In the Land and Environment Court of New South Wales
Case No: 2022/279591

GOLDCORAL PTY LIMITED
Applicant

V

RICHMOND VALLEY COUNCIL
First Respondent

JOINT REPORT ON FLOODING, ESSENTIAL SERVICES, STORMWATER, GROUNDWATER & EARTHWORKS

PREPARED 19 APRIL 2024

INTRODUCTION

1. The following experts (the **experts**) have prepared this joint report:

   a. Dr. Daniel Martens for Applicant (**DM**).

   b. Lachlan Prizeman for the Applicant (**LP**).

   c. Brian Eggins for Respondent (**BE**).

2. Curriculum Vita for each expert are provided in Attachment A.

3. The experts have read and agree to be bound to Part 31 of Division 2 of the Uniform Civil Procedure Rules 2005, Schedule 7 of the Uniform Civil Procedures Rules 2005.

4. The experts understand that the discussion is in respect of the proposed Iron Gates Residential Development of land at 240 Iron Gates Road, Evans Head (the **Site**).

5. This joint report covers contentions 3, 5, 7, 8 and 14 of the amended Statement of Facts and Contentions in the Proceedings dated 6 March 2024.

6. The experts also considered the following:

   a. 24GCT0055_LT01B – TTM Traffic Assessment (Attachment B).

   b. Amended Concept Engineering Plans – Revision 03 prepared by LP (Attachment C).

   c. Updated Groundwater Impact Plot prepared by DM (Attachment D).

   d. Richmond Valley Flood Study dated 12 September 2023 prepared by BMT.

COMMENTS ON CONTENTIONS

Contention 3 – Flooding (DM, BE)

*The proposed development is considered unacceptable pursuant to the provisions of s4.15(1)(a)(i) of the Environmental Planning and Assessment Act 1979 (**EP&A Act**) as the proposal has failed to adequately demonstrate consistency with the matters required to be satisfied in relation to flooding under clause 5.21 of the Richmond Valley Local Environmental Plan 2012 (**RVLEP 2012**)*

Particulars

(a) It has not been demonstrated that the proposed development is compatible with the flood hazard of the land including if the floor levels and filling of the proposed lots are in accordance with Council policies, including a climate change allowance.

Agreements

The experts agree that the proposed development is compatible with the flood hazard of the land and Council policies because the amended concept engineering plans now appropriately provide road and building floor levels which are consistent with the Richmond Valley Flood Study, inclusive of climate change allowances.

Specifically, all new roads have been designed to a minimum level of RL3.5m AHD and the finished floor level of all dwellings will be a minimum of RL4.0m AHD which is equivalent to the flood planning level (**FPL**).

This contention is resolved.

Disagreements

N/A

(b) It has not been demonstrated that there will not be a significant adverse effect on flood behaviour resulting in detrimental increases in the potential flood affectation of other development or properties.

Agreements

The experts agree that the development proposal shown on the amended concept engineering plans is located within a region of low velocity flood water and that the proposed filling is located offline from the main river channel flows. The resultant outcome of the development produces no impact to the existing flood regime within the vicinity of the site.

This contention is resolved.

Disagreements

N/A

(c) It has not been demonstrated that the proposal incorporates appropriate measures to manage risk to life from flood including evacuation of the site via Iron Gates Drive for a full range of floods.

Agreements

An Emergency Shelter is proposed to be located on lot 108 within the development site. The Emergency Shelter has been detailed in the Flood Emergency Response Plan (FERP) prepared by Martens. The experts agree that the proposed Emergency Shelter incorporated into the development appropriately manages risk to life from flood in the event that residents are not able to evacuate. The Emergency Shelter is designed to have a minimum building floor level of RL7.60m AHD, above the nominated PMF level of RL7.56m AHD at the selected location, consistent the Richmond Valley Flood Study. It is appropriate that the consent should include a condition to update flood levels in the FERP, prior to issue of a subdivision works certificate, to reflect levels in Richmond Valley Flood Study.

BE notes the New South Wales State Emergency Service (SES) is the combat agency for floods and the proposal and triggers for the Flood Emergency Response Plan should be reviewed by the SES as part of the update. This can be appropriately conditioned.

This contention is resolved.

Disagreements

N/A

(d) It has not been demonstrated that the proposal will not result in a significant adverse effect on the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses.

Agreements

The experts agree that the development proposal shown on the amended concept engineering plans is located within a region of low velocity flood water and that the proposed filling is located offline from the main river channel flows. The resultant outcome of the development produces no impact to the existing flood regime within the vicinity of the site. The development will therefore not lead to erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses.

This contention is resolved.

Disagreements

N/A

(e) The proposal is inconsistent with the objectives for flood planning pursuant to Clause 6.5(1) of the RVELP 2012 as it does not adequately demonstrate that the proposal minimises the flood risk to life and property associated with the use of land, it does not allow development on land that is compatible with the land's flood hazard, taking into account projected changes as a result of climate change as this is unknown and does not avoid significant adverse impacts on flood behaviour and the environment as this has not been provided.

Agreements

The experts agree that provision of the Emergency Shelter above the probable maximum flood, which can be utilised in the event that residents have not evacuated, will satisfactorily reduce flood risks to residents to an appropriate level.

The experts agree that the amended concept engineering plans propose site fill levels which comply with the Flood Planning Levels (FPLs) dictated in the Richmond Valley Flood Study and are compatible with the land's flood hazard. The amended site levels and engineering design as documented appropriately considers climate change and projected changes to flood levels and behaviour.

This contention is resolved.

Disagreements

N/A

(f) The Martens "Flood Assessment and Flood Emergency Response Plan (FERP)" Issue 3 dated 22 November 2023 - Section 3.2 Scenarios - does not use a full scenario for its climate change assessment. The Martens' report selected a peak ocean tailwater level of 2.9m as the criteria for the climate change assessment. Council adopted a climate change scenario at its meeting of 15 June 2010 of a 900mm sea level rise plus a +10% increase in rainfall intensity for the 2010 flood study and all future flood modelling.

Agreements

The experts agree that the development proposal as documented on the amended concept engineering plans now appropriately provide road and building floor levels consistent with the Richmond Valley Flood Study, inclusive of climate change allowances.

This contention is resolved.

Disagreements

N/A

(g) The proposal has failed to incorporate the most up to date flood modelling available, post February March 2022 major flood event on the Northern Rivers, with public exhibition of the Richmond Valley Flood Study 2023 from 3 July 2023 to 13 August 2023. and formally adopted by Council 19 September 2023, well prior to the Martens "Flood Assessment and Flood Emergency Response Plan (FERP)" Issue 2 DRAFT dated 4 October 2023. and the subsequent Issue 3 Final dated 22 November 2023.

Agreements

The experts agree that the development proposal as documented on the amended concept engineering plans now appropriately provide road and building floor levels consistent with the Richmond Valley Flood Study, inclusive of climate change allowances.

This contention is resolved.

Disagreements

N/A

Contention 5 – Essential Services (BE, LP)

The proposed development is considered unacceptable pursuant to the provisions of s4.15(1)(a)(i) of the EP&A Act as it has not been demonstrated that the proposed development will be provided with the essential services as required by Clause 6.2 of RVLEP 2012.

Particulars

(a) The proposal has not demonstrated that adequate arrangements have been made in relation to the supply of water and the disposal and management of sewage.

Agreements

The experts agree the proposed internal subdivision works are suitable to service the development allotments and are generally in accordance with the Northern Rivers Local Government Development Design and Construction Manual.

The experts agree that the condition and quality of sewer and water infrastructure in Iron Gates Drive for which the development proposes to connect is unknown, given the infrastructure has laid dormant for the past 30 years. It is also not clear based on available data the exact connection locations and details of the infrastructure in Iron Gates Drive to Council's network.

BE notes that the infrastructure has not been maintained by Council and was unlikely to have been accepted formally as a Council asset given the lack of quality assurance documentation (i.e. as-constructed data, testing and sampling results) and no evidence of final inspections.

The experts agree that the infrastructure in Iron Gates Drive may be suitable for connection and servicing of the proposed development, provided an Asset Condition Assessment Report is prepared (including pressure testing) and the connection points into Council's active sewer and water networks are re-examined. Subject to further investigation, modification/rectification of the infrastructure in Iron Gates Drive, Wattle Street, and Mangrove Street may be necessary to service the development. These are matters that can be appropriately conditioned.

This contention is resolved.

Disagreements

N/A

(b) The existing services located on site were required to be removed under historic court orders and the operational condition of those services is unknown and therefore cannot be relied on.

Agreements

The experts agree that the development proposal as currently documented considers the full removal of the existing services located on the site.

As noted under the agreements for Contention 5 a), the operational condition of infrastructure on Iron Gates Drive must be confirmed and accepted prior to any

development connection, but generally provide serviceability of the development subject to rectification/remediation works if required.

This contention is resolved.

Disagreements

N/A

(c) The proposal has not detailed or outlined that adequate arrangements have been made in relation to the supply of electricity and does not detail the nature of the future supply and whether this electricity will be provided overhead or underground.

Agreements

LP noted as outlined in the Engineering Services Report prepared by Arcadis and the included advice letter prepared by Preferred Energy, the proposed connection point for supply of electricity to the development is on Wattle Street, in the southern verge roughly halfway between Cedar Street and Cashmore Lane. The connection location is identified in Figure 1 below.

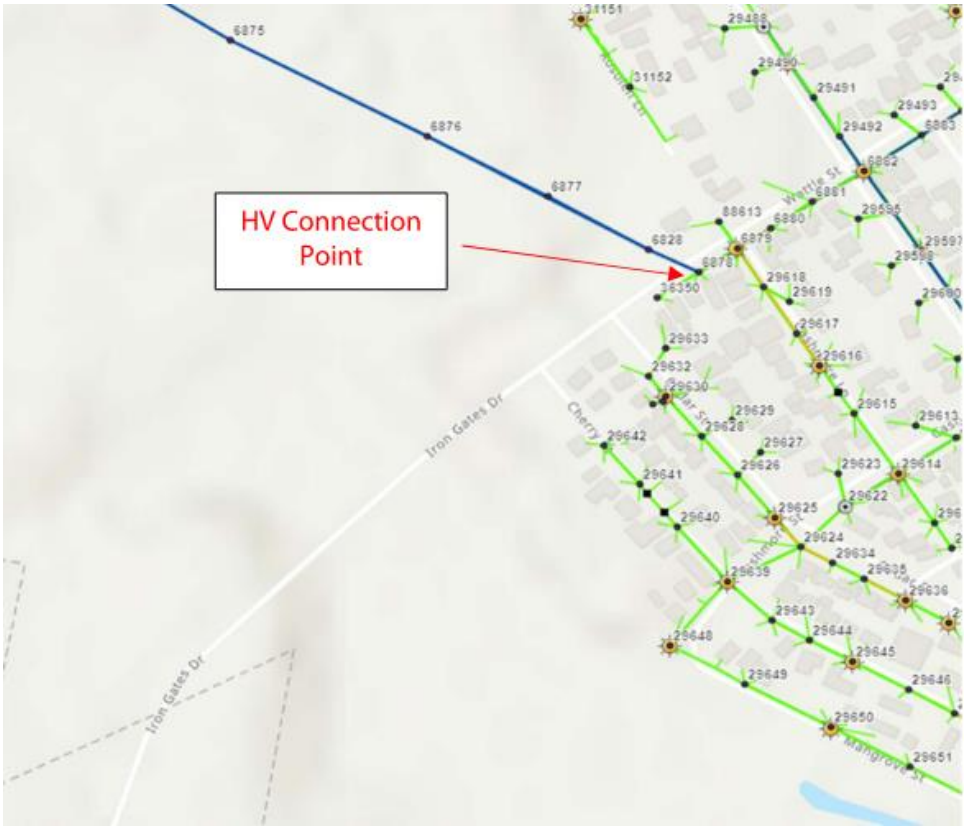


Figure 1 – Existing Essential Energy Network & Proposed Connection Point

Following the receipt of a Development Approval, Essential Energy would formalise the design requirements after receiving a Connection Application and Design Information Application. It is expected that the infrastructure to service the development would include underground cables along Iron Gates Drive, with an underground network throughout the development site road network to facilitate the connection of new lots to the Essential Energy network.

The experts agree that the provision of an underground network supply from Wattle Street is a suitable outcome.

This contention is resolved.

Disagreements

N/A

(d) Insufficient information has been provided in relation to the stormwater drainage of the proposed development.

Agreements

The experts agree that the amended concept engineering plans provide sufficient detail of stormwater drainage infrastructure, including collection, conveyance and treatment to the proposed discharge locations.

This contention is resolved.

Disagreements

N/A

(e) The proposal has not outlined that adequate arrangements have been made in relation to the suitable road access as inadequate and inconsistent information has been provided in relation to the design of the upgrade works to Iron Gates Drive.

Agreements

The experts agree that the current supporting documents for the Development Application have resolved the inconsistent information relating to the upgrade of Iron Gates Drive. The existing Iron Gates Drive includes a 6.5m-7.3m sealed carriageway with minimum 1m shoulders. The upgrade works along Iron Gates Drive are proposed to formulate an 8m full width sealed carriageway with 0.5m shoulders outside of the mapped coastal wetlands (generally the central 50% of the road). The works consider a slow point between the increased width sealed carriageway and the existing sealed carriageway where no upgrade works are proposed.

BE notes that the road infrastructure (carriageway and footpath) has not been maintained by Council and was unlikely to have been accepted formally as a Council asset given the lack of quality assurance documentation (i.e. as-constructed data, testing and sampling results) and no evidence of final inspections.

The experts agree that outside of the Iron Gates Drive widening works, the existing sealed road surface should be resealed or rectified where required following an existing pavement assessment.

The upgrade works to Iron Gates Drive are considered appropriate given the competing constraints.

This contention is resolved.

Disagreements

N/A

(f) There has been no assessment of impact or detail of work required to remove the infrastructure and works the subject of the Court orders and to then construct new infrastructure under the Amended Application.

Agreements

The experts agree the plans detail the extent of infrastructure to be removed within the site limits. A Demolition Management Plan or Construction Management Plan considering infrastructure removal should be prepared to capture the specific methodology of removal and disposal of the existing infrastructure prior to commencement of any works on the site.

This contention is resolved.

Disagreements

N/A

(g) The proposal has not demonstrated that adequate arrangements have been made in relation to the adequacy/condition/reconstruction of existing infrastructure (water/sewer) external to the site that is believed to have been constructed wholly or in part along streets such as Iron Gates Drive. Wattle Street and Mangrove Street. Further. An assessment has not been undertaken in relation to the potential environmental impact and extent of vegetation removal required for the upgrading or rebuilding of the network sewer and connection of the site to the water and sewer networks external to the site.

Agreements

Reference should be made to the Agreements reached under Contention 5 a). The experts support the completion of an Asset Condition Assessment Report and assessment of the relevant infrastructure connections to Council's active sewer and water network to determine the use of the existing infrastructure and any associated remediation works.

The experts agree that any pipeline reconditioning or replacement would be undertaken within the existing pipeline alignment and that impacts on vegetation would therefore not be anticipated. Where vegetation has grown over the pipeline that is not capable of removal, that portion of the pipeline would, if required, be replaced using under boring or directional boring or with an alternative service alignment which does not cause impact to the vegetation.

This contention is resolved.

