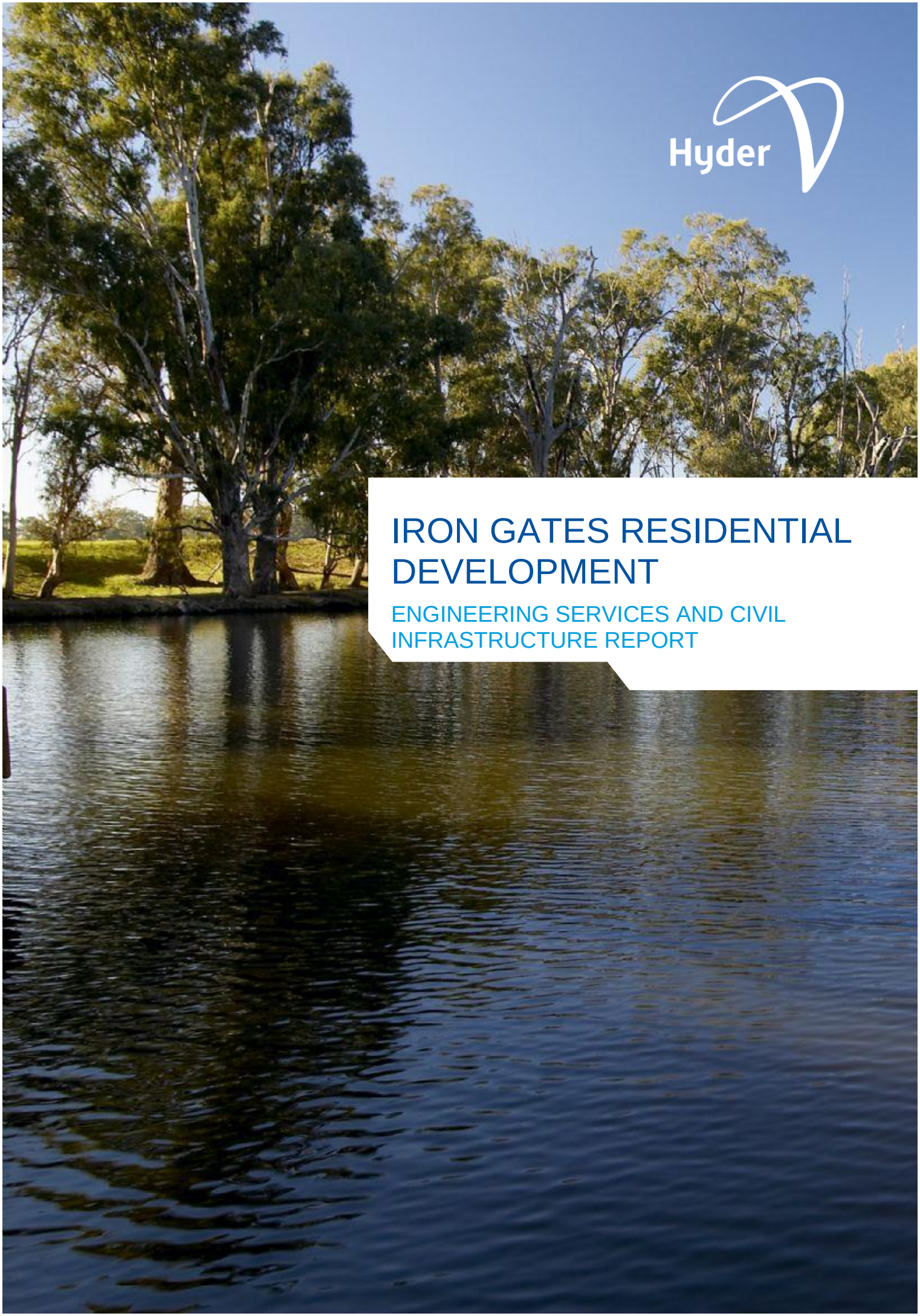

IRON GATES RESIDENTIAL DEVELOPMENT

ENGINEERING SERVICES AND CIVIL INFRASTRUCTURE REPORT

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IRON GATES RESIDENTIAL SUBDIVISION

Engineering Services and Civil Infrastructure Report

Development Application Submission

Date	Rev	Description	Author	Reviewed	Approved
03.10.2014	03	DA Issue	Darlan Castro	Jaco le Roux	Brad Lusty
21.07.2015	04	Amended to address Richmond Valley Council Request for Information	Ben Frost	Darlan Castro	Brad Lusty

Report No F0002-AA007094-AAR-04

This report has been prepared for GoldCoral Pty Ltd in accordance with the terms and conditions of appointment for Iron Gates Residential Subdivision dated 23.03.14. Hyder Consulting Pty Ltd (ABN 76 104 485 289) cannot accept any responsibility for any use of or reliance on the contents of this report by any third party.

CONTENTS

APPENDICES

1 INTRODUCTION

Hyder Consulting has been engaged by GoldCoral Pty Ltd to prepare an Engineering Services and Civil Infrastructure Report for a Development Application for a 176 lot residential subdivision know as *Iron Gates,* located approximately 2km west of Evans Head.

The development involves the construction of 176 residential lots, with a minimum size of 600m^2, associated civil infrastructure such as internal roads, stormwater drainage, sewer and potable water services are also proposed. The site is the subject of previous applications and construction, as well as ongoing environmental disputes. Existing road, water, sewer and stormwater infrastructure are already located on site as part of the construction of a previous development application. This infrastructure has since been abandoned and development halted as a result of outcomes from the Planning and Environment Court. The condition of existing infrastructure will have to be confirmed as the development progresses.

This new development application is to be lodged with Richmond Valley Council (RVC) under the provisions of the Environmental Planning and Assessment Act 1979. This report deals with the engineering services and civil infrastructure component of the development and the engineering planning issues associated with the development application.

1.1 REVISION 04

This report was revised on 3rd July 2015 in order to address the Information Request issued by Richmond Valley Council and the Office of Environment & Heritage for the abovementioned development on 18th November 2014 and 22nd December 2014 reference DA2015/096 – SMc:SL.

1.2 SITE DESCRIPTION

The subject site is known as *Iron Gates* and is surrounded by protected vegetation areas on the northern and eastern boundaries and the Evans River on the western and southern boundaries. The site is located over the following allotments:

- Lot 276 on DP755624;
- Lot 277 on DP755624; and
- Lot 163 on DP831052.

The site has previously been developed with existing roads, sewer, stormwater and water infrastructure located on the site. As a result of outcomes from the planning and environment court, the site has been abandoned and development has halted. The condition of the existing infrastructure on site is unknown however, where applicable testing will be undertaken to determine existing condition prior to Construction Certificate. The site was previously cleared in the mid 1990's however it has since been naturally vegetated.

The main access to the site is via Iron Gates Drive which continues on its alignment through the site to provide access to a small residence on the western boundary. Iron Gates Drive is subject to a separate approval. Evans River is located directly to the south of the site. A site locality plan is provided in Figure 1-1 below:

Figure 1-1 Site Locality

1.3 LOT TOPOGRAPHY

The site features grades ranging from 0.5% to 6%. The eastern portion of the site is very flat and features very minimal grades of approximately 0.5%. This portion of the site features two (2) man made channels running from north to south to help facilitate flows to Evans River. A ridge is located on the western side of the site with an elevation of 22m AHD. Steep grades of approximately 6% are located in this area as the ridge flattens out to the east.

1.4 TOTAL AREA OF LAND

The total residential area of the site is approximately 18 ha.

1.5 PROPOSED DEVELOPMENT

The proposed development is to feature 176 residential allotments. Allowances have been made in the Equivalent Tenement loadings for half of these to be duplex lots i.e. townhouses or other semi-attached dwellings. Duplex lots may not eventuate but is considered a conservative assessment of the site. The proposed development will utilise as much of the existing infrastructure as possible, including roads, stormwater, sewer and water infrastructure, pending on adequacy testing. Where necessary, existing infrastructure will be upgraded to ensure that it meets the standards of RVC and Northern Rivers Local Government (NRLG). Future infrastructure will be provided as an extension to the existing infrastructure and will be integrated into the previous existing design.

2 REFERENCE DOCUMENTS

This report should be read in conjunction with the following documents:

- Hyder Consulting drawings – Series C – July 2015
- Northern Rivers Local Government – Guidelines for Development and Subdivision of Land- January 2006
- Northern Rivers Local Government – Development Construction Specification – Quality System Requirements – August 2013
- Evans River Flood Study – Draft Report – prepared by BMT WBM June 2014
- Assessment of Local Runoff for the Iron Gates Development – BMT WBM Letter, dated August 2014
- Additional Flood Advice for the Iron Gates Development - BMT WBM Letter, dated July 2015
- Draft NSW MUSIC Modelling Guidelines- BMT WBM August 2010
- Evans Head Future Sewage Strategy Report – GHD May 2010
-

3 EARTHWORKS AND GRADING

3.1 SITE GRADING

Site grading has largely been dictated by existing ground levels, minimum and maximum road grades and drainage requirements.

Existing roads have been maintained at existing levels with allotments raised where necessary to comply with 100 year ARI flood levels.

All lots have been designed to achieve FFL above Flood Planning Levels of 3.6m. This assumes a minimum Earthworks level of 3.3m and a 300mm house slab.

3.1.1 EARTHWORKS QUANTITIES

The Iron Gates earthworks design estimates that earthwork volumes will not be balanced and fill will be imported. Table 3-1 below presents a summary of the estimated earthworks quantities and assume no compaction factors, road boxing or top soil striping.

Table 3-1 Summary of estimated earthworks quantities

Stage	Total Cut Volume (m3)	Total Fill Volume (m3)	Balance Volume (m3)
1	21	76,756	76,735
2	115	59,524	59,409
3	6,769	39,057	32,288
4	117,307	16,313	100,994

3.2 RETAINING WALLS

In areas that have significant grade or level difference, retaining walls may be used. It is proposed that either a concrete sleeper or reinforced block walls will be used.

Roads adjacent to the environmental zone have been assessed and where required retaining walls may be provided. In these situations the safety of both pedestrians and vehicles are considered paramount. Assessments have been undertaken and the use of a ‘W’ Beam guard rail will be used to minimise the risk of errant vehicles. Walls greater than, 1.0m will include a “2 rail” handrail system for pedestrian safety.

Due to a significant level difference between the proposed subdivision and the environmental zone west of Road MC1005 a 7m retain wall is proposed. The wall will be structurally designed as part of the Construction Certificate design.

4 ROADS

Vehicle access is currently provided via 2Km of Road known as Iron Gates Dive, located west of Evans Head. This road connects the existing Wattle Street in Evans Head to a proposed residential subdivision located at the western end of the road.

Pedestrian access will be provided as standard in the estate's road reserves in accordance with RVC policy. It is understood that all footpaths and bikeways must be designed in compliance with Council standards and be approved for construction prior to construction works.

4.1 INTERNAL ROADS

4.1.1 DESIGN VEHICLE

The design vehicle used in geometry checks for the internal roads is a 9.9m garbage truck with a 12.5m single unit truck used to check all roundabouts. Fire trails have been checked based on a fire tank 7.8m long and 2.4m wide.

Design turning paths were used to determine where local increases in pavement width were required to ensure that the design vehicle could negotiate turns and bends without striking or mounting the kerb.

Where necessary, 'No Stopping' signs will be provided to ensure that required turning areas are free of parked vehicles.

4.1.2 ROAD GEOMETRY AND WIDTH

Road geometry design has generally been undertaken in accordance with Northern Rivers Local Government's (NRLG) Development and Subdivision of Land, 2006'.

The table and notes below are an extract from this document.

GEOMETRIC ROAD DESIGN

Table D.1.5 Characteristics of Roads in Residential Subdivision Road Networks

Road Type	Maximum Traffic Volume (vpd) [1]	Maximum Speed [2] (km/h)	Carriageway Width (m)[3][10] Min	Parking Provisions Within Road Reserve	Kerbing [4]	Footpath Requirement [15] minimum	Bicycle path Requirement	Verge Width (m) minimum (each side)	Minimum Road Reserve Width (m)
Access Street	100	40	6	Carriageway	Mountable	No	No	3	14
Local Street	2000	50	7-9	Carriageway	Mountable	Network Dependent	Network Dependent	3.5	15-17
Collector Street	3000	50	11	Carriageway	Mountable	One side [16]	Network Dependent	3.5	18
Distributor Road	3000+	60	13	Carriageway	Upright	One Side	Network Dependent	3.5	20

NOTES:

1. For single dwelling allotments apply traffic generation rate of 10 vehicles per day (vpd)/allotment (equivalent to approximately one vehicle per hour (vph) in the peak hour) unless a lower rate can be demonstrated. Lower rates can be applied to multi-unit dwellings based on locally derived rates.
2. See Clauses D1.09 and D1.11 on designing for specific operating speeds.
3. Widening required at bends to allow for wider vehicle paths (using AUSTROADS Turning Templates).
4. Where kerbing is not required a flush pavement edge treatment can be used. Maximum carriageway widths required if barrier kerbing used.
5. Requires:
   (i) Provision for widening to 5.0m if necessary in the future.
   (ii) Verge parking as noted with scope for additional spaces.
6. Minimum width required to provide for pedestrians, services, drainage, landscape and preservation of existing trees. Add additional width on one side for future widening of carriageway to 5.0m if required. For two lane carriageway design, no provision for widening required.

There are 2 types of roads proposed for the Iron Gates Residential Subdivision. Details of the roads are presented in Table 4-1 and are generally consistent with the works in Council's LGA.

Table 4-1 Summary of road type characteristics

Road Name	Road Type	Pavement Width
MC1000	Local Street*	11.0 (CH0-320) 9.0 (CH320+)
MC1001	Local Street*	9.0
MC1002	Local Street	9.0
MC1003	Local Street	9.0
MC1004	Collector Road*	11.0
MC1005	Local Street	9.0
MC1006	Local Street *	9.0
MC1007	Local Street	9.0
MC10008	Local Street	9.0

*The table above shows the predominant dimensions. These may vary slightly from what has been shown. Park Edge roads have reduced verge width.

All roads will be provided with mountable layback kerb and gutter along both edges.

The exception to the above is for "Park Edge" roads that run adjacent to either open space or environmental areas. In this instance a "barrier" style kerb and gutter will be used along with a reduced verge width. This verge width may vary depending on the requirements for paths and guard rail as mentioned above. The typical road cross sections within the current Development Approval package show these details.

4.1.3 ROAD GRADING

Roads have been graded to ensure that parameters as presented in NRLG's 'Development and Subdivision of Land, 2006' are met. Table 4-2 presents minimum, maximum and typical road grades proposed for Iron Gates Residential Subdivision.

Table 4-2 Summary of minimum, maximum and typical road grades

Road Type	Minimum Road Grade	Maximum Road Grade
Local Street	0.5%	6.0%
Collector Street	0.5%	5.5%
Fire Trail	0.5%	2.5%

All roads have generally been designed with 3% cross fall.

4.1.4 ROAD PAVEMENT

Preliminary flexible road pavement designs have been prepared based on assumed subgrade CBR of 3.0% and presented in the design drawings. These designs are indicative only and subject to detail design and actual subgrade testing.10[#]

Table 4-3 below presents a summary of design criteria and overall pavement thickness for the site:

Table 4-3 Summary of Design Criteria for Pavement Thickness

	Local Access	Local Road	Collector Road
ESA [#]	$3x10^5$	$3x10^5$	$1x10^6$
Assumed CBR	3.0%	3.0%	3.0%
Asphaltic Concrete (AC 10)	50 mm*	50 mm*	50 mm*
Base	150 mm	150 mm	150 mm
Sub Base	150 mm	250 mm	360 mm
Total Pavement Thickness	350 mm	450 mm	560 mm

*2x25mm AC-10 – 2nd layer postponed until the majority of houses are constructed and occupied.

ESA extracted from section D2.04 Design Traffic of the Northern Rivers' Development Design Specification D2 , Pavement Design

4.1.5 FOOTPATH

Footpaths will be provided generally in accordance with NRLG's standard drawing R07. Shared paths for collector roads are intended to be provided at the time of construction. All footpaths within collector roads and local roads are proposed to be postponed until the majority of the houses are constructed and occupied.

4.2 EXTERNAL ROADS - IRON GATES DRIVE

As Iron Gates Drive has been constructed approximately 20 years ago and the original design information is not easily available. The road has been assessed via a recent topographic survey to determine the original design intent. The assessment has been split into Horizontal Alignment, Vertical Grades, Design Speed, Cross Section, Pavement and Pedestrian Facilities.

In order to determine if the existing road would comply with current standards the design has been compared to the current Northern Rivers Local Government Guidelines for Development and Subdivision of Land and AUSTROADS.

4.2.1 HORIZONTAL ALIGNMENT

The existing road has been surveyed and imported into the12D modelling software. From there an alignment was produced to create a best fit to the existing surveyed centreline.

The horizontal alignment consists of a series of straights and horizontal curves. The radii of these existing curves were noted to vary from R150m to R1750m. The R150 occurs at the southern end of Iron Gates Drive joining to an existing roundabout within the future development.

4.2.2 VERTICAL ALIGNMENT

The existing road vertical alignment has been assessed by matching a design alignment to the surveyed centreline as closely as possible. The longitudinal grades of the existing pavement have been determined to vary between 0.35% to 2.1 %(approximately). The grading technique used consists of a series of crests and four sags to combat the original flat terrain.

A long section has been provided within Appendix E

4.2.3 CROSS SECTION AND PAVEMENT

The existing cross section has been assessed based on the existing topographic survey. The assessment shows the existing section represents a Rural Residential profile in accordance with the D1.27 Carriageways section of the Geometric Road Design Aus-Spec for Northern Rivers – Local Government, Table T1.27. This table nominates 6m seal with 1m shoulders for rural roadways up to 500AADT and for rural residential roads. The existing profile consists of a pavement width of approximately 6m at 3% cross fall with varying verge widths consistent with the guidelines. It should be noted that in some areas the road does not have the full 1m shoulder as required within T1.27.

The guidelines also states that carriageway width to an existing road shall generally be in accordance with Table T1.27 but shall be assessed on merit for individual applications for a reduced standard at the discretion of the Director of Engineering Services or delegated officer.

In support of the existing road formation being suitable to service the proposed development reference is also made to the AUSTROADS Guide to Road Design Table 4.3 Urban Arterial Road widths which provides for 3.0 to 3.3m lane widths for use on low speed with low truck volumes.

D1.27 CARRIAGEWAYS

1. Carriageway widths for rural roads should generally be as follows:

Table T 1.27 – Carriageway and seal widths for rural roads

Local Government Area	Minor no through road up to 150 AADT	Minor road up to 1000 AADT	Major road over 1000 AADT	Rural Residential
Ballina **Byron** **Kyogle** **Richmond Valley** **Clarence Valley**	6m seal 0.5m shoulders	150 – 500 AADT 6m seal 1m shoulders 500 – 1000 AADT 7m seal 1.0m shoulders	7.5m seal 1.5m shoulders	6m seal 1m shoulders
Lismore	See City of Lismore Development Control Plan No. 28 - Subdivision			

2. Carriageway width to existing road shall generally be in accordance with Table T1.27 but shall be assessed on merit for individual applications for a reduced standard at the discretion of the Director of Engineering Services or delegated officer

On areas of horizontal curves, super elevation has been provided to a maximum of 5% cross fall. Two typical road cross sections have been detailed within the Engineering Plans in Appendix E.

From an initial inspection of Iron Gates road the pavement appears to be in reasonable condition. However, the pavement will undergo various NATA Geotechnical assessments and testing during the Construction Certificate stage to determine both the original design and current condition. Areas where the pavement is found to be either under designed or failing, subsequent maintenance treatment will be provided to ensure the pavement satisfy current Council requirements.

4.2.4 PEDESTRIAN FACILITIES

The existing road has a 2m wide concrete footpath on the southern side running the full length of the road. A duplication of this path has not been considered.

4.2.5 DESIGN SPEED

Based on the above, the current road geometry and future amendments, the design speed has been determined to be 70km/hr which incorporates a minimum horizontal radii of 200m with 5% super elevation. It should be noted that the radius 150m at the connection the existing roundabout is used to slow driver speeds as they approach the roundabout.

Both the vertical grading and horizontal alignment provide sufficient stopping sight distance for a 70m/hr design speed.

It is recommended that the signed speed for Iron Gates Drive to be 60km/hr.

4.2.6 IRON GARES DRIVE COMPLIANCE

The assessment conducted by Hyder consulting shows the Iron Gates Drive horizontal and vertical alignment are generally compliant with current Councils and Austroads design standards assuming a 70km/h design speed (signed 60km/hr).

Based on existing roads surrounding the site and the nature of the proposed development we believe this road can be classified as a rural residential road and with the incorporation of minor shoulder construction it should meet current standards for traffic volumes of up to 500 AADT. At the latter stages of the development, where traffic volumes may exceed 500 AADT we request Council to consider this road as compliant based on merit for individual applications for a reduced standard as described in council guidelines.

5 ROAD STORMWATER DRAINAGE WORKS

5.1 EXISTING STORMWATER DRAINAGE CHARACTERISTICS

The existing site consists of multiple catchments and features an extensive stormwater drainage network that has been inoperative since its construction in the mid 1990's. The network consists of multiple stormwater reticulation pipes ranging in size from Ø375mm at upstream locations to Ø825mm at downstream outlets. The drainage configuration also makes use of open drainage channels collecting stormwater from the various drainage systems to direct stormwater south of the project site towards Evans River.

5.2 PROPOSED STORMWATER DRAINAGE INFRASTRUCTURE

As part of the proposed works and requirements from the Planning and Environment Court ruling the existing open drainage channel along the eastern boundary will be filled. In addition to the filling of the open channel the proposed road layout and levels has precluded the utilization of any existing drainage infrastructure.

5.2.1 DRAINAGE DESING STANDARDS

The proposed road stormwater drainage network has been designed to comply with the Northern Rivers Local Government , Handbook of Stormwater Drainage Design – D5-Stormater Drainage Design.

The proposed system will safely convey major and minor flows to the Evans River. Design rainfall intensities have been adopted from Council's Guidelines as follows:

- Minor system:
  - Urban Residential - 5 years ARI
- Major System – 100 year ARI

Stormwater pits have been positioned to suit the proposed road geometry and generally maintain a maximum flow width of 2.5m from face of kerb during the design storm event (5 year ARI).

All overland flow paths are designed to cater for the 100year ARI storm event by maintaining a velocity-depth product of 0.4 or less and maximum flow depth equal or less than 200mm.

5.2.2 HYDRAULICS CALCULATION

The preliminary hydraulic calculation was conducted using PC_DRAIN software using the Rational Method to generate flows.

The model represents all catchments collected via a pit and pipe network designed to cater for the minor flows with considerations to major design storms. All areas are gravity drained with overland flow in excess of pipe capacity safely directed to Evans River.

On grade pits have been assumed to be 10% blocked whilst sag pits have been assumed to be 20% blocked. Field inlets have been assumed with 50% blockage. Minimum lintel size is 2.4m in sags.

MHWS water level have been used as the initial level for the hydraulic grade line calculations with Ku losses being calculated depending on diameter, flows and pipe angles.

150mm Freeboard has been generally maintained to top of grate levels for the design storm in accordance with Council guidelines.

The preliminary pipe diameter is presented in the engineering drawings Appendix A.

5.2.3 OVERLAND FLOW CHECK

Generally overland flow in excess of pipe capacity will be contained within the road corridor and will comply with Councils flood safety design criteria. In a single location (road MC1010) flows in excess of pipe capacity will be conveyed overland through a dedicated open space between lots 108, 104, 118 and 103.

Based on the preliminary stormwater assessment approximately 0.23 m3/s will travel south at the previously discussed location with maximum 0.08m depth and 0.04 vxd.

6 ON SITE DETENTION

Provision of on-site detention is considered to be best management practice to mitigate post development peak discharge flows. Due to the proximity of the development to the river mouth an investigation was conducted by BMT WBM to show that in this case, the application of detention devices would not achieve the desirable effects rather worsening flows overall.

As discussed in the NSW Floodplain Development Manual, a merit based assessment has been undertaken to show that a 'rapid disposal' method would be more efficient for this site. The WBM Study concluded that "by directly discharging runoff into the river, the water can be drained from the Evans River system with the receding tide. Most runoff will then be drained prior to the larger, regional flows passing through the Evans River, either from Upper Evans River catchment runoff or from Richmond River overflow. Therefore, BMT WBM recommends against using OSD to delay the release of floodwaters from the proposed development site."

Based on the WBM BMT study the site will not provide OSD. The full study is included in Appendix C.

7 WATER QUALITY

Water quality areas on the Site have been modelled and designed in accordance with the 'Draft NSW MUSIC Modelling Guidelines'- WBM BMT August 2010 and the Richmond Valley Development Control Plan 2012 – Section I9: Water Sensitive Urban Design. Accordingly, the objectives of this element are to:

- Protect the values and quality of receiving waters for human (commercial, recreational, aesthetic, public health) and ecological purposes.
- Promote and implement stormwater quality source control.
- Implement appropriate and safe stormwater quality devices for the target pollutant and site conditions.

Applicable water quality performance targets are provided within the Richmond Valley Development Control Plan 2012 – Section I9.4.3 and are detailed in Table 7-1 below:

Table 7-1 Stormwater Quality Targets Extract

Contaminant	Target
Coarse Sediment - 0.1 to 0.5mm (Total Suspended Solids)	80%
Total Phosphorus	45%
Total Nitrogen	45%
Litter (Gross Pollutants)	70%

7.1 SOURCE NODE INPUT DATA

Water quality assessment has been undertaken using MUSIC computer software (Version 6.1.0). Catchments have been estimated from CAD base drawings assuming road areas as 70% impervious (based on CoGC standard road sections considering verge and footpath) and allotment areas being comprised of 70% roof area and 30% ground area, of which 30% of this ground area has been considered to be impervious.

The site has been delineated into three primary catchments, illustrated on the engineering drawings included in Appendix A for reference.

- Catchment A – The northern portion of the site discharging towards the northern boundary.
- Catchment B – The area of the site located to the north-east of the central ecological zone discharging towards the Evans River.
- Catchment C – The south-western area of the site, split into three sub-catchments each discharging to a segment of bio-retention before discharging towards the Evans River.

A summary of the modelled MUSIC source nodes and their assumed imperviousness has been provided in Table 7-2 below:

Table 7-2 Summary of source node imperviousness

Source Node	MUSIC Source Node	Imperviousness (%)	Area (ha)
A-Roof Source Node	Residential Roof	100	0.661
A-Road Source Node	Residential Road	70	0.595
A-Ground Source Node	Residential Ground	30	0.284
B-Roof Source Node	Residential Roof	100	3.530
B-Road Source Node	Residential Road	70	2.209
B-Ground Source Node	Residential Ground	30	1.513
B-Road Bypass Source Node	Residential Road	70	0.374
C1-Roof Source Node	Residential Roof	100	0.471
C1-Road Source Node	Residential Road	70	1.057
C1-Ground Source Node	Residential Ground	30	0.202
C2-Roof Source Node	Residential Roof	100	2.273
C2-Road Source Node	Residential Road	70	3.707
C2-Ground Source Node	Residential Ground	30	0.974
C3-Roof Source Node	Residential Roof	100	0.903
C3-Road Source Node	Residential Road	70	0.760
C3-Ground Source Node	Residential Ground	30	0.387

7.2 TREATMENT SYSTEMS INPUT DATA

7.2.1 BIO-RETENTION AREAS

The bio-retention areas have been designed specifically in accordance with Water by Design Bio-Retention Technical Design Guidelines (2014). A saturated zone has been implemented in the bio-retention basin within catchment B improving the denitrification process and allowing for additional moisture storage for plant sustenance. The remaining proposed bio-retention basins have been designed without submerged zones. General parameters for the bio-retention areas have been modelled as per the tables below:

Table 7-3 Summary of Proposed Bio-retention Properties

Parameter	Value
	All Bio-Retention Basins
Hydraulic Conductivity	200mm/hr
Orthophosphate Content	40mg/kg
TN Content of Filter Media	400mg/kg
Base Lined?	Yes
Vegetation Properties	Vegetated with effective nutrient removal plants

Table 7-4 Summary of Proposed Bio-retention Dimensions

Parameter	Value			
	Bio B	Bio C1	Bio C2	Bio C3
Surface Area (m²)	95	80	225	200
Filter Area (m²)	80	75	210	180
Extended Detention Depth (m)	0.3	0.3	0.3	0.3
Filter Media Depth (m)	0.4	0.4	0.4	0.4
Weir Width (m)	4	4	4	4
Submerged Zone with Carbon	Yes	No	No	No

7.2.2 GROSS POLLUTANT TRAPS

The gross pollutant traps included in the treatment train have been designed as per the Draft MUSIC Modelling Guidelines for New South Wales (August 2010 issue). Four GPTs have been proposed for the site, to be used as pre-treatment devices before discharge into secondary treatment devices (bio-retention basins). The minimum performance criteria have been adopted, stated below:

Table 7-5 GPT Treatment Node Inputs Extract (Adapted from Alison et al 1998)

Parameter	Value	
	Input (mg/L)	Output (mg/L)
Total Suspended Solids (TSS)	0	0
	75	75
	1000	350
Total Phosphorus (TP)	0.00	0.00
	0.50	0.50
	1.00	0.85
Total Nitrogen (TN)	0.0	0.0
	0.5	0.5
	5.0	4.3
Gross Pollutants	0	0
	15	1.5

7.2.3 INFILTRATION PITS

Due to existing soil conditions comprising high infiltration rates (refer to Appendix D for geotechnical investigation results) infiltration pit systems have been introduced into the treatment train in Catchments A & B to supplement the proposed bio-retention and swale systems. Individual infiltration pits are proposed on a per lot basis to allow for further treatment of roof areas (modelled as lumped infiltration system for lumped roof catchment areas).

The proposed infiltration pits have been designed as per the Draft MUSIC Modelling Guidelines for New South Wales (August 2010 issue) with exfiltration rates confirmed from geotechnical investigations. Additionally, these infiltration pits have been designed to provide sufficient capacity to store inflow for a 1 in 3 month Average Recurrence Interval storm event with emptying time of less than 24 hours (approximately 2.5m^3 storage for 150m^2 of roof area with fill at 30mm nominal particle size).

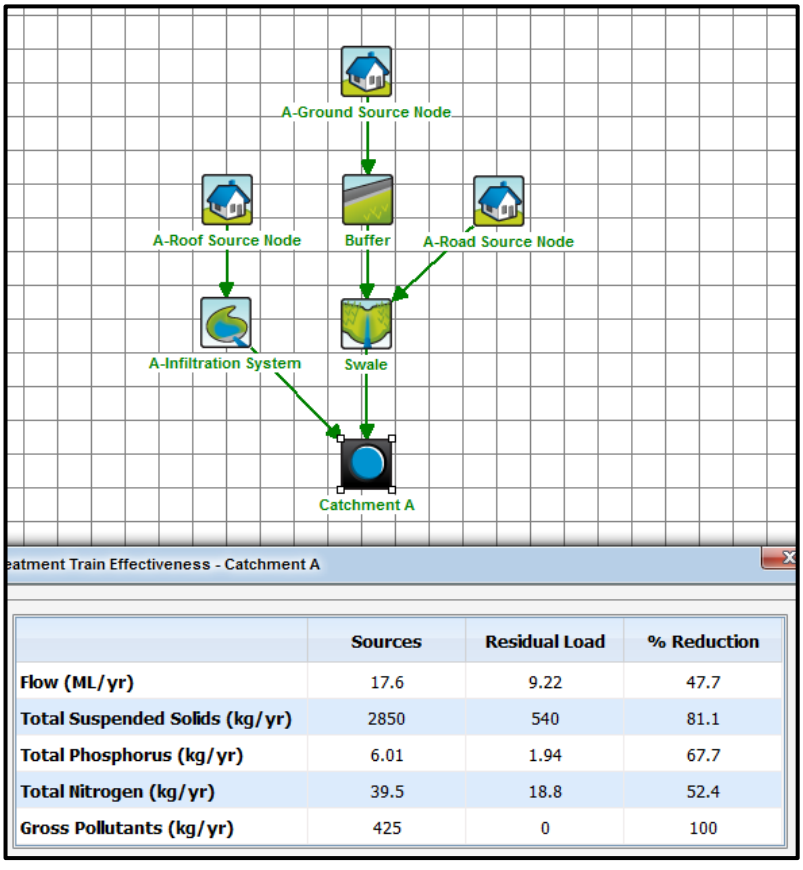
It should be noted that lots generally drain to the front of lot towards the adjacent road reserve. These infiltration systems are not proposed in lieu of inter allotment drainage, with their sole purpose being to act as stormwater quality treatment devices. All flows in excess of infiltration capacity will be directed to the road reserve where inter allotment drainage is not proposed. General parameters for the infiltration pits have been modelled as per Table 7-6 below:

Table 7-6 Summary of Proposed Infiltration Pit Parameters

Parameter	Catchment A	Catchment B
Total Surface Area (m²)	73	389
Total Filter Area (m^2)	73	389
Total Unlined Filter Media Perimeter (m)	34.2	79
Surface Area per Lot (m^2)	4.86	
Filter Area per Lot (m^2)	4.86	
Unlined Filter Media Perimeter per Lot (m)	8.82	
Extended Detention Depth (m)	1	
Infiltration Media Depth (m)	0.4	
Exfiltration Rate (mm/hr)	180 (Geotechnical Investigations revealed generally higher values but minimum hydraulic conductivity conservatively adopted)	
Evaporative Loss	0% of PET	

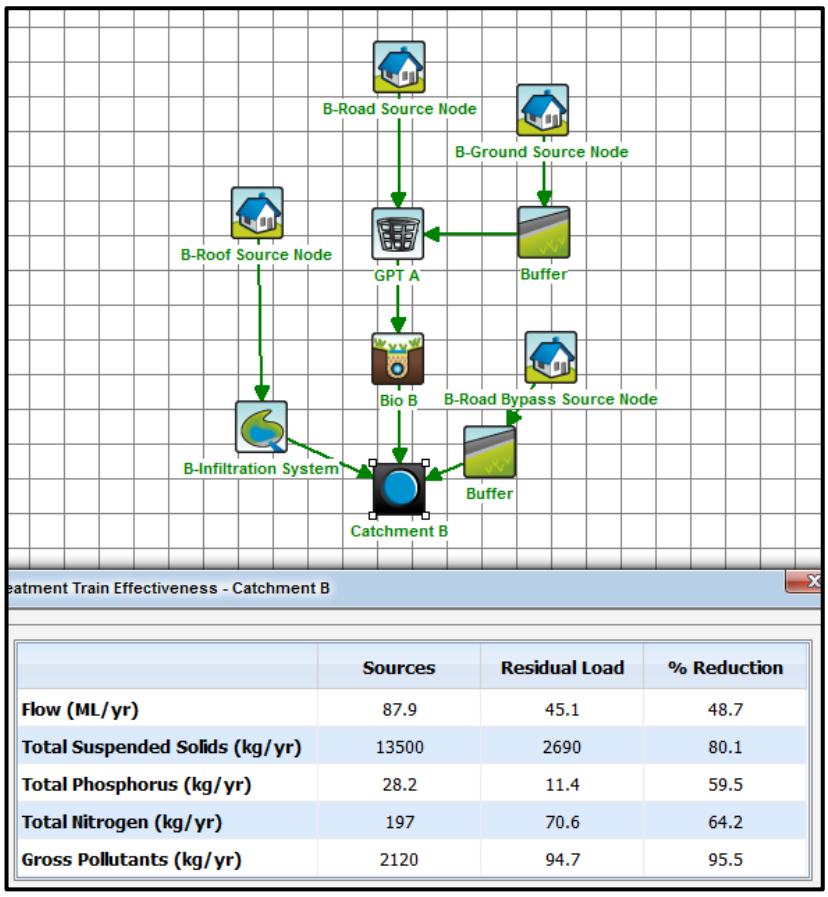
7.3 MUSIC MODELLING RESULTS

The developed site has been modelled in accordance with the sub-catchment regime to ensure each catchment meets pollutant reduction objectives as presented in Figures 7-1 to 7-3 below.



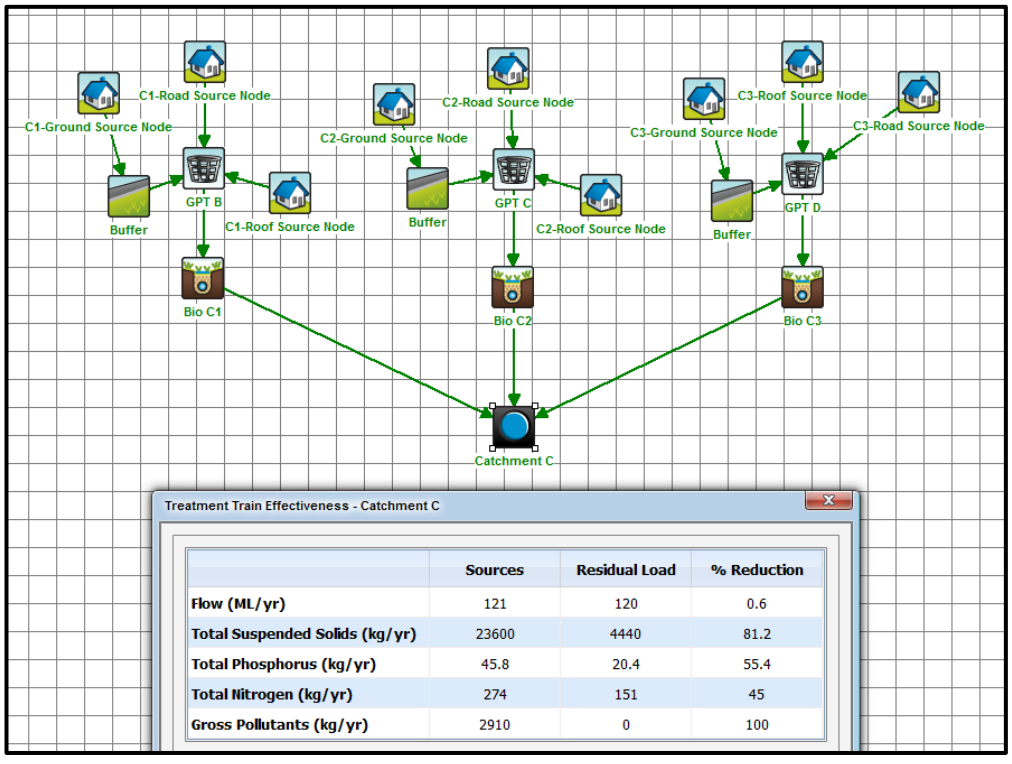
	Sources	Residual Load	% Reduction
Flow (ML/yr)	17.6	9.22	47.7
Total Suspended Solids (kg/yr)	2850	540	81.1
Total Phosphorus (kg/yr)	6.01	1.94	67.7
Total Nitrogen (kg/yr)	39.5	18.8	52.4
Gross Pollutants (kg/yr)	425	0	100

Figure 7-1 Catchment A MUSIC Layout and Pollutant Reduction Results



	Sources	Residual Load	% Reduction
Flow (ML/yr)	87.9	45.1	48.7
Total Suspended Solids (kg/yr)	13500	2690	80.1
Total Phosphorus (kg/yr)	28.2	11.4	59.5
Total Nitrogen (kg/yr)	197	70.6	64.2
Gross Pollutants (kg/yr)	2120	94.7	95.5

Figure 7-2 Catchment B MUSIC Layout and Pollutant Reduction Results



	Sources	Residual Load	% Reduction
Flow (ML/yr)	121	120	0.6
Total Suspended Solids (kg/yr)	23600	4440	81.2
Total Phosphorus (kg/yr)	45.8	20.4	55.4
Total Nitrogen (kg/yr)	274	151	45
Gross Pollutants (kg/yr)	2910	0	100

Figure 7-3 Catchment C MUSIC Layout and Pollutant Reduction Results

8 SEDIMENT AND EROSION CONTROL

Erosion and sediment control will be installed and maintained in accordance with NRLG's requirements and Landcom's Managing Urban Stormwater, Soils and Construction ('Blue Book').

9 PROPOSED UTILITY SERVICES PROVISION

9.1 POTABLE WATER

9.1.1 EXISTING WATER SUPPLY INFRASTRUCTURE

The site features an existing water reticulation system located within the verge of the existing road network. This reticulation features pipes ranging from Ø100mm to Ø300mm designed to service a previous lot layout.

Connection to the project site is currently through the Ø300mm main located within the Iron Gates Drive road reserve which runs along the length of Iron Gates Drive – Wattle Street before turning through Mangrove Street and connecting to the existing Ø250mm AC main located within the eastern verge of Elm Street.

9.1.2 PROPOSED WATER SUPPLY INFRASTRUCTURE

Connection for the proposed development to the RVC water supply network will be provided via a connection to the existing Ø300mm main located south-east of the project site within the Iron Gates Drive road reserve. Again, it is proposed to maximise utilisation of the existing network however the adequacy of the current water reticulation is to be determined to ensure compliance with RVC standards. The internal potable water network shall be the subject of detailed design during the Construction Certification phase of the project.

9.1.3 PROJECTED DEVELOPMENT LOADINGS

Network Loadings

The development has been assessed under two loading cases in order to better determine the anticipated impact it will have on the surrounding network. These cases are the:

- **Planned Demand** – A demand assigned to the site via discussions with Richmond Valley Council based on the Evans Head Future Sewage Strategy report;
- **Actual Demand** – The calculated demand for the property based on proposed architect plans and conversion rates from the 'AUS-SPEC#1 Development and Design Manual'.

In accordance with the 'AUS-SPEC#1 Development and Design Manual'; section D11.06, Tables 3.4 and 3-5 below show the calculations of Equivalent Persons (EPs) derived from both discussions with Richmond Valley Council and what is actually proposed on site.

Table 9-1 RVC Planned Demand as per Pre-Lodgement Meeting Minutes

Category	Conversion Rate (EP/ET)	Planned Demand (ET)	Planned Demand (EP)*
RVC Current Water Allowance	3.2	**100**	**320**

*3.2EP/ET – AUS-SPEC#1 Development and Design Manual D11.06

There are 176 lots proposed on site. 85 of these are assumed to have a loading of 1ET (3.2EP) per lot as per the RVC Development Guidelines. The other 85 have been assumed to be dual occupancy and have an applied loading of 2ET (6.4EP) per lot

Table 9-2 Proposed Development Loadings

Category	Units (No.)	Demand Rate (ET/unit)	Proposed Demand (ET)	Conversion Rate (EP/ET)	Proposed Demand (EP)*
Standard Single Dwelling Unit	85	1	85	3.2	**272**
Standard Dual Dwelling Unit	85	2	176	3.2	**563**
		Total	**261**		**835**

*3.2EP/ET – AUS-SPEC#1 Development and Design Manual D11.06

The difference in EPs between what has been planned and what is proposed is therefore **515 EPs**.

9.1.4 INTERNAL WATER NETWORK

The developer shall, as part of the development works, construct an internal water reticulation service for the proposed development in accordance with the relevant building code requirements.

A water network design will be undertaken by a qualified hydraulic engineer for the proposed development to determine adequate levels of services for all internal firefighting flows and services demands.

9.1.5 CAPACITY OF EXISTING EXTERNAL WATER

It is assumed that there is sufficient capacity in the existing external potable water infrastructure to cater for the proposed development. A water network capacity assessment should be undertaken to determine the effects on the development on the surrounding water infrastructure.

9.2 SEWER

9.2.1 EXISTING SEWERAGE INFRASTRUCTURE

The project site currently possesses a sewerage reticulation network dating back to a previous development attempt, consisting of Ø225mm mains cumulating at the south-east corner of the project site where a pump station is located. This station is equipped with a dual rising main configuration consisting of two Ø100mm rising mains, one which was to be used to cater for the first stage of the previous Development Application and a second to service future developments.

These rising mains are located within the Iron Gates Drive road reserve and follow Iron Gates Drive through Wattle Street and Mangrove Street to an existing Ø150mm gravity main.

9.2.2 PROPOSED SEWERAGE SUPPLY INFRASTRUCTURE

Connection for the proposed development to the RVC sewerage network will be provided via a sewerage reticulation network internal to the project site subject to a detailed sewer network capacity assessment ensuring adequate capacities are provided to service the development. Connection to the rising main is to occur from the existing south-eastern pump station, to be pumped along Iron Gates Drive to the connection point in Mangrove Street.

9.2.3 PROJECTED DEVELOPMENT LOADINGS

Network Loadings

The development has been assessed under two loading cases in order to better determine the anticipated impact it will have on the surrounding network. These cases are the:

- **Planned Demand** – A demand assigned to the site via discussions with Richmond Valley Council based on the Evans Head Future Sewage Strategy report;
- **Actual Demand** – The calculated demand for the property based on proposed architect plans and conversion rates from the 'AUS-SPEC#1 Development and Design Manual'.

In accordance with the 'AUS-SPEC#1 Development and Design Manual'; section D12.06, Tables 3.4 and 3-5 below show the calculations of Equivalent Persons (EPs) derived from both discussions with Richmond Valley Council and what is actually proposed on site.

Table 9-3 RVC Planned Demand as per Pre-Lodgement Meeting Minutes

Category	Conversion Rate (EP/ET)	Planned Demand (ET)	Planned Demand (EP)*
RVC Current Sewer Allowance	3.2	**100**	**320**

*3.2EP/ET – AUS-SPEC#1 Development and Design Manual D12.06

There are 176 lots proposed on site. 85 of these are assumed to have a loading of 1ET (3.2EP) per lot as per the RVC Development Guidelines. The other 85 have been assumed to be dual occupancy and have an applied loading of 2ET (6.4EP) per lot

Table 9-4 Proposed Development Loadings

Category	Units (No.)	Demand Rate (ET/unit)	Proposed Demand (ET)	Conversion Rate (EP/ET)	Proposed Demand (EP)*
Standard Single Dwelling Unit	85	1	85	3.2	**272**
Standard Dual Dwelling Unit	85	2	176	3.2	**563**
		Total	**261**		**835**

*3.2EP/ET – AUS-SPEC#1 Development and Design Manual D12.06

The difference in EPs between what has been planned and what is proposed is therefore **515 EPs**.

9.2.4 CAPACITY OF EXISTING EXTERNAL SEWER

Due to the proposed loads imposed on the existing external sewerage network a preliminary assessment has been undertaken to determine whether it has sufficient capacity. A report prepared by GHD in May 2010 titled "*Review of Evans Head Sewerage Augmentation Strategy"* includes an assessment of various augmentation strategies in order to upgrade the existing Richmond Valley Council sewerage system to cater for future development.

The most applicable upgrade discussed in the report is Option 3 - Strategy Revision (2010) which provides a rising main connection from the Iron Gates site to Wastewater Pump Station No. 2. It should be noted that in the augmentation strategy only 100ET (320EP) has been allowed for. This is an underestimation compared to the 835EP proposed as part of the development. This increased development yield should be considered in any network wide augmentation strategy, particularly any upgrades proposed to WWPS Nos. 1, 2, 4 and 8 which all have proposed upgrades as part of the Option 3 – Strategy Revision (2010) sewerage upgraded scheme.

A brief assessment of the 150mm diameter sewer gravity main in Mangrove Street that serves as the connection point has been undertaken to ensure that it has sufficient capacity to cater for the additional flows from the Iron Gates development. These flows, along with the existing catchment flows equates to approximately 2.49L/s. The capacity of the 150mm diameter pipe at minimum grade is 11.35L/s. This shows that there is sufficient capacity within the existing pipe down to the existing pump station. A detailed assessment of this pipe's capacity will be undertaken during Construction Certificate stage.

9.3 ELECTRICAL AND TELECOMMUNICATIONS SERVICES

The existing site is not equipped with electrical reticulation infrastructure however 'Essential Energy' Dial Before You Dig (DBYD) results have revealed the presence of an underground or earth wire structure within the south-western corner of the project site. Two electrical poles have also been located within the site in alignment with a service track to the north of the site. It is understood that the proposed development must incorporate an internal low-voltage electricity supply to all facilities within the development in order to comply with relevant legislation. Connection to electrical reticulation is proposed via infrastructure adjacent to the site at the northern service track, being dependant on detailed design. Refer to Appendix B for DBYD results.

Telecommunication services have been identified in the immediate surroundings of the site, with an underground telecommunication network being situated within the project site. This network is not connected to any working infrastructure and is therefore not live at this stage. Two elevated cable joints are also identified in the adjacent lot towards the west (Lot 163 DP831052), connecting to an elevated cable joint in Blue Pool Road.

Connection from the proposed development to the above mentioned services will be undertaken by a specialist consultant and will form part of the future Construction Certification applications.

A Level 3 Energy Accredited Service Provider will undertake the design and documentation of the electrical reticulation network. Street lighting will be installed in accordance with Authority standards

9.4 GAS

No allowance has been made to supply the development with reticulated gas. This will be subject to future agreement between the developer and local gas suppliers.

9.5 TESTING OF EXISTING INFRASTRUCTURE

There are areas of the development where it is proposed to utilise existing infrastructure constructed as part of a previous development design. Where this is proposed the infrastructure will be tested to ensure that it is of an appropriate quality as per the RVC Guidelines.

Water

- Pressure testing to detect leakage and defects in the pipeline including joints, thrust and anchor blocks.
- Disinfect all water mains in accordance with the specification in WSA 03 Part 4, section 13.

Sewer

- Compressed air testing of gravitation sewers;
- Ovality testing using a Council approved proving tool. Ovality should comply with the requirements specified in Chapter 402.40 – Initial Test of Gravitation Sewers of the Richmond Valley Council Construction Manual.
- Leakage test of maintenance holes. Tests should comply with Chapter 402.41 – Initial Test of Maintenance Holes of the Richmond Valley Council Construction Manual.
- Hydrostatic testing. Tests should comply with Chapter 402.45 – Hydrostatic testing of gravity mains of the Richmond Valley Council Construction Manual.
- Pressure testing of rising mains. Tests should comply with Chapter 402.47 – Testing of Rising Mains of the Richmond Valley Council Construction Manual.
- Visual inspection via CCTV cameras. Tests should comply with Chapter 402.65 – What is to be inspected of the Richmond Valley Council Construction Manual.

Stormwater

- Visual inspection via CCTV cameras. Tests should comply with Chapter 402.65 – What is to be inspected of the Richmond Valley Council Construction Manual.

10 CONCLUSION

This report has discussed the development of the following lots:

- Lot 276 on DP755624;
- Lot 277 on DP755624;
- Lot 163 on DP831052

The proposed development is to feature 176 residential allotments that are proposed to utilise as much of the existing infrastructure as possible, including roads, stormwater, sewer and water infrastructure.

This report has demonstrated that the proposed development can be adequately provided with all necessary engineering services, including sewer, water, stormwater drainage, electrical and telecommunication infrastructure. It is assumed that the other existing services which are located within the vicinity of the site can accommodate the proposed development's needs.

A summary of the existing and proposed stormwater drainage infrastructure on site has been presented. The provision of on-site stormwater detention has been shown to be detrimental in the case of this development based on the BMT WBM study identifying a rapid disposal method to be more efficient in the release of flood waters.

To service the development with potable water a single water connection point is proposed to the 300mm diameter potable water main in the Iron Gates Drive verge adjacent to the site, connecting to the existing Ø250mm AC main. A water network capacity assessment should be completed in order to confirm that the existing system is adequate to cater for the increased loads imposed on the network by the proposed development.

The proposed connection to the RVC sewerage network for the proposed development will be via the dual 100mm diameter rising main adjacent to the project site within the southern verge of Iron Gates Drive, connecting to the existing Ø150mm gravity main. A sewer network capacity assessment should be completed in order to confirm that the existing system is adequate to cater for the increased loads imposed on the network by the proposed development.

Electrical and telecommunication services shall be provided to the development through connection points to the existing services adjacent to the site in the northern service track and Blue Pool Road. Additional engineering issues such as road access and earthworks have also been presented within the report.

It is anticipated that there will not be any detrimental effects of the proposed development on surrounding properties and that it is possible for all engineering services to be catered for.

APPENDIX A

ENGINEERING DRAWINGS

RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD, EVANS HEAD
DEVELOPMENT APPLICATION

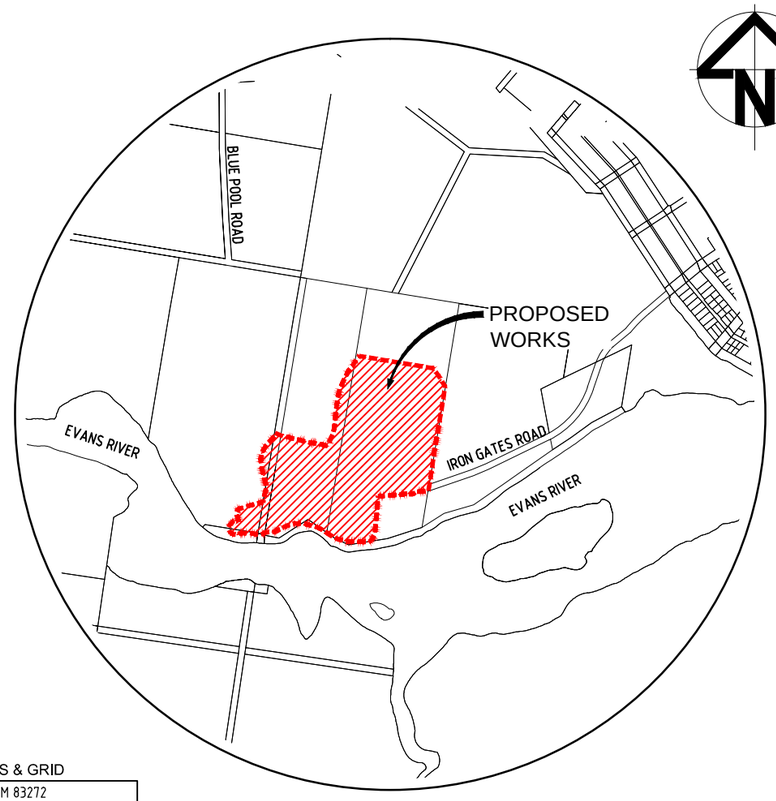
CIVIL ENGINEERING WORKS
FOR : GOLDCORAL PTY LTD

DRAWING SCHEDULE

DWG. No.	DESCRIPTION
C100-AA007094	DRAWING SCHEDULE & LOCALITY PLAN
C101-AA007094	GENERAL NOTES & DETAILS
C102-AA007094	GENERAL ARRANGEMENT LAYOUT PLAN
C105-AA007094	EXISTING FEATURES SURVEY PLAN - SHEET 1 OF 2
C106-AA007094	EXISTING FEATURES SURVEY PLAN - SHEET 2 OF 2
03 C107-AA007094	DEMOLITION LAYOUT PLAN - SHEET 1 OF 2
C108-AA007094	DEMOLITION LAYOUT PLAN - SHEET 2 OF 2
C110-AA007094	SEDIMENT & EROSION CONTROL PLAN - SHEET 1 OF 5
C111-AA007094	SEDIMENT & EROSION CONTROL PLAN - SHEET 2 OF 5
C112-AA007094	SEDIMENT & EROSION CONTROL PLAN - SHEET 3 OF 5
C113-AA007094	SEDIMENT & EROSION CONTROL PLAN - SHEET 4 OF 5
C114-AA007094	SEDIMENT & EROSION CONTROL PLAN - SHEET 5 OF 5
C115-AA007094	SEDIMENT & EROSION CONTROL DETAILS - SHEET 1 OF 3
C116-AA007094	SEDIMENT & EROSION CONTROL DETAILS - SHEET 2 OF 3
C117-AA007094	SEDIMENT & EROSION CONTROL DETAILS - SHEET 3 OF 3
C120-AA007094	BULK EARTHWORKS CUT & FILL LAYOUT PLAN - SHEET 1 OF 5
C121-AA007094	BULK EARTHWORKS CUT & FILL LAYOUT PLAN - SHEET 2 OF 5
C122-AA007094	BULK EARTHWORKS CUT & FILL LAYOUT PLAN - SHEET 3 OF 5
C123-AA007094	BULK EARTHWORKS CUT & FILL LAYOUT PLAN - SHEET 4 OF 5
C124-AA007094	BULK EARTHWORKS CUT & FILL LAYOUT PLAN - SHEET 5 OF 5
03 C125-AA007094	BULK EARTHWORKS CUT & FILL SECTIONS - SHEET 1 OF 2
C126-AA007094	BULK EARTHWORKS CUT & FILL SECTIONS - SHEET 2 OF 2
C130-AA007094	ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 1 OF 5
C131-AA007094	ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 2 OF 5

DRAWING SCHEDULE

DWG. No.	DESCRIPTION
C132-AA007094	ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 3 OF 5
C133-AA007094	ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 4 OF 5
C134-AA007094	ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 5 OF 5
03 C135-AA007094	STORMWATER CATCHMENT LAYOUT PLAN - SHEET 1 OF 2
C136-AA007094	STORMWATER CATCHMENT LAYOUT PLAN - SHEET 2 OF 2
C137-AA007094	TYPICAL BASIN DETAILS
C140-AA007094	TYPICAL ROAD CROSS SECTIONS
C145-AA007094	INTERSECTION DETAILS
C150-AA007094	MC1000 ROAD LONGITUDINAL SECTION - SHEET 1 OF 2
C151-AA007094	MC1000 ROAD LONGITUDINAL SECTION - SHEET 2 OF 2
C152-AA007094	MC1001 ROAD LONGITUDINAL SECTION
C153-AA007094	MC1002 & MC1003 ROAD LONGITUDINAL SECTIONS
C154-AA007094	MC1004 ROAD LONGITUDINAL SECTION
C155-AA007094	MC1005 ROAD LONGITUDINAL SECTION
C156-AA007094	MC1006 & MC1007 ROAD LONGITUDINAL SECTIONS
C157-AA007094	MC1008, MC1009 & MC1010 ROAD LONGITUDINAL SECTIONS
C160-AA007094	COMBINED SERVICES LAYOUT PLAN - SHEET 1 OF 5
C161-AA007094	COMBINED SERVICES LAYOUT PLAN - SHEET 2 OF 5
C162-AA007094	COMBINED SERVICES LAYOUT PLAN - SHEET 3 OF 5
C163-AA007094	COMBINED SERVICES LAYOUT PLAN - SHEET 4 OF 5
03 C164-AA007094	COMBINED SERVICES LAYOUT PLAN - SHEET 5 OF 5
C170-AA007094	IRON GATES ROAD VEHICLE SWEPT PATH ANALYSIS



LOCALITY PLAN
SCALE 1:10000

LEVELS & GRID
ORIGIN PM 83272
LEVELS to AHD
(AUSTRALIAN HEIGHT DATUM)
GRID to GDA94

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale: 0 100 200 400 600 800 1000m — 1 : 10000

Surveyor: ROBERT A HARRIES SURVEYOR
Architect:
Filename: C100-AA007094-GCD-00-DWGSCH.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION
Approved
R.P.E.Q No :
Scales: 1:10000
Original Size: A1
Height Datum: AHD
Grid: GRID
Current Issue Signatures
Author B.DAVEY
Designer A.CAMARDI
Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD
Title: DRAWING SCHEDULE & LOCALITY PLAN

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Drawing No. C100 — Project No. AA007094 — Issue 03

100mm on Original
21/Jul/2015 4:29 PM F:\AA007094\E-CAD\C-Civil\D-Final\C100-AA007094-GCD-00-DWGSCH.dwg V1

GENERAL NOTE:

ALL WORKS TO BE CARRIED OUT IN ACCORDANCE WITH RCV COUNCIL DESIGN GUIDELINES & WORKS SPECIFICATION.
WHERE DISCREPANCIES OCCUR THE MORE STRINGENT SPECIFICATION WILL TAKE PRECEDENCE.

