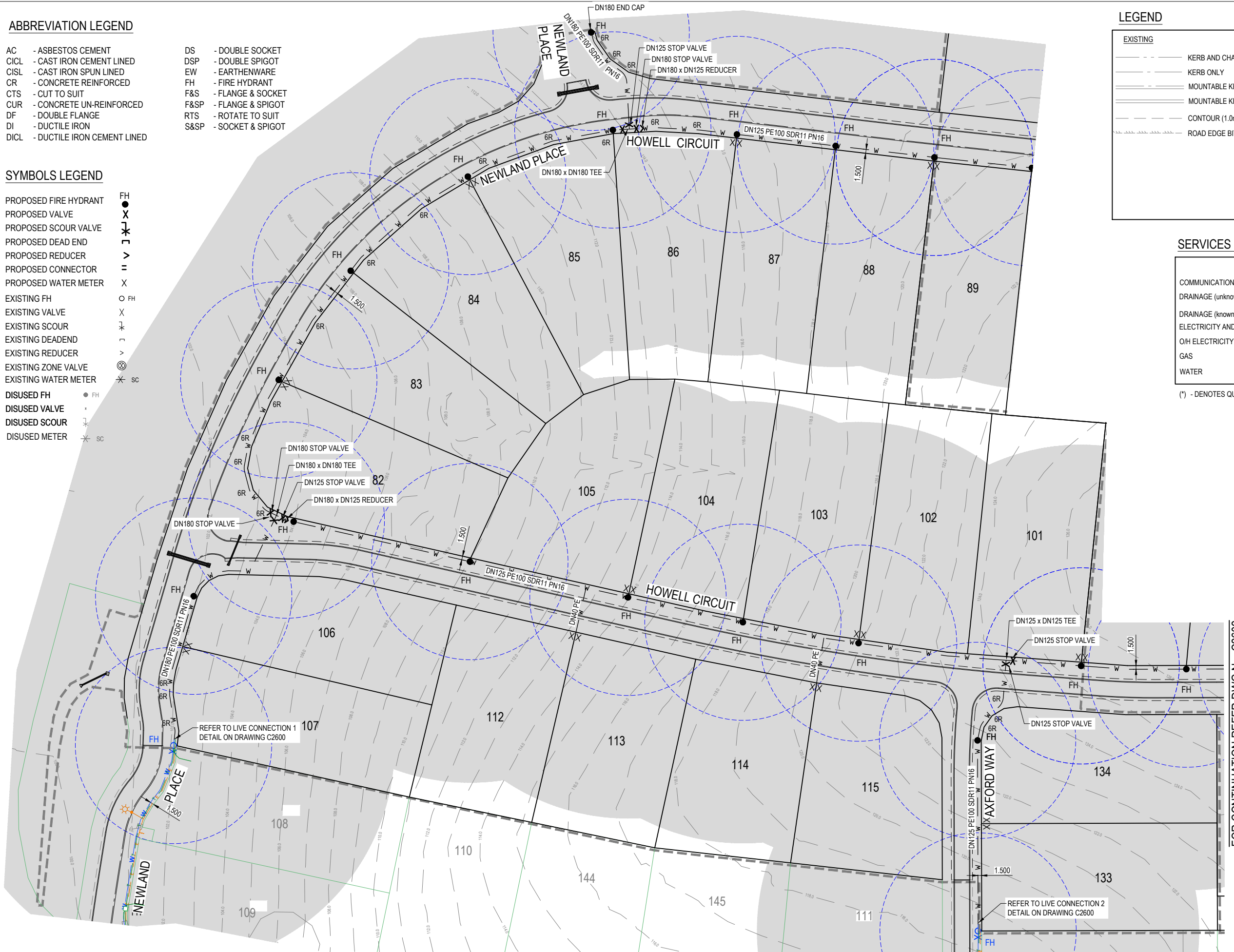
SERVICES (PUP) LEGEND

	EXISTING	PROPOSED
COMMUNICATIONS	C(*)	T
DRAINAGE (unknown dia.)	D(*)	○
DRAINAGE (known dia.)	○	○
ELECTRICITY AND PILLAR	E(*)	E
O/H ELECTRICITY & POLE	△	△
GAS	G(*)	W
WATER	W(*)	W

(*) - DENOTES QUALITY LEVEL AS PER A.S. 5488-2013.

NOTES:

- PROPERTY SERVICES ARE TO BE CONSTRUCTED IN ACCORDANCE WITH SEQ STD DWG SEQ-WAT-1107-1.
- ALL PROPERTY SERVICES TO BE LOCATED 0.3m FROM SIDE BOUNDARY UNLESS NOTED OTHERWISE.
- PIPE EMBEDMENT IS TO BE TYPE D IN ACCORDANCE WITH SEQ STD DWG SEQ-WAT-1200-2 AND SEQ-WAT-1201-1.



FOR CONTINUATION REFER DWG No. C2602

REVISIONS:	No.	REVISION DESCRIPTION	MP	DATE
A	1	ISSUED FOR APPROVAL	MP	21/03/23



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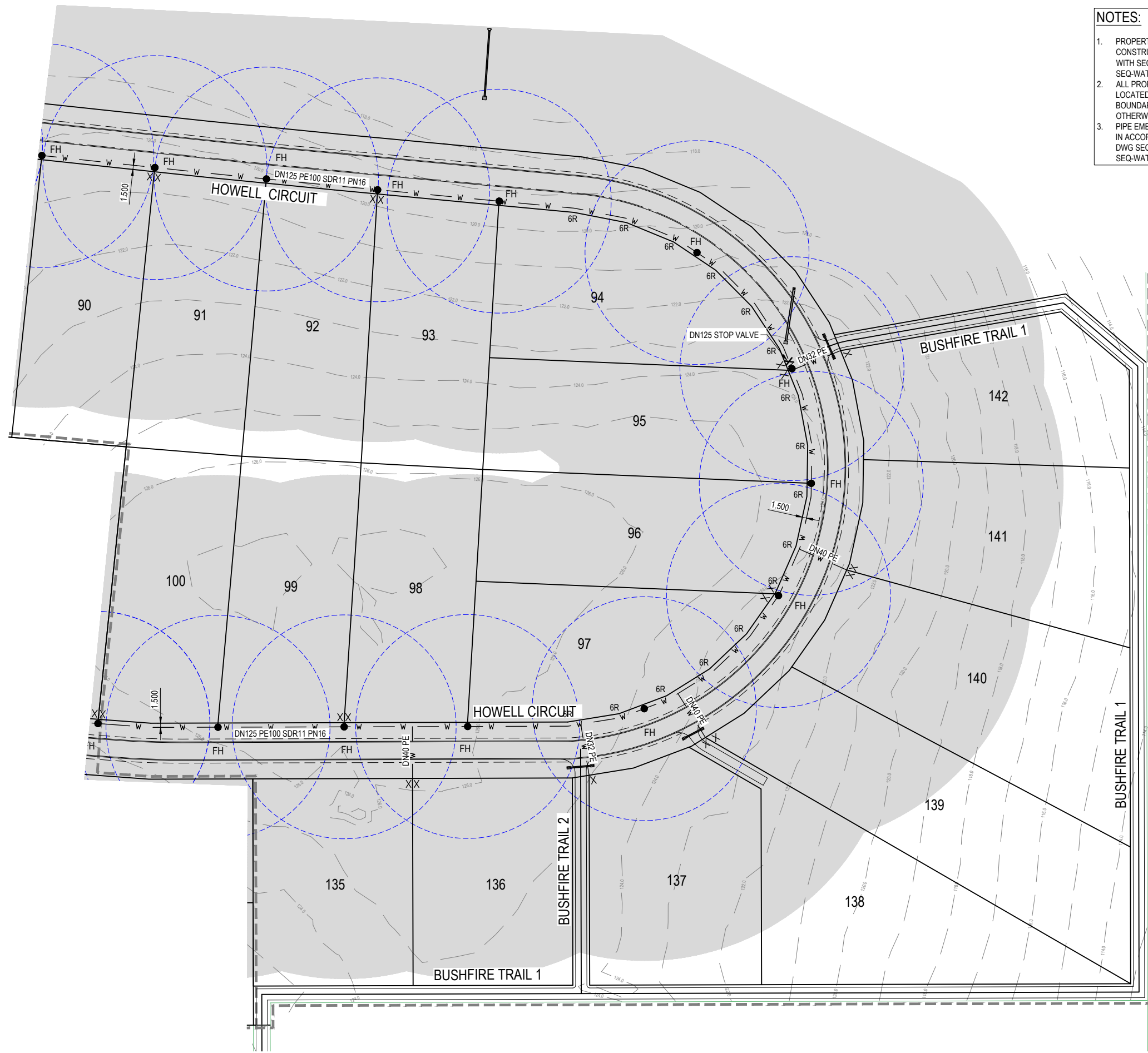
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 SCALE 1:750

PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3

DRAWING TITLE
WATER RETICULATION PLAN
SHEET 1

DRAWING STATUS			
ORIGINAL ISSUE			
FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2601	REVISION	A

FOR CONTINUATION REFER DWG No. C2601



- NOTES:**
- PROPERTY SERVICES ARE TO BE CONSTRUCTED IN ACCORDANCE WITH SEQ STD DWG SEQ-WAT-1107-1.
 - ALL PROPERTY SERVICES TO BE LOCATED 0.3m FROM SIDE BOUNDARY UNLESS NOTED OTHERWISE.
 - PIPE EMBEDMENT IS TO BE TYPE D IN ACCORDANCE WITH SEQ STD DWG SEQ-WAT-1200-2 AND SEQ-WAT-1201-1.

LEGEND

EXISTING	PROPOSED
--- KERB AND CHANNEL	==== KERB AND CHANNEL TYPE B1
--- KERB ONLY	==== MOUNTABLE KERB TYPE M4
--- CONTOUR (1.0m)	==== MOUNTABLE KERB TYPE M6
--- ROAD EDGE BITUMEN	--- ROAD EDGE BITUMEN
	--- ROAD SHOULDER
	--- DRAINAGE
	○ R40 HYDRANT SPACING
	■ R90 HYDRANT COVERAGE

SERVICES (PUP) LEGEND

	EXISTING	PROPOSED
COMMUNICATIONS	C(*)	T
DRAINAGE (unknown dia.)	D(*)	○
DRAINAGE (known dia.)	○	○
ELECTRICITY AND PILLAR	E(*)	E
O/H ELECTRICITY & POLE	⋈	⋈
GAS	G(*)	W
WATER	W(*)	W

(*) - DENOTES QUALITY LEVEL AS PER A.S. 5488-2013.

SYMBOLS LEGEND

PROPOSED FIRE HYDRANT	FH ●
PROPOSED VALVE	X
PROPOSED SCOUR VALVE	⋈
PROPOSED DEAD END	J
PROPOSED REDUCER	>
PROPOSED CONNECTOR	=
PROPOSED WATER METER	X
EXISTING FH	○ FH
EXISTING VALVE	X
EXISTING SCOUR	⋈
EXISTING DEADEND	J
EXISTING REDUCER	>
EXISTING ZONE VALVE	⊗
EXISTING WATER METER	⋈ sc
DISUSED FH	● FH
DISUSED VALVE	·
DISUSED SCOUR	⋈
DISUSED METER	⋈ sc

ABBREVIATION LEGEND

AC	- ASBESTOS CEMENT
CICL	- CAST IRON CEMENT LINED
CISL	- CAST IRON SPUN LINED
CR	- CONCRETE REINFORCED
CTS	- CUT TO SUIT
CUR	- CONCRETE UN-REINFORCED
DF	- DOUBLE FLANGE
DI	- DUCTILE IRON
DICL	- DUCTILE IRON CEMENT LINED
DS	- DOUBLE SOCKET
DSP	- DOUBLE SPIGOT
EW	- EARTHENWARE
FH	- FIRE HYDRANT
F&S	- FLANGE & SOCKET
F&SP	- FLANGE & SPIGOT
RTS	- ROTATE TO SUIT
S&SP	- SOCKET & SPIGOT

REVISIONS:

No.	REVISION DESCRIPTION	MP	DATE
A	ISSUED FOR APPROVAL	MP	21/03/23



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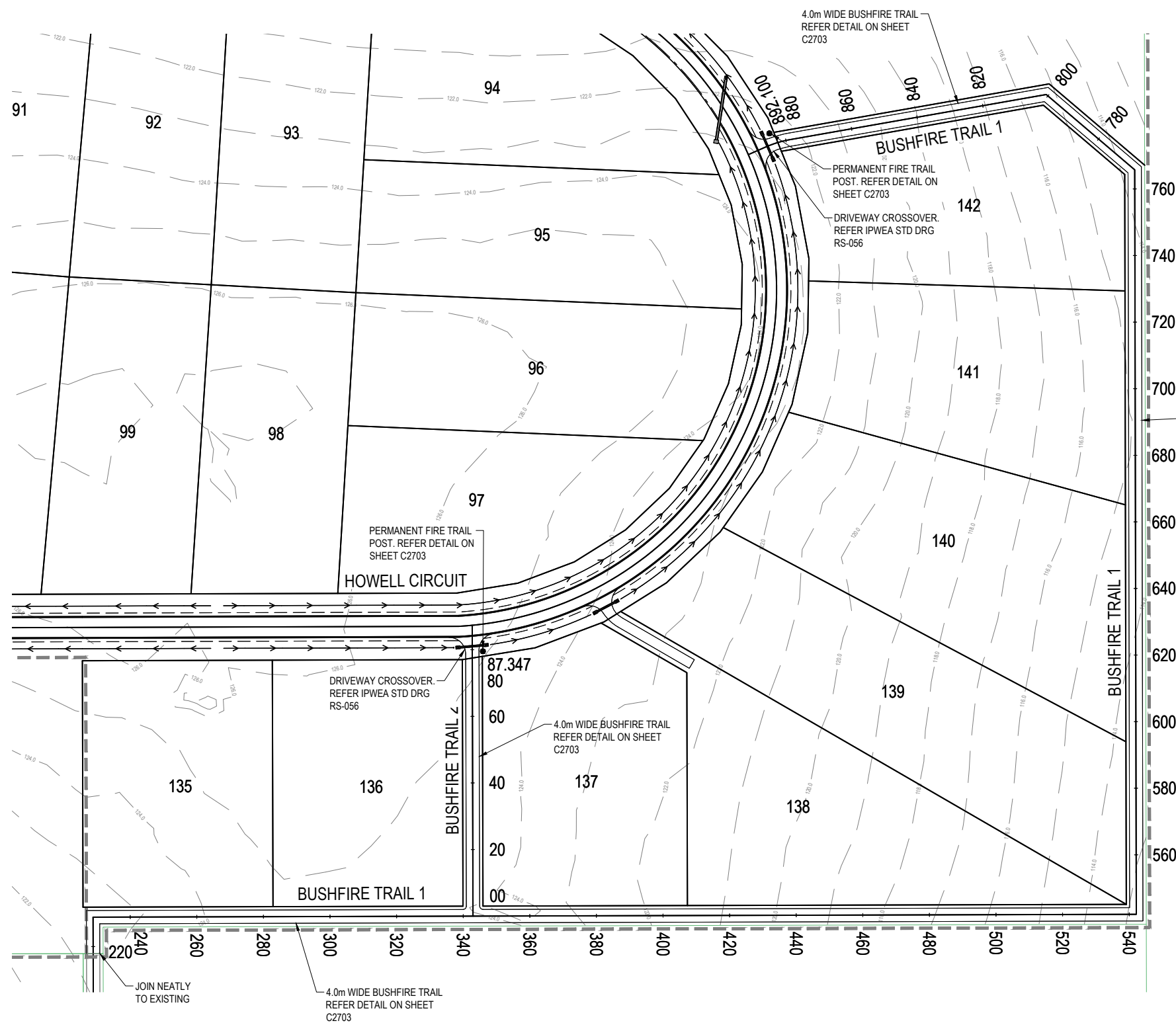
SCALE
0 7.5 15 22.5 30 37.5m 75m
SCALE 1:750

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
WATER RETICULATION PLAN
SHEET 2

DRAWING STATUS
ORIGINAL ISSUE
FOR APPROVAL

PROJECT LEADER	DESIGNER	SIGNATURE	DATE	SCALE	SHEET SIZE
CK	MP	C. KIRK	MAR 2023	AS SHOWN	A1
DRAFTSPERSON	SCALE	DATE	REVISION		
MP	AS SHOWN	MAR 2023			
JOB No.	DRAWING No.	REVISION			
BR222161	C2602	A			



LEGEND

EXISTING		PROPOSED	
	FENCE		OPEN DRAIN
	OPEN DRAIN		KERB AND CHANNEL TYPE B1
	KERB AND CHANNEL		MOUNTABLE KERB TYPE M4
	KERB ONLY		MOUNTABLE KERB TYPE M6
	CONTOUR (0.100m)		ROAD EDGE BITUMEN
	ROAD EDGE BITUMEN		ROAD SHOULDER
	TREE TO REMAIN		DRAINAGE
	TREE TO BE REMOVED		

REVISIONS:

No.	REVISION DESCRIPTION	MP	DATE
A	ISSUED FOR APPROVAL	MP	21/03/23



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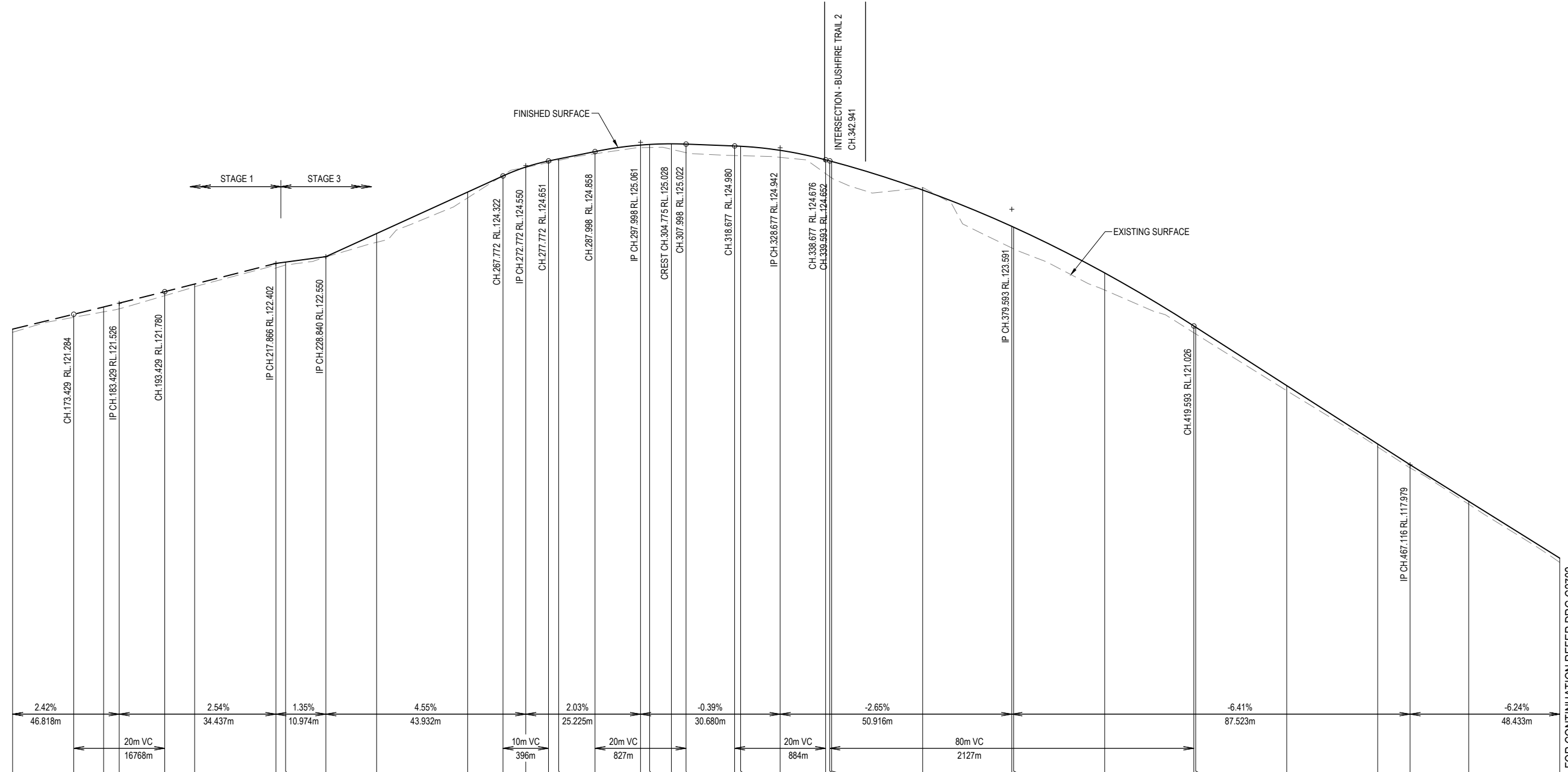
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SCALE
0 7.5 15 22.5 30 37.5m 75m
SCALE 1:750

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
BUSHFIRE TRAIL PLAN

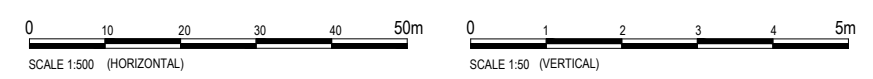
DRAWING STATUS			
ORIGINAL ISSUE			
FOR APPROVAL			
PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2700	REVISION A	



Horiz Curve Data
 Vertical Geometry Grade (%)
 Vertical Grade Length (m)
 Vertical Curve Length (m)
 Vertical Curve Radius (m)
 DATUM R.L. 111.000

Vertical Geometry Grade (%)	2.42%		2.54%	1.35%	4.55%	2.03%	-0.39%	-2.65%	-6.41%	-6.24%																												
Vertical Grade Length (m)	46.818m		34.437m	10.974m	43.932m	25.225m	30.680m	50.916m	87.523m	48.433m																												
Vertical Curve Length (m)		20m VC		10m VC		20m VC		20m VC	80m VC																													
Vertical Curve Radius (m)		16768m		396m		827m		884m	2127m																													
NATURAL SURFACE LEVELS	120.888	121.217	121.336	121.404	121.692	121.887	122.300	122.366	122.543	122.865	123.841	124.338	124.512	124.616	124.664	124.809	124.944	125.015	124.948	124.909	124.833	124.771	124.767	124.730	124.374	124.308	124.279	124.068	122.740	122.720	121.816	120.878	120.853	119.606	118.369	117.908	117.111	115.833
CUT / FILL DEPTH	0.070	0.067	0.108	0.125	0.088	0.061	0.102	0.065	0.007	0.193	0.128	-0.016	0.006	0.035	0.032	0.049	0.057	0.067	0.067	0.119	0.189	0.210	0.207	0.155	0.303	0.344	0.362	-0.055	0.475	0.477	0.377	0.148	0.147	0.112	0.066	0.071	0.064	0.094
DESIGN SURFACE LEVELS	120.958	121.284	121.444	121.529	121.780	121.948	122.402	122.431	122.550	123.058	123.968	124.322	124.518	124.651	124.696	124.858	125.001	125.015	125.028	125.028	125.022	124.980	124.974	124.885	124.676	124.652	124.641	124.013	123.215	123.197	122.193	121.026	121.000	119.718	118.435	117.979	117.175	115.928
CHAINAGE	160.000	173.429	180.000	183.429	193.429	200.000	217.866	220.000	228.840	240.000	260.000	267.772	272.772	277.772	280.000	287.998	297.998	300.000	304.775	307.998	318.677	320.000	328.677	338.677	339.593	340.000	360.000	379.593	380.000	400.000	419.593	420.000	440.000	460.000	467.116	480.000	500.000	

LONGITUDINAL SECTION - BUSHFIRE TRIAL 1
 HORIZONTAL SCALE 1:500
 VERTICAL SCALE 1:50



REVISIONS:	
No.	REVISION DESCRIPTION
A	ISSUED FOR APPROVAL
MP	21/03/23



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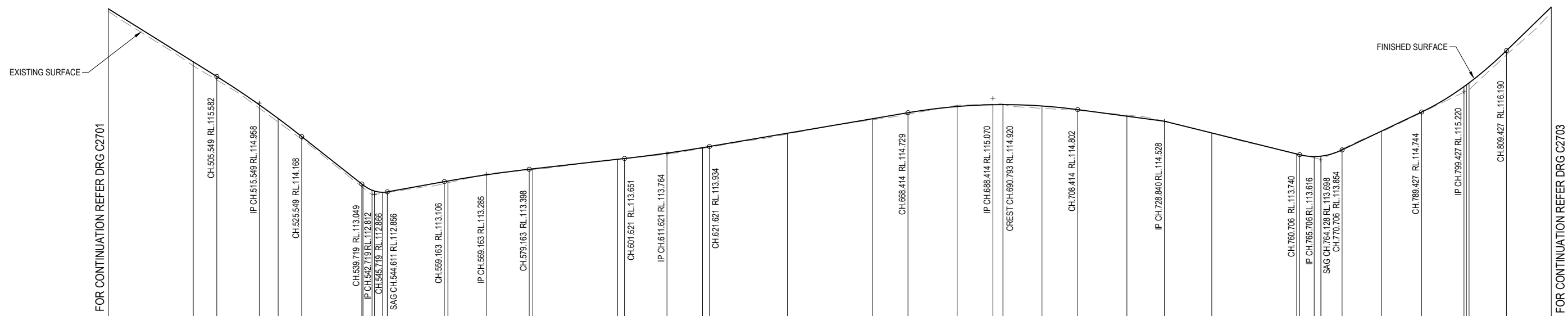
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 SCALE

PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3
 DRAWING TITLE
BUSHFIRE TRAIL 1 LONGITUDINAL SECTION - SHEET 1 OF 3

DRAWING STATUS
ORIGINAL ISSUE
 FOR APPROVAL
 PROJECT LEADER: CK
 DESIGNER: MP
 SIGNATURE: C. KIRK
 RPEID: 19536
 NER: 3053220
 DRAFTSPERSON: MP
 SCALE: AS SHOWN
 DATE: MAR 2023
 SHEET SIZE: A1
 JOB No: BR222161
 DRAWING No: C2701
 REVISION: A

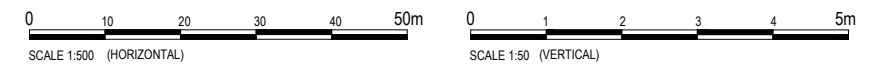
FOR CONTINUATION REFER DRG C2702



Horiz Curve Data	
Vertical Geometry Grade (%)	-6.24%
Vertical Grade Length (m)	48.433m
Vertical Curve Length (m)	20m VC
Vertical Curve Radius (m)	1205m
DATUM R.L.107.000	

CHAINAGE	NATURAL SURFACE LEVELS	CUT / FILL DEPTH	DESIGN SURFACE LEVELS
480.000	117.111	0.064	117.175
500.000	115.833	0.094	115.928
505.549	115.500	0.082	115.582
515.549	114.838	0.078	114.916
520.000	114.511	0.082	114.594
525.549	114.107	0.061	114.168
539.719	112.986	0.063	113.049
540.000	112.964	0.064	113.028
542.127	112.795	0.111	112.906
542.719	112.804	0.081	112.885
544.611	112.833	0.023	112.833
545.719	112.850	0.016	112.866
559.163	113.061	0.045	113.106
560.000	113.121	0.041	113.121
569.163	113.285	-0.017	113.269
579.163	113.398	0.013	113.398
580.000	113.392	0.015	113.407
600.000	113.634	-0.002	113.634
601.621	113.651	0.000	113.651
611.621	113.754	0.024	113.778
620.000	113.889	0.017	113.907
621.621	113.917	0.017	113.934
640.000	114.246	0.020	114.246
660.000	114.562	0.024	114.586
668.414	114.729	0.035	114.729
680.000	114.904	-0.029	114.875
688.414	114.929	-0.011	114.918
690.793	114.931	-0.011	114.920
700.000	114.833	0.055	114.887
708.414	114.791	0.011	114.802
720.000	114.673	-0.026	114.647
728.840	114.528	0.000	114.528
740.000	114.252	-0.000	114.252
760.000	113.766	-0.009	113.757
760.706	113.749	-0.009	113.740
764.128	113.668	0.030	113.698
765.706	113.633	0.074	113.707
765.742	113.632	0.075	113.707
770.706	113.876	-0.022	113.854
780.000	114.284	0.012	114.296
789.427	114.731	0.013	114.744
799.427	115.211	0.132	115.344
800.000	115.238	0.147	115.365
800.620	115.268	0.163	115.432
809.427	116.090	0.100	116.190
820.000	117.081	0.134	117.215

LONGITUDINAL SECTION - BUSHFIRE TRIAL 1
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:50



REVISIONS:	
No.	REVISION DESCRIPTION
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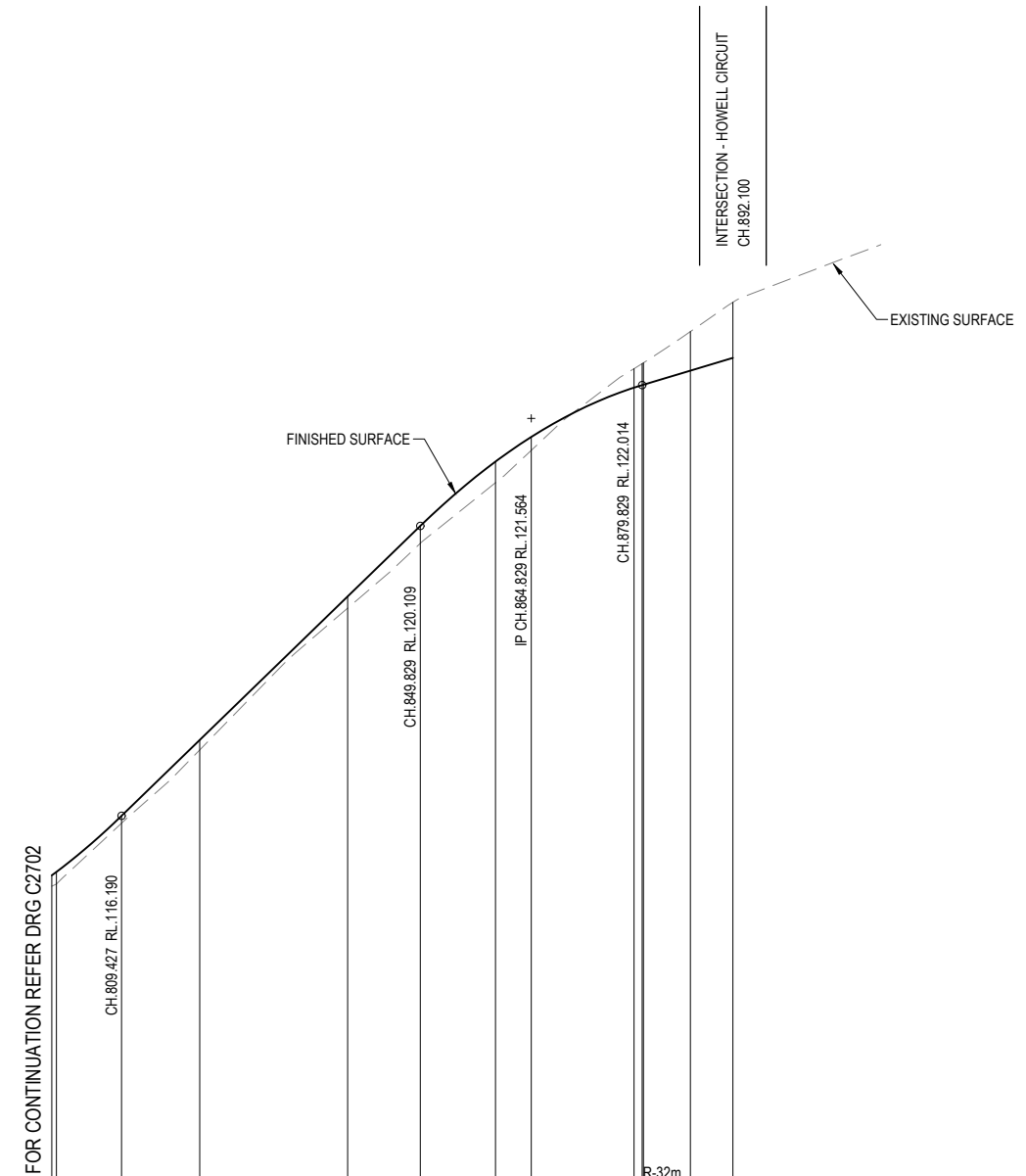
SCALE

PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
BUSHFIRE TRIAL 1 LONGITUDINAL SECTION - SHEET 2 OF 3

DRAWING STATUS
ORIGINAL ISSUE
FOR APPROVAL

PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2702	REVISION A	



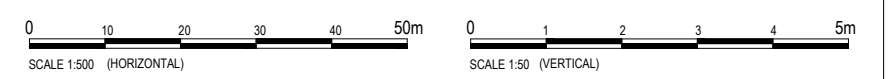
Horiz Curve Data

Vertical Geometry Grade (%)	9.7%	3%
Vertical Grade Length (m)	65.402m	22.972m
Vertical Curve Length (m)	20m VC	30m VC
Vertical Curve Radius (m)	405m	448m

DATUM R.L. 109.000

NATURAL SURFACE LEVELS	115.238	115.268	116.090	117.081	118.998	119.875	120.694	121.131	122.235	122.304	122.315	122.737	123.133
CUT / FILL DEPTH	0.147	0.163	0.100	0.134	0.158	0.234	0.286	0.181	-0.256	-0.290	-0.296	-0.528	
DESIGN SURFACE LEVELS	115.385	115.432	116.190	117.215	119.155	120.109	120.980	121.312	121.979	122.014	122.019	122.209	
CHAINAGE	800.000	800.620	809.427	820.000	840.000	849.829	860.000	864.829	878.724	879.829	880.000	886.345	892.100

LONGITUDINAL SECTION - BUSHFIRE TRIAL 1
 HORIZONTAL SCALE 1:500
 VERTICAL SCALE 1:50



REVISIONS:	
No.	REVISION DESCRIPTION
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MP	21/03/23



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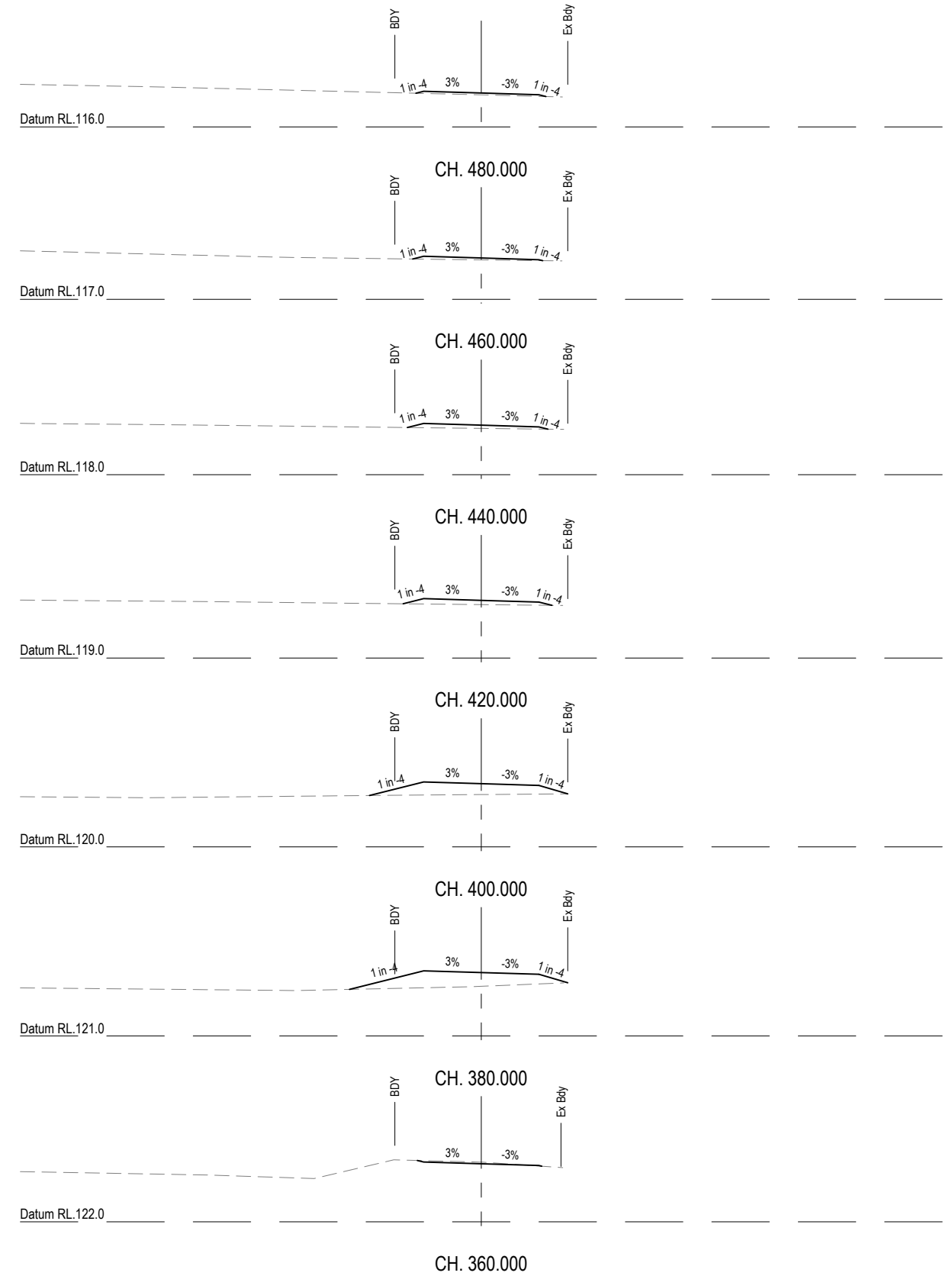
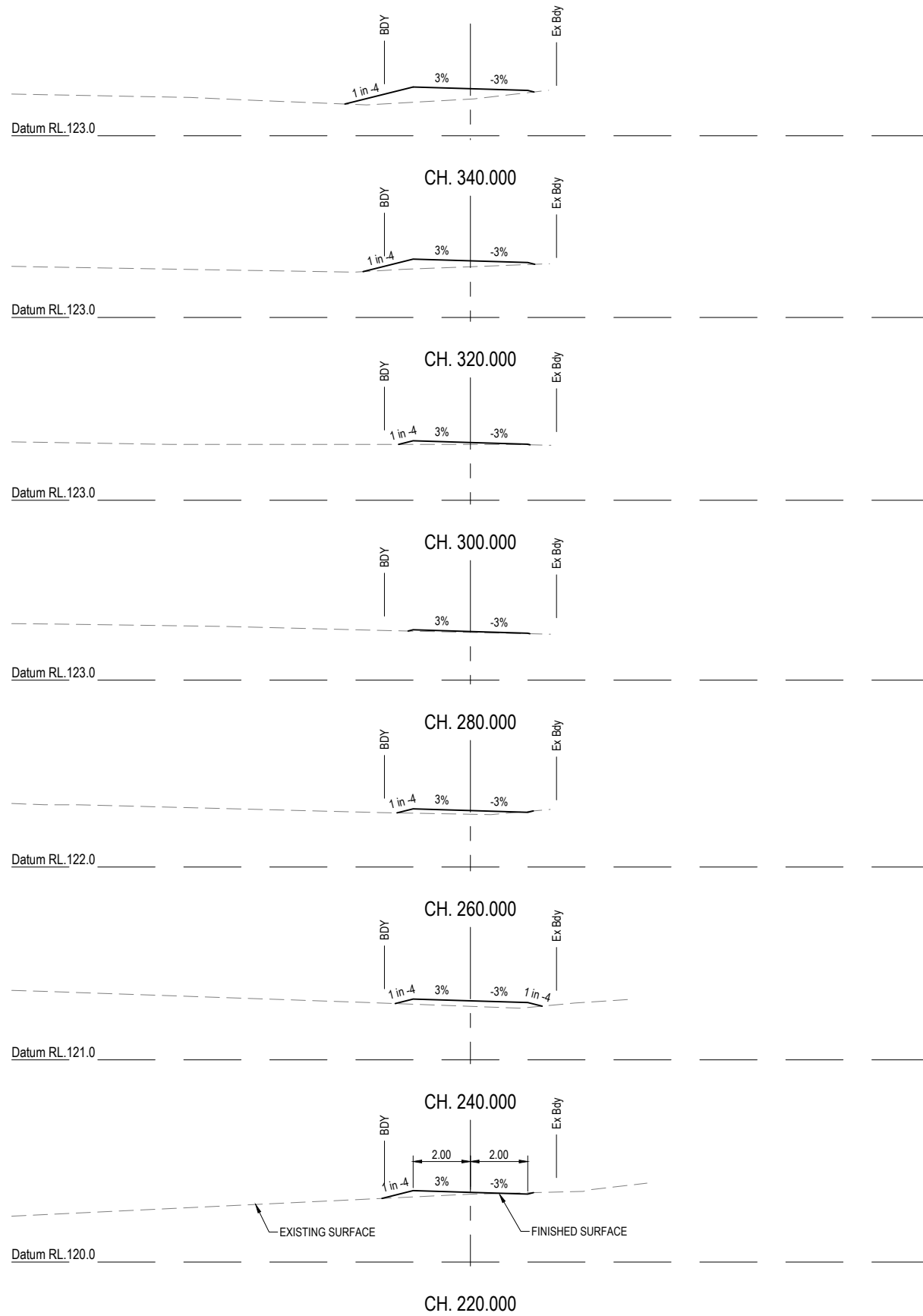
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PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3

DRAWING TITLE
BUSHFIRE TRIAL 1 LONGITUDINAL SECTION - SHEET 3 OF 3

DRAWING STATUS
ORIGINAL ISSUE
 FOR APPROVAL

PROJECT LEADER CK	DESIGNER MP	SIGNATURE C. KIRK	RPEID: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2703	REVISION A	



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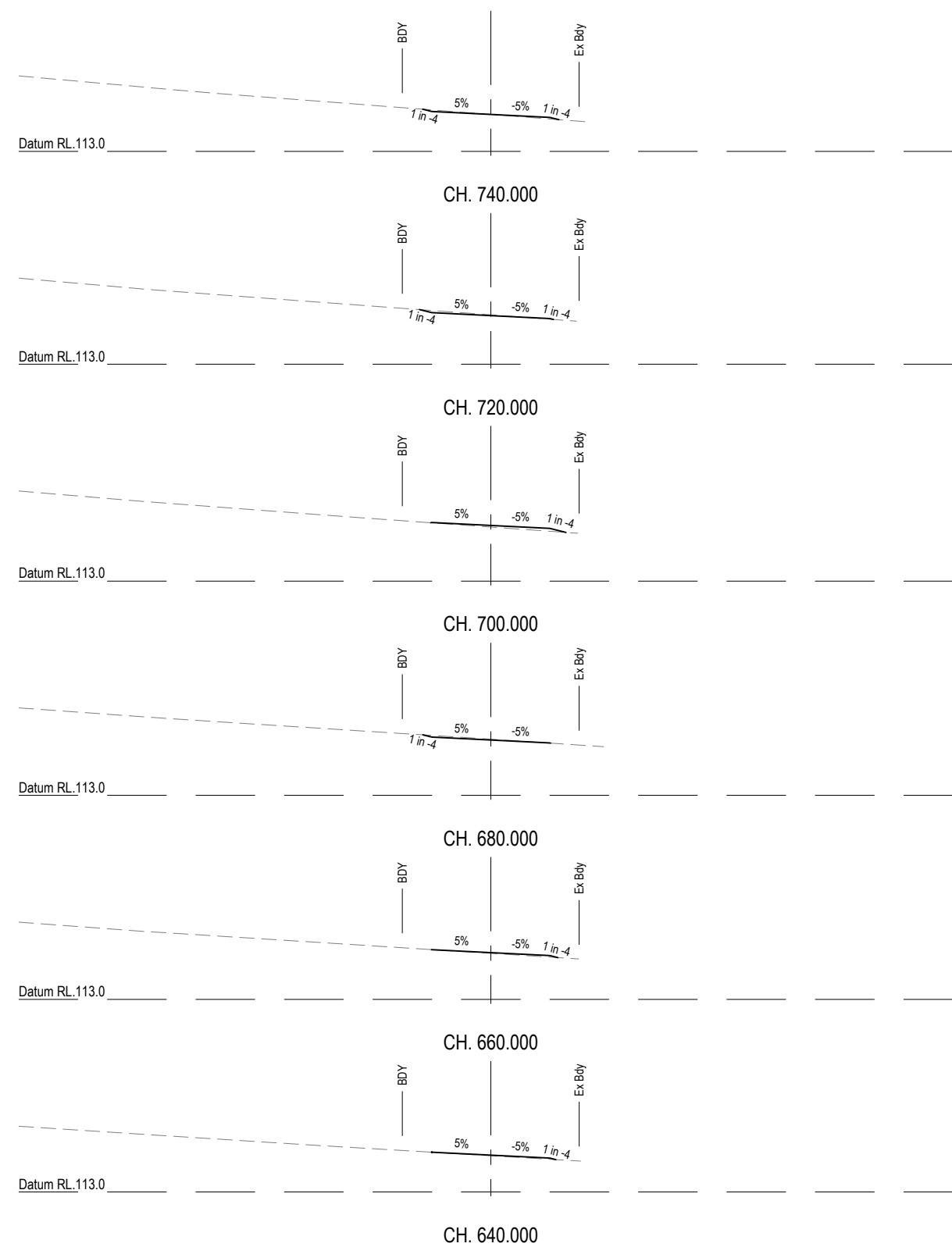
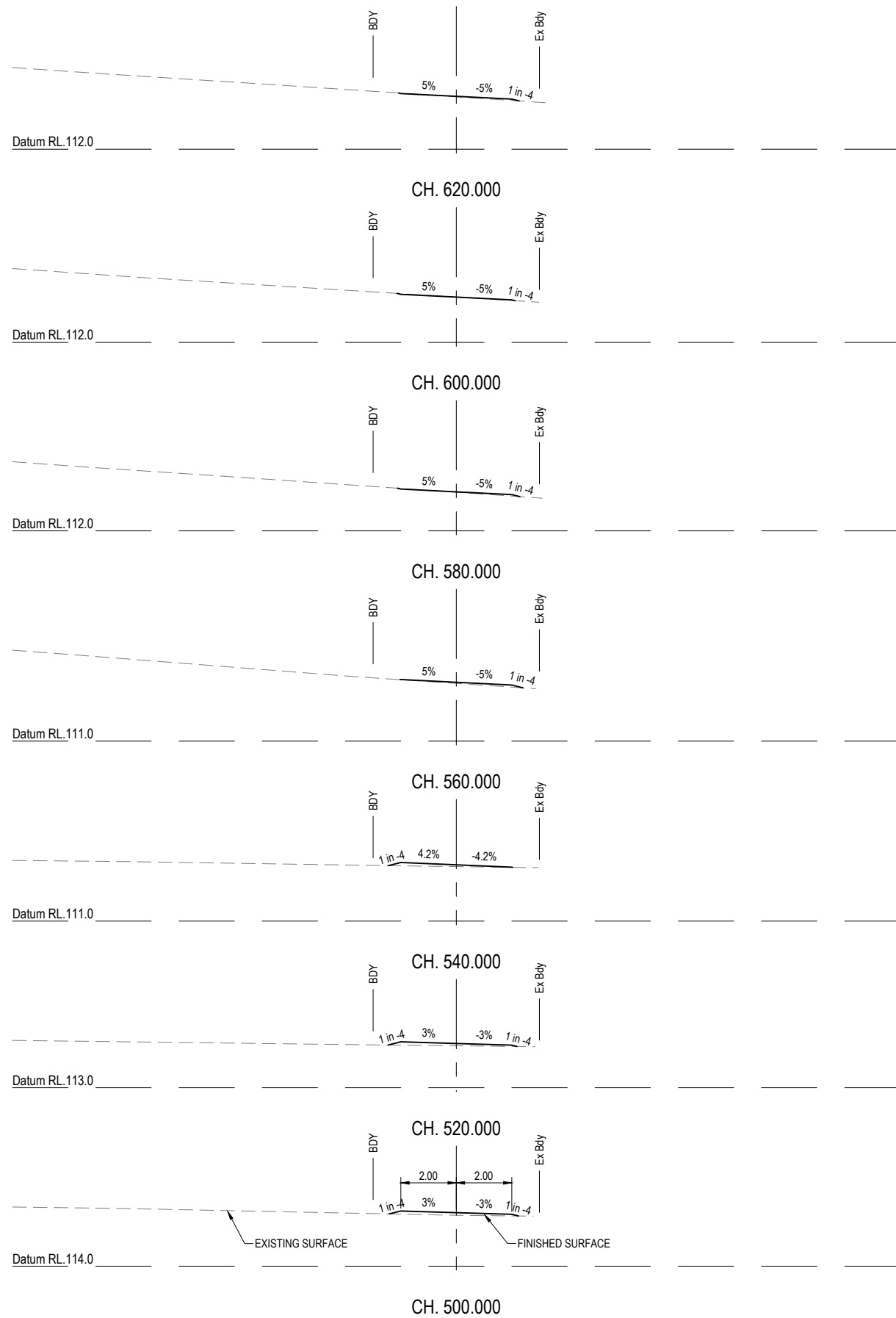
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PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
BUSHFIRE TRAIL 1
CROSS SECTIONS - SHEET 1

DRAWING STATUS			
ORIGINAL ISSUE			
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DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2704	REVISION A	