Disagreements

N/A

(h) It has not been demonstrated that there is capacity in the existing sewer network to receive additional flows from the site.

Agreements

LP notes the Engineering Services Report prepared by Arcadis includes a Sewer Network Capacity Assessment Memo in Appendix D. The resultant assessment indicates that the development produces 7.7L/s of peak wet weather flows using the agreed calculation methodology. The Evans Head Sewerage Augmentation Strategy Report prepared by GHD (2010) considered a catchment flow of 9.4L/s of peak wet weather flows from the Iron Gates estate. The proposed pump station EHPS-02 (located on Teak St) underwent a pump upgrade in 2008 to allow an outflow of 20.8L/s, including planned flows of 9.4L/s from Iron Gates and 11.4L/s from the local catchment.

BE notes changes have occurred in the network since the base information informing the completed sewer assessment was prepared, including new development near the airport and other changes which may impact the potential discharge point of the development flows.

The experts agree that historical allowances were made in the sewer network planning for the connection of developments flows from the subject site and that augmentations may be required to be undertaken downstream of the EHPS-02 pump station to facilitate servicing of the development upon finalisation of the development yield & resultant outflows. This matter can be appropriately conditioned.

This contention is resolved.

Disagreements

N/A

(i) The proposal has not demonstrated that the existing Iron Gates Drive Bridge meets the requirements of the current Australian Standards for construction and access.

Agreements

The Iron Gates Drive bridge was built by Council (as a contractor to the developer) at the time of previous development applications on the site. The experts agree the proposed development is consistent in the planned use of the site as the previous approvals at the time of the construction of the bridge by Council and that the existing bridge has been in use for many years and has not shown any signs of inadequate serviceability.

BE notes the bridge has not been maintained or inspection by Council since it was first built and that Iron Gates Drive was never adopted into Council's Asset Register.

The experts agree the consent should include a condition to investigate, prior toissue of a subdivision works certificate , to ensure the bridge is safe and trafficable, particularly for the demands imposed on the existing bridge by the significant heavy vehicle truck movements during the importation of the site filling, and that any rectification works are identified and completed appropriately (prior to the importation of fill) as part of the subdivision works.

This contention is resolved.

Disagreements

N/A

(j) The proposal has not demonstrated how the proposed Iron Gates Drive works will meet all of the competing requirements of the proposed development (such as engineering road standards for generated traffic, services corridor allocations, wetlands, bushfire and has not identified the extent and nature of the impacts of those works.

Agreements

The experts agree that the proposed works to be undertaken on Iron Gates Drive in accordance with the concept engineering plans include widening of the carriageway (between the coastal wetland mapping) and retention of the existing services on Iron Gates Drive (subject to the Asset Condition Assessment Report and associated infrastructure testing referred to in the responses to contentions 5a and 5 g). The works will not likely lead to any impacts because they will be located within the existing road corridor and will not disturb adjoining wetlands.

This convention is resolved.

Disagreements

N/A

(k) The proposal fails to consider and deliver appropriate road design as outlined in the Northern Rivers Local Government design specification (Development & Design and Construction manuals) to accommodate access. kerb and guttering, cycleways, underground services and telecommunications and road furniture.

(i) Road 01 bisecting the Littoral Rainforest has an insufficient road reserve width. The proposal has inadequately assessed requirements for all required infrastructure including but not limited to stormwater drainage lines within the Road 01 road reserve bisecting the littoral rainforests.

Agreements

Road 01 bisects the Littoral Rainforest and considers a reduced road reserve width, with the use of an elevated boardwalk/cycleway to limit impact to the existing sensitive vegetation communities.

The experts agree that the proposed 8m carriageway will provide a suitable outcome given the short length of road. A handrail on the outside of the elevated boardwalk should be designed to the relevant Australian Standards to ensure safety concerns are addressed given the level difference of to the order of 1m from design surface level to natural surface level.

The experts agree that the proposed ‘off-road’ elevated boardwalk is a shared/dual use pathway for cyclists and pedestrians. In accordance with table D9.1 of the Northern Rivers Local Government Development Design and Construction Manual Cycleway and Pathway Design, the minimum path width should be increased to 2.5m.

This contention is resolved.

Disagreements

N/A

(ii) Road 02 and Road 09 are partly proposed as a single-lane one-way roads along the perimeter of the subdivision,

Agreements

The experts agree that the revised proposal inclusive of the single lane one-way roads provides an appropriate outcome for the site edges given the potential volume of traffic.

Sufficient movement throughout the estate has been provided for waste collection in the ultimate development outcome, however the Stage 1 works in isolation of the Stage 2 works must consider appropriate turnaround facilities at any temporary road ends to allow manoeuvring of waste collection vehicles.

BE notes that where a two-way road ends at a one-way road against the direction of travel, sufficient turn around area must be provided. It is acknowledged that a potential change from one-way to two-way is being considered and can be finalised prior to the issue of a subdivision works certificate.

This contention is resolved.

Disagreements

N/A

(iii) Iron Gates Drive pavement formation width is insufficient.

Agreements

The proposed Iron Gates Drive works include a widening of the sealed carriageway to 8m. The extent of the upgrade proposed has been maximised between the coastal wetland mapping. The experts agree that the pavement formation is suitable given the competing constraints.

This contention is resolved.

Disagreements

N/A

(iv) It has not been demonstrated that the unsignalised T-intersection where Iron Gates Drive meets Road 01 & Road 02 at the south eastern corner of the site meets the geometric design and safety requirements set out in Austroads Guide to Road Design. A Traffic Impact Assessment has not been undertaken in relation to the Amended Proposal.

Agreements

A Traffic Impact Assessment (TIA) has been undertaken by TTM Consulting. The TIA indicates that the traffic movements at the intersection of Iron Gates Drive, Road 01 & Road 02 call for the use of a Basic Right (BAR) turn facility. The experts agree suitable

road reserve is available to allow the construction of a BAR turn facility at the intersection of Iron Gates Drive, Road 01 and Road 02. This can be conditioned.

This contention is resolved.

Disagreements

N/A

(l) The proposal includes reference to parking in the road verge via plastic reinforced turf. NSW road rule number 197 prohibits parking on footpaths and nature strips. The roads should be designed to AS2890.5:2020 to accommodate on-street parking.

Agreements

The experts agree that any on-street parking should be constructed at the road level as asphalt surfaced parallel bays within the 4.5m verge widths proposed in the subdivision layout. The location of on-street parking can be determined as part of the subdivision works certificate application with consideration to stormwater infrastructure and potential driveway locations within the wider verges. A condition can be included to this effect.

This contention is resolved.

Disagreements

N/A

(m) The proposal has not addressed the environmental impacts of the proposed removal of vegetation and existing historic infrastructure within the property and externally along streets such as Iron Gates Drive. Wattle Street and Mangrove Street where historic infrastructure has been constructed.

Agreements

The experts agree that potential vegetation impacts is a matter for the ecological experts.

Disagreements

N/A

(n) The proposal fails to adequately consider pedestrian safety by advocating that the trafficable area of Iron Gates Drive "provides a possible minimum trafficable area of 8.5m-9.5m outside of the footpath on the southern side of the road and inclusive of the footpath a minimum trafficable area for overtaking or passing of vehicles at slow speeds of 10.5m-11.5m". Pedestrian pathways should not be considered part of the trafficable area for overtaking or passing of vehicles.

Agreements

The experts agree that the upgrade works of Iron Gates Drive will include specific linemarking and signage treatments (including no parking lines and guide posts)

between the existing footpath and road carriageway to ensure delineation of the pedestrian and vehicle movements. This can be conditioned.

This contention is resolved.

Disagreements

N/A

Contention 7 – Stormwater (DM, BE, LP)

The proposed development is considered unacceptable pursuant to the provisions of s4.15(1)(a)(i) of the EP&A Act as the proposal has failed to adequately demonstrate the proposed stormwater management arrangements for the site pursuant to Clause 6.2(d) of RVLEP 2012

Particulars

(a) It has not been demonstrated how the stormwater from the proposed development is to be treated and discharged and whether the proposal will discharge untreated stormwater into the Evans River.

Agreements

The experts agree that the MUSIC model together with the amended concept engineering plans prepared demonstrate that all site stormwater will pass through appropriately designed stormwater treatment devices (bio-swales with incorporated gross pollutant traps) prior to discharge from the site. This will ensure that untreated stormwater discharge to the Evans River will not occur and that water quality is satisfactorily treated to the required standards prior to release.

This contention is resolved.

Disagreements

N/A

(b) It has not been demonstrated that the proposal will protect and preserve native coastal vegetation as required by Clause 2(1)(g)

Agreements

By reference to the response to Contention 7a, the experts agree that stormwater from the proposal is not expected to impact native coastal vegetation.

This contention is resolved.

Disagreements

N/A

(c) It has not been demonstrated that the proposal includes measures to conserve animals (within the meaning of the Threatened Species Conservation Act 1995) and plants (within the meaning of that Act), and their habitats.

Agreements

The experts agree that this is a matter for the ecological experts.

Disagreements

N/A

(d) It has not been demonstrated how the stormwater from the proposed eastern swale south of Iron Gates Drive to the Evans River is to be managed for quantity, quality, velocity, and erosion protection and protection of the environment.

Agreements

BE notes that historical design plans for the swale south of Iron Gates Drive and within the property, connecting to the Evans River, was a concrete lined base channel.

The experts agree discharge of the eastern swale (Bio-retention Swale B) and the central Littoral Rainforest is to include outlet scour protection at the discharge to appropriately reduce localised erosion, as shown on the amended concept engineering plans.

The experts agree this channel does not appear to be concrete lined in accordance with the historical design and that the channel has now established ecological significance to be retained and protected in its current form.

The experts agree the outlets of stormwater infrastructure would be designed as part of the detailed design process prior to the subdivision works certificate approval. Outlets should be designed to ensure that discharge velocity does not result in undue downslope erosion. The nominated design velocity should be determined by an investigation of the existing soils and vegetation at the proposed discharge location(s). An appropriately worded consent condition should be included to reflect this agreement.

This contention is resolved.

Disagreements

N/A

(e) It has not been demonstrated how the proposed bioswales will be effective having regard to their depth and reliance on evapotranspiration and what protection is proposed for the receiving waters and wetlands.

Agreements

The amended concept engineering plans now include semi-impermeable liners and underdrainage with appropriate outlets. The experts agree the proposed bio-swales will function more effectively with the inclusions documented.

The detailed design of the bio-swales should consider appropriate access for maintenance purposes. An appropriately worded consent condition should be included to reflect this agreement.

This contention is resolved.

Disagreements

N/A

(f) It has not been clearly demonstrated how drainage of the littoral rainforest will be managed following removal of the existing infrastructure and the long-term development of the site.

Agreements

The experts agree that an additional stormwater culvert crossing beneath Road 01 should be included at natural ground level to facilitate a secondary flow path for stormwater in the central littoral rainforest. An appropriately worded consent condition should be included to reflect this agreement.

This contention is resolved.

Disagreements

N/A

(g) It has not been demonstrated that the proposed stormwater drainage layout has been designed in accordance with the Northern Rivers Local Government design specification (Development & Design and Construction manuals).

Agreements

The experts agree that the stormwater pit and pipe network shown on the engineering concept plans can be amended as part of the subdivision works certificate application stage to conform to the standard drainage layout as described in the Northern Rivers Local Government Development Design and Construction Manual. The experts agree however that the layout shows the serviceability of the proposed development site to convey stormwater to the nominated discharge locations. An appropriately worded consent condition should be included to reflect this agreement.

This contention is resolved.

Disagreements

N/A

Contention 8 – Groundwater (DM, BE)

The proposed development is considered unacceptable pursuant to the provisions of s4.15(1)(b) of the EP&A Act as the proposal has not demonstrated that the ground water in the locality will not be adversely affected by the proposed development.

Particulars

(a) It has not been demonstrated that construction will not result in adverse impacts on groundwater of the site and the riparian and wetland areas in the vicinity of the site.

(b) Water NSW has not issued general terms of approval for the proposed development as required under the Water Management Act 2000.

(c) The statement of environmental effects indicates that further reporting is to be prepared regarding the issue of ground water. This material has not been submitted.

(d) The proposal contains inadequate information to satisfy section 2.8 of the SEPP RAH, in that:

i) It is unclear whether there will be a significant impact on the hydrological integrity of the adjacent coastal wetland and Littoral Rainforest; and
ii) the quality and quantity of surface and groundwater flows to the adjacent coastal wetland and Littoral Rainforest is unknown.

Agreements

BE notes that he has no experience in relation to Contention 8 – Groundwater, or SEPP RAH, and that interpretation of such modelling / analysis is for others.

DM – The impacts on groundwater were assessed in detail in the Hydrogeological Impact Assessment (the **HIA**) prepared by Martens & Associates in November 2023. The reviewed HIA concluded that groundwater was not adversely affected by the development proposal.

The groundwater model documented in the HIA was re-run based on the amended concept engineering plans. Amendments included all proposed bio-retention swale areas, with liner properties as follows: swale A 50 mm/hr, swale B impermeable, swale C 15 mm/hr, swale D 17 mm/hr and swale E 17 mm/hr, and revised stormwater flow rates to the bio-retention swales derived from an amended MUSIC model. A groundwater drawdown impact plot for the amended concept engineering plans is provided in Attachment D which demonstrates minimal change to existing groundwater conditions. Clause 2.8 of SEPP R&H is satisfied because:

- The projected change in average groundwater levels is very small (around 0.1 m) compared to the groundwater level variations experienced naturally within the rainforest and wetland areas, which were in the order of 2 – 5 m during the groundwater monitoring period.

- Groundwater gradients to wetlands are not expected to be materially altered, and therefore flow regimes to, and hydrological integrity of, the adjacent coastal wetlands and Littoral rainforest will not be impacted. The quantity of

groundwater discharged to the adjacent coastal wetlands and Littoral rainforest will therefore not be impacted.

- All stormwater will be treated via the bio-retention swales before release to the environment. No impact on surface and groundwater flows to the adjacent coastal wetlands and Littoral rainforest is therefore expected.

Disagreements

N/A

Contention 14 – Earthworks (BE, LP)

The proposal has failed to satisfy Clause 6.3 of the RVLEP 2012 in relation to earthworks.

Particulars

(a) The proposal is inconsistent with the objectives of Clause 6.3(1) as the development does not adequately demonstrate that the proposed earthworks will not have a detrimental impact on environmental functions and processes on the site or on neighbouring uses. In particular, there has been no consideration of the potential impacts arising from the proposed earthworks (filling and retaining walls) on the Littoral Rainforest in proposed Lot 141, on adjoining land to the east, the wetlands both on and adjoining the site or on the Evans River; and

Agreements

The experts agree that no works are proposed within the Littoral Rainforest and that all stormwater generated from the proposed earthworks will be suitably captured and treated by the proposed stormwater management system, including bio-retention swales. The stormwater system is not expected to impact on the Littoral rainforest or adjoining wetlands.

The experts agree that sediment and erosion control measures will need to be implemented during the subdivision works stage to ensure that construction works do not impact on the Littoral rainforest. An appropriately worded consent condition should be included to reflect this agreement.

We rely on the advice of DM that there will be no detrimental impacts on the receiving groundwater system (refer to response to Contention 8).

This contention is resolved.