SITEWORKS NOTES

1. CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO COMMENCEMENT OF WORK. ANY DISCREPANCIES TO BE REPORTED TO HYDER CONSULTING.
2. MAKE SMOOTH CONNECTION WITH EXISTING WORKS.
3. ALL TRENCH BACKFILL MATERIAL SHALL BE COMPACTED TO THE SAME DENSITY AS THE ADJACENT MATERIAL.
4. SEWER, POTABLE WATER AND RECYCLED WATERMAINS BACKFILL TO BE IN ACCORDANCE WITH WSA03-2002-2.2, WAT-1201, WAT-1202, WAT-1203 AND WAT-1204-V.
   ALL OTHER SERVICE TRENCHES UNDER VEHICULAR PAVEMENTS SHALL BE BACKFILLED WITH SAND TO 300mm ABOVE PIPE. WHERE PIPE IS UNDER PAVEMENTS BACKFILL REMAINDER OF TRENCH TO UNDERSIDE OF PAVEMENT WITH SAND OR APPROVED GRANULAR MATERIAL COMPACTED IN 150mm LAYERS TO MINIMUM 98% MODIFIED MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 5.2.1.
   (OR A DENSITY INDEX OF NOT LESS THAN 70)
5. PROVIDE 10mm WIDE EXPANSION JOINTS BETWEEN BUILDINGS AND ALL CONCRETE OR UNIT PAVEMENTS.
6. ASPHALTIC CONCRETE SHALL CONFORM TO R.T.A. SPECIFICATION R116.
7. ALL BASECOURSE MATERIAL SHALL BE IGNEOUS ROCK QUARRIED MATERIAL TO COMPLY WITH R.T.A. FORM 3051 (UNBOUND), R.T.A. FORM 3052 (BOUND) COMPACTED TO MINIMUM 98% MODIFIED DENSITY IN ACCORDANCE WITH AS 1289 5.2.1
   FREQUENCY OF COMPACTION TESTING SHALL NOT BE LESS THAN 1 TEST PER 50m^3 OF BASECOURSE MATERIAL PLACED.
8. ALL SUB-BASE COURSE MATERIAL SHALL BE IGNEOUS ROCK QUARRIED MATERIAL TO COMPLY WITH R.T.A. FORM 3051, 3051.1 AND COMPACTED TO MINIMUM 98% MODIFIED DENSITY IN ACCORDANCE WITH A.S 1289 5.2.1 FREQUENCY OF COMPACTION TESTING SHALL NOT BE LESS THAN 1 TEST PER 50m^3 OF SUB-BASE COURSE MATERIAL PLACED.
9. AS AN ALTERNATIVE TO THE USE OF IGNEOUS ROCK AS A SUB-BASE MATERIAL IN (9) A CERTIFIED RECYCLED CONCRETE MATERIAL COMPLYING WITH R.T.A. FORM 3051 AND 3051.1 WILL BE CONSIDERED, SUBJECT TO MATERIAL SAMPLES AND APPROPRIATE CERTIFICATIONS BEING PROVIDED TO THE SATISFACTION OF HYDER CONSULTING AND RCV COUNCIL SPEC.
10. SHOULD THE CONTRACTOR WISH TO USE A RECYCLED PRODUCT THIS SHALL BE CLEARLY INDICATED IN THEIR TENDER AND THE PRICE DIFFERENCE BETWEEN AN IGNEOUS PRODUCT AND A RECYCLED PRODUCT SHALL BE CLEARLY INDICATED.
11. WHERE NOTED ON THE DRAWINGS THAT WORKS ARE TO BE CARRIED BY OTHERS, (eg. ADJUSTMENT OF SERVICES), THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CO-ORDINATION OF THESE WORKS.
12. ALL FOOT PATHS AND CYLCEWAYS TO BE IN ACCORDANCE WITH RCV STD DRAWING R-07

GENERAL NOTES

1. ALL WORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH COUNCIL'S STANDARDS AND SPECIFICATIONS AND/OR AS DIRECTED BY THE ENGINEER.
2. THE CONTRACTOR SHALL LOCATE AND LEVEL ALL EXISTING SERVICES PRIOR TO COMMENCING CONSTRUCTION AND SHALL MAKE ALL NECESSARY ARRANGEMENTS WITH THE RELEVANT AUTHORITY TO RELOCATE OR ADJUST AS REQUIRED. ALL COSTS TO BE BORNE BY THE APPLICANT, (NOT AT COUNCIL'S EXPENSE)
3. THE CONTRACTOR SHALL NOT ENTER UPON OR DO ANY WORK WITHIN ADJACENT LANDS WITHOUT PRIOR WRITTEN PERMISSION OF THE LAND OWNER.
4. SURVEY MARKS SHOWN THUS ◘ SHALL BE MAINTAINED AT ALL TIMES. WHERE RETENTION IS NOT POSSIBLE THE ENGINEER SHALL BE NOTIFIED AND CONSENT RECEIVED PRIOR TO THEIR REMOVAL OR RELOCATION.
5. ALL NEW WORKS SHALL MAKE SMOOTH JUNCTION WITH EXISTING CONDITIONS.
6. SEDIMENT CONTROL MEASURES SHALL BE IMPLEMENTED PRIOR TO SOIL DISTURBANCE IN KEEPING WITH THE "MANAGING STORMWATER MANUAL", 2004 BY LANDCOM AND TO COUNCIL'S SOIL EROSION AND SEDIMENT CONTROL POLICY.
7. ALL LAND DISTURBED BY EARTHWORKS SHALL BE HYDROMULCHED, OR SIMILARLY TREATED TO ESTABLISH GRASS COVER. SEED MIXTURES ARE TO BE APPROVED BY COUNCIL PRIOR TO SPRAYING. ALL GRASSED AREAS SHALL BE REGULARLY WATERED AND MAINTAINED UNTIL EXPIRATION OF THE MAINTENANCE PERIOD.
8. THE CONTRACTOR SHALL MAINTAIN DUST CONTROL THROUGHOUT THE DURATION OF THE PROJECT.
9. ALL PITS DEEPER THAN 1.2m SHALL HAVE STEP IRONS PROVIDED IN ACCORDANCE WITH COUNCIL'S STANDARDS.
10. ALL DRAINAGE LINES THROUGH LOTS SHALL BE CONTAINED WITHIN THEIR EASEMENTS AND CONFORM WITH COUNCIL'S STANDARDS.
11. SUBSOIL DRAINS SHALL BE CONSTRUCTED TO THE SATISFACTION OF THE COUNCIL.
12. INTERALLOTMENT DRAINAGE LINES SHALL HAVE A MINIMUM 300mm COVER AND DESIRABLE MINIMUM GRADE OF 1%.
13. MINIMUM 50mm THICK TOPSOIL SHALL BE SPREAD ON ALL FOOTPATHS, BERMS, BATTERS AND SITE REGRADING AREAS. EXCESS TOPSOIL SHALL BE DISPOSED OF AS DIRECTED BY THE ENGINEER.
14. THE CONTRACTOR SHALL PROVIDE MINIMUM 48 HOURS NOTICE TO THE ENGINEER FOR ALL INSPECTIONS.
15. THE CONTRACTOR SHALL MAINTAIN SERVICES AND ALL WEATHER ACCESS AT ALL TIMES TO THE ADJOINING PROPERTIES.
16. THE CONTRACTOR SHALL UNDERTAKE TRAFFIC CONTROL MEASURES TO ENGINEER'S AND RCV COUNCIL SATISFACTION AND SHALL DISPLAY APPROPRIATE WARNING SIGNS THROUGHOUT THE DURATION OF CONSTRUCTION.
17. ALL NATURAL SURFACE DATA HAS BEEN DETERMINED BY TERRAIN MODELLING. ALL CONSTRUCTION SITE WORKS MUST BE CARRIED OUT USING THE BENCH MARKS NOTED ON THIS DRAWING.
18. 100 YEAR FLOW PATHS TO BE FORMED AT TIME OF CONSTRUCTION.

STRUCTURAL INSPECTIONS

1. STRUCTURAL INSPECTIONS ARE REQUIRED FOR STRUCTURES WHERE NOTED ON PLANS OR REQUIRED BY COUNCIL.
2. 48 HOURS NOTICE IS REQUIRED FOR ALL INSPECTIONS.

CONCRETE NOTES

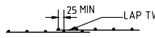
1. ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS 3600 CURRENT EDITION WITH AMENDMENTS, EXCEPT WHERE VARIED BY THE CONTRACT DOCUMENTS.
2. CONCRETE QUALITY
   ALL REQUIREMENTS OF THE CURRENT ACSE CONCRETE SPECIFICATION DOCUMENT 1 SHALL APPLY TO THE FORMWORK, REINFORCEMENT AND CONCRETE UNLESS NOTED OTHERWISE.

ELEMENT	AS 3600 F'c MPa AT 28 DAYS	SPECIFIED SLUMP	NOMINAL AGG. SIZE
VEHICULAR BASE	32	60	20
KERBS, PATHS, AND PITS	20	80	20
RETAINING WALLS	20	80	20

   - CEMENT TYPE SHALL BE (ACSE SPECIFICATION) TYPE SL
   - PROJECT CONTROL TESTING SHALL BE CARRIED OUT IN ACCORDANCE WITH AS 1379.
3. NO ADMIXTURES SHALL BE USED IN CONCRETE UNLESS APPROVED IN WRITING BY HYDER CONSULTING.
4. CLEAR CONCRETE COVER TO ALL REINFORCEMENT FOR DURABILITY SHALL BE 40mm TOP AND 70mm FOR EXTERNAL EDGES UNLESS NOTED OTHERWISE.
5. ALL REINFORCEMENT SHALL BE FIRMLY SUPPORTED ON MILD STEEL PLASTIC TIPPED CHAIRS, PLASTIC CHAIRS OR CONCRETE CHAIRS AT NOT GREATER THAN 1m CENTRES BOTH WAYS. BARS SHALL BE TIED AT ALTERNATE INTERSECTIONS.
6. THE FINISHED CONCRETE SHALL BE A DENSE HOMOGENEOUS MASS, COMPLETELY FILLING THE FORMWORK, THOROUGHLY EMBEDDING THE REINFORCEMENT AND FREE OF STONE POCKETS. ALL CONCRETE INCLUDING SLABS ON GROUND AND FOOTINGS SHALL BE COMPACTED AND CURED IN ACCORDANCE WITH R.T.A. SPECIFICATION R83.
7. REINFORCEMENT SYMBOLS:
   N DENOTES GRADE 450 N BARS TO AS 4671 GRADE N
   R DENOTES 230 R HOT ROLLED PLAIN BARS TO AS 4671
   SL DENOTES HARD-DRAWN WIRE REINFORCING FABRIC TO AS 4671

   NUMBER OF BARS IN GROUP — BAR GRADE AND TYPE
   17 N 20 250
   NOMINAL BAR SIZE IN mm — SPACING IN mm

   THE FIGURE FOLLOWING THE FABRIC SYMBOL SL IS THE REFERENCE NUMBER FOR FABRIC TO AS 4671.
8. FABRIC SHALL BE LAPPED IN ACCORDANCE WITH THE FOLLOWING DETAIL:



STORMWATER DRAINAGE NOTES

1. STORMWATER DESIGN CRITERIA:
   (A) AVERAGE RECURRENCE INTERVAL:
   ROAD DRAINAGE
   5 YEARS ARI MINOR STORM EVENT
   100 YEARS ARI MAJOR STORM EVENT
   INTER ALLOTMENT DRAINAGE
   5 YEARS ARI STORM EVENT
2. PIPES 375 DIA. AND LARGER TO BE REINFORCED CONCRETE CLASS '2' APPROVED SPIGOT AND SOCKET WITH RUBBER RING JOINTS. U.N.O.
3. PIPES TO BE INSTALLED TO TYPE HS1 SUPPORT IN ACCORDANCE WITH AS 3725 (1989) IN ALL CASES BACKFILL TRENCH WITH SAND TO 300mm ABOVE PIPE. WHERE PIPE IS UNDER PAVEMENTS BACKFILL REMAINDER OF TRENCH TO UNDERSIDE OF PAVEMENT WITH SAND OR APPROVED GRANULAR MATERIAL COMPACTED IN 150mm LAYERS TO MINIMUM 98% MODIFIED. MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 5.2.1. (OR A DENSITY INDEX OF NOT LESS THAN 70)
4. ALL INTERNAL WORKS WITHIN PROPERTY BOUNDARIES ARE TO COMPLY WITH THE REQUIREMENTS OF AS 3500 3.1 (1998) AND AS/NZS 3500 3.2 (1998).
5. PRECAST PITS MAY BE USED SUBJECT TO APPROVAL BY HYDER CONSULTING.
6. WHERE SUBSOIL DRAINS PASS UNDER FLOOR SLABS AND VEHICULAR PAVEMENTS, UNSLOTTED uPVC SEWER GRADE PIPE IS TO BE USED.
7. CARE IS TO BE TAKEN WITH LEVELS OF STORMWATER LINES. GRADES SHOWN ARE NOT TO BE REDUCED WITHOUT APPROVAL.
8. GRATES AND COVERS SHALL CONFORM TO BCC REQUIREMENTS AND AS3996
9. AT ALL TIMES DURING CONSTRUCTION OF STORMWATER PITS, ADEQUATE SAFETY PROCEDURES SHALL BE TAKEN TO ENSURE AGAINST THE POSSIBILITY OF PERSONNEL FALLING DOWN PITS.
10. ALL EXISTING STORMWATER DRAINAGE LINES AND PITS THAT ARE TO REMAIN ARE TO BE INSPECTED AND CLEANED. DURING THIS PROCESS ANY PART OF THE STORMWATER DRAINAGE SYSTEM THAT WARRANTS REPAIR SHALL BE REPORTED TO THE SUPERINTENDENT/ENGINEER FOR FURTHER DIRECTIONS.
11. CCTV ALL PIPES AFTER CONSTRUCTION AND PRIOR TO PRACTICAL COMPLETION.
12. PIPES ARE DESIGNED FOR OPERATIONAL TRAFFIC LOADS ONLY. APPROPRIATE MEASURES SHOULD BE TAKEN TO PROTECT PIPES DURING CONSTRUCTION.

BULK EARTHWORKS NOTES

1. ORIGIN OF LEVELS: REFER SURVEY NOTES
2. STRIP ALL TOPSOIL/ORGANIC MATERIAL (50mm NOMINAL) FROM CONSTRUCTION AREA AND REMOVE FROM SITE OR STOCK PILE AS DIRECTED BY SUPERINTENDENT.
3. EXCAVATED MATERIAL TO BE USED AS STRUCTURAL FILL PROVIDED THE PLACEMENT MOISTURE CONTENT OF THE MATERIAL IS +/- 2% OF THE OPTIMUM MOISTURE CONTENT.
4. COMPACT FILL AREAS AND SUBGRADE TO NOT LESS THAN:

LOCATION	MINIMUM DRY DENSITY (AS 1289 E 5.1.1.)
UNDER BUILDING SLABS ON GROUND	95% STD
UNDER ROADS, FOOTWAYS AND CARPARKS	98% STD
LANDSCAPED AREAS UNLESS NOTED OTHERWISE	95% STD

5. BEFORE PLACING FILL, PROOF ROLL EXPOSED SUBGRADE WITH AN 12 TONNE (MIN) DEADWEIGHT SMOOTH DRUM VIBRATORY ROLLER TO DETECT THEN REMOVE SOFT SPOTS (AREAS WITH MORE THAN 2mm MOVEMENT UNDER ROLLER).
6. FREQUENCY OF COMPACTION TESTING SHALL BE NOT LESS THAN :-
   (A) 1 TEST PER 200m^2 OF FILL PLACED PER 200 LAYER OF FILL.
   (B) 3 TESTS PER LAYER
   (C) 1 TEST PER 1000m^2 OF EXPOSED SUBGRADE
   TESTING SHALL BE "LEVEL 1" TESTING IN ACCORDANCE WITH AS 3798 (1996).
7. FILLING TO BE PLACED AND COMPACTED IN MAXIMUM 250mm LAYERS
8. NO FILLING SHALL TAKE PLACE TO EXPOSED SUBGRADE UNTIL THE AREA HAS BEEN PROOF ROLLED IN THE PRESENCE OF THE GEOTECHNICAL ENGINEER AND APPROVAL GIVEN IN WRITING THAT FILLING CAN PROCEED.
9. WHERE GROUNDWATER DISCHARGE OCCURS IN BULK EXCAVATIONS OR CUT FACES, SUBSOIL DRAINAGE SHALL BE INSTALLED IN ACCORDANCE WITH THE SITE SUPERINTENDENT / GEOTECH INSTRUCTIONS TO DIRECT DISCHARGE WATER TO THE NEAREST STORMWATER / SEDIMENTATION CONTROL DEVICE. THE SUBSOIL DRAINAGE MUST BE INSTALLED AS SOON AS PRACTICALLY POSSIBLE AFTER EXCAVATION. SUBSOIL DRAINAGE SHALL ALSO BE INSTALLED AT LOW POINTS IN THE FINISHED EARTHWORK PROFILE IN ACCORDANCE WITH THE SITE SUPERINTENDENT / GEOTECH'S INSTRUCTIONS.
10. ENSURE TEMPORARY DIVERSION CHANNELS ARE CONSTRUCTED AROUND STOCKPILED MATERIALS AND DISTURBED AREAS GENERALLY AS DETAILED.
11. THE CONTRACTOR SHALL ALLOW FOR AND COORDINATE ALL MONITORING AND MAINTENANCE REQUIREMENTS IN RELATION TO SOIL AND GROUNDWATER CONDITIONS DURING CONSTRUCTION.

SUBSOIL DRAINAGE NOTES:

1. SUBSOILS DRAINAGE TO BE IN ACCORDANCE WITH RCV COUNCIL SPECIFICATIONS.
2. SUBSOIL DRAINAGE LINES TO BE CONSTRUCTED UNDER ALL KERB AND GUTTER EXCEPT WHERE LONGITUDINAL ROAD DRAINAGE IS PROVIDED.
3. CLEANOUT TO BE PROVIDED IN ACCORDANCE WITH RCV COUNCIL SPECIFICATIONS.
4. EXTRA SUBSOIL DRAINS ARE TO BE PROVIDED WHERE SHOWN ON THE SITE WORKS AND DRAINAGE PLAN.

PROPOSED SERVICES NOTES

1. THIS DRAWING IS TO BE READ IN CONJUNCTION WITH:- SERVICE AUTHORITY DRAWINGS AND SPECIFICATIONS
2. THE CONTRACTOR SHALL ATTEND, MANAGE & SUPERVISE THE PROVISION OF PUBLIC UTILITY SERVICES TO THE WORKS GENERALLY AS INDICATED ON THE SERVICES PLANS, NOTING THAT PRIOR & DURING CONSTRUCTION THE PUBLIC UTILITY AUTHORITIES WILL FINALISE THEIR DOCUMENTATION TO CONSTRUCTION ISSUE STANDARD. THE FOLLOWING GENERAL ARRANGEMENTS SHALL APPLY IN RESPECT OF EACH PUBLIC UTILITY SERVICE.

   CONDUIT ROAD CROSSING

   THE CIVIL CONTRACTOR SHALL ALLOW IN THEIR PRICE FOR CONDUIT CROSSINGS UNDER THE PROPOSED ROADS AS SHOWN ON THE "SERVICES PLAN".
3. THE CIVIL CONTRACTOR (TRENCH PROVIDER) IS TO ARRANGE ON SITE MEETING WITH ALL SERVICE AUTHORITIES PRIOR TO THE INSTALLATION OF CONDUITS.
4. THE CIVIL CONTRACTOR TO CO-ORDINATE INSTALLATION OF ELECTRICITY, GAS AND TELECOMMUNICATION SERVICES.
5. ELECTRICITY, GAS AND TELECOMMUNICATION SERVICES ARE TO BE LAID FOLLOWING THE INSTALLATION OF STORMWATER, SEWER AND WATER SERVICES AND KERB AND GUTTER.
6. ALL UTILITY AUTHORITY REPRESENTATIVES TO INSPECT ROAD CROSSINGS PRIOR TO SEALING.
7. ALL ELECTRICAL ROAD CROSSINGS TO BE CLASS 6 (ORANGE) uPVC CONDUITS.
8. ALL GAS ROAD CROSSINGS TO BE uPVC GREY SEWER GRADE CONDUITS.
9. ALL STREET POLES TO BE POSITIONED 350mm FROM BOUNDARY TO CENTRELINE OF POLE. CONTRACTOR TO ALLOW TO EXCAVATE AND BACKFILL TRENCH GENERALLY IN ACCORDANCE WITH NOTE 2.
10. WHERE FOOTPATHS ARE TO BE CONSTRUCTED, ALL SERVICE PIT COVERS AND MARKERS ARE TO BE LAID WHOLLY WITHIN THE CONCRETE FOOTPATH. CONTACT SUPERINTENDENT SHOULD DIFFICULTIES ARISE.
11. ELECTRICITY CONDUITS ARE SHOWN FOR CLARITY HOWEVER, CABLES MAY BE DIRECTLY BURIED. APPROVAL BY ENERGY AUSTRALIA REQUIRED.
12. SERVICES MARKERS ARE TO BE PLACED ON THE KERB & GUTTER AT ALL ROAD CROSSING POINTS, ON BOTH SIDES OF THE ROAD.
13. ALL SERVICE PIT COVERS TO BE INSTALLED FLUSH WITH PROPOSED VERGE LEVELS AND GRADES.

TELSTRA - DUTY OF CARE NOTE

TELSTRA'S PLANS SHOW ONLY THE PRESENCE OF CABLES AND PLANT. THEY ONLY SHOW THEIR POSITION RELATIVE TO ROAD BOUNDARIES, PROPERTY FENCES ETC. AT THE TIME OF INSTALLATION AND TELSTRA DOES NOT WARRANT OR HOLD OUT THAT SUCH PLANS ARE ACCURATE THEREAFTER DUE TO CHANGES THAT MAY OCCUR OVER TIME.
DO NOT ASSUME DEPTH OR ALIGNMENT OF CABLES OR PLANT AS THESE VARY SIGNIFICANTLY.
THE CONTRACTOR HAS A DUTY OF CARE WHEN EXCAVATING NEAR TELSTRA CABLES AND PLANT. BEFORE USING MACHINE EXCAVATORS TELSTRA PLANT MUST FIRST BE PHYSICALLY EXPOSED BY SOFT DIG POTHOLING TO IDENTIFY IT'S LOCATION TELSTRA WILL SEEK COMPENSATION FOR DAMAGES CAUSED TO IT'S PROPERTY AND LOSSES CAUSED TO TELSTRA AND IT'S CUSTOMERS.

EXISTING UNDERGROUND SERVICES NOTES

THE LOCATIONS OF UNDERGROUND SERVICES SHOWN IN THIS SET OF DRAWINGS HAVE BEEN PLOTTED FROM SURVEY INFORMATION AND SERVICE AUTHORITY INFORMATION. THE SERVICE INFORMATION HAS BEEN PREPARED ONLY TO SHOW THE APPROXIMATE POSITIONS OF ANY KNOWN SERVICES AND MAY NOT BE AS CONSTRUCTED OR ACCURATE.
HYDER CONSULTING CAN NOT GUARANTEE THAT THE SERVICES INFORMATION SHOWN ON THESE DRAWINGS ACCURATELY INDICATES THE PRESENCE OR ABSENCE OF SERVICES OR THEIR LOCATION AND WILL ACCEPT NO LIABILITY FOR INACCURACIES IN THE SERVICES INFORMATION SHOWN FROM ANY CAUSE WHATSOEVER.

CONTRACTORS SHALL TAKE DUE CARE WHEN EXCAVATING ONSITE INCLUDING HAND EXCAVATION WHERE NECESSARY.

CONTRACTORS ARE TO CONTACT THE RELEVANT SERVICE AUTHORITY PRIOR TO COMMENCEMENT OF EXCAVATION WORKS.

CONTRACTORS ARE TO UNDERTAKE A SERVICES SEARCH, PRIOR TO COMMENCEMENT OF WORKS ON SITE. SEARCH RESULTS ARE TO BE KEPT ON SITE AT ALL TIMES.

TRAFFIC CONTROL NOTES

1. A TRAFFIC CONTROL PLAN IS TO BE PREPARED AND LODGED WITH COUNCIL BY THE CONTRACTOR PRIOR TO COMMENCEMENT OF CONSTRUCTION

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

100mm on Original

Scale

Surveyor: ROBERT A HARRIES SURVEYOR

Architect

Filename: C101-AA007094-GCD-00-GENERAL NOTES.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved

R.P.E.Q No :

Scales

Current Issue Signatures

Original Size: A1

Author: B.DAVEY

Designer: A.CAMARDI

Height Datum: AHD

Reviewer: B.LUSTY

Grid: GRID

Project: RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title: GENERAL NOTES & DETAILS

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Drawing No. C101 — Project No. AA007094 — Issue 03

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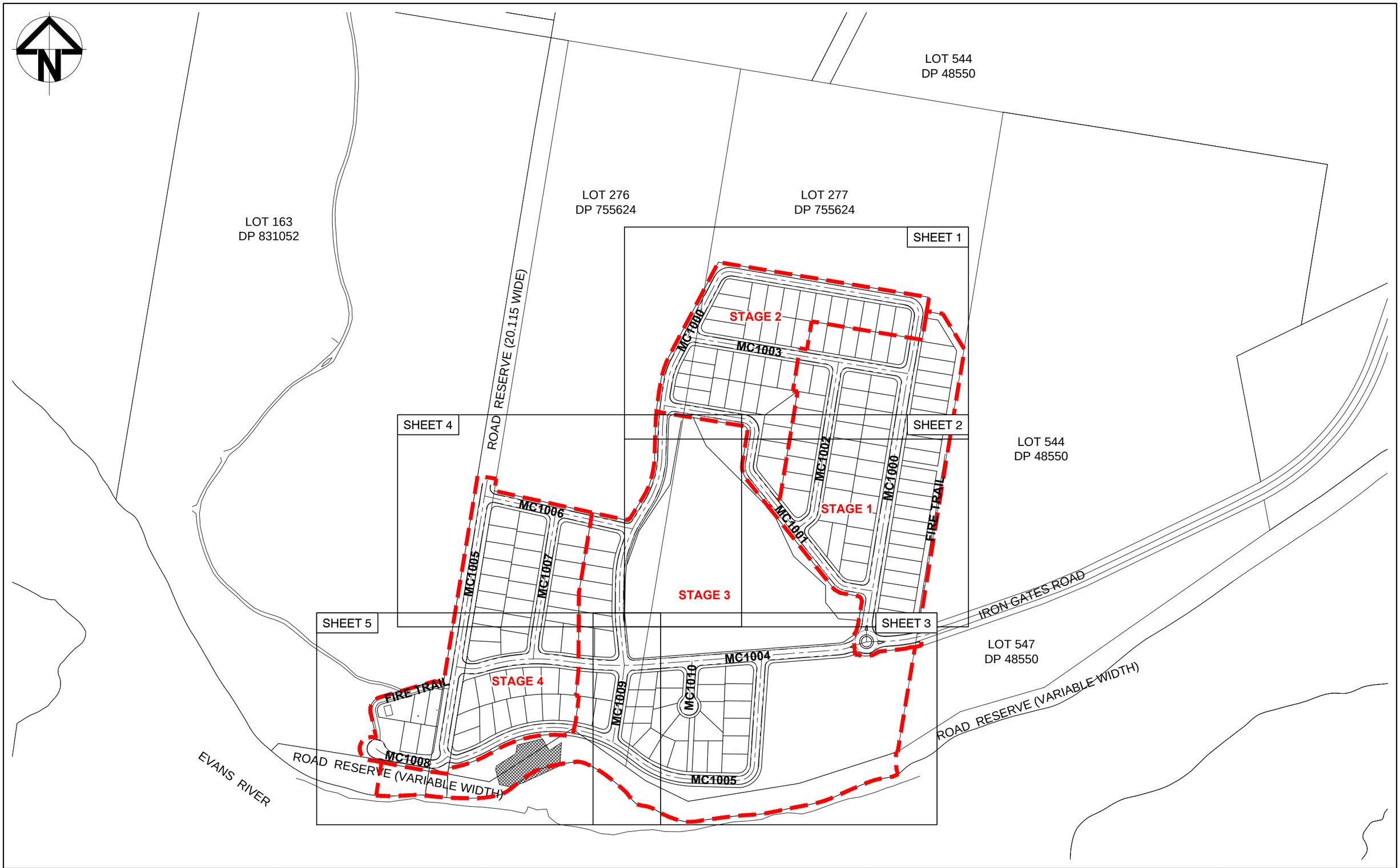

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale: 0 50 100 150 200m — 1 : 2000

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C102-AA007094-GCD-00-GENERAL ARRANGEMENT.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No :

Scales	1:2000	Current Issue Signatures	
		Author B.DAVEY	
Original Size	A1	Designer A.CAMARDI	
Height Datum	AHD	Reviewer B.LUSTY	
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Project: RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title: GENERAL ARRANGEMENT
LAYOUT PLAN

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C102	AA007094	03

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LEGEND

- EXISTING SURFACE CONTOURS
- EXISTING STORMWATER RETICULATION
- EXISTING SEWERAGE RETICULATION
- EXISTING SEWER RISING MAIN
- EXISTING WATER RETICULATION (INDICATIVE LAYOUT)
- EXISTING OVERHEAD ELECTRICAL
- EXISTING FENCE
- EXISTING KERB INVERT
- EXISTING TREES
- MIDDEN LOCATION
- SITE BOUNDARY

LOT 544
DP 48550

LOT 276
DP 755624

LOT 277
DP 755624

ROAD RESERVE (20.115 WIDE)

EXISTING OUTLET ϕ825

EXISTING OUTLET ϕ825

LOT 544
DP 48550

FOR CONTINUATION REFER DWG C106

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

100mm on Original

Scale
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1 : 1000

Surveyor
ROBERT A HARRIES
SURVEYOR

Architect

Filename: C105-AA007094-GCD-00-EXISTING FEATURES.DWG

Client
GOLDCORAL PTY LTD

Status
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		Current Issue Signatures	
Scales	1:1000	Author B.DAVEY	
Original Size	A1	Designer A.CAMARDI	
Height Datum	AHD	Reviewer B.LUSTY	
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Project
RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title
EXISTING FEATURES
SURVEY PLAN -
SHEET 1 OF 2

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Drawing No.	Project No.	Issue
C105	AA007094	03

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Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
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Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

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Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

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Scales	1:1000	Current Issue Signatures	
		Author B.DAVEY	
Original Size	A1	Designer A.CAMARDI	
Height Datum	AHD	Reviewer B.LUSTY	
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Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: EXISTING FEATURES SURVEY PLAN - SHEET 2 OF 2

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LEGEND

- EXISTING SURFACE CONTOURS
- EXISTING STORMWATER RETICULATION
- EXISTING SEWERAGE RETICULATION
- EXISTING SEWERAGE RETICULATION (TO BE REMOVED)
- EXISTING WATER RETICULATION (INDICATIVE LAYOUT)
- EXISTING WATER RETICULATION (TO BE REMOVED)
- EXISTING OVERHEAD ELECTRICAL
- EXISTING FENCE
- EXISTING PAVEMENT & KERB (TO BE REMOVED)
- EXISTING TREES
- MIDDEN LOCATION
- SITE BOUNDARY

LOT 544
DP 48550

LOT 276
DP 755624

LOT 277
DP 755624

FOR EXISTING ELECTRICAL INFORMATION REFER ELECTRICAL CONSULTANTS DRAWINGS

PROPOSED SUBDIVISION LAYOUT

WATER TO BE RETAINED

EXISTING OUTLET Ø825

SEWER TO BE RETAINED

EXISTING OUTLET Ø825

LOT 544
DP 48550

ROAD RESERVE (20.115 WIDE)

FOR CONTINUATION REFER DWG C108

Issue	Description		Date
01	ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15

Scale: 0 10 20 40 60 80 100m — 1 : 1000

100mm on Original

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C107-AA007094-GCD-00-DEMOLITION.DWG

Client: GOLDCORAL PTY LTD

Status: **FOR APPROVAL**
NOT TO BE USED FOR CONSTRUCTION

Approved

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Scales	1:1000	Current Issue Signatures	
Original Size	A1	Author B.DAVEY	
Height Datum	AHD	Designer A.CAMARDI	
Grid	GRID	Reviewer B.LUSTY	

Project: RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title: DEMOLITION LAYOUT PLAN
- SHEET 1 OF 2

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Drawing No.	Project No.	Issue
C107	AA007094	01

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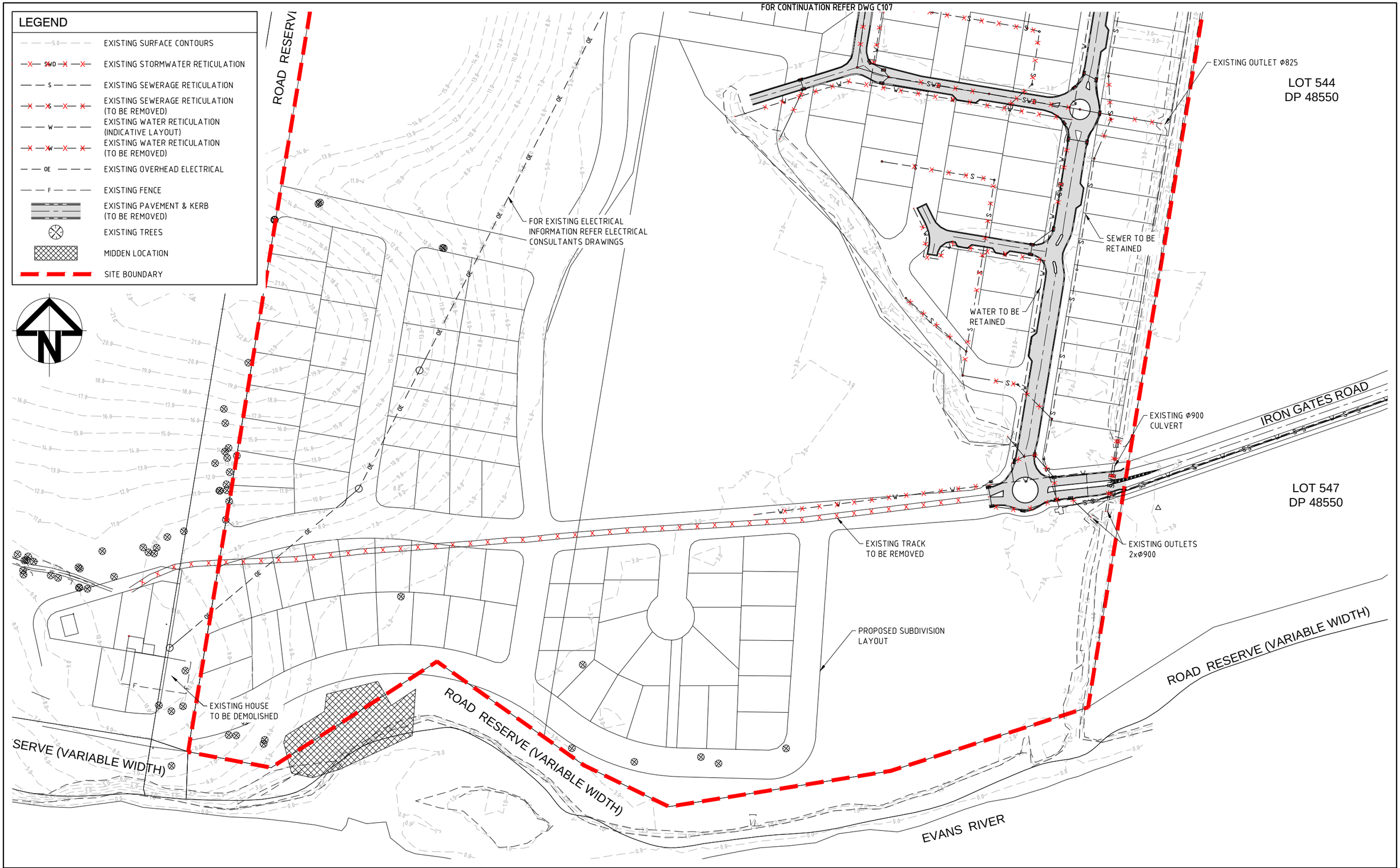

Issue	Description		Date
01	ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15

100mm on Original

Scale: 0 10 20 40 60 80 100m — 1 : 1000

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

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Client: GOLDCORAL PTY LTD

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Original Size: A1

Height Datum: AHD

Grid: GRID

Current Issue Signatures

Author B.DAVEY

Designer A.CAMARDI

Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: DEMOLITION LAYOUT PLAN - SHEET 2 OF 2

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LEGEND

- PROPOSED SURFACE CONTOURS (5.0)
- EXISTING SURFACE CONTOURS (5.0)
- PROPOSED STORMWATER LINE (SWD)
- TOP/TOE OF BATTER
- 1m WIDE TURF BEHIND KERB
- SILT FENCE (SF)
- FIELD INLET TREATMENT
- SAG GULLY TREATMENT (XXX)
- GULLY TREATMENT ON GRADE
- SAND BAG CHECK DAM (CHECK)
- SEDIMENTATION POND (SP)
- VEHICULAR SHAKEDOWN
- DIRECTION OF OVERLAND FLOW
- DIVERSION CHANNEL (DC)
- PROPOSED RETAINING WALL
- PROPOSED BIO
- MIDDEN LOCATION

GENERAL NOTES

1. SEDIMENT BASINS TO BE SIZED TO SUIT CONSTRUCTION CATCHMENTS & FINAL LAYOUT BY CONTRACTOR & APPROVED BY COUNCIL PRIOR TO CONSTRUCTION.
2. FOR SEDIMENT & EROSION CONTROL DETAILS REFER DWGS C115 TO C117

N

SHEET 1
SHEET 2
SHEET 3
SHEET 4
SHEET 5

180

MC1000
MC1001
MC1002
MC1003
FIRE TRAIL

FOR CONTINUATION REFER DWG C111

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
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Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C110-AA007094-GCD-00-SED & ERO.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

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		Current Issue Signatures	
Scales	1:500	Author B.DAVEY	
Original Size	A1	Designer A.CAMARDI	
Height Datum	AHD	Reviewer B.LUSTY	
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Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: SEDIMENT & EROSION CONTROL PLAN - SHEET 1 OF 5

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Drawing No. C110 — Project No. AA007094 — Issue 03

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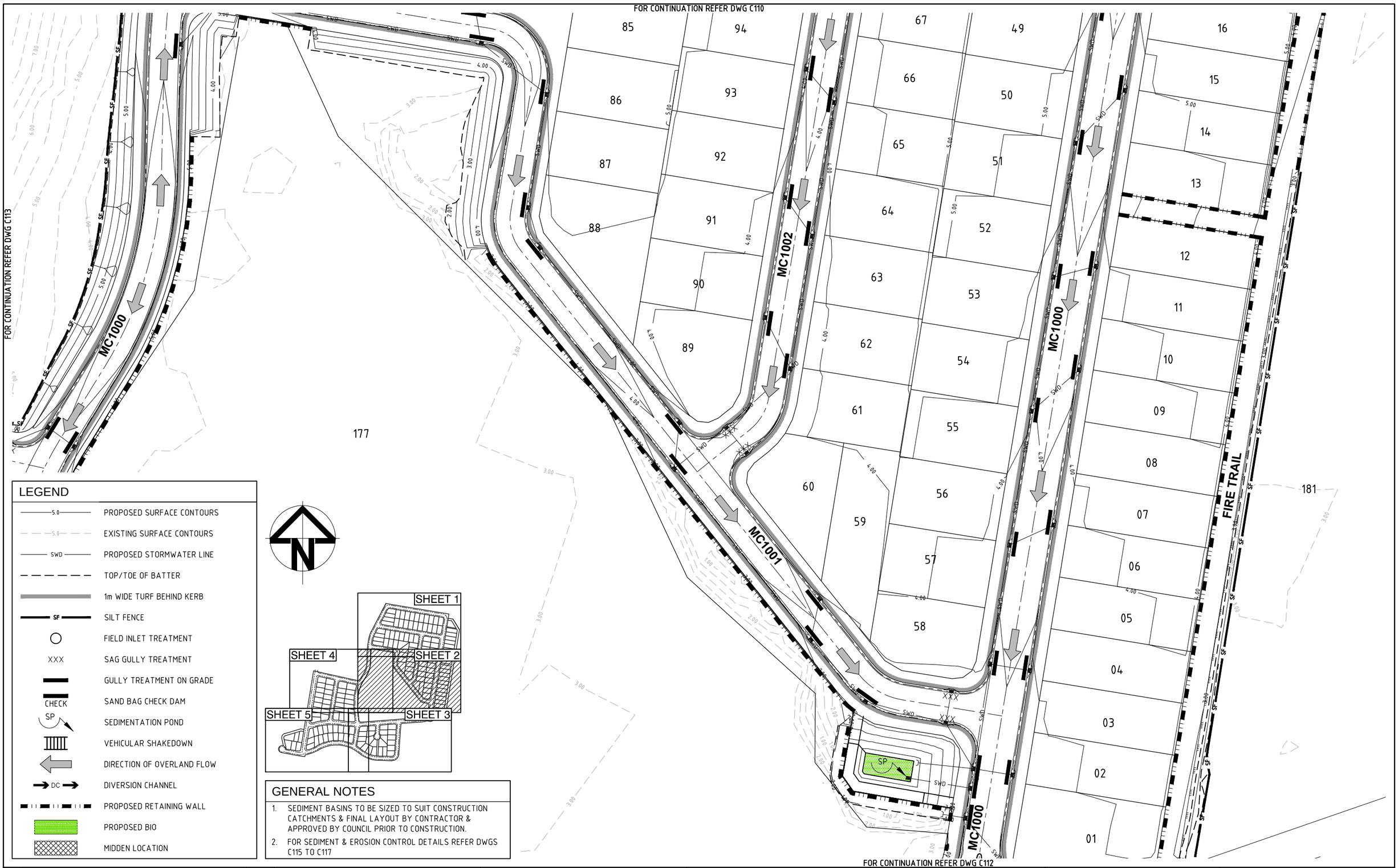

LEGEND

- PROPOSED SURFACE CONTOURS (5.0)
- EXISTING SURFACE CONTOURS (5.0)
- PROPOSED STORMWATER LINE (SWD)
- TOP/TOE OF BATTER
- 1m WIDE TURF BEHIND KERB
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- GULLY TREATMENT ON GRADE
- SAND BAG CHECK DAM (CHECK)
- SEDIMENTATION POND (SP)
- VEHICULAR SHAKEDOWN
- DIRECTION OF OVERLAND FLOW
- DIVERSION CHANNEL (DC)
- PROPOSED RETAINING WALL
- PROPOSED BIO
- MIDDEN LOCATION

GENERAL NOTES

1. SEDIMENT BASINS TO BE SIZED TO SUIT CONSTRUCTION CATCHMENTS & FINAL LAYOUT BY CONTRACTOR & APPROVED BY COUNCIL PRIOR TO CONSTRUCTION.
2. FOR SEDIMENT & EROSION CONTROL DETAILS REFER DWGS C115 TO C117

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
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Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C110-AA007094-GCD-00-SED & ERO.DWG

Client: GOLDCORAL PTY LTD

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Scales	1:500	Author B.DAVEY	
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Title: SEDIMENT & EROSION CONTROL PLAN - SHEET 2 OF 5

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Drawing No. C111 — Project No. AA007094 — Issue 03

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FOR CONTINUATION REFER DWG C111

FOR CONTINUATION REFER DWG C114

MC1000
MC1004
MC0000
MC1010
MC1009
MC1005

164
119
137
112
111
113
110
114
109
115
116
117
118
107
96
106
97
105
98
104
108
103
102
99
100
101
01
178 (PART)

SWD
SF
CHECK
SP
4.00
3.00
2.00
1.00
0.00

SHEET 1
SHEET 2
SHEET 3
SHEET 4
SHEET 5

GENERAL NOTES

1. SEDIMENT BASINS TO BE SIZED TO SUIT CONSTRUCTION CATCHMENTS & FINAL LAYOUT BY CONTRACTOR & APPROVED BY COUNCIL PRIOR TO CONSTRUCTION.
2. FOR SEDIMENT & EROSION CONTROL DETAILS REFER DWGS C115 TO C117

LEGEND

- PROPOSED SURFACE CONTOURS
- EXISTING SURFACE CONTOURS
- PROPOSED STORMWATER LINE
- TOP/TOE OF BATTER
- 1m WIDE TURF BEHIND KERB
- SILT FENCE
- FIELD INLET TREATMENT
- SAG GULLY TREATMENT
- GULLY TREATMENT ON GRADE
- SAND BAG CHECK DAM
- SEDIMENTATION POND
- VEHICULAR SHAKEDOWN
- DIRECTION OF OVERLAND FLOW
- DIVERSION CHANNEL
- PROPOSED RETAINING WALL
- PROPOSED BIO
- MIDDEN LOCATION

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C110-AA007094-GCD-00-SED & ERO.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No :

Scales: 1:500

Original Size: A1

Height Datum: AHD

Grid: GRID

Current Issue Signatures: Author B.DAVEY; Designer A.CAMARDI; Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: SEDIMENT & EROSION CONTROL PLAN - SHEET 3 OF 5

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Drawing No. C112 | Project No. AA007094 | Issue 03

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LEGEND

- PROPOSED SURFACE CONTOURS (5.0)
- EXISTING SURFACE CONTOURS (5.0)
- PROPOSED STORMWATER LINE (SWD)
- TOP/TOE OF BATTER
- 1m WIDE TURF BEHIND KERB
- SILT FENCE (SF)
- FIELD INLET TREATMENT
- SAG GULLY TREATMENT (XXX)
- GULLY TREATMENT ON GRADE
- SAND BAG CHECK DAM (CHECK)
- SEDIMENTATION POND (SP)
- VEHICULAR SHAKEDOWN
- DIRECTION OF OVERLAND FLOW
- DIVERSION CHANNEL (DC)
- PROPOSED RETAINING WALL
- PROPOSED BIO
- MIDDEN LOCATION

GENERAL NOTES

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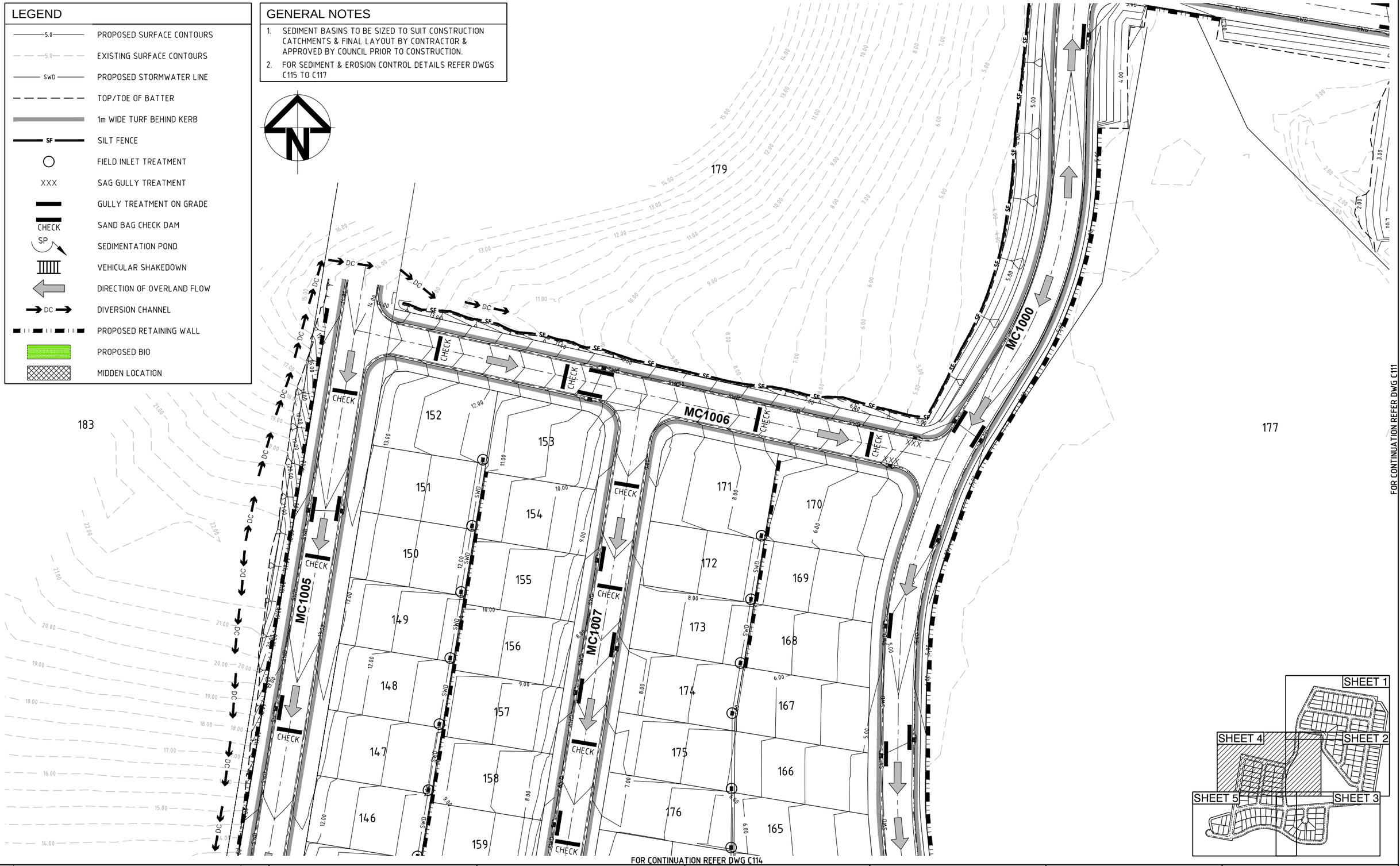

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LEGEND

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- GULLY TREATMENT ON GRADE
- SAND BAG CHECK DAM
- SEDIMENTATION POND
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GENERAL NOTES

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SHEET 1 | SHEET 2 | SHEET 3 | SHEET 4 | SHEET 5

FOR CONTINUATION REFER DWG C113

FOR CONTINUATION REFER DWG C112

FIRE TRAIL

MC1004 MC1005 MC1007 MC1008 MC1009 MC1000

EVANS RIVER

Issue	Description		Date
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GENERAL

1. IT IS THE CONTRACTORS RESPONSIBILITY TO ENSURE INSPECTION, MAINTENANCE AND TESTING OF ALL DRAINAGE, EROSION AND SEDIMENT CONTROL MEASURES ARE UNDERTAKEN ON SITE.
2. ALL DRAINAGE, EROSION AND SEDIMENT CONTROL MEASURES MUST BE APPLIED AND MAINTAINED IN ACCORDANCE WITH THE LATEST INTERNATIONAL EROSION CONTROL ASSOCIATION (IECA) AUSTRALASIA BEST PRACTICE EROSION AND SEDIMENT CONTROL (BPESC) DOCUMENT.
3. REFER TO APPROVED PLANS FOR LOCATION, EXTENT, AND CONSTRUCTION DETAILS. IF THERE ARE QUESTIONS OR PROBLEMS WITH THE LOCATION, EXTENT, OR METHOD OF INSTALLATION, CONTACT THE ENGINEER OR RESPONSIBLE ON-SITE OFFICER FOR ASSISTANCE.
4. ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES MUST BE IMPLEMENTED AND A REVISED EROSION AND SEDIMENT CONTROL PLAN (ESCP) MUST BE SUBMITTED FOR APPROVAL IN THE EVENT THAT SITE CONDITIONS CHANGE SIGNIFICANTLY FROM THOSE CONSIDERED WITHIN THIS ESCP.
5. IN CIRCUMSTANCES WHERE IT IS CONSIDERED NECESSARY TO PREPARE AN AMENDED EROSION AND SEDIMENT CONTROL PLAN (ESCP), AND WHERE THE DELIVERY OF SUCH AN AMENDED ESCP IS NOT IMMINENT, THEN ALL NECESSARY NEW OR MODIFIED EROSION AND SEDIMENT CONTROL WORKS MUST BE IN ACCORDANCE WITH THE LATEST VERSION OF THE IECA BPESC DOCUMENT. UPON APPROVAL OF THE AMENDED ESCP, ALL WORKS MUST BE IMPLEMENTED IN ACCORDANCE WITH THE AMENDED PLAN.
6. WHERE THERE IS A HIGH PROBABILITY THAT SERIOUS OR MATERIAL ENVIRONMENTAL HARM MAY OCCUR AS A RESULT OF SEDIMENT LEAVING THE SITE, APPROPRIATE ADDITIONAL EROSION AND SEDIMENT CONTROL MEASURES MUST BE IMPLEMENTED SUCH THAT ALL REASONABLE AND PRACTICABLE MEASURES ARE BEING TAKEN TO PREVENT OR MINIMISE SUCH HARM. ONLY THOSE WORKS NECESSARY TO MINIMISE OR PREVENT ENVIRONMENTAL HARM SHALL BE CONDUCTED ON-SITE PRIOR TO APPROVAL OF THE AMENDED EROSION AND SEDIMENT CONTROL PLAN (ESCP).
7. AT ALL TIMES THE CONTRACTOR SHALL MONITOR THE PREVAILING WEATHER CONDITIONS AND PROTECT ANY DOWNSTREAM CONSTRUCTION OR RECEIVING ENVIRONMENTS.
8. WORKS SHALL BE COMPLETED ON SITE GENERALLY IN ACCORDANCE WITH THE FOLLOWING SCHEDULE:
   (i) PRE CONSTRUCTION - CONSTRUCT SILT FENCES PRIOR TO PRE-START MEETING, WHICH WILL PROTECT EXISTING DOWNSTREAM PROPERTIES, PARKS OR ROAD RESERVES FROM SEDIMENTATION AND EROSION.
   (ii) CLEARING AND BULK EARTHWORKS - CONSTRUCT AND MAINTAIN SILT FENCES WHICH CONTROL SEDIMENTATION AND EROSION DURING CLEARING AND BULK EARTHWORKS. ALL DISTURBED AREAS TO BE EITHER GRASS SEEDED OR TURFED, AS SPECIFIED, AS SOON AS POSSIBLE OR WITHIN 7 DAYS OF FINAL TRIMMING OF EARTHWORKS.
   (iii) MAINTENANCE PERIOD - CONSTRUCT AND MAINTAIN SILT MANAGEMENT CONTROLS WHICH CONTROL SEDIMENTATION AND EROSION PRIOR TO THE ESTABLISHMENT OF GRASS COVER AND REHABILITATION. PROVIDE GRASS FILTER STRIPS IN LOCATIONS AS SHOWN ON EROSION AND SEDIMENT CONTROL PLANS.
9. EROSION AND SEDIMENT CONTROL PROTECTION MEASURES SHALL BE MAINTAINED BY THE CONTRACTOR THROUGHOUT THE CONTRACT.