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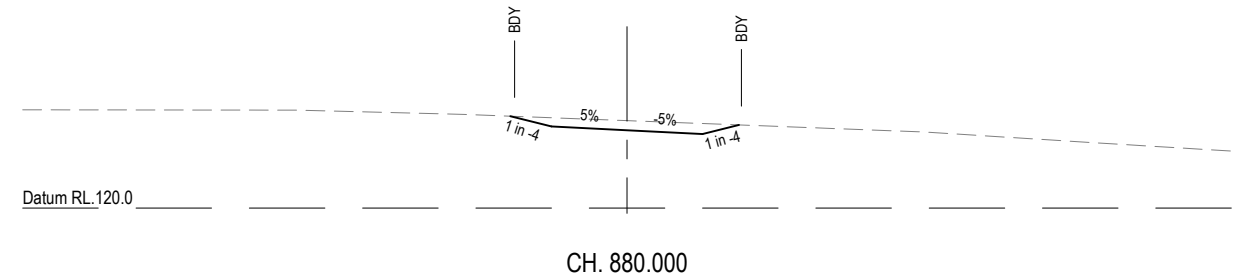
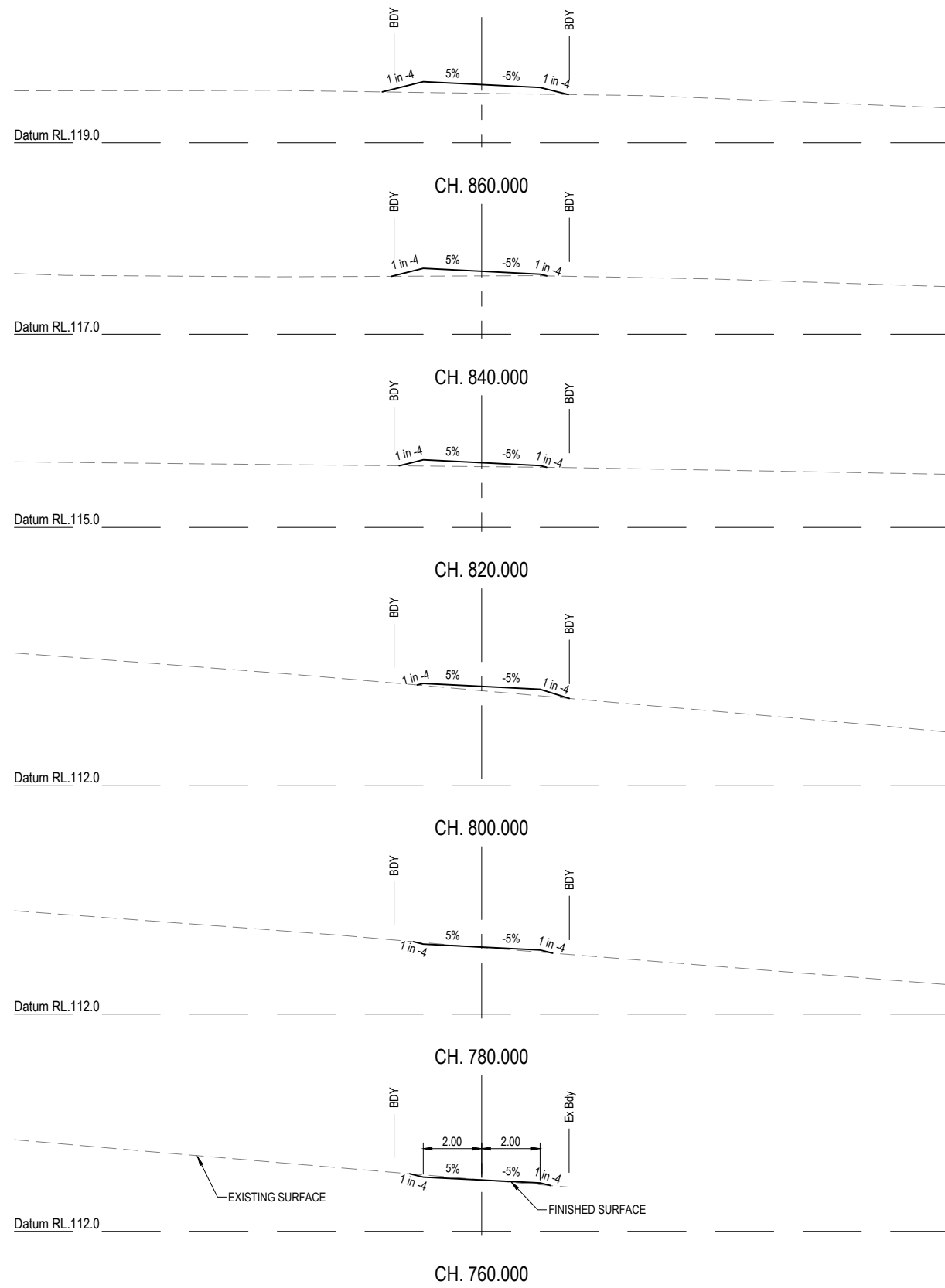
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PROJECT TITLE
PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
BUSHFIRE TRAIL 1
CROSS SECTIONS - SHEET 2

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JOB No. BR222161	DRAWING No. C2705	REVISION A	



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SCALE
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SCALE 1:100

PROJECT TITLE
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174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

DRAWING TITLE
BUSHFIRE TRAIL 1
CROSS SECTIONS - SHEET 3

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DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2706	REVISION A	



Horiz Curve Data

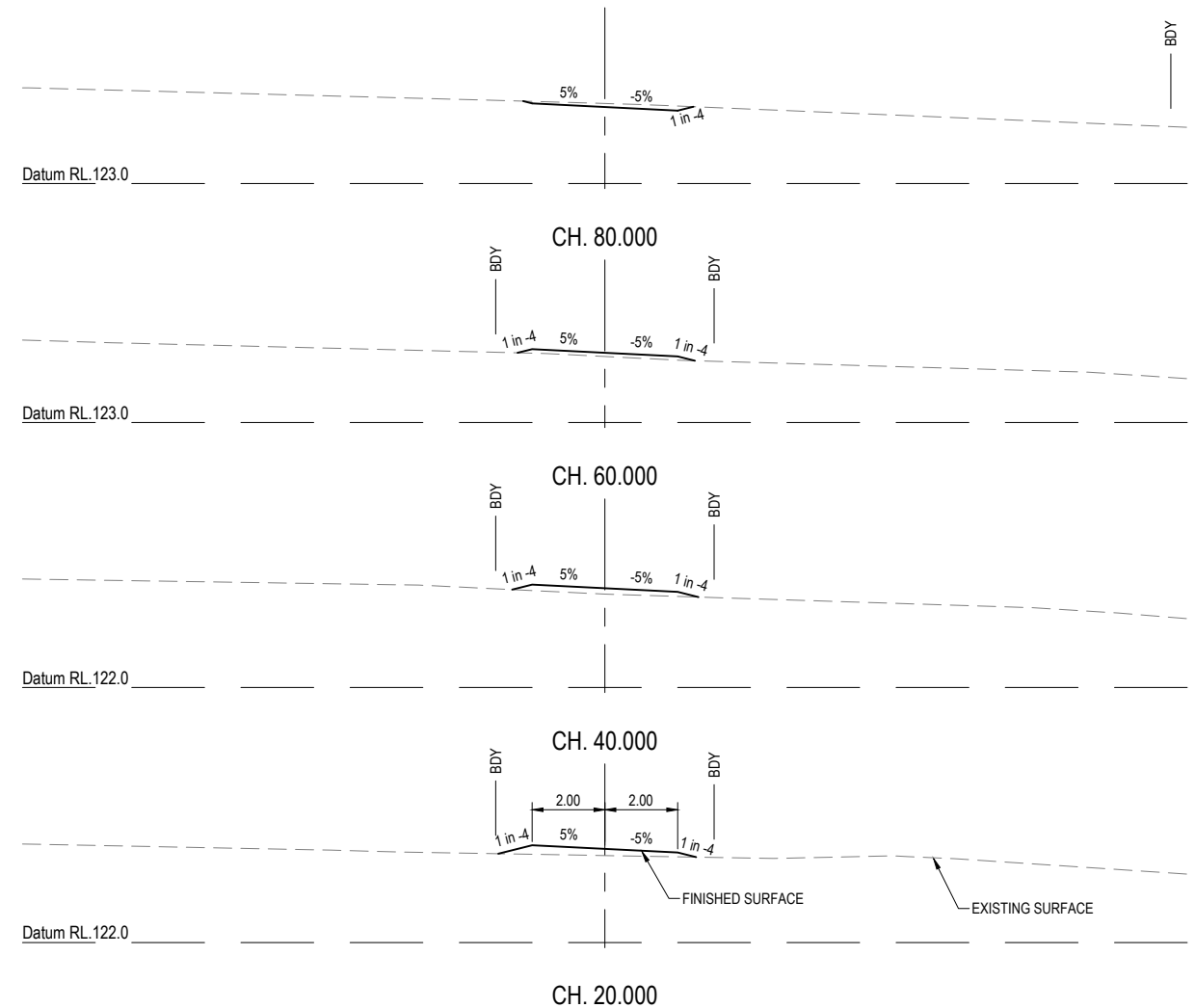
Vertical Geometry Grade (%)
Vertical Grade Length (m)

Vertical Curve Length (m)
Vertical Curve Radius (m)

DATUM R.L.117.000

	0.000	2.000	4.500	6.020	7.000	17.644	20.000	22.018	22.644	27.644	40.000	60.000	60.179	70.179	80.000	80.179	87.347
NATURAL SURFACE LEVELS	124.145	123.960	124.061	124.123	124.163	124.412	124.392	124.374	124.378	124.461	124.565	124.814	124.814	124.977	125.199	125.203	125.339
CUT / FILL DEPTH	0.416	0.661	0.612	0.568	0.515	0.188	0.196	0.209	0.207	0.149	0.161	0.101	0.102	0.079	0.084	0.086	
DESIGN SURFACE LEVELS	124.561	124.621	124.673	124.681	124.678	124.600	124.587	124.584	124.584	124.610	124.726	124.915	124.916	125.056	125.283	125.288	
CHAINAGE	0.000	2.000	4.500	6.020	7.000	17.644	20.000	22.018	22.644	27.644	40.000	60.000	60.179	70.179	80.000	80.179	87.347

LONGITUDINAL SECTION - BUSHFIRE TRIAL 2
HORIZONTAL SCALE 1:500
VERTICAL SCALE 1:50



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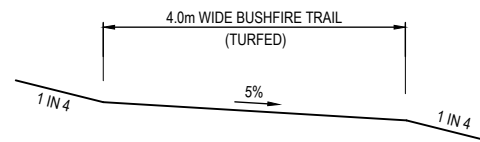
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PROPOSED SUBDIVISION
174 ADARE ROAD, ADARE, QLD 4343
STAGES 2 AND 3

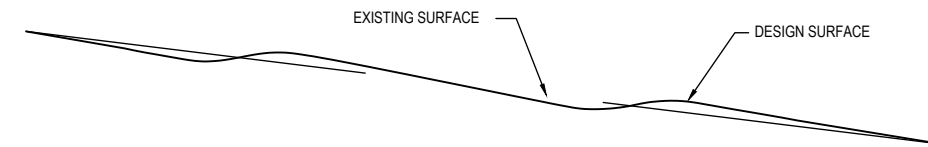
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LONGITUDINAL AND CROSS SECTIONS

DRAWING STATUS
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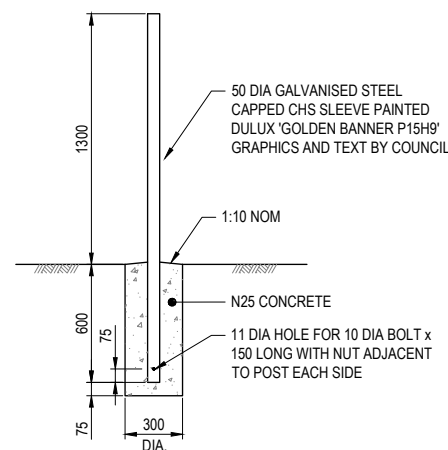
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JOB No. BR222161		DRAWING No. C2707	REVISION A



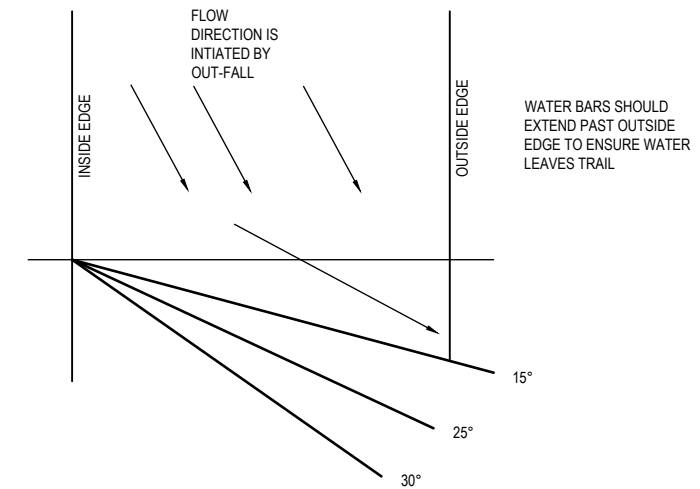
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SCALE 1:50



FORMATION OF WATERBAR
NOT TO SCALE



PERMANENT FIRE TRAIL POST DETAIL
SCALE 1:20

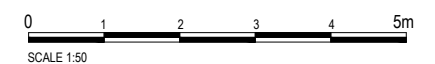
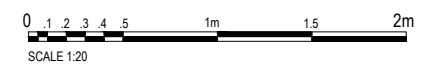


WATER BAR ORIENTATION ON THE TRAIL
NOT TO SCALE

FIRE TRAIL NOTES

1. FIRE TRAIL TO BE IN ACCORDANCE WITH THE APPROVED REPORT "BUSHFIRE RISK ASSESSMENT & MANAGEMENT PLAN" PREPARED BY BUSHLAND PROTECTION SYSTEMS DATED 20TH APRIL 2022.
2. PROVIDE A FIRE TRAIL NUMBER SIGN AT EVERY ENTRANCE TO A FIRE TRAIL.
3. COUNCIL WILL ALLOCATE TRAIL NUMBERS AND INSTALL NUMBERING ON POST.

ROAD GRADE	WATER BAR ORIENTATION	SOIL CLASS A WATER BAR SPACING	SOIL CLASS B WATER BAR SPACING	SOIL CLASS C WATER BAR SPACING	WATER BAR HEIGHT
UP TO 10%	35°	15 - 20m	10 - 12m (apart)	7 - 10m (apart)	0.3 - 0.4m
11% TO 15%	25°	8 - 10m	7 - 10m	UNDESIRABLE	0.4 - 0.6m
15% TO 20%	15°	5 - 8m	CONCRETE	CONCRETE	CONCRETE & OUT-FALL
21% TO 25%	CONCRETE	CONCRETE	CONCRETE	CONCRETE	CONCRETE & OUT-FALL
26% TO 30%	CONCRETE	CONCRETE	CONCRETE	CONCRETE	CONCRETE & OUT-FALL
ABOVE 30%	RELOCATE TRAIL ALIGNMENT	RELOCATE TRAIL ALIGNMENT	RELOCATE TRAIL ALIGNMENT	RELOCATE TRAIL ALIGNMENT	RELOCATE TRAIL ALIGNMENT



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PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3

DRAWING TITLE
BUSHFIRE TRAIL DETAILS

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Appendix D – Maintenance Checklist

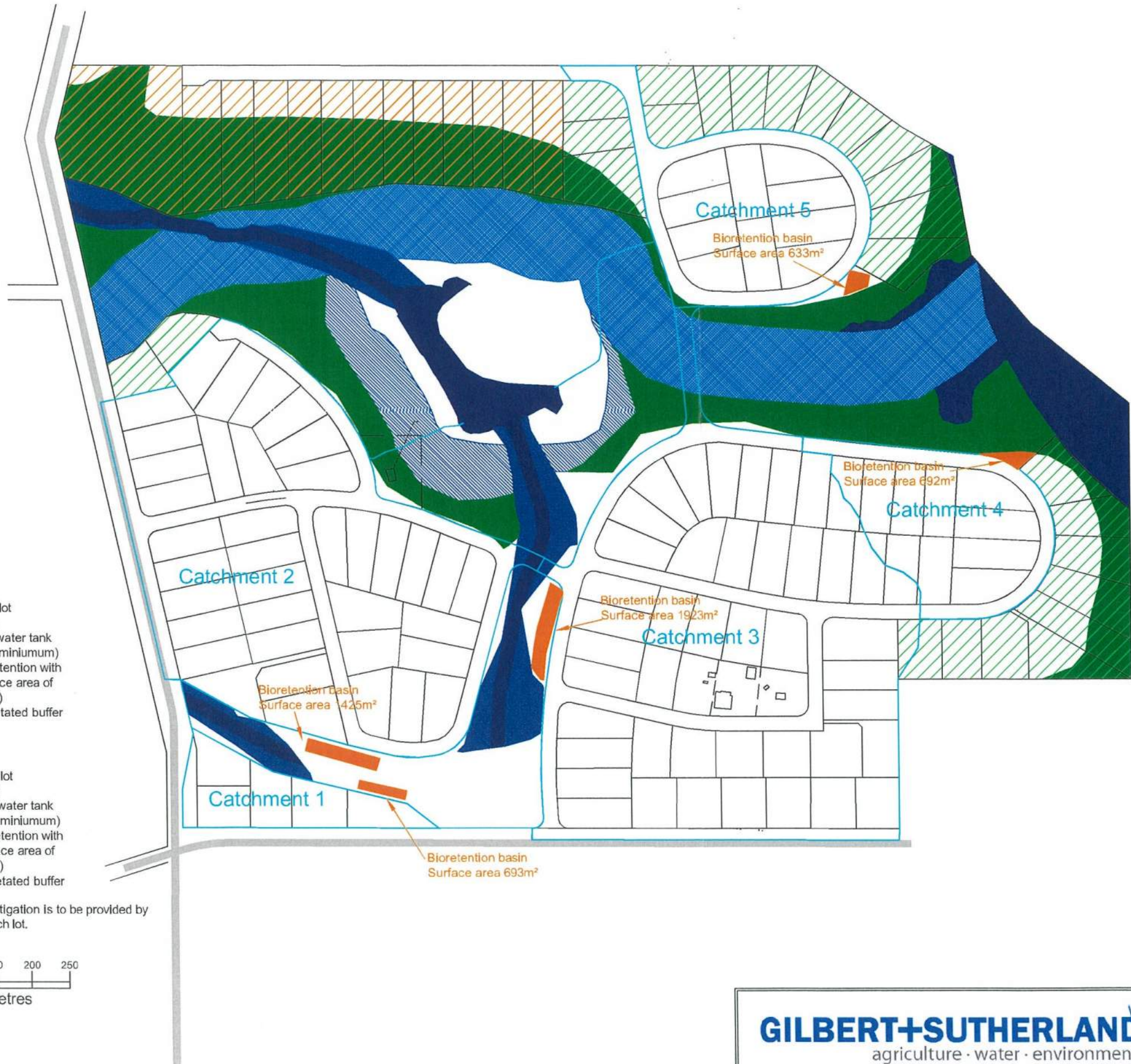
Name:		Date:		
Items	Checked	Satisfactory	Action (If unsatisfactory)	Initials
Weeds removed				
Watering undertaken				
Replanting (as required)				
Photos of growth and maturity				
Survivorship on arrival greater than 90%				
80% coverage of system				
Minimum of 5 plants/m ²				
Propagation is occurring (2-3 stems, seeding) during establishment				
Identifiable defects (as specified in Table 5-2 of SWMR)				
Blockages, reduced filtration and structural failure				
Scour and short-circuiting of flows				
Failure of plants				
Additional Comments				

Appendix E – Previous Stormwater Management Plan

Conceptual Stormwater Assessment
Proposed Development
Redbank Creek Rd, Adare
Queensland

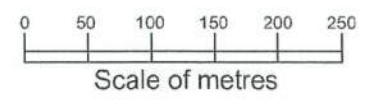
Prepared for:
Wallangarra Pastoral Company

February 2010



- Individual lot treatment**
- Rainwater tank (5kL minimum)
 - Bioretention with surface area of 35m²
 - Vegetated buffer
- Individual lot treatment**
- Rainwater tank (5kL minimum)
 - Bioretention with surface area of 10m²
 - Vegetated buffer

Note: Peak flow mitigation is to be provided by 'leaky tanks' on each lot.



LEGEND

- 1. CORE CONSERVATION**
(Areas to be retained in Public Open Space)
- 1.1 Assessable Vegetation (mapped remnant and regrowth) associated with watercourses (1st & 2nd order) and referable wetlands (Redbank Creek): To be retained in accordance with Regional Vegetation Management Code (RVMC Version 2 November 2009) Acceptable Solutions AS P.2 and AS P.3
 - 1.2 Assessable Vegetation outside of the areas prescribed at RVMC AS P.3 but below the Indicative Q100 line: To be retained in order to ensure achievement of Performance Requirement RVMC PR P.3
 - 1.3 Mapped remnant vegetation within minimum 100m wide east-west corridor: To be retained in order to maintain contiguity between large areas of remnant vegetation adjacent Ranger Road and along Redbank Creek in accordance with RVMC AS P4.2 (a, b, c and d) and DERM Policy Note 15.
 - 1.4 Unmapped areas below Indicative Q100 line to be retained in order to ensure appropriate configuration of conservation areas in accordance with the Intent of RVMC PR P.4 (a)
 - 1.5 Remnant vegetation within 100m of dam edge: To be retained as supplementary terrestrial fauna connection to southern side of dam and provide further support for achievement of RVMC PR P.4
- 2. BUFFER CONSERVATION**
(To be retained in Public Open Space or in Rear of Lots without fencing)
- 2.1 Additional mapped remnant vegetation to be retained in accordance with RVMC AS P4.2 (e and f), as determined from DERM Policy Note 15. TOTAL area of mapped remnant vegetation retained equals 38.4 ha over a site area of 122 ha (31.5%). As a consequence of the above, an additional 100m wide corridor of mapped remnant vegetation has been retained to the south of the existing dam with another 100m wide remnant corridor extending from the south-eastern corner of the site, supplementing the primary corridor described at 1.3 above.
 - 2.2 Mapped regrowth vegetation to be retained in order to ensure appropriate configuration of conservation areas in accordance with the Intent of RVMC PR P.4 (a)
 - 2.3 Unmapped regrowth vegetation to be retained in order to ensure appropriate configuration of conservation areas in accordance with the Intent of RVMC PR P.4 (a)
- 3. GENERAL USE**
(Retain vegetation where possible and practicable)
- 3.1 Mapped remnant vegetation to be retained in lots where possible and practicable or otherwise removed
 - 3.2 Mapped regrowth vegetation to be retained in lots where possible and practicable or otherwise removed
 - 3.3 Unmapped areas or areas beyond the boundary of the subject land

GILBERT+SUTHERLAND
agriculture · water · environment

Eastside
5/232 Robina Town Centre Drive, Robina, Qld. 4226
Phone 55789944 Mobile 0418 760919 Fax 55789945

PROJECT
WALLANGARRA PASTORAL CO.
REDBANK CREEK ROAD, GATTON, QLD
PROPOSED STORMWATER MANAGEMENT DEVICES

FIGURED DIMENSIONS TO BE READ IN PREFERENCE TO SCALING.	APPROVED	SCALE AS SHOWN	DRAWN B.M.W.	DRAWING No.
	DATE 28/01/10	CHECKED	VJ0112_1_3

Base plan provided by Urbis and Yurrah

Document control

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Title:	Conceptual Stormwater Assessment, Proposed Development, 63 Redbank Creek Rd, Adare, Queensland	
Project Manager:	Chris Anderson	
Author:	Khan Thorne, Nicholas Darwin	
Client:	Wallangarra Pastoral Company	
Client Contact:		
Client Reference:		
Synopsis:	This report describes assessments of the conceptual stormwater management measures required to ensure that the stormwater runoff from the proposed development meets Lockyer Valley Regional Council's water quality objectives.	

Revision History

Revision #	Date	Edition By		Approved By	
1		KT	ND	CMA	LJV
2					
3					

Distribution

Distribution	Revision Number									
	1	2	3	4	5	6	7	8	9	10
Urbis	1									
G&S file and library	2									

VJ0112_SWA_NWVD_ZD.doc

Summary

Urbis, on behalf of Wallangarra Pastoral Company, commissioned Gilbert & Sutherland Pty Ltd to prepare a conceptual assessment report in support of a development application for proposed subdivision at 63 Redbank Creek Road, Adare Queensland.

This Conceptual Stormwater Assessment has been prepared in accordance with the requirements of Lockyer Valley Regional Council and Healthy Waterways Water Sensitive Urban Design Technical Design Guidelines for South East Queensland, 2006. As such it provides conceptual details of the stormwater management 'treatment trains' that may be employed where appropriate to manage impacts on stormwater quality consequent to the proposed development. Further details will be included in the Detailed Stormwater Management Plans that will be prepared and submitted to Council prior to or as part of Operational Works (OPW) applications for future stages.

This conceptual analysis indicates that provided the recommended water quality management measures are suitably designed at subsequent operational works stages and properly installed and maintained, the water quality of runoff from the proposed development will achieve Council's specified objectives.