Disagreements

N/A

(b) The proposal has not adequately demonstrated that the matters for consideration prior to the grant of consent pursuant to Clause 6.3(3) have been satisfied particularly the likely disruption of, or any detrimental effect on, existing drainage patterns and soil stability in the locality, the proximity to and potential for adverse impacts on any watercourse, drinking water catchment or environmentally sensitive area, and whether any appropriate measures proposed to avoid, minimise or mitigate the impacts of the development are proposed.

Agreements

The experts agree that the proposed earthworks will not likely disrupt, or have a detrimental effect on, the existing drainage system and soil stability in the local area, nor would they likely impact on any watercourse or environmentally sensitive areas. The land is not located in a drinking water catchment. Reference is made to the Agreements reached on the Groundwater, Stormwater and Flooding Contentions.

This contention is resolved.

Disagreements

N/A

(c) The proposal has not adequately demonstrated the satisfactory site filling levels to address the current Richmond Valley Flood Study that was publicly exhibited 4Y2 months prior to the date of the Arcadis "Engineering Services and Civil Infrastructure Report" Revision 02 (amended development layout) dated 14 November 2023, and Martens' "Flood assessment and Flood Emergency Response Plan (FERP)" Issue 03 (Amended Application - Final) dated 22 November 2023.

Agreements

The experts agree that the amended concept engineering plans provide additional filling to achieve compliance with and appropriately consider the new Flood Planning Levels (FPLs) including climate change outlined in the 2023 Richmond Valley Flood Study.

Specifically, all new roads shall be designed to a minimum level of RL3.5m AHD and the finished floor level of all dwellings shall be designed to RL4.0m AHD.

This contention is resolved.

Disagreements

N/A

(d) The proposal fails to address the negative impacts on the existing road infrastructure, and the amenity of the residents along the haul route. The Arcadis "Engineering Services and Civil Infrastructure Report"' Revision 02 (amended development layout) dated 14 November 2023 s4.2 Earthworks Quantities states that 78,269 cubic metres of imported material will be required to raise the existing ground levels. The 78,269 cubic metres over a period of 12 weeks equates approximately 1 truck every 2 minutes for 12 weeks. (The stated quantities do not reflect the level required to meet the 2023 design flood levels including the full 2010 Council adopted climate change criteria.)

Agreements

LP notes the amended concept engineering plans to address the FPLs including climate change set out in the 2023 Richmond Valley Flood Study increase the volume of earthworks import to 127,093 cubic metres.

The experts agree that a Traffic Management Plan should be prepared prior to the import of any material to the site which considers the hours of haulage to limit disruption to existing residents in Evans Head. Particular consideration should be given to school holidays and annual holiday periods.

The experts agree the channelised right turn lane and linemarking intersection upgrade to Woodburn Street and Wattle Street should be completed prior to the import of any material to the site to improve the functionality of the intersection.

The experts agree a dilapidation report of the existing Council road network along the identified haul route should be undertaken prior to works commencing and that any damage identified will be rectified at the Developer's expense.

The experts agree that appropriately worded consent conditions should be included to reflect these agreements.

This contention is resolved.

Disagreements

N/A

(e) The proposal is inconsistent in relation to the proposed level of roads and does not adequately take into account the future flood level projections due to the full criteria for assessing climate change not being included.

i) The Arcadis "Engineering Services and Civil Infrastructure Report' Revision 02 (amended development layout) dated 14 November 2023 Section 4.1 Site Grading states All proposed roads will be designed above the 1% AEP (100 year ARI) regional flood level inclusive of climate change allowance (RL3.0m AHD).

ii) The Martens "Flood Assessment and Flood Emergency Response Plan (FERP)" Issue 3 dated 22 November 2023 - Section 4.3 Flood Engineering Control Features dot point 2, states that the road will be constructed to RL 2.7 m AHD (300mm above the non-climate change 1% level of RL 2.4 m AHD, thereby continuing to use the non-climate change design levels (determined from modelling calibrated to historic flood events) without using the climate change levels that project into the future for long term sustainability of the development. This represents a 300mm difference in filling levels and a potential increase in the imported fill and negative impacts on the community, traffic, and existing road infrastructure.

Agreements

The experts agree that the amended concept engineering plans provide adequate allowance for climate change and future flood level projections.

Specifically, all new roads shall be designed to a minimum level of RL3.5m AHD and the finished floor level of all dwellings shall be designed to RL4.0m AHD.

This contention is resolved.

Disagreements

N/A

Signatures

Dr. Daniel Martens	Lachlan Prizeman	Brian Eggins

ATTACHMENT A – EXPERT CVS

Brian Eggins

Position

Senior Development Engineer – Richmond Valley Council

Qualifications

- Bachelor of Engineering (Civil) - Darling Downs Institute of Advanced Education (Toowoomba) –
  now University of Southern Queensland

- Graduate Diploma Local Government Engineering – University of Technology Sydney

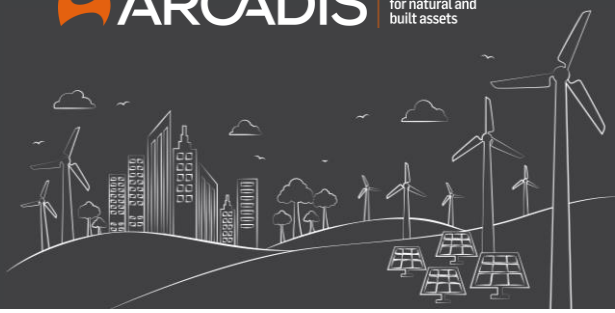
Experience

40+ years in Local Government

SENIOR CIVIL ENGINEER

LACHLAN PRIZEMAN

ARCADIS Design & Consultancy for natural and built assets



Lachlan is an experienced Engineer and Project Manager, responsible for the resourcing, planning and design delivery of significant projects in South East Queensland.

CORE SKILLS

1. Authority Approvals
2. Infrastructure Agreements
3. Civil Engineering Design
4. Flood Plain Development
5. Stormwater Quality & Quantity Assessment - Water Sensitive Urban Design
6. Design Delivery & Project Management
7. 1 & 2 Dimensional Hydraulic Flood Modelling
8. Floodplain Development – Maximising Land Use and Evacuation Procedures

QUALIFICATIONS

- Bachelor of Engineering (with Advanced Studies) – First Class Honours

MEMBERSHIPS

- Member, Institute of Engineers Australia

SUMMARY

Lachlan is currently a Senior Civil Engineer and Project Manager in the Urban Development and Regeneration team at Arcadis' Gold Coast office. He has thirteen years' experience in the civil engineering field and has a wide range of experience on projects from conception to asset handover, with a focus on Floodplain Development incorporating both Residential and Mixed-Use Development.

Lachlan has substantial and exclusive experience working on large scale, unique projects that sit outside the standard frame of design and assessment, where cookie-cutter approaches fail to achieve the required project outcomes. These include works on the Royal Pines Resort (under the Integrated Resorts Development Act), Star Casino and Destination Gold Coast (under the Jupiters Casino Act) and various projects of State Significance.

Lachlan's technical skills and management style have been engaged on numerous projects to create innovative solutions and exceed client expectations, underpinned by a strong team spirit and motivated team members.

PROJECT EXPERIENCE

Bloom Development – Coomera, QLD

Pointcorp Development Pty Ltd - Civil Engineer & Project Manager

The Bloom Development is the final stages of the Master Planned Big Sky Development, a $650 million mixed use urban development project comprising 906 residential allotments, a multi-level residential apartment building and a Commercial Centre located within the suburb of Coomera on the Gold Coast.

As the project manager, Lachlan was responsible for the civil works design management and internal commercial management of the project from concept/development approval through to detailed design and construction. Internal design reviews and a fresh approach to residential land development led to significantly improved allotment usage and presentation throughout the development, increasing the potential project revenue. Working in close conjunction with the Client, Lachlan also negotiated an Infrastructure Agreement with Council for Trunk Infrastructure works worth up to $10 million and three separate adjacent land owner agreements.

Star Casino and Hotel, The Darling Hotel – Broadbeach

Star Entertainment Group Pty Ltd – Civil & Hydraulic Engineer

Arcadis conducted the initial hydraulic assessment of the project site to assist in determining the land use options and planning the most effective development outcomes for the client. Over the following years, Arcadis produced relevant documentation to assist in the development approvals from all external stakeholders (including new bridge connection crossing the Gold Coast Light Rail and Little Tallebudgera Creek). Arcadis were engaged by Star Entertainment Group as the Principal's consultant, as well as by Probuild Construction Australia toward the end of the project to assist in closing out the bridge design and tie-in to the Gold Coast Highway.

Destination Gold Coast Development – Broadbeach Island

Destination Gold Coast Consortium Pty Ltd – Civil Engineer & Project Manager

Destination Gold Coast is a master planned development and regeneration of the Jupiter's Casino Island. The master plan will consist of five new mixed use towers on the Casino Island which fall under a special development act in Queensland. Arcadis assisted with preparing the development documents for the Master Plan, with designs including stormwater, wastewater, potable water and flood planning. This required extensive negotiations with the local authority (City of Gold Coast Council) around the water and sewer infrastructure. Lachlan assisted in negotiating a cost-effective solution for both the Client and the Council. Due to the scale and quality of the worked delivered, the Council requested Arcadis to undertake a regional wastewater catchment analysis that would benefit both Destination Gold Coast and the Council under an Infrastructure agreement. This wastewater catchment analysis will be presented to Council to include in the overall network master planning.

Australian Legend World – Carrara, QLD

Songcheng Australia Pty Ltd – Civil & Hydraulic Engineer

Australian Legend World is a proposed $600 million theme park with residential aspects in Nerang. The site was heavily limited by numerus constraints from flooding, lack of infrastructure, environmental factors and land use planning. Lachlan was responsible for organising and planning the completion of the engineering works on a tight development application schedule. The works included developing a water and sewer servicing strategy for the local area, providing an effective water quality treatment solution melding into the environmental features and ensuring that the proposed development did not cause nuisance or actionable damage to nearby properties during times of flood. Arcadis have also been involved in the stakeholders negotiations and external infrastructure upgrade considerations.

Gold Coast Parklands, Commonwealth Games Village

Economic Development Queensland – Civil & Hydraulic Engineer

Arcadis' role on the Commonwealth Games Village included the Hydrologic and Hydraulic Analysis of existing large Stormwater infrastructure and upstream catchments, including the interaction with the adjacent Gold Coast University Hospital. Arcadis also provided Assistance in design of the sporting fields and wetland bio-detention area in combination with new stormwater infrastructure to mitigate downstream impacts and convey stormwater through the development site.

Royal Pines Resort Golf Course – Benowa, QLD

RACV Pty Ltd – Civil Engineer & Project Manager

Arcadis provided Civil Engineering services to the golf course architects in the form of bulk earthworks design, sediment and erosion control, hydraulic impact assessment (including on-going flood storage analysis), construction methodology and site inspections and development approvals. The course was redeveloped for the hosting of the PGA Australian Masters Golf Tournament.

City of Gold Coast Stormwater and Flooding Resilience

City of Gold Coast – Hydraulic Engineer

Arcadis were engaged by City of Gold Coast Council to assess the drainage infrastructure of 5 catchments through the region that were tidally influenced. The catchments were constructed in a 2-D regional flood model, including significant amount of 1-D pit and pipe networks, to be assessed during a myriad of local stormwater rainfall events. During the rainfall events, several different tidal boundary conditions were used, looking at climate change predictions and sea level rise, to determine the 'flood resilience' of the some of the Gold Coast's most exposed areas.

Royal Pines Marina Concourse – Benowa, QLD

Sunland Pty Ltd – Civil Engineer & Project Manager

The Marina Concourse Development includes 6 storeys of high quality, waterfront apartments with ground level cafés, retail and leisure integrated into the marina space. Arcadis was commissioned to undertake the flooding assessment and Civil Works detailed design and construction services for the proposed development. With completion scheduled for mid-2018, Sunland's ultimate vision of development over the water was realised through Arcadis' flood infrastructure and modelling experience.

Somerset College – Merrimac, QLD

Eastview Australia Pty Ltd - Civil & Hydraulic Engineer

The sports field re-development of Somerset College involved the Hydraulic and Flood Storage modelling and impact assessments and operational works design for the general bulk earthworks and drainage channels. Arcadis created a 2D flood model of the area using survey information, digital elevation data (provided by Council) and the proposed bulk earthworks. The 2D model was then used to assess the impacts of the proposed earthworks during a range of flood events. Large upstream catchments were analysed and the existing drainage channels surrounding the site were redesigned to provide specific immunity to the new fields.

Position

Managing Director

Principal Engineer

Profession

Civil Engineering

Environmental Engineering

Environmental Science

Experience

30+ years

Education

BSc Hons1 1989 *(USyd)*
(Geomorphology, hydrology, ecology)

PhD 1996 *(USyd)*
(sewage management, stormwater, groundwater, urban hydrology)

MEngSc 1999 *(UNSW)*
(civil, waste & contamination, geotechnics, hydrology, hydrogeology)

LLB Hons 1 2017 *(MaqU)*
(environmental and planning law majors)

GradDip Legal Prac 2019 *(College of Law)*

Skills Summary

- Flooding & hydrology
- Stormwater and drainage
- Water supply & wastewater
- Geotechnics & groundwater
- Civil & traffic
- Environmental systems
- Land contamination

Contact

Suite 201, 20 George Street,
Hornsby, NSW, 2077, Australia
Ph +61-2-9476 9999

Dr Daniel Martens

LLB (Hons1), BSc (Hons1), MEngSc, PhD, GDLP, FIEAust, CPEng, NER, RPEQ
Civil, Geotechnical and Environmental Engineer, Environmental Scientist

Summary of Experience

Dr Martens maintains 30+ years experience in a range of fields which cover both environmental science and engineering. His work has included provision of advice to Local and State Government, as well as the private sector, on a diverse array of topics including: mining, infrastructure, urban land release, construction management, agriculture, environmental systems, and envionmental impact and management. He has provided expert testimony in legal proceedings relating to his various fields of expertise in the NSW Supreme Court, District Court and Land and Environment Court, as well as tribunals in NSW and the ACT.