RECOMMENDED IMPLEMENTATION SEQUENCE

1 ALL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED AND FUNCTIONAL PRIOR TO WORKS COMMENCING AND IN THE FOLLOWING SEQUENCE:
   a. CONSTRUCT TEMPORARY STABILISED SITE ACCESS
   b. PROVIDE INLET PROTECTION TO STORMWATER INLETS AND GULLIES ON ALL ROADS ADJOIN THE SITE.
   c. CONSTRUCT BARRIER FENCING AROUND RESTRICTED 'NO-GO' ZONES OF THE RETAINED VEGETATION AND AREAS NOT TO BE DISTURBED AND AREAS WHICH REMAIN UN-WORKED.
   d. INSTALL ALL TEMPORARY SEDIMENT FENCES
   e. CONSTRUCT DIVERSION BANKS AS NECESSARY (PARALLEL TO CONTOURS) TO DIVERT RUNOFF FROM DISTURBED AREAS INTO THE SEDIMENT PONDS/BASINS
   f. WORK AREAS TO BE DELINEATED BY BARRIER FENCING AND DIVERSION CHANNEL UPSLOPE AND SEDIMENT FENCING DOWNSLOPE.
   g. MAINTAIN EXISTING SEDIMENT PONDS/BASINS AS LONG AS PRACTICALLY POSSIBLE
   h. STABILISE ALL DISTURBED AREAS ASAP AND PROGRESSIVELY AS WORKS ARE COMPLETED.
   i. TEMPORARY STABILISATION TO BE DONE USING MULCHING, HYDROMULCHING, HYDROSEEDING OR DIRECT SEEDING TO GIVE A 70% COVERAGE OF GROUND SURFACE WITHIN 14 DAYS OF WORKS COMPLETING (EVEN IF WORKS MAY CONTINUE LATER)
2 EROSION AND SEDIMENT CONTROL PROTECTION MEASURES MAY NEED TO BE REVISED AND UPDATED TO REFLECT THE SITE CONDITIONS AND PROGRESSION OF THE WORKS, I.E. MEASURES INCLUDING SEDIMENT FENCES SHOULD BE MOVED AND REINSTATED AS WORKS PROGRESS.

SITE MANAGEMENT

1. ALL OFFICE FACILITIES AND OPERATIONAL ACTIVITIES MUST BE LOCATED SUCH THAT ANY LIQUID EFFLUENT (E.G. PROCESS WATER, WASH-DOWN WATER, EFFLUENT FROM EQUIPMENT CLEANING, OR PLANT WATERING), CAN BE TOTALLY CONTAINED AND TREATED WITHIN THE SITE.
2. THE CONSTRUCTION SCHEDULE MUST AIM TO MINIMISE THE DURATION THAT ANY AND ALL AREAS OF SOIL ARE EXPOSED TO THE EROSIVE EFFECTS OF WIND, RAIN AND SURFACE WATER.
3. LAND-DISTURBING ACTIVITIES MUST BE UNDERTAKEN IN ACCORDANCE WITH THE ESCP AND ASSOCIATED DEVELOPMENT CONDITIONS.
4. LAND-DISTURBING ACTIVITIES MUST BE UNDERTAKEN IN SUCH A MANNER THAT ALLOWS ALL REASONABLE AND PRACTICABLE MEASURES TO BE UNDERTAKEN TO:
   (i) ALLOW STORMWATER TO PASS THROUGH THE SITE IN A CONTROLLED MANNER AND AT NON-EROSIVE FLOW VELOCITIES UP TO THE SPECIFIED DESIGN STORM DISCHARGE;
   (ii) MINIMISE SOIL EROSION RESULTING FROM RAIN, WATER FLOW AND/OR WIND;
   (iii) MINIMISE ADVERSE EFFECTS OF SEDIMENT RUNOFF, INCLUDING SAFETY ISSUES;
   (iv) PREVENT, OR AT LEAST MINIMISE, ENVIRONMENTAL HARM RESULTING FROM WORK-RELATED SOIL EROSION AND SEDIMENT RUNOFF;
   (v) ENSURE THAT THE VALUE AND USE OF LAND/PROPERTIES ADJACENT TO THE DEVELOPMENT (INCLUDING ROADS) ARE NOT DIMINISHED AS A RESULT OF THE ADOPTED ESC MEASURES.
5. ALL EROSION AND SEDIMENT CONTROL MEASURES MUST CONFORM TO THE STANDARDS AND SPECIFICATIONS CONTAINED IN:
   (i) THE DEVELOPMENT APPROVAL CONDITION ISSUED BY THE RELEVANT REGULATORY AUTHORITY; AND
   (ii) THE APPROVED ESCP AND SUPPORTING DOCUMENTATION; OR
   (iii) THE LATEST VERSION OF THE IECA BPESC DOCUMENT, IF THE STANDARDS AND SPECIFICATIONS ARE NOT CONTAINED IN THE APPROVED ESCP.
6. ANY WORKS THAT MAY CAUSE SIGNIFICANT SOIL DISTURBANCE AND ARE ANCILLARY TO ANY ACTIVITY FOR WHICH REGULATORY BODY APPROVAL IS REQUIRED, MUST NOT COMMENCE BEFORE THE ISSUE OF THAT APPROVAL.
7. ADDITIONAL AND/OR ALTERNATIVE ESC MEASURES MUST BE IMPLEMENTED IN THE EVENT THAT SITE INSPECTIONS, THE SITE'S MONITORING AND MAINTENANCE PROGRAM, OR THE REGULATORY AUTHORITY, IDENTIFIES THAT UNACCEPTABLE OFF-SITE SEDIMENTATION IS OCCURRING AS A RESULT OF THE WORK ACTIVITIES.
8. LAND-DISTURBING ACTIVITIES MUST NOT CAUSE UNNECESSARY SOIL DISTURBANCE IF AN ALTERNATIVE CONSTRUCTION PROCESS IS AVAILABLE THAT ACHIEVES THE SAME OR EQUIVALENT OUTCOMES AT AN EQUIVALENT COST.
9. SEDIMENT (INCLUDING CLAY, SILT, SAND, GRAVEL, SOIL, MUD, CEMENT AND CERAMIC WASTE) DEPOSITED OFF THE SITE AS A DIRECT RESULT OF AN ON-SITE ACTIVITY, MUST BE COLLECTED AND THE AREA APPROPRIATELY CLEANED/REHABILITATED AS SOON AS REASONABLE AND PRACTICABLE, AND IN A MANNER THAT GIVES APPROPRIATE CONSIDERATION TO THE SAFETY AND ENVIRONMENTAL RISKS ASSOCIATED WITH THE SEDIMENT DEPOSITION.
10. WHEREVER REASONABLE AND PRACTICABLE, BRICK, TILE AND MASONRY CUTTING MUST BE CARRIED OUT ON A PERVIOUS SURFACE, SUCH AS GRASS, OR OPEN SOIL, OR IN SUCH A MANNER THAT ALL SEDIMENT-LADEN RUNOFF IS PREVENTED FROM DISCHARGING INTO A GUTTER, DRAIN, OR WATER BODY.
11. ADEQUATE WASTE COLLECTION BINS MUST BE PROVIDED ON-SITE AND MAINTAINED SUCH THAT POTENTIAL AND ACTUAL ENVIRONMENTAL HARM RESULTING FROM SUCH MATERIAL WASTE IS MINIMISED.
12. CONCRETE WASTE AND CHEMICAL PRODUCTS, INCLUDING PETROLEUM AND OIL-BASED PRODUCTS, MUST BE PREVENTED FROM ENTERING AN INTERNAL WATER BODY, OR AN EXTERNAL DRAIN, STORMWATER SYSTEM, OR WATER BODY.
13. ALL FLAMMABLE AND COMBUSTIBLE LIQUIDS, INCLUDING ALL LIQUID CHEMICALS IF SUCH CHEMICALS COULD POTENTIALLY BE WASHED OR DISCHARGED FROM THE SITE, ARE STORED AND HANDLED ON-SITE IN ACCORDANCE WITH RELEVANT STANDARDS SUCH AS AS1940 THE STORAGE AND HANDLING OF FLAMMABLE AND COMBUSTIBLE LIQUIDS.
14. TRENCHES NOT LOCATED WITHIN ROADWAYS MUST BE BACKFILLED, CAPPED WITH TOPSOIL, AND COMPACTED TO A LEVEL AT LEAST 75mm ABOVE ADJOINING GROUND LEVEL AND APPROPRIATELY STABILISED.
15. ALL STORMWATER, SEWER LINE AND OTHER SERVICE TRENCHES, NOT LOCATED WITHIN ROADWAYS, MUST BE MULCHED AND SEEDED, OR OTHERWISE APPROPRIATELY STABILISED WITHIN 7 DAYS AFTER BACKFILL.
16. NO MORE THAN 150m OF A STORMWATER, SEWER LINE OR OTHER SERVICE TRENCH MUST TO BE OPEN AT ANY ONE TIME.
17. SITE SPOIL MUST BE LAWFULLY DISPOSED OF IN A MANNER THAT DOES NOT RESULT IN ONGOING SOIL EROSION OR ENVIRONMENTAL HARM.
18. ALL FILL MATERIAL PLACED ON SITE MUST COMPRISE ONLY NATURAL EARTH AND ROCK, AND IS TO BE FREE OF CONTAMINANTS, BE FREE DRAINING, AND BE COMPACTED IN LAYERS NOT EXCEEDING 300mm TO 95% STANDARD RELATIVE DRY DENSITY IN ACCORDANCE WITH AS1289.
19. FOOT AND VEHICULAR TRAFFIC WILL BE RESTRICTED IN RECENTLY STABILISED AREAS INCLUDING THOSE HYDROSEEDED, TURFED OR GRASS SEEDED.
20. TEMPORARY SITE STABILISATION PROCEDURES MUST COMMENCE AT LEAST 30 DAYS PRIOR TO THE NOMINATED SITE SHUTDOWN DATE. AT LEAST 70% STABLE COVER OF ALL UNSTABLE AND/OR DISTURBED SOIL SURFACES MUST BE ACHIEVED PRIOR TO SHUTDOWN. THE STABILISATION WORKS MUST NOT RELY UPON THE LONGEVITY OF NON-VEGETATED EROSION CONTROL BLANKETS, OR TEMPORARY SOIL BINDERS.
21. IF BIO-RETENTION FILTER MEDIA IS INSTALLED PRIOR TO 80% OF THE UPSTREAM CATCHMENT BEING FULLY DEVELOPED, THE FILTER MEDIA SHALL BE PROTECTED WITH A LAYER OF GEOFABRIC WITH TURF ON TOP.

LAND CLEARING

1. LAND CLEARING MUST BE DELAYED AS LONG AS PRACTICABLE AND MUST BE UNDERTAKEN IN CONJUNCTION WITH DEVELOPMENT OF EACH STAGE OF WORKS, UNLESS OTHERWISE APPROVED BY SUPERINTENDENT.
2. ALL REASONABLE AND PRACTICABLE EFFORTS MUST BE TAKEN TO DELAY THE REMOVAL OF, OR DISTURBANCE TO, EXISTING GROUND COVER (ORGANIC OR INORGANIC) PRIOR TO LAND-DISTURBING ACTIVITIES.
6. BULK TREE CLEARING MUST OCCUR IN A MANNER THAT MINIMISES DISTURBANCE TO EXISTING GROUND COVER (ORGANIC OR INORGANIC).
7. BULK TREE CLEARING AND GRUBBING OF THE SITE MUST BE IMMEDIATELY FOLLOWED BY SPECIFIED TEMPORARY STABILISATION MEASURES (E.G. TEMPORARY GRASSING, OR MULCHING) PRIOR TO COMMENCEMENT OF EACH STAGE OF CONSTRUCTION WORKS.
8. DISTURBANCE TO NATURAL WATERCOURSES (INCLUDING BED AND BANKS) AND THEIR ASSOCIATED RIPARIAN ZONES MUST BE LIMITED TO THE MINIMUM PRACTICABLE.
9. NO LAND CLEARING SHALL BE UNDERTAKEN UNLESS PRECEDED BY THE INSTALLATION OF ADEQUATE DRAINAGE AND SEDIMENT CONTROL MEASURES, UNLESS SUCH CLEARING IS REQUIRED FOR THE PURPOSE OF INSTALLING SUCH MEASURES, IN WHICH CASE, ONLY THE MINIMUM CLEARING REQUIRED TO INSTALL SUCH MEASURES SHALL OCCUR.
10. LAND CLEARING MUST BE LIMITED TO 5M FROM THE EDGE OF PROPOSED CONSTRUCTED WORKS, 2M OF ESSENTIAL CONSTRUCTION TRAFFIC ROUTES, AND A TOTAL OF 10M WIDTH FOR CONSTRUCTION ACCESS, UNLESS OTHERWISE APPROVED BY SUPERINTENDENT.
11. PRIOR TO LAND CLEARING, AREAS OF PROTECTED VEGETATION, AND SIGNIFICANT AREAS OF RETAINED VEGETATION MUST BE CLEARLY IDENTIFIED (E.G. WITH HIGH-VISIBILITY TAPE, OR LIGHT FENCING) FOR THE PURPOSES OF MINIMISING THE RISK OF UNNECESSARY LAND CLEARING.
12. ALL REASONABLE AND PRACTICABLE MEASURES MUST BE TAKEN TO MINIMISE THE REMOVAL OF, OR DISTURBANCE TO, THOSE TREES, SHRUBS AND GROUND COVERS (ORGANIC OR INORGANIC) THAT ARE INTENDED TO BE RETAINED.
13. ALL LAND CLEARING MUST BE IN ACCORDANCE WITH THE FEDERAL, STATE AND LOCAL GOVERNMENT VEGETATION PROTECTION/PRESERVATION REQUIREMENTS AND/OR POLICIES.
14. LAND CLEARING IS LIMITED TO THE MINIMUM PRACTICABLE DURING THOSE PERIODS WHEN SOIL EROSION DUE TO WIND, RAIN OR SURFACE WATER IS POSSIBLE.
15. LAND CLEARING MUST NOT EXTEND BEYOND THAT NECESSARY TO PROVIDE UP TO EIGHT (8) WEEKS OF SITE ACTIVITY DURING THOSE MONTHS WHEN THE ACTUAL OR AVERAGE RAINFALL IS LESS THAN 45mm, SIX (6) IF BETWEEN 45 AND 100mm, FOUR (4) WEEKS IF BETWEEN 100 AND 225mm, AND TWO (2) WEEKS IF GREATER THAN 225mm.
16. NATIVE SITE VEGETATION REQUIRED AND APPROVED FOR CLEARING SHOULD BE MULCHED AND STOCKPILED FOR LATER USE IN LANDSCAPING, STABILISATION AND/OR SITE REHABILITATION WORKS.

SITE ACCESS

1. PRIOR TO THE COMMENCEMENT OF SITE WORKS, THE LOCATION OF THE SITE ACCESS POINT(S) MUST BE VERIFIED WITH THE RELEVANT REGULATORY AUTHORITY.
2. SITE ACCESS MUST BE RESTRICTED TO THE MINIMUM PRACTICAL NUMBER OF LOCATIONS.
3. SITE EXIT POINTS MUST BE APPROPRIATELY MANAGED TO MINIMISE THE RISK OF SEDIMENT BEING TRACKED ONTO SEALED, PUBLIC ROADWAYS.
5. INSTALL SEDIMENT FENCING AND/OR BARRIER FENCING TO CONFINE INGRESS TO AND EGRESS FROM THE SITE TO STABILISED ACCESS POINTS ONLY.
4. STORMWATER RUNOFF FROM ACCESS ROADS AND STABILISED ENTRY/EXIT POINTS MUST DRAIN TO AN APPROPRIATE SEDIMENT CONTROL DEVICE.

CONSTRUCTION EXIT - ROCK PAD

MATERIALS:

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

INSTALLATION:

1. CLEAR THE LOCATION OF THE ROCK PAD, 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.
2. 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.
3. PLACE THE ROCK PAD FORMING A MINIMUM 200mm THICK LAYER OF CLEAN, OPEN-VOID ROCK.
4. IF THE ASSOCIATED CONSTRUCTION SITE IS UP-SLOPE OF THE ROCKPAD, THUS CAUSING STORMWATER RUNOFF TO FLOW TOWARD 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.
5. THE LENGTH OF THE ROCK PAD 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 PAD SHOULD COMMENCE AT THE EDGE OF THE OFF-SITE SEALED ROAD OR PAVEMENT.
6. FLARE THE END THE ROCK PAD WHERE IT MEETS THE PAVEMENT SO THAT THE WHEELS OF TURNING VEHICLES DO NOT TRAVEL OVER UNPROTECTED SOIL.
7. IF THE FOOTPATH IS OPEN TO PEDESTRIAN MOVEMENT, THEN COVER THE COARSE ROCK WITH FINE AGGREGATE OR GRAVEL, OR OTHERWISE TAKE WHATEVER MEASURES ARE NEEDED TO MAKE THE AREA SAFE.

SOIL AND STOCKPILE MANAGEMENT

1. TOPSOIL SHALL BE STRIPPED AND STOCKPILED FOR LATER USE ONSITE.
2. ALL REASONABLE AND PRACTICABLE MEASURES MUST BE TAKEN TO OBTAIN THE MAXIMUM BENEFIT FROM EXISTING TOPSOIL, INCLUDING:
   (i) WHERE THE PROPOSED AREA OF SOIL DISTURBANCE DOES NOT EXCEED 2500m², AND THE TOPSOIL DOES NOT CONTAIN UNDESIRABLE WEED SEED, THE TOP 100mm OF SOIL LOCATED WITHIN AREAS OF PROPOSED SOIL DISTURBANCE (INCLUDING STOCKPILE AREAS) MUST BE STRIPPED AND STOCKPILED SEPARATELY FROM THE REMAINING SOIL.
   (ii) WHERE THE PROPOSED AREA OF SOIL DISTURBANCE EXCEEDS 2500m², AND THE TOPSOIL DOES NOT CONTAIN UNDESIRABLE WEED SEED, THE TOP 50mm OF SOIL MUST BE STRIPPED AND STOCKPILED SEPARATELY FROM THE REMAINING TOPSOIL, AND SPREAD AS A FINAL SURFACE SOIL.
   (iii) IN AREAS WHERE THE TOPSOIL CONTAINS UNDESIRABLE WEED SEED, THE AFFECTED SOIL MUST BE SUITABLY BURIED OR REMOVED FROM THE SITE.
3. STOCKPILES OF ERODABLE MATERIAL THAT HAS THE POTENTIAL TO CAUSE ENVIRONMENTAL HARM IF DISPLACED, MUST BE:
   (i) APPROPRIATELY PROTECTED FROM WIND, RAIN, CONCENTRATED SURFACE FLOW AND EXCESSIVE UP-SLOPE STORMWATER SURFACE FLOWS.
   (ii) LOCATED AT LEAST 2M (PREFERABLY 5M) FROM ANY HAZARDOUS AREA, RETAINED VEGETATION, ROADS AND CONCENTRATED WATER FLOW.
   (iii) LOCATED UP-SLOPE OF AN APPROPRIATE SEDIMENT CONTROL SYSTEM.
   (iv) PROVIDED WITH AN APPROPRIATE PROTECTIVE COVER (SYNTHETIC, MULCH OR VEGETATIVE) IF THE MATERIALS ARE LIKELY TO BE STOCKPILED FOR MORE THAN 28 DAYS.
   (v) 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.
   (vi) 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 AN EXTREME EROSION RISK.
4. A SUITABLE FLOW DIVERSION SYSTEM MUST BE ESTABLISHED IMMEDIATELY UP-SLOPE OF A STOCKPILE OF ERODABLE MATERIAL THAT HAS THE POTENTIAL TO CAUSE ENVIRONMENTAL HARM IF DISPLACED, IF THE UP-SLOPE CATCHMENT AREA DRAINING TO THE STOCKPILE EXCEEDS 1500m².

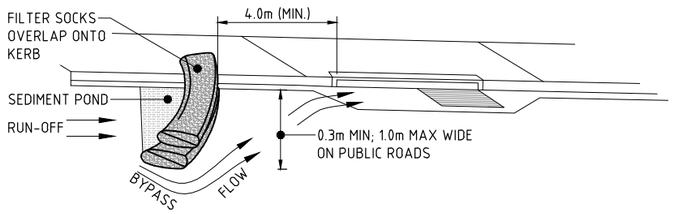
FILTER SOCKS-CONCENTRATED FLOW

MATERIALS:

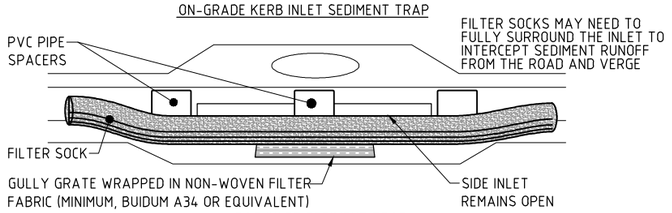
1. SOCKS: MINIMUM Ø200mm SYNTHETIC OR BIODEGRADABLE TUBES MANUFACTURED FROM NON-WOVEN OR COMPOSITE FABRIC SUITABLE FOR THE "FILTRATION" OF COURSE SEDIMENT.
2. FILL MATERIALS: STRAW, CANE MULCH, COMPOSTED MATERIAL (AS4454), COARSE SAND, OR CLEAN AGGREGATE

INSTALLATION:

1. ENSURE THE SOCKS ARE PLACED INDIVIDUALLY OR COLLECTIVELY (AS A SINGLE SEDIMENT TRAP) SUCH THAT:
   i) LEAKAGE AROUND OR UNDER THE SOCKS IS MINIMISED;
   ii) ADJOINING SOCKS ARE TIGHTLY BUTTED OR OVERLAPPED AT LEAST 450mm.
   iii) THE SURFACE AREA OF POTENTIAL WATER PONDING UP-SLOPE OF EACH SEDIMENT TRAP IS MAXIMISED.
   iv) 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.

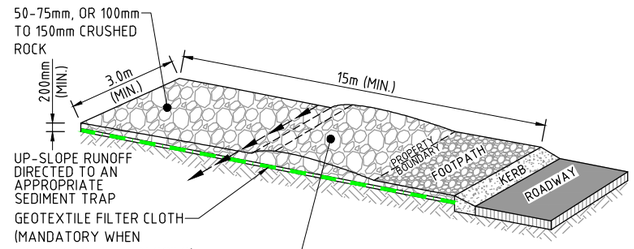


ON-GRADE KERB INLET SEDIMENT TRAP

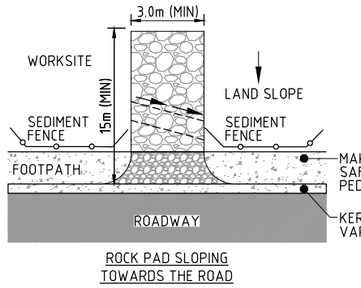


SAG INLET SEDIMENT TRAP

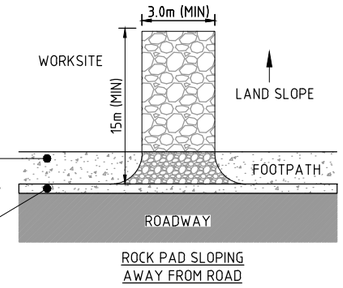
FILTER SOCKS - CONCENTRATED FLOWS



ROCK ENTRY/EXIT PAD FOR CONSTRUCTION SITES

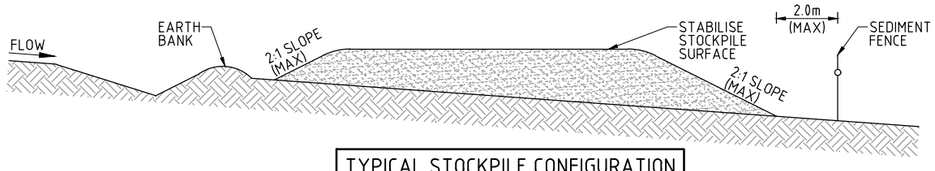


ROCK PAD SLOPING TOWARDS THE ROAD



ROCK PAD SLOPING AWAY FROM ROAD

CONSTRUCTION EXIT - ROCK PAD
(CONSTRUCTION SITES ONLY)



TYPICAL STOCKPILE CONFIGURATION

Issue	Description		Date
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.07.15
01	ORIGINAL ISSUE	BD	18.06.14

Scale

Surveyor: ROBERT A HARRIES SURVEYOR

Architect

Filename: C115-AA007094-GCD-00-SED & ERO DETS.DWG

Client: GOLDCORAL PTY LTD

Status: **FOR APPROVAL** NOT TO BE USED FOR CONSTRUCTION

Approved

R.P.E.Q No :

Scales: N.T.S

Original Size: A1

Height Datum: AHD

Grid: GRID

Current Issue Signatures

Author B.DAVEY

Designer A.CAMARDI

Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: SEDIMENT & EROSION CONTROL DETAILS - SHEET 1 OF 3

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Drawing No. C115 | Project No. AA007094 | Issue 02

100mm on Original

DRAINAGE CONTROL

1. WHEREVER REASONABLE AND PRACTICABLE, STORMWATER RUNOFF ENTERING THE SITE FROM EXTERNAL AREAS, AND NON-SEDIMENT LADEN (CLEAN) STORMWATER RUNOFF ENTERING A WORK AREA OR AREA OF SOIL DISTURBANCE, MUST BE DIVERTED AROUND OR THROUGH THAT AREA IN A MANNER THAT MINIMISES SOIL EROSION AND THE CONTAMINATION OF THAT WATER FOR ALL DISCHARGES UP TO THE SPECIFIED DESIGN STORM DISCHARGE.
2. DURING THE CONSTRUCTION PERIOD, ALL REASONABLE AND PRACTICABLE MEASURES MUST BE IMPLEMENTED TO CONTROL FLOW VELOCITIES IN SUCH A MANNER THAT PREVENTS SOIL EROSION ALONG DRAINAGE PATHS AND AT THE ENTRANCE AND EXIT OF ALL DRAINS AND DRAINAGE PIPES DURING ALL STORMS UP TO THE RELEVANT DESIGN STORM DISCHARGE.
3. TO THE MAXIMUM DEGREE REASONABLE AND PRACTICABLE, ALL WATERS DISCHARGED DURING THE CONSTRUCTION PHASE MUST DISCHARGE ONTO STABLE LAND, IN A NON-EROSIVE MANNER, AND AT A LEGAL POINT OF DISCHARGE.
4. DURING THE CONSTRUCTION PERIOD, ROOF WATER MUST BE MANAGED IN A MANNER THAT MINIMISES SOIL EROSION THROUGHOUT THE SITE, AND SITE WETNESS WITHIN ACTIVE WORK AREAS.

DIVERSION CHANNELS AND CATCH DRAINS

1. CLEAR THE LOCATION FOR THE CHANNEL, CLEARING ONLY WHAT IS NEEDED TO PROVIDE ACCESS FOR PERSONNEL AND CONSTRUCTION EQUIPMENT.
2. REMOVE ROOTS, STUMPS, AND OTHER DEBRIS AND DISPOSE OF THEM PROPERLY. DO NOT USE DEBRIS TO BUILD ANY ASSOCIATED EMBANKMENTS.
3. EXCAVATE THE CHANNEL TO THE SPECIFIED SHAPE, ELEVATION AND GRADIENT (1% MIN). THE SIDES OF THE CHANNEL SHOULD BE NO STEEPER THAN A 2:1 (H:V) IF CONSTRUCTED IN EARTH, UNLESS SPECIFICALLY DIRECTED WITHIN THE APPROVED PLANS.
4. STABILISE THE CHANNEL AND BANKS IMMEDIATELY UNLESS IT WILL OPERATE FOR LESS THAN 30 DAYS. IN EITHER CASE, TEMPORARY EROSION PROTECTION (MATTING, ROCK, TURF, ETC.) WILL BE REQUIRED AS SPECIFIED WITHIN THE APPROVED PLANS OR AS DIRECTED.
5. IF THE CHANNEL IS CUT INTO A DISPERSIVE (SODIC) SOIL, THE EXPOSED DISPERSIVE SOIL MUST BE COVERED AND MAINTAINED WITH A MINIMUM 200mm THICK LAYER OF NON-DISPERSIVE SOIL PRIOR TO PLACEMENT OF EROSION PROTECTION MEASURES.
6. ENSURE THE CHANNEL DISCHARGES TO A STABLE AREA SUCH THAT SOIL EROSION WILL BE PREVENTED. SPECIFICALLY, ENSURE THE DRAIN DOES NOT DISCHARGE TO AN UNSTABLE FILL SLOPE.

EROSION CONTROL

1. THE APPLICATION OF LIQUID-BASED DUST SUPPRESSION MEASURES MUST ENSURE THAT SEDIMENT-LADEN RUNOFF RESULTING FROM SUCH MEASURES DOES NOT CREATE A TRAFFIC OR ENVIRONMENTAL HAZARD.
2. ALL TEMPORARY EARTH BANKS, FLOW DIVERSION SYSTEMS, AND EMBANKMENTS ASSOCIATED WITH CONSTRUCTED SEDIMENT BASINS MUST BE MACHINE-COMPACTED, SEEDED AND MULCHED FOR THE PURPOSE OF ESTABLISHING A TEMPORARY VEGETATIVE COVER WITHIN 10 DAYS AFTER GRADING.
3. UNPROTECTED SLOPE LENGTHS MUST NOT EXCEED 80M, OR AN EQUIVALENT VERTICAL FALL OF 3M.
4. THE CONSTRUCTION AND STABILISATION OF EARTH BATTERS STEEPER THAN 6:1 (H:V) MUST BE STAGED SUCH THAT NO MORE THAN 3 VERTICAL-METRES OF ANY BATTER IS EXPOSED TO RAINFALL AT ANY INSTANT.
5. SYNTHETIC REINFORCED EROSION CONTROL MATS AND BLANKETS MUST NOT BE PLACED WITHIN, OR ADJACENT TO, RIPARIAN ZONES AND WATERCOURSES IF SUCH MATERIALS ARE LIKELY TO CAUSE ENVIRONMENTAL HARM TO WILDLIFE OR WILDLIFE HABITATS.
6. A MINIMUM 60% GROUND COVER MUST BE ACHIEVED ON ALL NON-COMPLETED EARTHWORKS EXPOSED TO ACCELERATED SOIL EROSION IF FURTHER CONSTRUCTION ACTIVITIES OR SOIL DISTURBANCES ARE LIKELY TO BE SUSPENDED FOR MORE THAN 30 DAYS DURING THOSE MONTHS WHEN THE EXPECTED RAINFALL IS LESS THAN 30mm; MINIMUM 70% COVER WITHIN 30 DAYS IF BETWEEN 30 AND 45mm; MINIMUM 70% COVER WITHIN 20 DAYS IF BETWEEN 45 AND 100mm; MINIMUM 75% COVER WITHIN 10 DAYS IF BETWEEN 100 AND 225mm; AND MINIMUM 80% COVER WITHIN 5 DAYS IF GREATER THAN 225mm. (ALTERNATIVE TO ABOVE)

EROSION CONTROL MAT LINING

1. EROSION CONTROL MATS MUST BE STORED AWAY FROM DIRECT SUNLIGHT OR COVERED WITH ULTRAVIOLET PROTECTIVE SHEETING UNTIL THE SITE IS READY FOR THEIR INSTALLATION.
2. VEHICLES AND CONSTRUCTION EQUIPMENT MUST NOT BE PERMITTED TO MANEUVER OVER THE MATTING UNLESS IT HAS BEEN COVERED WITH A LAYER OF SOIL OR GRAVEL AT LEAST 150mm THICK.
3. IF THE CHANNEL IS TO BE GRASSED, PREPARE A SMOOTH SEED BED OF APPROXIMATELY 75mm OF TOPSOIL, SEED, FERTILISE, WATER AND RAKE TO REMOVE ANY REMAINING SURFACE IRREGULARITIES.
4. EXCAVATE A 300mm DEEP BY 150mm WIDE ANCHOR TRENCH ALONG THE FULL WIDTH OF THE UPSTREAM END OF THE AREA TO BE TREATED.
5. AT LEAST 300mm OF THE MAT MUST BE ANCHORED INTO THE TRENCH WITH THE ROLL OF MATTING RESTING ON THE GROUND UP-SLOPE OF THE TRENCH.
6. WHEN SPREADING THE MATS, AVOID STRETCHING THE FABRIC. THE MATS SHOULD REMAIN IN GOOD CONTACT WITH THE SOIL.
7. THE INSTALLATION PROCEDURE MUST ENSURE THAT THE MAT ACHIEVES AND RETAINS GOOD CONTACT WITH THE SOIL.
8. DAMAGED MATTING MUST BE REPAIRED OR REPLACED.

TURF LINED

1. TURF SHOULD BE USED WITHIN 12 HOURS OF DELIVERY, OTHERWISE ENSURE THE TURF IS STORED IN CONDITIONS APPROPRIATE FOR THE WEATHER CONDITIONS (e.g. A SHADED AREA).
2. MOISTENING THE TURF AFTER IT IS UNROLLED WILL HELP MAINTAIN ITS VIABILITY.
3. TURF SHOULD BE LAID ON A MINIMUM 75mm BED OF ADEQUATELY FERTILISED TOPSOIL. RAKE THE SOIL SURFACE TO BREAK THE CRUST JUST BEFORE LAYING THE TURF.
4. DURING THE WARMER MONTHS, LIGHTLY IRRIGATE THE SOIL IMMEDIATELY BEFORE LAYING THE TURF.
5. ENSURE THE TURF IS NOT LAID ON GRAVEL, HEAVILY COMPACTED SOILS, OR SOILS THAT HAVE BEEN RECENTLY TREATED WITH HERBICIDES.
6. ENSURE THE TURF EXTENDS UP THE SIDES OF THE DRAIN AT LEAST 100mm ABOVE THE ELEVATION OF THE CHANNEL INVERT, OR AT LEAST TO A SUFFICIENT ELEVATION TO FULLY CONTAIN EXPECTED CHANNEL FLOW.
7. ON CHANNEL GRADIENTS OF 3:1(H:V) OR STEEPER, OR IN SITUATIONS WHERE HIGH FLOW VELOCITIES (i.e. VELOCITY >1.5m/s) ARE LIKELY WITHIN THE FIRST TWO WEEK FOLLOWING PLACEMENT, SECURE THE INDIVIDUAL TURF STRIPS WITH WOODEN OR PLASTIC PEGS.
8. ENSURE THAT INTIMATE CONTACT IS ACHIEVED AND MAINTAINED BETWEEN THE TURF AND THE SOIL SUCH THAT SEEPAGE FLOW BENEATH THE TURF IS AVOIDED.
9. WATER UNTIL THE SOIL IS WET 100mm BELOW THE TURF. THEREAFTER, WATERING SHOULD BE SUFFICIENT TO MAINTAIN AND PROMOTE HEALTHY GROWTH.

ROCK-LINED

1. ALL ROCK MUST BE HARD, WEATHER RESISTANT, AND DURABLE AGAINST DISINTEGRATION UNDER CONDITIONS TO BE MET IN HANDLING, PLACEMENT AND OPERATION.
2. ALL ROCK MUST HAVE ITS GREATEST DIMENSION NOT GREATER THAN 3 TIMES ITS LEAST DIMENSIONS.
3. THE ROCK USED IN FORMATION OF THE DRAIN MUST BE EVENLY GRADED WITH 50% BY WEIGHT LARGER THAN THE SPECIFIED NOMINAL ROCK SIZE AND HAVE SUFFICIENT SMALL ROCK TO FILL THE VOIDS BETWEEN THE LARGER ROCK. DIRT, FINES, AND SMALLER ROCK MUST NOT EXCEED 5% BY WEIGHT.
4. THE DIAMETER OF THE LARGEST ROCK SIZE SHOULD BE NO LARGER THAN 1.5 TIMES THE NOMINAL ROCK SIZE. SPECIFIC GRAVITY TO BE AT LEAST 2.5.
5. FILTER CLOTH GEOTEXTILE FABRIC: HEAVY-DUTY, NEEDLE-PUNCHED, NON-WOVEN FILTER CLOTH, MINIMUM 'BIDIM' A24 OR EQUIVALENT.
6. PRIOR TO PLACEMENT, ALL ROCKS MUST BE VISUALLY CHECKED FOR SIZE, ELONGATION, CRACKS, DETERIORATION AND OTHER VISIBLE DEFECTS. THE DEGREE AND THOROUGHNESS OF SUCH CHECKING MUST BE APPROPRIATE FOR THE POTENTIAL CONSEQUENCES ASSOCIATED WITH FAILURE OF THE STRUCTURE OR PURPOSE FOR WHICH THE MATERIAL WILL BE USED.
7. IF A FILTER CLOTH UNDERLAY IS SPECIFIED, PLACE THE FILTER FABRIC DIRECTLY ON THE PREPARED FOUNDATION. IF MORE THAN ONE SHEET OF FILTER CLOTH IS REQUIRED OVER THE AREA, OVERLAP THE EDGE OF EACH SHEET AT LEAST 300mm, AND SECURE ANCHOR PINS AT MINIMUM 1M SPACING ALONG THE OVERLAP.
8. ENSURE THE FILTER CLOTH IS PROTECTED FROM PUNCHING OR TEARING DURING INSTALLATION OF THE FABRIC AND THE ROCK. REPAIR ANY DAMAGE BY REMOVING THE ROCK AND REPLACING WITH ANOTHER PIECE OF FILTER CLOTH OVER THE DAMAGED AREA OVERLAPPING THE EXISTING FABRIC A MINIMUM OF 300mm.
9. PLACEMENT OF ROCK SHOULD FOLLOW IMMEDIATELY AFTER PLACEMENT OF THE FILTER LAYER. PLACE ROCK SO THAT IT FORMS A DENSE, WELL-GRADED MASS OF ROCK WITH A MINIMUM OF VOIDS.
10. PLACE ROCK LINING TO THE EXTENT AND DEPTH INDICATED WITHIN THE APPROVED PLANS.
11. ENSURE THE ROCK IS PLACED IN AN APPROPRIATE MANNER TO AVOID DISPLACING UNDERLYING MATERIALS OR PLACING UNDUE IMPACT FORCE ON THE BEDDING MATERIALS.
12. ENSURE THE ROCK IS PLACED WITH A MINIMUM THICKNESS OF 1.5 TIMES THE NOMINAL ROCK SIZE (D50).
13. ENSURE MATERIALS THAT ARE D50 AND LARGER ARE POSITIONED FLUSH WITH THE TOP SURFACE WITH FACES AND SHAPES MATCHED TO MINIMISE VOIDS.
14. ENSURE PROJECTIONS ABOVE OR DEPRESSIONS UNDER THE SPECIFIED TOP SURFACE ARE LESS THAN 20% OF THE ROCK LAYER THICKNESS. THE AVERAGE SURFACE PLANE OF THE FINISHED ROCK IS DEFINED AS THE PLANE WHERE 50% OF THE TOPS OF ROCKS WOULD CONTACT.
15. ENSURE THE COMPLETED CHANNEL HAS SUFFICIENT DEPTH (AS SPECIFIED FOR THE TYPE OF CHANNEL) MEASURED FROM THE CHANNEL INVERT (AVERAGE SURFACE PLANE ALONG CHANNEL INVERT) TO THE TOP OF THE EMBANKMENT. THE AVERAGE SURFACE PLANE OF THE FINISHED ROCK IS DEFINED AS THE PLANE WHERE 50% OF THE TOPS OF ROCKS WOULD CONTACT.
16. TO THE MAXIMUM DEGREE PRACTICABLE, THE MATERIAL BETWEEN LARGER ROCK MUST NOT BE LOOSE OR EASILY DISPLACED BY THE EXPECTED FLOW.
17. AFTER PLACEMENT OF THE ROCK LINING, ENSURE THE DRAIN HAS A CONSTANT FALL IN THE DESIRED DIRECTION FREE OF OBSTRUCTIONS.

CHECK DAMS

1. CHECK DAMS CAN BE BUILT WITH VARIOUS MATERIALS INCLUDING ROCKS AND SANDBAGS.

MATERIALS:

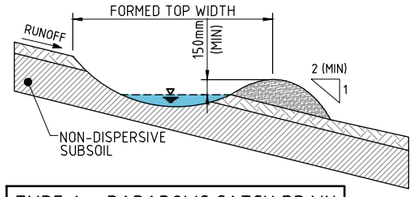
1. ROCK: 150 TO 300mm EQUIVALENT DIAMETER HARD EROSION RESISTANT ROCK.
2. RECYCLED CONCRETE: 150 TO 300mm EQUIVALENT DIAMETER FREE FROM FINES AND CEMENT DUST.
3. SANDBAGS: GEOTEXTILE BAGS (WOVEN SYNTHETIC, OR NON-WOVEN BIODEGRADABLE) FILLED WITH CLEAN COARSE SAND, CLEAN AGGREGATE, OR COMPOST.

INSTALLATION:

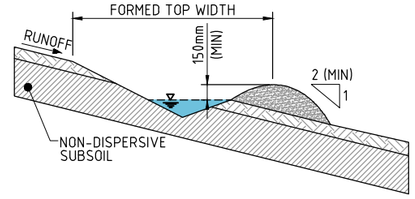
1. PRIOR TO PLACEMENT OF THE SEDIMENT TRAP, ENSURE THE DRAINAGE CHANNEL IS DEEP ENOUGH TO PREVENT WATER BEING UNSAFELY DIVERTED OUT OF THE DRAIN ONCE THE CHECK DAMS ARE INSTALLED.
2. LOCATE EACH CHECK DAM SEDIMENT TRAP AS DIRECTED WITHIN THE APPROVED PLANS, OR OTHERWISE AT SUCH A SPACING TO ACHIEVE THE REQUIRED SEDIMENT TRAPPING OUTCOMES. REFER DETAIL.
3. PLACE EACH CHECK DAM SEDIMENT TRAP TO THE LINES AND PROFILE SHOWN IN THE APPROVED PLAN OR AS DIRECTED BY THE SITE SUPERVISOR.

LEVEL SPREADER INSTALLATION:

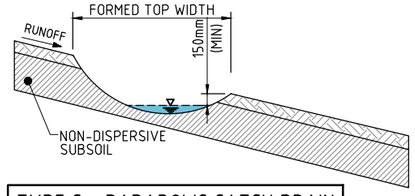
1. THE OUTLET SILL OF THE SPREADER SHOULD BE PROTECTED WITH EROSION CONTROL MATTING TO PREVENT EROSION DURING THE ESTABLISHMENT OF VEGETATION. THE MATTING SHOULD BE A MINIMUM OF 1200mm WIDE EXTENDING AT LEAST 300mm UPSTREAM OF THE EDGE OF THE OUTLET CREST AND BURIED AT LEAST 150mm IN A VERTICAL TRENCH. THE DOWNSTREAM EDGE SHOULD BE SECURELY HELD IN PLACE WITH CLOSELY SPACED HEAVY-DUTY WIRE STAPLES AT LEAST 150mm LONG.
2. ENSURE THAT THE OUTLET SILL (CREST) IS LEVEL FOR THE SPECIFIED LENGTH.
3. IMMEDIATELY AFTER CONSTRUCTION, TURF, OR SEED AND MULCH WHERE APPROPRIATE, THE LEVEL SPREADER.



TYPE A - PARABOLIC CATCH DRAIN WITH DOWN-SLOPE BANK



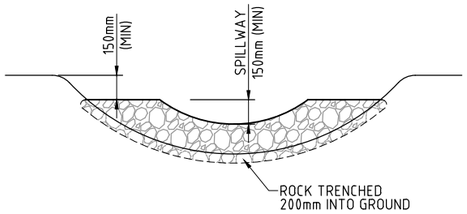
TYPE B - TRIANGULAR V-DRAIN CATCH DRAIN WITH DOWN-SLOPE BANK



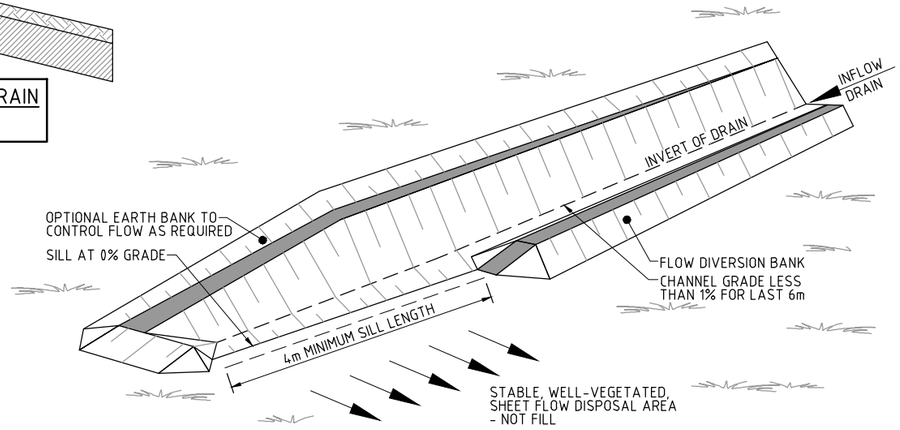
TYPE C - PARABOLIC CATCH DRAIN WITH BANK

CONSTRUCTED DIMENSIONS OF PARABOLIC CATCH DRAINS		
DRAIN TYPE	FORMED WIDTH WITH OR WITHOUT BANK	FORMED DEPTH WIDTH OR WITHOUT BANK
TYPE-A TYPE-B TYPE-C	1.6m 2.4m 3.6m	0.30m 0.45m 0.65m

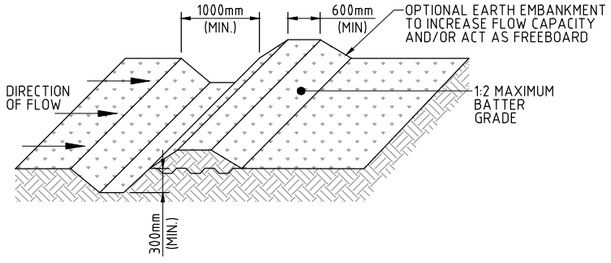
CONSTRUCTED DIMENSIONS OF TRIANGULAR V-DRAINS		
DRAIN TYPE	FORMED WIDTH WITH OR WITHOUT BANK	FORMED DEPTH WIDTH OR WITHOUT BANK
TYPE-AV TYPE-BV TYPE-CV	2.0m 2.7m 3.9m	0.30m 0.45m 0.65m



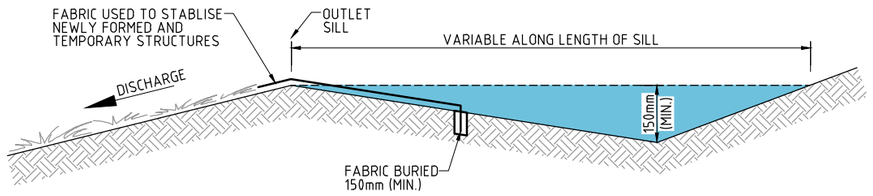
CHECK DAMS



TYPICAL LAYOUT OF LEVEL SPREADER



DIVERSION CHANNEL



TYPICAL PROFILE OF THE OUTLET WEIR

LEVEL SPREADER

Issue	Description		Date
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.07.15
01	ORIGINAL ISSUE	BD	18.06.14

100mm on Original

Scale

Surveyor: ROBERT A HARRIES SURVEYOR

Architect

Filename: C115-AA007094-GCD-00-SED & ERO DETS.DWG

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Approved

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Current Issue Signatures

Author B.DAVEY

Designer A.CAMARDI

Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title: SEDIMENT & EROSION CONTROL DETAILS - SHEET 2 OF 3

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Drawing No. C116 | Project No. AA007094 | Issue 02

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SEDIMENT CONTROL

1. OPTIMUM BENEFIT MUST BE MADE OF EVERY OPPORTUNITY TO TRAP SEDIMENT WITHIN THE WORK SITE, AND AS CLOSE AS PRACTICABLE TO ITS SOURCE.
2. SEDIMENT TRAPS MUST BE INSTALLED AND OPERATED TO BOTH COLLECT AND RETAIN SEDIMENT.
3. THE POTENTIAL SAFETY RISK OF A PROPOSED SEDIMENT TRAP TO SITE WORKERS AND THE PUBLIC MUST BE GIVEN APPROPRIATE CONSIDERATION, ESPECIALLY THOSE DEVICES LOCATED WITHIN PUBLICLY ACCESSIBLE AREAS.
4. ALL REASONABLE AND PRACTICABLE MEASURES MUST BE TAKEN TO PREVENT, OR AT LEAST MINIMISE, THE RELEASE OF SEDIMENT FROM THE SITE.
5. SUITABLE ALL-WEATHER MAINTENANCE ACCESS MUST BE PROVIDED TO ALL SEDIMENT CONTROL DEVICES.

SEDIMENT FENCE

1. SEDIMENT FENCE TO BE INSTALLED ALONG A LINE OF CONSTANT GROUND ELEVATION WHEREVER PRACTICAL.
2. BOTH ENDS OF THE SEDIMENT FENCE TO EXTEND UP THE SLOPE AT LEAST 1m.
3. SUPPORT POST TO BE SPACED A MAXIMUM 2m UNLESS THE FENCE IS SUPPORTED BY A TOP WIRE OR MESH BACKING, IN WHICH CASE 3m MAXIMUM SPACING.
4. FENCE 'RETURNS' SHALL BE INSTALLED AT MAXIMUM 20m SPACING IF FENCE IS INSTALLED ALONG THE CONTOUR, OTHERWISE 5 TO 10m MAXIMUM SPACING DEPENDING ON SLOPE.
5. MINIMUM 4 STAPLES OR TIE WIRES PER STAKE.

MATERIALS:

1. FABRIC: POLYPROPYLENE, POLYAMIDE, NYLON, POLYESTER, OR POLYETHYLENE WOVEN OR NON-WOVEN FABRIC, AT LEAST 700mm IN WIDTH AND A MINIMUM UNIT WEIGHT OF 140GSM. ALL FABRICS TO CONTAIN ULTRAVIOLET INHIBITORS AND STABILISERS TO PROVIDE A MINIMUM OF 6 MONTHS OF USEABLE CONSTRUCTION LIFE (ULTRAVIOLET STABILITY EXCEEDING 70%).
2. FABRIC REINFORCEMENTS: WIRE OR STEEL MESH MINIMUM 14-GAUGE WITH A MAXIMUM MESH SPACING OF 200mm.
3. SUPPORT POSTS/STAKES: 1500mm² (MIN.) HARDWOOD, 2500mm² (MIN.) SOFTWOOD, OR 1.5kg/m (MIN) STEEL STAR PICKETS SUITABLE FOR ATTACHING FABRIC.

INSTALLATION OF A SPILL-THROUGH WEIR:

1. LOCATE THE SPILL-THROUGH WEIR SUCH THAT THE WEIR CREST WILL BE LOWER THAN THE GROUND LEVEL AT EACH END OF THE FENCE.
2. ENSURE THE CREST OF THE SPILL-THROUGH WEIR IS AT LEAST 300mm ABOVE THE GROUND ELEVATION.
3. SECURELY TIE A HORIZONTAL CROSS MEMBER (WEIR) TO THE SUPPORT POSTS/STAKES EACH SIDE OF THE WEIR. CUT THE FABRIC DOWN THE SIDE OF EACH POST AND FOLD THE FABRIC OVER THE CROSS MEMBER AND APPROPRIATELY SECURE THE FABRIC.
4. INSTALL A SUITABLE SPLASH PAD AND/OR CHUTE IMMEDIATELY DOWN-SLOPE OF THE SPILL-THROUGH WEIR TO CONTROL SOIL EROSION AND APPROPRIATELY DISCHARGE THE CONCENTRATED FLOW PASSING OVER THE WEIR.

INSTALLATION FABRIC DROP INLET PROTECTION:

1. ENSURE THAT THE INSTALLATION OF THE SEDIMENT TRAP WILL NOT CAUSE UNDESIRABLE SAFETY OR FLOODING ISSUES.
2. WHERE POSSIBLE, EXCAVATE A 200x200mm TRENCH AROUND THE INLET STRUCTURE.
3. SPACE STAKES EVENLY AROUND THE PERIMETER OF THE STORMWATER INLET AT A MAXIMUM 1m SPACING AND SECURELY DRIVE THEM INTO THE GROUND.
4. WHERE NECESSARY, INSTALL A HORIZONTAL SPILL-THROUGH WEIR TO LIMIT THE MAXIMUM HEIGHT WATER PONDING AROUND THE STRUCTURE.
5. ENSURE THE MAXIMUM POND HEIGHT WILL NOT CAUSE A SAFETY HAZARD, INCLUDING UNDESIRABLE FLOODING OF AN ADJACENT PROPERTY OR ROADWAY. WHEREVER PRACTICAL, THE SPILL-THROUGH WEIR SHOULD BE AT LEAST 300mm ABOVE GROUND LEVEL.
6. IF A SPILL THROUGH WEIR IS NOT INSTALLED, THEN FRAME THE TOP OF THE STAKES WITH HORIZONTAL CROSS MEMBERS.
7. CUT FABRIC FROM A CONTINUOUS ROLL TO ELIMINATE JOINTS.
8. PLACE THE BOTTOM 300mm OF FABRIC IN THE EXCAVATED TRENCH
9. SECURELY FASTEN THE FABRIC TO THE STAKES AND CROSS MEMBERS AT THE FABRIC JOINT, OVERLAP THE FABRIC TO THE NEXT STAKE.
10. BACKFILL THE TRENCH WITH AT LEAST 200mm OF AGGREGATE OR COMPACTED SOIL. IF A TRENCH CANNOT BE EXCAVATED, LAY THE BOTTOM 300mm OF FABRIC EVENLY ON THE GROUND SURFACE AND COVER WITH A 300mm LAYER OF AGGREGATE, NOT EARTH OR SOIL.
11. WHERE REQUIRED, INSTALL A FLOW CONTROL BUND TO MAINTAIN THE SPECIFIED POOL DEPTH AND CONTROL THE MOVEMENT OF WATER.
12. TAKE ALL NECESSARY MEASURES TO MINIMISE THE SAFETY RISK CAUSED BY THE STRUCTURE AND TO PREVENT UNSAFE ENTRY INTO THE STORMWATER INLET.

SEDIMENT BASIN

1. REMOVE ALL VEGETATION AND TOPSOIL FROM UNDER THE DAM WALL AND FROM WITHIN THE STORAGE AREA.
2. PREPARE THE SITE UNDER THE EMBANKMENT BY RIPPING AT LEAST 100mm TO HELP BOND COMPACTED FILL TO THE EXISTING SUBSTRATE.
3. FOR EARTH EMBANKMENT MATERIAL TYPE AND COMPACTION REFER TO DTMR SPECIFICATION MRTS04 SECTION14.2.6 - WATER RETAINING EMBANKMENTS.
4. CONSTRUCT EMERGENCY SPILLWAY.
5. INSTALL MARKER POST SHOWING MAXIMUM STORAGE AND SETTLING ZONE VOLUMES.
6. AS-CONSTRUCTED PLANS MUST BE PREPARED FOR ALL CONSTRUCTED SEDIMENT BASINS AND ASSOCIATED EMERGENCY SPILLWAYS. SUCH PLANS MUST APPROPRIATELY VERIFY THE BASIN'S DIMENSIONS, LEVELS AND VOLUMES, AND MUST BE SUBMITTED TO THE RELEVANT REGULATORY AUTHORITY WITHIN 14 CALENDAR DAYS OF THE CONSTRUCTION OF EACH BASIN.
7. BASINS SHOULD BE APPROPRIATELY FENCED AND MARKED BY WARNING SIGNS IF UNSUPERVISED PUBLIC ACCESS IS LIKELY AND PUBLIC SAFETY IS AT RISK.