Analysis has been undertaken to ensure that peak flows leaving the site do not increase as a result of the development. To achieve this objective, conceptual mitigation devices have been proposed.

Careful management will be required to ensure that the projected quality levels are achieved and maintained particularly during the construction phases. These details are considered in the Stormwater Management Plan (SWMP), which is included as Attachment 1.

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VJ0112.1.5b	Typical individual allotment bioretention trench section
VJ0112.1.6	Pre-development catchment boundaries
VJ0112.1.7	Post development catchment boundaries

Glossary

Australian Height Datum (AHD)	National reference for relative height measurement in Australia.
Average Recurrence Interval (ARI)	The average or expected length of time between exceedances of a given variable, such as rainfall.
Bund	An embankment constructed around an area to prevent the inflow or outflow of liquids. Also called Bunding.
Catchment	The area above a given point which contributes to the runoff.
Clay	Very fine-grained sediment or soil (often defined as having a particle size less than 0.002 mm, or 2 microns, in diameter).
Ephemeral	A stream that flows briefly only in direct response to precipitation in the immediate locality and the channel of which is at all times above the watertable.
Erosion	The process by which material (such as rock or soil) is worn away or removed (as by wind or water).
Groundwater	The water contained in interconnected pores located below the watertable in an unconfined aquifer or located in a confined aquifer.
Intermittent	A stream in which the flow is seasonal, usually in response to rainfall in the immediate area (see ephemeral).
Loam	Medium-textured soil composed of approximately 10% to 25% clay, 25% to 50% silt and less than 50% sand.
pH	The degree of acidity or alkalinity measured on a scale of 1 to 14 with 7 as neutral. From 0 to 7 is acidic; from 7 to 14 is alkaline.
Sand	Sediment composed of particles within the size range 63 microns to 2 millimetres.
Scouring	The action of removing sediment from stream banks, particle by particle. This is a more destructive process than collapse when viewed over time due to incremental effects.
Sediment	Unconsolidated, fine-grained material (typically derived from the weathering of rocks), that is transported by water and settles on the floor of seas, rivers streams and other bodies of water.
Silt	Sediment having particles finer than sand and coarser than clay (i.e. 2 to 63 microns).
Sub-catchment	A smaller area within a catchment drained by one or more tributaries of the main water body.
Suspended Solids (SS)	The concentration of filterable particles in water (retained on a 0.45mm filter) and reported by volume (mg/L).
Total Nitrogen (TN)	Total nitrogen is the sum of the nitrogen present in all nitrogen-containing components in the water column. The nutrients, nitrogen and phosphorus are essential for plant growth. High concentrations indicate potential for excessive weed and algal growth.
Total Phosphorus (TP)	Total phosphorus is the sum of the phosphorus present in all phosphorus-containing components in the water column. The nutrients, nitrogen and phosphorus are essential for plant growth. High concentrations indicate potential for excessive weed and algal growth.
Turbidity	A measure of the cloudiness of water which is determined by the amount of light scattered by suspended particles.

1) Introduction

Urbis, on behalf of Wallangarra Pastoral Company, commissioned Gilbert & Sutherland Pty Ltd (G&S) to prepare a Conceptual Stormwater Assessment in support of a development application for a rural-residential development at 63 Redbank Creek Road, Adare, Queensland. The land subject to the proposed development ('the site') is approximately 121.9ha in size.

The site is described as Lots 95 & 96 on CA311434. The site location is shown on Drawing No. VJ0112.1.1.

This report addresses issues related to stormwater quality and quantity management. It is divided into sections

dealing with the proposal, a description of the physical characteristics of the site, an assessment of the likely stormwater runoff quality, hydraulic assessment and management of the potential stormwater impacts during the construction and operational phases. These management measures are detailed in the Stormwater Management Plan (SWMP) that is included as Attachment 1.

This report, prepared by qualified Gilbert & Sutherland staff, is based on assessments, MUSIC Version 3.01 and WBNM computer modelling of likely changes to annual stormwater sediment and nutrient loads and peak flows due to the proposed development.



NOTE: IMAGE SOURCE GOOGLE EARTH

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FIGURED DIMENSIONS TO BE READ IN PREFERENCE TO SCALING.

APPROVED
.....

PROJECT
WALLANGARRA PASTORAL CO.
REDBANK CREEK ROAD, ADARE, QLD
SITE LOCATION

SCALE AS SHOWN
DATE 29/01/10

DRAWN D.M.W.
CHECKED

DRAWING No.
VJ0112.1.1

2) Site description and proposal

2.1 Location and existing development

The proposed residential development is located at 63 Redbank Creek Rd, Adare, Queensland. Properly described as 95 & 96 on CA311434, the site is bound to the west by Adare Road, Redbank Creek to the east, to the south by Redbank Creek Road and by existing vegetation on the northern boundary.

2.2 Vegetation

The site has sparsely distributed remnant woodland communities separated by grasses typical of the local vegetation.

2.3 Geology

A review of the Geological Survey of Queensland 1:500,000 Geology Series Map (Moreton) indicates that the lower slopes associated with Redbank Creek are comprised of Quaternary deposited alluvium characterised by flood plains and river terraces. The remainder of the site is comprised of Triassic-Jurassic Woogaroo Subgroup and Jurassic Marburg formation. These formations comprise of sandstone, conglomerate, siltstone, shale and coal.

2.4 Catchment Description

Existing surface elevations range from approximately 98m to 130m Australian Height Datum (AHD). The site slopes range from 'very gently inclined' to 'moderately inclined'.¹

The site can be broken into two main catchments. The north-western portion of the site flows to a west-east drainage line

which eventually discharges into Redbank Creek. The remaining portion of the site flows towards a central drainage line, which conveys flows through the site from upstream. This drainage line discharges under Redbank Creek Road situated to the south of the site.

2.5 Proposed development

The total site area is 121.9ha, of which 41.8ha is proposed as open space.

The proposed development would consist of rural residential lots, conservation lots and open space as shown on Drawing No. VJ0112.1.2.

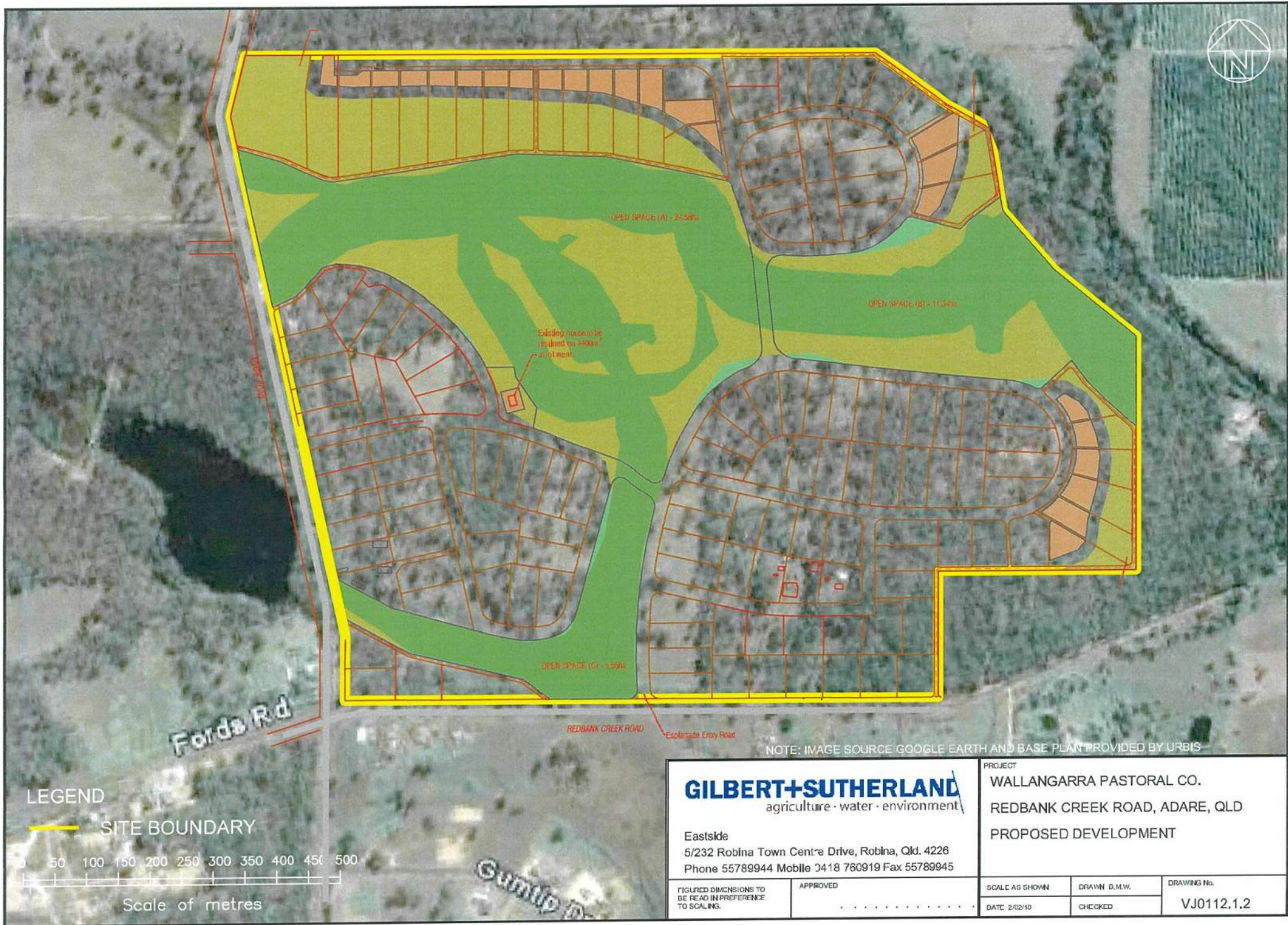
Lots will have a minimum building location envelope of 1000m². Conservation lots will contain buffer conservation areas at the rear of the lot. The open space consists of buffer conservation areas and core conservation areas.

The proposed development comprises the construction and/or installation of the following components:

- site earthworks
- stormwater drains
- electricity distribution cables
- telecommunication cables
- other ancillary services
- construction of residential houses
- landscaping.

Once the development has been completed, all disturbed portions of the site will be rehabilitated or covered by some form of improvement protecting the soils from erosion, hence minimising the transport of suspended solids from the site. The improvements will include structures, paved areas and landscaping.

¹ McDonald R C, Isbell R F, Speight J G, Walker J & Hopkins M S, *Australian Soil and Land Survey Field Handbook*, Second Edition 1990, Inkata Press Pty Ltd, Melbourne, VIC.



LEGEND

SITE BOUNDARY

0 50 100 150 200 250 300 350 400 450 500

Scale of metres

NOTE: IMAGE SOURCE GOOGLE EARTH AND BASE PLAN PROVIDED BY URBIS

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PROJECT
 WALLANGARRA PASTORAL CO.
 REDBANK CREEK ROAD, ADARE, QLD
 PROPOSED DEVELOPMENT

FIGURED DIMENSIONS TO BE READ IN PREFERENCE TO SCALING.

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SCALE AS SHOWN
 DATE 2/02/10

DRAWN D.M.W.
 CHECKED

DRAWING No.
 VJ0112.1.2

3) Stormwater quality assessment methods

3.1 Methods

3.1.1 MUSIC modelling

The CRC for Catchment Hydrology Model for Urban Stormwater Improvement Conceptualisation (MUSIC) Version 3.01 computer model would be used to assess the likely impacts of the proposed development on water quality.

MUSIC is a water resources package with components for generating surface and subsurface runoff, non-point source pollutant export and pollutant transporting and routing. It is specifically designed for the analysis of the effects of planned land use changes and for the evaluation of best management practice stormwater quality improvement devices.

The input data requirements are as follows.

3.1.2 Model input data

This model requires the input of rainfall and evapotranspiration data. The rainfall data must be in the form of 6 minute time-step pluviometer records. This information was obtained from the Bureau of Meteorology for its site at University of Queensland, Gatton campus, which is considered appropriate for this study in terms of proximity and relief.

Suitable records were available from 1956 to 2007. From this we extracted a continuous 6 minute time-step dataset from

Table 3.1.2.1 Rainfall Statistics

Year	Total Rainfall (mm)	Percentile Ranking
1990	953	66.1
1991	919.1	57.6
1992	923.1	59.3
1993	523.7	5.9
1994	525.2	6.7
1995	1031.7	77.1
1996	1397.2	93.2
1997	892	50
1998	815.6	34.7
1999	1023.9	73.7
Average	900.4	-

01/01/1990 to 31/12/1999. An analysis of the 6 minute time-step MUSIC dataset yielded an average annual rainfall of 1508mm and the following annual totals.

An analysis of the daily time-step rainfall data set for the same weather station at University of Queensland, Gatton spanning the period from 1889 to 2008 provided the following annual rainfall data:

- Driest Year 422mm
- 10th percentile year 590mm
- Average year 911mm
- Median year 889mm
- 90th percentile year 1292mm
- Wettest year 1865mm

A continuous model run using the MUSIC dataset from 1990 to 1999 would therefore be expected to yield indicative results. This is because the average rainfall (900mm) of the dataset is close the long term average (911mm).

Average monthly potential areal evapotranspiration values were obtained from the Bureau of Meteorology web site. These values are presented in Table 3.1.2.2.

Table 3.1.2.2 Evapotranspiration data

Month	Evapotranspiration (mm)
Jan	180
Feb	135
Mar	135
Apr	105
May	75
Jun	67
Jul	67
Aug	85
Sep	105
Oct	145
Nov	160
Dec	180

3.1.3 Runoff parameters

Relevant parameters for the land uses were sourced from Brisbane City Council's 'Guidelines for Pollutant Export Modelling in Brisbane, Version 7 – Draft' October 2003 (BCC 2003) and are presented in Table 3.1.3.

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Table 3.1.3 Runoff parameters

Parameter	Rural Land Use	Urban Land Use
Field capacity (mm)	80	200
Infiltration coefficient	200	50
Infiltration exponent	1	1
Rainfall threshold (mm)	1	1
Soil capacity (mm)	120	400
Initial storage (%)	25	10
Daily recharge rate (%)	25	25
Daily drainage rate (%)	5	5
Initial depth (mm)	50	50

3.1.4 Water quality parameters

The water quality parameters modelled were:

- Suspended Sediment
- Total Nitrogen
- Total Phosphorus

The sediment and nutrient export characteristics were adopted from the Brisbane City Council's 'Guidelines for Pollutant Export Modelling in Brisbane, Version 7 – Draft' October 2003 (BCC 2003) as shown in Table 3.1.4.1.

It should be noted that the rainfall to runoff model and the pollutant export expressions have not been calibrated for local catchments. This means the modelling results can not be expected to produce accurate assessments of the amount of pollutants likely to be exported from the proposed development. However, the results do provide useful assessments which enable comparisons of the effectiveness of various stormwater management strategies.

Table 3.1.4.1 Pollutant Export Parameters (Log₁₀mg/L)

Land use	Parameter	Suspended Solids		Total Nitrogen		Total Phosphorus	
		Base Flow	Storm Flow	Base Flow	Storm Flow	Base Flow	Storm Flow
Rural	Mean	0.53	2.26	-0.52	0.32	-1.54	-0.56
	Std Deviation	0.24	0.51	0.39	0.30	0.38	0.28
Urban	Mean	1.00	2.18	0.20	0.26	-0.97	-0.47
	Std Deviation	0.34	0.39	0.20	0.23	0.31	0.31
Shops	Mean	0.78	2.16	0.32	0.37	-0.60	-0.39
	Std Deviation	0.39	0.38	0.30	0.34	0.50	0.34

An assessment of the pervious and impervious proportions for the urban areas in each catchment was carried out to provide input for the model. The effective fraction impervious was calculated to represent the directly connected impervious area. These proportions have been calculated using the recommended proportions shown in Table 2.2 of the Brisbane City Council 'Guidelines for Pollutant Export Modelling in Brisbane Version 7 – Draft', October 2003 (BCC, 2003), which has been reproduced in Table 3.1.4.2.

Table 3.1.4.2 Effective Impervious proportion

Land Use	Rural	Urban
Effective fraction impervious as a % of the fraction impervious	55%	31%

3.1.5 Modelling undertaken

During the design phase, the MUSIC model would be used to form a basic model for the stormwater treatment system simulating the existing environment (base case) to compare with models representing the anticipated environment subsequent to the change in land use (developed case after completion of the construction phase).

The following scenarios would be modelled:

- Development case WITHOUT treatment measures.
- Development case WITH treatment measures.

Descriptions of the catchments before and after completion of the development are included in Section 3.2.2. Details of the stormwater treatment methods recommended and the results of the MUSIC modelling are provided in Section 4.3.

3.2 Site description and proposal

3.2.1 Receiving environment

The catchment has been described in Section 2.4.

No water quality monitoring has been carried out by Gilbert & Sutherland to establish background water quality levels on the site. However, water quality treatment measures should be installed to ensure that the load based reduction targets detailed in Section 1.5 of Healthy Waterways 2006 are met during the operational phase.

3.2.2 Catchment description

This assessment is based on the conceptual plan and provides conceptual details of the treatment measures likely to be adopted and their performance in mitigating the impacts of stormwater runoff from the completed development.

The physical catchment characteristics were described in Section 2 of this report. The developed catchment boundaries are shown on Drawing No. VJ0112.1.3.

All of the proposed lots have an assumed urban building envelope of 1500m². 450m² of this area is expected to be roofed areas and of the balance of this is anticipated to contain 100m² of impervious surfaces and all other surfaces have been nominated as pervious. The remaining area outside of the building envelope is to be undeveloped and is therefore modelled as a rural source of runoff.

The areas of the land uses included in the developed model are shown in Table 3.2.2.1.

Table 3.2.2.1 Catchment Characteristics of the proposed development

Catchment No.	Rural Area (ha)	Urban Area (ha)	Total Area (ha)
1	1.342	0.600	2.092
2	10.400	8.96	19.360
3	12.077	11.424	23.501
4	2.584	2.717	5.301
5	2.813	3.704	6.517
6	0	0.150	0.150
7	0	1.300	1.300

Table 3.2.2.2 Post developed urban catchment impervious fractions

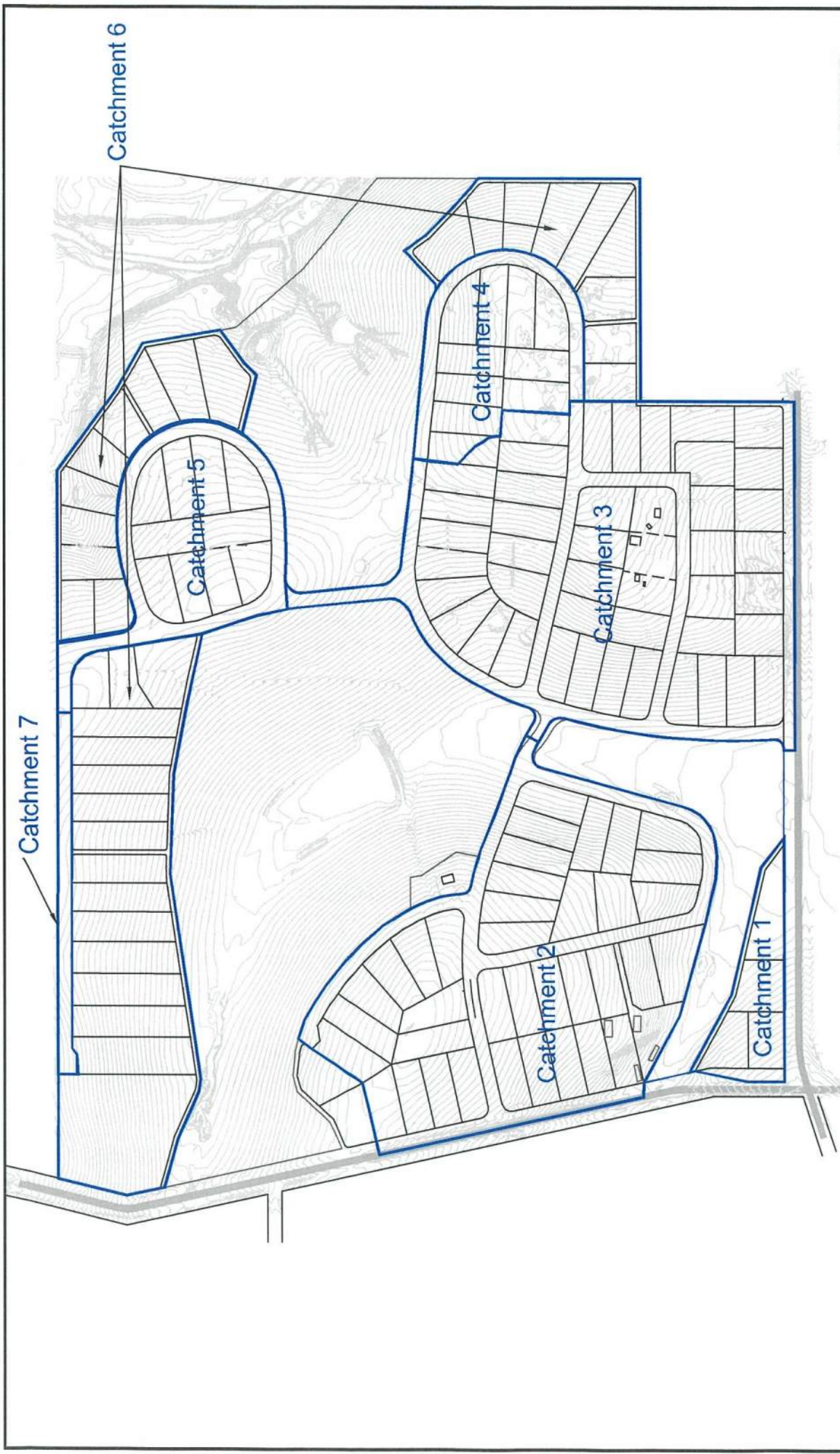
Catchment	Area (ha)	Impervious Area (ha)	Effective Impervious percentage (%)
Catchment 1			
Roof	0.225	0.225	31
Urban Balance	0.525	0.05	3
Rural	1.342	0.013	1
Catchment 2			
Roof	1.575	0.575	31
Urban Balance	3.675	0.350	3
Road	3.710	3.675	16
Rural	10.400	0.104	1
Catchment 3			
Roof	2.025	2.025	31
Urban Balance	4.725	0.047	3
Road	4.675	2.337	16
Rural	12.077	0.121	1
Catchment 4			
Roof	0.450	0.450	31
Urban Balance	1.050	0.100	3
Road	1.218	0.609	16
Rural	2.584	0.0258	1
Catchment 5			
Roof	0.450	0.450	31
Urban Balance	1.050	0.100	3
Road	2.203	1.102	16
Rural	2.813	0.0258	1
Catchment 6 – typical allotment			
Roof	0.045	0.450	31
Urban Balance	0.105	0.100	3
Road	-	-	16
Rural	-	-	1
Catchment 7			
Roof	-	-	31
Urban Balance	-	-	3
Road	1.300	0.515	16
Rural	-	-	1

The catchments were appropriately broken up into sub catchments as indicated in Table 3.2.2.2 below. Catchment 6 was modelled as a typical lot in accordance with Tables 3.2.2.1 and 3.2.2.2.

Generally the 'urban' land use would be used to represent the roads, driveway and

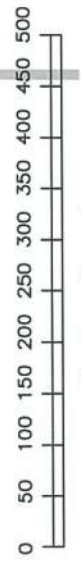
pathway areas, the building envelopes and surrounds. The rural land use has been used to represent the open space areas and the low density rural residential area in the southern portion of the site.

The estimated impervious and effective impervious fractions for the urban catchments have been calculated in accordance with the BCC Guidelines.



LEGEND

— MUSIC MODELLING CATCHMENT BOUNDARY



Scale of metres

Base film provided by Linc

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PROJECT		WALLANGARRA PASTORAL CO.	
		REDBANK CREEK ROAD, ADARE, QLD	
		MUSIC MODELLING CATCHMENT PLAN	
SCALE AS SHOWN	DRAWN D.M.W.	DRAWING NO.	VJ0112.1.3
DATE 2/02/10	CHECKED		

4) Stormwater quality assessment results

4.1 Water quality assessment results

Details of the MUSIC modelling software, the input parameters and the catchments have been provided in Section 3.

4.1.1 Developed Untreated Case

Table 4.1.1.1 presents the average annual runoff volumes and quantities of suspended sediment, nitrogen and phosphorus predicted to be exported from the site in its developed untreated state during the seven-year model simulation. It demonstrates the changes in runoff and pollutants that are likely to occur if the development was completed without any stormwater management or treatment measures.

To meet the water quality objectives, the mean annual pollutant load reductions and the target mean annual loads given in Table 4.1.1.2 must be achieved.

Table 4.1.1.2 Catchment 5 - Mean annual load reductions (% reduction and kg/year).