Affiliations

FIEAust	Fellow of the Institute of Engineers Australia
CPEng	Chartered Professional Engineer
NER	Registered on the National (Australian) Engineering Register
RPEQ	Registered Professional Engineer Queensland
APEC Engineer	Registered APEC Engineer (environmental engineering)
IntPE(Aus)	International Professional Engineer
AGS	Australian Geomechanics Society
AWA	Australian Water Association
ISSMGE	Internat. Society of Soil Mechanics / Geotechnical Engineering
IAH(Aus)	International Association of Hydrogeologists Australia
SEAg	Society for Engineering in Agriculture
SSEE	Society for Sustainability and Environmental Engineering
ITE	Institute of Transportation Engineers (Australian and NZ)
Lawyer	Admitted to Supreme Court of New South Wales

Other Training

Asbestos	Conduct Asbestos Assessment Associated With Removal 2017
Traffic	Authorised Traffic Control Plan Developer (Red Card) 2015

Committees

AS/NZ 1546.2	Committee for Waterless and Composting Toilets
AS/NZ 1546.3	Committee for Aerated Wastewater Treatment Systems
AS/NZ 1547	Committee for On-site Domestic Wastewater Management

Awards

Outstanding Academic Achievement in Law, MaqU Dean of Law 2017

Runner-up Best Paper, NZ Water / Wastewater Conference, Auckland, NZ 1995

Australian Young Achievers Finalist: Land and Water Care Category 1994

Rev. A. S. McCook Memorial Scholarship for Geography 1988

Employment

1993 to date	**Martens & Associates Pty Ltd, Director, *Principal Engineer and Scientist***
	Principal engineer and scientist responsible for technical oversight of more than 9,000 projects. Technical responsibilities include civil and traffic engineering, hydrology and water resources, services delivery, environmental investigations and management, site contamination investigations and asbestos management, geotechnical investigations and design, building inspections and dilapidation survey, GIS and mapping, land capability assessment, environmental planning and impact assessment, hydrogeology, modelling and process simulation.
2000 to 2015	**Ecowerks Engineering Pty Ltd, Director, *Principal Engineer and Scientist***
	Responsible for the design and construction of water management infrastructure facilities such as: sewage treatment plants, stormwater systems, and water and sewer servicing infrastructure.
1995 to 1996	**Environmental Technology Service Pty Ltd, Director, *Principal Engineer and Scientist***
	Supervising environmental scientist / engineer responsible for co-ordination of the functional design of digital terrain based hydrological transport models (water, sediment and contaminants) and algorithms for the incorporation into environmental software (TCM-Manager™).
1990 - 1995	**University of Sydney, *Casual Lecturer***
	Teaching duties included: computer simulation in geomorphology; statistical methods in water resources; GIS; fluvial geomorphology (morphology and sedimentology); hydrographic survey and hydrological processes; soil science, water-quality and pollution in urban and rural regions of eastern Australia; environmental impact assessment.
1989 to 1990	**University of Sydney, *Research Assistant***
	Morphometric and hydraulic studies and hydrographic surveys of the Bellinger, Clarence and Hawkesbury River systems. Work included river cross-sectional surveys, velocity and discharge profile measurements and gauging. Other research concerned the detection of tectonic movements in the East Australian Highlands, including field and mapping studies. At the Macintosh Centre for Quaternary Dating, tasks included geomorphological descriptions and areal photo interpretations of Tasmanian river systems.

Fields of Expertise and Competency

Hydrology, Flooding and Drainage	Including: mapping hydrological systems, river / stream gauging and flow assessment, hydrographic survey and instrumentation, flood forecasting and modelling, floodplain management strategies, technical review of modelling undertaken by others, stormwater and drainage system design, inspection and auditing of stormater drainage systems, water sensitive urban design (WSUD), and surface water quality management systems. Includes 300 + flood investigations and 500 + stormwater and drainage system investigations.
Water Supply	Incuding: demand analysis, raw water capture, pumping systems, agricultural supply, urban supply, demand analysis, reticulation systems and networks, hydraulic analysis, reservoirs and storages, dam and embankment design, and water treatment.
Wastewater Management & Sewerage Systems	Including: sewage generation / yield investigation, infrastructure planning, sewer reticulation systems design, sewage pumping stations, wet-weather flow management, risk management, hydraulic analysis, wastewater treatment plant design, effluent disposal and beneficial re-use, construction supervision.
Traffic Engineering	Including: traffic generation and impact assessment, parking, intersection and network modelling, swept path design and analysis, and dilapidation survey.
Civil Engineering	Including: civil project planning such as feasibilty and constraints analysis, cost assessment and options analysis; civil design such as, sub-division layout, roads and pavements, drainage, retaining structures, earthworks; design and planning of erosion and sediment control structures; construction management plans; and construction environmental management plans.

Geotechnical Engineering	Site investigations, including: drilling techniques, sampling, monitoring and remediation. Foundations, including: site testing, design, and settlement analysis. Excavations, including: design, shoring systems, risk analysis, and groundwater management. Slope stability assessment, including: site investigation, risk assessment, site remediation, modelling. Pavements, including: investigation, design and re-instatement.
Dilapidaton Survey	Inspection and dilapidation surveys of buildings, roads, civil structures, shoring and retaining systems, footings and foundations.
Land Contamination	Includes review of, undertaking, supervision or oversight of numerous land contamination investigations. Works include for example: preliminary risk assessments, detailed soil contamination investigations, remediation action plans, asbestos management plans, and assessment of impact of land contamination.
Hydrogeology	Most areas of hydrologeology, including undertaking or supervising 100+ field or modelling investigations. Works include for example: bore field installation and monitoring, development of aquifer properties, groundwater quality monitoring, groundwater modelling, impact assessment, and pump testing.
Coastal Processes and Engineering	Includes mapping of coastal systems, assessment of nearshore coastal processes (eg. waves, currents, tides, storm surge, sediment transport, coastal erosion and recession, sea level rise impacts, rainfall etc) and design of structures / works (eg. seawalls, revetnments, groynes, beach and dune stabilisation etc).
Environmental Systems and Processes	Some 300 + environmental investigations covering: coastal systems and processes; estuarine systems; fluvial and riverine systems and processes; riparian corridor identification and management; soil processes; salinity investigations and management plans; geological and geomorphological processes; environmental monitoring, planning and modelling.

Other Skills

Aerial Photo Interpretation	Mapping: land clearing and soil erosion; earthworks including cut and filling operations; hydrological systems; and land cover classification.
Soil Survey	Soil survey including: establishment of sample sites, physiochemical sampling, laboratory processing and mapping.
Programming	Python, Visual Basic, Pascal, Assembly, Fortran, C++.
GIS/CAD	12D, AutoCAD, BricsCAD, TurboCAD, QGIS, IDRISI, ARC/INFO, ERDAS, MapInfo.

ATTACHMENT B – TTM TRAFFIC ASSESSMENT

17 April 2024
Our Ref: 24GCT0055_LT01B

Attention: Lachlan Prizeman

C/- Corrs Chambers Westgarth
By Email

Dear Lachlan,

RE: Iron Gates Development, Evans Heads – Amended Design Submission

1. Introduction

TTM Consulting Pty Ltd (TTM) has been engaged to undertake a traffic assessment for the Iron Gates Development in support of the amended design submission to Richmond Valley Council. TTM has undertaken a traffic study for the proposed residential lot subdivision based on the revised Iron Gates residential subdivision development application in Evans Heads. This assessment aims to discuss the proposed access road capacity including treatment required and impact on the local network.

This assessment has been undertaken in response to Council's Amended Statement of Facts and Contentions dated 7 March 2024, in particular:

- Contention 5(k)(iv), which states:

  It has not been demonstrated that the unsignalised T intersection where Iron Gates Drive meets Road 01 & Road 02 at the south-eastern corner of the site meets the geometric design and safety requirements set out in Austroads Guide to Road Design. A Traffic Impact Assessment has not been undertaken in relation to the Amended Proposal.

- Contention 14(d), which states:

  The proposal fails to address the negative impacts on the existing road infrastructure, and the amenity of the residents along the haul route. The Arcadis "Engineering Services and Civil Infrastructure Report"' Revision 02 (amended development layout) dated 14 November 2023 s4.2 Earthworks Quantities states that 78,269 cubic metres of imported material will be required to raise the existing ground levels. The 78,269 cubic metres over a period of 12 weeks equates approximately 1 truck every 2 minutes for 12 weeks. (The stated quantities do not reflect the level

required to meet the 2023 design flood levels including the full 2010 Council adopted climate change criteria).

2. Site Location

The site is located along Iron Gates Drive, located approximately 2km west of Evans Head NSW. The property description of the development is Lot 163 DP 831052, Lots 276 and 277 DP 755624, Crown Road Reserve between Lots 163 DP 831052 and Lot 276 DP 755724, and Iron Gates Drive, Evans Head NSW.

The site is currently zoned for General Residential and Environmental Conservation uses according to the Richmond Valley Local Environmental Pan 2012 and is currently provided access from Iron Gates Drive.

3. Development Description

The development is a concept proposal for residential subdivision of the site and the carrying out of subdivision works for Stage 1. Stage 1 will involve the creation of:

- 121 Residential lots
- 1 lot for a community refuge building
- Additional lots for public open space and conservation purposes
- Internal roads
- Upgrading of Iron Gates Drive.

Stage 2, if ultimately developed in accordance with the concept proposal, would involve the creation of a further 17 residential lots, for a total of 138 residential lots across the site.

4. Estimated Development Traffic Generation

TTM has estimated the expected peak hour trip generation for the proposed development. It is worth noting that the proposal is not a traffic generating development under the Transport and Infrastructure SEPP.

TfNSW's Guide to Traffic Generating Developments Updated traffic surveys (2013) recommends using specific generation rates, for planning purposes, for different development types. Application of these rates to the proposed development, results in the estimate of development site traffic generation, as shown in Table 1.

An in:out split of 20:80 for the morning peak period and 70:30 for the evening peak period has been assumed for the proposed residential dwellings. In the morning peak hour, there tends to be significant outbound trips as residents leave for work or other activities, resulting in a higher proportion of vehicles exiting the residential area. Conversely, in the evening peak hour, there is typically higher inbound trips as residents return home, which leads to a higher proportion of vehicles entering the residential area. Due to different work end times, the percentage of inbound trips during the evening peak hour (70%) is not same as the percentage of outbound trips during the morning peak hour (80%).

TTM understands that development consent for the construction of dwellings is not being sought as part of the current proposal. TTM also understands that the Richmond Valley Local Environmental Plan 2012 contains provisions that allow dual occupancies to be erected on sufficiently large lots in the General Residential zone.

TTM does not know whether any dual occupancies are intended for the future development of the site. However, a conservative assumption has been made for the purposes of this assessment that 55 of the residential lots (i.e., approximately 40%) would be developed as dual occupancies, to ensure that this potentiality is captured by the trip generation data.

TTM has undertaken the peak hour trip and daily trip generation estimation based on the maximum dwelling yield across the site.

Table 1: Peak Hour Trip Generation

Land Use	TfNSW Trip Rate	Extent	Trip Generation	In:Out Split	In:Out Trips
Morning Peak Hour					
Regional Area Dwelling	0.78 trips per dwelling	83 dwellings	59	20:80	12:47
Dual Occupancy	0.6 trips per dwelling	55 dual occupancies (110 dwellings)	66	20:80	13:53
Total			**125**		**25:100**
Evening Peak Hour					
Regional Area Dwelling	0.71 trips per dwelling	83 dwellings	65	70:30	45:20
Dual Occupancy	0.6 trips per dwelling	55 dual occupancies (110 dwellings)	66	70:30	46:20
Total			**131 trips**		**91:40**

Table 2: Daily Trip Generation

Land Use	TfNSW Daily Trip Rate	Extent	Daily Trip Generation
Regional Area Dwelling	7.4 trips per dwelling	83 dwellings	615
Dual Occupancy	6 trips per dwelling	55 dual occupancies (110 dwellings)	660
Total			**1,275 trips**

Based on the above, the proposed development is expected to generate 1,275 daily vehicle trips, 125 trips in AM peak hour and 131 trips in PM peak hour. All vehicular trips would access the site via Iron Gates Drive.

5. Trip Distribution of Generated Traffic

TTM has estimated the distribution of development traffic and the resulting turning volumes at the Iron Gates Drive/Site Access Intersection and Woodburn Street/Wattle Street intersection. TTM acknowledges that the estimated traffic represents a worst-case scenario for the Woodburn Street/Wattle Street intersection, considering that some traffic may divert onto Cypress Street or Cedar Street. Figures 1 and 2 illustrate the percentage distribution of development trips and traffic volume at the Iron Gates Drive/Site Access Intersection and Woodburn Street/Wattle Street intersection.

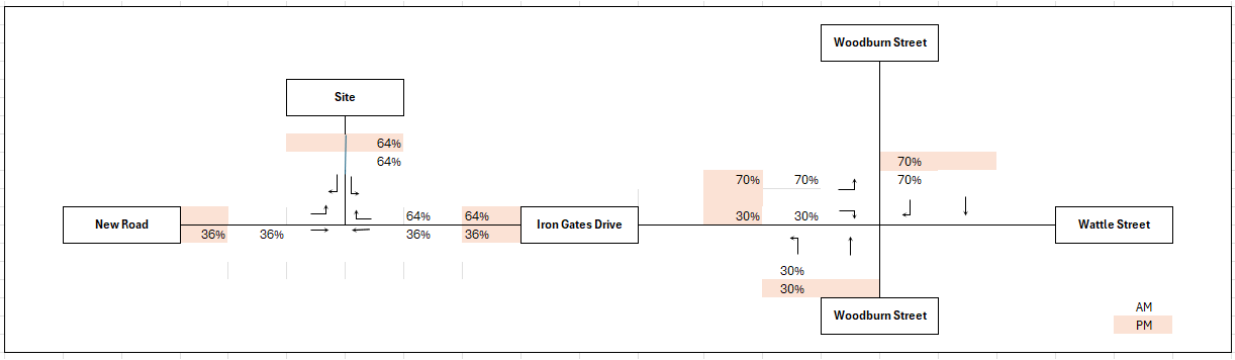


Figure 1: Assumed percentage for development traffic distribution

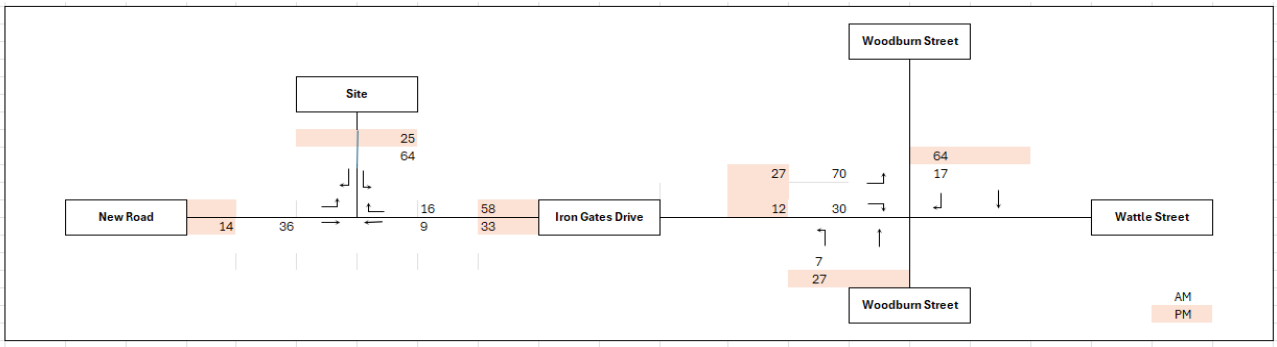


Figure 2: Estimated development traffic volume into the nearest intersection.

6. Existing Peak Hour Traffic Volume

TTM has been provided AADT data from the Richmond Valley Council along Woodburn Street, as follows:

- Year 2007 – 3,505 AADT
- Year 2017 – 4,570 AADT

This increase in AADT between 2007 and 2017 corresponds to an average background traffic increase of 2.7% per annum.

TTM has estimated the base traffic for the 2024 scenario to be an AADT of 5,507 vehicles per day (vpd). This would correspond to volumes of 276 vehicles in each direction on Woodburn Street during peak hours (i.e., 10% of daily traffic during peak hours with a 50:50 split).

Currently, Iron Gates Drive is a no-through road near the proposed site. Given that there is no other development along Iron Gates Drive between the proposed site access and Cherry Street, it can be assumed that there is no traffic on this section of Iron Gates Drive.