SITE MONITORING AND MAINTENANCE

1. ALL DRAINAGE, EROSION AND SEDIMENT CONTROL MEASURES MUST BE INSPECTED:
   (i) AT LEAST DAILY (WHEN WORK IS OCCURRING ON-SITE);
   (ii) AT LEAST WEEKLY (WHEN WORK IS NOT OCCURRING ON-SITE);
   (iii) WITHIN 24 HOURS OF EXPECTED RAINFALL; AND
   (iv) WITHIN 18 HOURS OF A RAINFALL EVENT OF SUFFICIENT INTENSITY AND DURATION TO CAUSE RUNOFF ON-SITE).
2. INSPECTION SHALL BE CONDUCTED IN LINE WITH THE FOLLOWING AS A MINIMUM:
   i) RECORD TYPE OF DEVICE/CONTROL MEASURE BEING INSPECTED AND ITS LOCATION;
   ii) RECORD THE CONDITION OF EACH DEVICE/CONTROL MEASURE BEING INSPECTED;
   iii) RECORD MAINTENANCE REQUIREMENTS FOR DEVICE/CONTROL MEASURE BEING INSPECTED;
   iv) RECORD SEDIMENT VOLUMES REMOVED FROM DEVICE/CONTROL MEASURE BEING INSPECTED;
   v) RECORD DETAILS OF SEDIMENT BASIN TREATMENT, FLOCCULENT DOSAGE AND CLEANOUTS;
   vi) RECORD SEDIMENT DISPOSAL PROCEDURES AND LOCATION;
2. ALL DRAINAGE, EROSION AND SEDIMENT CONTROL MEASURES MUST BE MAINTAINED IN PROPER WORKING ORDER AT ALL TIMES DURING THEIR OPERATIONAL LIVES.
4. SEDIMENT CONTROL DEVICES MUST BE DE-SILTED AND MADE FULLY OPERATIONAL AS SOON AS REASONABLE AND PRACTICABLE AFTER A SEDIMENT-PRODUCING EVENT, WHETHER NATURAL OR ARTIFICIAL, IF THE DEVICE'S SEDIMENT RETENTION CAPACITY FALLS BELOW 75% OF ITS DESIGN RETENTION CAPACITY. DE-SILT SEDIMENT TRAP IF THE SEDIMENT LEVEL EXCEEDS 1/3 OF THE CREST HEIGHT.
5. MATERIALS, WHETHER LIQUID OR SOLID, REMOVED FROM SEDIMENT CONTROL DEVICES DURING MAINTENANCE OR DECOMMISSIONING, MUST BE DISPOSED OF IN A MANNER THAT DOES NOT CAUSE ONGOING SOIL EROSION OR ENVIRONMENTAL HARM.
7. ALL WATER QUALITY DATA, INCLUDING DATES OF RAINFALL, DATES OF TESTING, TESTING RESULTS AND DATES OF WATER RELEASE, MUST BE KEPT IN AN ON-SITE REGISTER. THE REGISTER IS TO BE MAINTAINED UP TO DATE FOR THE DURATION OF THE APPROVED WORKS AND BE AVAILABLE ON-SITE FOR INSPECTION BY THE RELEVANT REGULATORY AUTHORITY ON REQUEST.
8. AT NOMINATED INSTREAM WATER MONITORING SITES, A MINIMUM OF 3 WATER SAMPLES MUST BE TAKEN AND ANALYSED, AND THE AVERAGE RESULT USED TO DETERMINE QUALITY.
9. ALL ENVIRONMENTALLY RELEVANT INCIDENTS MUST BE RECORDED IN A FIELD LOG THAT MUST REMAIN ACCESSIBLE TO ALL RELEVANT REGULATORY AUTHORITIES.
10. WASHING/FLUSHING OF SEALED ROADWAYS MUST ONLY OCCUR WHERE SWEEPING HAS FAILED TO REMOVE SUFFICIENT SEDIMENT AND THERE IS A COMPELLING NEED TO REMOVE THE REMAINING SEDIMENT (E.G. FOR SAFETY REASONS). IN SUCH CIRCUMSTANCES, ALL REASONABLE AND PRACTICABLE SEDIMENT CONTROL MEASURES MUST BE USED TO PREVENT, OR AT LEAST MINIMISE, THE RELEASE OF SEDIMENT INTO RECEIVING WATERS. ONLY THOSE MEASURES THAT WILL NOT CAUSE SAFETY AND PROPERTY FLOODING ISSUES SHALL BE EMPLOYED. SEDIMENT REMOVED FROM ROADWAYS MUST BE DISPOSED OF IN A LAWFUL MANNER THAT DOES NOT CAUSE ONGOING SOIL EROSION OR ENVIRONMENTAL HARM.
11. ALL SEEDING, HYDROSEEDING AND TURFING REQUIRES REGULAR WATERING UNTIL EFFECTIVE COVER IS ESTABLISHED AND PLANTS ARE GROWING VIGOROUSLY. WATERING SHOULD DEPEND ON WEATHER AND SOIL CONDITIONS. WATERING SHOULD START IMMEDIATELY AFTER PLANTING AND SHOULD COMPLY WITH THE FOLLOWING AS A MINIMUM:
    i) WEEK 1 — 3 WATERINGS PER WEEK
    ii) WEEK 2-6 — 2 WATERINGS PER WEEK
    iii) WEEK 7-12 — 1 WATERING PER WEEK
11. MAINTENANCE MOWING OF ALL ROAD SHOULDERS, TABLE DRAINS, BATTERS AND OTHER SURFACES LIKELY TO EXPERIENCE ACCELERATED SOIL EROSION MUST AIM TO LEAVE THE GRASS LENGTH NO SHORTER THAN 50mm WHERE REASONABLE AND PRACTICABLE.
12. MAINTENANCE MOWING MUST BE DONE IN A MANNER THAT WILL NOT DAMAGE THE PROFILE OF FORMED, SOFT EDGES, SUCH AS THE CREST OF EARTH EMBANKMENTS.

SEDIMENT BASIN

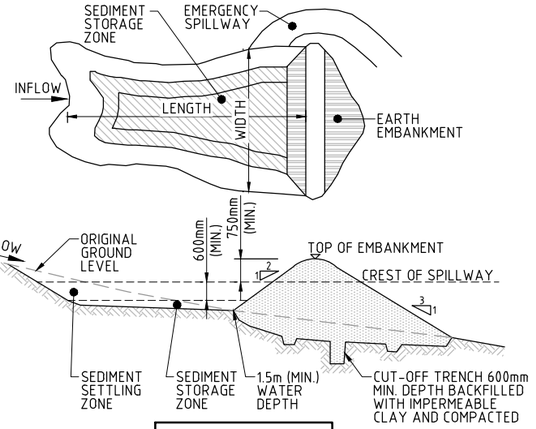
1. CONSTRUCTED SEDIMENT BASINS MUST BE MAINTAINED AND FULLY OPERATIONAL THROUGHOUT THE CONSTRUCTION PERIOD AND UNTIL EACH BASIN'S CATCHMENT AREA ACHIEVES 80% GROUND COVER ON ALL SOIL SURFACES.
2. SETTLED SEDIMENT MUST BE REMOVED FROM SEDIMENT BASINS WHEN THE VOLUME OF THE SEDIMENT EXCEEDS THE DESIGNATED SEDIMENT STORAGE VOLUME, OR THE DESIGN MAXIMUM SEDIMENT STORAGE ELEVATION.
3. SEDIMENT BASIN WATER QUALITY SAMPLES MUST BE TAKEN AT A DEPTH NO GREATER THAN 200mm ABOVE THE LEVEL OF SETTLED SEDIMENT BY A SUITABLY QUALIFIED PERSON. WATER TESTING TO BE UNDERTAKEN USING EITHER A HANDHELD PH/TURBIDITY METER OR SAMPLES COLLECTED FOR LABORATORY TESTING PRIOR TO BASIN DEWATERING. ALL LABORATORY TESTING TO BE UNDERTAKEN BY A NATA ACCREDITED LABORATORY.
4. ALL WATER PUMPED FROM THE SEDIMENT BASIN SHALL BE TESTED FOR ENVIRONMENTAL COMPLIANCE AGAINST THE RELEASE CRITERIA IN THE TABLE BELOW (AS A MINIMUM), UNLESS ALTERNATIVE (MORE STRINGENT) STANDARDS ARE SPECIFIED BY THE LOCAL AUTHORITY PRIOR TO RELEASE.

PARAMETER	RELEASE CRITERIA
SUSPENDED SOLIDS	50mg/l MAX
pH	WITHIN RANGE 6.5-8.5
VISUAL AMENITY	NO VISUAL PLUME

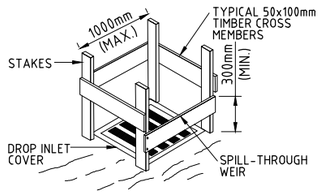
5. THE SEDIMENT BASIN SHALL BE TREATED BY FLOCCULATION AFTER ALL RAINFALL EVENTS (> 5mm) USING GYPSUM OR ALUM. MANUAL DOSAGE OF BASIN SHALL BE UNDERTAKEN USING A MINIMUM RATE OF 32kg/100m³ FOR GYPSUM AND 1.5-8kg/100m³ FOR ALUM. HIGHER DOSAGE MAY BE REQUIRED DEPENDING ON SOIL TYPE AND APPLICATION TECHNIQUE. ALUM SHALL NOT BE USED WHERE THE CATCHMENT DISCHARGES DIRECTLY TO A WATERWAY.
6. THE CHOSEN FLOCCULENT SHALL BE SPREAD EVENLY OVER THE BASIN SURFACE AREA. THE BASIN WILL REQUIRE A PUMP SYSTEM TO SPRAY SLURRY OF FLOCCULANTS OVER SURFACE AT AN ANGLE OF 10°-20°.
7. THE TREATED BASIN SHALL BE DEWATERED WITH A PUMP SYSTEM WITH A FLOATING INLET TO ENSURE SETTLED SEDIMENT IS NOT ENTRAINED AND DISCHARGED. BASIN DEWATERING SHALL OCCUR WITHIN 5 DAYS FROM CONCLUSION OF RAINFALL EVENT.

SITE REHABILITATION

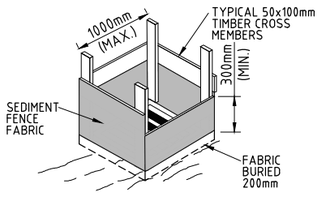
1. ALL DISTURBED AREAS IDENTIFIED AS VERY LOW, LOW, MEDIUM, HIGH, OR EXTREME EROSION RISK MUST BE SUITABLY STABILISED WITHIN 60, 30, 20, 10 OR 5 DAYS RESPECTIVELY, OR PRIOR TO ANTICIPATED RAINFALL, WHICHEVER IS THE GREATER, FROM THE DAY THAT SOIL DISTURBANCES ON THE AREA HAVE BEEN FINALISED.
2. THE TYPE OF GROUND COVER APPLIED TO COMPLETED EARTHWORKS SHOULD BE COMPATIBLE WITH THE ANTICIPATED LONG-TERM LAND USE, ENVIRONMENTAL RISK, AND SITE REHABILITATION MEASURES.
3. UNLESS OTHERWISE DIRECTED BY SUPERINTENDENT OR WHERE DIRECTED BY THE APPROVED REVEGETATION PLAN, TOPSOIL MUST BE PLACED AT A MINIMUM DEPTH OF 75mm ON SLOPES 4:1 (H:V) OR FLATTER, AND 50mm ON SLOPES STEEPER THAN 4:1.
4. THE PH LEVEL (SOIL:WATER 1:5) OF TOPSOIL MUST BE ADEQUATE TO ENABLE ESTABLISHMENT AND GROWTH OF THE SPECIFIED VEGETATION.
5. SOIL AMELIORANTS MUST BE ADDED TO THE SOIL IN ACCORDANCE WITH THE APPROVED LANDSCAPE/REVEGETATION PLANS AND/OR SOIL ANALYSIS.
6. SOIL DENSITY/COMPACTION MUST BE ADJUSTED PRIOR TO SEEDING/PLANTING IN ACCORDANCE WITH THE RELEVANT SPECIFICATIONS, SOIL REPORT AND/OR APPROPRIATE REFERENCE PLANS.
7. ALL UNSTABLE OR DISTURBED SOIL SURFACES MUST BE ADEQUATELY STABILISED AGAINST EROSION (MINIMUM 80%) PRIOR TO COMMENCEMENT OF USE, OR SURVEY PLAN ENDORSEMENT.
8. ALL TEMPORARY DRAINAGE, EROSION AND SEDIMENT CONTROL MEASURES MUST BE REMOVED AFTER ACHIEVING A SATISFACTORY "OFF-MAINTENANCE INSPECTION" BY THE RELEVANT REGULATORY AUTHORITY.
9. DISPOSE OF ANY COLLECTED SEDIMENT OR FILL IN A LAWFUL MANNER THAT DOES NOT CAUSE ONGOING SOIL EROSION OR ENVIRONMENTAL HARM.
10. IMMEDIATELY PRIOR TO THE CONSTRUCTION OF THE PERMANENT STORMWATER TREATMENT DEVICE, APPROPRIATE FLOW BYPASS CONDITIONS MUST BE ESTABLISHED TO PREVENT SEDIMENT-LADEN WATER ENTERING THE DEVICE.
11. IMMEDIATELY FOLLOWING THE CONSTRUCTION OF THE FILTER MEDIA OF THE PERMANENT STORMWATER TREATMENT DEVICE, THE FILTER MEDIA MUST BE COVERED BY HEAVY-DUTY FILTER CLOTH (MINIMUM BIDUM A44 OR EQUIVALENT) AND A MINIMUM 200mm LAYER OF EARTH OR SACRIFICIAL FILTER MEDIA. SUCH EARTH AND FILTER CLOTH MUST NOT BE REMOVED FROM THE DEVICE UNTIL SUITABLE SURFACE CONDITIONS BEING ACHIEVED WITHIN THE BASIN'S CATCHMENT AREA.
12. IMMEDIATELY FOLLOWING THE CONSTRUCTION OF THE PERMANENT STORMWATER TREATMENT DEVICE AN APPROPRIATE TYPE 2 SEDIMENT TRAP MUST BE INSTALLED IN A MANNER TO PREVENT SEDIMENT INTRUSION INTO THE DEVICE.
13. THE MINIMUM SEDIMENT CONTROL STANDARD FOR THE PROTECTION OF THE PERMANENT STORMWATER TREATMENT DEVICE DURING THE CONSTRUCTION AND MAINTENANCE PHASES IS A TYPE 2 SEDIMENT TRAP. (ALTERNATIVE TO ABOVE)
14. PLANT ESTABLISHMENT WITHIN THE PERMANENT STORMWATER TREATMENT DEVICE MUST BE DELAYED UNTIL SEDIMENT INTRUSION INTO THE DEVICE IS SUITABLY UNDER CONTROL.
15. UPON SUITABLE CONDITIONS BEING ACHIEVED WITHIN THE BASIN'S CATCHMENT AREA, THE OPERATIONAL FEATURES OF THE PERMANENT STORMWATER TREATMENT SYSTEM MUST BE MADE FULLY OPERATIONAL (I.E. MAINTENANCE AND/OR RECONSTRUCTION AS REQUIRED).
16. THE PERMANENT STORMWATER TREATMENT FEATURES OF THE REHABILITATED BASIN MUST NOT BE MADE OPERATIONAL UNTIL ALL UP-SLOPE SITE STABILISATION MEASURES HAVE BEEN IMPLEMENTED AND ARE APPROPRIATELY WORKING TO CONTROL SOIL EROSION AND SEDIMENT RUNOFF IN ACCORDANCE WITH THE SPECIFIED ESC STANDARD. (ALTERNATIVE TO ABOVE).



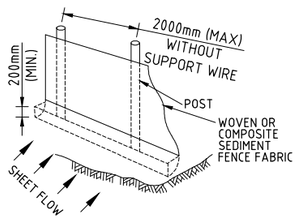
SEDIMENT BASIN



DETAILS OF SUPPORT FRAME WITH SPILL-THROUGH WEIR

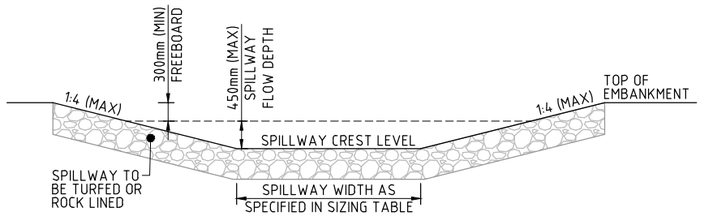


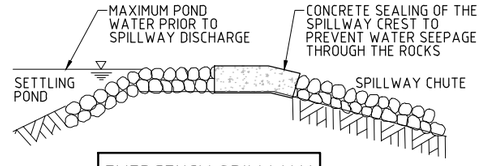
FABRIC DROP INLET PROTECTION WITH SPILL-THROUGH WEIR



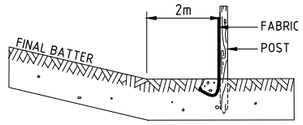
INSTALLATION WITHOUT BACKING SUPPORT

FABRIC DROP INLET PROTECTION

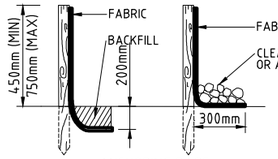




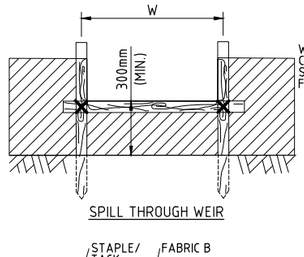
EMERGENCY SPILLWAY



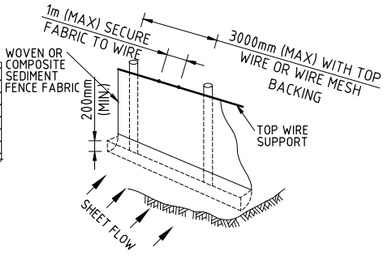
LOCATION OF FENCE RELATIVE TO BASE OF SLOPE



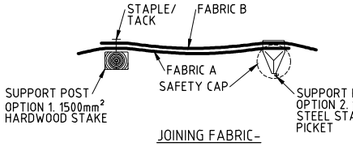
ANCHORING BASE OF FABRIC



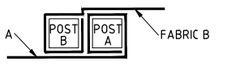
SPILL THROUGH WEIR



INSTALLATION WITH TOP WIRE SUPPORT

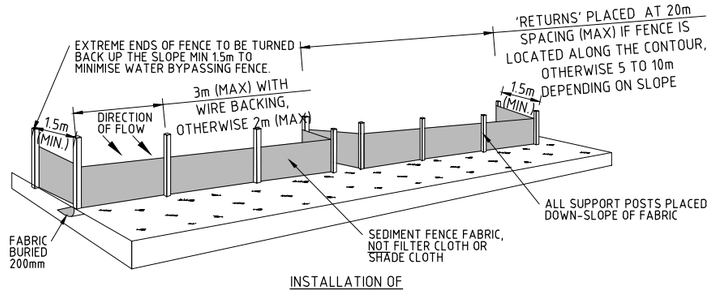


JOINING FABRIC - METHOD 2



FABRIC TO FOLD AROUND EACH STAKE ONE FULL TURN. STAKE B TO BE DRIVEN TIGHTLY AGAINST STAKE A. THE TOPS OF BOTH STAKES TO BE SECURED WITH WIRE.

JOINING FABRIC - METHOD 1



INSTALLATION OF SEDIMENT FENCE

SEDIMENT FENCE

Issue	Description		Date
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.07.15
01	ORIGINAL ISSUE	BD	18.06.14

100mm on Original

Surveyor: ROBERT A HARRIES SURVEYOR
Scale:
Architect:
Filename: C115-AA007094-GCD-00-SED & ERO DETS.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION
Approved: R.P.E.Q No.:

Scales	N.T.S	Current Issue Signatures	
		Author B.DAVEY	
Original Size	A1	Designer A.CAMARDI	
Height Datum	AHD	Reviewer B.LUSTY	
Grid	GRID	© Copyright reserved	

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: SEDIMENT & EROSION CONTROL DETAILS - SHEET 3 OF 3

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Drawing No. C117 — Project No. AA007094 — Issue 02

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LEGEND

- PROPOSED SURFACE CONTOURS
- EXISTING SURFACE CONTOURS
- TOP/TOE OF BATTER
- EARTHWORKS BATTER
- BUILDING PAD AND LEVEL
- NOMINAL KERB LINE
- PROPOSED RETAINING WALL (MAX 1.5m)
- FILL
- CUT
- MIDDEN LOCATION
- STAGE BOUNDARY

BULK EARTHWORKS VOLUMES

CUT	124,213m³
FILL	191,652m³
BALANCE	67,439m³ IMPORT

NOTE: NO COMPACTION FACTORS, BOXING OR STRIPPING HAVE BEEN APPLIED TO THE ABOVE VOLUMES.

SHEET 1 | SHEET 2 | SHEET 3 | SHEET 4 | SHEET 5

STAGE 1

STAGE 2

FOR CONTINUATION REFER DWG C121

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

100mm on Original

Scale: 1 : 500 (0 5 10 20 30 40 50m)

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C120-AA007094-GCD-00-BULK EW.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No.:

Scales	1:500	Current Issue Signatures	
Original Size	A1	Author B.DAVEY	
Height Datum	AHD	Designer A.CAMARDI	
Grid	GRID	Reviewer B.LUSTY	

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: BULK EARTHWORKS CUT & FILL LAYOUT PLAN - SHEET 1 OF 5

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Drawing No.	Project No.	Issue
C120	AA007094	03

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FOR CONTINUATION REFER DWG C120

FOR CONTINUATION REFER DWG C123

FOR CONTINUATION REFER DWG C122

STAGE 1

STAGE 2

MC1000

MC1001

MC1002

FIRE TRAIL

CH 800.000 TP 811.863 CH 820.000 TP 839.064 CH 840.000 CH 860.000 CREST 865.724 CH 880.000 TP 897.187 CH 900.000 SAG 8.481 CH 0.000 R-100.000 R110.000

CH 320.000 CH 300.000 CH 280.000 TP 259.417 CH 260.000 TP 241.020 CH 240.000 CH 220.000 TP 210.545 CH 200.000 TP 198.614 CH 180.000 CH 160.000 CH 140.000 CH 120.000 CH 100.000 CH 80.000 CH 60.000 R14.250 R-5.000 R20.000

CH 140.000 CH 120.000 CH 100.000 CH 80.000 CH 60.000 CH 40.000 TP 30.208 CH 20.000 TP 19.205 SAG 13.575 CH 0.000 TP 43.602 TP 28.858 CH 20.000 SAG 13.342 CH 0.000 TP 20.868

CH 260.000 CH 240.000 CH 220.000 CH 200.000 CH 180.000 CH 160.000 CH 140.000 CH 120.000 CH 100.000 CH 80.000 CH 60.000 CH 40.000

177 181

B C01115 E C01115

BULK EARTHWORKS VOLUMES

CUT	124,213m³
FILL	191,652m³
BALANCE	67,439m³ IMPORT

NOTE: NO COMPACTION FACTORS, BOXING OR STRIPPING HAVE BEEN APPLIED TO THE ABOVE VOLUMES.

LEGEND

- PROPOSED SURFACE CONTOURS (5.0)
- EXISTING SURFACE CONTOURS (5.0)
- TOP/TOE OF BATTER
- EARTHWORKS BATTER
- BUILDING PAD AND LEVEL (14.25)
- NOMINAL KERB LINE
- PROPOSED RETAINING WALL (MAX 1.5m)
- FILL
- CUT
- MIDDEN LOCATION
- STAGE BOUNDARY

SHEET 1 SHEET 2 SHEET 3 SHEET 4 SHEET 5

N

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C120-AA007094-GCD-00-BULK EW.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No :

Scales: 1:500

Original Size: A1

Height Datum: AHD

Grid: GRID

Current Issue Signatures

Author B.DAVEY

Designer A.CAMARDI

Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: BULK EARTHWORKS CUT & FILL LAYOUT PLAN - SHEET 2 OF 5

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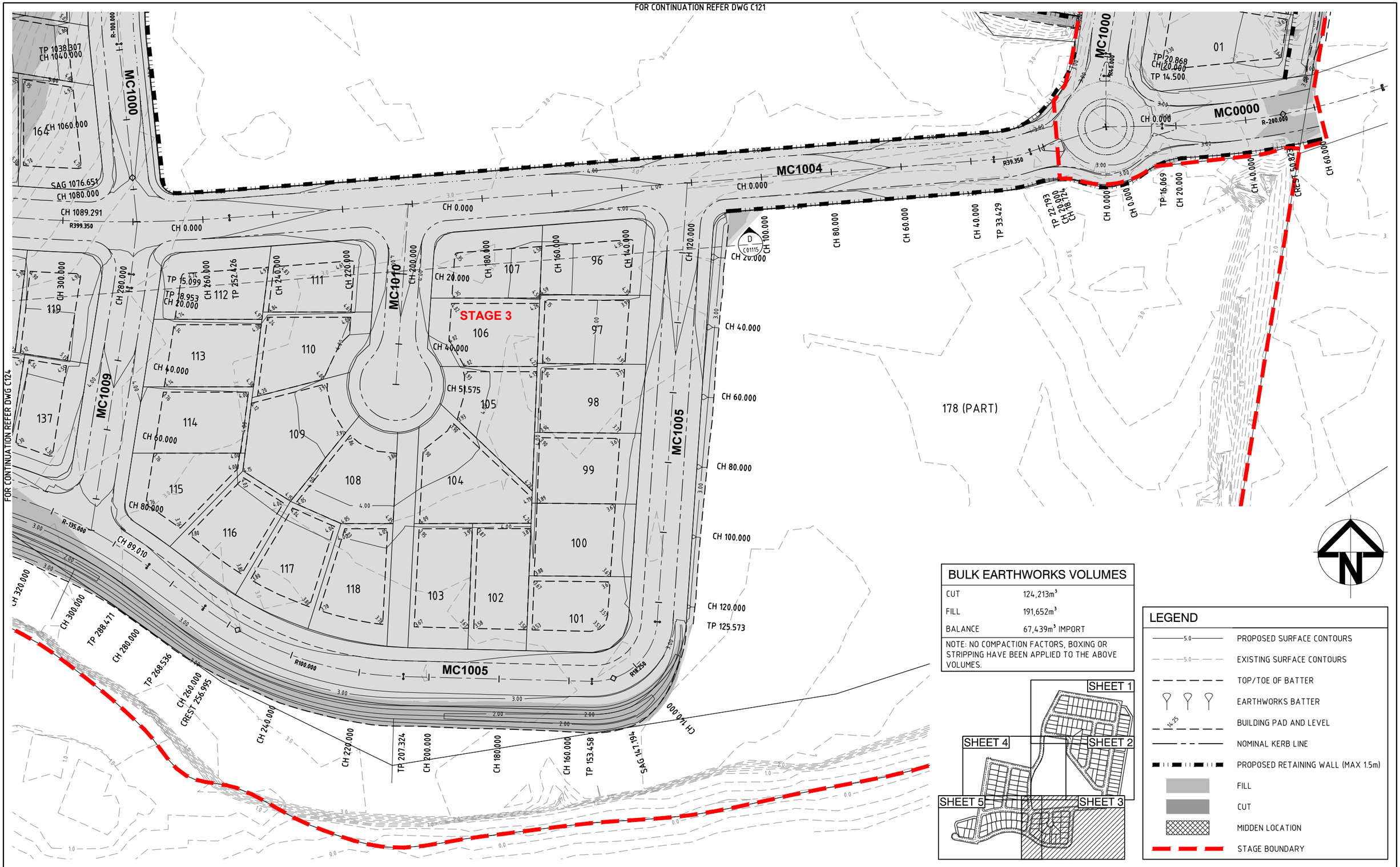
Drawing No. C121 | Project No. AA007094 | Issue 03

100mm on Original

21/ Jul/2015 4:30 PM F:\AA007094\E-CAD\C-Civil\D-Final\C120-AA007094-GCD-00-BULK EW.dwg V1

FOR CONTINUATION REFER DWG C121

FOR CONTINUATION REFER DWG C124



BULK EARTHWORKS VOLUMES

CUT	124,213m³
FILL	191,652m³
BALANCE	67,439m³ IMPORT

NOTE: NO COMPACTION FACTORS, BOXING OR STRIPPING HAVE BEEN APPLIED TO THE ABOVE VOLUMES.

LEGEND

- PROPOSED SURFACE CONTOURS
- EXISTING SURFACE CONTOURS
- TOP/TOE OF BATTER
- EARTHWORKS BATTER
- BUILDING PAD AND LEVEL
- NOMINAL KERB LINE
- PROPOSED RETAINING WALL (MAX 1.5m)
- FILL
- CUT
- MIDDEN LOCATION
- STAGE BOUNDARY

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C120-AA007094-GCD-00-BULK EW.DWG

Client: GOLDCORAL PTY LTD

Status: **FOR APPROVAL** — NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No :

Scales	1:500	Current Issue Signatures	
Original Size	A1	Author B.DAVEY	
Height Datum	AHD	Designer A.CAMARDI	
Grid	GRID	Reviewer B.LUSTY	
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Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: BULK EARTHWORKS CUT & FILL LAYOUT PLAN - SHEET 3 OF 5

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Drawing No.	Project No.	Issue
C122	— AA007094 —	03

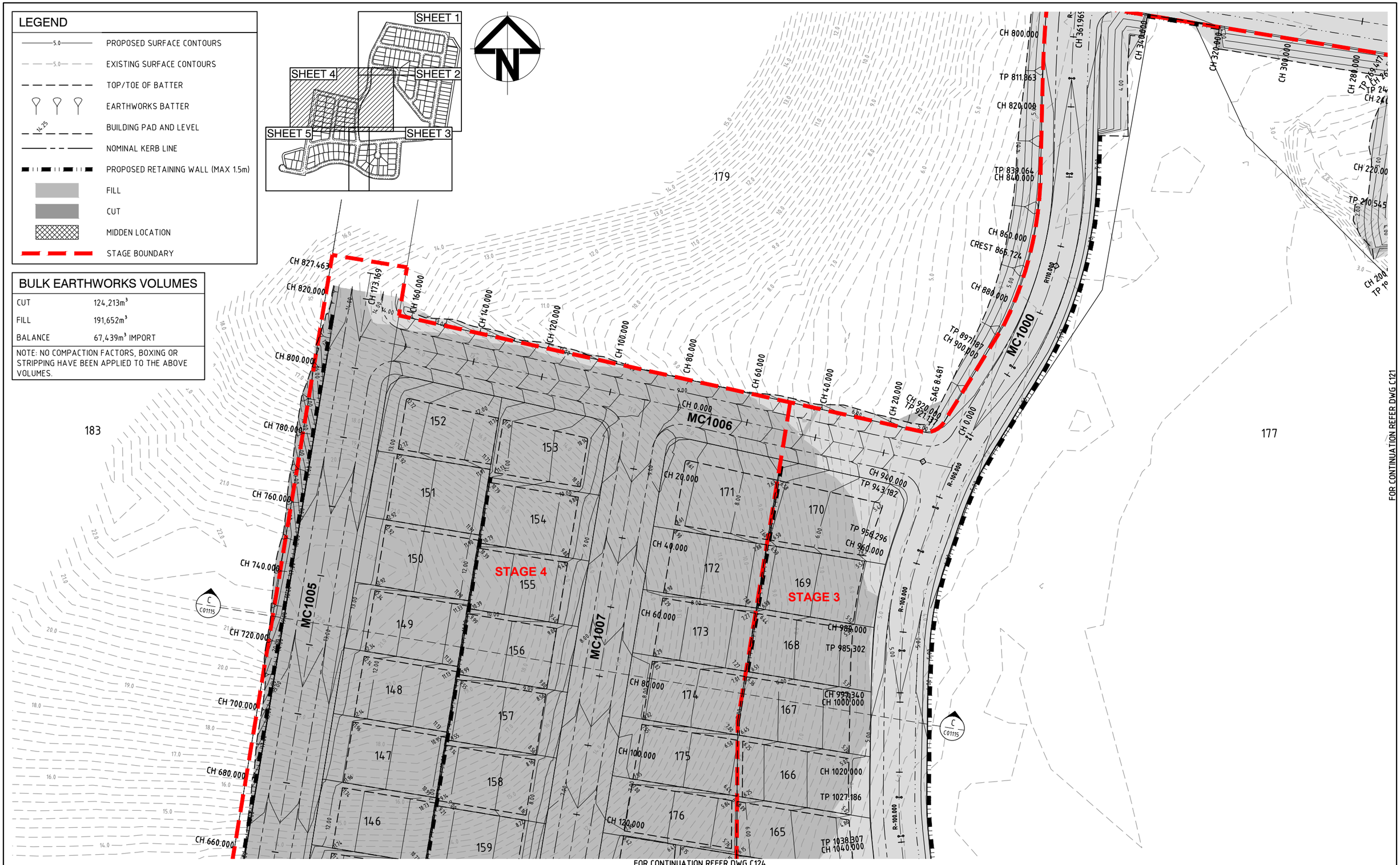
LEGEND

- PROPOSED SURFACE CONTOURS (5.0)
- EXISTING SURFACE CONTOURS (5.0)
- TOP/TOE OF BATTER
- EARTHWORKS BATTER
- BUILDING PAD AND LEVEL (14.25)
- NOMINAL KERB LINE
- PROPOSED RETAINING WALL (MAX 1.5m)
- FILL
- CUT
- MIDDEN LOCATION
- STAGE BOUNDARY

BULK EARTHWORKS VOLUMES

CUT	124,213m³
FILL	191,652m³
BALANCE	67,439m³ IMPORT

NOTE: NO COMPACTION FACTORS, BOXING OR STRIPPING HAVE BEEN APPLIED TO THE ABOVE VOLUMES.



Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

100mm on Original

Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C120-AA007094-GCD-00-BULK EW.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No:

Scales: 1:500 | Original Size: A1 | Height Datum: AHD | Grid: GRID

Current Issue Signatures

Author B.DAVEY

Designer A.CAMARDI

Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: BULK EARTHWORKS CUT & FILL LAYOUT PLAN - SHEET 4 OF 5

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Drawing No. C123 | Project No. AA007094 | Issue 03

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FOR CONTINUATION REFER DWG C123

LEGEND

- PROPOSED SURFACE CONTOURS
- EXISTING SURFACE CONTOURS
- TOP/TOE OF BATTER
- EARTHWORKS BATTER
- BUILDING PAD AND LEVEL
- NOMINAL KERB LINE
- PROPOSED RETAINING WALL (MAX 1.5m)
- FILL
- CUT
- MIDDEN LOCATION
- STAGE BOUNDARY

SHEET 1 | SHEET 2 | SHEET 3 | SHEET 4 | SHEET 5

STAGE 4

STAGE 3

FIRE TRAIL

MC1000 MC1004 MC1005 MC1007 MC1008 MC1009

178 (PART)

EVANS RIVER

FOR CONTINUATION REFER DWG C122

BULK EARTHWORKS VOLUMES

CUT	124,213m³
FILL	191,652m³
BALANCE	67,439m³ IMPORT

NOTE: NO COMPACTION FACTORS, BOXING OR STRIPPING HAVE BEEN APPLIED TO THE ABOVE VOLUMES.

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C120-AA007094-GCD-00-BULK EW.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No :

Scales: 1:500

Original Size: A1

Height Datum: AHD

Grid: GRID

Current Issue Signatures: Author B.DAVEY; Designer A.CAMARDI; Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: BULK EARTHWORKS CUT & FILL LAYOUT PLAN - SHEET 5 OF 5

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Drawing No. C124 — Project No. AA007094 — Issue 03

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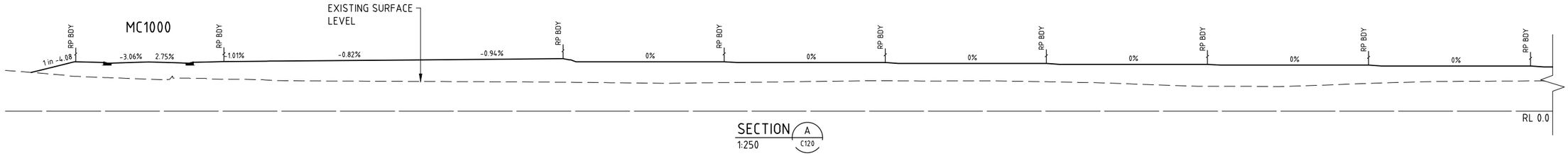

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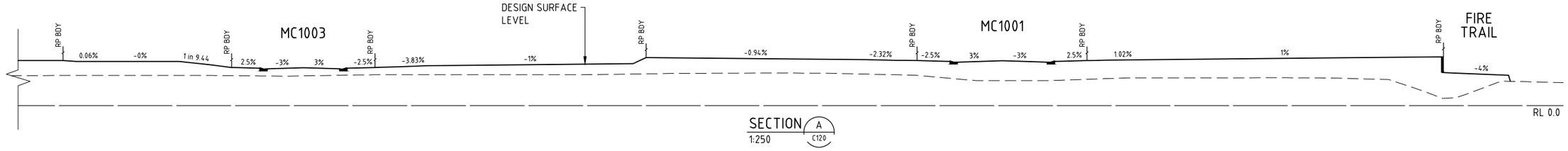
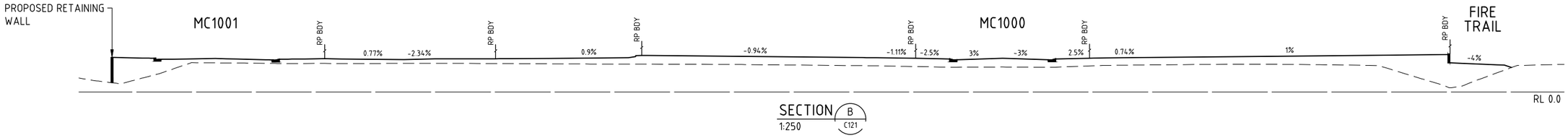


SECTION A
1:250 C120



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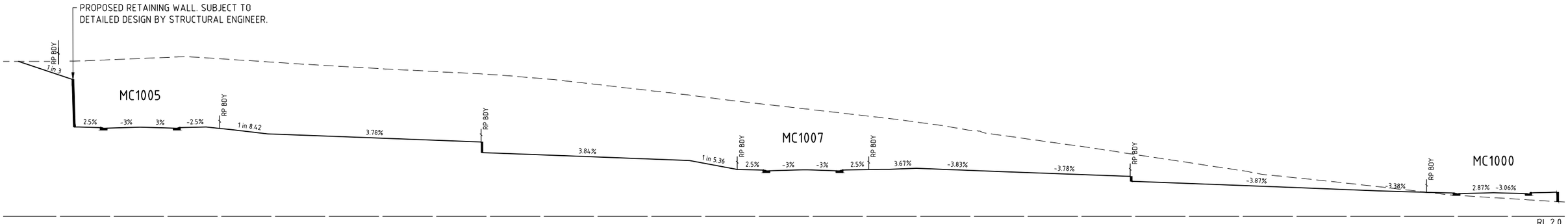

SECTION C
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01	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
Issue	Description		Date

100mm on Original

Scale
0 5 10 15 20 25m
1 : 250

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C125-AA007094-GCD-00-BULK EW XS.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved

R.P.E.Q No :

Scales	1:250	Current Issue Signatures	
		Author B.DAVEY	
Original Size	A1	Designer A.CAMARDI	
Height Datum	AHD	Reviewer B.LUSTY	
Grid	GRID	© Copyright reserved	

Project: RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title: BULK EARTHWORKS CUT & FILL SECTIONS - SHEET 1 OF 2

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Drawing No.	Project No.	Issue
C125	AA007094	01

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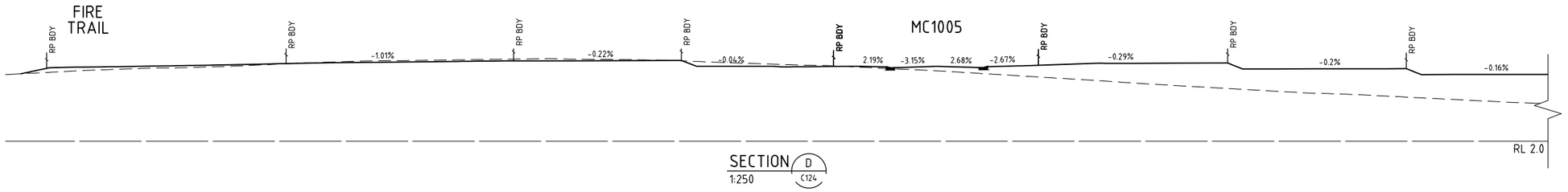

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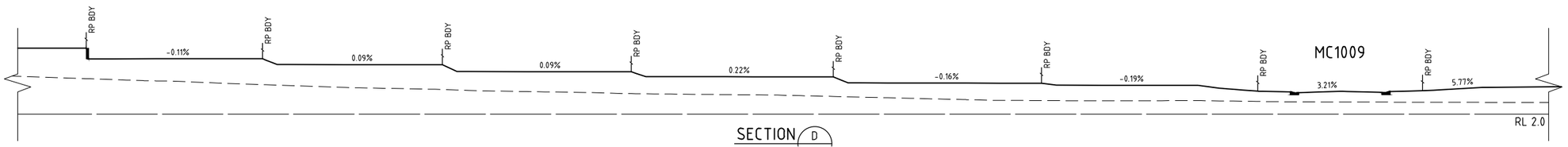

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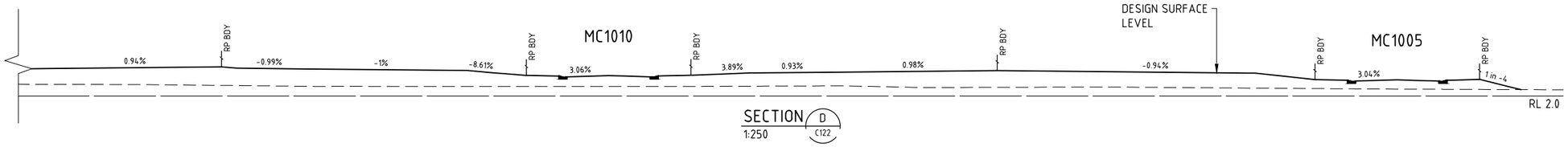

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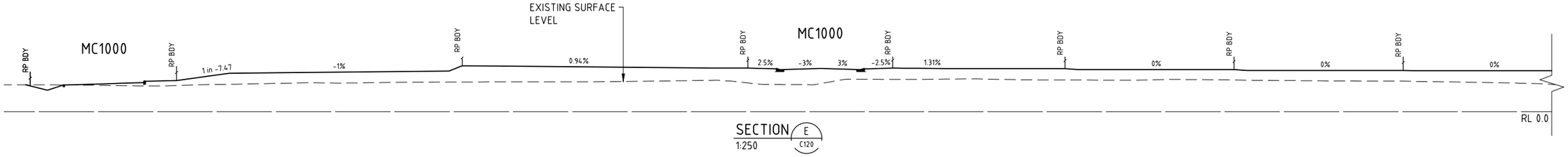

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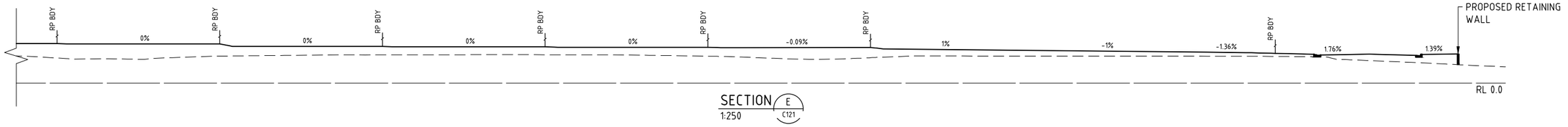
1:250 C120



SECTION E
1:250 C121

Issue	Description	Date
01	RE-ISSUE FOR DEVELOPMENT APPROVAL BD	13.07.15

100mm on Original

Scale
0 5 10 15 20 25m
1 : 250

Surveyor
ROBERT A HARRIES
SURVEYOR

Architect

Filename: C125-AA007094-GCD-00-BULK EW XS.DWG

Client
GOLDCORAL PTY LTD

Status
FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved
R.P.E.Q No :

Scales	1:250	Current Issue Signatures	
Original Size	A1	Author B.DAVEY	
Height Datum	AHD	Designer A.CAMARDI	
Grid	GRID	Reviewer B.LUSTY	

Project
RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title
BULK EARTHWORKS CUT & FILL
SECTIONS - SHEET 2 OF 2

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Drawing No.	Project No.	Issue
C126	AA007094	01

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LEGEND

- PROPOSED SURFACE CONTOURS
- EXISTING SURFACE CONTOURS
- PROPOSED MOUNTABLE/LAYBACK KERB
- PROPOSED BARRIER KERB & CHANNEL
- PROPOSED BARRIER KERB
- PROPOSED EDGE RESTRAINT
- TOP/TOE OF BATTER
- PROPOSED STORMWATER PIPE
- PROPOSED WATER RETICULATION
- PROPOSED SEWERAGE RETICULATION
- EXISTING SEWERAGE RETICULATION
- SEEPAGE PIT
- PROPOSED RETAINING WALL
- PROPOSED PAVEMENT
- PROPOSED BIO
- MIDDEN LOCATION
- STAGE BOUNDARY

SHEET 1 | SHEET 2 | SHEET 3 | SHEET 4 | SHEET 5

MC1000 MC1001 MC1002 MC1003 FIRE TRAIL STAGE 1 STAGE 2

FOR CONTINUATION REFER DWG C131

Issue	Description		Date
04	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
03	ISSUE FOR DEVELOPMENT APPROVAL / PAVEMENT HATCH ADDED	ND	21.10.14
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

100mm on Original

Scale: 1 : 500 (0 5 10 20 30 40 50m)

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C130-AA007094-GCD-00-RDWKS & DRAIN.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No.:

Scales: 1:500

Original Size: A1

Height Datum: AHD

Grid: GRID

Current Issue Signatures

Author B.DAVEY

Designer A.CAMARDI

Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title: ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 1 OF 5

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Drawing No. C130 — Project No. AA007094 — Issue 04

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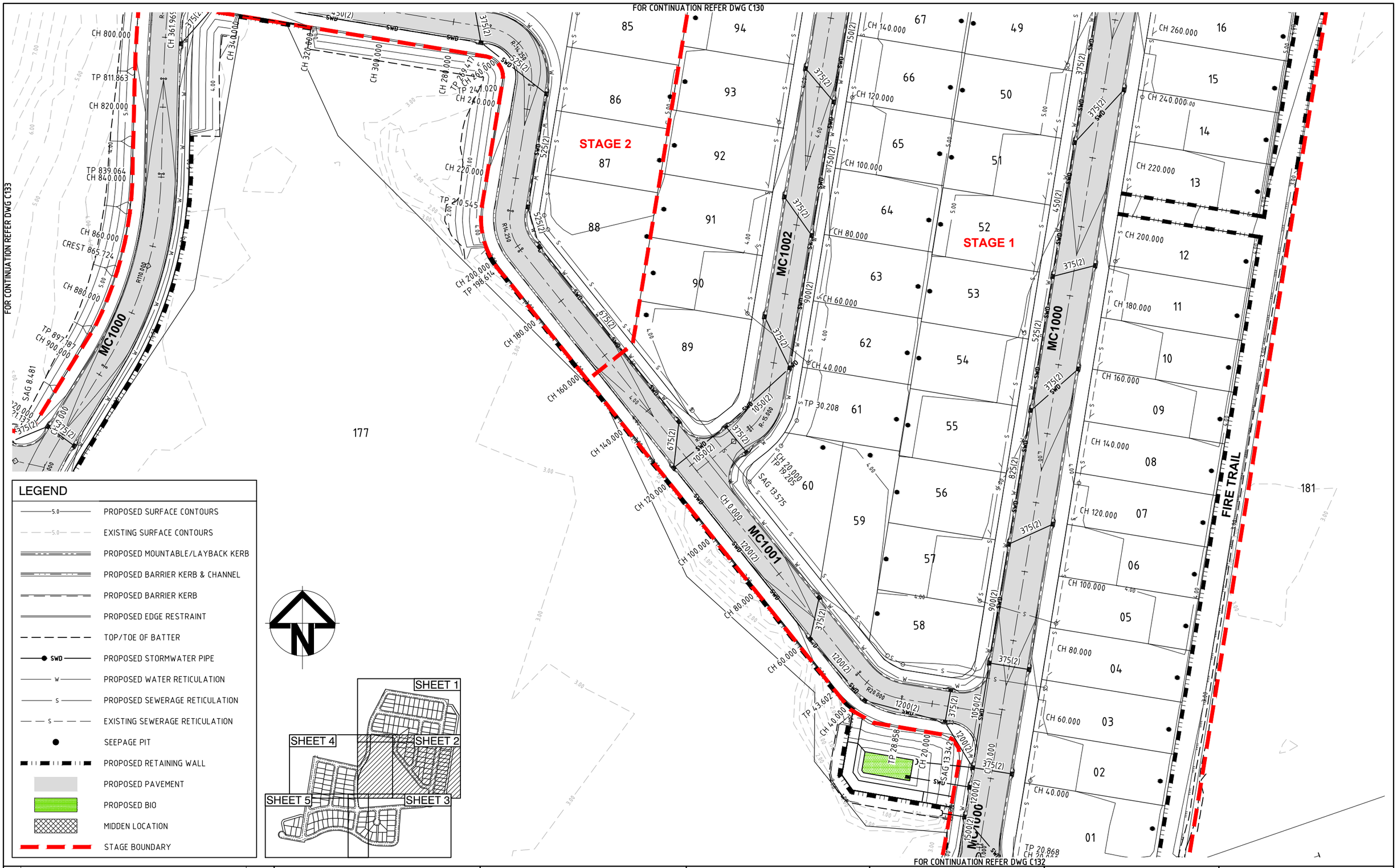

LEGEND

- PROPOSED SURFACE CONTOURS
- EXISTING SURFACE CONTOURS
- PROPOSED MOUNTABLE/LAYBACK KERB
- PROPOSED BARRIER KERB & CHANNEL
- PROPOSED BARRIER KERB
- PROPOSED EDGE RESTRAINT
- TOP/TOE OF BATTER
- PROPOSED STORMWATER PIPE
- PROPOSED WATER RETICULATION
- PROPOSED SEWERAGE RETICULATION
- EXISTING SEWERAGE RETICULATION
- SEEPAGE PIT
- PROPOSED RETAINING WALL
- PROPOSED PAVEMENT
- PROPOSED BIO
- MIDDEN LOCATION
- STAGE BOUNDARY

Issue	Description		Date
04	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
03	ISSUE FOR DEVELOPMENT APPROVAL / PAVEMENT HATCH ADDED	ND	21.10.14
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C130-AA007094-GCD-00-RDWKS & DRAIN.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No :

Scales	1:500	Current Issue Signatures	
		Author B.DAVEY	
Original Size	A1	Designer A.CAMARDI	
Height Datum	AHD	Reviewer B.LUSTY	
Grid	GRID	© Copyright reserved	

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 2 OF 5

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Drawing No. C131 — Project No. AA007094 — Issue 04

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FOR CONTINUATION REFER DWG C131

FOR CONTINUATION REFER DWG C134

MC1000 MC1004 MC0000 MC1009 MC1010 MC1005

STAGE 3

178 (PART)

01

LEGEND

- PROPOSED SURFACE CONTOURS
- EXISTING SURFACE CONTOURS
- PROPOSED MOUNTABLE/LAYBACK KERB
- PROPOSED BARRIER KERB & CHANNEL
- PROPOSED BARRIER KERB
- PROPOSED EDGE RESTRAINT
- TOP/TOE OF BATTER
- PROPOSED STORMWATER PIPE
- PROPOSED WATER RETICULATION
- PROPOSED SEWERAGE RETICULATION
- EXISTING SEWERAGE RETICULATION
- SEEPAGE PIT
- PROPOSED RETAINING WALL
- PROPOSED PAVEMENT
- PROPOSED BIO
- MIDDEN LOCATION
- STAGE BOUNDARY

SHEET 1 SHEET 2 SHEET 3 SHEET 4 SHEET 5

Issue	Description		Date
04	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
03	ISSUE FOR DEVELOPMENT APPROVAL / PAVEMENT HATCH ADDED	ND	21.10.14
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C130-AA007094-GCD-00-RDWKS & DRAIN.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No :

Scales: 1:500 | Original Size: A1 | Height Datum: AHD | Grid: GRID

Current Issue Signatures: Author B.DAVEY; Designer A.CAMARDI; Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 3 OF 5

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Drawing No. C132 — Project No. AA007094 — Issue 04

100mm on Original

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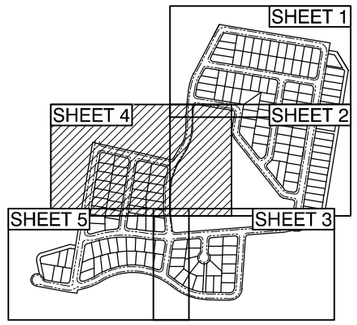
LEGEND

- PROPOSED SURFACE CONTOURS
- EXISTING SURFACE CONTOURS
- PROPOSED MOUNTABLE/LAYBACK KERB
- PROPOSED BARRIER KERB & CHANNEL
- PROPOSED BARRIER KERB
- PROPOSED EDGE RESTRAINT
- TOP/TOE OF BATTER
- PROPOSED STORMWATER PIPE
- PROPOSED WATER RETICULATION
- PROPOSED SEWERAGE RETICULATION
- EXISTING SEWERAGE RETICULATION
- SEEPAGE PIT
- PROPOSED RETAINING WALL
- PROPOSED PAVEMENT
- PROPOSED BIO
- MIDDEN LOCATION
- STAGE BOUNDARY



Issue	Description		Date
04	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
03	ISSUE FOR DEVELOPMENT APPROVAL / PAVEMENT HATCH ADDED	ND	21.10.14
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

100mm on Original

Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C130-AA007094-GCD-00-RDWKS & DRAIN.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No :

Scales: 1:500 — Current Issue Signatures

Original Size: A1 — Author B.DAVEY

Height Datum: AHD — Designer A.CAMARDI

Grid: GRID — Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 4 OF 5

HYDER CONSULTING PTY. LTD
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Drawing No. C133 — Project No. AA007094 — Issue 04

21/Jul/2015 4:30 PM F:\AA007094\E-CAD\C-Civil\D-Final\C130-AA007094-GCD-00-RDWKS & DRAIN.dwg V1

Issue	Description		Date
04	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
03	ISSUE FOR DEVELOPMENT APPROVAL / PAVEMENT HATCH ADDED	ND	21.10.14
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C130-AA007094-GCD-00-RDWKS & DRAIN.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No :

Scales: 1:500 — Current Issue Signatures

Original Size: A1 — Author B.DAVEY

Height Datum: AHD — Designer A.CAMARDI

Grid: GRID — Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 5 OF 5

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Drawing No. C134 — Project No. AA007094 — Issue 04

100mm on Original

21/Jul/2015 4:30 PM F:\AA007094\E-CAD\C-Civil\D-Final\C130-AA007094-GCD-00-RDWKS & DRAIN.dwg V1

LEGEND

- CATCHMENT BOUNDARY
- SWD — PROPOSED STORMWATER RETICULATION
- NOMINAL KERB LINE
- 5.0 — PROPOSED SURFACE CONTOURS
- STAGE BOUNDARY

FOR CONTINUATION REFER DWG C136

Issue	Description		Date
01	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15

100mm on Original

Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C135-AA007094-GCD-00-SWD CATCHMENT.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No :

Scales	1:500	Current Issue Signatures	
Original Size	A1	Author B.DAVEY	
Height Datum	AHD	Designer A.CAMARDI	
Grid	GRID	Reviewer B.LUSTY	

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: STORMWATER CATCHMENT LAYOUT PLAN - SHEET 1 OF 2

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Drawing No.	Project No.	Issue
C135	AA007094	01

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01	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
Issue	Description		Date

100mm on Original

Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C135-AA007094-GCD-00-SWD CATCHMENT.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No :

Scales: 1:500 | Original Size: A1 | Height Datum: AHD | Grid: GRID

Current Issue Signatures: Author B.DAVEY; Designer A.CAMARDI; Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: STORMWATER CATCHMENT LAYOUT PLAN - SHEET 2 OF 2

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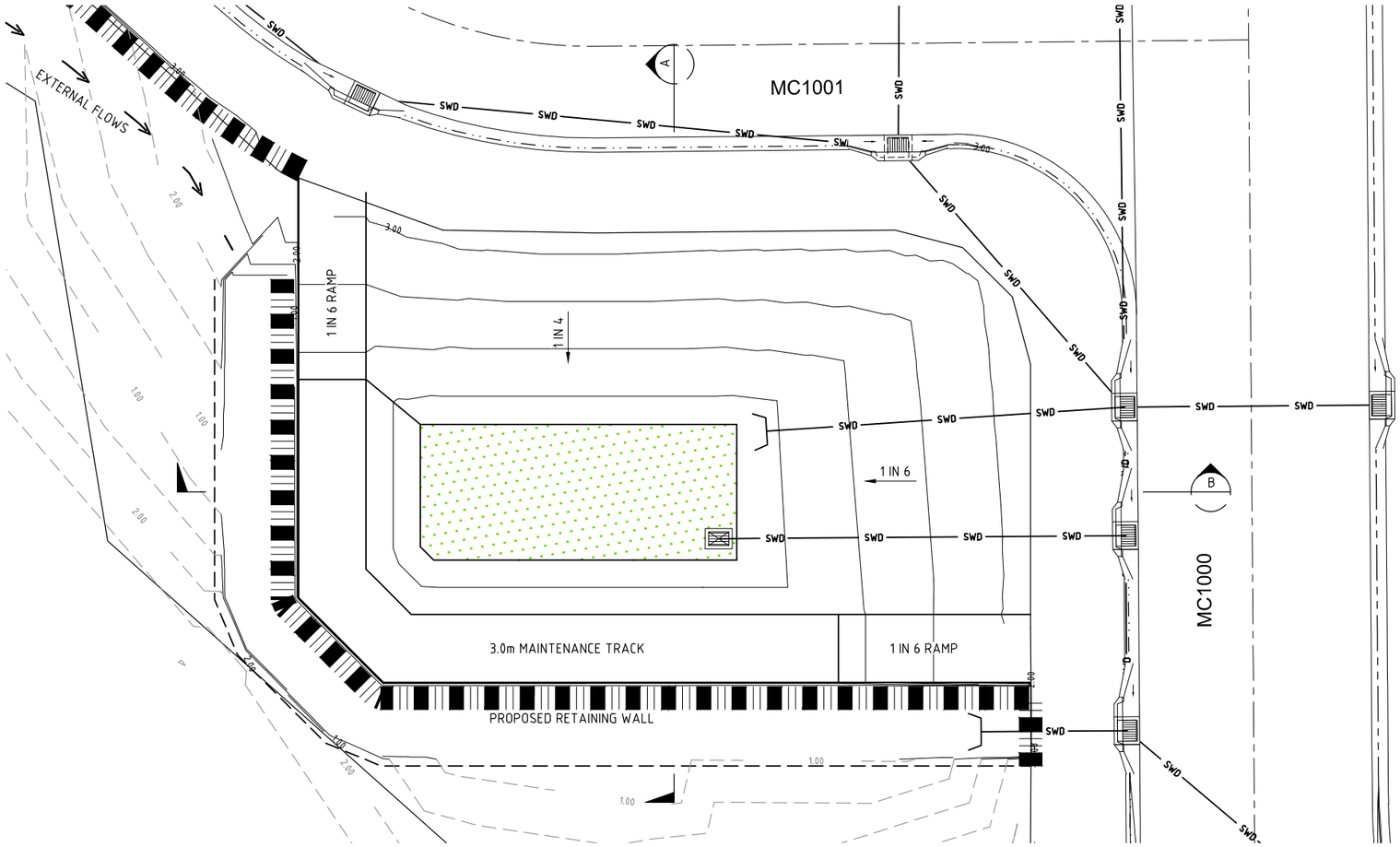
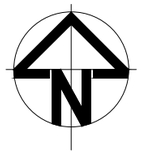
Drawing No. C136 — Project No. AA007094 — Issue 01

21/Jul/2015 4:30 PM F:\AA007094\E-CAD\C-Civil\D-Final\C135-AA007094-GCD-00-SWD CATCHMENT.dwg V1





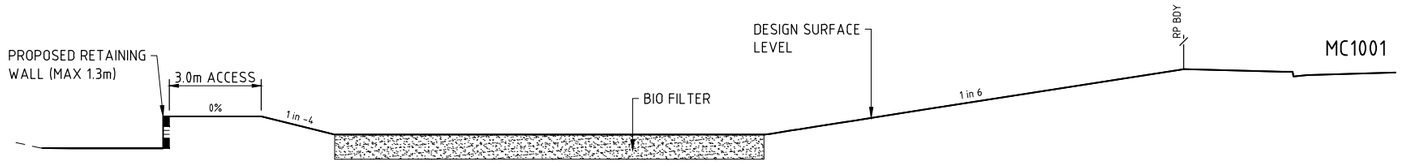
LEGEND

- 5.0 — PROPOSED SURFACE CONTOURS
- SWD — FUTURE STORMWATER RETICULATION
- TOP/TOE OF BATTER
- EXTENT OF FILTER MEDIA

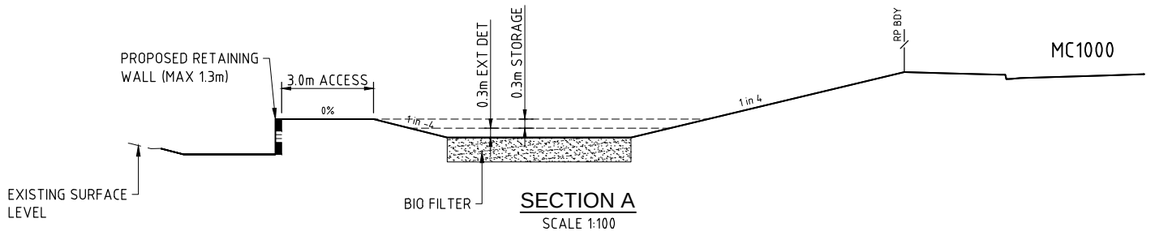
BIO-FILTRATION NOTES

MINIMUM FILTER DEPTH IS TO BE 0.7m AND IS TO CONSIST OF THE FOLLOWING MEDIA:

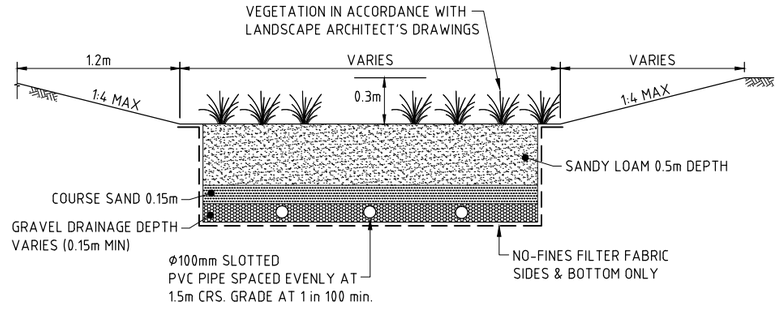
1. 0.4m OF LOAMY SANDY MATERIAL WITH A HYDRAULIC CONDUCTIVITY OF 50-200mm/h AND A PARTICLE SIZE OF 0.45-0.5mm.
2. TRANSITION LAYER - COARSE SAND, CONSTANT DEPTH - 150mm, NOM. SIZE 0.5-2.0
3. DRAINAGE LAYER - FINE AGGREGATE, CONSTANT DEPTH - 150mm, NOM. SIZE 2-5
4. CONTRACTOR TO ERECT SIGNAGE IDENTIFYING THE PURPOSE OF THE BIO-RETENTION BASIN AS PER COUNCIL REQUIREMENTS.
5. CONTRACTOR TO INSTALL GEOFABRIC, LAY TOPSOIL AND TURF AFTER BASIN INTERNAL DRAINAGE AND FILTER MEDIA IS INSTALLED TO PROTECT FILTER MEDIA. TURF AND GEOFABRIC TO BE REMOVED AFTER 80% OF BUILDINGS AND CONSTRUCTION IS COMPLETE.