Target annual load reductions (%)		
Suspended Sediment	Total Nitrogen	Total Phosphorus
80	45	60
Target mean annual Loads (kg/year)		
Suspended Sediment	Total Nitrogen	Total Phosphorus
8048.8	98.2	13.504

4.1.2 Developed Treated Case

The same areas as above were modelled under the same rainfall conditions in a developed state with treatment measures included. It is proposed that runoff from the site will be treated using a combination of rainwater tanks, vegetative buffers, swales and bioretention basins. All houses within the development would be required to install rainwater tanks.

The selected treatment devices are discussed below.

Rainwater tanks

We have assumed that rainwater storage tanks (minimum size 5,000L/lot) would be installed to capture runoff from the roof areas. It is expected that the tank water would be used for flushing toilets and all outdoor uses and that the tanks would be connected to the reticulated drinking water supply system for top-up purposes. Please note that a first flush diversion device or filtration unit should be installed.

For the purposes of the modelling it has been assumed that the roof area contributing to the tank would be 450m² per connected roof area.

Table 4.1.2.1 (following page) details the conceptual rainwater tank properties for each catchment used as input for the MUSIC model.

Vegetated filters

Runoff from the hardstand of each allotment (excluding roof areas draining to a rainwater tank) are to be directed into vegetated filters.

Table 4.1.1.1 Developed Untreated Case average annual loads – Catchments 1-5

Catchments	Runoff (ML/year)	Suspended Sediment (kg/year)	Total Nitrogen (kg/year)	Total Phosphorus (kg/year)
Rural				
Catchments 1-5	28.01	6111	48.53	6.041
Urban				
Catchments 1-5	43.59	9689	90.47	18.659
Sum				
Catchments 1.5	71.6	15800	139	24.7
Urban				
Catchment 6	0.222	46.9	0.094	0.4690
Urban				
Catchment 7	2.25	500	2.50	0.181

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Table 4.1.2.1 - Adopted conceptual rainwater tank characteristics

Catchment	Volume below overflow pipe (kL)	Depth above overflow (m)	Surface area (m ²)	Overflow pipe diameter (mm)	Annual demand (kL/yr)
1	25	0.2	12.5	260	225
2	175	0.2	87.5	687	525
3	225	0.2	112.5	779	150
4	50	0.2	25	367	150
5	50	0.2	25	367	375
Single Lot	5	0.2	12.5	116	375

The vegetative filters are the existing site vegetation for treatment of shallow overland flow. The flow entering the vegetated filter should be evenly distributed as sheet flow across its upstream end.

For the purposes of the modelling it was assumed the vegetated filters would treat 50% of the upstream impervious area.

Swales

Stormwater runoff from the road is to be directed into a grassed swale as shown on Drawing No. VJ0112_1_4.

A swale is a vegetated drain that runs longitudinally to treat stormwater. The vegetation in the swale and the volumetric capacity of the swale allow it to retard flows and treat the water as it passes down its length. Vegetation in the swale will include appropriate sedges, rushes and grasses.

The removal efficiency of a swale is dependant on its size and configuration. Pollutant removal is modelled by MUSIC using empirical equations derived from analysis of data published in technical literature (MUSIC manual). The dimensions of the swales modelled are shown in Table 4.1.2.2.

Bioretention devices

Vegetated non-conveyance bioretention devices are to be provided to treat runoff from the majority of the site before it is discharged into the receiving environment.

Bioretention devices should be installed in the locations indicated on Drawing No.

VJ0112.1.4. It is also proposed that individual allotments in Catchment 6 will have vegetated non-conveyance bioretention devices to treat runoff.

It is envisaged that the devices would generally be dry. However during (and for a short period after) wet weather, the devices may be filled with water.

The bioretention devices would have a filter section, filled with sand of appropriate size to filter the water, and a swale section to pond water above the filter so that the volume of treated runoff is maximised. Vegetation in the swale section would include appropriate shrubs, sedges, rushes and grasses. The sand in the trench section allows stormwater to infiltrate, be treated then drain through an agricultural pipe to the outlet.

A typical bioretention basin is shown on Drawing No. VJ0112_1_5a with the typical 'on-lot' bioretention cross section shown on Drawing No. VJ0112_1_5b.

Operating characteristics for each device are set out in Table 4.1.2.3 (following page).

Details of appropriate plant species selection, size and spacing is detailed in Chapter 12 of the Water Sensitive Urban Design – Technical Design Guidelines for South East Queensland, June 2006. Care would be taken to protect the filter media from excessive sediment loads during the construction phase.

Table 4.1.2.2 – Modelled swale characteristics

Catchment	Length (m)	Bed slope (%)	Average base width (m)	Average top width (m)	Average depth (m)	Vegetation height (m)	Seepage loss (mm/hr)
7	465	3	1.5	3.5	0.25	0.05	0

Table 4.1.2.3 – Modelled bioretention basins characteristics

Parameter	Bio 1	Bio 2	Bio 3	Bio 4	Bio 5	Bio 6*	Bio 7
Storage Properties							
Extended detention depth (m)	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Surface area (m ²)	121	720	995	265	265	28	116
Seepage loss (mm/hr)	0	0	0	0	0	0	0
Infiltration Properties							
Filter area (m ²)	36	400	600	135	135	8	50
Filter depth (m)	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Filter particle effective diameter (mm)	0.45	0.45	0.45	0.45	0.45	0.45	0.45
Saturated hydraulic conductivity (mm/hr)	180	180	180	180	180	180	180
Outlet properties							
Overflow weir width (m)	2.0	2.0	2.0	2.0	2.0	2.0	2.0

Notes: * Bioretention trench characteristics for a single allotment within Catchment 6.

Appropriate procedures for the maintenance of the stormwater devices are described in the attached Stormwater Management Plan.

Modelling results for the developed treated case are shown in Table 4.1.2.4. The estimated load reductions of the development are detailed in Table 4.1.2.5 along with the BCC performance criteria.

Based on the assessment and modelling described above, the load-based targets for operational phase performance criteria can be met.

Table 4.1.2.5 Developed Treated Case pollutant load reduction statistics

	TSS	TN	TP
Target	80%	45%	60%
Sum Load Reduction (Catchments 1-5)	54%	95%	13%
Developed area load reduction catchments 1-5	91%	53%	61%
Developed area load reduction Catchment 6	80%	49%	68%
Urban load reduction Catchment 7	95%	46%	81%

Table 4.1.2.4 Developed Treated Case average annual loads

Catchments	Runoff (ML/year)	Pollutant loads (kg/year)		
		TSS	TN	TP
Rural				
Catchments 1-5	28.01	6111	48.53	6.041
Urban				
Catchments 1-5	38.09	819	45.87	7.259
Sum				
Catchments 1-5	66.1	6930	94.4	13.3
Urban				
Catchment 6	0.169	8.99	0.238	0.03013.3
Urban				
Catchment 7	2.26	22.8	2.50	0.181

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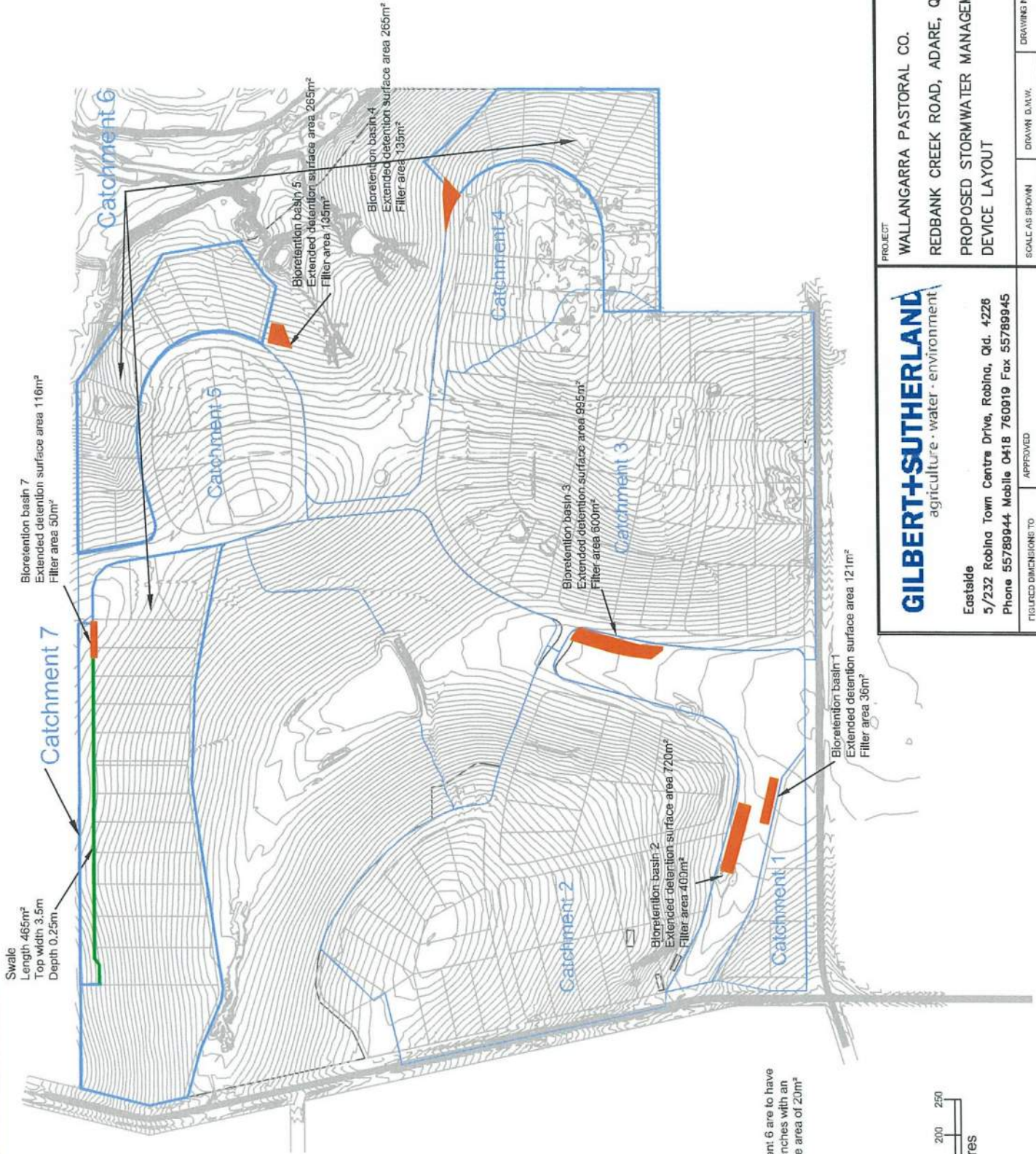
4.2 Water quality assessment summary

The design assessment carried out shows that the proposed residential development can satisfy the water quality load based operational phase performance criteria, provided the recommended treatment devices are properly installed and maintained.

A summary of the treatment measures for each catchment is shown in Table 4.2.1.1.

Table 4.2.1.1 – Proposed permanent stormwater quality treatment devices

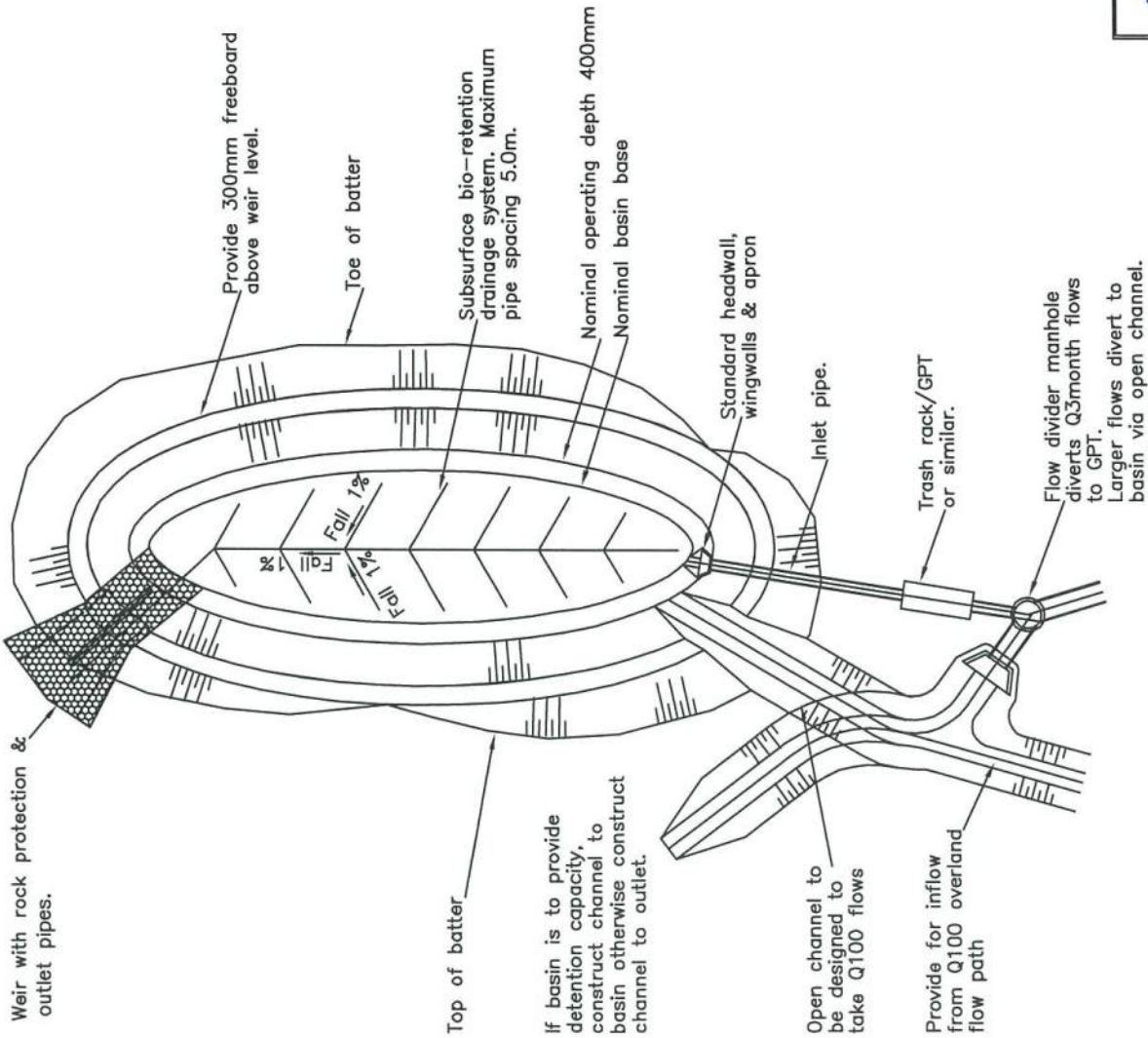
Catchment	Swale	Rainwater Tanks	Vegetated Buffer	Bioretention basins	Individual allotment based bioretention trenches
1		✓	✓	✓	
2		✓	✓	✓	
3		✓	✓	✓	
4		✓	✓	✓	
5		✓	✓	✓	
6		✓	✓		✓
7	✓			✓	



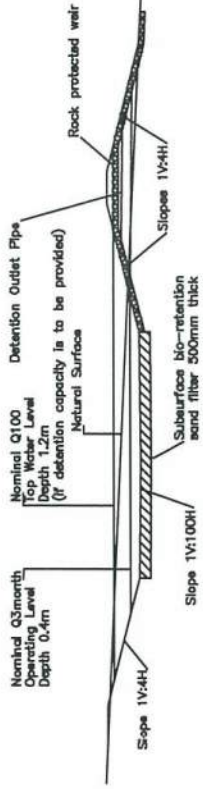
NOTE:
 Allments within Catchment 6 are to have individual bioretention trenches with an extended detention surface area of 20m² and filter area 8m²



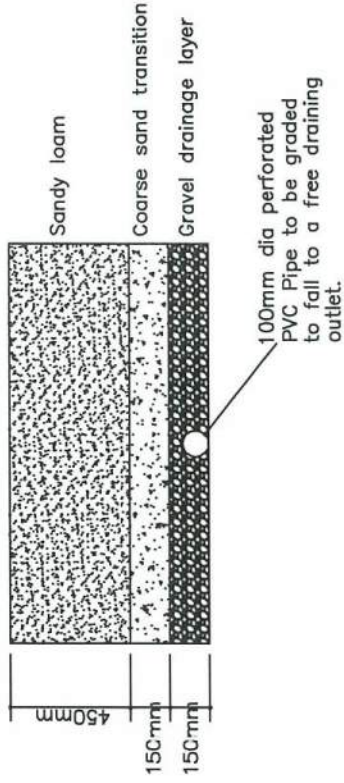
GILBERT+SUTHERLAND agriculture · water · environment		PROJECT WALLANGARRA PASTORAL CO. REDBANK CREEK ROAD, ADARE, QLD PROPOSED STORMWATER MANAGEMENT DEVICE LAYOUT	
Eastside 5/232 Robina Town Centre Drive, Robina, Qld. 4226 Phone 55789944 Mobile 0418 760919 Fax 55789945	APPROVED FIGURED DIMENSIONS TO BE READ IN PREFERENCE TO SCALING.	SCALE AS SHOWN DATE 28/01/10	DRAWN D.M.W. CHECKED DRAWING NO. VJ0112.1.4



TYPICAL LAYOUT



TYPICAL SECTION



BIO-RETENTION FILTER
TYPICAL SECTION

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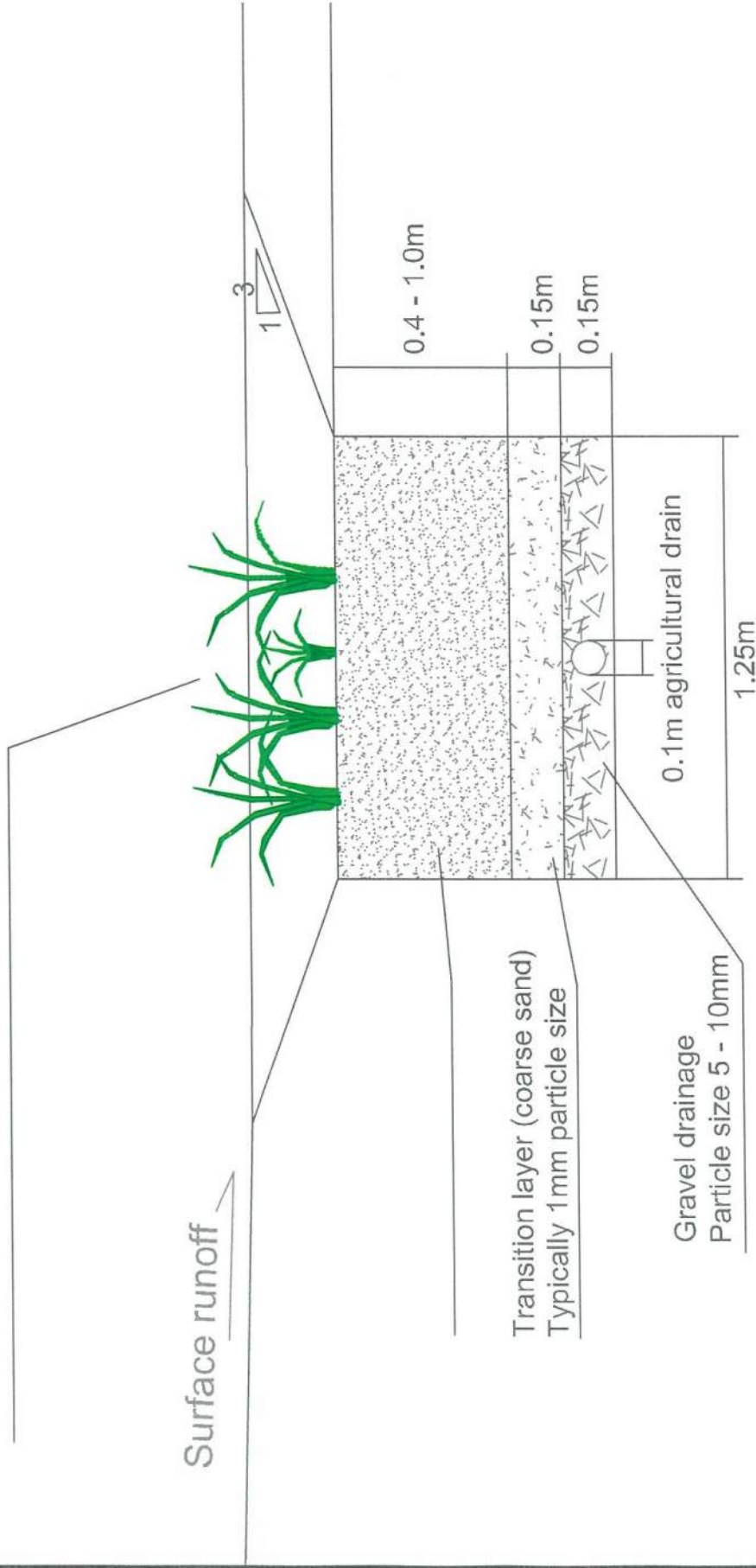
PROJECT
 WALLANGARRA PASTORAL CO.
 REDBANK CREEK ROAD, ADARE, QLD
 TYPICAL BIORETENTION BASIN DETAILS

FIGURED DIMENSIONS TO BE READ IN PREFERENCE TO SCALING.
 APPROVED

NOT TO SCALE
 DATE 10/10/08
 DRAWN C.M.A.
 CHECKED

DRAWING No.
 VJ0112.1.5a

Vegetation in the swale section should include appropriate shrubs, sedges, rushes and grasses, and should be based on the information provided in Chapter 12 of the Water Sensitive Urban Design - Technical Design Guidelines for South East Queensland, June 2006



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APPROVED

FIGURED DIMENSIONS TO BE READ IN PREFERENCE TO SCALES.

PROJECT
 WALLANGARRA PASTORAL CO.
 REDBANK CREEK ROAD, ADARE, QLD
 TYPICAL ON-LOT BIOTRETENTION SECTION

SCALE AS SHOWN
 DATE 1/05/08

DRAWN K.T.
 CHECKED

DRAWING NO.
 VJ112.1.5b

5) Stormwater quantity assessment method

A hydrological assessment was undertaken to assess the extent of flow attenuation measures required under a range of rainfall events using the Rational Method and the Watershed Bounded Network Model (WBNM) computer modelling software.

The hydrological assessment described in this section considers and references the pre-developed catchments as shown on Drawing No. VJ0112_1_6 and the post-developed catchments shown on Drawing No. VJ0112_1_7.

5.1 Rational Method

The Rational Method (Section 4.03 QUDM 2007) is flexible in its data requirements and is able to produce satisfactory estimates of peak discharges from a site with the following data input:

- local intensity frequency duration data
- catchment areas
- runoff coefficients.

Discharge using the Rational Method is calculated by:

$$Q = \frac{F_Y C_{10} I A}{360}$$

where: Q = Peak flow (m³/s)
 F_Y = Frequency factor
 C_{10} = Runoff coefficient (10yr)
 I = Rainfall intensity (mm/hr)
 A = Catchment area (ha)

Peak discharges were estimated for the pre-developed and post-developed case for events with average recurrence intervals (ARI) between 1 and 100 years.

5.1.1 Time of concentration

Time of concentration (t_c) for Catchment A was calculated using Bransby William's equation with 43 minutes to be adopted for both pre-developed and developed conditions. For Catchments 4 and 5, time of concentration was calculated using Friend's Equation for overland sheet flow of the first 50m and channel flow using figure 4.09 of QUDM.

For Catchment 4 a pre-developed t_c of 26 minutes and developed t_c of 29.5 minutes was adopted. A pre-developed t_c of 17 minutes and developed t_c of 16 minutes was adopted for Catchment 5.

5.1.2 Runoff coefficients

The runoff coefficient for the 10 year (C_{10}) average recurrence interval (ARI) was adopted based on recommendations in QUDM Tables 4.05.1 and 4.05.2. These have been modified using the frequency factors contained in tables 4.05.3a and 4.05.3b of QUDM.

For the Undeveloped Case, the value of 0.56 was adopted for areas with zero fraction impervious, medium density bush and medium permeability soil.

Due to a low percentage impervious for the Developed Case of Catchment A, the value of 0.56 for 13% fraction impervious was adopted. For the Developed Case of catchments 4 and 5, the value of 0.60 for 20% impervious was adopted.

5.2 WBNM modelling

The Watershed Bounded Network Model (WBNM) is an event-based hydrologic model which calculates flood hydrographs from storm rainfall hyetographs. It can be used for modelling natural, partially developed and fully developed catchments.

For developed catchments, it calculates runoff from pervious and impervious surfaces and routes it through the major system of open water courses. WBNM does not model the details of piped drainage systems. It can be used to generate hydrographs from an actual storm event and or a design storm utilising Intensity – Frequency – Duration data together with dimensionless storm temporal patterns.

The WBNM model is flexible in its data requirements and is able to produce satisfactory results with the following data input:

- local intensity frequency duration data
- design temporal patterns
- subcatchment areas
- impervious areas.

The model was calibrated by adjusting the rainfall depths and lag parameter (C) to closely replicate the runoff estimated by using the Rational Formula.