Wattle Street serves as a link between Iron Gates Drive and Woodburn Street. There are several dwellings on both sides of Wattle Street, generating traffic volume towards the Wattle Street/Woodburn Street Intersection. Due to the lack of available traffic volume data on Wattle Street, TTM conducted a Lot count on both sides of Wattle Street between Chashmore Street and Booyong Street. It is assumed that 50% of these dwellings use Wattle Street, while the remaining 50% use Booyong Street and Chashmore Street. Taking this into account, Wattle Street accommodates trips from 65 dwellings, resulting in 47 trips during the morning peak and 51 trips during the afternoon peak.

Considering the above, the existing turning volumes at the Wattle Street/Woodburn Street Intersection and the Site Access/Iron Gates Drive Intersection are depicted in Figure 3

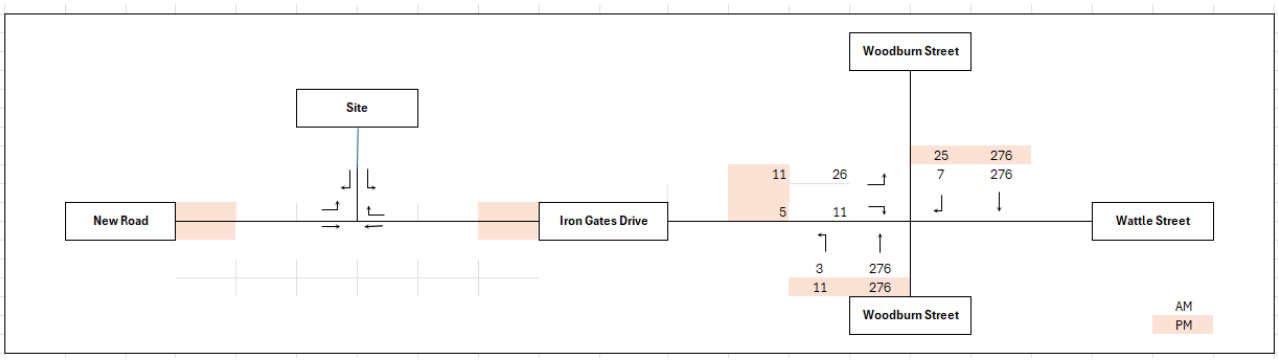


Figure 3: Existing turning volume at the intersections during peak hours of 2024

7. Peak Hour Traffic Volume during the design year (2034)

TTM has estimated the 2034 base case through traffic on Woodburn Street and the turning volume from Wattle Street onto Woodburn Street by applying a compounding growth factor of 2.7% over a span of 10 years from 2024. The 2034 project case has subsequently been derived from the sum of the development-generated traffic and the 2034 base case scenario. Figures 4 and 5 illustrate the turning volumes at the two intersections during morning and afternoon peak hours in 2034, respectively.

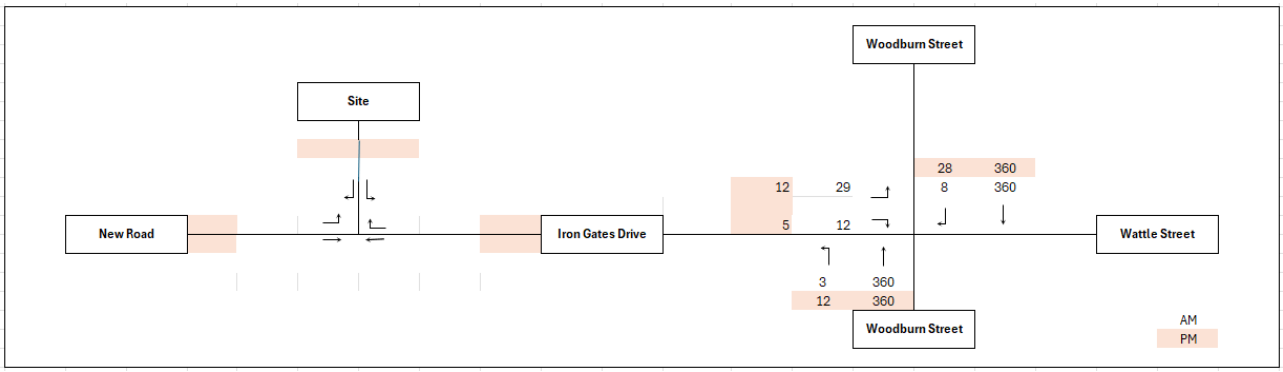


Figure 4: Estimated Traffic Movements for Background Traffic 2034 Design Year

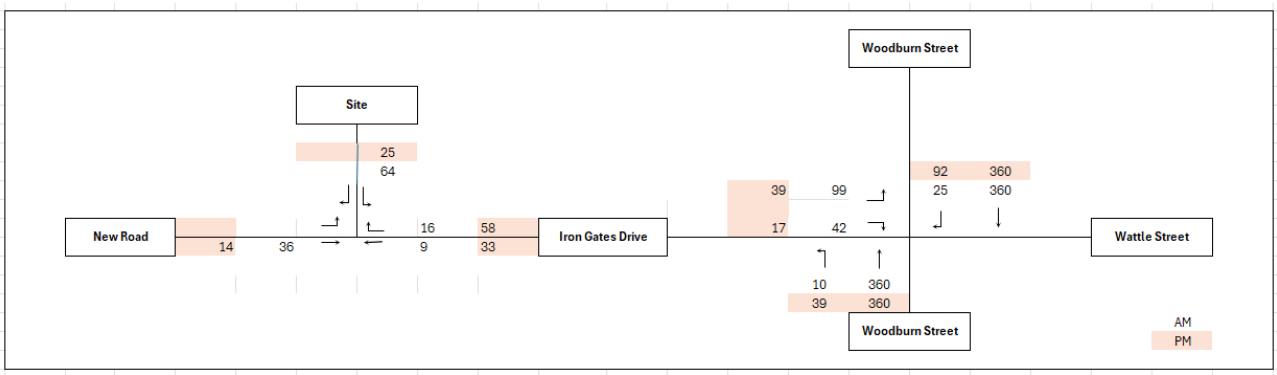


Figure 5: Estimated Traffic Movements for Development Generated Traffic 2034 Design Year

8. Turn Warrant Assessment for the nearest Intersections

TTM has conducted a turn warrant assessment for the future 2034 project design year at the Iron Gates Drive/Site Access Intersection and Woodburn Street/Wattle Street intersection, as depicted in Figure 6 and Figure 7.

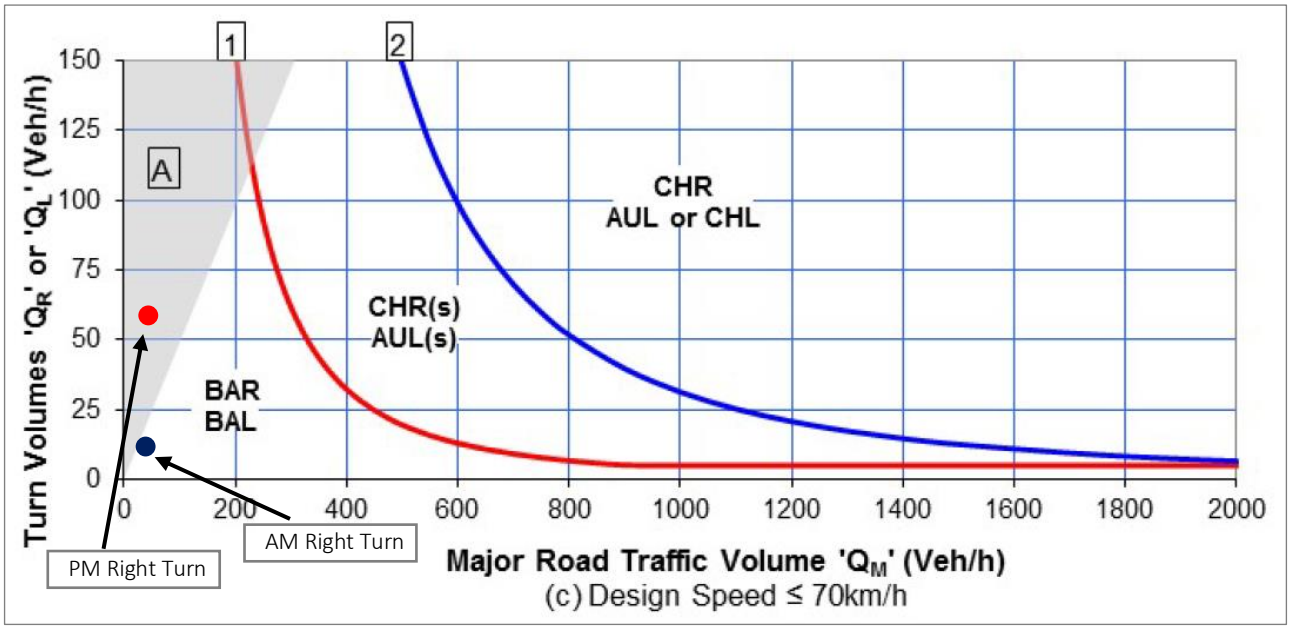


Figure 6: Turn treatment assessment for Site Access/ Iron Gates Drive Intersection in the design year 2034

The assessment of the right turn treatment for Site Access/Iron Gates Drive, as depicted in Figure 6, indicates that a Basic Right (BAR) turn facility is sufficient to accommodate the right-turning volume at this intersection. The BAR turn facility should incorporate extra space on the roadway for through traffic movement when the lane is occupied by a right-turning vehicle. Consequently, turn treatments such as Channelised Right (CHR) are not warranted.

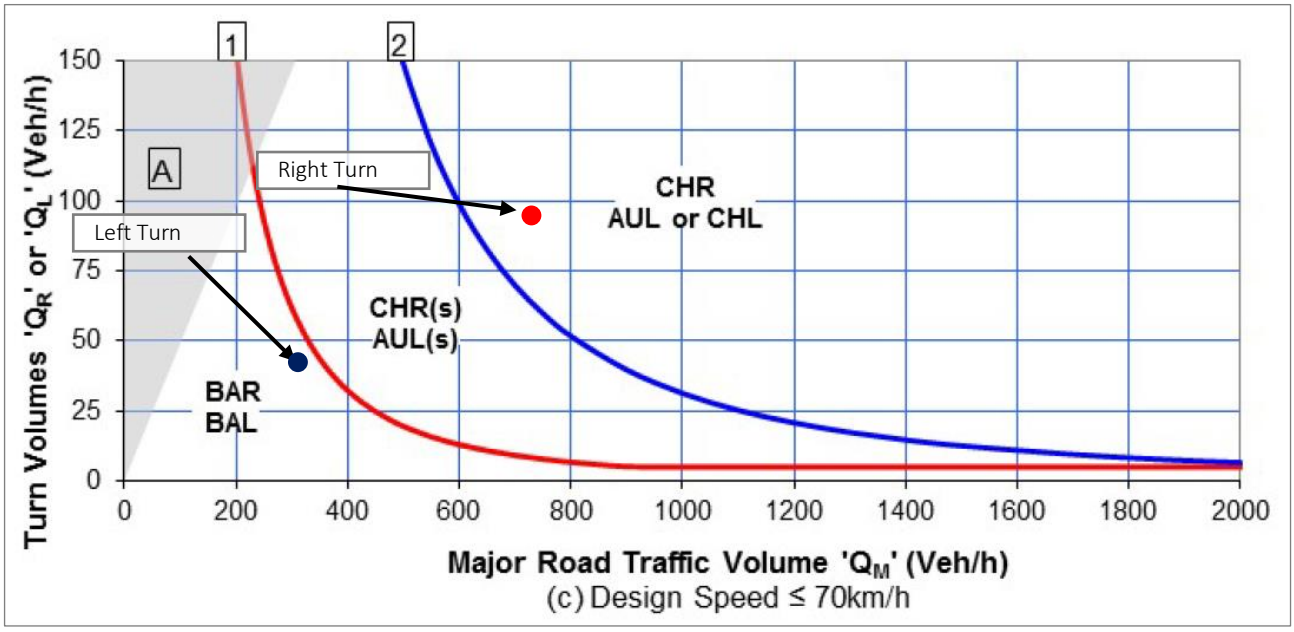


Figure 7: Turn treatment assessment for Woodburn Street / Wattle Street Intersection in the design year 2034

The assessment of turn treatments for right turns from southbound Woodburn Street to Wattle Street indicates the necessity of a Channelised Right Turn (CHR), while a Basic Left Turn (BAL) facility is deemed sufficient for left turns from northbound Woodburn Street to Wattle Street. TTM recommends incorporating a CHR turning treatment into the design of the Woodburn Street/Wattle Street intersection. This turning treatment is expected to be achievable through line marking and should be implemented before the completion of the development. Refer to Appendix B for the concept functional layout incorporating the required CHR treatment on Woodburn Street. As the updated concept proposal for the development (Appendix A) is expected to generate comparatively less traffic than the previous proposal, the functional layout provided in the previous traffic letter dated July 17, 2019 (refer Appendix B of this letter), can be retained.

9. Impact of the surrounding network due to bulk earthwork traffic

Arcadis has notified TTM that the bulk earthworks are expected to last 10 weeks, involving imports of 127,311m^3 conducted 6 days a week for 9 hours per day, with an anticipated total of 108 truck trips each way daily. This equates to a maximum average rate of 12 trucks per hour inbound and 12 trucks outbound.

Additionally, TTM has been informed that deliveries will be facilitated by Truck & Dogs (19m) from the Doonbah Quarry, located 5km west of Evans Head, utilising the route via Evans Head – Woodburn Road and then proceeding via Wattle Street. Consequently, all delivery traffic will pass through the Iron Gates Drive/Site Access Intersection and Woodburn Street/Wattle Street intersection.

The trip distribution for bulk earthworks and turning volumes at the intersection during this activity are depicted in Figures 8 and 9.

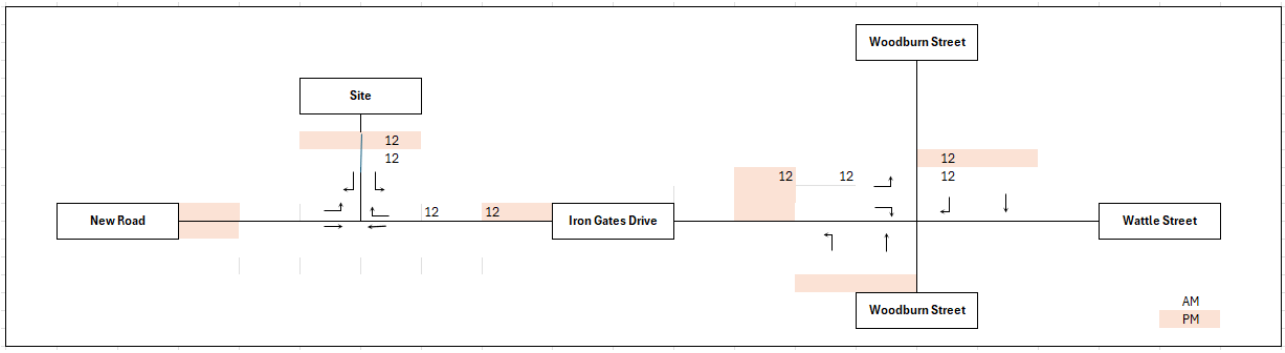


Figure 8: Bulk earthwork traffic distribution during peak hours

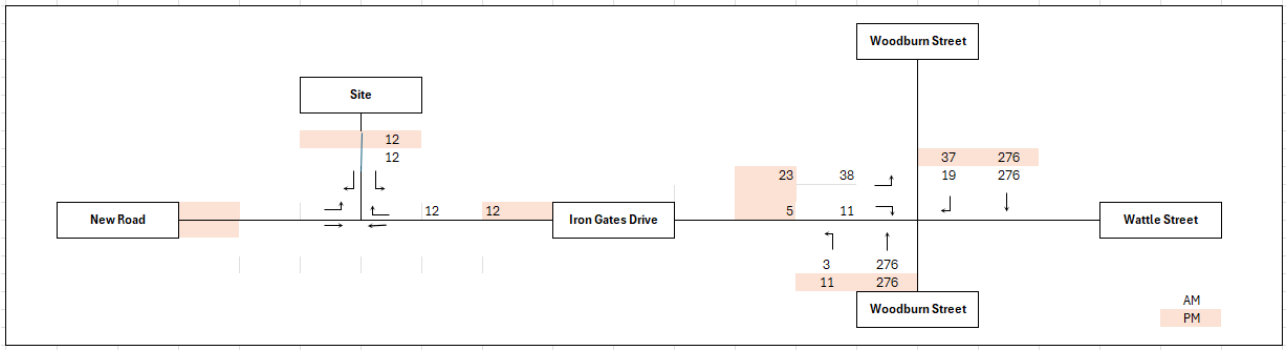


Figure 9: Peak hour Turn volume at the intersection during bulk earthwork

Given the low traffic flow anticipated at the Iron Gates Drive/Site Access Intersection during bulk earthworks, a turn warrant assessment is deemed unnecessary as there would be no residential traffic movement at this intersection during that period.