SECTION B
SCALE 1:100



SECTION A
SCALE 1:100



TYPICAL BIO-DETENTION BASIN SECTION
SCALE 1:50

Issue	Description		Date
01	ISSUE FOR DEVELOPMENT APPROVAL	ANC	15.07.15

Scale: 0 2.5 5 7.5 10 12.5m — 1 : 125

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C137-AA007094-GCD-00-BASIN-DETAILS.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

Approved

R.P.E.Q No :

Scales: 1:125

Original Size: A1

Height Datum: AHD

Grid: GRID

Current Issue Signatures

Author B.DAVEY

Designer A.CAMARDI

Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: TYPICAL BASIN DETAILS

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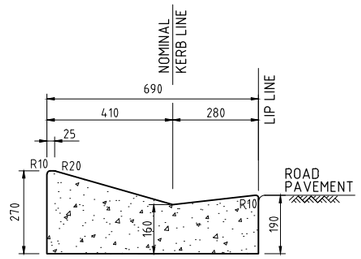
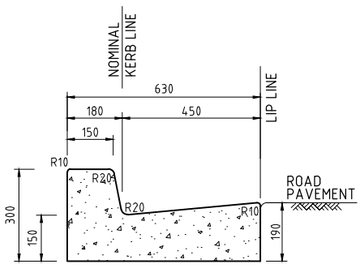
Drawing No. C137 — Project No. AA007094 — Issue 02

100mm on Original

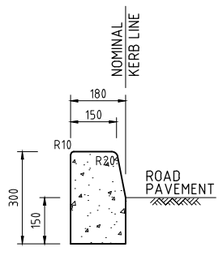
21/Jul/2015 4:30 PM F:\AA007094\E-CAD\C-Civil\D-Final\C137-AA007094-GCD-00-BASIN-DETAILS.dwg V1



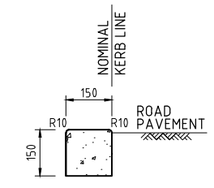
MOUNTABLE / LAYBACK KERB
SCALE 1:10
AS-PER NORTHERN RIVERS STD DRG. SEQ R-03



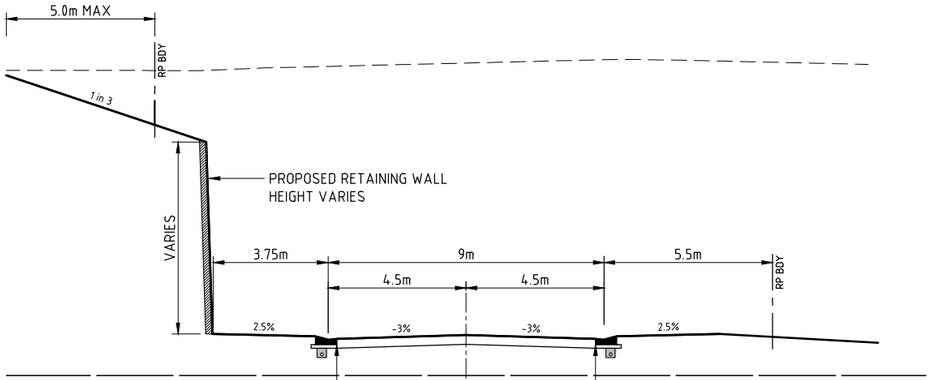
UPRIGHT KERB - B1
SCALE 1:10
AS-PER NORTHERN RIVERS STD DRG. SEQ R-03



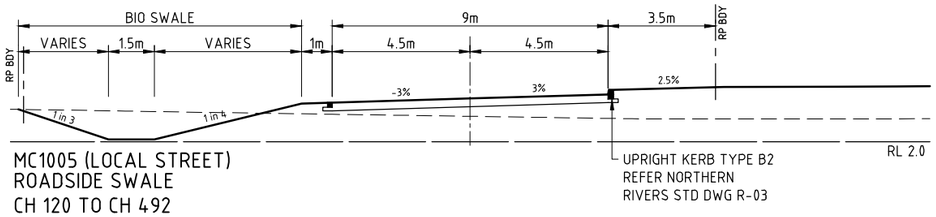
UPRIGHT KERB - B2
SCALE 1:10
AS-PER NORTHERN RIVERS STD DRG. SEQ R-03



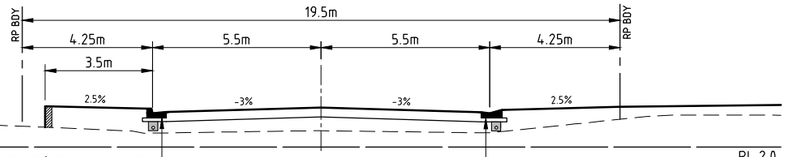
EDGE RESTRAINT - ER2
SCALE 1:10
AS-PER NORTHERN RIVERS STD DRG. SEQ R-03



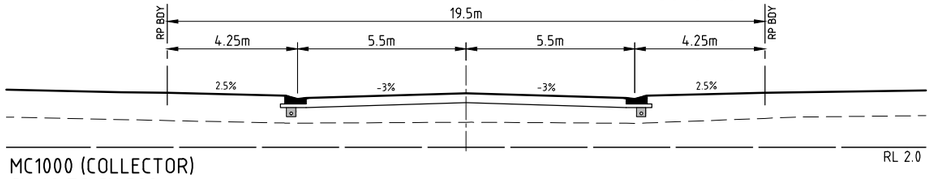
MC1005 (LOCAL STREET)
CH 640 TO CH 800



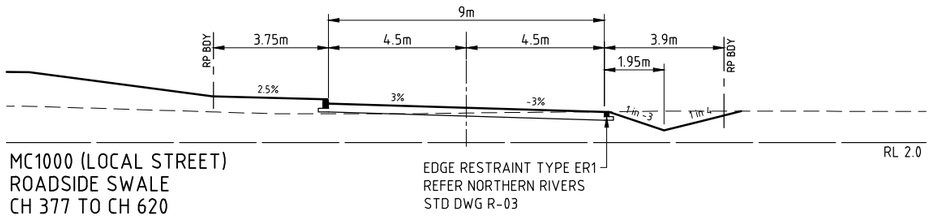
MC1005 (LOCAL STREET)
ROADSIDE SWALE
CH 120 TO CH 492



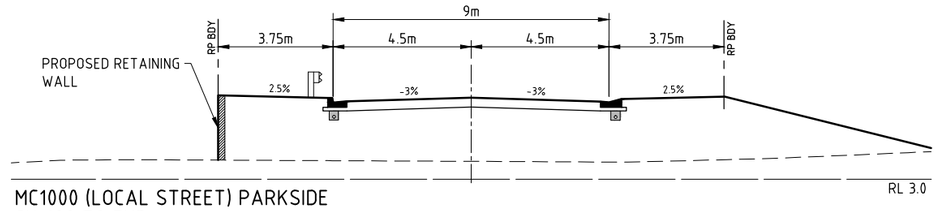
MC1000 (COLLECTOR) PARKSIDE
CH 0.60 TO CH 60



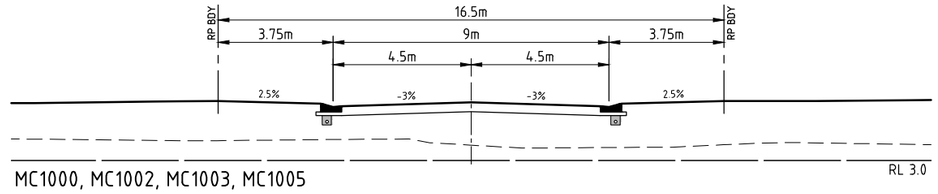
MC1000 (COLLECTOR)
CH 60 TO CH 300



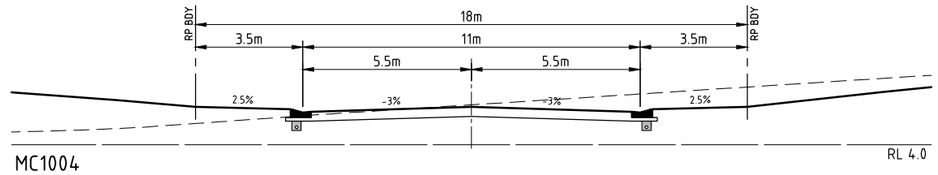
MC1000 (LOCAL STREET)
ROADSIDE SWALE
CH 377 TO CH 620



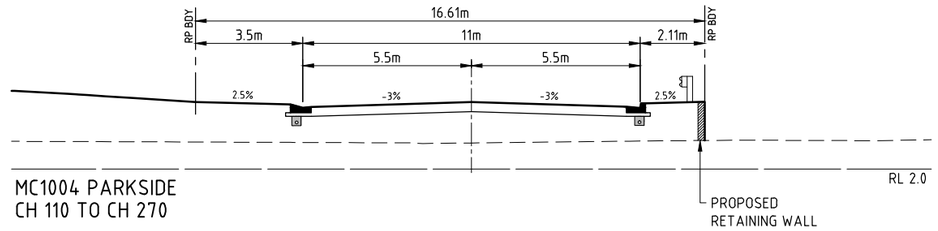
MC1000 (LOCAL STREET) PARKSIDE
CH 620 TO END



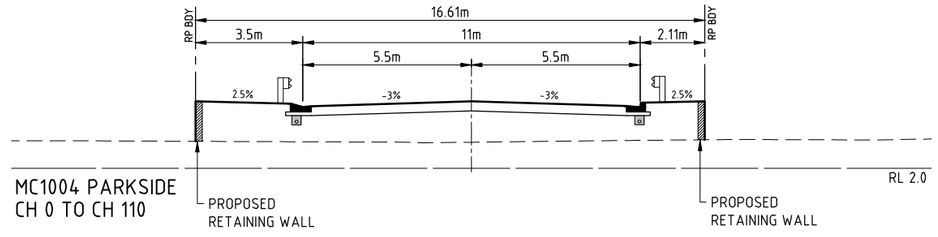
MC1000, MC1002, MC1003, MC1005
MC1006, MC1007, MC1008, MC1010



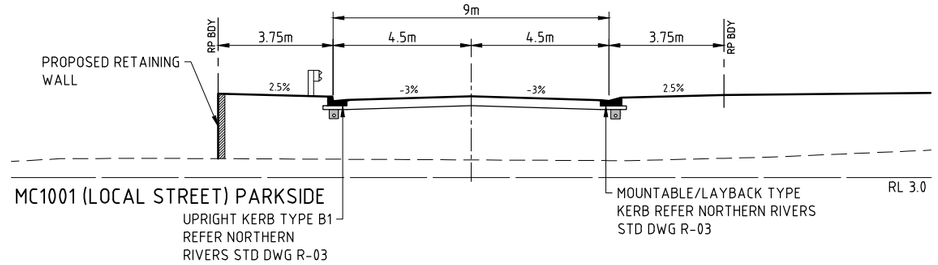
MC1004
CH 270 TO END



MC1004 PARKSIDE
CH 110 TO CH 270



MC1004 PARKSIDE
CH 0 TO CH 110



MC1001 (LOCAL STREET) PARKSIDE

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

0 100 200 400 600 800 1000mm
1 : 10

Scale
0 1 2 4 6 8 10m
1 : 100

Surveyor: ROBERT A HARRIES SURVEYOR

Architect

Filename: C140-AA007094-GCD-00-TYP ROAD XS.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved

R.P.E.Q No :

Scales	1:10 & 1:100	Current Issue Signatures	
Original Size	A1	Author B.DAVEY	
Height Datum	AHD	Designer A.CAMARDI	
Grid	GRID	Reviewer B.LUSTY	

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Project: RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title: TYPICAL ROAD
CROSS SECTIONS

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Drawing No.	Project No.	Issue
C140	AA007094	03

100mm on Original

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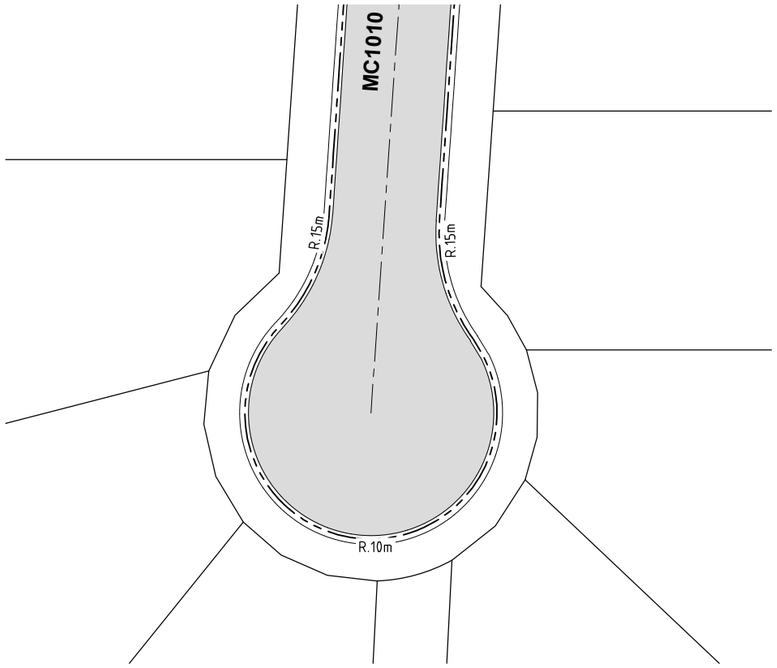
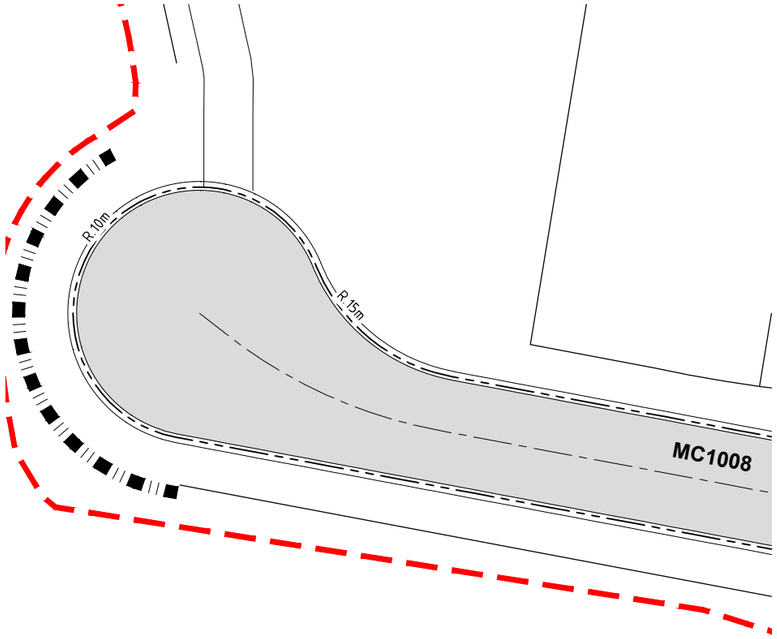


MC1010 - CULDESAC DETAILS
SCALE 1:250

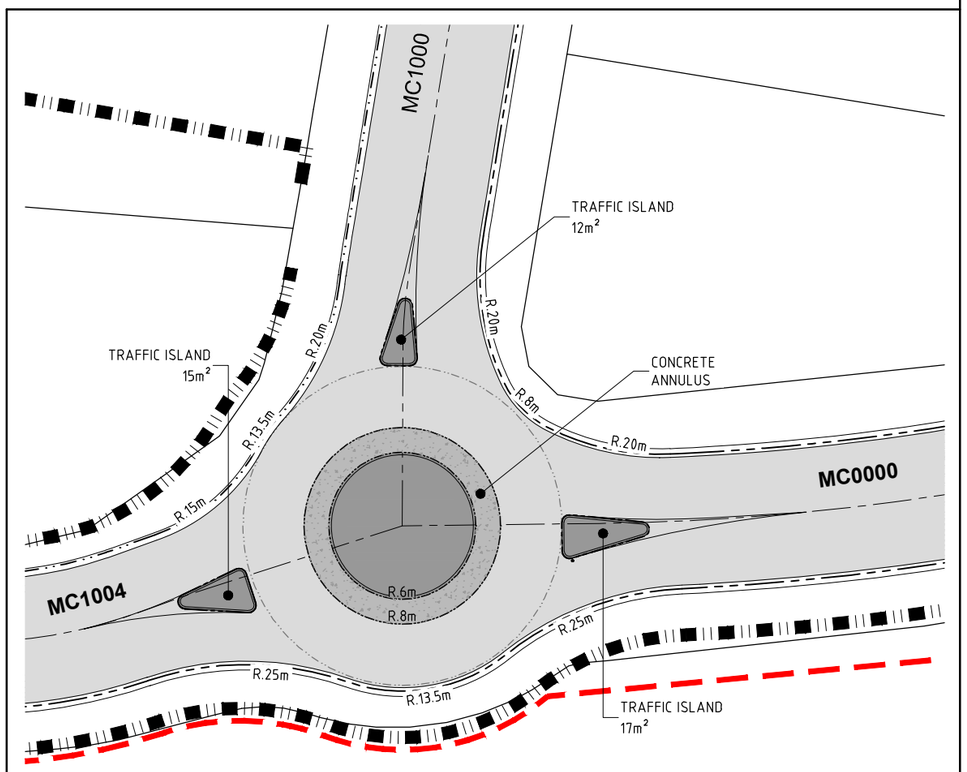


MC1008 - CULDESAC DETAILS
SCALE 1:250

LEGEND

- PROPOSED LAYBACK KERB
- EXISTING LAYBACK KERB
- PROPOSED CONCRETE ANNULUS
- STAGE BOUNDARY

N



12.5m BUS TURNING MOVEMENT
SCALE 1:250

Issue	Description		Date
01	ISSUE FOR DEVELOPMENT APPROVAL	ANC	15.07.15

Scale
0 5 10 15 20 25m
1 : 250

Surveyor
ROBERT A HARRIES
SURVEYOR

Architect

Filename: C145-AA007094-GCD-00-INT-DETAILS.DWG

Client
GOLDCORAL PTY LTD

Status
FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved
R.P.E.Q No :

Scales	1:250	Current Issue Signatures	
Original Size	A1	Author B.DAVEY	
Height Datum	AHD	Designer A.CAMARDI	
Grid	GRID	Reviewer B.LUSTY	

Project
RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title
INTERSECTION DETAILS

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Drawing No.	Project No.	Issue
C145	AA007094	02

100mm on Original

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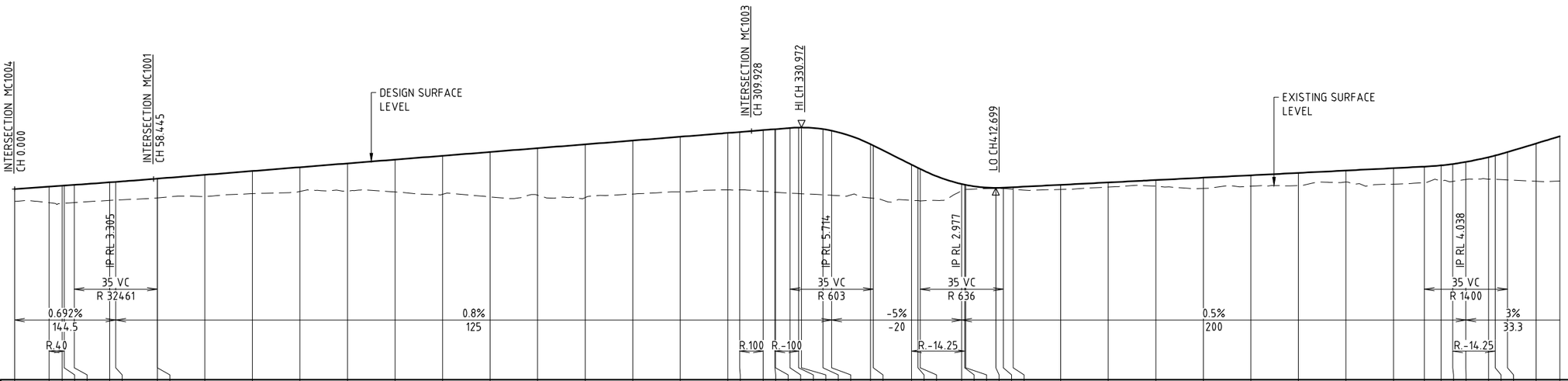

DATUM RL.-5.000

DESIGN LEVELS ON ROAD CENTRELINE	3.011	3.111	3.149	3.155	3.184	3.291	3.310	3.445	3.445	3.605
DESIGN LIP OF KERB (LHS)	3.052	2.963	2.993	2.999	3.028	3.135	3.154	3.289	3.289	3.449
DESIGN LIP OF KERB (RHS)	4.471	2.978	3.002	3.006	3.028	3.135	3.154	3.289	3.289	3.449
EXISTING SURFACE ON ROAD CENTRELINE	2.488	2.434	2.403	2.409	2.440	2.531	2.545	2.635	2.635	2.701
CUT / FILL DEPTH	0.523	0.677	0.747	0.746	0.745	0.760	0.765	0.810	0.810	0.904
PEGGED CHAINAGE	0.000	14.500	20.000	20.868	25.032	40.000	42.532	60.000	60.032	80.000

DESIGN LEVELS ON ROAD CENTRELINE	3.765	3.925	4.085	4.245	4.405	4.565	4.725	4.885	5.045	5.205
DESIGN LIP OF KERB (LHS)	3.609	3.769	3.929	4.089	4.249	4.409	4.569	4.729	4.889	5.049
DESIGN LIP OF KERB (RHS)	3.609	3.769	3.929	4.089	4.249	4.409	4.569	4.729	4.889	5.049
EXISTING SURFACE ON ROAD CENTRELINE	2.818	2.911	2.930	2.887	2.790	2.671	2.748	2.649	2.799	2.891
CUT / FILL DEPTH	0.947	1.015	1.155	1.358	1.615	1.894	1.977	2.236	2.246	2.315
PEGGED CHAINAGE	100.000	120.000	140.000	160.000	180.000	200.000	220.000	240.000	260.000	280.000

DESIGN LEVELS ON ROAD CENTRELINE	5.365	5.405	5.484	5.523	5.525	5.574	5.592	5.594	5.526	5.461
DESIGN LIP OF KERB (LHS)	5.211	5.257	5.350	5.395	5.397	5.448	5.466	5.467	5.399	5.333
DESIGN LIP OF KERB (RHS)	5.209	5.248	5.338	5.387	5.391	5.446	5.466	5.467	5.399	5.333
EXISTING SURFACE ON ROAD CENTRELINE	2.971	2.970	2.914	2.873	2.873	2.838	2.816	2.811	2.768	2.745
CUT / FILL DEPTH	2.394	2.435	2.570	2.651	2.653	2.736	2.776	2.783	2.758	2.716
PEGGED CHAINAGE	300.000	304.939	314.906	319.773	320.000	326.144	329.780	330.972	340.000	343.644

DESIGN LEVELS ON ROAD CENTRELINE	4.895	4.839	4.032	3.897	3.852	3.218	3.192	3.184	3.057	3.065
DESIGN LIP OF KERB (LHS)	4.823	4.780	4.167	4.042	4.001	3.359	3.327	3.316	3.192	3.200
DESIGN LIP OF KERB (RHS)	4.769	4.713	3.906	3.762	3.717	3.083	3.057	3.049	2.922	2.930
EXISTING SURFACE ON ROAD CENTRELINE	2.636	2.625	2.535	2.524	2.510	2.944	2.990	2.992	3.034	3.034
CUT / FILL DEPTH	2.259	2.214	1.497	1.372	1.343	0.275	0.201	0.192	0.023	0.031
PEGGED CHAINAGE	360.000	361.144	377.285	380.000	380.880	398.380	399.612	400.000	412.699	415.880

DESIGN LEVELS ON ROAD CENTRELINE	3.086	3.186	3.286	3.386	3.486	3.586	3.686	3.786	3.886	3.950
DESIGN LIP OF KERB (LHS)	3.221	3.321	3.421	3.521	3.621	3.721	3.821	3.921	4.021	4.085
DESIGN LIP OF KERB (RHS)	2.951	3.051	3.151	3.251	3.351	3.451	3.551	3.651	3.751	3.815
EXISTING SURFACE ON ROAD CENTRELINE	3.001	2.991	3.090	3.129	3.033	3.125	3.151	3.303	3.217	3.277
CUT / FILL DEPTH	0.084	0.195	0.196	0.256	0.452	0.461	0.535	0.483	0.669	0.673
PEGGED CHAINAGE	420.000	440.000	460.000	480.000	500.000	520.000	540.000	560.000	580.000	592.946

DESIGN LEVELS ON ROAD CENTRELINE	4.003	4.061	4.147	4.347	4.417	4.563	4.924	5.224
DESIGN LIP OF KERB (LHS)	4.138	4.198	4.301	4.494	4.553	4.630	4.853	5.098
DESIGN LIP OF KERB (RHS)	3.868	3.926	4.012	4.212	4.282	4.436	4.798	5.098
EXISTING SURFACE ON ROAD CENTRELINE	3.353	3.330	3.413	3.422	3.414	3.392	3.336	3.348
CUT / FILL DEPTH	0.650	0.731	0.734	0.925	1.003	1.171	1.589	1.877
PEGGED CHAINAGE	600.000	604.884	610.446	620.000	622.755	627.946	640.000	650.000

MC1000 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:100

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

100mm on Original

Scale
HORZ 0 10 20 40 60 80 100m
1:1000
VERT 0 1 2 4 6 8 10m
1:100

Surveyor
ROBERT A HARRIES
SURVEYOR

Architect

Filename: C150-AA007094-GCD-00-ROAD LS.DWG

Client
GOLDCORAL PTY LTD

Status
FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved
R.P.E.Q No :

Scales: 1:100 (V)
1:1000 (H)
Current Issue Signatures
Author: B.DAVEY
Original Size: A1
Designer: A.CAMARDI
Height Datum: AHD
Reviewer: B.LUSTY
Grid: GRID

Project
RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title
MC1000 ROAD
LONGITUDINAL SECTION
- SHEET 1 OF 2

Hyder Consulting
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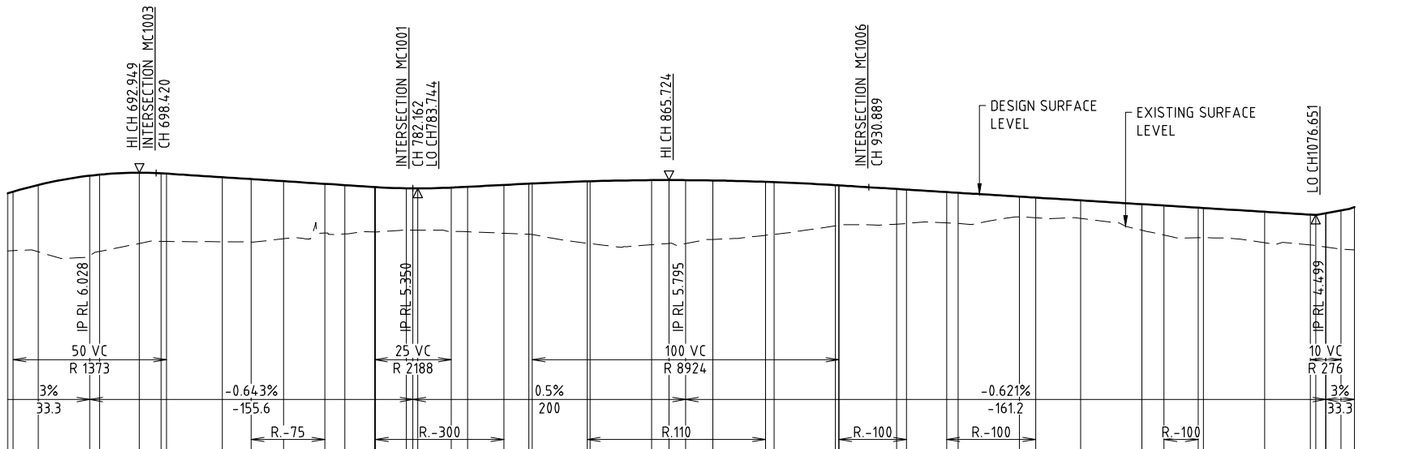
Drawing No. C150 — Project No. AA007094 — Issue 03



DESIGN LEVELS ON ROAD CENTRELINE	5.224	5.278	5.500	5.800	5.834	5.895	5.877	5.867	5.750	5.689	5.621	5.535	5.493
DESIGN LIP OF KERB (LHS)	5.098	5.151	5.373	5.673	5.708	5.769	5.751	5.740	5.623	5.562	5.495	5.408	5.366
DESIGN LIP OF KERB (RHS)	5.098	5.151	5.373	5.673	5.708	5.769	5.751	5.740	5.623	5.562	5.495	5.408	5.366
EXISTING SURFACE ON ROAD CENTRELINE	3.348	3.354	3.316	3.195	3.331	3.590	3.660	3.657	3.646	3.638	3.745	3.928	3.901
CUT / FILL DEPTH	1.877	1.923	2.183	2.605	2.503	2.306	2.217	2.210	2.104	2.052	1.876	1.607	1.592
PEGGED CHAINAGE	650.000	651.771	660.000	676.771	680.000	692.949	700.000	701.771	720.000	729.438	740.000	753.417	760.000

DESIGN LEVELS ON ROAD CENTRELINE	5.430	5.429	5.388	5.386	5.385	5.413	5.439	5.498	5.539	5.545	5.616	5.619	5.654
DESIGN LIP OF KERB (LHS)	5.304	5.302	5.262	5.259	5.259	5.286	5.312	5.372	5.412	5.418	5.490	5.492	5.527
DESIGN LIP OF KERB (RHS)	5.304	5.302	5.262	5.259	5.259	5.286	5.312	5.372	5.412	5.418	5.490	5.492	5.527
EXISTING SURFACE ON ROAD CENTRELINE	3.969	3.969	4.022	4.023	4.024	3.969	3.974	3.922	3.893	3.881	3.596	3.585	3.549
CUT / FILL DEPTH	1.461	1.460	1.367	1.363	1.362	1.444	1.466	1.576	1.646	1.664	2.020	2.035	2.106
PEGGED CHAINAGE	769.682	769.966	780.000	782.182	783.744	794.682	800.000	811.863	820.000	821.102	839.064	840.000	860.000

DESIGN LEVELS ON ROAD CENTRELINE	5.656	5.655	5.645	5.601	5.590	5.491	5.484	5.484	5.367	5.347	5.266	5.243	5.119
DESIGN LIP OF KERB (LHS)	5.528	5.527	5.516	5.471	5.460	5.359	5.352	5.352	5.233	5.213	5.130	5.107	4.981
DESIGN LIP OF KERB (RHS)	5.528	5.527	5.516	5.471	5.460	5.359	5.352	5.352	5.233	5.213	5.130	5.107	4.981
EXISTING SURFACE ON ROAD CENTRELINE	3.593	3.582	3.722	3.858	3.887	4.168	4.185	4.185	4.217	4.243	4.262	4.242	4.457
CUT / FILL DEPTH	2.064	2.072	1.923	1.743	1.703	1.323	1.300	1.299	1.151	1.105	1.004	1.000	0.662
PEGGED CHAINAGE	865.724	871.102	880.000	897.187	900.000	920.000	921.102	921.137	940.000	943.182	956.296	960.000	980.000

DESIGN LEVELS ON ROAD CENTRELINE	5.086	4.995	4.871	4.826	4.757	4.747	4.622	4.530	4.524	4.544	4.545	4.649	
DESIGN LIP OF KERB (LHS)	4.947	4.854	4.728	4.683	4.613	4.602	4.476	4.381	4.376	5.448	5.441	5.032	4.828
DESIGN LIP OF KERB (RHS)	4.947	4.854	4.728	4.683	4.613	4.602	4.476	4.381	4.376	4.397	4.398	4.539	4.114
EXISTING SURFACE ON ROAD CENTRELINE	4.430	4.409	4.021	3.866	3.775	3.775	3.616	3.541	3.522	3.477	3.476	3.408	3.380
CUT / FILL DEPTH	0.656	0.586	0.849	0.960	0.982	0.971	1.006	0.989	1.002	1.067	1.069	1.241	
PEGGED CHAINAGE	985.302	1000.000	1020.000	1027.186	1038.307	1040.000	1060.000	1074.937	1076.651	1079.937	1080.000	1084.937	1089.291

MC1000 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:100

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale
HORZ 0 10 20 40 60 80 100m
1:1000
VERT 0 1 2 4 6 8 10m
1:100

100mm on Original

Surveyor
ROBERT A HARRIES
SURVEYOR

Architect

Filename: C150-AA007094-GCD-00-ROAD LS.DWG

Client
GOLDCORAL PTY LTD

Status
FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved
R.P.E.Q No :

Scales	1:100 (V) 1:1000 (H)	Current Issue Signatures	
		Author B.DAVEY	
Original Size	A1	Designer A.CAMARDI	
Height Datum	AHD	Reviewer B.LUSTY	
Grid	GRID	Ⓒ Copyright reserved	

Project
RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title
MC1000 ROAD
LONGITUDINAL SECTION
- SHEET 2 OF 2

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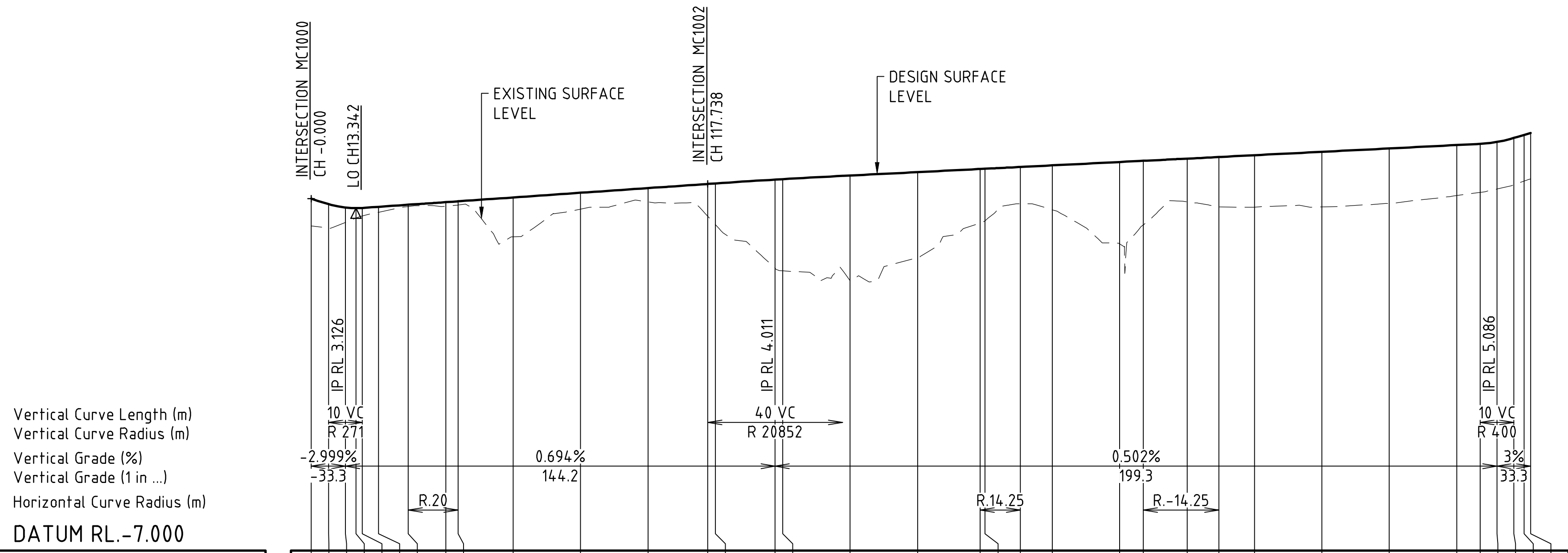
Drawing No.	Project No.	Issue
C151	AA007094	03

21/Jul/2015 4:30 PM F:\AA007094\E-CAD\C-Civil\D-Final\C150-AA007094-GCD-00-ROAD LS.dwg V1



DESIGN LEVELS ON ROAD CENTRELINE	3.433	3.276	3.172	3.154	3.161	3.194	3.255	3.333	3.358	3.471	3.610	3.749
DESIGN LIP OF KERB (LHS)		3.276	3.051	3.028	3.034	3.067	3.129	3.206	3.231	3.345	3.484	3.622
DESIGN LIP OF KERB (RHS)			3.070	3.028	3.034	3.067	3.129	3.206	3.231	3.345	3.484	3.622
EXISTING SURFACE ON ROAD CENTRELINE	2.621	2.560	2.735	2.861	2.926	3.033	3.204	3.212	3.247	2.304	3.125	3.341
CUT / FILL DEPTH	0.811	0.716	0.438	0.294	0.235	0.161	0.052	0.121	0.111	1.168	0.485	0.408
PEGGED CHAINAGE	0.000	5.220	10.220	13.342	15.220	20.000	28.858	40.000	43.602	60.000	80.000	100.000

DESIGN LEVELS ON ROAD CENTRELINE	3.872	3.888	4.001	4.015	4.122	4.223	4.316	4.323	4.376	4.424	4.524	4.559
DESIGN LIP OF KERB (LHS)	3.745	3.761	3.875	3.888	3.996	4.096	4.190	4.197	4.249	4.297	4.397	4.433
DESIGN LIP OF KERB (RHS)	3.745	3.761	3.875	3.888	3.996	4.096	4.190	4.197	4.249	4.297	4.397	4.433
EXISTING SURFACE ON ROAD CENTRELINE	2.914	2.669	1.372	1.294	0.999	1.690	2.712	2.774	3.284	3.108	2.094	2.655
CUT / FILL DEPTH	0.958	1.219	2.630	2.721	3.124	2.533	1.604	1.549	1.092	1.316	2.429	1.904
PEGGED CHAINAGE	117.738	120.000	137.738	140.000	160.000	180.000	198.614	200.000	210.545	220.000	240.000	247.020

DESIGN LEVELS ON ROAD CENTRELINE	4.624	4.672	4.725	4.825	4.925	5.026	5.061	5.117	5.236	5.327	5.386
DESIGN LIP OF KERB (LHS)	4.498	4.545	4.598	4.698	4.799	4.899	4.934	5.003	5.491		
DESIGN LIP OF KERB (RHS)	4.498	4.545	4.598	4.698	4.799	4.899	4.934	4.993	5.222	5.483	5.426
EXISTING SURFACE ON ROAD CENTRELINE	3.343	3.188	3.186	3.191	3.298	3.527	3.622	3.723	3.848	3.954	4.023
CUT / FILL DEPTH	1.281	1.484	1.539	1.634	1.628	1.498	1.439	1.394	1.388	1.373	1.363
PEGGED CHAINAGE	260.000	269.417	280.000	300.000	320.000	340.000	346.969	351.969	356.969	360.000	361.969

MC1001 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:100

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale
HORZ 0 10 20 40 60 80 100m
1:1000
VERT 0 1 2 4 6 8 10m
1:100

100mm on Original

Surveyor
ROBERT A HARRIES
SURVEYOR

Architect

Filename: C150-AA007094-GCD-00-ROAD LS.DWG

Client
GOLDCORAL PTY LTD

Status
FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved
R.P.E.Q No :

Scales 1:100 (V)
1:1000 (H)

Current Issue Signatures
Author B.DAVEY
Designer A.CAMARDI
Reviewer B.LUSTY

Original Size A1
Height Datum AHD
Grid GRID

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Project
RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title
MC1001 ROAD
LONGITUDINAL SECTION

Hyder Consulting

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Drawing No. C152 — Project No. AA007094 — Issue 03

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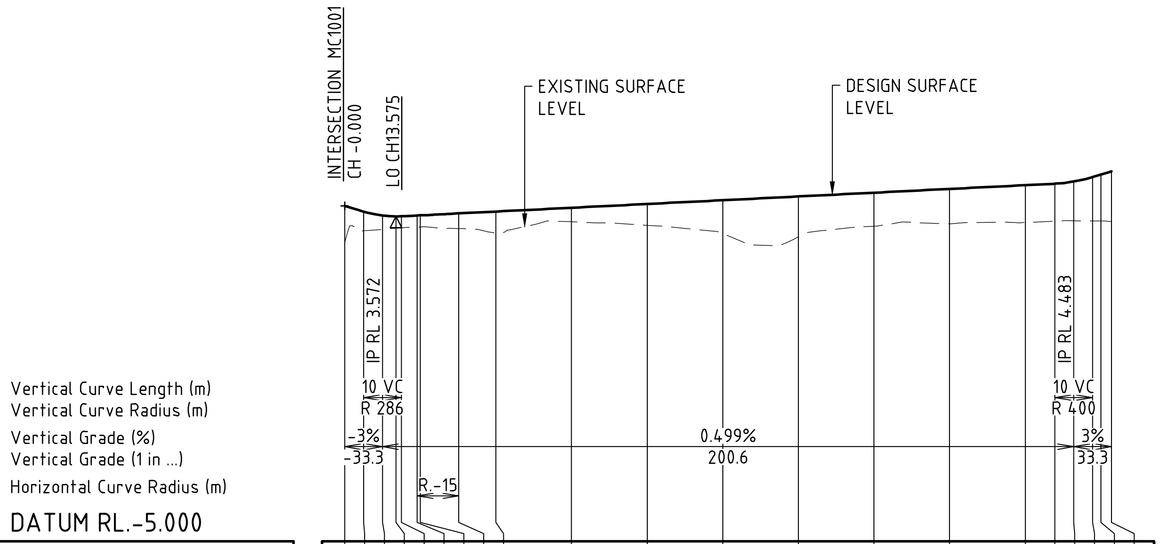
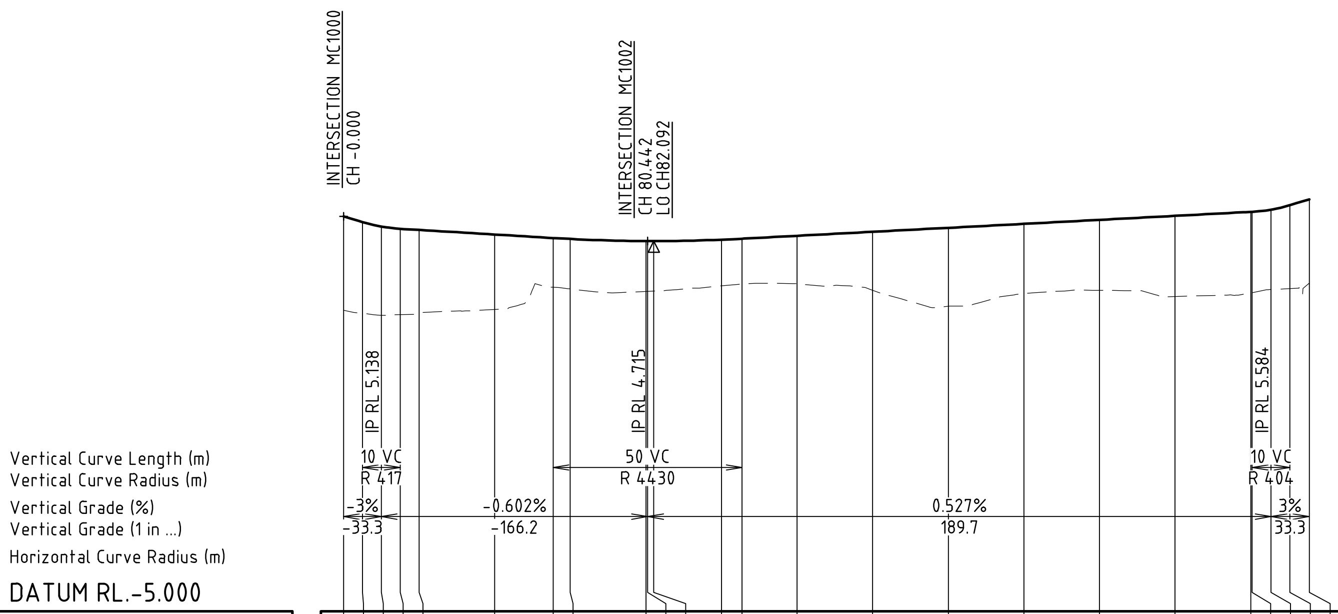


DATUM RL.-5.000

DESIGN LEVELS ON ROAD CENTRELINE	3.872	3.722	3.616	3.593	3.597	3.618	3.622	3.673	3.722	3.821	3.921	4.021	4.120	4.220	4.320	4.420	4.458	4.515	4.633	4.699	4.783
DESIGN LIP OF KERB (LHS)	3.148	3.755	3.498	3.467	3.470	3.491	3.495	3.546	3.595	3.695	3.794	3.894	3.994	4.094	4.193	4.293	4.332	4.395	4.615	5.278	5.303
DESIGN LIP OF KERB (RHS)	4.814	3.644	3.492	3.467	3.470	3.491	3.495	3.546	3.595	3.695	3.794	3.894	3.994	4.094	4.193	4.293	4.332	4.395	4.625	5.732	5.750
EXISTING SURFACE ON ROAD CENTRELINE	2.914	3.210	3.250	3.278	3.289	3.312	3.315	3.269	3.156	3.449	3.359	3.135	3.054	3.334	3.398	3.428	3.466	3.476	3.474	3.473	3.452
CUT / FILL DEPTH	0.958	0.512	0.366	0.315	0.307	0.306	0.306	0.403	0.566	0.372	0.562	0.885	1.067	0.886	0.922	0.991	0.993	1.038	1.159	1.226	1.332
PEGGED CHAINAGE	0.000	5.000	10.000	13.575	15.000	19.205	20.000	30.208	40.000	60.000	80.000	100.000	120.000	140.000	160.000	180.000	187.814	192.814	197.814	200.000	202.814

MC1002 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:100



DATUM RL.-5.000

DESIGN LEVELS ON ROAD CENTRELINE	5.438	5.288	5.168	5.108	5.078	4.958	4.865	4.840	4.785	4.785	4.785	4.821	4.846	4.923	5.028	5.134	5.239	5.345	5.450	5.556	5.558	5.615	5.734	
DESIGN LIP OF KERB (LHS)		5.262	5.048	4.982	4.952	4.831	4.738	4.713	4.659	4.659	4.658	4.694	4.720	4.796	4.902	5.007	5.113	5.218	5.324	5.429	5.431	5.489	5.767	
DESIGN LIP OF KERB (RHS)		5.279	5.047	4.982	4.952	4.831	4.738	4.713	4.659	4.659	4.658	4.694	4.720	4.796	4.902	5.007	5.113	5.218	5.324	5.434	5.441	5.616	4.918	4.948
EXISTING SURFACE ON ROAD CENTRELINE	2.953	2.873	2.819	2.842	2.885	2.975	3.564	3.521	3.450	3.452	3.459	3.598	3.648	3.652	3.485	3.059	3.394	3.481	3.317	3.416	3.423	3.505	3.531	3.663
CUT / FILL DEPTH	2.485	2.415	2.349	2.267	2.193	1.983	1.301	1.319	1.335	1.333	1.326	1.223	1.198	1.271	1.544	2.075	1.845	1.864	2.133	2.140	2.135	2.110	2.203	
PEGGED CHAINAGE	0.000	5.000	10.000	15.000	20.000	40.000	55.442	60.000	80.000	80.442	82.092	100.000	105.442	120.000	140.000	160.000	180.000	200.000	220.000	240.000	240.407	245.407	250.407	255.531

MC1003 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:100

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale
HORZ 0 10 20 40 60 80 100m
1:1000
VERT 0 1 2 4 6 8 10m
1:100

100mm on Original

Surveyor
ROBERT A HARRIES
SURVEYOR

Architect

Filename: C150-AA007094-GCD-00-ROAD LS.DWG

Client
GOLDCORAL PTY LTD

Status
FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved
R.P.E.Q No :

Scales	1:100 (V) 1:1000 (H)	Current Issue Signatures	
		Author B.DAVEY	
Original Size	A1	Designer A.CAMARDI	
Height Datum	AHD	Reviewer B.LUSTY	
Grid	GRID	Ⓒ Copyright reserved	

Project
RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title
MC1002 & MC1003 ROAD
LONGITUDINAL SECTIONS

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Drawing No. C153 — Project No. AA007094 — Issue 03

21/Jul/2015 4:30 PM
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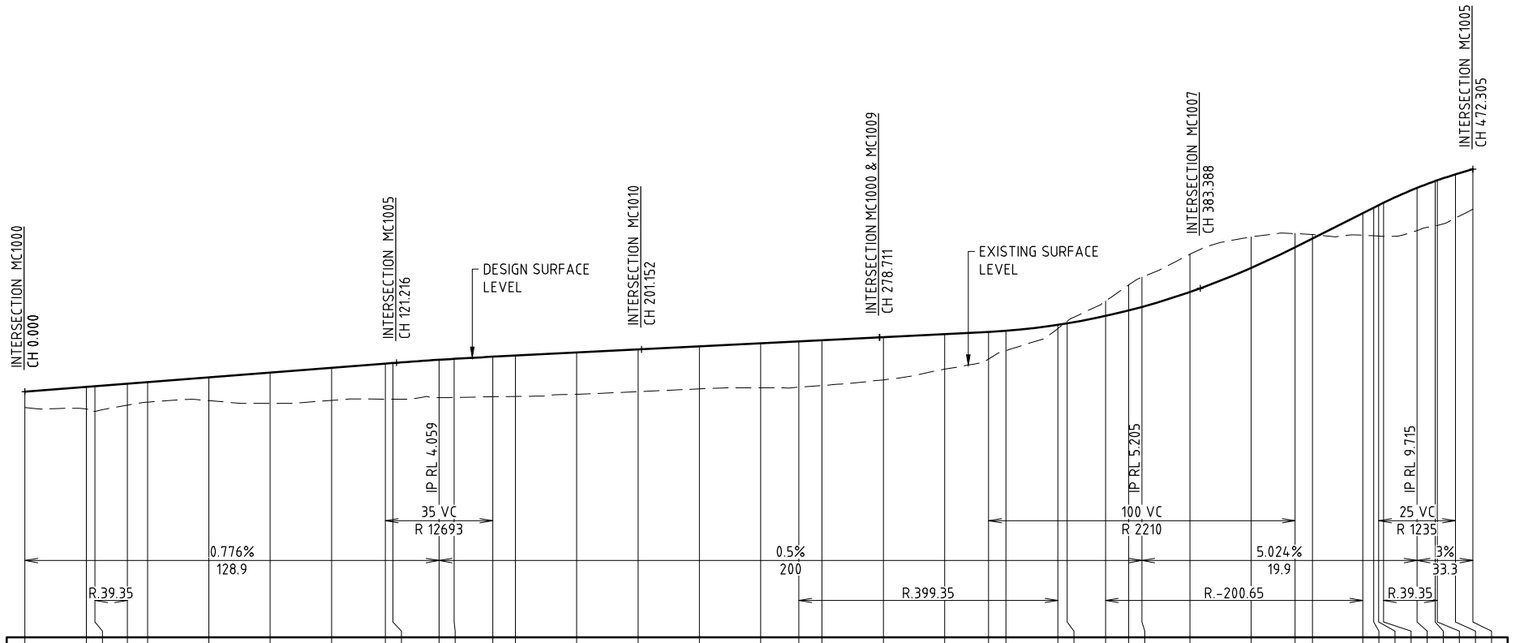
V1



Vertical Curve Length (m)
Vertical Curve Radius (m)
Vertical Grade (%)
Vertical Grade (1 in ...)
Horizontal Curve Radius (m)