5.2.1 Storm data

The rainfall intensities for the simulation of the design rainfall events were calculated in accordance with Book 2 of Australian Rainfall and Runoff 1998 (AR&R). Rainfall intensity-frequency-duration data for Beenleigh was produced in AUSIFD to provide a reliable estimate of rainfall intensities for the site. The AR&R Standard Temporal patterns were used.

Losses used in the modelling were estimated in order to replicate the flows calculated using the rational method. Losses were also determined in conjunction with the recommendations contained in the XP-RAFTS reference manual and those published in AR&R 1998, Book 2, Design Rainfall Considerations, Section 3.4. The losses adopted for this site are shown in Table 5.3.1.

Table 5.3.1 Model losses

Storm ARI (years)	Pervious Initial loss (mm)	Pervious Continuing loss (mm)	Impervious Initial loss (mm)	Impervious Continuing loss (mm)
1	15.0	2.5	0.5	0.0
2	15.0	2.5	0.5	0.0
5	12.0	2.5	0.5	0.0
10	10.0	2.5	0.5	0.0
20	6.0	2.5	0.5	0.0
50	2.5	2.5	0.5	0.0
100	0.0	2.5	0.5	0.0

It should be noted that the actual estimates of the impervious areas for the proposed development have been used in the modelling as this approach would provide more realistic estimates of the likely changes resulting from the development.

5.3 Peak flow site characteristics

The physical characteristics of the catchment were described in Section 2 of this report. In its current state, the catchment may be described as part forested part rural.

It is proposed to attenuate flows for each catchment as follows:

- Catchment 4 & 5 – Use of a detention basin for each catchment.
- Catchment B (Individual allotments) - Use of 'leaky tanks'. The rainwater tanks, previously described in Section 4.3 will have a total volume of 20kL, comprising 5kL permanent storage and a further 15kL for peak flow attenuation. The entire roof area within each lot (assumed as 450m²) will drain to the tank.

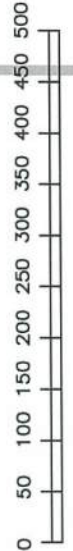
For the purpose of the modelling, it has been assumed that the 5kL permanent store within each tank may be full at the start of the critical storm and have not been included as part of the detention storage.

Details of the detention storages are provided in Section 6.3.



LEGEND

— PRE-DEVELOPMENT CATCHMENT BOUNDARY



Base plan provided by LDBS

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FIGURED DIMENSIONS TO BE READ IN PREFERENCE TO SCALING.

APPROVED

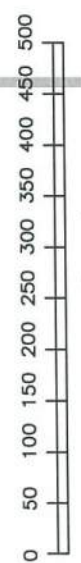
PROJECT		DRAWING No.	
WALLANGARRA PASTORAL CO.		VJ0112.1.6	
REDBANK CREEK ROAD, ADARE, QLD		DRAWN D.M.W.	CHECKED
PREDEVELOPMENT CATCHMENT BOUNDARIES		SCALE AS SHOWN	DATE 2/02/10



NOTE:
 Allotments within the Catchment B area were assessed using a 'typical' individual allotment analysis

LEGEND

— POST DEVELOPMENT CATCHMENT BOUNDARY



Scale of metres

Base plan provided by Utlé

GILBERT+SUTHERLAND agriculture · water · environment Eastside 5/232 Robina Town Centre Drive, Robina, Qld. 4226 Phone 55789944 Mobile 0418 760919 Fax 55789945 <small>FIGURED DIMENSIONS TO BE READ IN PREFERENCE TO SCALES.</small>	<small>APPROVED</small>	<small>SCALE AS SHOWN</small> DRAWN D.M.V. CHECKED	<small>DRAWING NO.</small> VJ0112.1.7
	<small>PROJECT</small> WALLANGARRA PASTORAL CO. REDBANK CREEK ROAD, ADARE, QLD POST DEVELOPMENT CATCHMENT BOUNDARY	<small>DATE</small> 2021/0	<small>DRAWING NO.</small> VJ0112.1.7

6) Stormwater quantity assessment results

6.1 Rational Method peak flows

6.1.1 Pre-developed Case

The assumptions adopted to determine the peak flow rates discharging from each catchment in its present condition are listed in Table 6.1.1.1.

Table 6.1.1.1 Rational method assumptions – pre-developed case

Parameter	A	4	5	Single
Runoff coefficient (C_{10})	0.56	0.56	0.56	0.56
Time of concentration (t_c , min)	43	26	17	5
Catchment area (A, ha)	93	6.5	10.4	0.4

The resultant peak flow rates at the discharge point for each catchment over the standard ARI events are shown Table 6.1.1.2.

6.1.2 Post-developed Case

The assumptions adopted to determine the peak flow rates discharging from each catchment are listed in Table 6.1.2.1. The peak flows for the site in a developed state are shown in Table 6.1.2.2.

Table 6.1.2.1 Rational method assumptions – pre-developed case

Parameter	A	4	5	Single
Runoff coefficient (C_{10})	0.56	0.60	0.60	0.65
Time of concentration (t_c , min)	43	29.5	16	5
Catchment area (ha)	92.5	8.96	13.6	0.4

A comparison of tables 6.1.1.2 and 6.1.2.2 indicates that peak flows would increase by up to 44%, hence the installation of attenuation devices is required. However, as a result of a smaller developed catchment relative to the pre-developed case, peak flows for Catchment A do not increase, thus attenuation in Catchment A is not required.

Table 6.1.1.2 Pre-developed peak flows by rational method

ARI (yrs)	$C_r (F_r C_{10})$	I (mm/hr)	Q (m ³ /s)			
			A	4	5	Single
1	0.448	62.54	4.513	0.412	0.809	0.019
2	0.476	80.99	6.219	0.567	1.114	0.026
5	0.532	103.7	8.940	0.813	1.594	0.038
10	0.560	118.0	10.73	0.976	1.910	0.045
20	0.588	137.5	13.16	1.196	2.337	0.055
50	0.644	164.5	17.27	1.568	3.061	0.072
100	0.672	186.0	20.42	1.852	3.611	0.085

Table 6.1.2.2 Post-developed peak flows by rational method

ARI (yrs)	$C_r (F_r C_{10})$	I (mm/hr)	Q (m ³ /s)			
			A	4	5	B (Individual allotments)
1	0.680	104	4.489	0.574	1.166	0.023
2	0.723	132	6.185	0.790	1.604	0.031
5	0.808	162	8.892	1.135	2.294	0.044
10	0.850	179	10.68	1.362	2.749	0.053
20	0.893	204	13.09	1.669	3.363	0.065
50	0.978	236	17.19	2.190	4.403	0.085
100	1.000	261	20.31	2.587	5.194	0.100

6.2 WBNM modelling results

An assessment of the critical storm duration was carried out by estimating the peak flows from each catchment during 100 year ARI storms having durations ranging from 5 minutes to 2 hours.

Adopting a Lag parameter (C) value of 1.70, the critical duration rainfall depths were iteratively adjusted so the post-developed peak flows replicated those calculated using the Rational Method. The rainfall depth adjustments for each ARI are shown in Table 6.2.1.

Table 6.2.1 Rainfall depth adjustments

ARI (years)	Rainfall depth adjustment (%)			
	Catchment			
	A	4	5	B (Individual allotments)
1	-	-7.3%	+12.5%	+20.5%
2	-	-13.6%	+5.5%	+8.5%
5	-	-25.8%	-6.2%	-3%
10	-	-31.25%	-10.6%	-7.5%
20	-	-38.6%	-16.85%	-11.3%
50	-	-35.3%	-10.2%	-
100	-	-36.3%	+1.0%	+1.6%

The inputs and assumptions detailed above were incorporated into the WBNM model to generate hydrographs for the site. Peak flows of the generated hydrographs from the developed site for a range of rainfall events are shown in Table 6.2.2 for comparison with the peak flows previously determined by the rational method.

Having achieved a reasonable correlation for the post-development model for modelled storm events up to the Q100 peak flow rate, the post-development WBNM model was then rerun to estimate the volume requirements and outlet details for the detention systems required within the proposed development.

6.3 Final detention design

For the purposes of this preliminary hydraulic assessment it was assumed that detention storage for catchments 4 and 5 be provided by means of a single open detention basin at the outlet of each developed catchment.

Table 6.2.2 Rational method and WBNM modelled peak flow comparison

ARI (years)	Rational method calculated flow (m ³ /s)	WBNM modelled flow (m ³ /s)
Catchment A		
1	4.489	-
2	6.185	-
5	8.892	-
10	10.68	-
20	13.09	-
50	17.19	-
100	20.31	-
Catchment 4		
1	0.574	0.576
2	0.790	0.800
5	1.135	1.157
10	1.362	1.387
20	1.669	1.692
50	2.190	2.212
100	2.587	2.610
Catchment 5		
1	1.166	1.171
2	1.604	1.652
5	2.294	2.329
10	2.749	2.790
20	3.363	3.407
50	4.403	4.447
100	5.194	6.033
Catchment B (Individual allotments)		
1	0.023	0.024
2	0.031	0.034
5	0.044	0.044
10	0.053	0.053
20	0.065	0.066
50	0.085	0.085
100	0.100	0.103

The basin volume and outlet configurations were iteratively adjusted until the basin discharge closely replicated the rational method pre-developed flow.

The outlets (pipes and weirs) will direct the runoff into the local drainage network at the nominated legal points of discharge.

Details of the operating conditions for each detention basin are given in Table 6.3.1 (following page).

Table 6.3.1 Detention basin details

Catchment 4 Conceptual Detention Basin	
Storage Properties	
Basin level (m)	Storage volume (m ³)
0	0
0.2	160
0.4	320
0.6	480
0.8	640
1	800
1.2	960
Outlet 1 details	
Outlet type	Pipe
Number of pipes	1
Pipe diameter (mm)	550
Invert level (m)	0.0
Outlet 2 details	
Outlet type	Pipe
Number of pipes	2
Pipe diameter (mm)	400
Invert level (m)	0.5
Outlet 3 details	
Outlet type	Weir
Weir width (m)	1
Invert level (m)	1.0
Catchment 5 Conceptual Detention Basin	
Storage Properties	
Basin level (m)	Storage volume (m ³)
0	0
0.2	400
0.4	800
0.6	1200
0.8	1600
1	2000
1.2	2400
1.4	2800
Outlet 1 details	
Outlet type	Pipe
Number of pipes	3
Pipe diameter (mm)	400
Invert level (m)	0.0
Outlet 1 details	
Outlet type	Pipe
Number of pipes	1
Pipe diameter (mm)	500
Invert level (m)	0.5

Full detention has been provided in each basin for all events up to an ARI of 100 years. The maximum water surface elevation within the conceptual basins did not exceeded 1.4m.

It is intended to attenuate flows of Catchment B (individual allotments) through the use of 'leaky tanks'. Each house in Catchment B will be fitted with a 20kL rainwater collection tank, comprising 5kL permanent storage for reuse and a further 15kL for peak flow attenuation. The tanks have been assumed to be 2.2m high, with a surface area of 5m².

The entire roof area within each lot (assumed as 450m²) will drain to the tank. For the purpose of the modelling, it has been assumed that the 5kL permanent store within each tank may be full at the start of the critical storm and have not been included as part of the detention storage.

The outlet from the 'leaky' component of each tank will comprise a 75mm diameter pipe at the base of the detention store. Discharge from this outlet would be allowed to drain with runoff from the remainder of the site. Details of the operating conditions for the detention component of the leaky tanks are given in Table 6.3.2.

Table 6.3.2 Catchment B (Individual allotment) final detention storage (leaky tank) operating characteristics

Storage characteristics	
Level (m)	Volume (m ³)
1.0	0
1.2	2.5
1.4	5.0
1.6	7.5
1.8	10.0
2.2	15.0
Outlet 1 (Pipe)	
Pipe diameter (mm)	75
Invert level (m)	1.00
Estimated Q100 water level (m)	2.11

The WBNM model was re-run using storm durations ranging from 5minutes to 2 hours to ensure the detention volume was able to provide effective attenuation for all expected events. Results for storms of all durations are presented in Appendix 1.

6.4 Post developed peak flow results

The model results for the post developed case incorporating the conceptual detention basins are shown in Table 6.4.1 (following page).

A comparison between the attenuated post-developed results and the pre-developed results in Table 6.1.1.2 indicates that the conceptual detention measures would have sufficient detention storage and appropriately sized outlet works to reduce the peak flows to rates comparable to the estimated pre-developed conditions.

Table 6.4.1 Post developed peak flows including detention

ARI (years)	WBNM modelled flow (m ³ /s)			
	A	4	5	B
1	-	0.405	0.799	0.019
2	-	0.559	1.088	0.026
5	-	0.811	1.569	0.036
10	-	0.949	1.674	0.043
20	-	1.123	1.988	0.054
50	-	1.556	2.708	0.069
100	-	1.801	3.600	0.084

6.5 Summary of hydrological modelling

The modelling undertaken has considered three scenarios to depict the effect of the development on the peak flows discharging from the subject site.

A comparison of the estimated peak flow rates before and after completion of the proposed development and subsequently including detention is shown Table 6.5.1. Detailed results are attached as Appendix 1.

The modelled results are considered acceptable given that they are generally within the limits of accuracy of the model and the assumptions made in creating it.

6.6 Water quantity management conclusions

The WBNM modelling described in this report indicates that the proposed flow attenuation measures would reduce the peak flows in the developed catchments to levels close to or below the undeveloped case. These results are considered acceptable.

Table 6.5.1 Summary of hydrological modelling

ARI (years)	Pre-Development (m ³ /s)	Post-Development (m ³ /s)	Attenuated Post-Development (m ³ /s)
Catchment A			
1	4.513	4.489	-
2	6.219	6.185	-
5	8.940	8.892	-
10	10.73	10.68	-
20	13.16	13.09	-
50	17.27	17.19	-
100	20.42	20.31	-
Catchment 4			
1	0.412	0.574	0.405
2	0.567	0.790	0.559
5	0.813	1.135	0.811
10	0.976	1.362	0.949
20	1.196	1.669	1.123
50	1.568	2.190	1.556
100	1.852	2.587	1.801
Catchment 5			
1	0.809	1.166	0.799
2	1.114	1.604	1.088
5	1.594	2.294	1.569
10	1.910	2.749	1.674
20	2.337	3.363	1.988
50	3.061	4.403	2.708
100	3.611	5.194	3.600
Catchment B - Single Lot Catchment			
1	0.019	0.023	0.019
2	0.026	0.031	0.026
5	0.038	0.044	0.036
10	0.045	0.053	0.043
20	0.055	0.065	0.054
50	0.072	0.085	0.069
100	0.085	0.100	0.084

7) Conclusions

Stormwater quality management measures should be installed as described in Section 3.1.4. This conceptual analysis indicates that, provided the recommended water quality management measures are suitably designed at subsequent operational works stages, properly installed and maintained, the water quality of runoff from the proposed development will achieve the specified objectives.

Careful management will be required to ensure that the projected quality levels are achieved and maintained particularly during the construction phases. These details are considered in the stormwater management plan, which is included as Attachment 1.

Stormwater quantity should be managed by provision of detention storage as described in Section 6.3. Provided the recommendations in Section 6.3 are followed, adequate attenuation for events up to the Q_{100} can be achieved.

Further refinement and detailing of the stormwater management plan (based on this stormwater assessment and management plan) will be undertaken, with stormwater management plans prepared to support subsequent development applications. The construction of the development would then be undertaken in accordance with the approved, more detailed stormwater management plans.

8) Appendix 1

8.1 WBNM modelling results

Job No. VJ0112
 Client Wallangarra Pastoral Co.
 Project Redbank Creek Rd, Adare
 Date 2/02/2010
 Description: WBNM Model results Catchment 4

CATCHMENT 4					Detention Basin OUTLET Strc on: Catchment 4				
ARI (years)	RATIONAL METHOD DEVELOPED PEAK FLOW	RATIONAL METHOD PREDEVELOPED PEAK FLOW	WBNM UNATTENUATED DEVELOPED CASE PEAK FLOW (m ³ /s)	WBNM ATTENUATED DEVELOPED CASE PEAK FLOW (m ³ /s)	Inflow Peak (m3/s)	Outflow Peak (m3/s)	Inflow Volume (m3)	Max Vol. Stored (m3)	Max Water Elevation (m)
	(m ³ /s)	(m ³ /s)	(m ³ /s)	(m ³ /s)					
1	0.574	0.412	0.576	0.405	0.463	0.242	1210	386	0.482
2	0.790	0.567	0.800	0.559	0.626	0.330	1524	464	0.581
5	1.135	0.813	1.157	0.811	0.891	0.477	1900	561	0.702
10	1.362	0.976	1.387	0.949	1.029	0.554	2095	610	0.762
20	1.669	1.196	1.692	1.123	1.202	0.653	2325	669	0.836
50	2.190	1.568	2.212	1.556	1.514	0.910	3120	822	1.014
100	2.587	1.852	2.610	1.801	1.759	1.048	3574	923	1.077

CATCHMENT 4					OUTLET Strc on: Catchment 4				
ARI (years)	STORM DURATION (mins)	WBNM UNATTENUATED DEVELOPED CASE PEAK FLOW (m ³ /s)	WBNM ATTENUATED DEVELOPED CASE PEAK FLOW (m ³ /s)	Inflow Peak (m3/s)	Outflow Peak (m3/s)	Inflow Volume (m3)	Max Vol. Stored (m3)	Max Water Elevation (m)	
		(m ³ /s)	(m ³ /s)						
1	5	0.362	0.034	0.362	0.034	130	108	0.135	
1	10	0.313	0.055	0.313	0.055	203	165	0.207	
1	15	0.401	0.089	0.401	0.086	264	204	0.255	
1	20	0.389	0.16	0.389	0.118	393	244	0.306	
1	25	0.495	0.219	0.463	0.144	499	277	0.346	
1	30	0.434	0.262	0.416	0.161	586	299	0.374	
1	45	0.45	0.362	0.341	0.216	807	359	0.449	
1	60	0.501	0.392	0.437	0.235	930	379	0.474	
1	90	0.576	0.405	0.412	0.242	1114	386	0.482	
1	120	0.472	0.371	0.33	0.223	1210	366	0.458	
2	5	0.438	0.041	0.425	0.041	153	128	0.16	
2	10	0.38	0.076	0.367	0.076	238	192	0.24	
2	15	0.488	0.168	0.47	0.123	399	251	0.314	
2	20	0.63	0.271	0.495	0.171	555	311	0.389	
2	25	0.783	0.349	0.626	0.211	682	355	0.443	
2	30	0.697	0.398	0.566	0.237	786	380	0.476	
2	45	0.681	0.513	0.449	0.303	1046	441	0.551	
2	60	0.8	0.553	0.6	0.328	1195	463	0.578	
2	90	0.794	0.559	0.554	0.33	1406	464	0.581	
2	120	0.699	0.509	0.449	0.303	1524	441	0.551	
5	5	0.46	0.044	0.46	0.044	167	139	0.173	
5	10	0.588	0.184	0.507	0.119	408	246	0.308	
5	15	0.765	0.345	0.663	0.199	630	342	0.428	
5	20	0.952	0.487	0.719	0.275	810	417	0.521	
5	25	1.157	0.581	0.891	0.333	961	467	0.584	
5	30	1.057	0.625	0.819	0.367	1081	492	0.615	
5	45	0.907	0.742	0.664	0.44	1377	538	0.672	
5	60	1.145	0.811	0.842	0.477	1544	561	0.702	
5	90	1.073	0.799	0.744	0.468	1776	555	0.694	
5	120	0.907	0.721	0.629	0.424	1900	527	0.659	
10	5	0.543	0.064	0.527	0.051	216	161	0.201	
10	10	0.775	0.275	0.619	0.156	524	292	0.365	
10	15	0.976	0.462	0.792	0.253	760	397	0.496	

10	20	1.155	0.618	0.838	0.341	949	474	0.593
10	25	1.387	0.719	1.029	0.415	1108	522	0.653
10	30	1.279	0.764	0.952	0.445	1237	541	0.677
10	45	1.085	0.869	0.778	0.512	1552	583	0.729
10	60	1.345	0.949	0.96	0.554	1726	610	0.762
10	90	1.209	0.928	0.832	0.541	1967	601	0.751
10	120	1.039	0.839	0.719	0.49	2095	570	0.712
20	5	0.812	0.184	0.686	0.098	384	219	0.274
20	10	1.052	0.429	0.776	0.223	698	366	0.457
20	15	1.298	0.649	0.977	0.342	948	475	0.594
20	20	1.437	0.828	0.995	0.458	1145	549	0.686
20	25	1.692	0.918	1.202	0.524	1309	591	0.738
20	30	1.577	0.949	1.12	0.546	1444	604	0.756
20	45	1.351	1.03	0.924	0.603	1778	641	0.801
20	60	1.588	1.123	1.095	0.653	1953	669	0.836
20	90	1.371	1.079	0.92	0.626	2197	654	0.817
20	120	1.195	0.982	0.817	0.57	2325	620	0.775
50	5	1.392	0.421	1.068	0.206	669	349	0.436
50	10	1.68	0.789	1.175	0.417	1062	523	0.654
50	15	1.895	1.119	1.35	0.607	1376	643	0.803
50	20	2.051	1.33	1.37	0.748	1628	724	0.906
50	25	2.212	1.385	1.514	0.802	1831	750	0.944
50	30	2.104	1.394	1.438	0.809	2007	760	0.95
50	45	1.884	1.48	1.244	0.865	2437	792	0.99
50	60	2.117	1.556	1.412	0.91	2661	822	1.014
50	90	1.694	1.429	1.104	0.833	2971	774	0.967
50	120	1.468	1.276	0.971	0.746	3120	723	0.904
100	5	1.764	0.591	1.304	0.287	845	427	0.534
100	10	2.042	1.052	1.396	0.556	1284	611	0.764
100	15	2.288	1.416	1.595	0.773	1632	738	0.923
100	20	2.422	1.623	1.593	0.913	1913	825	1.016
100	25	2.61	1.668	1.759	0.953	2142	854	1.034
100	30	2.49	1.647	1.674	0.954	2340	855	1.034
100	45	2.211	1.72	1.439	0.997	2815	886	1.054
100	60	2.454	1.801	1.618	1.048	3066	923	1.077
100	90	1.938	1.647	1.252	0.952	3413	853	1.033
100	120	1.687	1.476	1.104	0.865	3574	792	0.99

Job No. VJ0112
 Client Wallangarra Pastoral Co.
 Project Redbank Creek Rd, Adare
 Date 2/02/2010
 Description: WBNM Model results Catchment 5

CATCHMENT 5

ARI (years)	RATIONAL METHOD DEVELOPED	RATIONAL METHOD PREDEVELOPE D	WBNM UNATTENUATED DEVELOPED CASE PEAK FLOW (m ³ /s)	WBNM ATTENUATED DEVELOPED CASE PEAK FLOW (m ³ /s)
	PEAK FLOW (m ³ /s)	PEAK FLOW (m ³ /s)		
1	1.166	0.809	1.171	0.799
2	1.604	1.114	1.652	1.088
5	2.294	1.594	2.329	1.569
10	2.749	1.910	2.790	1.674
20	3.363	2.337	3.407	1.988
50	4.403	3.061	4.447	2.708
100	5.194	3.611	6.033	3.600

**Detention Basin
 OUTLET Strc on: Catchment 5**

Inflow Peak (m3/s)	Outflow Peak (m3/s)	Inflow Volume (m3)	Max Vol. Stored (m3)	Max Water Elevation (m)
0.943	0.385	2091	773	0.387
1.276	0.498	2679	986	0.493
1.649	0.681	3316	1314	0.657
1.899	0.714	3621	1374	0.687
2.211	0.824	4095	1576	0.788
2.761	1.105	5501	2092	1.046
3.647	1.451	7151	2726	1.363