TTM has conducted a turn warrant assessment specifically for the right turns from the northern approach (Woodburn Street) at the Woodburn Street/Wattle Street Intersection, considering scenarios with and without bulk earthwork traffic. These assessments are depicted in Figure 10 and Figure 11, respectively.

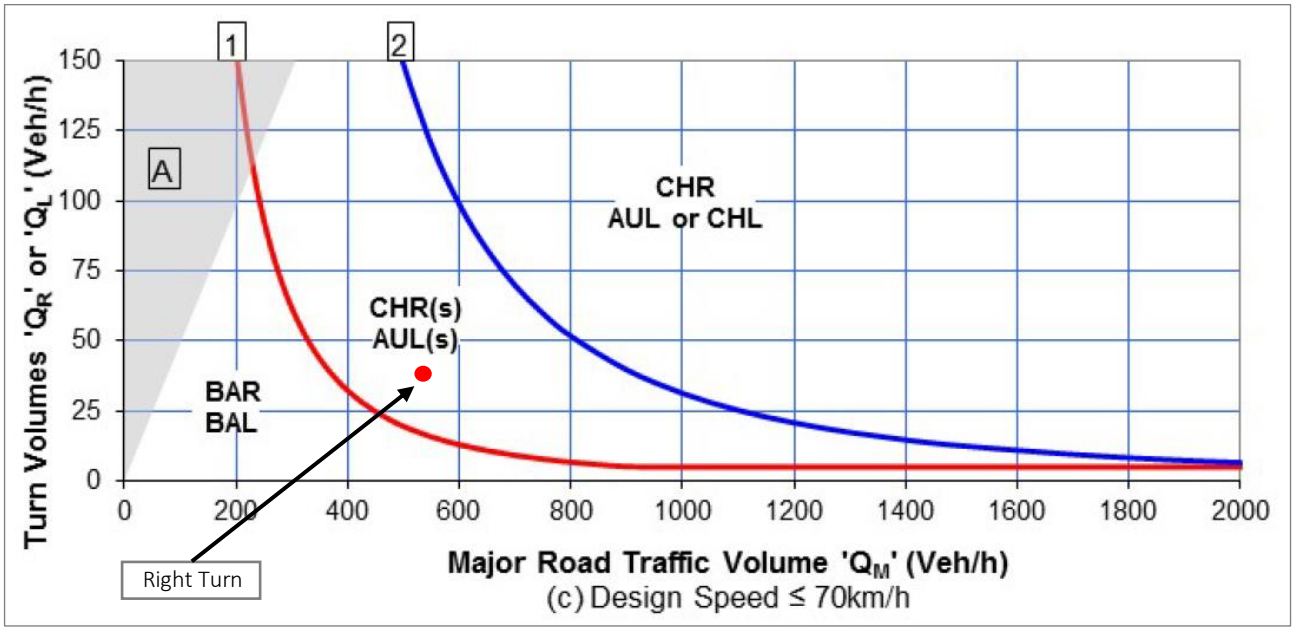


Figure 10: Turn Warrant Assessment for Woodburn Street / Wattle Street Intersection during Bulk Earthworks

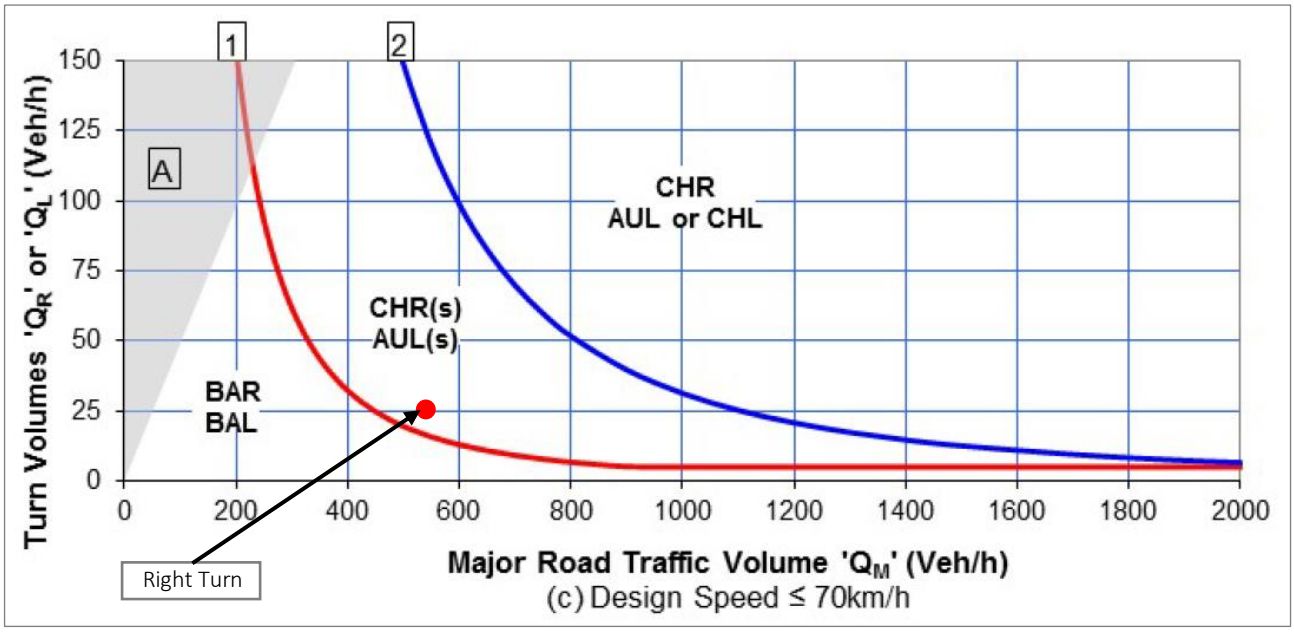


Figure 11: Turn Warrant Assessment for Woodburn Street / Wattle Street Intersection in existing condition

Following the turn warrant assessment, it is determined that a channelised right turn treatment is necessary for right turn movements from southbound Woodburn Road. However, the need for this turn warrant treatment is not triggered by bulk earthwork traffic but by the existing traffic conditions. Nevertheless, considering the temporary nature of the works and the resulting low traffic volume, coupled with the operational status of the current basic right (BAR) turning treatment, a channelised right turn treatment specifically due to bulk earthwork is deemed unnecessary.

TTM acknowledges that Woodburn Street currently features a 22m wide carriageway, including two 11m wide through lanes (which also accommodate informal car parking). This width provides ample space for a through vehicle to pass a waiting right-turning vehicle, effectively functioning as a BAR treatment. Therefore, TTM concludes that the existing intersection design is adequate to accommodate the traffic associated with the proposed bulk earthworks.

10. Conclusion

Based on the assessment outlined in this letter, it is determined that the proposed road Site Access/Iron Gates Drive can sufficiently handle the traffic generated by the development without requiring additional turn treatments at the intersection. The bulk earthwork is not expected to have a significant impact on the surrounding road network, as it is suitably designed to accommodate the anticipated development traffic.

TTM recommends the installation of a channelised right-turn facility on the northern approach of the Woodburn Street/Wattle Street Intersection before the completion of the development, in accordance with the concept plan of the intersection functional layout provided in Appendix B.

Yours sincerely,

Mahmud Hasan
Lead Consultant

TTM Consulting Pty Ltd

Appendix A Proposed Site Plan

Last saved by THOMAS.WONG on 9/11/2023 at 4:05:20 PM

Lot	Area (sqm)
1	635
2	602
3	602
4	602
5	602
6	602
7	602
8	602
9	602
10	602
11	602
12	628
13	600
14	600
15	628
16	602
17	602
18	602
19	602
20	602
21	602
22	602
23	602
24	602
25	602
26	602
27	740
28	604
29	602
30	602
31	602
32	602
33	602
34	602
35	628
36	600
37	600
38	628
39	602
40	602
41	602
42	602
43	602
44	795
45	631
46	603
47	603
48	603
49	603
50	603
51	618
52	606
53	621
54	624
55	614
56	663
57	607
58	618
59	603
60	603
61	603
62	603
63	702
64	718
65	653
66	630
67	633
68	634
69	635
70	634
71	634
72	633
73	627
74	616
75	605
76	601
77	602

Lot	Area (sqm)
78	609
79	625
80	614
81	603
82	603
83	603
84	603
85	603
86	603
87	603
88	603
89	650
90	618
91	618
92	618
93	651
94	627
95	624
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97	654
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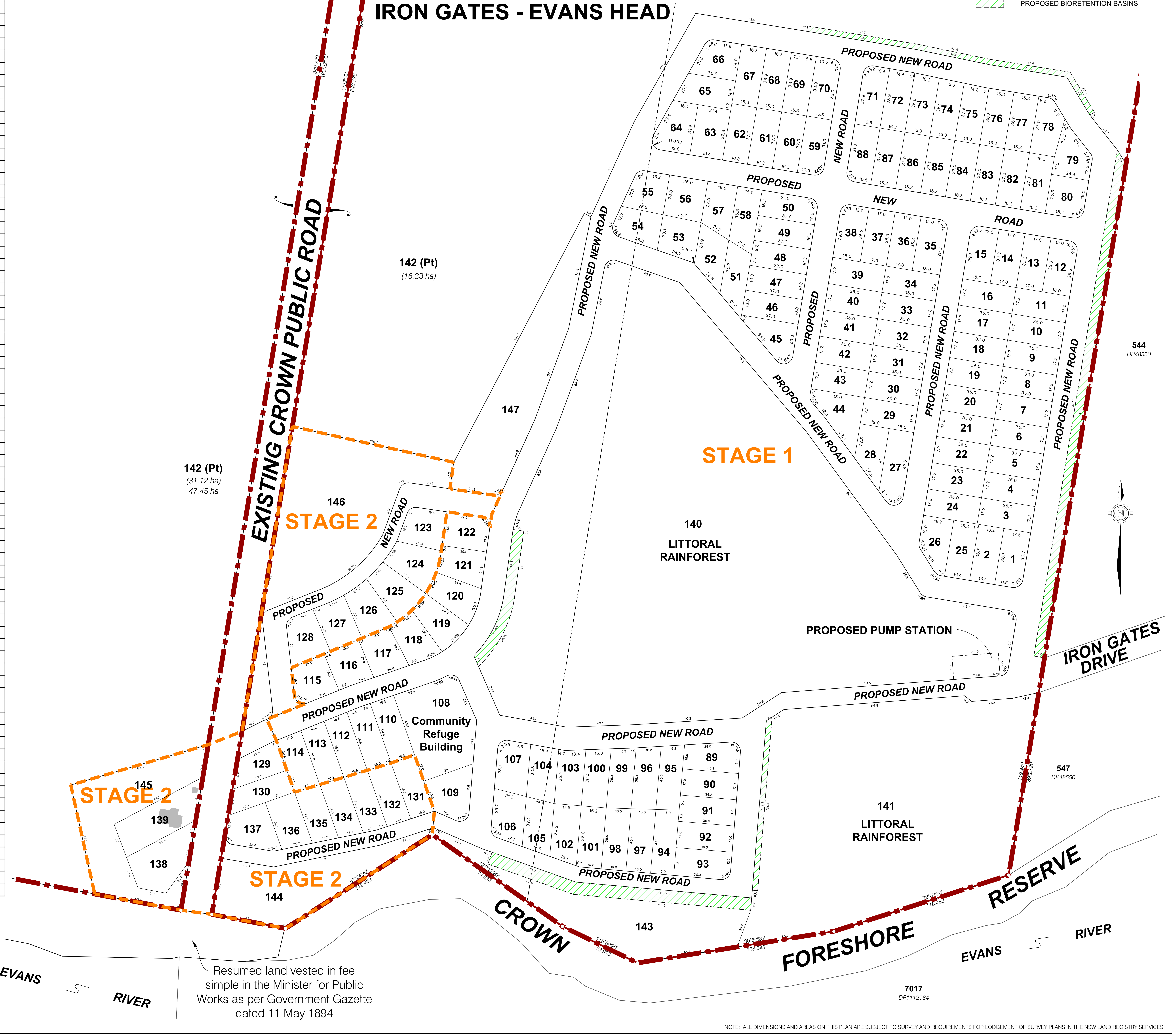
125	714
126	689
127	650
128	683
129	603
130	619
131	614
132	615
133	608
134	603
135	607
136	671
137	774
138	1140
139	1300
140	57187
141	23199
142	474503
143	6150
144	3727
145	3949
146	8190
147	4982

CONCEPT PROPOSAL FOR SUBDIVISION - DA 2015/0096- STAGE 1 & 2 IRON GATES - EVANS HEAD



NOTE: ALL DIMENSIONS AND AREAS ON THIS PLAN ARE SUBJECT TO SURVEY AND REQUIREMENTS FOR LODGEMENT OF SURVEY PLANS IN THE NSW LAND REGISTRY SERVICES.

CLIENT

GOLDCORAL PTY LTD

PROJECT

PROPOSED SUBDIVISION OF
LOTS 276 & 277 ON DP755624,
LOT 163 ON DP831052, AND CROWN
PUBLIC ROAD RESERVE (BETWEEN LOT
163 DP831052 AND LOT 276 DP755624)

LOCAL AUTHORITY

RICHMOND VALLEY

NOTES

(i) This plan was prepared for the purpose and exclusive use of GOLDCORAL PTY LTD to accompany an application to RICHMOND VALLEY for approval to reconfigure the land described in this plan and is not to be used for any other purpose or by any other person or corporation. LandPartners Pty Ltd accepts no responsibility for any loss or damage suffered howsoever arising to any person or corporation who may use or rely on this plan in contravention of the terms of this clause or clauses (ii) or (iii) hereof.

(ii) The dimensions, areas, number of lots, size and location of improvements & flood information (if shown) are approximate only and may vary.

(iii) This plan may not be copied unless these notes are included.