DATUM RL.-5.000

PEGGED CHAINAGE	CUT / FILL DEPTH	EXISTING SURFACE ON ROAD CENTRELINE	DESIGN LIP OF KERB (RHS)	DESIGN LIP OF KERB (LHS)	DESIGN LEVELS ON ROAD CENTRELINE
0.000	0.523	2.488		2.974	3.011
20.000	0.726	2.441		3.040	3.166
22.793	0.822	2.366		3.061	3.188
33.429	0.706	2.564	3.144	3.144	3.270
40.000	0.653	2.668	3.195	3.195	3.321
60.000	0.763	2.714	3.350	3.350	3.476
80.000	1.008	2.624	3.505	3.505	3.632
100.000	1.065	2.722	3.660	3.660	3.787
117.583	1.159	2.764	3.796	3.796	3.923
120.000	1.179	2.763	3.814	3.814	3.942
135.083	1.235	2.812	3.919	3.919	4.047
140.000	1.258	2.819	3.950	3.950	4.077
152.583	1.307	2.839	4.019	4.019	4.146
160.000	1.333	2.851	4.056	4.056	4.183
180.000	1.361	2.923	4.156	4.156	4.283
200.000	1.375	3.009	4.256	4.256	4.383
220.000	1.386	3.097	4.356	4.356	4.483
240.000	1.452	3.131	4.456	4.456	4.583
252.426	1.494	3.152	4.518	4.518	4.646
260.000	1.475	3.208	4.556	4.556	4.683
280.000	1.392	3.392	4.656	4.656	4.783
300.000	1.144	3.739	4.756	4.756	4.883
314.339	0.884	4.072	4.828	4.828	4.955
320.000	0.645	4.346	4.864	4.864	4.991
336.964	0.118	5.066	5.057	5.057	5.184
340.000	-0.069	5.302	5.105	5.105	5.232
352.490	-0.484	5.960	5.346	5.346	5.475
360.000	-0.830	6.486	5.525	5.525	5.655
364.339	-0.971	6.742	5.640	5.640	5.771
380.000	-1.229	7.488	6.123	6.123	6.259
400.000	-1.011	8.054	6.900	6.900	7.043
414.339	-0.450	8.168	7.568	7.568	7.717
420.000	-0.131	8.133	7.850	7.850	8.002
436.370	0.715	8.109	8.666	8.666	8.824
440.000	0.917	8.090	8.847	8.847	9.006
441.605	1.006	8.081	8.927	8.927	9.087
443.141	1.091	8.073	9.004	9.004	9.163
454.105	1.394	8.258	9.500	9.500	9.652
460.000	1.461	8.413	9.726	9.726	9.874
460.683	1.469	8.429	9.849	13.458	9.898
466.605	1.425	8.665	10.292	13.722	10.090
472.305	1.303	8.958			10.261

MC1004 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:100

Issue	Description	Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL BD	03.10.14
01	ORIGINAL ISSUE BD	18.06.14

Scale
HORZ 0 10 20 40 60 80 100m
1:1000
VERT 0 1 2 4 6 8 10m
1:100

Surveyor: ROBERT A HARRIES SURVEYOR
Architect:
Filename: C150-AA007094-GCD-00-ROAD LS.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION
Approved
R.P.E.Q No :
Scales 1:100 (V) 1:1000 (H)
Original Size A1
Height Datum AHD
Grid GRID
Current Issue Signatures
Author B.DAVEY
Designer A.CAMARDI
Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title: MC1004 ROAD
LONGITUDINAL SECTION

HYDER CONSULTING PTY. LTD
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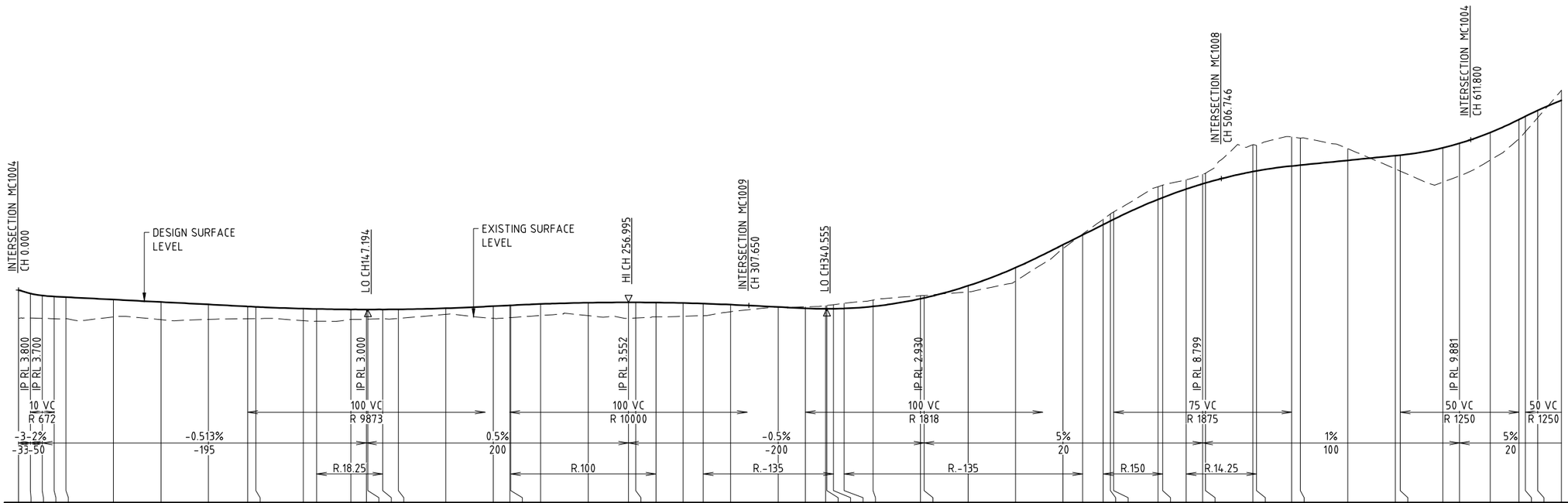
Drawing No. C154 — Project No. AA007094 — Issue 03

100mm on Original

21/Jul/2015 4:30 PM F:\AA007094\E-CAD\C-Civil\D-Final\C150-AA007094-GCD-00-ROAD LS.dwg V1



DESIGN LEVELS ON ROAD CENTRELINE	3.950	3.800	3.719	3.675	3.649	3.547	3.444	3.341	3.256	3.239	3.164	3.150	3.129
DESIGN LIP OF KERB (LHS)	4.426	3.833	3.601	3.552	3.526	3.423	3.321	3.218	3.133	3.116	3.039	3.017	2.995
DESIGN LIP OF KERB (RHS)			3.666	3.552	3.526	3.423	3.321	3.218	3.133	3.116	3.233	3.287	3.265
EXISTING SURFACE ON ROAD CENTRELINE	2.763	2.767	2.755	2.739	2.737	2.818	2.697	2.710	2.740	2.745	2.658	2.635	2.714
CUT / FILL DEPTH	1.188	1.033	0.964	0.936	0.912	0.729	0.747	0.631	0.516	0.494	0.506	0.516	0.416
PEGGED CHAINAGE	0.000	5.000	10.000	15.000	20.000	40.000	60.000	80.000	96.557	100.000	120.000	125.573	140.000

DESIGN LEVELS ON ROAD CENTRELINE	3.127	3.127	3.129	3.135	3.181	3.267	3.302	3.304	3.359	3.413	3.427	3.427	3.421
DESIGN LIP OF KERB (LHS)	2.992	2.992	2.993	2.999	3.044	3.129	3.164	3.166	3.221	3.277	3.292	3.292	3.286
DESIGN LIP OF KERB (RHS)	3.262	3.262	3.263	3.269	3.314	3.399	3.434	3.436	3.491	3.547	3.562	3.562	3.556
EXISTING SURFACE ON ROAD CENTRELINE	2.717	2.719	2.744	2.752	2.923	2.755	2.785	2.787	2.873	2.868	2.757	2.770	2.822
CUT / FILL DEPTH	0.409	0.408	0.384	0.383	0.258	0.512	0.518	0.517	0.485	0.545	0.670	0.657	0.598
PEGGED CHAINAGE	146.557	147.194	153.458	160.000	180.000	200.000	206.995	207.324	220.000	240.000	256.995	260.000	268.536

DESIGN LEVELS ON ROAD CENTRELINE	3.401	3.378	3.335	3.237	3.180	3.157	3.157	3.159	3.172	3.261	3.585	3.617	4.129
DESIGN LIP OF KERB (LHS)	3.267	3.245	3.203	3.105	3.048	3.023	3.022	3.023	3.034	3.119	3.436	3.468	3.973
DESIGN LIP OF KERB (RHS)	3.537	3.515	3.473	3.375	3.318	3.293	3.292	3.293	3.304	3.389	3.706	3.738	4.243
EXISTING SURFACE ON ROAD CENTRELINE	2.841	2.867	3.034	3.231	3.238	3.291	3.297	3.332	3.388	3.526	3.709	3.719	3.873
CUT / FILL DEPTH	0.560	0.511	0.301	0.006	-0.059	-0.133	-0.140	-0.173	-0.216	-0.265	-0.124	-0.102	0.256
PEGGED CHAINAGE	280.000	288.471	300.000	320.000	331.464	340.000	340.555	343.313	347.799	360.000	380.000	381.464	400.000

DESIGN LEVELS ON ROAD CENTRELINE	4.893	5.857	6.271	6.704	6.857	6.924	7.764	7.843	8.204	8.424	8.458	8.939	8.968
DESIGN LIP OF KERB (LHS)	4.729	5.689	6.103	6.536	6.689	6.756	7.602	7.682	8.055	8.278	8.312	8.800	8.830
DESIGN LIP OF KERB (RHS)	4.999	5.959	6.373	6.806	6.959	7.026	7.748	7.805	8.055	8.278	8.312	8.800	8.830
EXISTING SURFACE ON ROAD CENTRELINE	4.324	5.695	6.308	6.932	7.154	7.238	8.302	8.368	8.591	8.819	8.869	10.070	10.042
CUT / FILL DEPTH	0.569	0.161	-0.037	-0.228	-0.297	-0.313	-0.538	-0.526	-0.388	-0.395	-0.411	-1.130	-1.074
PEGGED CHAINAGE	420.000	440.000	448.285	456.949	460.000	461.353	480.000	481.989	491.925	498.853	500.000	520.000	521.566

DESIGN LEVELS ON ROAD CENTRELINE	9.174	9.211	9.411	9.611	9.631	9.940	10.131	10.587	11.131	11.270	11.518	11.937
DESIGN LIP OF KERB (LHS)	9.041	9.078	9.278	9.478	9.498	9.797	9.985	10.434	10.972	11.111	11.361	11.785
DESIGN LIP OF KERB (RHS)	9.041	9.078	9.278	9.478	9.498	9.797	9.985	10.434	10.972	11.111	11.361	11.785
EXISTING SURFACE ON ROAD CENTRELINE	10.399	10.351	9.902	9.051	8.961	8.494	8.758	9.424	10.311	10.619	11.215	12.364
CUT / FILL DEPTH	-1.224	-1.140	-0.492	0.560	0.670	1.446	1.374	1.163	0.820	0.651	0.303	-0.427
PEGGED CHAINAGE	536.353	540.000	560.000	580.000	582.055	600.000	607.055	620.000	632.055	634.833	640.000	650.000

MC1005 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:100

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale
HORZ 0 10 20 40 60 80 100m
1:1000
VERT 0 1 2 4 6 8 10m
1:100

100mm on Original

Surveyor
ROBERT A HARRIES
SURVEYOR

Architect

Filename: C150-AA007094-GCD-00-ROAD LS.DWG

Client
GOLDCORAL PTY LTD

Status
FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved
R.P.E.Q No :

Scales: 1:100 (V)
1:1000 (H)
Original Size: A1
Height Datum: AHD
Grid: GRID

Current Issue Signatures
Author: B.DAVEY
Designer: A.CAMARDI
Reviewer: B.LUSTY

Project
RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title
MC1005 ROAD
LONGITUDINAL SECTION

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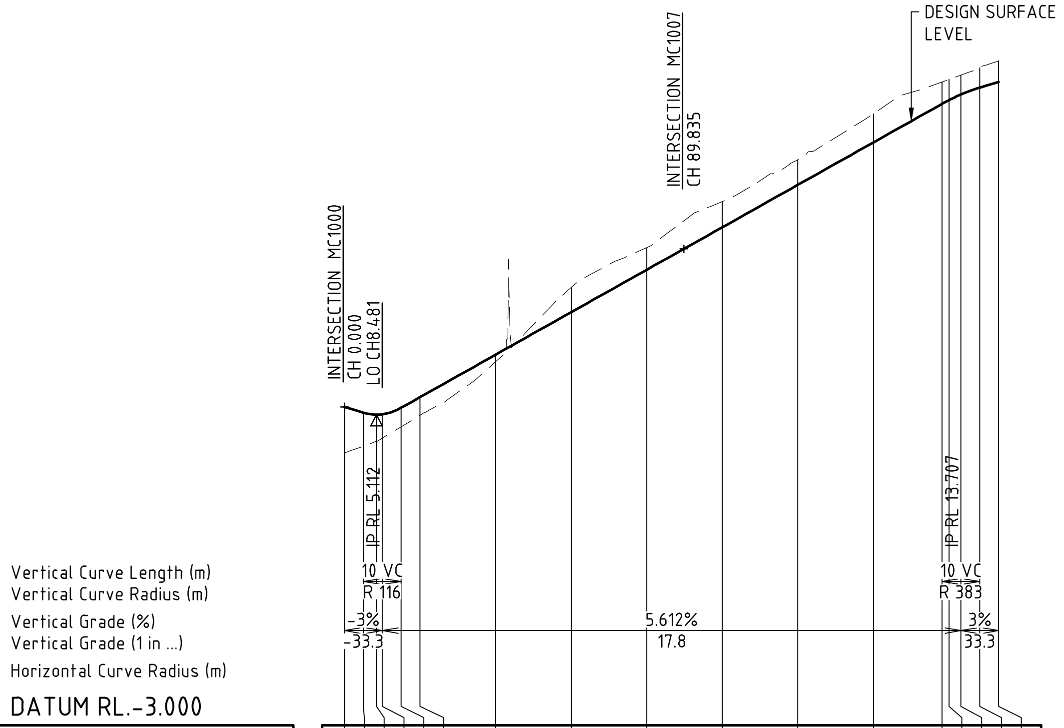
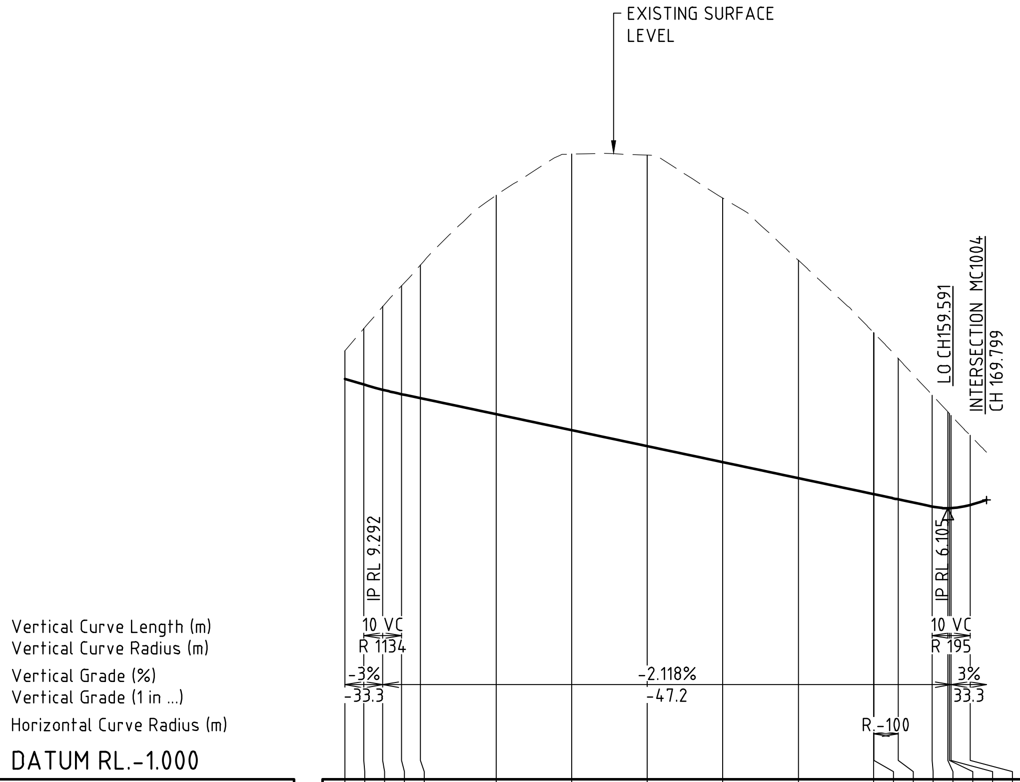
Drawing No.	Project No.	Issue
C155	AA007094	03



DESIGN LEVELS ON ROAD CENTRELINE	5.412	5.262	5.210	5.220	5.392	5.673	6.796	7.918	9.040	10.163	11.285	12.407	13.427	13.525	13.675	13.857	
DESIGN LIP OF KERB (LHS)			5.138	5.113	5.266	5.547	6.669	7.791	8.914	10.036	11.158	12.281	13.300	13.399	13.547		
DESIGN LIP OF KERB (RHS)	4.728	5.265	5.082	5.093	5.266	5.547	6.669	7.791	8.914	10.036	11.158	12.281	13.300	13.399	13.555	13.875	8.293
EXISTING SURFACE ON ROAD CENTRELINE	4.198	4.378	4.501	4.588	4.890	5.192	6.610	8.570	9.625	10.843	11.948	13.161	14.007	14.073	14.187	14.381	14.565
CUT / FILL DEPTH	1.214	0.884	0.709	0.632	0.502	0.481	0.186	-0.652	-0.584	-0.680	-0.663	-0.754	-0.580	-0.548	-0.513	-0.523	
PEGGED CHAINAGE	0.000	4.998	8.481	9.998	14.998	20.000	40.000	60.000	80.000	100.000	120.000	140.000	158.168	160.000	163.168	168.168	173.169

MC1006 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:100



DESIGN LEVELS ON ROAD CENTRELINE		9.442	9.303	9.186	9.080	8.657	8.233	7.809	7.386	6.962	6.541	6.538	6.403	6.211	6.167	6.168	6.169	6.255
DESIGN LIP OF KERB (LHS)	13.835	13.746	9.028	9.058	8.952	8.524	8.096	7.668	7.240	6.812	6.386	6.384	6.246	6.053	5.988	5.982	5.976	11.039
DESIGN LIP OF KERB (RHS)	5.185	9.667	9.100	9.058	8.952	8.524	8.096	7.668	7.240	6.812	6.386	6.384	6.246	6.053	6.008	6.009	6.014	6.320
EXISTING SURFACE ON ROAD CENTRELINE	10.335	10.924	11.508	12.056	12.603	14.444	15.537	15.510	14.370	12.729	10.820	10.807	10.132	9.161	8.717	8.673	8.624	8.096
CUT / FILL DEPTH		-1.482	-2.204	-2.870	-3.523	-5.788	-7.304	-7.701	-6.984	-5.767	-4.279	-4.269	-3.729	-2.950	-2.549	-2.505	-2.455	-1.840
PEGGED CHAINAGE	0.000	5.001	10.001	15.001	20.000	40.000	60.000	80.000	100.000	120.000	139.882	140.000	146.412	155.452	159.591	160.000	160.452	165.452

MC1007 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:100

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

100mm on Original

Scale
HORZ 0 10 20 40 60 80 100m
1:1000
VERT 0 1 2 4 6 8 10m
1:100

Surveyor
ROBERT A HARRIES
SURVEYOR

Architect

Filename: C150-AA007094-GCD-00-ROAD LS.DWG

Client
GOLDCORAL PTY LTD

Status
FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved
R.P.E.Q No :

Scales	1:100 (V) 1:1000 (H)	Current Issue Signatures	
		Author B.DAVEY	
Original Size	A1	Designer A.CAMARDI	
Height Datum	AHD	Reviewer B.LUSTY	
Grid	GRID	Ⓒ Copyright reserved	

Project
RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title
MC1006 & MC1007 ROAD
LONGITUDINAL SECTIONS

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Drawing No.		Project No.		Issue
C156	—	AA007094	—	03

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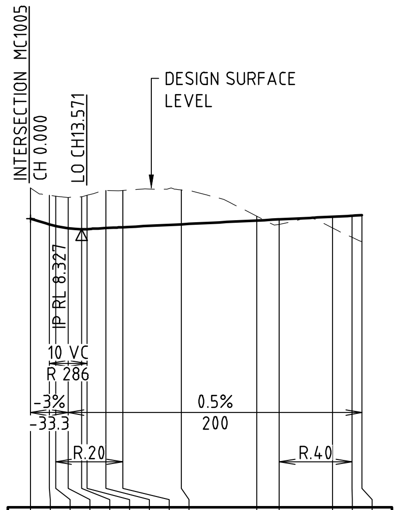


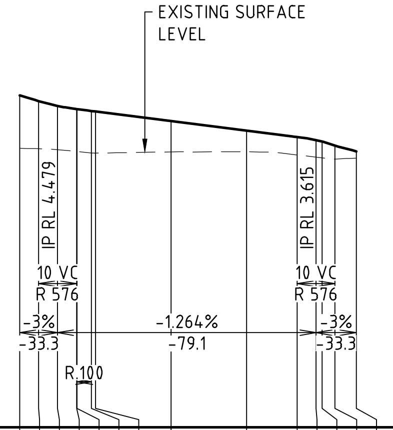
Vertical Curve Length (m)
Vertical Curve Radius (m)
Vertical Grade (%)
Vertical Grade (1 in ...)
Horizontal Curve Radius (m)

DATUM RL.1.000

DESIGN LEVELS ON ROAD CENTRELINE	8.627	8.477	8.432	8.371	8.349	8.352	8.377	8.400	8.477	8.577	8.607	8.677	8.703	8.716
DESIGN LIP OF KERB (LHS)	8.286	8.332	8.304	8.244	8.222	8.226	8.251	8.273	8.351	8.451	8.480	8.562	8.624	8.667
DESIGN LIP OF KERB (RHS)		8.590	8.490	8.347	8.275	8.278	8.251	8.273	8.351	8.451	8.480			
EXISTING SURFACE ON ROAD CENTRELINE	9.439	9.243	9.218	9.188	9.206	9.239	9.367	9.370	9.386	8.689	8.476	8.377	8.132	8.017
CUT / FILL DEPTH	-0.812	-0.765	-0.786	-0.817	-0.857	-0.886	-0.990	-0.970	-0.909	-0.112	0.131	0.300	0.571	0.700
PEGGED CHAINAGE	0.000	5.000	6.686	10.000	13.571	15.000	20.000	24.475	40.000	60.000	65.900	80.000	85.169	87.819

MC1008 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:100



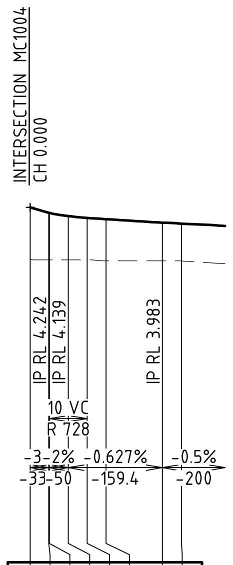
Vertical Curve Length (m)
Vertical Curve Radius (m)
Vertical Grade (%)
Vertical Grade (1 in ...)
Horizontal Curve Radius (m)

DATUM RL.-4.000

DESIGN LEVELS ON ROAD CENTRELINE		4.629	4.501	4.416	4.414	4.366	4.352	4.100	3.847	3.678	3.593	3.556	3.465	
DESIGN LIP OF KERB (LHS)	11.145	4.657	4.385	4.295	4.294	4.244	4.231	3.975	3.719	3.548	3.467	3.432	3.401	3.088
DESIGN LIP OF KERB (RHS)	3.999	3.961	4.432	4.295	4.294	4.244	4.231	3.975	3.719	3.545	3.455	3.403	3.416	3.486
EXISTING SURFACE ON ROAD CENTRELINE	3.378	3.367	3.341	3.294	3.293	3.258	3.249	3.282	3.285	3.203	3.148	3.129	3.092	3.121
CUT / FILL DEPTH		1.261	1.160	1.122	1.121	1.108	1.103	0.818	0.562	0.475	0.446	0.427	0.373	
PEGGED CHAINAGE	0.000	5.000	10.000	15.000	15.099	18.953	20.000	40.000	60.000	73.369	78.369	80.000	83.369	89.010

MC1009 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:100



Vertical Curve Length (m)
Vertical Curve Radius (m)
Vertical Grade (%)
Vertical Grade (1 in ...)
Horizontal Curve Radius (m)

DATUM RL.-5.000

DESIGN LEVELS ON ROAD CENTRELINE	4.389	4.242	4.239	4.157	4.108	4.077	3.983	3.958
DESIGN LIP OF KERB (LHS)	5.985	4.265	4.269	4.039	3.986	3.954	3.861	4.110
DESIGN LIP OF KERB (RHS)	3.610	3.544	3.544	4.096	3.986	3.954	3.861	3.816
EXISTING SURFACE ON ROAD CENTRELINE	3.014	2.998	2.998	2.997	2.996	2.975	2.975	2.969
CUT / FILL DEPTH	1.375	1.244	1.241	1.160	1.112	1.101	1.008	0.989
PEGGED CHAINAGE	0.000	4.896	5.029	10.029	15.029	20.000	34.931	40.000

MC1010 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:100

Issue	Description		Date
01	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15

Scale
HORZ 0 10 20 40 60 80 100m
1:1000
VERT 0 1 2 4 6 8 10m
1:100

Surveyor
ROBERT A HARRIES
SURVEYOR

Architect

Filename: C150-AA007094-GCD-00-ROAD LS.DWG

Client
GOLDCORAL PTY LTD

Status
FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved
R.P.E.Q No :

Scales: 1:100 (V) 1:1000 (H)
Original Size: A1
Height Datum: AHD
Grid: GRID

Current Issue Signatures
Author B.DAVEY
Designer A.CAMARDI
Reviewer B.LUSTY

Project
RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title
MC1008, MC1009 & MC1010
ROAD LONGITUDINAL SECTIONS

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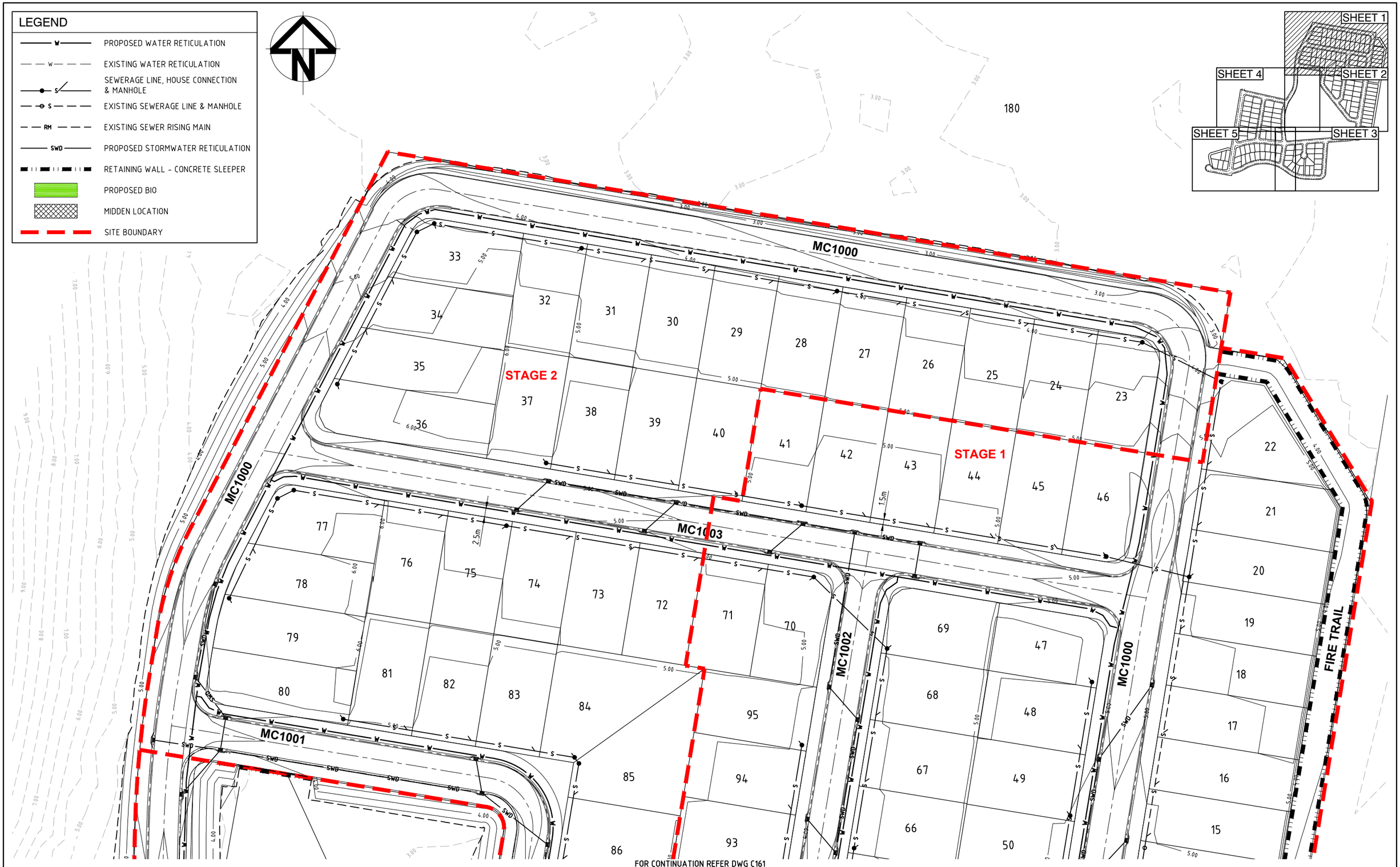
www.hyderconsulting.com

Drawing No. C157 — Project No. AA007094 — Issue 01

LEGEND

- PROPOSED WATER RETICULATION
- EXISTING WATER RETICULATION
- SEWERAGE LINE, HOUSE CONNECTION & MANHOLE
- EXISTING SEWERAGE LINE & MANHOLE
- EXISTING SEWER RISING MAIN
- PROPOSED STORMWATER RETICULATION
- RETAINING WALL - CONCRETE SLEEPER
- PROPOSED BIO
- MIDDEN LOCATION
- SITE BOUNDARY



FOR CONTINUATION REFER DWG C161

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C160-AA007094-GCD-00-SERVICES.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No :

Scales	1:500	Current Issue Signatures	
		Author B.DAVEY	
Original Size	A1	Designer A.CAMARDI	
Height Datum	AHD	Reviewer B.LUSTY	
Grid	GRID	© Copyright reserved	

Project: RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title: COMBINED SERVICES LAYOUT PLAN - SHEET 1 OF 5

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Drawing No.	Project No.	Issue
C160	AA007094	03

100mm on Original

21/Jul/2015 4:31 PM F:\AA007094\E-CAD\C-Civil\D-Final\C160-AA007094-GCD-00-SERVICES.dwg V1

FOR CONTINUATION REFER DWG C160

FOR CONTINUATION REFER DWG C163

FOR CONTINUATION REFER DWG C162

MC1000

MC1001

MC1002

STAGE 1

STAGE 2

FIRE TRAIL

1.5m

2.5m

177

181

LEGEND

- PROPOSED WATER RETICULATION
- EXISTING WATER RETICULATION
- SEWERAGE LINE, HOUSE CONNECTION & MANHOLE
- EXISTING SEWERAGE LINE & MANHOLE
- EXISTING SEWER RISING MAIN
- PROPOSED STORMWATER RETICULATION
- RETAINING WALL - CONCRETE SLEEPER
- PROPOSED BIO
- MIDDEN LOCATION
- SITE BOUNDARY

SHEET 1 | SHEET 2 | SHEET 3 | SHEET 4 | SHEET 5

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C160-AA007094-GCD-00-SERVICES.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No :

Scales	1:500	Current Issue Signatures	
		Author B.DAVEY	
Original Size	A1	Designer A.CAMARDI	
Height Datum	AHD	Reviewer B.LUSTY	
Grid	GRID	© Copyright reserved	

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: COMBINED SERVICES LAYOUT PLAN - SHEET 2 OF 5

HYDER CONSULTING PTY. LTD
ABN 76 104 485 289
P O Box 1653
Southport, QLD 4215
Australia
Tel: +61 (07) 5532 3933
Fax: +61 (07) 5591 4778
www.hyderconsulting.com

Drawing No. C161 | Project No. AA007094 | Issue 03

100mm on Original

21/Jul/2015 4:31 PM F:\AA007094\E-CAD\C-Civil\D-Final\C160-AA007094-GCD-00-SERVICES.dwg V1

FOR CONTINUATION REFER DWG C161

FOR CONTINUATION REFER DWG C164

MC1000
MC1004
MC0000
MC1010
MC1009
MC1005
SWD
STAGE 3
01
164
119
112
111
107
96
106
97
113
110
105
98
137
114
109
99
115
108
104
116
100
117
118
103
102
101
178 (PART)

SHEET 1
SHEET 2
SHEET 3
SHEET 4
SHEET 5

LEGEND

- PROPOSED WATER RETICULATION
- EXISTING WATER RETICULATION
- SEWERAGE LINE, HOUSE CONNECTION & MANHOLE
- EXISTING SEWERAGE LINE & MANHOLE
- EXISTING SEWER RISING MAIN
- PROPOSED STORMWATER RETICULATION
- RETAINING WALL - CONCRETE SLEEPER
- PROPOSED BIO
- MIDDEN LOCATION
- SITE BOUNDARY

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C160-AA007094-GCD-00-SERVICES.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved

R.P.E.Q No :

Scales	1:500	Current Issue Signatures
Original Size	A1	Author B.DAVEY
Height Datum	AHD	Designer A.CAMARDI
Grid	GRID	Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title: COMBINED SERVICES LAYOUT PLAN - SHEET 3 OF 5

HYDER CONSULTING PTY. LTD
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Drawing No.	Project No.	Issue
C162	AA007094	03

100mm on Original

21/Jul/2015 4:31 PM F:\AA007094\E-CAD\C-Civil\D-Final\C160-AA007094-GCD-00-SERVICES.dwg V1

LEGEND

- PROPOSED WATER RETICULATION
- EXISTING WATER RETICULATION
- SEWERAGE LINE, HOUSE CONNECTION & MANHOLE
- EXISTING SEWERAGE LINE & MANHOLE
- EXISTING SEWER RISING MAIN
- PROPOSED STORMWATER RETICULATION
- RETAINING WALL - CONCRETE SLEEPER
- PROPOSED BIO
- MIDDEN LOCATION
- SITE BOUNDARY

FOR CONTINUATION REFER DWG C161

FOR CONTINUATION REFER DWG C164

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

100mm on Original

Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C160-AA007094-GCD-00-SERVICES.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL — NOT TO BE USED FOR CONSTRUCTION

Approved: R.P.E.Q No :

Scales: 1:500

Original Size: A1

Height Datum: AHD

Grid: GRID

Current Issue Signatures

Author: B.DAVEY

Designer: A.CAMARDI

Reviewer: B.LUSTY

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: COMBINED SERVICES LAYOUT PLAN - SHEET 4 OF 5

HYDER CONSULTING PTY. LTD
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Southport, QLD 4215
Australia
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Fax: +61 (07) 5591 4778
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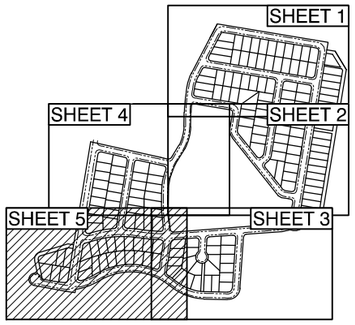
Drawing No. C163 — Project No. AA007094 — Issue 03

21/Jul/2015 4:31 PM F:\AA007094\E-CAD\C-Civil\D-Final\C160-AA007094-GCD-00-SERVICES.dwg V1

FOR CONTINUATION REFER DWG C133

LEGEND

- PROPOSED WATER RETICULATION
- EXISTING WATER RETICULATION
- SEWERAGE LINE, HOUSE CONNECTION & MANHOLE
- EXISTING SEWERAGE LINE & MANHOLE
- EXISTING SEWER RISING MAIN
- PROPOSED STORMWATER RETICULATION
- RETAINING WALL - CONCRETE SLEEPER
- PROPOSED BIO
- MIDDEN LOCATION
- SITE BOUNDARY



FIRE TRAIL

STAGE 4

STAGE 3

MC1000 MC1004 MC1005 MC1007 MC1008 MC1009

178 (PART)

EVANS RIVER

FOR CONTINUATION REFER DWG C132

Issue	Description		Date
03	RE-ISSUE FOR DEVELOPMENT APPROVAL	BD	13.07.15
02	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14
01	ORIGINAL ISSUE	BD	18.06.14

Scale: 1 : 500 (0 5 10 20 30 40 50m)

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C160-AA007094-GCD-00-SERVICES.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved

R.P.E.Q No :

Scales: 1:500

Original Size: A1

Height Datum: AHD

Grid: GRID

Current Issue Signatures

Author B.DAVEY

Designer A.CAMARDI

Reviewer B.LUSTY

Project: RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title: COMBINED SERVICES LAYOUT PLAN - SHEET 5 OF 5

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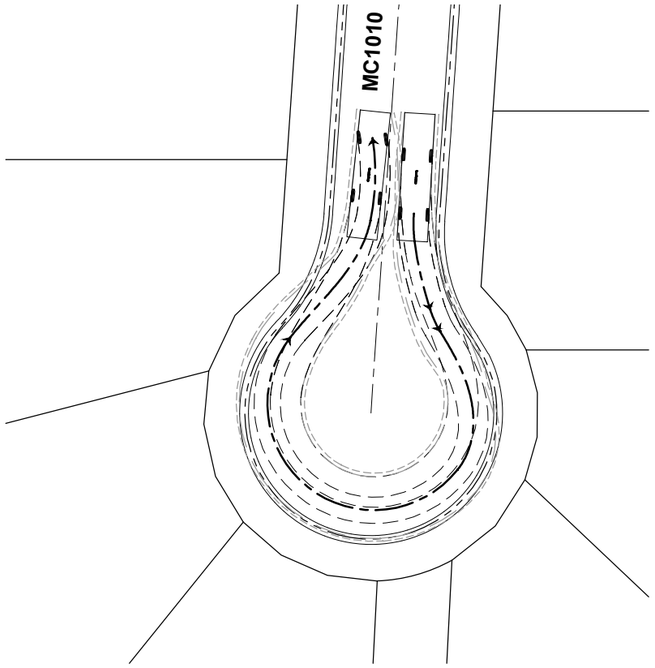
www.hyderconsulting.com

Drawing No. C164 | Project No. AA007094 | Issue 03

100mm on Original

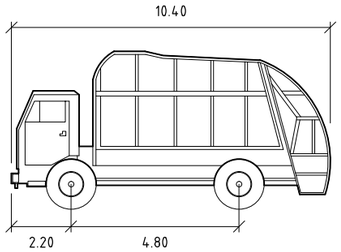
21/Jul/2015 4:31 PM F:\AA007094\E-CAD\C-Civil\D-Final\C160-AA007094-GCD-00-SERVICES.dwg V1



GARBAGE TRUCK TURNING MOVEMENT MC1010
SCALE 1:250

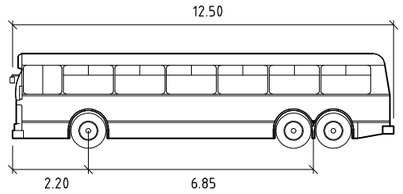
LEGEND

- PROPOSED LAYBACK KERB
- EXISTING LAYBACK KERB
- PROPOSED CONCRETE ANNULUS
- STAGE BOUNDARY



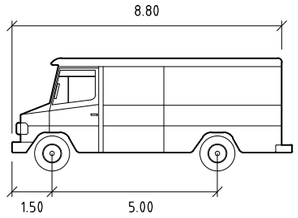
BUS	METERS
WIDTH	: 2.48
TRACK	: 2.48
LOCK TO LOCK TIME	: 6.0
STEERING ANGLE	: 33.5

10.4m GARBAGE TRUCK DETAILS
SCALE NTS



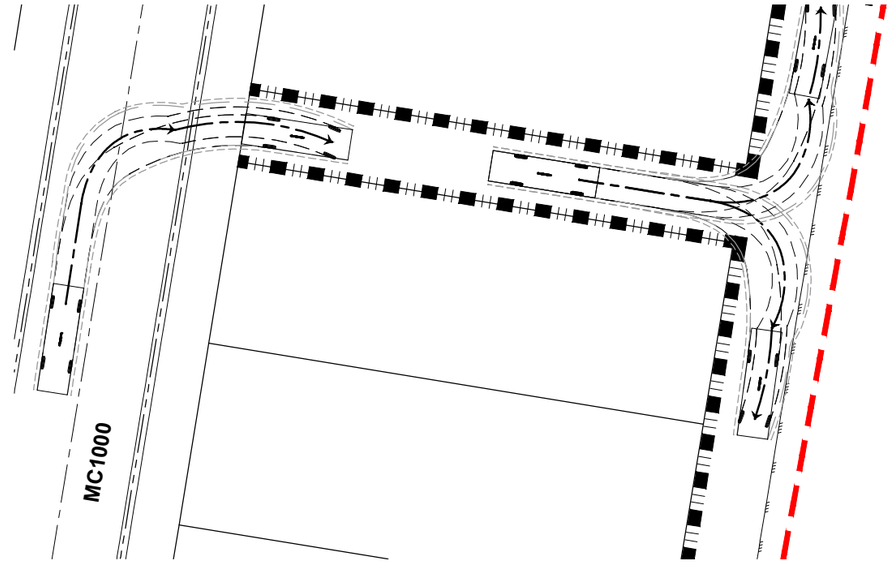
BUS	METERS
WIDTH	: 2.50
TRACK	: 2.50
LOCK TO LOCK TIME	: 6.0
STEERING ANGLE	: 36.6

12.5m BUS DETAILS
SCALE NTS

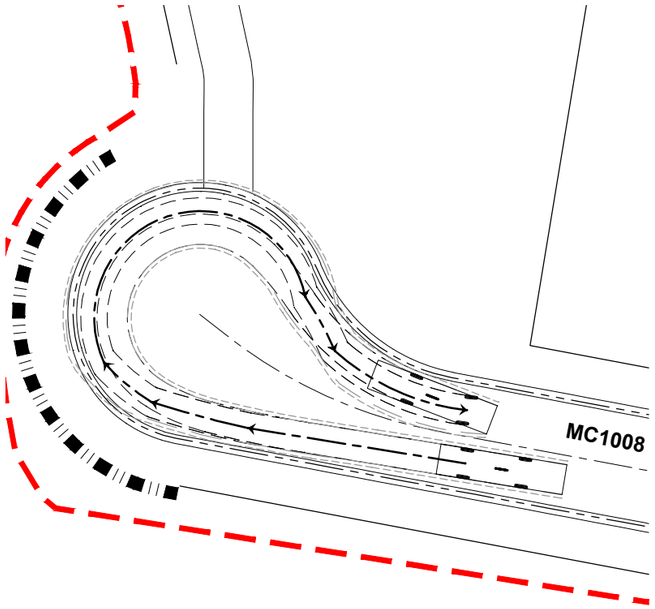


BUS	METERS
WIDTH	: 2.50
TRACK	: 2.50
LOCK TO LOCK TIME	: 6.0
STEERING ANGLE	: 38.7

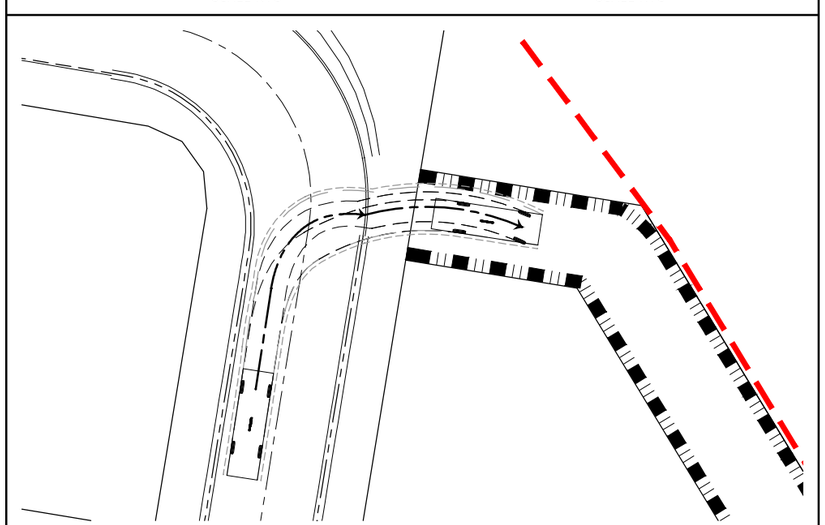
SERVICE VEHICLE DETAILS
SCALE NTS



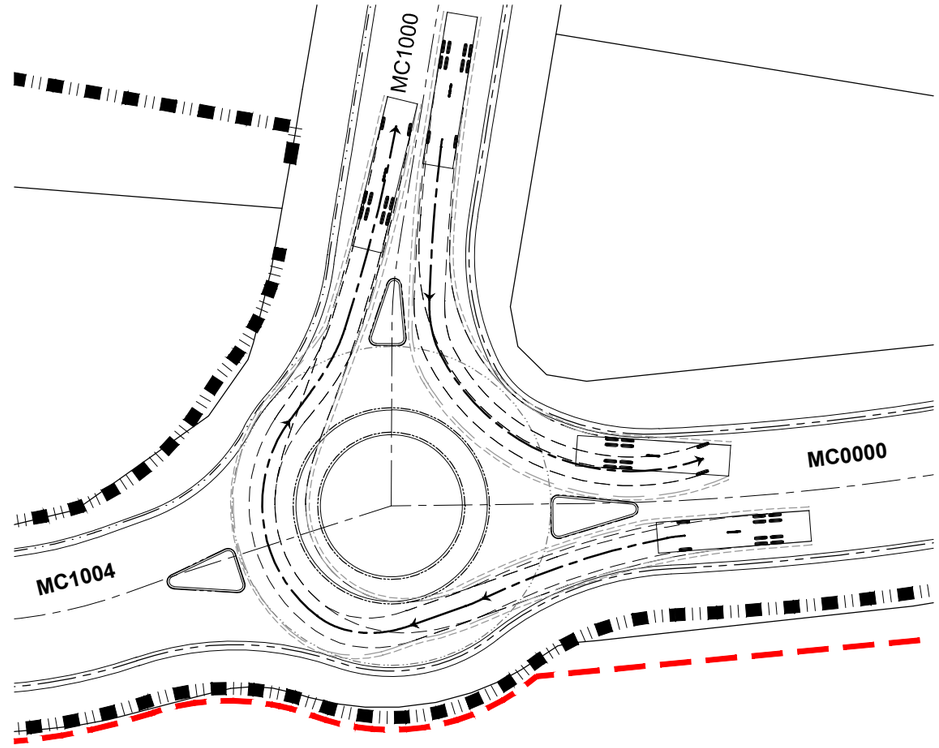
SERVICE VEHICLE TURNING MOVEMENT MC1000 AND FIRETRAIL
SCALE 1:250



GARBAGE TRUCK TURNING MOVEMENT MC1008
SCALE 1:250



SERVICE VEHICLE TURNING MOVEMENT MC1000 AND FIRETRAIL
SCALE 1:250



12.5m BUS TURNING MOVEMENT
SCALE 1:250

Issue	Description		Date
02	AMENDED AS PER COUNCIL RFI	ANC	10.07.15
01	ISSUE FOR DEVELOPMENT APPROVAL	BD	03.10.14

Scale: 0 5 10 15 20 25m — 1 : 250

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C170-AA007094-GCD-00-SWEPT PATH.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL
NOT TO BE USED FOR CONSTRUCTION

Approved

R.P.E.Q No :

Scales	1:250	Current Issue Signatures	
Original Size	A1	Author B.DAVEY	
Height Datum	AHD	Designer A.CAMARDI	
Grid	GRID	Reviewer B.LUSTY	

Project: RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title: IRON GATES ROAD
VEHICLE SWEPT PATH
ANALYSIS

Hyder Consulting
HYDER CONSULTING PTY. LTD
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Drawing No.	Project No.	Issue
C170	— AA007094 —	02

100mm on Original

21/Jul/2015 4:31 PM F:\AA007094\E-CAD\C-Civil\D-Final\C170-AA007094-GCD-00-SWEPT PATH.dwg V1

APPENDIX B

DIAL BEFORE YOU DIG SEARCH RESULTS

Job No 8032706

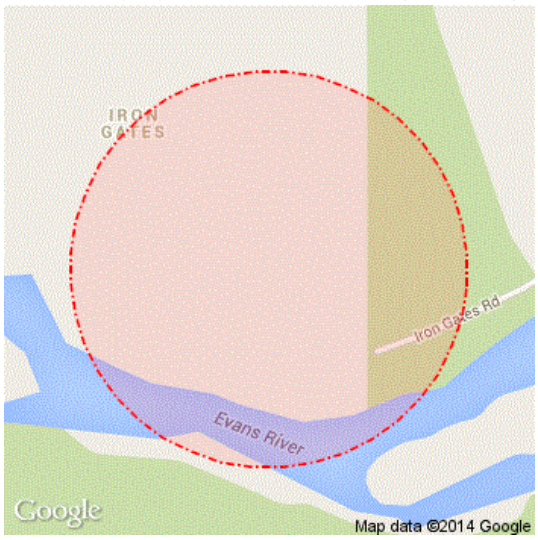
Phone: 1100
www.1100.com.au

Caller Details

Contact:	Mr Mike Cazeres	**Caller Id:**	1280753	**Phone:**	07 5503 4886
Company:	Not Supplied	**Mobile:**	0410 101 179	**Fax:**	Not Supplied
Address:	Level 7 Premion Place Queen Street Southport QLD 4215	**Email:**	mike.cazeres@hyderconsulting.com		

Dig Site and Enquiry Details

WARNING: The map below only displays the location of the proposed dig site and does not display any asset owners' pipe or cables. The area highlighted has been used only to identify the participating asset owners, who will send information to you directly.



User Reference: AA007094
Working on Behalf of:
Private

Enquiry Date:	Start Date:	End Date:
24/06/2014	26/06/2014	30/06/2014

Address:
Iron Gates Road
Iron Gates NSW 2473

Job Purpose: Excavation
Onsite Activity: Mechanical Excavation
Location of Workplace: Private Property
Location in Road: Not Supplied

- Check that the location of the dig site is correct. If not you must submit a new enquiry.
- Should the scope of works change, or plan validity dates expire, you must submit a new enquiry.
- Do NOT dig without plans. Safe excavation is your responsibility. If you do not understand the plans or how to proceed safely, please contact the relevant asset owners.

Notes/Description of Works:
Not Supplied

Your Responsibilities and Duty of Care

- If plans are not received within 2 working days, contact the asset owners directly & quote their Sequence No.
- ALWAYS perform an onsite inspection for the presence of assets. Should you require an onsite location, contact the asset owners directly. Please remember, plans do not detail the exact location of assets.
- Pothole to establish the exact location of all underground assets using a hand shovel, before using heavy machinery.
- Ensure you adhere to any State legislative requirements regarding Duty of Care and safe digging requirements.
- If you damage an underground asset you MUST advise the asset owner immediately.
- By using this service, you agree to Privacy Policy and the terms and disclaimers set out at **www.1100.com.au**
- **For more information on safe excavation practices, visit www.1100.com.au**

Asset Owner Details

The assets owners listed below have been requested to contact you with information about their asset locations within 2 working days. Additional time should be allowed for information issued by post. It is **your responsibility** to identify the presence of any underground assets in and around your proposed dig site. Please be aware, that not all asset owners are registered with the Dial Before You Dig service, so it is **your responsibility** to identify and contact any asset owners not listed here directly.
** Asset owners highlighted by asterisks ** require that you visit their offices to collect plans.
# Asset owners highlighted with a hash require that you call them to discuss your enquiry or to obtain plans.

Seq. No.	Authority Name	Phone	Status
40148856	Essential Energy	132391	NOTIFIED
40148855	Richmond Valley	0266600300	NOTIFIED
40148857	Telstra NSW, North	1800653935	NOTIFIED

END OF UTILITIES LIST

LEGEND

Exchange
(major cable present)

Footway access chamber
(can vary from 1-lid to 12-lid)

Roadway access chamber

Pillar/cabinet
(above the ground / free standing)

Above ground complex equipment housing (eg RIM)
Please Note: This equipment is powered by 240V electricity.

PT **Public telephone**
Please Note: This equipment is powered by 240V electricity.

Direct buried cable

Cable jointing pit
(number indicating pit type)

Buried cable jointing pit
(number indicating pit type)

Elevated cable joint
(above ground joint on buried cable)

Cable loop (direct buried)

Telstra Plant in shared utility trench

Aerial Cable
(above ground)

Aerial Cable
(attached to joint use pole e.g. power)

SMOF **Optical fibre cable direct buried**

Single to multiple round conduit
Configurations 1, 2, 4, 9 respectively
(Attached text denotes conduit type and size)
P100

Multiple square conduit
Configurations 2, 4, 6 respectively
(Attached text denotes conduit type and size)
E85

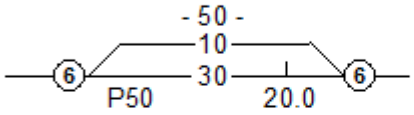
Some examples of conduit type and size:

A - Asbestos cement, P - PVC / plastic, C - Concrete, GI - Galvanised iron, E - Earthenware.

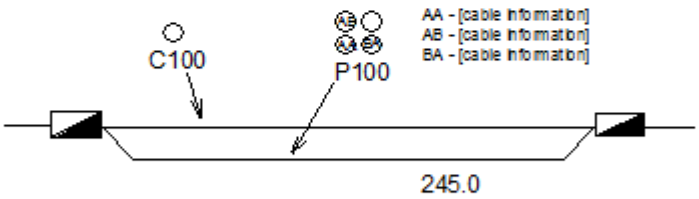
Conduit sizes *nominally* range from 20mm to 100mm.

P50	50mm PVC conduit
P100	100mm PVC conduit
A100	100mm asbestos cement conduit
E 85	85mm square earthenware conduit

Some examples of how to read Telstra plans:

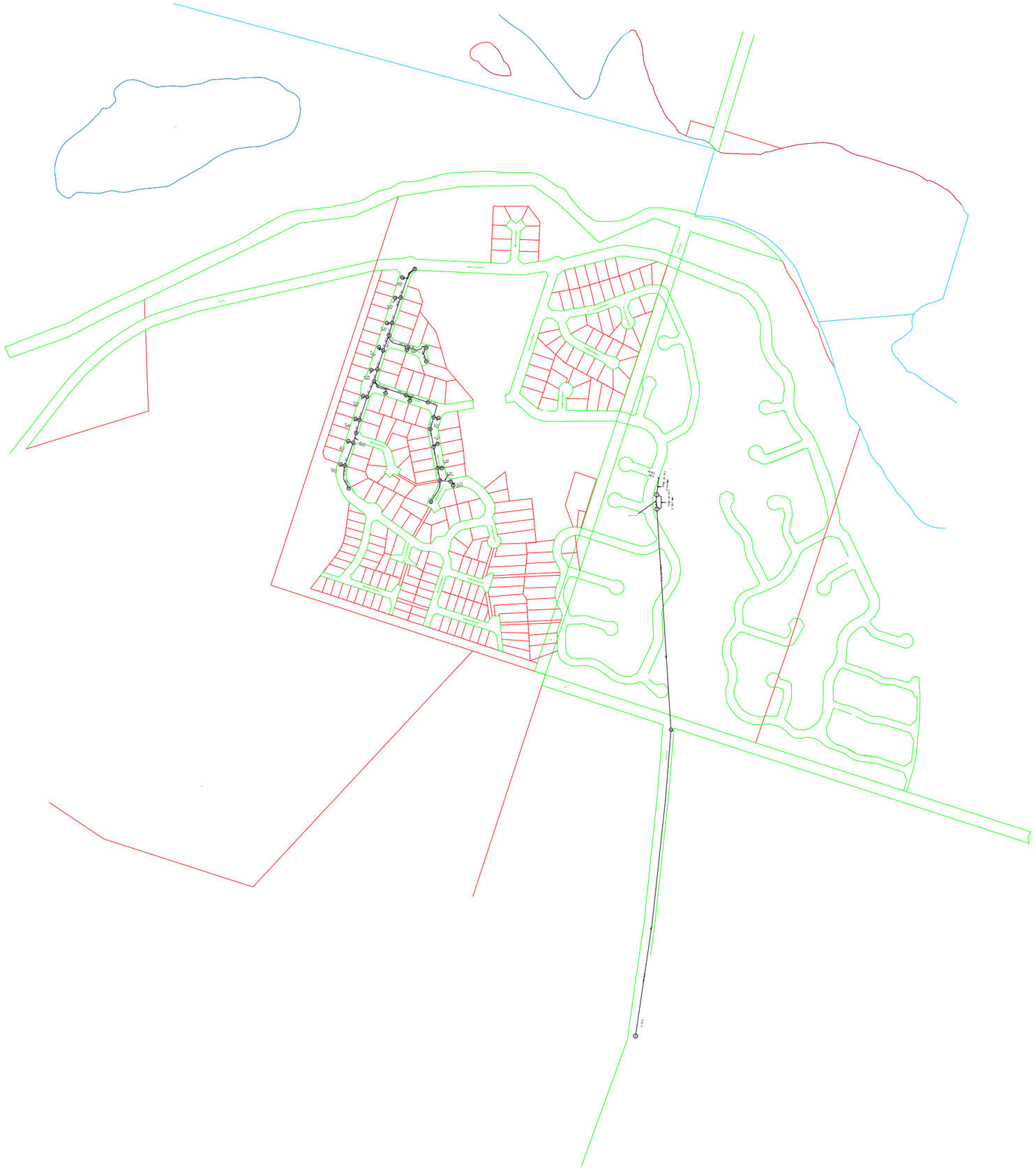


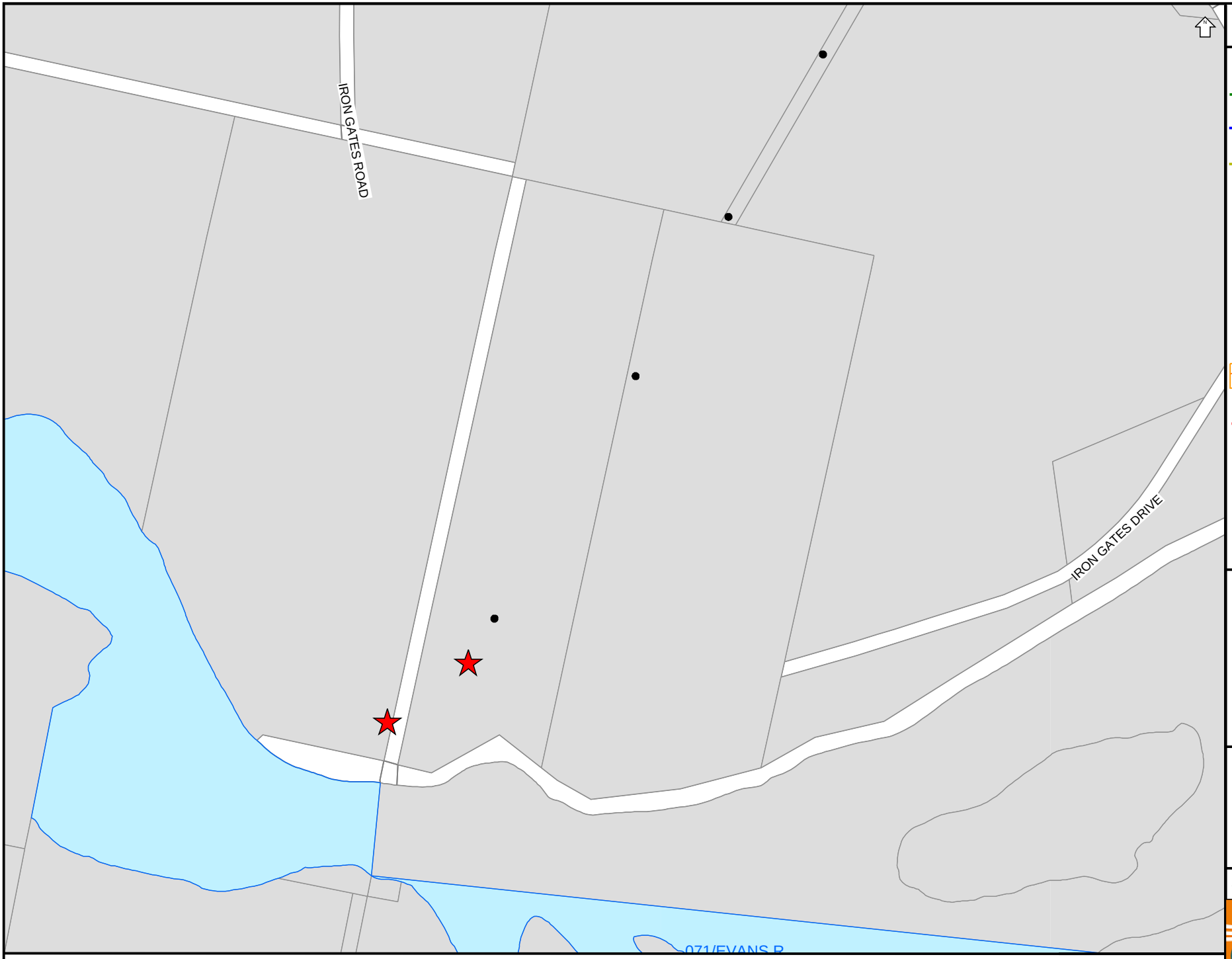
One 50mm PVC conduit (P50) containing a 50-pair and a 10-pair cable between two 6-pits, 20.0m apart, with a direct buried 30-pair cable along the same route.