OUTLET Strc on: Catchment 5

ARI (years)	STORM DURATION (mins)	WBNM UNATTENUATED DEVELOPED CASE PEAK FLOW (m ³ /s)	WBNM ATTENUATED DEVELOPED CASE PEAK FLOW (m ³ /s)	Inflow Peak (m3/s)	Outflow Peak (m3/s)	Inflow Volume (m3)	Max Vol. Stored (m3)	Max Water Elevation (m)
1	5	0.646	0.064	0.646	0.064	251	205	0.102
1	10	0.571	0.098	0.571	0.098	389	313	0.156
1	15	0.742	0.225	0.738	0.143	621	425	0.212
1	20	0.916	0.383	0.76	0.208	820	518	0.259
1	25	1.122	0.5	0.943	0.255	982	586	0.293
1	30	1.007	0.575	0.861	0.286	1115	630	0.315
1	45	0.95	0.738	0.687	0.357	1449	732	0.366
1	60	1.123	0.787	0.876	0.382	1642	769	0.384
1	90	1.171	0.799	0.78	0.385	1922	773	0.387
1	120	0.984	0.741	0.651	0.362	2091	740	0.37
2	5	0.787	0.079	0.787	0.079	307	251	0.125
2	10	0.841	0.194	0.763	0.131	576	408	0.204
2	15	1.094	0.438	0.988	0.232	877	554	0.277
2	20	1.371	0.65	1.038	0.315	1123	672	0.336
2	25	1.652	0.788	1.276	0.375	1325	758	0.379
2	30	1.502	0.863	1.173	0.409	1489	809	0.405
2	45	1.345	1.02	0.946	0.471	1896	934	0.467
2	60	1.64	1.088	1.185	0.498	2133	986	0.493
2	90	1.611	1.083	1.037	0.498	2474	985	0.493
2	120	1.364	1.008	0.89	0.471	2679	932	0.466
5	5	0.95	0.117	0.921	0.093	394	297	0.148
5	10	1.335	0.448	1.041	0.217	846	531	0.266
5	15	1.661	0.763	1.317	0.341	1195	710	0.355
5	20	1.962	1	1.352	0.43	1474	851	0.426
5	25	2.329	1.118	1.649	0.484	1708	959	0.48
5	30	2.151	1.181	1.529	0.518	1899	1022	0.511
5	45	1.837	1.335	1.245	0.595	2370	1159	0.579
5	60	2.254	1.432	1.509	0.628	2634	1217	0.608
5	90	2.295	1.569	1.422	0.681	3316	1314	0.657
5	120	1.783	1.296	1.132	0.58	3235	1131	0.566
10	5	1.238	0.223	1.097	0.114	542	365	0.183
10	10	1.688	0.639	1.233	0.281	1030	623	0.311
10	15	2.076	1.002	1.551	0.415	1414	823	0.411
10	20	2.369	1.223	1.566	0.497	1715	985	0.492

10	25	2.79	1.346	1.899	0.564	1971	1104	0.552
10	30	2.593	1.414	1.768	0.602	2180	1170	0.585
10	45	2.232	1.563	1.449	0.682	2698	1316	0.658
10	60	2.658	1.674	1.721	0.714	2980	1374	0.687
10	90	2.356	1.625	1.447	0.697	3387	1343	0.672
10	120	2.064	1.505	1.288	0.655	3621	1267	0.633
20	5	1.749	0.444	1.377	0.18	772	478	0.239
20	10	2.205	0.946	1.494	0.375	1296	758	0.379
20	15	2.67	1.341	1.86	0.499	1713	987	0.494
20	20	2.939	1.554	1.842	0.601	2046	1169	0.584
20	25	3.407	1.686	2.211	0.671	2320	1296	0.648
20	30	3.187	1.728	2.067	0.709	2549	1365	0.682
20	45	2.756	1.852	1.699	0.79	3116	1514	0.757
20	60	3.188	1.988	1.978	0.824	3422	1576	0.788
20	90	2.739	1.911	1.626	0.795	3857	1523	0.762
20	120	2.397	1.765	1.463	0.746	4095	1434	0.717
50	5	2.816	0.911	2.028	0.336	1202	703	0.352
50	10	3.409	1.606	2.186	0.555	1876	1087	0.544
50	15	3.814	2.056	2.504	0.723	2414	1391	0.695
50	20	4.154	2.304	2.495	0.851	2848	1626	0.813
50	25	4.447	2.391	2.761	0.934	3201	1778	0.889
50	30	4.238	2.435	2.626	0.982	3504	1867	0.933
50	45	3.822	2.586	2.254	1.079	4247	2044	1.022
50	60	4.264	2.708	2.538	1.105	4644	2092	1.046
50	90	3.441	2.499	1.96	1.034	5208	1961	0.98
50	120	2.988	2.261	1.738	0.948	5501	1803	0.902
100	5	4.012	1.437	2.766	0.483	1654	957	0.478
100	10	4.719	2.325	2.926	0.762	2515	1464	0.732
100	15	5.259	2.869	3.344	0.976	3199	1856	0.928
100	20	5.628	3.175	3.291	1.141	3751	2157	1.079
100	25	6.033	3.259	3.647	1.246	4208	2349	1.175
100	30	5.758	3.283	3.473	1.303	4598	2455	1.228
100	45	5.159	3.463	2.967	1.418	5546	2666	1.333
100	60	5.703	3.6	3.32	1.451	6056	2726	1.363
100	90	4.545	3.324	2.542	1.348	6781	2538	1.269
100	120	3.95	2.99	2.256	1.234	7151	2328	1.164

Job No. VJ0112
 Client Wallangarra Pastoral Co.
 Project Redbank Creek Rd, Adare
 Date 2/02/2010
 Description: WBNM Model results Catchment B per Lot Attenuation

Catchment B

ARI (years)	RATIONAL METHOD DEVELOPED PEAK FLOW (m ³ /s)	RATIONAL METHOD PREDEVELOPE D PEAK FLOW (m ³ /s)	WBNM UNATTENUATED DEVELOPED CASE PEAK FLOW (m ³ /s)	WBNM ATTENUATED DEVELOPED CASE PEAK FLOW (m ³ /s)	Inflow Peak (m ³ /s)	Outflow Peak (m ³ /s)	Inflow Volume (m ³)	Max Vol. Stored (m ³)	Max Water Elevation (m)
	1	0.023	0.019	0.024	0.019	0.013	0.007	17	4
2	0.031	0.026	0.034	0.026	0.015	0.007	19	5	0.397
5	0.044	0.038	0.044	0.036	0.016	0.008	22	6	0.461
10	0.053	0.045	0.053	0.043	0.018	0.009	25	7	0.530
20	0.065	0.055	0.066	0.054	0.022	0.010	29	8	0.651
50	0.085	0.072	0.085	0.069	0.029	0.012	41	11	0.890
100	0.100	0.085	0.103	0.084	0.035	0.014	49	14	1.111

'Leaky tank'
 OUTLET Strc on: Individual Lot Attenuation

OUTLET Strc on: Individual Lot Attenuation

ARI (years)	STORM DURATION (mins)	WBNM UNATTENUATED DEVELOPED CASE PEAK FLOW (m ³ /s)	WBNM ATTENUATED DEVELOPED CASE PEAK FLOW (m ³ /s)	Inflow Peak (m ³ /s)	Outflow Peak (m ³ /s)	Inflow Volume (m ³)	Max Vol. Stored (m ³)	Max Water Elevation (m)
		1	5	0.015	0.008	0.012	0.005	4
1	10	0.013	0.007	0.011	0.006	6	3	0.265
1	15	0.015	0.01	0.012	0.006	7	3	0.298
1	20	0.017	0.014	0.012	0.006	8	4	0.328
1	25	0.023	0.017	0.013	0.007	10	4	0.344
1	30	0.02	0.015	0.012	0.006	10	4	0.328
1	45	0.015	0.016	0.01	0.006	13	4	0.304
1	60	0.024	0.019	0.011	0.006	14	4	0.312
1	90	0.023	0.019	0.009	0.006	16	3	0.26
1	120	0.017	0.016	0.008	0.005	17	3	0.242
2	5	0.018	0.008	0.014	0.005	4	3	0.242
2	10	0.016	0.008	0.012	0.006	6	4	0.303
2	15	0.02	0.014	0.014	0.007	8	4	0.342
2	20	0.025	0.021	0.014	0.007	10	5	0.379
2	25	0.034	0.024	0.015	0.007	11	5	0.397
2	30	0.03	0.022	0.013	0.007	12	5	0.378
2	45	0.023	0.019	0.012	0.007	15	4	0.353
2	60	0.031	0.026	0.012	0.007	16	4	0.365
2	90	0.029	0.024	0.01	0.006	18	4	0.304
2	120	0.025	0.02	0.01	0.006	19	3	0.278
5	5	0.02	0.009	0.016	0.006	5	3	0.267
5	10	0.024	0.02	0.014	0.007	7	4	0.34
5	15	0.033	0.024	0.016	0.007	9	5	0.384
5	20	0.033	0.029	0.016	0.008	11	5	0.435
5	25	0.044	0.036	0.016	0.008	12	6	0.461
5	30	0.041	0.033	0.015	0.008	14	5	0.436
5	45	0.03	0.027	0.014	0.007	16	5	0.402
5	60	0.04	0.034	0.014	0.008	18	5	0.421
5	90	0.033	0.028	0.011	0.007	20	4	0.35
5	120	0.03	0.026	0.011	0.006	22	4	0.317
10	5	0.027	0.015	0.018	0.006	5	3	0.295
10	10	0.032	0.027	0.016	0.007	8	5	0.38
10	15	0.044	0.033	0.018	0.008	10	5	0.437
10	20	0.04	0.035	0.018	0.008	12	6	0.501

10	25	0.053	0.043	0.018	0.009	14	7	0.53
10	30	0.049	0.04	0.017	0.008	15	6	0.502
10	45	0.037	0.033	0.015	0.008	18	6	0.465
10	60	0.047	0.039	0.016	0.008	20	6	0.49
10	90	0.038	0.032	0.013	0.007	23	5	0.399
10	120	0.035	0.029	0.012	0.007	25	4	0.361
20	5	0.048	0.033	0.021	0.007	6	4	0.343
20	10	0.044	0.037	0.018	0.008	10	6	0.46
20	15	0.06	0.047	0.021	0.009	12	7	0.537
20	20	0.058	0.044	0.021	0.009	15	8	0.616
20	25	0.066	0.054	0.022	0.01	16	8	0.651
20	30	0.062	0.051	0.02	0.009	18	8	0.618
20	45	0.052	0.041	0.018	0.009	22	7	0.577
20	60	0.057	0.047	0.019	0.009	24	8	0.612
20	90	0.045	0.038	0.015	0.008	27	6	0.511
20	120	0.042	0.035	0.014	0.008	29	6	0.448
50	5	0.079	0.057	0.029	0.008	9	6	0.482
50	10	0.068	0.056	0.024	0.01	14	9	0.681
50	15	0.084	0.066	0.027	0.011	17	10	0.79
50	20	0.081	0.063	0.027	0.012	20	11	0.883
50	25	0.085	0.069	0.027	0.012	23	11	0.89
50	30	0.08	0.066	0.025	0.012	25	11	0.855
50	45	0.072	0.057	0.023	0.011	30	10	0.83
50	60	0.075	0.062	0.024	0.012	33	11	0.878
50	90	0.056	0.047	0.018	0.011	38	9	0.736
50	120	0.051	0.043	0.017	0.01	41	8	0.63
100	5	0.1	0.074	0.035	0.009	11	7	0.596
100	10	0.083	0.069	0.029	0.012	16	11	0.846
100	15	0.103	0.081	0.033	0.013	21	12	0.987
100	20	0.1	0.078	0.033	0.014	25	14	1.1
100	25	0.103	0.084	0.032	0.014	28	14	1.111
100	30	0.097	0.08	0.03	0.014	30	13	1.069
100	45	0.088	0.07	0.028	0.013	37	13	1.051
100	60	0.091	0.075	0.029	0.014	40	14	1.109
100	90	0.068	0.057	0.022	0.012	46	12	0.947
100	120	0.062	0.052	0.02	0.011	49	10	0.816

9) Attachment 1

9.1 Stormwater Management Plan

Stormwater Management Plan
63 Redbank Creek Road,
Adare, Queensland

Prepared for:
Wallangarra Pastoral Company

February, 2010

Document control

Document:	VJ0112-1_SWMP_RKS1F.doc	Gilbert & Sutherland P/L ABN 56 077 310 840 Originating Office: Brisbane Cathedral Village 20/115 Wickham Street PO Box 694 Fortitude Valley Q4006 Telephone 07 3852 3999 Facsimile 07 3852 3933 gsbne@groupgs.com Also at Kawana and Robina
Title:	Stormwater Management Plan 63 Redbank Creek Road Adare, Queensland	
Project Manager:	Chris Anderson	
Author:	Kate Smith	
Client:	Wallangarra Pastoral Company	
Client Contact:	C/- Kris Krpan, Urbis Pty Ltd	
Client Reference:		
Synopsis:	This management plan establishes responsibilities and procedures for the management of stormwater during the construction and operational phases of the proposed development at 63 Redbank Creek Road, Adare, Queensland.	

Revision History

Revision #	Date	Edition By		Approved By	
1	02.02.10	K. Smith		C. Anderson	L. Varcoe

Distribution

Distribution	Revision Number									
	1	2	3	4	5	6	7	8	9	10
Wallangarra Pastoral Company c/- Urbis Pty Ltd	5									
G&S Library and File	2									

Summary

Urbis Pty Ltd, on behalf of Wallangarra Pastoral Company, commissioned Gilbert & Sutherland Pty Ltd (G&S) to prepare a Stormwater Assessment and Management Plan (SWMP) for a proposed residential development on Rebank Creek Road, Adare, Queensland.

The investigation for the Stormwater Assessment involved MUSIC computer modelling of the pollutant loads from the site. Results of the MUSIC modelling indicate that a treatment train consisting of the following measures would be suitable for stormwater treatment at the site;

- bioretention basins
- swales
- rainwater tanks
- vegetative filters.

This document constitutes the Stormwater Management Plan for the development and provides procedures to ensure that surface water quality during the construction, on-maintenance and operational phases of the works is in accordance with projections.

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1) Stormwater management plan

1.1 Objectives and implementation

1.1.1 Objectives

The principal objective of this SWMP is to provide mitigation measures to minimise the potential impacts on stormwater quality and related environmental impacts as a result of the development.

Additionally, the SWMP provides information on specific site management issues relating to potential environmental impacts from the development during the construction and operational phases.

The control measures detailed in this SWMP have been developed to minimise impacts on the environment and achieve the following objectives:

- appropriate stewardship of natural resources
- protection of downstream flora and fauna habitats
- confirmation of the success of impact control measures by the means of monitoring during the construction of the proposed development
- compliance with statutory requirements
- preservation of the existing groundwater conditions.

1.1.2 Implementation

The management plan requires the Proponent to mitigate the potential environmental impacts associated with the construction and operational phases of the proposed residential development.

It is intended that the SWMP will provide a set of performance criteria and guiding principles with which the engineering designs for the development will comply.

1.2 SWMP structure

This SWMP acknowledges the environmental impacts associated with the development and details strategies to mitigate them.

Each control strategy is based upon proven environmental management methods and is presented as a commitment.

The SWMP is based on a series of tables. The person responsible for the implementation of the measures detailed is written on the table itself. The tables then detail the issue, the performance criteria, the implementation strategy, monitoring, auditing, reporting, failure identification and the corrective action.

The detachable pages within each section detail the provisions of the SWMP. The format is presented below for reference purposes.

#Table 1

Person responsible	This is the person who has accepted the responsibility of implementing the SWMP provisions detailed on this page
Issue	The issue with which the table deals.
Operational policy	The operational policy or management objective that applies to the element.
Performance criteria	Performance criteria (outcomes) for each element of the operation.
Implementation strategy	The strategies or tasks (to nominated operational design standards) that will be implemented to achieve the performance criteria
Monitoring	The monitoring requirements which will measure actual performance (i.e. specified limits to pre-selected indicators of change).
Auditing	The auditing requirements, which will verify implementation of, agreed construction and operation phase environmental management strategies and compliance with agreed performance criteria.
Reporting	Content, timing and responsibility for reporting and auditing of monitoring results.
Identification of incident or failure	The circumstances under which the agreed performance criteria are unlikely to be met and environmental harm is likely to result.
Corrective action	The action to be implemented in case a performance requirement is not reached and the company(s) responsible for action.

Commitment #

A promise made by management.

An objective of the tabular format is to allow for change and allow the management plan to be a working document. If items need altering, changes may be made (after the appropriate consultation with the statutory authorities) to the individual tables.

1.3 General commitments

Commitment 1

The Proponents undertake to comply with the environmental implementation strategy as contained within the approved Stormwater Management Plan (SWMP).

Commitment 2

The Proponents undertake to fulfil all commitments made in this SWMP and to carry out their activities on the project site in accordance with relevant current statutory requirements and approved amendments.

1.4 Definitions

In this SWMP the terms have the following meanings:

SWMP means the approved Stormwater Management Plan and includes any amendments that may be approved from time to time.

Development means the proposed development at 63 Redbank Creek Road, Adare.

LVRC means Lockyer Valley Regional Council.

Proponent means the person undertaking the development of the land and includes the person nominated by the Proponent as having the responsibility for implementing the provisions of the SWMP.

EPA means Queensland Environment Protection Agency.

1.5 Contact details

The following persons are responsible for the implementation of the management measures described in the individual tables of the SWMP.

Contractor's Site Manager

The name and address of the Contractor and its representative will be notified to LVRC by the Consulting Engineer prior to the commencement of the project.

Consulting Engineer

Unless advised otherwise the Consulting Engineer is:

Company: TBA

Address:

Contact Details:

Phone:

Facsimile:

Environmental Consultant

Unless advised otherwise the Environmental Consultant is:

Company Gilbert & Sutherland Pty Ltd

Address: Eastside
5/232 Robina Town Centre Drive
Robina Q4230

Contact Details: Mr Neil Sutherland

Phone: 07 5578 9944

Facsimile: 07 5578 9945

2) Management of potential impacts –construction phase

The SWMP requires the Proponent to mitigate the potential environmental impacts associated with the construction works.

Erosion and sediment control measures must be installed in disturbed areas during the building construction phase in accordance with the requirements of Lockyer Valley Regional Council. These measures should be maintained until landscaping has been completed and becomes established.

Nutrient transport from the site during the construction phase should be minimised by implementation of appropriate control measures.

The following detachable pages detail the provisions of this SWMP for the construction phase.

2.1 Construction phase dust management

Person responsible	Contractor's Site Manager
Issue	Minimisation of dust movement off site.
Operational policy	To achieve acceptable air quality standards through the control of movement of dust off site from site works.
Performance criteria	The target level for complaints by nearby residents is no more than one in any seven day period. Ambient air quality should not deteriorate by more than 30% over a period of seven consecutive days. Dust deposition at any nearby residence should not exceed 100mg/m ² /day.
Implementation strategy	The minimisation of the movement of dust offsite will be achieved through the following onsite practices: <ul style="list-style-type: none"> • All dust creating activities to cease if wind speed exceeds 10m/sec. • Contractors' staff to be trained to implement dust minimisation measures.
Monitoring	Daily inspections will be carried out to verify that dust mitigation measures are being implemented. Dust monitoring will be conducted upon receipt of repeated complaints by residents. If dust monitoring is to take place, the following will occur: <ul style="list-style-type: none"> • Temporary dust deposition gauges will monitor the movement of dust offsite at the nearest residences adjacent to the proposed development site and within the predominant wind directions. • Monitoring will be undertaken in accordance with AS 3580.10.1(2003).
Auditing	Management to examine the complaints register weekly and review corrective action taken.
Reporting	The contractor to notify EPA of a possible environmental nuisance on receipt of 3 or more dust complaints in any 24 hour period. Complaints by residents are to be recorded in a Complaints Register and notified to LVRC.
Identification of incident or failure	Any dust-related complaints by residents will indicate a failure of the dust control measures.
Corrective action	Locate the source of the dust and implement the following measures: <ul style="list-style-type: none"> • Apply water sprays to vegetation • Cover or water exposed areas • If dust persists, cease the dust creating activities. All dust complaints to be addressed in consultation with council officers.

Commitment 3

Dust generated during the construction works will be managed to ensure that dust movement offsite is controlled.

2.2 Construction phase sediment and erosion controls

Person responsible	Contractor's Site Manager, Consulting Engineer
Issue	Sediment and Erosion Controls.
Operational policy	To prevent the displacement of sediment and soil across and offsite.
Performance criteria	Offsite discharges to comply with requirements for suspended sediments as detailed in Section 2.3 of the SWMP. No visual indication of erosion on areas under construction, including evidence of rilling (an indicator of sheet erosion).
Implementation strategy	<ul style="list-style-type: none"> Erosion and sediment control devices shall be installed prior to commencement of work in accordance with the approved plans and to the reasonable satisfaction of LVRC. Temporary erosion measures (eg. silt fences) are to be employed onsite during construction where reasonably deemed necessary by LVRC. Such measures should be in accordance with the recommendations in the <i>Best Practice Erosion & Sediment Control Guidelines</i>, International Erosion and Sediment Control Guidelines, November 2008. Stockpiled soil should be stored/bunded in a manner to prevent soil being washed offsite (i.e. bunding where necessary.) Outside the construction area existing surface water conditions should be maintained wherever possible.
Monitoring	Carry out visual inspections daily and after rainfall events (>25mm in 24hrs) to ensure that erosion measures are in place and operational to suit the activities taking place at the time.
Auditing	Visual inspections to be carried out monthly and after rainfall events to verify that control measures are in place and properly maintained.
Reporting	Reporting only required if insufficient sediment and erosion measures are identified.
Identification of incident or failure	Signs of erosion on site. Damaged or failed erosion control devices. Falling water quality as identified by the Contractor. Build-up of sediment.
Corrective action	Apply remedial measures to improve sediment and erosion measures, for example: silt fences, shake down areas.

Commitment 4

Best management practices will be implemented into work practices throughout the construction works to minimise erosion and sediment transport offsite.

2.3 Construction phase surface water monitoring

Person responsible	Contractor's Site Manager, Environmental Consultant															
Issue	Surface water controls on site.															
Operational policy	To maintain water quality conditions of runoff during construction phase.															
Performance criteria	All controlled discharges of water from the site during the construction phase should comply with the following criteria: <table border="1" data-bbox="464 580 1315 777"> <thead> <tr> <th>Water Quality Parameter</th> <th>Release Criteria</th> <th>Criteria Type</th> </tr> </thead> <tbody> <tr> <td>pH</td> <td>6.5 – 9.0</td> <td>Range</td> </tr> <tr> <td>Dissolved oxygen</td> <td>>6.0mg/L</td> <td>Minimum</td> </tr> <tr> <td>Turbidity</td> <td><50NTU</td> <td>Maximum</td> </tr> <tr> <td>Suspended Solids</td> <td><50mg/L</td> <td>Maximum</td> </tr> </tbody> </table>	Water Quality Parameter	Release Criteria	Criteria Type	pH	6.5 – 9.0	Range	Dissolved oxygen	>6.0mg/L	Minimum	Turbidity	<50NTU	Maximum	Suspended Solids	<50mg/L	Maximum
Water Quality Parameter	Release Criteria	Criteria Type														
pH	6.5 – 9.0	Range														
Dissolved oxygen	>6.0mg/L	Minimum														
Turbidity	<50NTU	Maximum														
Suspended Solids	<50mg/L	Maximum														
Implementation strategy	<ul style="list-style-type: none"> Stormwater control should be achieved by directing as much runoff as practicable from disturbed areas to temporary control measures. 'Clean' runoff from undisturbed areas should be diverted around disturbed areas if possible. All samples must be analysed at a NATA registered laboratory for the indicators listed in 'Monitoring' below. 															
Monitoring	<p>Surface water monitoring to occur if water discharged offsite (i.e. rainfall event >25mm in 24 hours or during controlled discharge). Flow rates are to be estimated and recorded at the time of sampling.</p> <p>Samples collected for suspended solids analysis should be analysed at a NATA registered laboratory.</p>															
Auditing	The Consulting Engineer to audit water quality results to ensure all discharges comply with the performance criteria above.															
Reporting	Result sheets to be compiled for monitoring results. All results to be kept on site for inspection by local and state government officers at all times.															
Identification of incident or failure	<ul style="list-style-type: none"> Degradation of surface water quality (i.e. Suspended Solids) at the monitoring points to below the levels specified in 'Performance Criteria' above prior to discharge. Visible changes in water body conditions. 															
Corrective action	<ul style="list-style-type: none"> If pH is detected outside the criteria range (6.5 to 9.0) then waters should be contained and the pH adjusted to within the range prior to release. If total suspended solids exceed the water quality criteria for this parameter, then water must be contained on site for a period sufficient to allow suspended solids to settle out prior to release, or settling should be aided by dosing with flocculation agents at the rate recommended by the manufacturer (for example Gypsum at dose rate of 30kg/100m³). Immediate inspection and cleaning (if necessary) of erosion controls. Additional erosion control devices should be installed if a need is detected to prevent future breaches of the suspended solids criteria. The placement of stockpiles and management of disturbed areas should be reviewed with regard to sediment and silt control. 															

Commitment 5

The Proponent will ensure that all waters discharged from the site meet the performance criteria set out above.

2.4 Construction phase contractor management

Person responsible	Consulting Engineer
Issue	Contractor management.
Operational policy	To ensure the proponent's duty of care is met by ensuring the Contractor is aware of his responsibilities under the terms of the SWMP and the EPA.
Performance criteria	Contractor is fully aware of their responsibilities under the terms of the SWMP.
Implementation strategy	Review of the SWMP and the construction phase contracts by the proponent. Periodic checks to be made by an independent Environmental Consultant. Training for construction staff in implementation of SWMP provisions.
Monitoring	Weekly site inspections to be carried out.
Auditing	Inspections will be carried out monthly during the construction phase by the Consulting Engineer.
Reporting	Full details to be available to the contractor together with suggested corrective actions if required.
Corrective action	To be detailed at the time.

Commitment 6

A proactive program of contractor management will be implemented.