LOTS	TOTAL AREA
Torrens Title Lots (9)	58.1887ha
Road Reserve	5.1209ha
Residential Lots (138)	8.7531ha
TOTAL	72.0627ha

ADDITIONAL NOTES

SCALE BAR
0 5 10 20 30 50 80m
SCALE 1:1250 @ A1

LANDPARTNERS
surveyors and planners

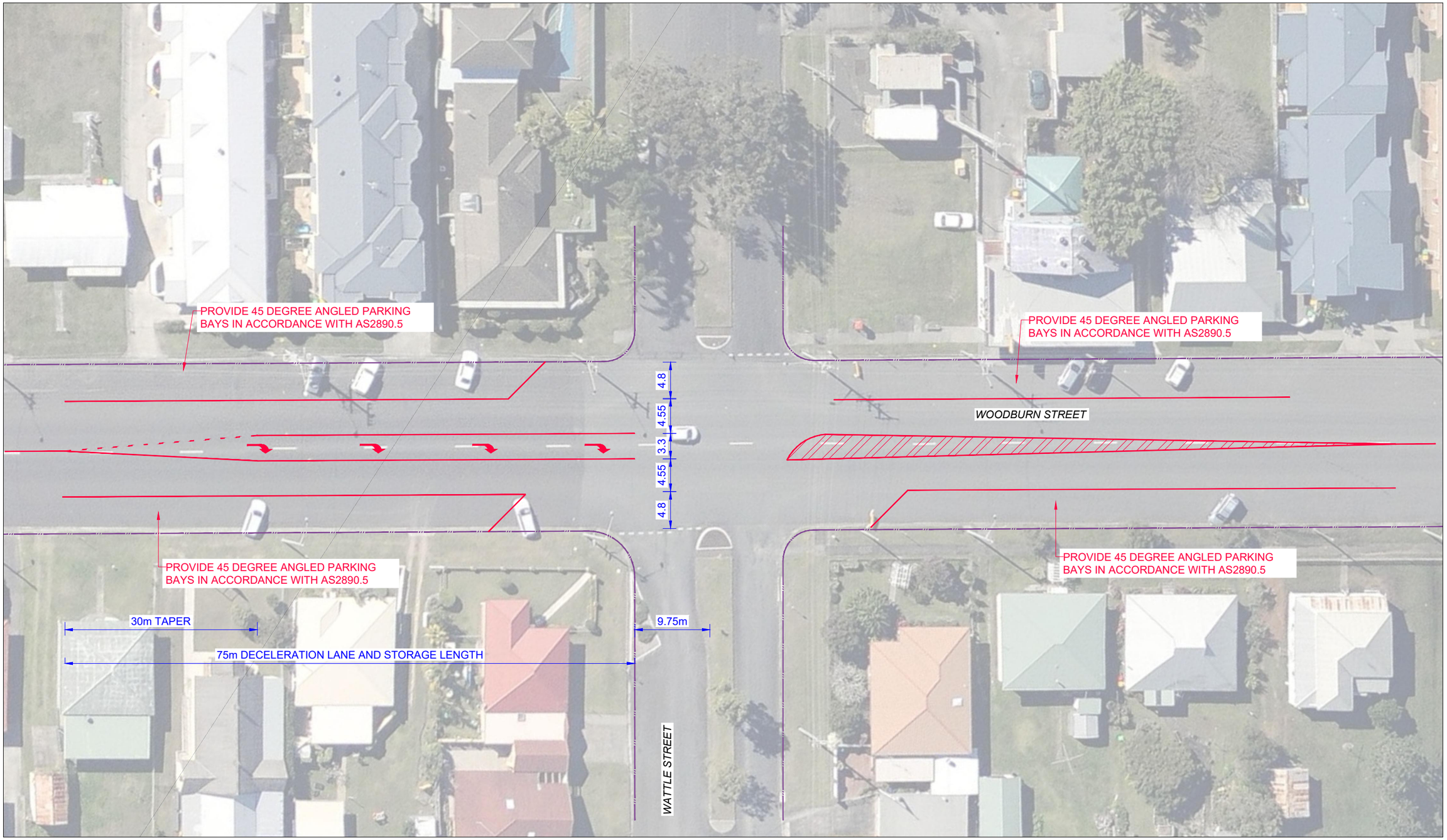
Brisbane Office
Level 1
18 Little Cribb Street
Milton Qld 4064
PO Box 1399
Milton Qld 4064
p: (07) 3842 1000
e: info@landpartners.com.au
w: www.landpartners.com.au

ISO 9001 Quality Management Systems CERTIFIED
ISO 45001 Occupational Health and Safety Management CERTIFIED
AS/NZS 4801 Occupational Health and Safety CERTIFIED

LEVEL DATUM	AHD
LEVEL ORIGIN	-
CONTOUR INTERVAL	-
COMPUTER FILE	BRJD6396-100-33-26
DRAWN AJD	DATE 09/11/2023
CHECKED CGW	DATE 09/11/2023
APPROVED CGW	DATE -
PLAN NUMBER SHEET 2 OF 2 BRJD6396-100-55	REV 4

CGW

Appendix B Concept Functional Layout of the Intersection



PRELIMINARY

ISSUED FOR COMMENT ONLY

REV.	DATE	AMENDMENT DESCRIPTION	DRAWN	CHECKED	APPROVED
A	12-04-24	REISSUE	HY	MH	RJ
A	05-07-19	ORIGINAL ISSUE	LD	BB	BB

SCALE 0 2.5 5 7.5 10 12.5m

SCALE 1:250 AT ORIGINAL SIZE

NORTH

CLIENT

ARCADIS

TTM CONSULTING PTY LTD
ABN 65 010 868 621
41A Quay Street, Sanctuary Cove, QLD, 4212
P.O. BOX 930, Sanctuary Cove, QLD, 4212
T: (07) 5514 8000 F: (07) 5514 8144
E: ttmgc@ttmgroup.com.au W: www.ttmgroup.com.au

PROJECT: **IRON GATES DEVELOPMENT**

DRAWING TITLE: **FUNCTIONAL LAYOUT WOODBURN STREET & WATTLE STREET**

PROJECT NUMBER	ORIGINAL SIZE
24GCT0055	A3
DRAWING NUMBER	REVISION
24GCT0055-01	A
DATE	SHEET
12 Apr 2024	1 OF 1

z:\gc\19gct\19gct0119 iron gates development\3 - plans\ttm\19 07 05 - chr(s) linemarking\19gct0119 - copy.dwg

ATTACHMENT C – AMENDED CONCEPT ENGINEERING PLANS

LEGEND

- PROPOSED CONTOUR (5.0)
- EXISTING CONTOUR (5.0)
- BUILDING PAD
- PROPOSED MOUNTABLE KERB / LAYBACK KERB
- PROPOSED BARRIER KERB & CHANNEL
- PROPOSED SEMI-MOUNTABLE KERB
- PROPOSED EDGE RESTRAIN KERB
- DIVERSION CHANNEL (DC)
- NOMINAL KERB LINE
- EARTHWORKS EXTENTS
- LITTORAL RAINFOREST BUFFER
- PROPOSED RETAINING WALL (MAX 1.5m)
- PROPOSED GABION WALL
- STAGE BOUNDARY
- MIDDEN LOCATION
- EARTHWORKS CUT
- EARTHWORKS FILL

BULK EARTHWORKS VOLUMES

TOTAL CUT	-30, 792m^3
TOTAL FILL	158,103m^3
TOTAL BALANCE (IMPORT)	127, 311m^3

NOTES:

1. EARTHWORKS VOLUMES HAVE BEEN CALCULATED BETWEEN THE EXISTING SURVEY SURFACE AND DESIGN EARTHWORKS SURFACE.
2. VOLUMES ARE APPROXIMATE ONLY AND DO NOT TAKE INTO ACCOUNT THE FOLLOWING:
   - BULKING FACTORS
   - RETAINING WALL BACKFILL
   - SEDIMENT AND EROSION CONTROL BASINS AND DRAINS
   - EXCAVATION FOR FUTURE BUILDING, CIVIL INFRASTRUCTURE OR LANDSCAPING WORKS.

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	GP	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales

0 30 60 90 120 150m

1 : 1500

Surveyor: ROBERT A HARRIES SURVEYOR

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL

Original Issue Signatures

Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: BULK EARTHWORKS PLAN OVERALL

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0100

Issue: 03

Date Plotted: 15 Apr 2024 - 10:41PM File Name: C:\Users\lpaz2589\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0100-BulkEarthworksPlan_Overall.dwg

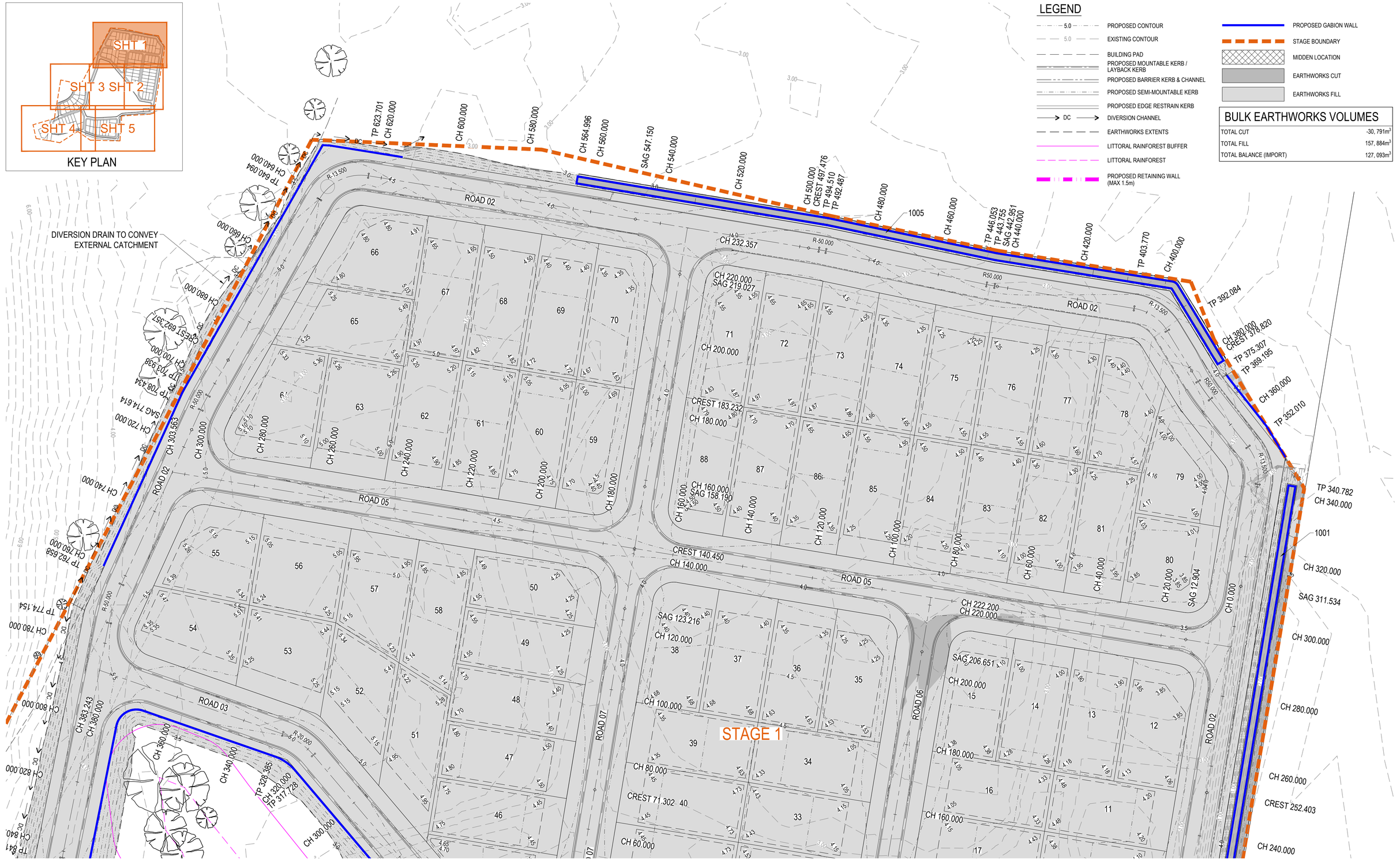
KEY PLAN

LEGEND

- PROPOSED CONTOUR
- EXISTING CONTOUR
- BUILDING PAD
- PROPOSED MOUNTABLE KERB / LAYBACK KERB
- PROPOSED BARRIER KERB & CHANNEL
- PROPOSED SEMI-MOUNTABLE KERB
- PROPOSED EDGE RESTRAIN KERB
- DC DIVERSION CHANNEL
- EARTHWORKS EXTENTS
- LITTORAL RAINFOREST BUFFER
- LITTORAL RAINFOREST
- PROPOSED RETAINING WALL (MAX 1.5m)
- PROPOSED GABION WALL
- STAGE BOUNDARY
- MIDDEN LOCATION
- EARTHWORKS CUT
- EARTHWORKS FILL

BULK EARTHWORKS VOLUMES

TOTAL CUT	-30, 791m^3
TOTAL FILL	157, 884m^3
TOTAL BALANCE (IMPORT)	127, 093m^3



Issue	Description	DR	CH	VE	Date
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02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales

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1 : 500

Surveyor

ROBERT A HARRIES
SURVEYOR

Client

GOLDCORAL PTY LTD

Status

FOR APPROVAL

Original Issue Signatures			
Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project

RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title

BULK EARTHWORKS
CUT AND FILL PLAN
SHEET 1

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
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ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number	30180356

Drawing No.	Issue
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LEGEND

- PROPOSED CONTOUR (5.0)
- EXISTING CONTOUR (5.0)
- BUILDING PAD
- PROPOSED MOUNTABLE KERB / LAYBACK KERB
- PROPOSED BARRIER KERB & CHANNEL
- PROPOSED SEMI-MOUNTABLE KERB
- PROPOSED EDGE RESTRAIN KERB
- DIVERSION CHANNEL (DC)
- EARTHWORKS EXTENTS
- LITTORAL RAINFOREST BUFFER
- LITTORAL RAINFOREST
- PROPOSED RETAINING WALL (MAX 1.5m)
- PROPOSED GABION WALL
- STAGE BOUNDARY
- MIDDEN LOCATION
- EARTHWORKS CUT
- EARTHWORKS FILL

BULK EARTHWORKS VOLUMES

TOTAL CUT	-30, 791m^3
TOTAL FILL	157, 884m^3
TOTAL BALANCE (IMPORT)	127, 093m^3

KEY PLAN

Issue	Description	DR	CH	VE	Date
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02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales

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1 : 500

Surveyor

ROBERT A HARRIES
SURVEYOR

Client

GOLDCORAL PTY LTD

Status

FOR APPROVAL

Original Issue Signatures			
Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project

RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title

BULK EARTHWORKS
CUT AND FILL PLAN
SHEET 2

ARCADIS
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Tel No: +61 2 8907 9000
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Project Number	30180356

Drawing No.	Issue
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DIVERSION DRAIN TO CONVEY EXTERNAL CATCHMENT