Two separate conduit runs between two footway access chambers (manholes) 245m apart. A nest of four 100mm PVC conduits (P100) containing assorted cables in three ducts (one being empty) and one empty 100mm concrete duct (C100) along the same route.

WARNING: Telstra's plans show only the presence of cables and plant. They only show their position relative to road boundaries, property fences etc. at the time of installation and Telstra does not warrant or hold out that such plans are accurate thereafter due to changes that may occur over time.
DO NOT ASSUME DEPTH OR ALIGNMENT of cables or plant as these vary significantly.
The customer has a DUTY OF CARE when excavating near Telstra cables and plant. Before using machine excavators TELSTRA PLANT MUST FIRST BE PHYSICALLY EXPOSED BY SOFT DIG (potholing) to identify its location.
Telstra will seek compensation for damages caused to its property and losses caused to Telstra and its customers.





Overhead wires not shown LOOK UP & LIVE!

LEGEND

- LV Underground Cable
- HV Underground Cable
- Underground Pipe
- Underground Earth or Wires
- Ground Substation
- Pole
- Cubicle
- Pit
- Proposed Construction
- Critical* Underground Cable
- Critical* Zone Substation

* Critical Assets: Contact Essential Energy on 13 23 91

THE INFORMATION ON THIS MAP MAY NOT BE ACCURATE.
If details are incorrect, please notify Essential Energy on 13 23 91
(or fax 1800 354 636)

ISSUE DATE: 24/06/2014

You must resubmit your request if you have not started work within 4 weeks of the 'Issue Date' above

A4 | SCALE: 1:7111

Job Number: 8032706 Sequence number: 40148856 Job location: Iron Gates Road, Iron Gates Map Centre: 153° 24' 51.8", -29° 7' 17.8"

essential energy

APPENDIX C

BMT WBM FLOOD STUDY

BMT WBM Pty Ltd
Level 8, 200 Creek Street
Brisbane Qld 4000
Australia
PO Box 203, Spring Hill 4004

Tel: +61 7 3831 6744
Fax: + 61 7 3832 3627

ABN 54 010 830 421

www.bmtwbm.com.au

Our Ref: : L.B19079.012_Iron_Gates.docx

22 August 2014

Gold Coral Pty Ltd
c/o Planit Consulting
Level 2, 11-13 Pearl Street
Kingscliff
NSW 2487

Attention: Adam Smith

Dear Adam

RE: ASSESSMENT OF LOCAL RUNOFF FOR THE IRON GATES DEVELOPMENT

This letter has been prepared at the request of Planit Consulting, acting on behalf of Gold Coral Pty Ltd, to assess the impact of runoff from the proposed Iron Gates development site. The main focus of this assessment is whether on-site detention of runoff is required to protect downstream properties.

Background of Flood Modelling

In 2010, BMT WBM prepared the *Richmond River Flood Mapping Study* (RRFMS) for Richmond Valley Council and Richmond River County Council. A major component of that study was the preparation of regional hydrologic and hydraulic models. In 2012, on behalf of the Ingles Group, BMT WBM extended the RRFMS flood model down the Evans River to the river mouth at Evans Head. The purpose of that assessment was to assess the flood risk for the Iron Gates development as well as any potential flood impact. In 2014, BMT WBM prepared the *Evans River Flood Study* (ERFS) for Richmond River County Council. For that study, a new flood model of the Evans River was prepared, incorporating more recent topographic survey than used in the RRFMS. The new Evans River model was higher resolution than any previous modelling, and represented the Evans River system using a two-dimensional grid[1].

Peak flood levels adjacent to the Iron Gates development site are consistent between the 2012 flood assessment and the recent Evans River Flood Study. Peak 100 year ARI flood levels are shown in Table 1, together with the corresponding climate change scenario flood levels.

Table 1 100 year ARI flood levels at the Iron Gates site

	100 Year ARI Flood Level	100 Year ARI Flood Level including Climate Change
Iron Gates Flood Assessment (2012)	2.5m AHD	3.0m AHD
Evans River Flood Study (2014)	2.5m AHD	3.1m AHD

[1] The RRFMS flood model used a 1D representation of the Evans River past Iron Gates, whereas the 2012 Iron Gates Flood Assessment model used an integrated 1D/2D approach.

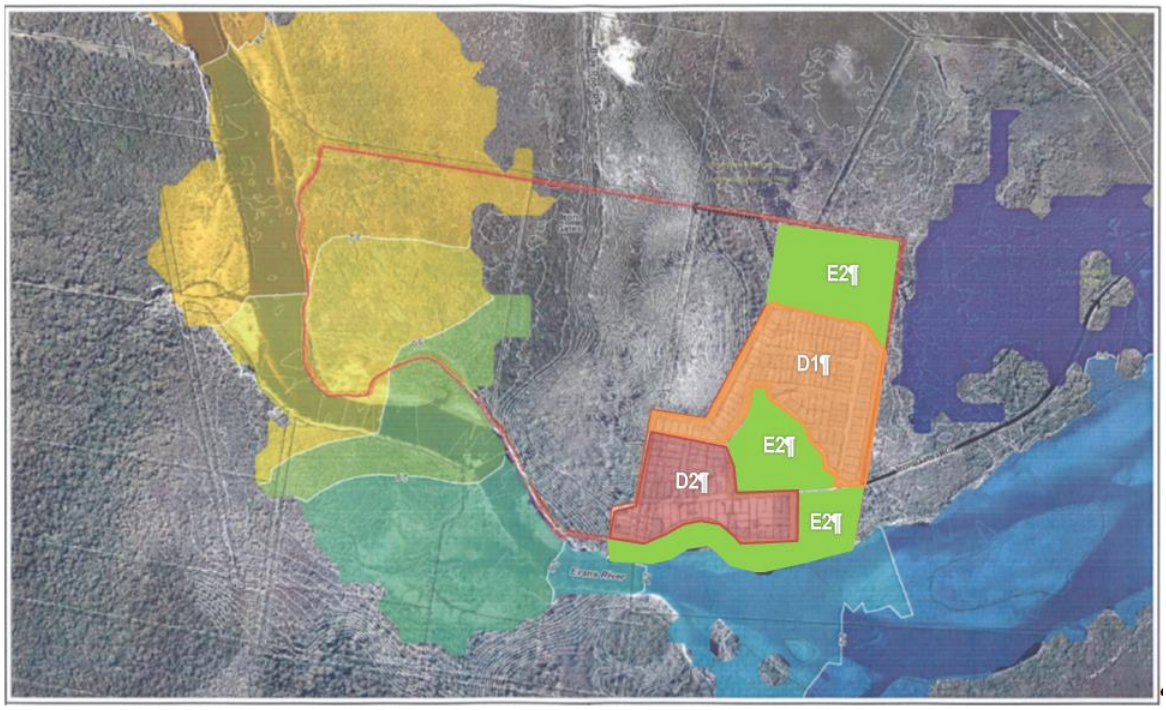


Figure 1 Proposed Iron Gates development site

Of relevance to this assessment, the following conclusions are listed in the ERFS report (ref. R.B2500.001.02.Main_Report):

- *At Evans Head the main flood risk is from storm surge. However, much of Evans Head is at elevations sufficient to be above the 100 year ARI storm surge level.*
- *A climate change assessment was undertaken with a 10% increase in rainfall intensity and a 0.9m rise in sea level. This showed that whilst flood depths increased significantly in the Evans River, the overall 100 year ARI flood extent within Evans Head did not notably change with the exception of some additional inundation along Ocean Drive and Bundjalung Road.*
- *A local, short duration, high intensity rainfall event across the Evans River does not result in higher flood levels than for when a Richmond River event passes through the Evans River catchment.*
- *The approximate travel time of a significant flood peak (100 year ARI event) between the Tuckombil Weir and Evans Head is around 5 hours.*

For this assessment, three flood / runoff scenarios are discussed:

- Regional flooding from the Richmond River;
- Evans River catchment flooding; and
- Storm surge.

Regional Flooding from the Richmond River

During significant flood events, floodwaters in the Richmond River and Rocky Mouth Creek overtop the Tuckombil Canal and enter the Evans River. This mechanism of flooding poses the greatest risk to the Evans River catchment, in terms of peak flood levels and flows. Typically, the response time of the Richmond River at the Tuckombil Canal is greater than 2 days, meaning that flooding in the Mid-Richmond area will typically occur days after the main rainfall. The critical duration assessment of the Richmond River also shows the highest flood levels at the Tuckombil Canal to be the 72 hour design event. As shown during previous studies, whilst these floods pose the greatest risk to the Evans River catchment, peak 100 year ARI flood levels are still below the ground elevation of the development site.

Shown in Figure 1 is the flood hydrograph (flood level vs time) in the Evans River adjacent to the site, resulting from a 100 year ARI 72 hour duration Richmond River Flood (blue line). The hydrograph shows the peak occurring at 91 hours simulation time, with a smaller peak occurring on the high tide the day before at 67 hours simulation time. The local runoff from the sub-catchment incorporating the Iron Gates development is shown as the red line. The primary point of interest from this figure is the correlation between the two time series. As runoff from the local catchments enters the Evans River, there is a series of minor rises in river level. The peaks shown at 5, 17, 29, 42, 55 hours simulation time, are actually a result of the storm surge, rather than the local runoff. However, the magnitude of the peaks is determined by the volume of water in the system due to local runoff. This can be seen by looking at the low tides between these peaks, where the peak flood level remains above 0.6m AHD following the start of the storm. The local runoff is generally drained with each falling tide, always resulting in the low tide flood level being below 1.0m AHD.

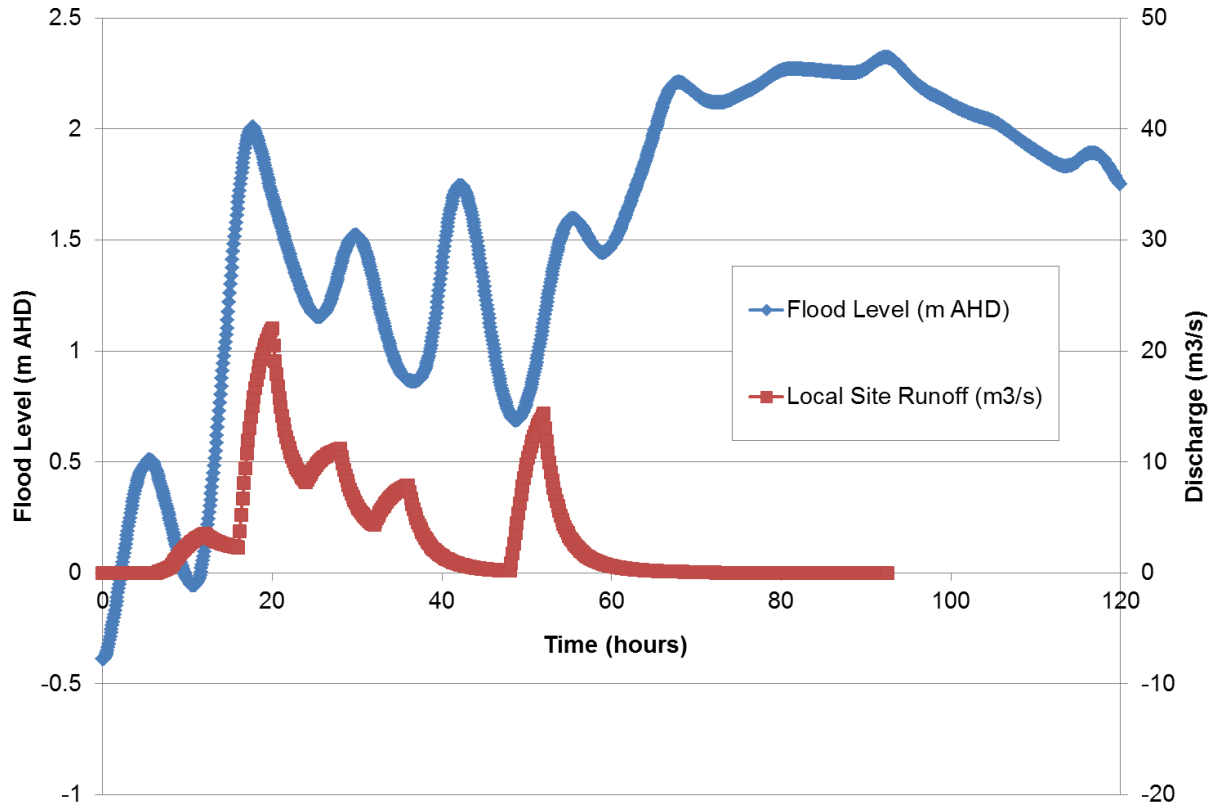


Figure 2 Richmond River and Local Catchment runoff timing

Following the local catchment runoff, the Tuckombil Canal overtops and the Richmond River flood flushes through the Evans River system. This can be seen on Figure 1 by the major flood levels occurring after 60 hours simulation time. During the Richmond River flush, flood levels remain above 1.5m for nearly 3 days. During this time, whilst the tide is having an influence on the discharge from the system, it is not having a significant effect on flood levels.

In order to minimise the peak flood levels, it is important to allow as much of the local runoff to drain from the Evans River system prior to the Richmond River flood flushing through.

Evans River Catchment Flooding

Flooding from the Evans River catchment follows the same trend, albeit on shorter timescale and with lower flood levels. The local catchment runoff enters the Evans River and drains with the next receding tide. This is then followed by the Upper Evans River catchment runoff flowing along the Evans River through the Iron Gates.

Storm Surge Flooding

Storm surge has been incorporated into the various modelling simulations undertaken for all flood assessments on the Evans River. Storm surge in isolation from rainfall does not pose a risk to the development site. The various simulations undertaken have included storm surge both with and without an allowance for sea level rise. The presence of storm surge at the tidal boundary does not influence the relative timings of the local catchment runoff, Evans River catchment runoff and the Richmond River runoff.

Development Scenarios

The following development scenarios have been considered in terms of their effect on peak flows in the Evans River.

- Entire site development – Catchments D1 and D2 considered to be fully developed without detention basins and environmental areas E2, undeveloped
- Partial site development – Catchment D2 to detain flows to pre-development peak; Catchments D1 developed without detention basin and environmental areas E2 undeveloped.

The WBNM hydrologic model has been updated to include these development scenarios. The outcome from the assessment is that whilst there is an increase in local runoff from the development, in the context of the broader river system, these changes are not noticeable. The fully developed site results in a change to the local sub-catchment (draining western half of Evans Head and the low land to the east of the Iron Gates Ridge) of less than 5%. In terms of the Evans River catchment, this change is less than 0.3% of the area.

This minor change has no influence on peak discharge rates and peak flood levels in the Evans River.

Concluding Remarks

The use of on-site detention (OSD) to mitigate post development peak discharge to pre-development rates is well considered best management practice. However, in some scenarios, the application of OSD is counter-productive. In such cases, consideration must be given on a merit based approach, as recommended in the NSW Floodplain Development Manual.

The Iron Gates development is a good example for not using OSD to manage discharge rates. The proximity of the development to the river mouth means that the traditional ‘rapid disposal’ method is more applicable. By directly discharging runoff into the river, the water can be drained from the Evans River system with the receding tide. Most runoff will then be drained prior to the larger, regional flows passing through the Evans River, either from Upper Evans River catchment runoff or from Richmond River overflow.

Therefore, BMT WBM recommends against using OSD to delay the release of floodwaters from the proposed development site.

Should you wish to discuss the contents of this letter or require any additional information, please call the undersigned on 07 3831 6744.

BMT WBM Pty Ltd

Ben Caddis

Associate
Senior Flood Engineer

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Our Ref: : L.B19079.014.Iron_Gates.docx

2 July 2015

Gold Coral Pty Ltd
c/o Planit Consulting
Level 2, 11-13 Pearl Street
Kingscliff
NSW 2487

Attention: Luke Blandford

Dear Luke

RE: ADDITIONAL FLOOD ADVICE FOR THE IRON GATES DEVELOPMENT

This letter has been prepared at the request of Graeme Ingles of Gold Coral Pty Ltd, to provide supporting information for Development Application No. 2015.096 – Iron Gates Rd, Evans Head. The Request for Information issued by the NSW Office of Environment and Heritage (OEH) states the following in relation to flood management of the proposed development (refer to Figures 1 and 2 for location and lot layout):

> *'OEH recommends that prior to determining the development application Council should be satisfied that:*
>
> *12. The floor levels and filling of the proposed lots are in accordance with Council policies for the FPL. The FPL should include a climate change allowance.*
>
> *13. The filling of the lots does not adversely impact on the flood levels at other properties in the area.*
>
> *14. The proponent has assessed and managed the evacuation of the proposed subdivision layout for a full range of floods including the PMF. Providing flood free evacuation routes may require a revision to the concept plan. Any concept plan revision should also consider the recommendations of the Hawkesbury – Nepean Floodplain Management Steering Committee Guidelines: Designing Safer Subdivisions (Guidance on Subdivision Design in Flood Prone Areas) and Managing Flood Risk through Planning Opportunities (Guidance on Land Use Planning in Flood Prone Areas).'*

This letter supports the previous advice provided by BMT WBM for the Iron Gates development, issued in the following two letters:

- Iron Gates Flood Assessment (ref. L.B19079.003, 10 September 2012)
- Assessment of Local Runoff for the Iron Gates Development (ref. L.B19079.012.Iron_Gates, 22 August 2014)

Background of Flood Modelling

In 2010, BMT WBM prepared the *Richmond River Flood Mapping Study* (RRFMS) for Richmond Valley Council and Richmond River County Council. A major component of that study was the preparation of regional hydrologic and hydraulic models. In 2012, on behalf of the Ingles Group, BMT WBM extended

the RRFMS flood model down the Evans River to the river mouth at Evans Head. The purpose of that assessment was to assess the flood risk for the Iron Gates development as well as any potential flood impact. In 2014, BMT WBM prepared the *Evans River Flood Study* (ERFS) for Richmond River County Council. For that study, a new flood model of the Evans River was prepared, incorporating more recent topographic survey than used in the RRFMS. The new Evans River model was higher resolution than any previous modelling, and represented the Evans River system using a two-dimensional grid[1].

Peak flood levels adjacent to the Iron Gates development site are consistent between the 2012 flood assessment and the recent Evans River Flood Study. Peak 100 year ARI flood levels are shown in Table 1, together with the corresponding climate change scenario flood levels.

Table 1 100 year ARI flood levels at the Iron Gates site

	100 Year ARI Flood Level	100 Year ARI Flood Level including Climate Change
Iron Gates Flood Assessment (2012)	2.5m AHD	3.0m AHD
Evans River Flood Study (2014)	2.5m AHD	3.1m AHD

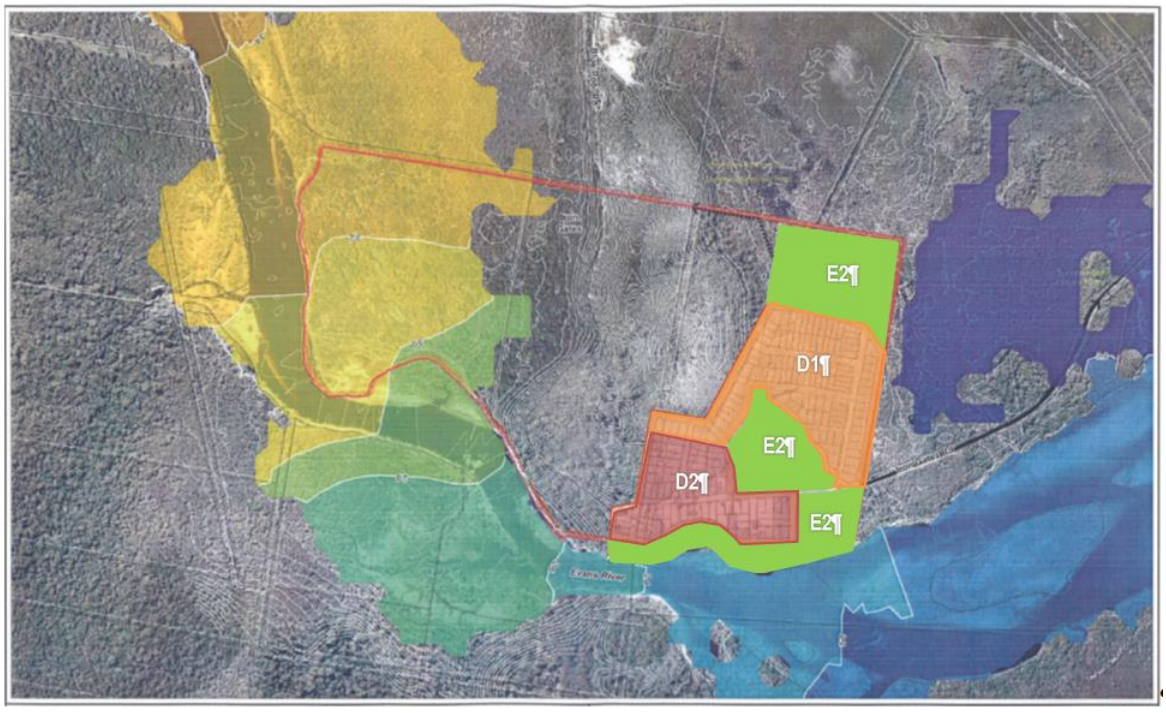


Figure 1 Proposed Iron Gates development site (superseded lot layout)

[1] The RRFMS flood model used a 1D representation of the Evans River past Iron Gates, whereas the 2012 Iron Gates Flood Assessment model used an integrated 1D/2D approach.

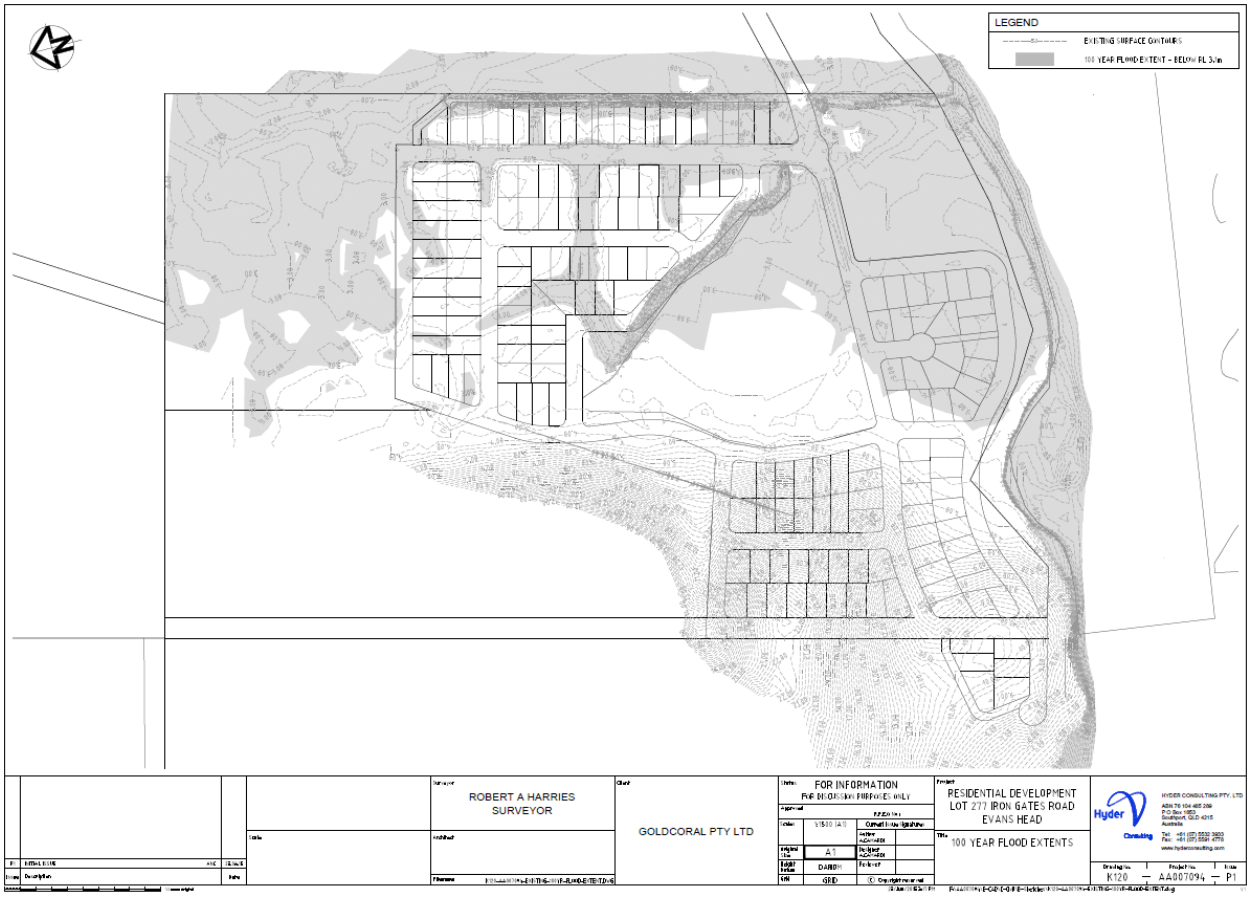


Figure 2 Proposed Iron Gates development site (recent lot layout provided by Hyder)

RFI Item 12 – Flood Planning Levels

Richmond Valley Council's policy for flood planning levels (FPL) specifies that the minimum habitable floor level is determined based on the 100 year ARI flood level, inclusive of climate change allowance, plus 0.5m for freeboard. Based on this, the FPL for the site is 3.6m AHD.

BMT WBM understands that habitable floor levels will be set to a minimum level of 3.6m AHD.

RFI Item 13 – Flood Impacts

Following correspondence with Planit Consulting, it is understood that Richmond Valley Council require flood impacts to be assessed for the 100 year ARI event only. Topographic survey using LiDAR survey acquired by the NSW Department of Land and Property Information in 2010, and site survey provided by Hyder (refer Figure 2), indicates that most of the site is above the 100 year ARI peak flood level of 2.5m AHD. The only parts of the site that may be below the 100 year ARI flood level are inverts of the existing drains, which are expected to be remodelled during construction.

Filling on the site is, therefore, not expected to affect peak flood levels along the Evans River.

RFI Item 14 – Flood Evacuation

The proposal for flood evacuation is via a fire trail leading from the western end of the proposed development up onto the hill ridge at Iron Gates. Refer to attached plan and longitudinal sections of the fire trail.

Based on modelling presented in the *Evans River Flood Study* (BMT WBM, 2014), the fire trail will provide flood free evacuation access from the development site to Blue Pool Road and Evans Head Road during events up to the 500 year ARI event.

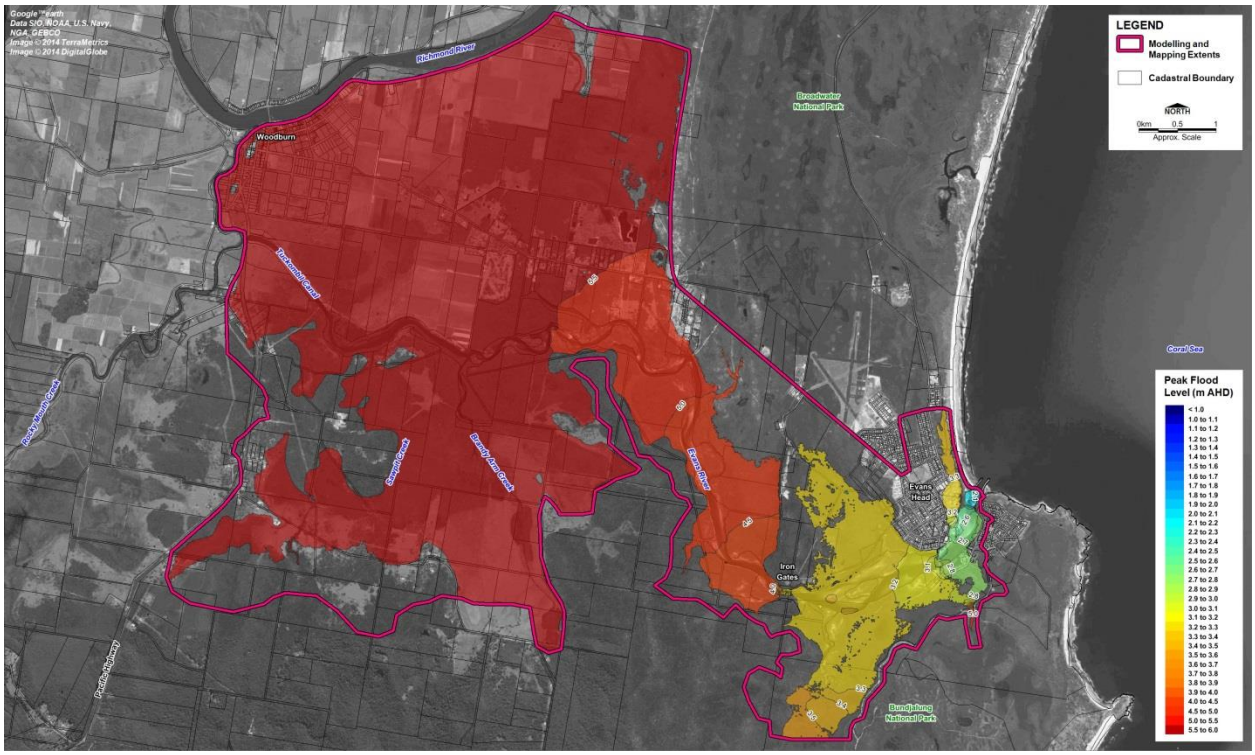


Figure 3 500 year ARI flood levels (source Evans River Flood Study, 2014)

The PMF flood levels were not determined in the *Evans River Flood Study* due to uncertainties associated with flows from the Richmond River and scour of the coastal dune system. Presented in the *Evans River Flood Study* is a map showing the area of land which is potentially liable to flooding during a PMF event. Refer to Figure 4. The mapping presents a highly conservative estimate of flood liable land. With reference to the proposed Iron Gates development, it clear that there is immediate access to PMF flood free land via the fire trail. It is, however, expected that Blue Pool Road would be inundated in a PMF event, thus restricting access to any evacuation shelter.

The following aspects are favourable to for flood evacuation:

- Flood free access to PMF flood free land;
- Continual rise in access road; and
- Long lead time and slow rising floodwaters.

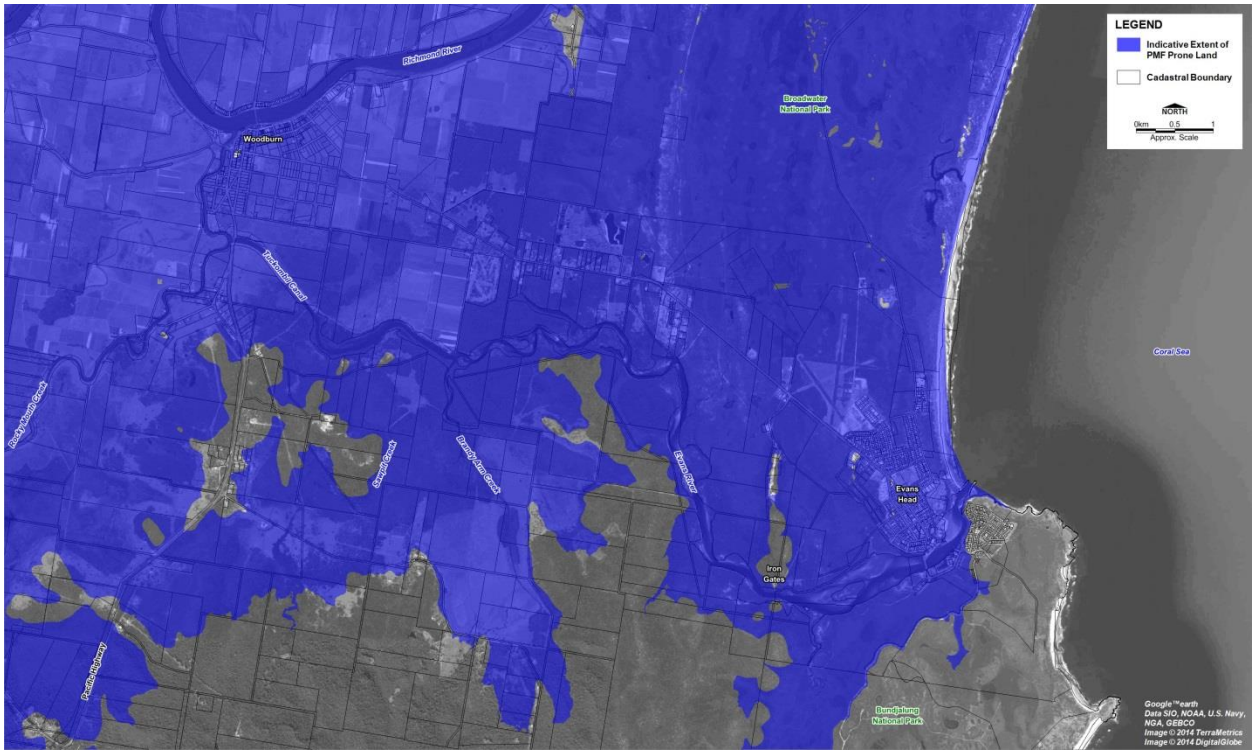


Figure 4 Land liable to flooding during a PMF event (source Evans River Flood Study, 2014)

The following aspects are not favourable for flood evacuation:

- No access to PMF flood free evacuation shelter; and
- Potential for residents to attempt to evacuate directly to Evans Head via Iron Gates Road.

In summary, the site is considered a low risk in terms of flood evacuation. BMT WBM recommends the following:

- the access from the eastern to the western development area does not present an isolation hazard to the eastern development area; and
- an evacuation management plan is prepared for the development. The evacuation management plan shall consider the following:
  - Ongoing community awareness of evacuation routes and procedures;
  - Definition of roles and responsibilities for emergency response stakeholders;
  - Communication of the Plan to the SES and Council; and
  - Maintenance program for the fire trail access.

Concluding Remarks

Information has been presented in this letter demonstrating compliance with Items 12, 13 and 14 of the Request for Information issued by OEH. Further recommendations have been provided relating the flood evacuation management and achieving best management practice.

Should you wish to discuss the contents of this letter or require any additional information, please call the undersigned on 07 3831 6744.

BMT WBM Pty Ltd

Ben Caddis

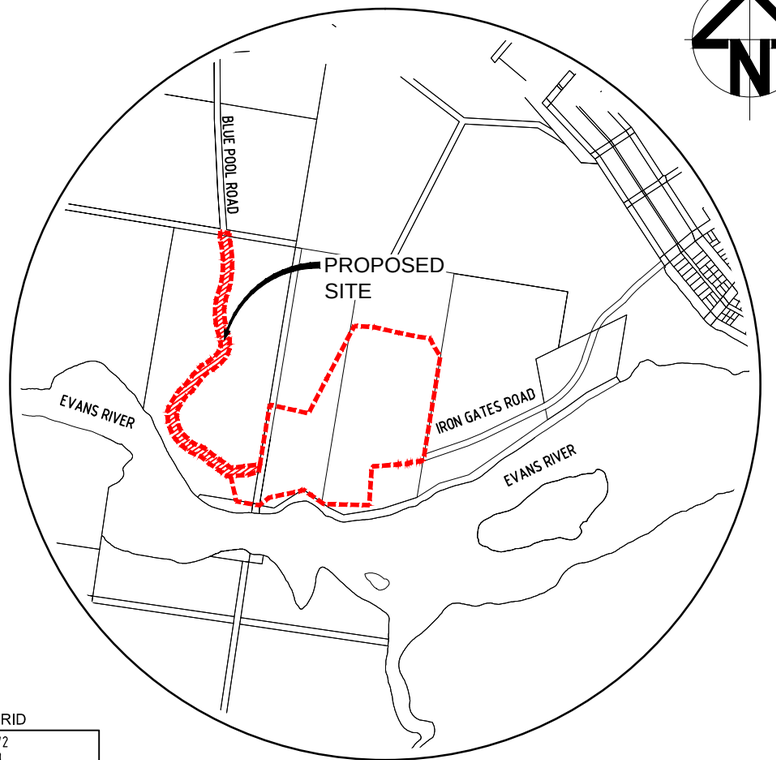
Associate
Senior Flood Engineer

LOT 277 IRON GATES ROAD,
EVANS HEAD
FIRE TRAIL (PROPERTY ACCESS ROAD)

CIVIL ENGINEERING CONCEPT
FOR : GOLDCORAL PTY LTD

DRAWING SCHEDULE

DWG. NO.	DESCRIPTION
C300 -AA007094	DRAWING SCHEDULE & LOCALITY PLAN
C301 -AA007094	FIRE TRAIL ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 1 OF 4
C302 -AA007094	FIRE TRAIL ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 2 OF 4
C303 -AA007094	FIRE TRAIL ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 3 OF 4
C304 -AA007094	FIRE TRAIL ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 4 OF 4
C305 -AA007094	FIRE TRAIL LONGITUDINAL SECTION - SHEET 1 OF 2
C306 -AA007094	FIRE TRAIL LONGITUDINAL SECTION - SHEET 2 OF 2



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GRID to GDA94

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Architect:

Filename: C300-AA007094-GCD-00-DWGSCH.DWG

Client: GOLDCORAL PTY LTD

Status: PRELIMINARY
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Approved:

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		Author B.DAVEY	
Original Size	A1	Designer B.FINSELBACH	
Height Datum	AHD	Reviewer J.L.ROUX	
Grid	GRID	© Copyright reserved	

Project: LOT 277 IRON GATES ROAD EVANS HEAD FIRE TRAIL (PROPERTY ACCESS ROAD)

Title: DRAWING SCHEDULE & LOCALITY PLAN

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Drawing No.	Project No.	Issue
C300	AA007094	01

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TC	128.214	539921.937	6778811.017	6.876	266°47'32.57"		266°47'32.57"	250
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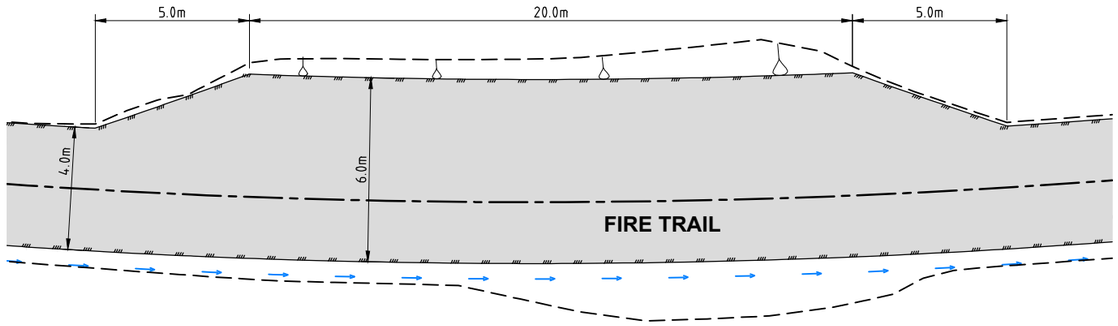
CC	226.181	539900.052	6778715.923	7.686	259°33'55.10"	-100	259°33'55.10"	-200
CT	297.891	539899.849	6778644.597	7.465	280°06'31.16"	-200	280°06'31.16"	

LEGEND

- EXISTING SURFACE CONTOURS
- TOP / TOE OF BATTER
- PROPOSED CULVERT CROSSING (SWD)
- PROPOSED SWALE DRAIN
- PROPOSED EDGE OF BITUMEN
- PROPOSED GRAVEL PAVEMENT



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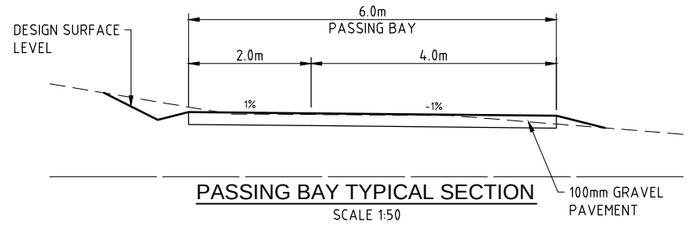

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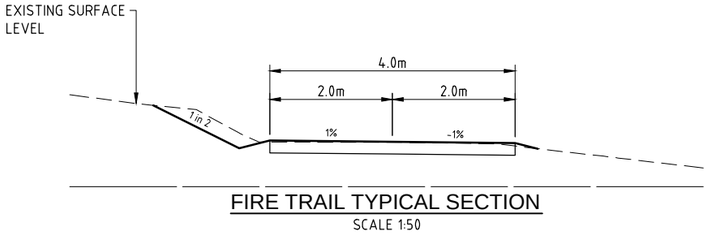

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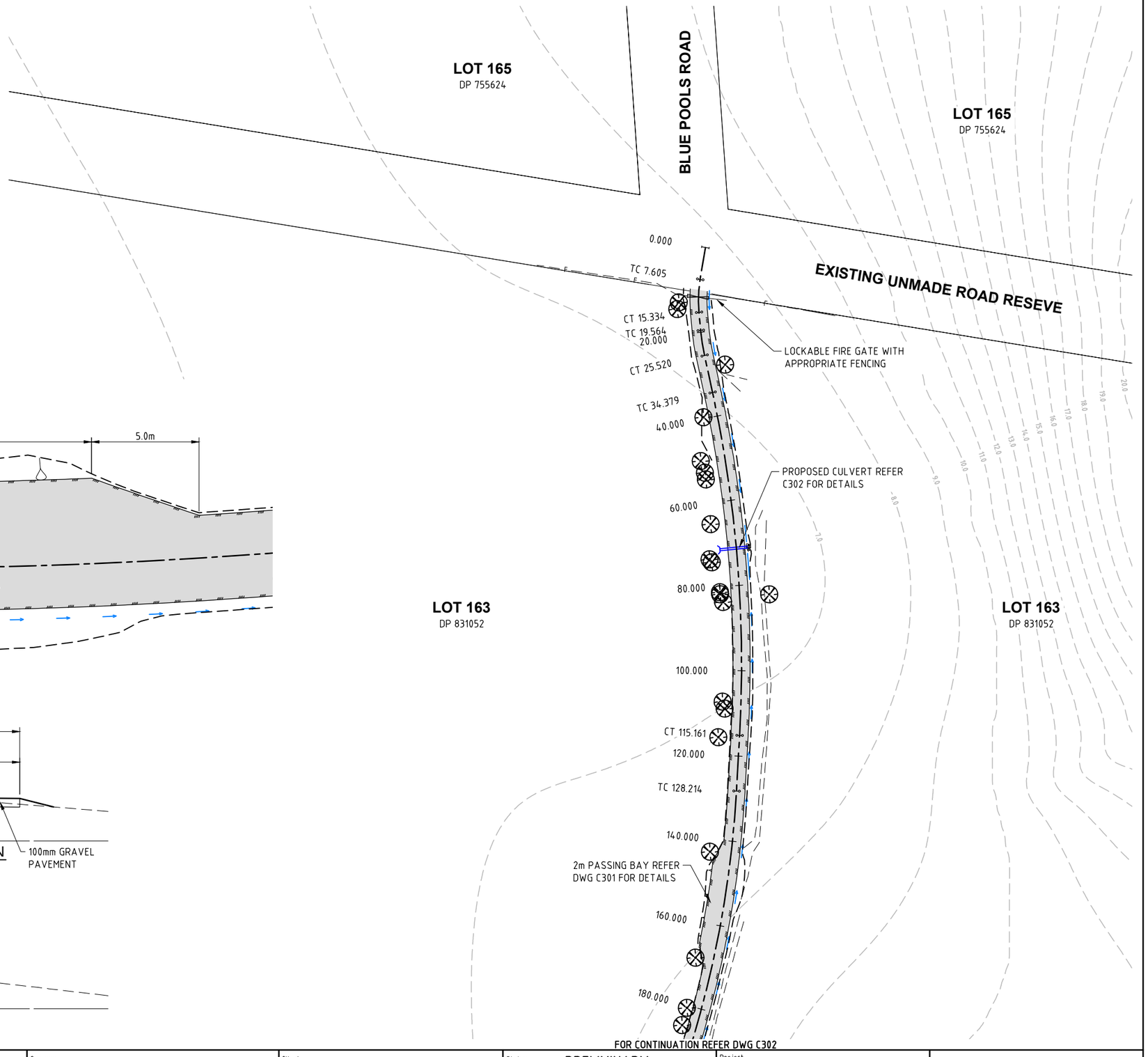

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Architect:

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Client: GOLDCORAL PTY LTD

Status: PRELIMINARY — NOT TO BE USED FOR CONSTRUCTION

Approved:

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Height Datum	AHD	Designer B.FINSELBACH	
Grid	GRID	Reviewer J.L.ROUX	

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Project: LOT 277 IRON GATES ROAD EVANS HEAD FIRE TRAIL (PROPERTY ACCESS ROAD)

Title: FIRE TRAIL ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 1 OF 4

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Drawing No.	Project No.	Issue
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CC	226.181	539900.052	6778715.923	7.686	259°33'55.10"	-100	259°33'55.10"	-200
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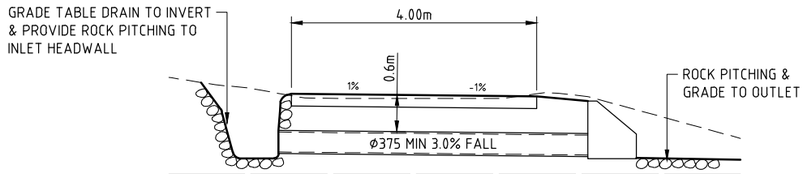

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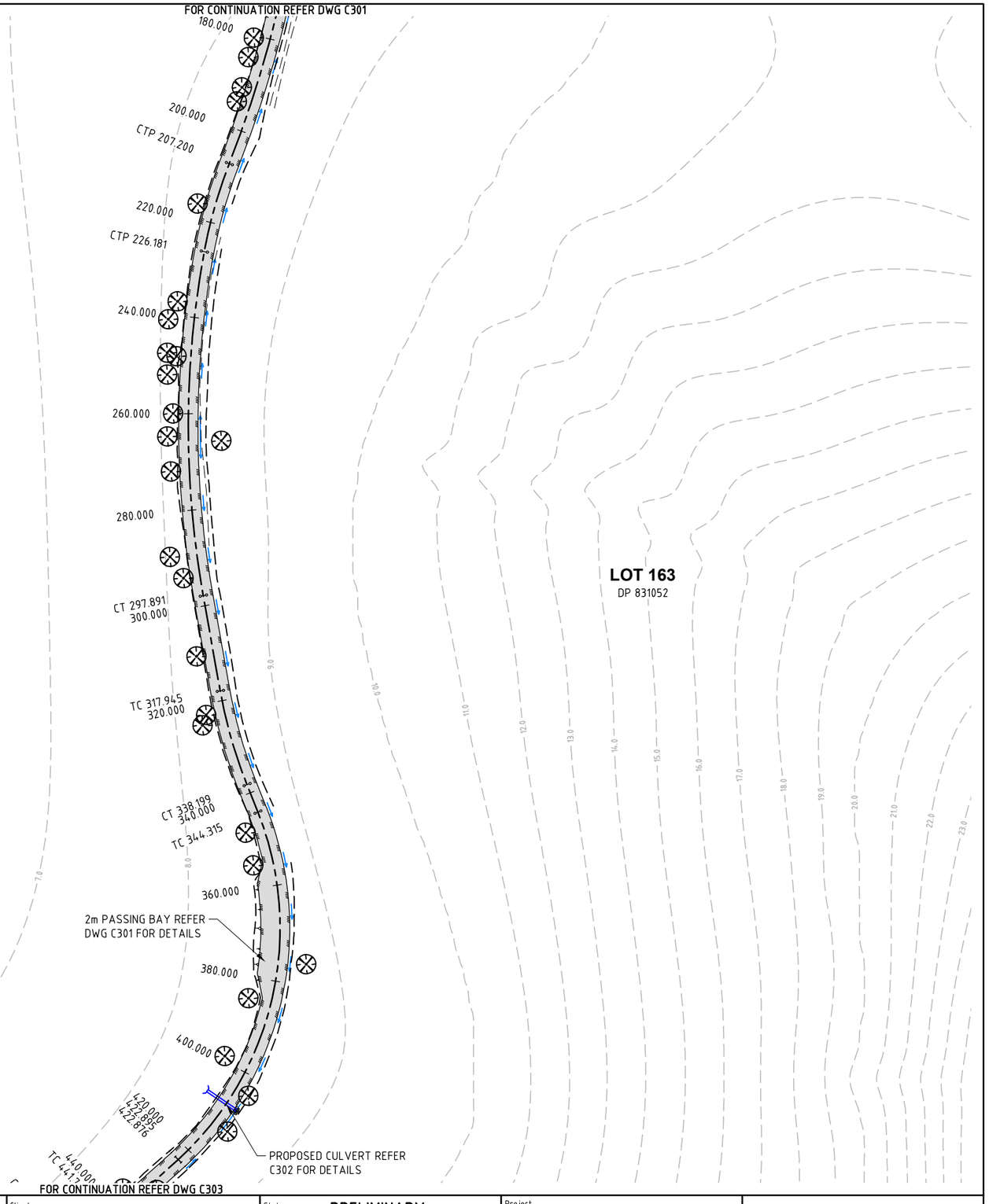

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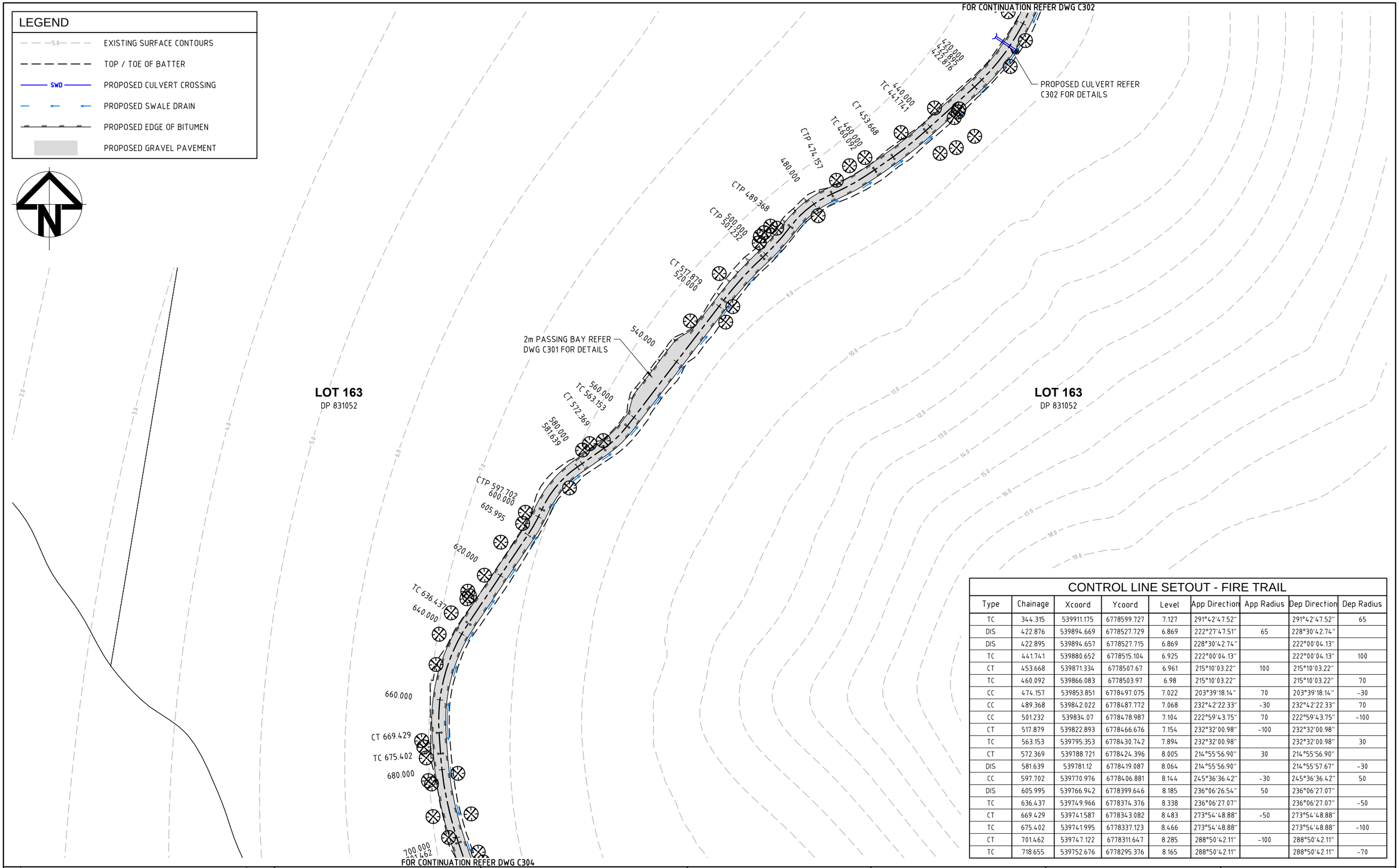