3) Management of potential impacts – on maintenance phase

3.1 Intent

This part of the SWMP specifies those matters which must be complied with by the Proponent during the 'on-maintenance period', being the period after construction but before Lockyer Valley Regional Council assumes responsibility for the works. The Proponents' obligations in this Section of the SWMP conclude at the end of the maintenance period as agreed upon with Council.

It also details how the development design will contribute to stormwater treatment and water quality maintenance during the operational phase (or life) of the development.

3.2 On maintenance phase sediment and erosion controls

Person responsible	Proponent
Issue	Sediment and erosion controls.
Operational policy	To prevent the displacement of sediment and soil across and off site.
Performance criteria	There should be no evidence of erosion on site or movement of sediment offsite during or following rainfall events.
Implementation strategy	Temporary erosion and sediment control devices shall be maintained in an operational state during the maintenance period until the disturbed areas have been revegetated or otherwise stabilised.
Monitoring	Temporary erosion control measures are to be inspected monthly and after rainfall events. Permanent control measures including swales and vegetated filters are to be inspected monthly and after rainfall events.
Auditing	Quarterly inspections to be carried out by an independent Consultant.
Reporting	Reporting only required in the event of failure of the sediment and erosion control measures.
Identification of incident or failure	<ul style="list-style-type: none"> • Signs of erosion on site • Build up of sediment • Falling water quality
Corrective action	Repair temporary sediment and erosion control measures. Check permanent measures for build up of sediment and clean out as necessary.

Commitment 7

Erosion and sediment control devices will be maintained during the on-maintenance period until the risk of soil erosion and sediment transport is considered negligible.

3.3 On maintenance phase surface water quality monitoring

Person responsible	Proponent																
Issue	Surface water monitoring																
Operational policy	To ensure that any water discharged from the permanent treatment measures is compliant with the specified water quality objectives.																
Performance criteria	<p>The median of all discharges from the permanent treatment measures (local bioretention basins) must comply with the following water quality objectives.</p> <table border="1"> <thead> <tr> <th>Water Quality Parameter</th> <th>Water Quality Objective</th> </tr> </thead> <tbody> <tr> <td>pH</td> <td>6.5 to 9.0</td> </tr> <tr> <td>Dissolved oxygen</td> <td>>6.0mg/L</td> </tr> <tr> <td>Total phosphorous</td> <td><1.0mg/L</td> </tr> <tr> <td>Total nitrogen</td> <td><0.75mg/L</td> </tr> <tr> <td>Suspended solids</td> <td><50mg/L</td> </tr> <tr> <td>Litter and gross pollutants</td> <td>No anthropogenic (man-made) material >5mm in any dimension</td> </tr> <tr> <td>Oil and grease</td> <td>No visible films or odour</td> </tr> </tbody> </table>	Water Quality Parameter	Water Quality Objective	pH	6.5 to 9.0	Dissolved oxygen	>6.0mg/L	Total phosphorous	<1.0mg/L	Total nitrogen	<0.75mg/L	Suspended solids	<50mg/L	Litter and gross pollutants	No anthropogenic (man-made) material >5mm in any dimension	Oil and grease	No visible films or odour
Water Quality Parameter	Water Quality Objective																
pH	6.5 to 9.0																
Dissolved oxygen	>6.0mg/L																
Total phosphorous	<1.0mg/L																
Total nitrogen	<0.75mg/L																
Suspended solids	<50mg/L																
Litter and gross pollutants	No anthropogenic (man-made) material >5mm in any dimension																
Oil and grease	No visible films or odour																
Implementation strategy	Routine surface water quality monitoring to be undertaken.																
Monitoring	<ul style="list-style-type: none"> • Surface water quality monitoring to be conducted at the inlet and outlet of each local treatment device/train for the parameters outlined above. • Water quality monitoring to be conducted following the first monthly rainfall event of greater than 25mm in a 24 hour period. • Sample recovery and in-situ analysis will be performed in accordance with the <i>Australian Guidelines for Water Quality Monitoring and Reporting – Summary, October 2000</i> (Australian and New Zealand Environment and Conservation Council, Agriculture and Resource Management Council of Australia and New Zealand). • When required, laboratory testing will be performed by an independent laboratory holding current NATA accreditation. 																
Auditing	Management to carry out quarterly inspections to verify that water quality monitoring is to being undertaken and any recommendations for maintenance implemented																
Reporting	Monthly reports to be submitted to LVRC.																
Identification of incident or failure	<ul style="list-style-type: none"> • Exceedence of the water quality objectives. • Failure to implement the recommendations given to improve water quality. 																
Corrective action	<ul style="list-style-type: none"> • Improve/maintain permanent and temporary erosion and sediment controls. • Install additional control methods. • Implement recommendations given in water quality reports. 																

Commitment 8

The Proponent will ensure routine monitoring is carried out to ensure water quality is in accordance with the water quality objectives.

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3.4 On maintenance phase maintenance of bioretention basins

Person responsible	Proponent
Issue	Maintenance of bioretention basins.
Operational policy	To maintain the water quality control structures (bioretention basins) to ensure adequate performance during the maintenance period.
Performance criteria	Bioretention basins must be maintained and operational.
Implementation strategy	<ul style="list-style-type: none"> • Ensure inlets and outlets are not blocked. • Ensure that trash and/or sediment accumulation does not impair operation inlet pits or vegetation. • Ensure erosion of batters is minimised. • Remove sediment that is impeding flow direction or smothering the vegetation and reprofile to original design specifications. • Ensure vegetation is maintained at effective operating level
Monitoring	<p>Monthly rainfall event based inspections (>25mm in 24 hours) of bioretention basins during the first 6 months of the maintenance period. Frequency can be reduced after this time upon agreement by LVRC.</p> <p>Water quality monitoring to be conducted in accordance with Table 3.3.</p> <p>Any recurring problems with the control structures to be rectified during the maintenance period including re-profiling or re-vegetating to original specifications if required.</p>
Auditing	Management to carry out quarterly inspections to verify that the control measures are properly maintained.
Reporting of monitoring results	<ul style="list-style-type: none"> • Record inspection details. • Inspection records to be compiled and submitted to LVRC at the cessation of the on maintenance period. • Results to be made available for inspection by local or regional regulatory bodies upon request.
Identification of incident or failure	<ul style="list-style-type: none"> • Blockage of stormwater system. • Re-entrainment of trapped sediments. • Deterioration of water quality within or downstream of control structure. • Death of vegetation.
Corrective action	Clean or maintain stormwater control structure as appropriate. Take necessary steps to address the problem to prevent a recurrence.

Commitment 9

Bioretention basins will be adequately maintained during the maintenance period to ensure continued performance.

3.5 On maintenance phase maintenance of swales

Person responsible	Proponent
Issue	Maintenance of swales.
Operational policy	To maintain the water quality control structures (swales) to ensure adequate performance during the maintenance period.
Performance criteria	Swales must be maintained and operational.
Implementation strategy	<ul style="list-style-type: none"> • Ensure inlets and outlets are not blocked and are structurally stable. • All waste to be disposed of at Council approved waste facilities. • Ensure that sediment accumulation does not impair operation of the swales (particularly during establishment of vegetation). • Ensure that landscaping is growing healthily. • Ensure no scouring or rill erosion. • Ensure no rubbish or litter accumulation. • Remove any weeds. • Ensure swale field inlet pits are structurally sound and free of blockages and debris. • Regular watering/irrigation of vegetation until plants are established and actively growing. • Mowing of grass if required.
Monitoring	<p>Monthly rainfall event based inspections (>25mm in 24 hours) of swales during the first 6 months of the maintenance period. Frequency can be reduced after this time upon agreement by LVRC.</p> <p>Water quality monitoring to be conducted in accordance with Table 3.3.</p> <p>Any recurring problems with the control structures to be rectified during the maintenance period including re-profiling or re-vegetating to original specifications if required.</p>
Auditing	Management to carry out quarterly inspections to verify that the control measures are properly maintained.
Reporting of monitoring results	<ul style="list-style-type: none"> • Record inspection details. • Inspection records to be compiled and submitted to LVRC at the cessation of the on maintenance period. • Results to be made available for inspection by local or regional regulatory bodies upon request.
Identification of incident or failure	<ul style="list-style-type: none"> • Blockage of stormwater system. • Re-entrainment of trapped sediments. • Deterioration of water quality within or downstream of control structure. • Death of vegetation.
Corrective action	Clean or maintain stormwater control structure as appropriate. Take necessary steps to address the problem to prevent a recurrence.

Commitment 10
Swales will be adequately maintained during the maintenance period to ensure continued performance.

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3.6 On maintenance phase maintenance of vegetated filters

Person responsible	Proponent
Issue	Maintenance of vegetated filters
Operational policy	To maintain the water quality control structures (vegetated filters) to ensure adequate performance during the maintenance period.
Performance criteria	Vegetated filters must be maintained and operational.
Implementation strategy	<ul style="list-style-type: none"> • Ensure inlets and outlets are not blocked and are structurally stable. • All waste removed during maintenance works to be disposed of at council approved waste facilities. • Ensure that sediment accumulation does not impair operation of the vegetative filters. • Ensure no scouring or rill erosion. • Ensure no rubbish or litter accumulation. • Remove any weeds. • Replacement of dead vegetation.
Monitoring	<p>Monthly rainfall event based inspections (>25mm in 24 hours) of vegetated filters during the first 6 months of the maintenance period. Frequency can be reduced after this time upon agreement by LVRC. Water quality monitoring to be conducted in accordance with Table 3.3.</p> <p>Any recurring problems with the control structures to be rectified during the maintenance period including re-profiling or re-vegetating to original specifications if required.</p>
Auditing	Management to carry out quarterly inspections to verify that the control measures are properly maintained.
Reporting of monitoring results	<ul style="list-style-type: none"> • Record inspection details. • Inspection records to be compiled and submitted to LVRC at the cessation of the on maintenance period. • Results to be made available for inspection by local or regional regulatory bodies upon request.
Identification of incident or failure	<ul style="list-style-type: none"> • Blockage of stormwater system. • Re-entrainment of trapped sediments. • Deterioration of water quality within or downstream of control structure. • Death of vegetation.
Corrective action	<p>Clean or maintain stormwater control structure as appropriate.</p> <p>Take necessary steps to address the problem to prevent a recurrence.</p>

Commitment 11

Vegetated filters will be adequately maintained during the maintenance period to ensure continued performance.

4) Management of potential impacts – operational phase

4.1 Intent

This part of the SWMP specifies those matters that must be complied with by Lockyer Valley Regional Council after it assumes responsibility for the completed works.

4.2 Implementation

Permanent water quality control devices are to be monitored and maintained as detailed in the following tables.

4.3 Operational phase maintenance of local bioretention basins

Person responsible	Lockyer Valley Regional Council
Issue	Operation and maintenance of the treatment local bioretention basins.
Operational policy	To maintain the water quality control structures to ensure adequate performance during the operational period.
Performance criteria	Local bioretention basins must be maintained and operational.
Implementation strategy	<ul style="list-style-type: none"> • Ensure inlets and outlets are not blocked. • Ensure that trash and/or sediment accumulation does not impair operation inlet pits or vegetation. • Ensure erosion of batters is minimised. • Remove sediment that is impeding flow direction or smothering the vegetation and reprofile to original design specifications. • Ensure vegetation is maintained at effective operating level.
Monitoring	Quarterly rainfall event based (>25mm in 24 hours) inspections of local bioretention basins to ensure they are functioning as designed.
Auditing	LVRC to carry out quarterly inspections to verify that monitoring has been carried out and that action has been implemented as required to correct any shortcomings.
Reporting of monitoring results	NA
Identification of incident or failure	<ul style="list-style-type: none"> • Apparent deterioration of water quality. • Complaints from residents about odours or increased mosquito numbers. • Death of vegetation.
Corrective action	Clean or maintain stormwater control structure as appropriate.

4.4 Operational phase maintenance of individual lot bioretention basins

Person Responsible	Individual lot owner
Issue	Operation and maintenance of the individual lot bioretention basins.
Operational policy	To maintain the water quality control structures to ensure adequate performance during the operational period.
Performance criteria	The individual lot bioretention basins are maintained and operational.
Implementation strategy	<ul style="list-style-type: none"> • Ensure inlets and outlets are not blocked. • Ensure that trash and/or sediment accumulation does not impair operation inlet pits or vegetation. • Ensure erosion of batters is minimised. • Remove sediment that is impeding flow direction or smothering the vegetation and reprofile to original design specifications. • Ensure vegetation is maintained at effective operating level.
Monitoring	Quarterly rainfall event based (>25mm in 24 hours) inspections of individual lot bioretention basins to ensure they are functioning as designed.
Auditing	NA
Reporting of monitoring results	NA
Identification of incident or failure	<ul style="list-style-type: none"> • Apparent deterioration of water quality. • Complaints from residents about odours or increased mosquito numbers. • Death of vegetation.
Corrective action	Clean or maintain stormwater control structure as appropriate.

4.5 Operational phase maintenance of swales

Person responsible	Lockyer Valley Regional Council
Issue	Operation and maintenance of the treatment swales.
Operational policy	To maintain the water quality control structures to ensure adequate performance during the operational period.
Performance criteria	Swales must be maintained and operational.
Implementation strategy	<ul style="list-style-type: none"> • Ensure inlets and outlets are not blocked. • Ensure that sediment accumulation does not impair operation of the swales (particularly during establishment of vegetation). • Ensure that landscaping is growing healthily. • Ensure no scouring or rill erosion. • Ensure no rubbish or litter accumulation. • Removal of any weeds. • Ensure swale field inlet pits are structurally sound and free of blockages and debris. • Regular watering/irrigation of vegetation until plants are established and actively growing. • Mowing of grass if required.
Monitoring	Quarterly rainfall event based (>25mm in 24 hours) inspections of swales to ensure they are functioning as designed.
Auditing	LVRC to carry out quarterly inspections to verify that monitoring has been carried out and that action has been implemented as required to correct any shortcomings.
Reporting of monitoring results	NA
Identification of incident or failure	<ul style="list-style-type: none"> • Apparent deterioration of water quality. • Complaints from residents about odours or increased mosquito numbers. • Death of vegetation.
Corrective action	Clean or maintain stormwater control structure as appropriate.

4.6 Operational phase maintenance of vegetated filters

Person responsible	Lockyer Valley Regional Council
Issue	Maintenance of vegetated filters
Operational policy	To maintain the water quality control structures (vegetated filters) to ensure adequate performance during the operations.
Performance criteria	Vegetated filters must be maintained and operational.
Implementation strategy	<ul style="list-style-type: none"> • Ensure inlets and outlets are not blocked and are structurally stable. • All waste removed during maintenance works to be disposed of at council approved waste facilities. • Ensure that sediment accumulation does not impair operation of the vegetative filters. • Ensure no scouring or rill erosion. • Ensure no rubbish or litter accumulation. • Remove any weeds. • Replacement of dead vegetation.
Monitoring	Quarterly rainfall event based (>25mm in 24 hours) inspections of swales to ensure they are functioning as designed.
Auditing	LVRC to carry out quarterly inspections to verify that monitoring has been carried out and that action has been implemented as required to correct any shortcomings.
Reporting of monitoring results	NA
Identification of incident or failure	<ul style="list-style-type: none"> • Blockage of stormwater system. • Re-entrainment of trapped sediments. • Deterioration of water quality within or downstream of control structure. • Death of vegetation.
Corrective action	<p>Clean or maintain stormwater control structure as appropriate.</p> <p>Take necessary steps to address the problem to prevent a recurrence.</p>

4.7 Operational phase maintenance of rainwater tank

Person Responsible	Tank owner
Issue	Operation and maintenance of the rainwater tank.
Operational policy	To maintain the rainwater tank and ensure adequate performance during the operational period.
Performance criteria	The rainwater tanks are maintained and operational.
Implementation strategy	<ul style="list-style-type: none"> • Ensure inlets and outlets are not blocked or do not impair operation. • Verify that inlet screens are insect proof.
Monitoring	Inspect control structures quarterly and following major rainfall events.
Auditing	NA
Reporting of monitoring results	NA
Identification of incident or failure	Complaints about odours or increased mosquito numbers.
Corrective action	Clean or maintain rainwater tank as appropriate.

5) Administration of the SWMP

5.1 Amendment of the SWMP

The proponent may make application to LVRC to amend the provisions of this SWMP. The application shall:

- a. be in writing
- b. specify the provisions of the SWMP to which the application relates
- c. state how the proposed amendment(s) achieve the objectives of the provisions to which the amendment(s) relate.

LVRC shall approve the amendment(s) where LVRC is satisfied acting reasonably that the proposed amendment(s) achieve the objective of the provisions to which the amendment(s) relates.

5.2 Incident management

The Proponent and any person appointed by the Proponent as having responsibility for a control strategy set out in this SWMP have clearly defined responsibilities under the *Environment Protection Act 1994* to report any incidents likely to cause material or serious environmental harm.

Appendix F – Stormwater Catchment Sketch

TABLE DRAIN CALCULATIONS - LOCATION A
DESIGN STORM AS PER QUDM TABLE 7.3.1

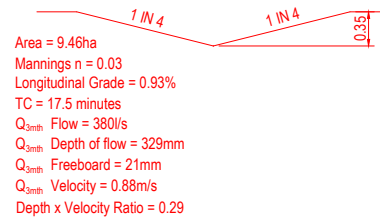


TABLE DRAIN CALCULATIONS - LOCATION B
DESIGN STORM AS PER QUDM TABLE 7.3.1

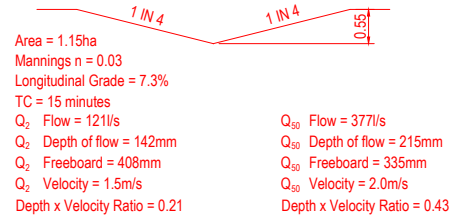


TABLE DRAIN CALCULATIONS - LOCATION C
DESIGN STORM AS PER QUDM TABLE 7.3.1

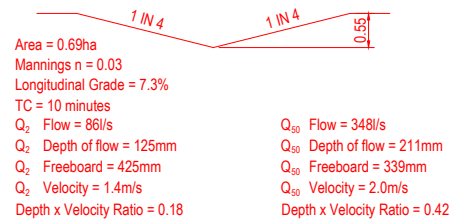


TABLE DRAIN CALCULATIONS - LOCATION D
DESIGN STORM AS PER QUDM TABLE 7.3.1

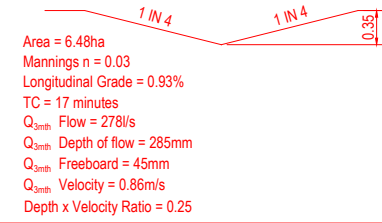


TABLE DRAIN CALCULATIONS - LOCATION F
DESIGN STORM AS PER QUDM TABLE 7.3.1

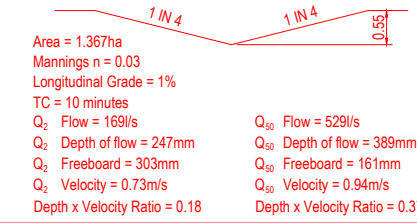


TABLE DRAIN CALCULATIONS - LOCATION E
DESIGN STORM AS PER QUDM TABLE 7.3.1

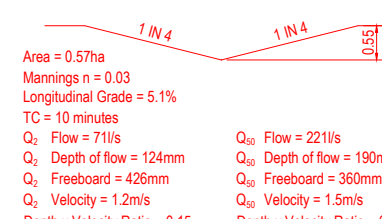
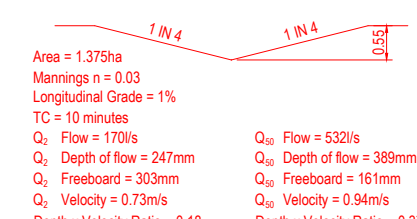


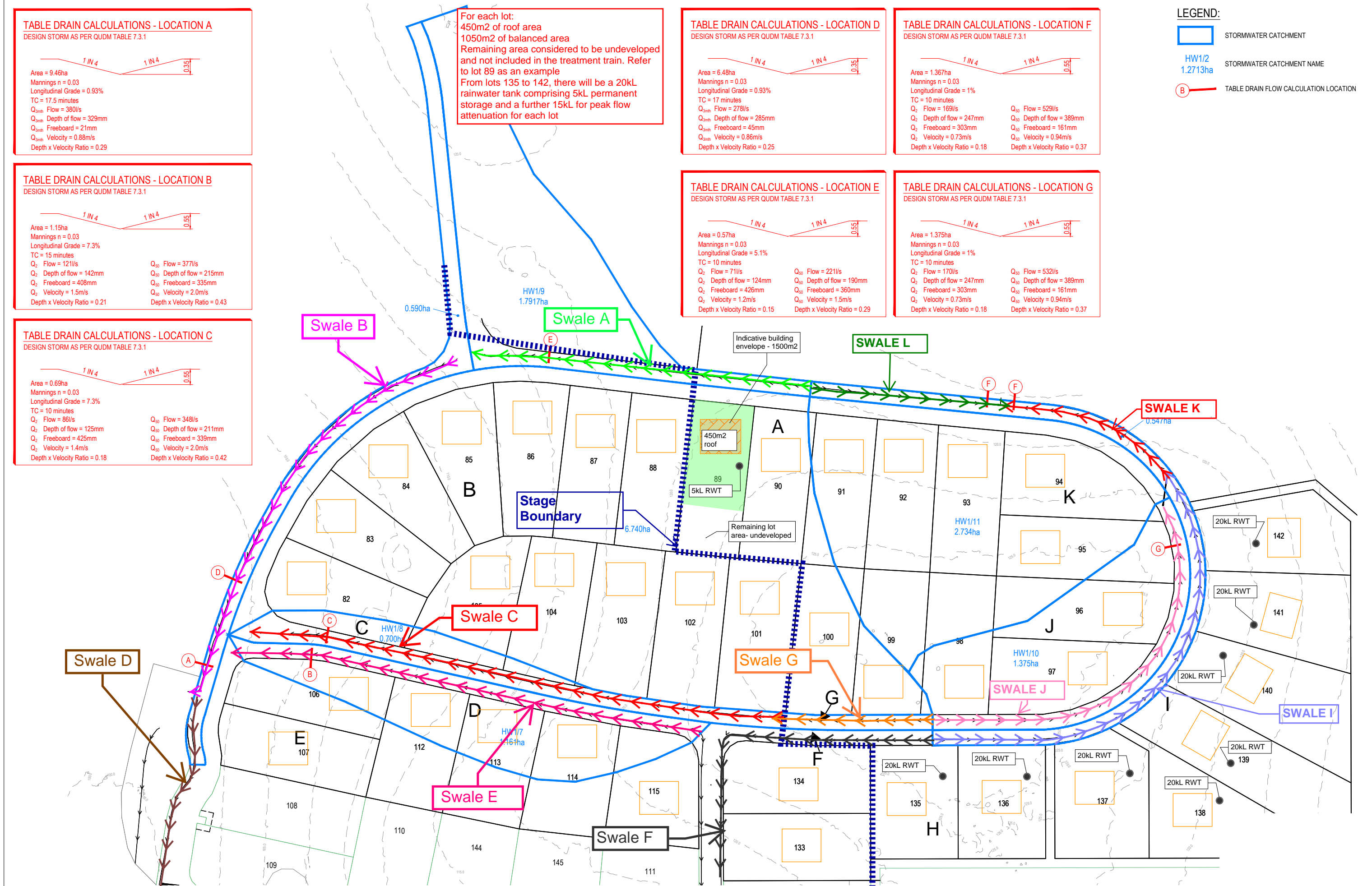
TABLE DRAIN CALCULATIONS - LOCATION G
DESIGN STORM AS PER QUDM TABLE 7.3.1



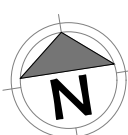
LEGEND:

- STORMWATER CATCHMENT
- HW1/2 1.2713ha STORMWATER CATCHMENT NAME
- TABLE DRAIN FLOW CALCULATION LOCATION

For each lot:
 450m² of roof area
 1050m² of balanced area
 Remaining area considered to be undeveloped and not included in the treatment train. Refer to lot 89 as an example
 From lots 135 to 142, there will be a 20kL rainwater tank comprising 5kL permanent storage and a further 15kL for peak flow attenuation for each lot



No.	REVISION DESCRIPTION	DRAWN	DATE



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CLIENT
PARK LAKE ADARE PTY LTD
 PO BOX 4107 SPRINGFIELD QLD 4300

SCALE
 0 10 20 30 40 50m 100m
 SCALE 1:1000

PROJECT TITLE
PROPOSED SUBDIVISION
 174 ADARE ROAD, ADARE, QLD 4343
 STAGES 2 AND 3

DRAWING TITLE
DRAINAGE CATCHMENT PLAN

DRAWING STATUS
ORIGINAL ISSUE
 FOR APPROVAL

PROJECT LEADER CK	DESIGNER MP	C. KIRK	RPEQ: 19536 NER: 3053220
DRAFTSPERSON MP	SCALE AS SHOWN	DATE MAR 2023	SHEET SIZE A1
JOB No. BR222161	DRAWING No. C2500	REVISION A	



van der meer