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DIS	422.895	539894.657	6778527.715	6.869	228°30'42.74"		222°00'04.13"	
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CT	453.668	539871.334	6778507.67	6.961	215°10'03.22"	100	215°10'03.22"	
TC	460.092	539866.083	6778503.97	6.98	215°10'03.22"		215°10'03.22"	70
CC	474.157	539853.851	6778497.075	7.022	203°39'18.14"	70	203°39'18.14"	-30
CC	489.368	539842.022	6778487.772	7.068	232°42'22.33"	-30	232°42'22.33"	70
CC	501.232	539834.07	6778478.987	7.104	222°59'43.75"	70	222°59'43.75"	-100
CT	517.879	539822.893	6778466.676	7.154	232°32'00.98"	-100	232°32'00.98"	
TC	563.153	539795.353	6778430.742	7.894	232°32'00.98"		232°32'00.98"	30
CT	572.369	539788.721	6778424.396	8.005	214°55'56.90"	30	214°55'56.90"	
DIS	581.639	539781.12	6778419.087	8.064	214°55'56.90"		214°55'57.67"	-30
CC	597.702	539770.976	6778406.881	8.144	245°36'36.42"	-30	245°36'36.42"	50
DIS	605.995	539766.942	6778399.646	8.185	236°06'26.54"	50	236°06'27.07"	
TC	636.437	539749.966	6778374.376	8.338	236°06'27.07"		236°06'27.07"	-50
CT	669.429	539741.587	6778343.082	8.483	273°54'48.88"	-50	273°54'48.88"	
TC	675.402	539741.995	6778337.123	8.466	273°54'48.88"		273°54'48.88"	-100
CT	701.462	539747.122	6778311.647	8.285	288°50'42.11"	-100	288°50'42.11"	
TC	718.655	539752.676	6778295.376	8.165	288°50'42.11"		288°50'42.11"	-70

Issue	Description	Date
01	ORIGINAL ISSUE BD	13.03.15

100mm on Original

Scale: 1 : 500 (0 5 10 20 30 40 50m)

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C301-AA007094-GCD-00-RDWKS LAYOUT.DWG

Client: GOLDCORAL PTY LTD

Status: PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Approved:

Scales	1:500	Current Issue Signatures	
Original Size	A1	Author B.DAVEY	
Height Datum	AHD	Designer B.FINSELBACH	
Grid	GRID	Reviewer J.L.ROUX	
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Project: LOT 277 IRON GATES ROAD
EVANS HEAD
FIRE TRAIL
(PROPERTY ACCESS ROAD)

Title: FIRE TRAIL ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 3 OF 4

HYDER CONSULTING PTY. LTD
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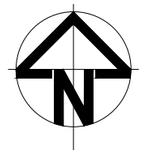
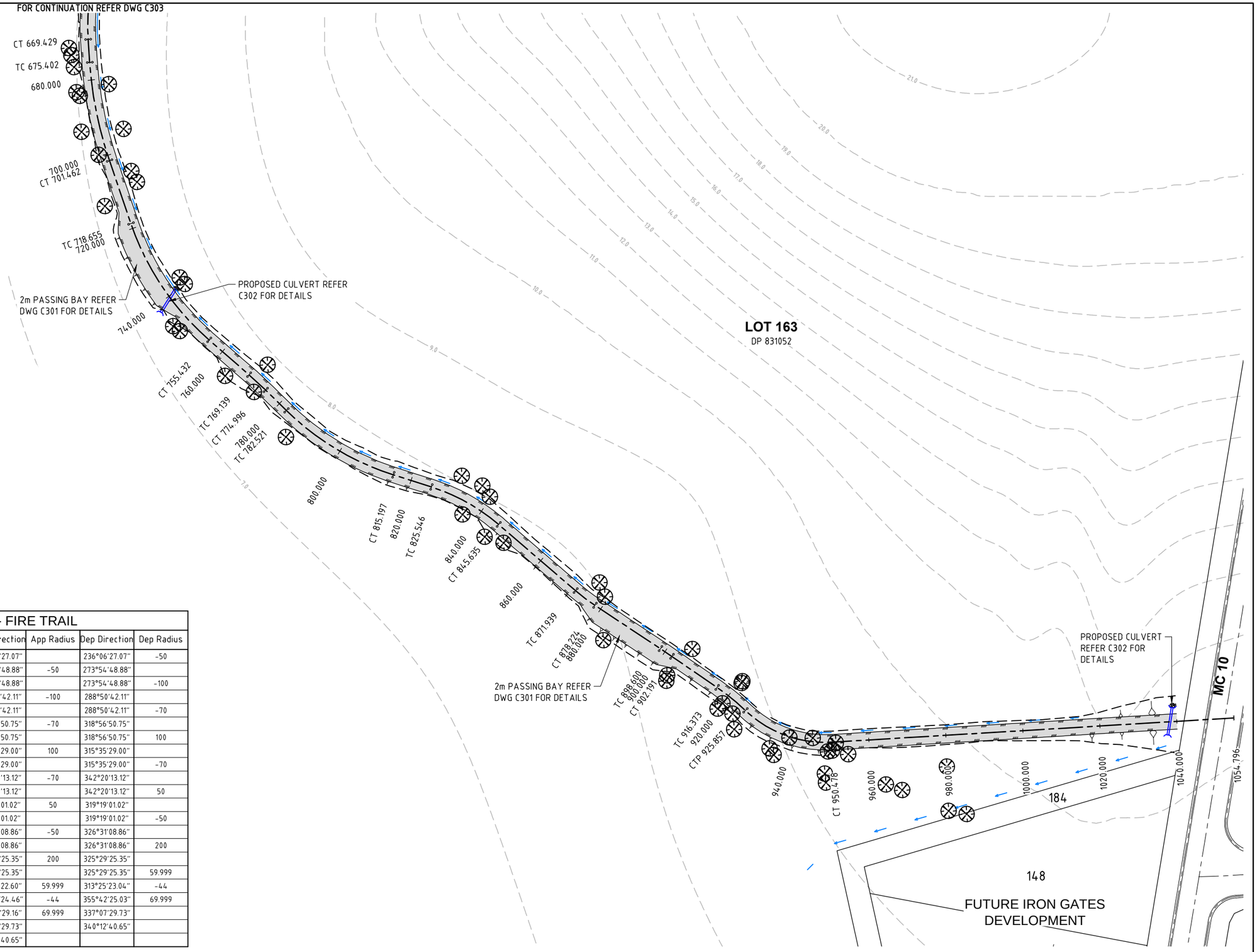
Drawing No.	Project No.	Issue
C303	AA007094	01

25/Mar/2015 4:22 PM F:\AA007094\E-CAD\C-Civil\D-Final\C301-AA007094-GCD-00-RDWKS LAYOUT.dwg V1

LEGEND

- EXISTING SURFACE CONTOURS
- TOP / TOE OF BATTER
- PROPOSED CULVERT CROSSING (SWD)
- PROPOSED SWALE DRAIN
- PROPOSED EDGE OF BITUMEN
- PROPOSED GRAVEL PAVEMENT





CONTROL LINE SETOUT - FIRE TRAIL

Type	Chainage	Xcoord	Ycoord	Level	App Direction	App Radius	Dep Direction	Dep Radius
TC	636.437	539749.966	6778374.376	8.338	236°06'27.07"		236°06'27.07"	-50
CT	669.429	539741.587	6778343.082	8.483	273°54'48.88"	-50	273°54'48.88"	
TC	675.402	539741.995	6778337.123	8.466	273°54'48.88"		273°54'48.88"	-100
CT	701.462	539747.122	6778311.647	8.285	288°50'42.11"	-100	288°50'42.11"	
TC	718.655	539752.676	6778295.376	8.165	288°50'42.11"		288°50'42.11"	-70
CT	755.432	539772.951	6778265.199	8.143	318°56'50.75"	-70	318°56'50.75"	
TC	769.139	539783.287	6778256.197	8.211	318°56'50.75"		318°56'50.75"	100
CT	774.996	539787.589	6778252.223	8.24	315°35'29.00"	100	315°35'29.00"	
TC	782.521	539792.965	6778246.957	8.278	315°35'29.00"		315°35'29.00"	-70
CT	815.197	539820.71	6778230.263	8.632	342°20'13.12"	-70	342°20'13.12"	
TC	825.546	539830.571	6778227.123	8.994	342°20'13.12"		342°20'13.12"	50
CT	845.635	539847.993	6778217.396	9.428	319°19'01.02"	50	319°19'01.02"	
TC	871.939	539867.941	6778200.249	9.404	319°19'01.02"		319°19'01.02"	-50
CT	878.224	539872.952	6778196.462	9.385	326°31'08.86"	-50	326°31'08.86"	
TC	898.6	539889.946	6778185.222	9.324	326°31'08.86"		326°31'08.86"	200
CT	902.191	539892.923	6778183.214	9.313	325°29'25.35"	200	325°29'25.35"	
TC	916.373	539904.61	6778175.179	9.271	325°29'25.35"		325°29'25.35"	59.999
CC	929.01	539914.195	6778166.98	9.233	313°25'22.60"	59.999	313°25'23.04"	-44
CC	961.481	539942.858	6778153.349	9.615	355°42'24.46"	-44	355°42'25.03"	69.999
CT	984.183	539964.829	6778148.04	10.079	337°07'29.16"	69.999	337°07'29.73"	
DIS	995.205	539974.983	6778143.756	10.19	337°07'29.73"		340°12'40.65"	
E	1004.095	539983.349	6778140.746	10.244	340°12'40.65"			

Issue	Description	Date
01	ORIGINAL ISSUE BD	13.03.15

180mm on Original

Scale: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C301-AA007094-GCD-00-RDWKS LAYOUT.DWG

Client: GOLDCORAL PTY LTD

Status: PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Approved:

Scales: 1:500

Original Size: A1

Height Datum: AHD

Grid: GRID

Current Issue Signatures

Author B.DAVEY

Designer B.FINSELBACH

Reviewer J.L.ROUX

Project: LOT 277 IRON GATES ROAD EVANS HEAD FIRE TRAIL (PROPERTY ACCESS ROAD)

Title: FIRE TRAIL ROADWORKS & DRAINAGE LAYOUT PLAN - SHEET 4 OF 4

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Drawing No.	Project No.	Issue
C304	AA007094	01

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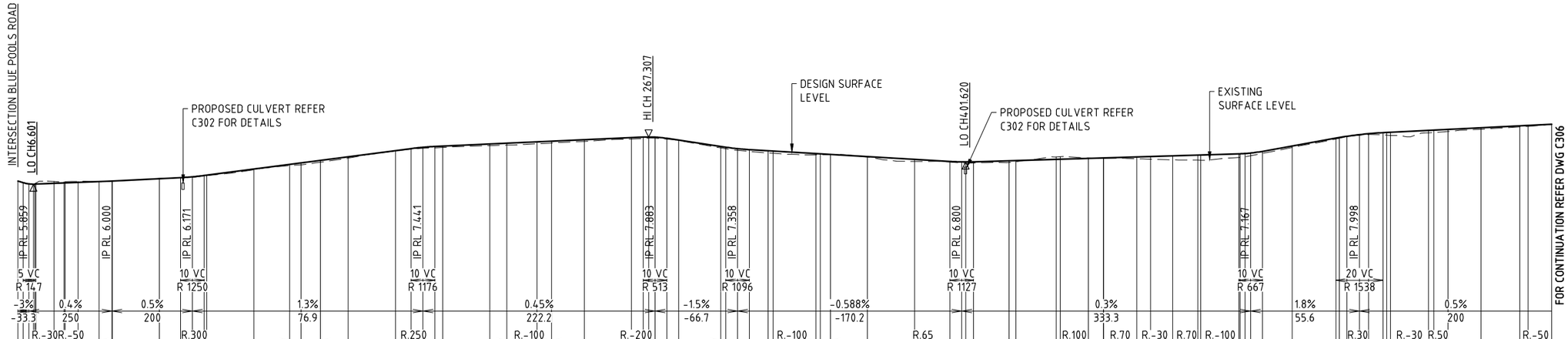

DESIGN LEVELS ON ROAD CENTRELINE	6.000	5.934	5.881	5.868	5.869	5.871	5.902	5.919	5.921	5.943	5.978	6.000	6.001	6.101	6.146
EXISTING SURFACE ON ROAD CENTRELINE						5.918	5.982	5.972	5.972	5.984	5.968	6.000	6.000	6.106	6.132
CUT / FILL DEPTH						-0.047	-0.080	-0.053	-0.052	-0.042	0.010	0.000	0.001	-0.005	0.013
PEGGED CHAINAGE	0.000	2.189	4.689	6.601	7.189	7.605	15.334	19.564	20.000	25.520	34.379	39.855	40.000	60.000	68.966

DESIGN LEVELS ON ROAD CENTRELINE	6.181	6.236	6.249	6.509	6.706	6.769	6.876	7.029	7.289	7.376	7.430	7.463	7.478	7.568	7.601
EXISTING SURFACE ON ROAD CENTRELINE	6.159	6.214	6.225	6.478	6.653	6.683	6.798	6.970	7.269	7.345	7.383	7.404	7.422	7.501	7.520
CUT / FILL DEPTH	0.021	0.021	0.024	0.031	0.053	0.086	0.077	0.059	0.020	0.030	0.047	0.059	0.056	0.067	0.081
PEGGED CHAINAGE	73.966	78.966	80.000	100.000	115.161	120.000	128.214	140.000	160.000	166.671	171.671	176.671	180.000	200.000	207.200

DESIGN LEVELS ON ROAD CENTRELINE	7.658	7.686	7.748	7.838	7.861	7.866	7.859	7.808	7.733	7.465	7.433	7.370	7.329	7.282	7.270
EXISTING SURFACE ON ROAD CENTRELINE	7.575	7.611	7.678	7.776	7.803	7.816	7.812	7.774	7.724	7.401	7.365	7.298	7.256	7.191	7.175
CUT / FILL DEPTH	0.083	0.075	0.070	0.062	0.058	0.050	0.047	0.034	0.010	0.064	0.068	0.071	0.073	0.091	0.095
PEGGED CHAINAGE	220.000	226.181	240.000	260.000	265.000	267.307	270.000	275.000	280.000	297.891	300.000	305.000	310.000	317.945	320.000

DESIGN LEVELS ON ROAD CENTRELINE	7.163	7.153	7.127	7.035	6.918	6.829	6.811	6.810	6.815	6.860	6.869	6.920	6.925	6.961	6.980
EXISTING SURFACE ON ROAD CENTRELINE	7.111	7.114	7.120	7.016	6.827	6.803	6.762	6.743	6.765	6.790	6.818	7.021	7.031	6.981	6.969
CUT / FILL DEPTH	0.052	0.039	0.007	0.019	0.090	0.027	0.050	0.067	0.050	0.070	0.051	-0.101	-0.106	-0.020	0.011
PEGGED CHAINAGE	338.199	340.000	344.315	360.000	380.000	395.000	400.000	401.620	405.000	420.000	422.876	440.000	441.741	453.668	460.000

DESIGN LEVELS ON ROAD CENTRELINE	6.980	7.022	7.040	7.068	7.100	7.104	7.152	7.154	7.165	7.186	7.257	7.485	7.818	7.844	7.894
EXISTING SURFACE ON ROAD CENTRELINE	6.969	6.945	6.924	6.896	6.886	6.884	6.993	6.996	7.028	7.073	7.170	7.425	7.782	7.812	7.876
CUT / FILL DEPTH	0.011	0.078	0.116	0.172	0.214	0.219	0.159	0.158	0.138	0.112	0.087	0.060	0.036	0.032	0.019
PEGGED CHAINAGE	460.092	474.157	480.000	489.368	500.000	501.232	517.361	517.879	520.000	522.361	527.361	540.000	558.522	560.000	563.153

DESIGN LEVELS ON ROAD CENTRELINE	7.965	8.005	8.048	8.055	8.064	8.144	8.155	8.185	8.255	8.338	8.355	8.405
EXISTING SURFACE ON ROAD CENTRELINE	7.937	7.965	7.955	7.944	7.931	8.043	8.057	8.098	8.192	8.291	8.314	8.400
CUT / FILL DEPTH	0.029	0.040	0.093	0.112	0.133	0.101	0.098	0.088	0.063	0.046	0.041	0.005
PEGGED CHAINAGE	568.522	572.369	578.522	580.000	581.639	597.702	600.000	605.995	620.000	636.437	640.000	650.000

FIRE TRAIL LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:100

Issue	Description		Date
01	ORIGINAL ISSUE	BD	13.03.15

Scale
HORZ 0 10 20 40 60 80 100m
1:1000
VERT 0 1 2 4 6 8 10m
1:100

Surveyor
ROBERT A HARRIES
SURVEYOR

Architect

Filename: C305-AA007094-GCD-00-ROAD LS.DWG

Client
GOLDCORAL PTY LTD

Status
PRELIMINARY
NOT TO BE USED FOR CONSTRUCTION

Approved

Scales 1:100 (V)
1:1000 (H)

Current Issue Signatures
Author B.DAVEY
Designer B.FINSELBACH
Reviewer J.L.ROUX

Original Size A1
Height Datum AHD
Grid GRID

Project
LOT 277 IRON GATES ROAD
EVANS HEAD
FIRE TRAIL
(PROPERTY ACCESS ROAD)

Title
FIRE TRAIL LONGITUDINAL
SECTION - SHEET 1 OF 2

HYDER CONSULTING PTY. LTD
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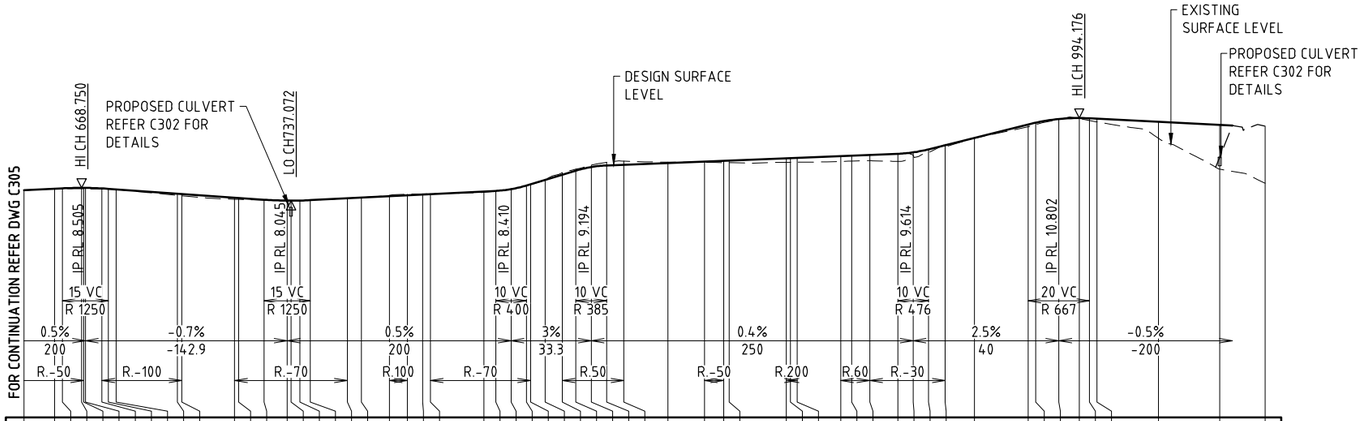
Drawing No.	Project No.	Issue
C305	AA007094	01



PEGGED CHAINAGE	DESIGN LEVELS ON ROAD CENTRELINE	EXISTING SURFACE ON ROAD CENTRELINE	CUT / FILL DEPTH
650.000	8.405	8.400	0.005
660.000	8.455	8.446	0.010
662.500	8.468	8.452	0.016
668.750	8.484	8.456	0.027
669.429	8.483	8.455	0.028
670.000	8.483	8.455	0.028
675.402	8.466	8.446	0.020
677.500	8.453	8.442	0.011
680.000	8.435	8.435	0.000
700.000	8.295	8.238	0.057
701.462	8.285	8.223	0.062
718.655	8.165	8.112	0.053
720.000	8.155	8.108	0.047
728.322	8.097	8.087	0.010
735.822	8.067	8.075	-0.008
737.072	8.066	8.072	-0.006
740.000	8.070	8.073	-0.003
743.322	8.082	8.081	0.001
755.432	8.143	8.141	0.002
760.000	8.166	8.165	0.001
769.139	8.211	8.242	-0.031
774.996	8.240	8.274	-0.034
780.000	8.266	8.285	-0.019
782.521	8.278	8.290	-0.012
800.000	8.366	8.340	0.025
803.850	8.385	8.369	0.016
808.850	8.441	8.449	-0.008
813.850	8.560	8.557	0.002
815.197	8.600	8.593	0.008
820.000	8.744	8.759	-0.015
825.546	8.911	8.982	-0.071
830.000	9.044	9.095	-0.051
835.000	9.162	9.222	-0.060
840.000	9.214	9.317	-0.103
845.635	9.237	9.357	-0.121
860.000	9.294	9.323	-0.029
871.939	9.342	9.313	0.029
878.224	9.367	9.306	0.061
880.000	9.374	9.305	0.070
898.600	9.449	9.316	0.133
900.000	9.454	9.317	0.137
902.191	9.463	9.320	0.143
916.373	9.520	9.348	0.172
920.000	9.534	9.359	0.175
925.857	9.558	9.369	0.189
935.000	9.594	9.347	0.247
940.000	9.641	9.541	0.099
945.000	9.739	9.633	0.106
950.478	9.876	9.907	-0.030
960.000	10.114	10.103	0.011
977.510	10.552	10.473	0.079
980.000	10.610	10.547	0.063
987.510	10.727	10.713	0.014
994.176	10.760	10.741	0.020
997.510	10.752	10.679	0.073
1000.000	10.740	10.635	0.105
1020.000	10.640	10.101	0.539
1040.000	10.540	9.096	1.443
1054.796		8.636	

FIRE TRAIL LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:100

Issue	Description		Date
01	ORIGINAL ISSUE	BD	13.03.15

Scale
HORZ 0 10 20 40 60 80 100m
1:1000
VERT 0 1 2 4 6 8 10m
1:100

100mm on Original

Surveyor
ROBERT A HARRIES
SURVEYOR

Architect

Filename: C305-AA007094-GCD-00-ROAD LS.DWG

Client
GOLDCORAL PTY LTD

Status **PRELIMINARY**
NOT TO BE USED FOR CONSTRUCTION

Approved

Scales 1:100 (V)
1:1000 (H)

Current Issue Signatures
Author B.DAVEY
Designer B.FINSELBACH
Reviewer J.L.ROUX

Original Size A1
Height Datum AHD
Grid GRID

Project
LOT 277 IRON GATES ROAD
EVANS HEAD
FIRE TRAIL
(PROPERTY ACCESS ROAD)

Title
FIRE TRAIL LONGITUDINAL
SECTION - SHEET 2 OF 2

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Drawing No. C306 — Project No. AA007094 — Issue 01

25/Mar/2015 4:22 PM F:\AA007094\E-CAD\C-Civil\D-Final\C305-AA007094-GCD-00-ROAD LS.dwg V1

APPENDIX D

GEOTECHNICAL INVESTIGATION RESULTS

ABN 81154555478
ACN 154555478

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admin@geotechinvestigations.com

Our Ref: JW:jw: GI 2039-a
2 June 2015

Gold Coral Pty Ltd
PO Box 3441
Australia Fair Southport QLD 4215

REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P1

Location	N: 6778265 E: 540560	
Test Date	25/05/2015	
Soil Description	0 m (SM) Silty SAND: Fine sand, moist, grey brown 0.5 m (SP) SAND: Fine sand, dry, pale grey 2.2 m (SP) SAND: Fine sand, wet, pale grey T.D. 3 m	
Water Table (estimated based on drilling)	2.2 m BSL	
Field Test Results	K_{sat} = 13.7 m/day = 572 mm/hr	K = 1.6 x 10^{-4} m/s
Test Hole Depth	1.1 m BSL	
Indicative Drainage Class	'rapidly drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

James Walle *RPEQ (15701), RPEng (Civil), B.Eng (Civil)*
Senior Geotechnical Engineer

ABN 81154555478
ACN 154555478

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Our Ref: JW:jw: GI 2039-b
2 June 2015

Gold Coral Pty Ltd
PO Box 3441
Australia Fair Southport QLD 4215

REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P2

Location	N: 6778474 E: 540581	
Test Date	25/05/2015	
Soil Description	0 m (SM) Silty SAND: Fine sand, moist, grey brown 0.5 m (SP) SAND: Fine sand, moist, pale grey 1.4 m (SP) SAND: Trace silt, fine sand, moist, dark brown 1.6 m (SP) SAND: Trace silt, fine sand, moist, dark grey T.D. 3 m	
Water Table (estimated based on drilling)	Not identified	
Field Test Results	K_{sat} = 89.5 m/day = 3728 mm/hr	K = 1 x 10^{-3} m/s
Test Hole Depth	0.6 m BSL	
Indicative Drainage Class	'rapidly drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

James Walle *RPEQ (15701), RPEng (Civil), B.Eng (Civil)*
Senior Geotechnical Engineer

ABN 81154555478
ACN 154555478

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Our Ref: JW:jw: GI 2039-c
2 June 2015

Gold Coral Pty Ltd
PO Box 3441
Australia Fair Southport QLD 4215

REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P3

Location	N: 6778597 E: 540503	
Test Date	25/05/2015	
Soil Description	0 m (SP) SAND: With silt, fine sand, moist, grey 0.3 m (SM) Silty SAND: Fine sand, moist, dark brown 0.6 m (SP) SAND: Trace silt, fine sand, wet, pale grey 1.4 m (SP) SAND: Trace silt, fine sand, wet, dark brown T.D. 3 m	
Water Table (estimated based on drilling)	0.6 m BSL	
Field Test Results	K_{sat} = 16.8 m/day = 698 mm/hr	K = 1.9 x 10^{-4} m/s
Test Hole Depth	0.17 m BSL	
Indicative Drainage Class	'rapidly drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

James Walle *RPEQ (15701), RPEng (Civil), B.Eng (Civil)*
Senior Geotechnical Engineer

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Our Ref: JW:jw: GI 2039-d
2 June 2015

Gold Coral Pty Ltd
PO Box 3441
Australia Fair Southport QLD 4215

REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P4

Location	N: 6778425 E: 540493	
Test Date	25/05/2015	
Soil Description	0 m (SM) Silty SAND: Fine to medium sand, moist, dark brown 0.7 m (SP) SAND: Trace silt, fine sand, moist, pale grey 1.7 m (SP) SAND: Trace silt, fine sand, wet, pale grey 2.0 m (SP) SAND: Trace silt, fine sand, wet, grey brown T.D. 3 m	
Water Table (estimated based on drilling)	1.7 m BSL	
Field Test Results	K_{sat} = 27.0 m/day = 1128 mm/hr	K = 3.1 x 10^{-4} m/s
Test Hole Depth	0.77 m BSL	
Indicative Drainage Class	'rapidly drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

James Walle *RPEQ (15701), RPEng (Civil), B.Eng (Civil)*
Senior Geotechnical Engineer

ABN 81154555478
ACN 154555478

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F 07 5523 3981
admin@geotechinvestigations.com

Our Ref: JW:jw: GI 2039-e
2 June 2015

Gold Coral Pty Ltd
PO Box 3441
Australia Fair Southport QLD 4215

REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P5

Location	N: 6778333 E: 540483	
Test Date	25/05/2015	
Soil Description	0 m (SM) Silty SAND: Fine sand, moist, dark brown 0.6 m (SP) SAND: Trace silt, fine sand, dry, pale grey 1.4 m (SP) SAND: Trace silt, fine sand, moist to wet, pale grey 2.4 m (SP) SAND: Trace silt, fine sand, wet, grey brown T.D. 3 m	
Water Table (estimated based on drilling)	1.5 m BSL	
Field Test Results	K_{sat} = 4.2 m/day = 176 mm/hr	K = 4.9 x 10^{-5} m/s
Test Hole Depth	1.1 m BSL	
Indicative Drainage Class	'rapidly drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

James Walle *RPEQ (15701), RPEng (Civil), B.Eng (Civil)*
Senior Geotechnical Engineer

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Our Ref: JW:jw: GI 2039-f
2 June 2015

Gold Coral Pty Ltd
PO Box 3441
Australia Fair Southport QLD 4215

REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P6

Location	N: 6778091 E: 540285	
Test Date	25/05/2015	
Soil Description	0 m (SM) Silty SAND: Fine sand, moist, dark grey 0.4 m (SP) SAND: Trace silt, fine sand, moist, pale grey 0.8 m (SM) Silty SAND: Fine sand, moist, dark orange brown 1.2 m (SM) Silty SAND: Fine sand, moist, grey brown mottled orange brown 2.7 m (SM) Silty SAND: Fine sand, wet, grey brown mottled orange brown T.D. 3 m	
Water Table	2.7 m BSL	
Field Test Results	K_{sat} = 2.2 m/day = 91 mm/hr	K = 2.5 x 10^{-5} m/s
Test Hole Depth	1.1 m BSL	
Indicative Drainage Class	'well drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

James Walle *RPEQ (15701), RPEng (Civil), B.Eng (Civil)*
Senior Geotechnical Engineer

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Our Ref: JW:jw: GI 2039-g
2 June 2015

Gold Coral Pty Ltd
PO Box 3441
Australia Fair Southport QLD 4215

REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P7

Location	N: 6778447 E: 540402	
Test Date	25/05/2015	
Soil Description	0 m (SP) SAND: With silt, fine to medium sand, moist, grey brown 0.2 m (SP) SAND: Trace silt, fine sand, moist, pale grey 0.7 m (SM) Silty SAND: Trace clay, fine sand, wet, orange brown 1.1 m (SP) SAND: Trace silt, fine sand, wet, dark brown T.D. 3 m	
Water Table (estimated based on drilling)	0.7 m BSL	
Field Test Results	K_{sat} = 7.2 m/day = 300 mm/hr	K = 8.3 x 10^{-5} m/s
Test Hole Depth	0.87 m BSL	
Indicative Drainage Class	'rapidly drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

James Walle *RPEQ (15701), RPEng (Civil), B.Eng (Civil)*
Senior Geotechnical Engineer

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Our Ref: JW:jw: GI 2039-h
2 June 2015

Gold Coral Pty Ltd
PO Box 3441
Australia Fair Southport QLD 4215

REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P8

Location	N: 6778560 E: 540397	
Test Date	25/05/2015	
Soil Description	0 m (SP) SAND: Trace silt, fine sand, moist, brown 0.4 m (SP) SAND: Trace silt, fine sand, moist, pale grey 1.2 m (SP) SAND: Trace silt, fine sand, wet, pale grey 1.4 m (SM) Silty SAND: Fine sand, wet, dark brown 1.9 m (SP) SAND: Trace silt, fine sand, wet, dark grey / brown T.D. 3 m	
Water Table (estimated based on drilling)	0.6 m BSL	
Field Test Results	K_{sat} = 2.6 m/day = 109 mm/hr	K = 3.0 x 10^{-5} m/s
Test Hole Depth	0.07 m BSL	
Indicative Drainage Class	'well drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

James Walle *RPEQ (15701), RPEng (Civil), B.Eng (Civil)*
Senior Geotechnical Engineer

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Our Ref: JW:jw: GI 2039-i
2 June 2015

Gold Coral Pty Ltd
PO Box 3441
Australia Fair Southport QLD 4215

REPORT ON IN-SITU PERMEABILITY TESTING
IRON GATES DRIVE, EVANS HEAD

Test ID: Test P9

Location	N: 6778502 E: 540329	
Test Date	25/05/2015	
Soil Description	0 m (SM) Silty SAND: Fine to medium sand, moist, dark grey 0.5 m (SP) SAND: Trace silt, fine sand, moist, pale grey 1.8 m (SM) Silty SAND: With clay, fine sand, wet, dark brown 2.0 m (SM) Silty SAND: Fine sand, wet, dark brown mottled orange brown 2.5 m (SP) SAND: Trace silt, fine sand, wet, dark brown T.D. 3 m	
Water Table (estimated based on drilling)	0.5 m BSL	
Field Test Results	K_{sat} = 18.6 m/day = 775 mm/hr	K = 2.2 x 10^{-4} m/s
Test Hole Depth	0.07 m BSL	
Indicative Drainage Class	'rapidly drained'	

Notes: T.D. – Terminate depth of borehole BSL – Below existing surface level
K_{sat} – Saturated hydraulic conductivity K – Permeability
Table 4.2A4 AS 1547 (On-site domestic wastewater management)

For and on behalf of
Geotech Investigations Pty Ltd

James Walle *RPEQ (15701), RPEng (Civil), B.Eng (Civil)*
Senior Geotechnical Engineer

PLAN OF SUBDIVISION

IRON GATES, EVANS HEAD

LOT	AREA
01	958.54m²
02	609.58m²
03	610.02m²
04	610.48m²
05	610.80m²
06	611.13m²
07	611.45m²
08	611.78m²
09	612.10m²
10	612.43m²
11	612.75m²
12	612.98m²
13	611.49m²
14	613.85m²
15	614.18m²
16	614.50m²
17	614.82m²
18	615.14m²
19	615.47m²
20	615.80m²
21	653.44m²
22	639.06m²
23	600.87m²
24	601.48m²
25	601.78m²
26	602.07m²
27	602.37m²
28	602.67m²
29	602.97m²
30	603.27m²
31	603.56m²
32	603.87m²
33	611.56m²
34	602.69m²
35	687.98m²
36	744.04m²
37	601.47m²
38	601.47m²
39	601.47m²
40	601.47m²
41	601.47m²
42	601.47m²
43	601.47m²
44	601.47m²
45	601.47m²
46	601.84m²
47	600.97m²
48	602.78m²
49	601.06m²
50	600.70m²
51	604.45m²
52	604.30m²
53	604.17m²
54	604.11m²
55	603.12m²
56	601.74m²
57	600.79m²
58	833.34m²
59	783.87m²
60	674.25m²
61	612.30m²
62	605.75m²
63	604.82m²
64	603.90m²
65	602.98m²
66	602.05m²
67	601.13m²
68	600.20m²
69	603.67m²
70	620.23m²
71	603.10m²
72	600.46m²
73	601.06m²

LOT	AREA
74	601.67m²
75	602.27m²
76	602.86m²
77	611.90m²
78	601.02m²
79	645.62m²
80	642.13m²
81	602.42m²
82	602.31m²
83	602.20m²
84	854.34m²
85	854.15m²
86	601.23m²
87	601.27m²
88	951.69m²
89	794.12m²
90	601.19m²
91	601.15m²
92	601.11m²
93	601.06m²
94	601.03m²
95	600.07m²
96	665.25m²
97	617.23m²
98	605.72m²
99	609.16m²
100	613.10m²
101	606.61m²
102	600.24m²
103	600.05m²
104	603.86m²
105	606.12m²
106	604.88m²
107	644.68m²
108	604.83m²
109	603.24m²
110	608.18m²
111	606.58m²
112	608.28m²
113	736.06m²
114	720.51m²
115	1029.27m²
116	602.49m²
117	609.57m²
118	607.83m²
119	651.61m²
120	603.93m²
121	603.27m²
122	604.77m²
123	613.74m²
124	602.29m²
125	628.60m²
126	603.18m²
127	690.16m²
128	601.05m²
129	606.82m²
130	632.34m²
131	609.67m²
132	606.00m²
133	601.02m²
134	600.03m²
135	600.92m²
136	600.85m²
137	600.91m²
138	639.85m²
139	655.96m²
140	795.02m²
141	897.95m²
142	603.25m²
143	636.28m²
144	722.96m²
145	620.19m²
146	623.04m²

LOT	AREA
147	623.04m²
148	623.04m²
149	623.04m²
150	623.04m²
151	623.04m²
152	701.77m²
153	703.42m²
154	611.15m²
155	611.15m²
156	611.15m²
157	611.15m²
158	611.15m²
159	611.29m²
160	720.75m²
161	753.34m²
162	633.95m²
163	602.77m²
164	707.28m²
165	649.98m²
166	661.66m²
167	686.92m²
168	640.98m²
169	621.28m²
170	845.54m²
171	829.97m²
172	600.73m²
173	600.73m²
174	601.88m²
175	600.94m²
176	618.69m²

LOT 276
DP 755624

LOT 277
DP 755624

180
69,051m²

179
98,043m²

183
31.07Ha

177
44,324m²

182
1023m²

178 (PART)
2558m²

178 (PART)
22,973m²

181
3407m²

LOT 544
DP 48550

LOT 547
DP 48550

ROAD RESERVE (20.115 WIDE)

ROAD RESERVE (VARIABLE WIDTH)

ROAD RESERVE (VARIABLE WIDTH)

ROAD RESERVE (VARIABLE WIDTH)

IRON GATES ROAD

EVANS RIVER

P1

P2

P3

P4

P5

P6

P7

P8

P9

P10 (TEST COULD NOT BE COMPLETED DUE TO PERCHED WATER TABLE)

GEOTECH INVESTIGATIONS PTY LTD - LEGEND

P1 - APPOXIMATE TEST LOCATIONS

LEGEND

SITE BOUNDARY
TOTAL AREA: 72.31Ha

PLANIT CONSULTING

PROJECT TITLE:
IRON GATES DEVELOPMENT, EVANS HEAD

DRAWING TITLE:
PLAN OF SUBDIVISION - OPTION 7

BASE PROVIDED BY:
N/A

CLIENT:
GOLD CORAL

NO	DATE	REVISION	BY
-	-	-	-

SCALE:
1/1500 @ A1

DESIGN:
PLANIT CONSULTING

DRAWN:
ZP

DATE:
03/2015

CHECKED:
AS

DRAWING NO:
IRONGATES_PLNOFSUB_01

NORTH POINT:

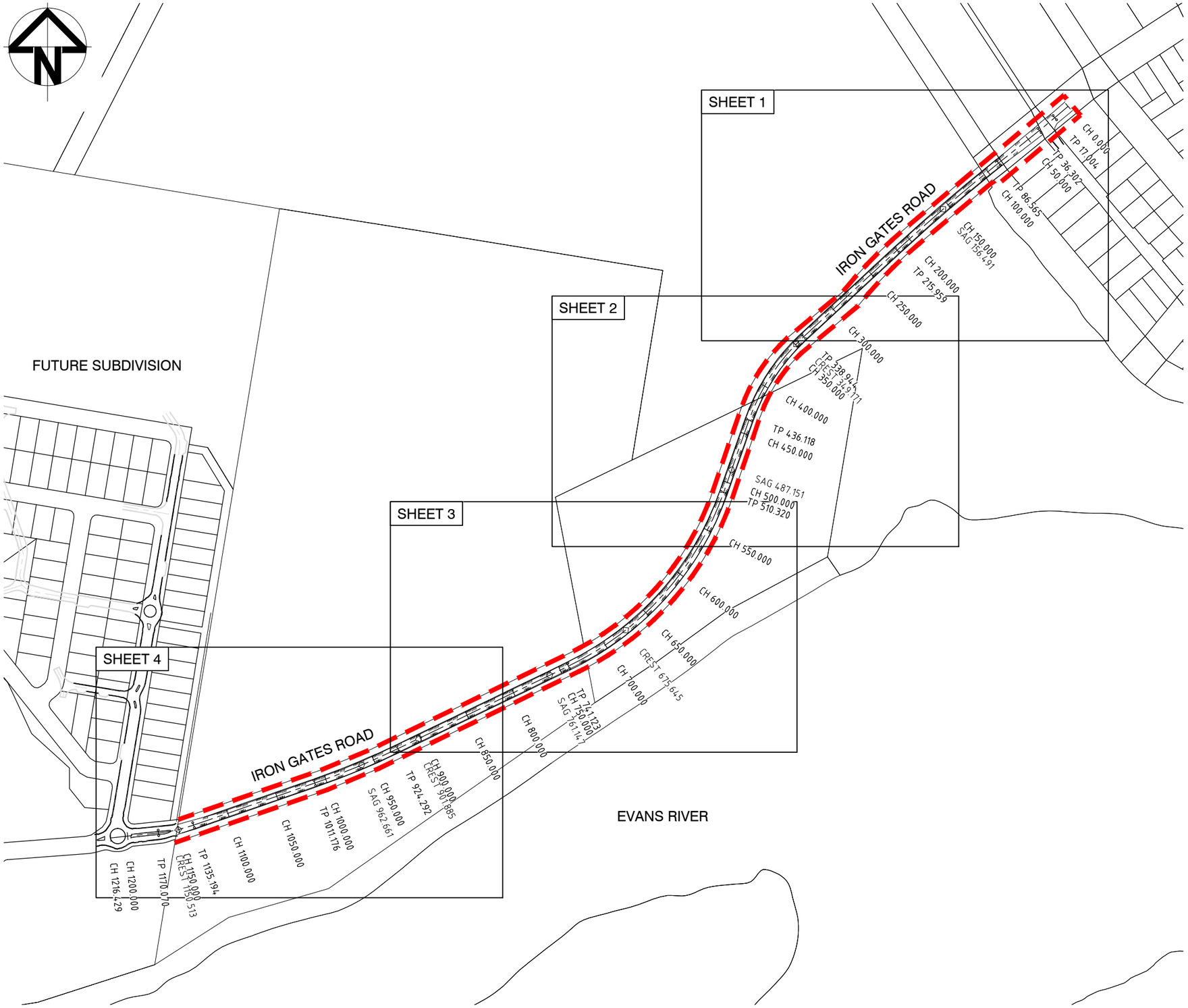
SHEET NO:
01 OF 01

Level 1 2247 Gold Coast Hwy
Nobby Beach
PO Box 206 QLD 4218

Telephone: 07 5526 1500
Fax: 07 5526 1502
Email: admin@planitconsulting.com.au

APPENDIX E

IRON GATES DRIVE



CONTROL LINE SETOUT - ACCESS ROAD

PT	CHAINAGE	EASTING	NORTHING	LEVEL	BEARING	RAD/SPIRAL	A.LENGTH	D.ANGLE
IP1	0.000	541423.554	6778903.755	4.543	229°14'24.26"			
TC	17.004	541410.674	6778892.653	4.383	229°14'24.26"			
IP2	26.653	541403.365	6778886.352	4.284		500.000	19.298	2°12'40.97"
CT	36.302	541395.818	6778880.339	4.167	231°27'05.22"			
	50.000	541385.104	6778871.802	3.969	231°27'05.22"			
TC	86.565	541356.507	6778849.016	3.273	231°27'05.22"			
	100.000	541346.033	6778840.603	2.991	231°00'41.74"			
	150.000	541307.624	6778808.594	1.945	229°22'28.46"			
IP3	151.262	541305.886	6778808.680	1.926		-1750.000	129.393	4°14'11.02"
	200.000	541270.145	6778775.501	2.083	227°44'15.18"			
CT	215.959	541258.383	6778764.715	2.155	227°12'54.20"			
	250.000	541233.400	6778741.592	2.309	227°12'54.20"			
	300.000	541196.705	6778707.630	2.534	227°12'54.20"			
TC	338.944	541168.123	6778681.177	2.709	227°12'54.20"			
	350.000	541160.221	6778673.447	2.739	224°02'52.33"			
IP4	387.531	541131.746	6778647.509	2.360		-200.000	97.173	27°50'17.05"
	400.000	541130.288	6778633.559	2.184	209°43'26.13"			
CT	436.118	541115.301	6778600.751	1.905	199°22'37.15"			
	450.000	541110.696	6778587.655	1.835	199°22'37.15"			
	500.000	541094.106	6778540.488	1.709	199°22'37.15"			
TC	510.320	541090.682	6778530.752	1.745	199°22'37.15"			
	550.000	541075.043	6778494.317	1.884	207°05'01.45"			
	600.000	541048.624	6778451.937	2.059	216°47'41.59"			
IP5	625.722	541050.314	6778415.972	2.149		295.000	230.803	44°49'38.29"
	650.000	541015.434	6778414.621	2.234	226°30'21.73"			
	700.000	540976.426	6778383.438	2.217	236°13'01.86"			
CT	741.123	540940.766	6778363.024	2.012	244°12'15.44"			
	750.000	540932.774	6778359.161	1.967	244°12'15.44"			
	800.000	540887.756	6778337.403	2.126	244°12'15.44"			
	850.000	540842.738	6778315.645	2.403	244°12'15.44"			
	900.000	540797.721	6778293.887	2.676	244°12'15.44"			
TC	924.292	540775.850	6778283.316	2.525	244°12'15.44"			
	950.000	540752.516	6778272.528	2.322	246°10'05.70"			
IP6	967.734	540736.693	6778264.390	2.262		750.000	86.884	6°38'14.74"
	1000.000	540706.140	6778253.864	2.407	249°59'16.69"			
CT	1011.176	540695.611	6778250.118	2.458	250°50'30.18"			
	1050.000	540658.937	6778237.376	2.633	250°50'30.18"			
	1100.000	540611.706	6778220.967	2.858	250°50'30.18"			
TC	1135.194	540578.461	6778209.417	3.055	250°50'30.18"			
	1150.000	540564.259	6778205.256	3.141	256°29'49.70"			
IP7	1152.632	540561.915	6778203.669	3.138		150.000	34.876	13°19'17.49"
CT	1170.070	540544.489	6778201.887	2.921	264°09'47.67"			
	1200.000	540514.714	6778198.844	2.399	264°09'47.67"			
IP8	1216.429	540498.370	6778197.173	NaN	264°09'47.67"			

Issue	Description	Date
01	ORIGINAL ISSUE BD	11.09.14

Scale: 0 50 100 150 200m — 1 : 2000

Surveyor: ROBERT A HARRIES SURVEYOR

Architect:

Filename: C201-AA007094-GCD-00-GENERAL ARRANGEMENT.DWG

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL
CONSTRUCTION SUBJECT TO COUNCIL APPROVAL

Approved: R.P.E.Q No :

Scales	1:2000	Current Issue Signatures
		Author B.DAVEY
Original Size	A1	Designer B.FINSELBACH
Height Datum	AHD	Reviewer B.LUSTY
Grid	GRID	© Copyright reserved

Project: LOT 277 IRON GATES ROAD
EVANS HEAD
ACCESS ROAD
DEVELOPMENT APPLICATION

Title: GENERAL ARRANGEMENT
LAYOUT PLAN

HYDER CONSULTING PTY. LTD
ABN 76 104 485 289
P O Box 1653
Southport, QLD 4215
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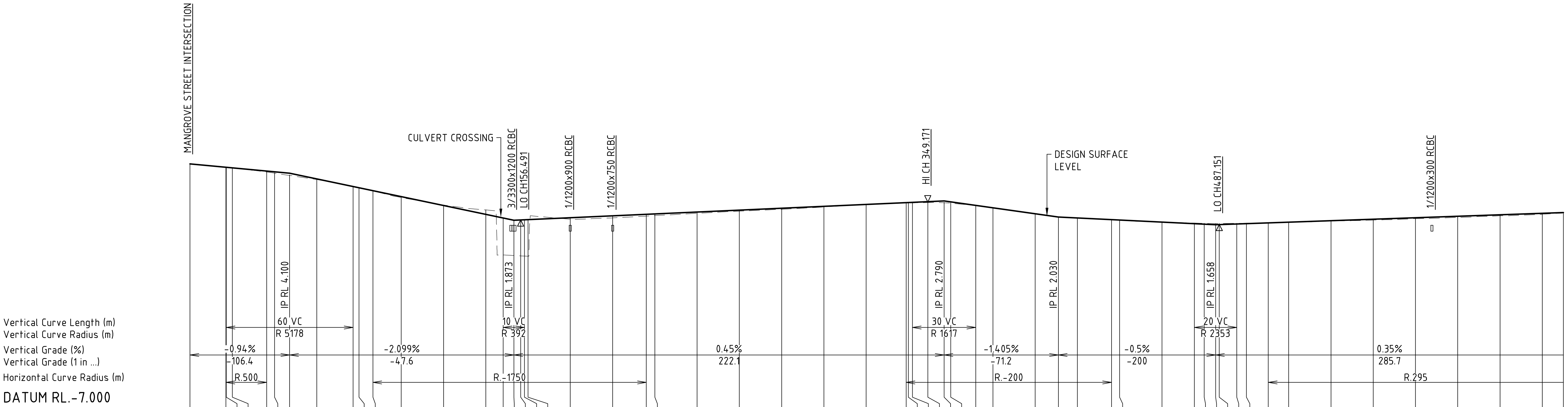
Tel: +61 (07) 5532 3933
Fax: +61 (07) 5591 4778
www.hyderconsulting.com

Drawing No.	Project No.	Issue
C201	AA007094	01

100mm on Original

21/Jul/2015 3:20 PM F:\AA007094\E-CAD\C-Civil\D-Final\C201-AA007094-GCD-00-GENERAL ARRANGEMENT.dwg V1



DESIGN LEVELS ON ROAD CENTRELINE	4.543	4.383	4.382	4.354	4.167	4.117	4.013	3.802	3.470	3.410	3.273	2.991
EXISTING SURFACE ON ROAD CENTRELINE	4.543	4.396	4.394	4.357	4.156	4.100	3.994	3.798	3.477	3.424	3.265	2.950
CUT / FILL DEPTH	0.000	-0.012	-0.012	-0.002	0.011	0.016	0.019	0.004	-0.007	-0.013	0.008	0.041
PEGGED CHAINAGE	0.000	17.004	17.147	20.000	36.302	40.000	47.147	60.000	77.147	80.000	86.565	100.000

DESIGN LEVELS ON ROAD CENTRELINE	2.571	2.151	1.978	1.905	1.892	1.896	1.903	1.993	2.083	2.155	2.174	2.264
EXISTING SURFACE ON ROAD CENTRELINE	2.597	2.361	0.228	0.207	0.188	0.179	0.170	1.919	1.986	2.070	2.092	2.202
CUT / FILL DEPTH	-0.026	-0.210	1.750	1.698	1.703	1.716	1.733	0.074	0.098	0.085	0.081	0.062
PEGGED CHAINAGE	120.000	140.000	148.258	153.258	156.491	158.258	160.000	180.000	200.000	215.959	220.000	240.000

DESIGN LEVELS ON ROAD CENTRELINE	2.354	2.444	2.534	2.624	2.709	2.714	2.722	2.739	2.720	2.703	2.579	2.465
EXISTING SURFACE ON ROAD CENTRELINE	2.305	2.393	2.501	2.620	2.685	2.688	2.694	2.713	2.703	2.681	2.568	2.466
CUT / FILL DEPTH	0.049	0.051	0.032	0.004	0.024	0.026	0.028	0.026	0.017	0.022	0.011	-0.001
PEGGED CHAINAGE	260.000	280.000	300.000	320.000	338.944	340.000	341.888	349.171	356.888	360.000	371.888	380.000

DESIGN LEVELS ON ROAD CENTRELINE	2.184	2.030	1.985	1.905	1.885	1.785	1.708	1.690	1.679	1.679	1.693	1.709
EXISTING SURFACE ON ROAD CENTRELINE	2.200	2.032	1.990	1.891	1.868	1.787	1.742	1.729	1.716	1.718	1.728	1.734
CUT / FILL DEPTH	-0.015	-0.001	-0.005	0.014	0.017	-0.002	-0.034	-0.039	-0.036	-0.039	-0.035	-0.025
PEGGED CHAINAGE	400.000	410.978	420.000	436.118	440.000	460.000	475.387	480.000	485.387	487.151	495.387	500.000

DESIGN LEVELS ON ROAD CENTRELINE	1.745	1.779	1.849	1.919	1.989	2.059	2.129	2.199	2.234
EXISTING SURFACE ON ROAD CENTRELINE	1.747	1.770	1.836	1.886	1.950	2.009	2.083	2.159	2.213
CUT / FILL DEPTH	-0.001	0.009	0.014	0.034	0.039	0.050	0.046	0.041	0.021
PEGGED CHAINAGE	510.320	520.000	540.000	560.000	580.000	600.000	620.000	640.000	650.000

ACCESS ROAD LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:100

Issue	Description		Date
01	ORIGINAL ISSUE	BD	11.09.14

Scale 0 10 20 40 60 80 100m
HORZ
1:1000
0 1 2 4 6 8 10m
VERT
1:100

Surveyor
ROBERT A HARRIES
SURVEYOR

Architect

Filename: C210-AA007094-GCD-00-ROAD LS.DWG

Client
GOLDCORAL PTY LTD

Status
FOR APPROVAL
CONSTRUCTION SUBJECT TO COUNCIL APPROVAL

Approved
R.P.E.Q No :

Scales	1:100 (V) 1:1000 (H)	Current Issue Signatures
		Author B.DAVEY
Original Size	A1	Designer B.FINSELBACH
Height Datum	AHD	Reviewer B.LUSTY
Grid	GRID	© Copyright reserved

Project
LOT 277 IRON GATES ROAD
EVANS HEAD
ACCESS ROAD
DEVELOPMENT APPLICATION

Title
ACCESS ROAD LONGITUDINAL
SECTION - SHEET 1 OF 2

HYDER CONSULTING PTY. LTD
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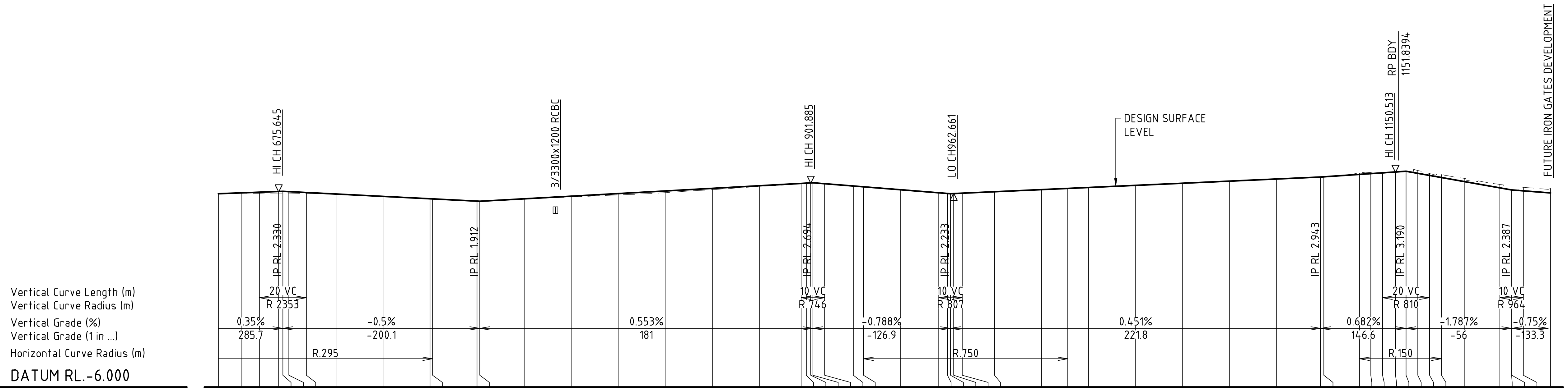
Drawing No.		Project No.		Issue
C210	—	AA007094	—	01



DESIGN LEVELS ON ROAD CENTRELINE	2.234	2.269	2.295	2.310	2.309	2.306	2.280	2.217	2.117	2.017	2.012	1.917	1.912	2.016
EXISTING SURFACE ON ROAD CENTRELINE	2.213	2.245	2.253	2.261	2.260	2.259	2.246	2.206	2.128	2.030	2.024	1.918	1.912	1.998
CUT / FILL DEPTH	0.021	0.025	0.042	0.049	0.049	0.047	0.034	0.012	-0.011	-0.013	-0.012	-0.001	0.000	0.018
PEGGED CHAINAGE	650.000	660.000	667.409	675.645	677.409	680.000	687.409	700.000	720.000	740.000	741.123	760.000	761.147	780.000

DESIGN LEVELS ON ROAD CENTRELINE	2.126	2.237	2.347	2.458	2.568	2.667	2.676	2.678	2.677	2.655	2.558	2.525	2.401	2.272
EXISTING SURFACE ON ROAD CENTRELINE	2.090	2.177	2.276	2.406	2.536	2.652	2.667	2.679	2.680	2.648	2.565	2.535	2.423	2.281
CUT / FILL DEPTH	0.037	0.059	0.072	0.052	0.032	0.014	0.008	-0.001	-0.002	0.007	-0.006	-0.011	-0.022	-0.008
PEGGED CHAINAGE	800.000	820.000	840.000	860.000	880.000	897.763	900.000	901.885	902.763	907.763	920.000	924.292	940.000	956.301

DESIGN LEVELS ON ROAD CENTRELINE	2.252	2.248	2.247	2.256	2.317	2.407	2.458	2.498	2.588	2.678	2.768	2.858	2.943	2.951
EXISTING SURFACE ON ROAD CENTRELINE	2.246	2.233	2.240	2.255	2.307	2.413	2.465	2.503	2.590	2.679	2.770	2.858	2.943	2.951
CUT / FILL DEPTH	0.006	0.015	0.008	0.000	0.010	-0.005	-0.007	-0.006	-0.002	-0.001	-0.002	0.000	-0.000	0.000
PEGGED CHAINAGE	960.000	961.301	962.661	966.301	980.000	1000.000	1011.176	1020.000	1040.000	1060.000	1080.000	1100.000	1118.704	1120.000

DESIGN LEVELS ON ROAD CENTRELINE	3.055	3.088	3.122	3.141	3.128	3.085	3.011	2.921	2.743	2.477	2.400	2.399	2.350	
EXISTING SURFACE ON ROAD CENTRELINE	3.113	3.124	3.100	3.143	3.176	3.222	3.091	3.044	2.883	2.628	2.402	2.401	2.502	2.447
CUT / FILL DEPTH	-0.058	-0.036	0.022	-0.002	-0.048	-0.136	-0.079	-0.124	-0.140	-0.152	-0.002	-0.002	-0.152	
PEGGED CHAINAGE	1135.194	1140.000	1144.988	1150.513	1154.988	1160.000	1164.988	1170.070	1180.000	1194.909	1199.909	1200.000	1204.909	1216.429

ACCESS ROAD LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:100

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LOT 277 IRON GATES ROAD
EVANS HEAD
ACCESS ROAD
DEVELOPMENT APPLICATION

Title
ACCESS ROAD LONGITUDINAL
SECTION - SHEET 2 OF 2

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Drawing No.	Project No.	Issue
C211	AA007094	01

100mm on Original