LITTORAL RAINFOREST

LEGEND

- PROPOSED CONTOUR
- EXISTING CONTOUR
- BUILDING PAD
- PROPOSED MOUNTABLE KERB / LAYBACK KERB
- PROPOSED BARRIER KERB & CHANNEL
- PROPOSED SEMI-MOUNTABLE KERB
- PROPOSED EDGE RESTRAIN KERB
- DC — DIVERSION CHANNEL
- EARTHWORKS EXTENTS
- LITTORAL RAINFOREST BUFFER
- LITTORAL RAINFOREST
- PROPOSED RETAINING WALL (MAX 1.5m)
- PROPOSED GABION WALL
- STAGE BOUNDARY
- MIDDEN LOCATION
- EARTHWORKS CUT
- EARTHWORKS FILL

BULK EARTHWORKS VOLUMES

TOTAL CUT	-30, 791m^3
TOTAL FILL	157, 884m^3
TOTAL BALANCE (IMPORT)	127, 093m^3

KEY PLAN

SHT 1 · SHT 3 SHT 2 · SHT 4 · SHT 5

Issue	Description	DR	CH	VE	Date
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02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales

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1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL

Original Issue Signatures			
Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: BULK EARTHWORKS CUT AND FILL PLAN SHEET 3

ARCADIS
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SYDNEY NSW 2000
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Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0103

Issue: 03

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LEGEND

- 5.0 — PROPOSED CONTOUR
- 5.0 — EXISTING CONTOUR
- BUILDING PAD
- PROPOSED MOUNTABLE KERB / LAYBACK KERB
- PROPOSED BARRIER KERB & CHANNEL
- PROPOSED SEMI-MOUNTABLE KERB
- PROPOSED EDGE RESTRAIN KERB
- DC — DIVERSION CHANNEL
- EARTHWORKS EXTENTS
- LITTORAL RAINFOREST BUFFER
- LITTORAL RAINFOREST
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- PROPOSED GABION WALL
- STAGE BOUNDARY
- MIDDEN LOCATION
- EARTHWORKS CUT
- EARTHWORKS FILL

BULK EARTHWORKS VOLUMES

TOTAL CUT	-30, 791m^3
TOTAL FILL	157, 884m^3
TOTAL BALANCE (IMPORT)	127, 093m^3

STAGE 2

ROAD 02

ROAD 10

CROWN FORESHORE RESERVE

EVANS RIVER

KEY PLAN

SHT 1 SHT 3 SHT 2 SHT 4 SHT 5

Issue	Description	DR	CH	VE	Date
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02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales

0 5 10 20 30 40 50m

1 : 500

Surveyor

ROBERT A HARRIES
SURVEYOR

Client

GOLDCORAL PTY LTD

Status

FOR APPROVAL

Original Issue Signatures			
Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project

RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title

BULK EARTHWORKS
CUT AND FILL PLAN
SHEET 4

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0104

Issue: 03

Date Plotted: 15 Apr 2024 - 09:04PM File Name: C:\Users\lpaz2589\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0101-BulkEarthworksPlan.dwg

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ROAD 02
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R13.500
R20.000
R30.000
R10.000
R11.500
R13.500
CH 1900.000
CH 1880.000
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CREST 1649.450
TP 1733.925
TP 1656.658
TP 1543.522
TP 1540.632
TP 1496.910
TP 1865.473
TP 1862.600
TP 1820.794
TP 1820.000
TP 1819.559
TP 1757.076
TP 1184.965
TP 1179.990
TP 82.955
TP 80.000
TP 61.624
TP 45.687
TP 33.668
CREST 44.3
TP 49.199
TP 39.308
CH 40.000
CH 60.000
CH 80.000
CH 100.000
CH 120.000
CH 140.000
CH 160.000
CH 180.000
CH 200.000
CH 1515.097
CH 1660.000
CH 2173.973
SEWER PUMP STATION
LITTORAL RAINFOREST
CROWN FORESHORE RESERVE
EVANS RIVER
1002
1003
89
90
91
92
93
94
95
96
97
98
99
100
101
102
103
104
105
106
107

LEGEND

- PROPOSED CONTOUR (5.0)
- EXISTING CONTOUR (5.0)
- BUILDING PAD
- PROPOSED MOUNTABLE KERB / LAYBACK KERB
- PROPOSED BARRIER KERB & CHANNEL
- PROPOSED SEMI-MOUNTABLE KERB
- PROPOSED EDGE RESTRAIN KERB
- DC — DIVERSION CHANNEL
- EARTHWORKS EXTENTS
- LITTORAL RAINFOREST BUFFER
- LITTORAL RAINFOREST
- PROPOSED RETAINING WALL (MAX 1.5m)
- PROPOSED GABION WALL
- STAGE BOUNDARY
- MIDDEN LOCATION
- EARTHWORKS CUT
- EARTHWORKS FILL

BULK EARTHWORKS VOLUMES

TOTAL CUT	-30, 791m^3
TOTAL FILL	157, 884m^3
TOTAL BALANCE (IMPORT)	127, 093m^3

KEY PLAN

SHT 1
SHT 3 SHT 2
SHT 4
SHT 5

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	GP	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales

0 5 10 20 30 40 50m

1 : 500

Surveyor

ROBERT A HARRIES
SURVEYOR

Client

GOLDCORAL PTY LTD

Status: FOR APPROVAL

Original Issue Signatures			
Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project: RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title: BULK EARTHWORKS
CUT AND FILL PLAN
SHEET 5

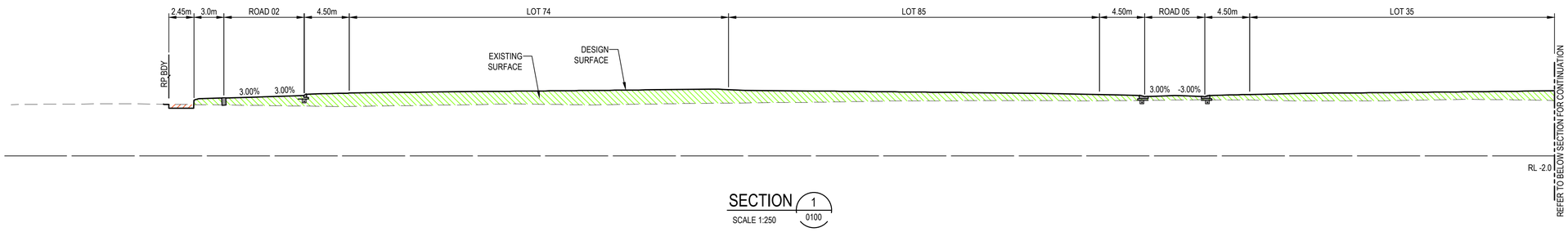
ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0105

Issue: 03

Date Plotted: 15 Apr 2024 - 09:04PM File Name: C:\Users\lpaz2589\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0101-BulkEarthworksPlan.dwg



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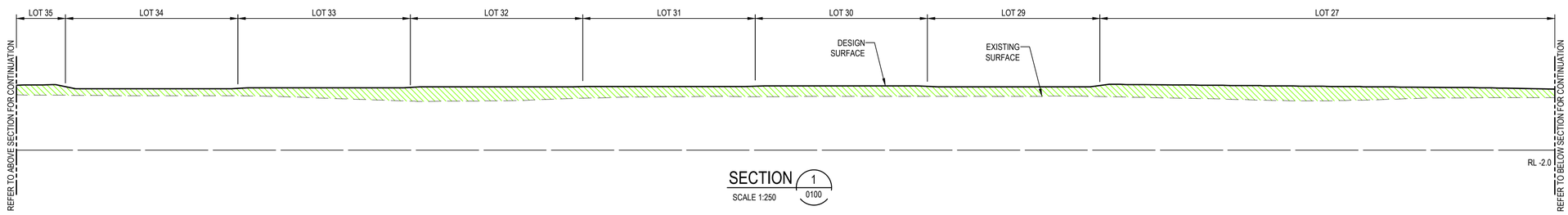
SCALE 1:250



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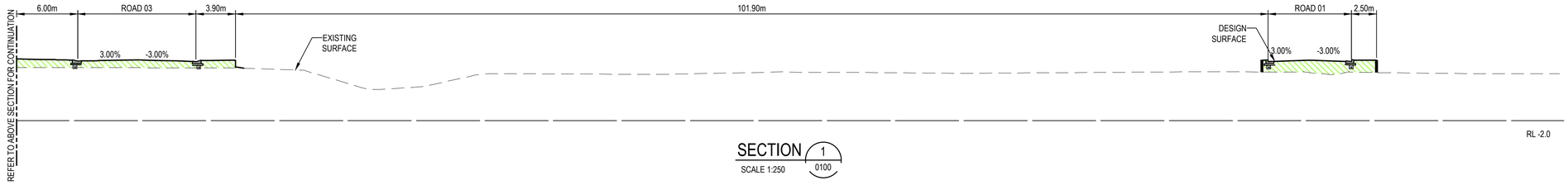

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SCALE 1:250

LEGEND:

FILL AREA

CUT AREA

Issue	Description	DR	CH	VE	Date
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02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales

0 5 10 15 20 25m

1 : 250

Surveyor

ROBERT A HARRIES
SURVEYOR

Client

GOLDCORAL PTY LTD

Status

FOR APPROVAL

Original Issue Signatures			
Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project

RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title

EARTHWORKS SITE SECTIONS
SHEET 1

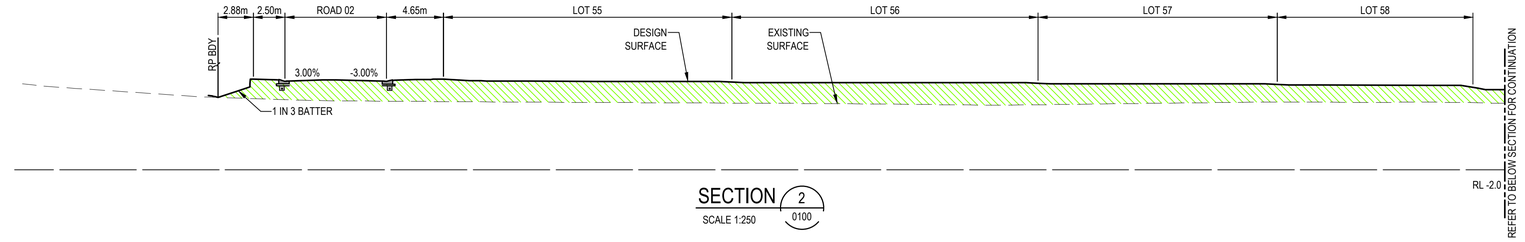
ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0121

Issue: 03

Date Plotted: 3 Apr 2024 - 02:57PM File Name: C:\Users\santosj7508\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0121-EarthworksSiteSections.dwg



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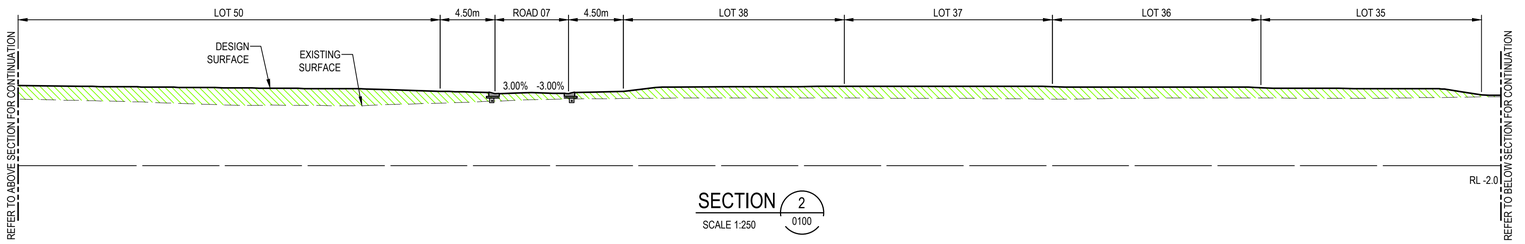

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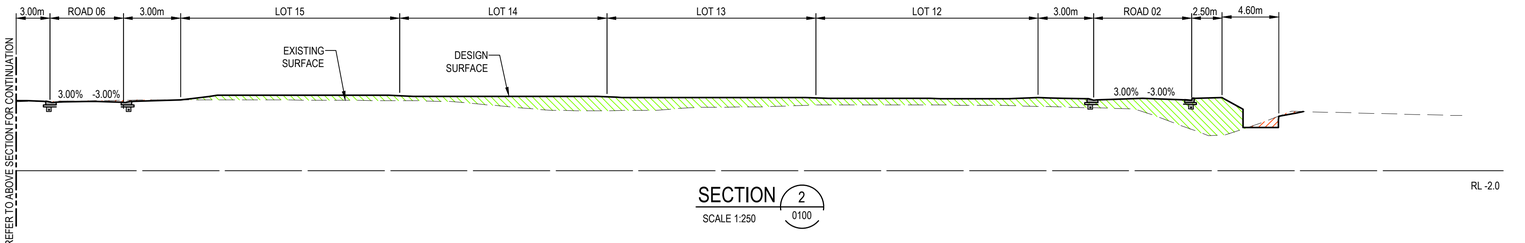
SCALE 1:250 0100



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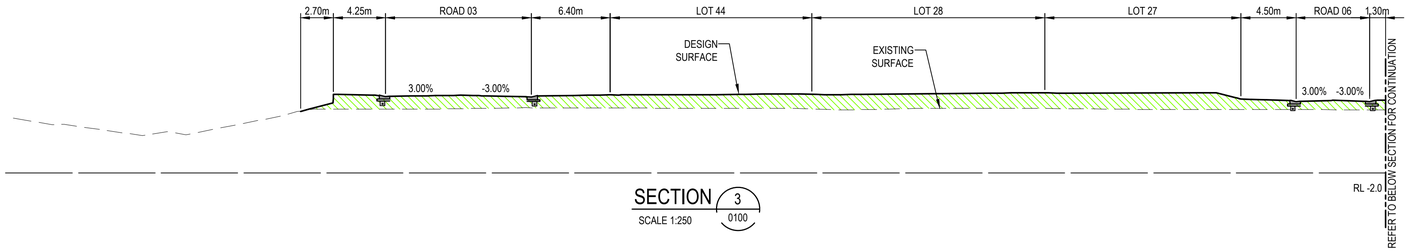

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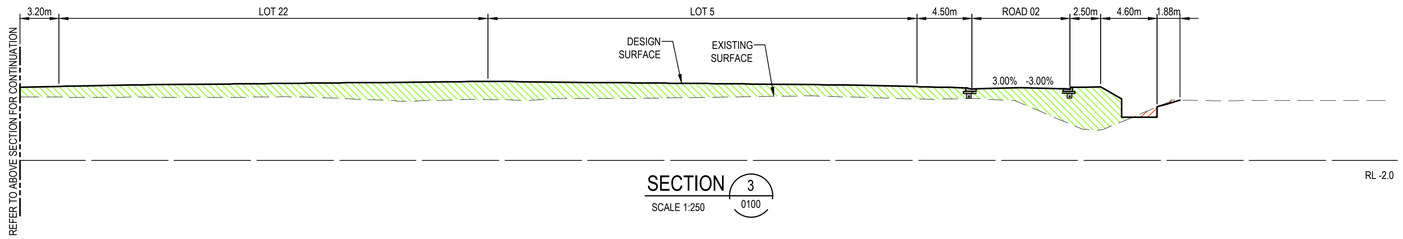


SECTION 3
SCALE 1:250 0100

LEGEND:

FILL AREA

CUT AREA

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	GP	LP	LP	02.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales

0 5 10 15 20 25m

1 : 250

Surveyor

ROBERT A HARRIES
SURVEYOR

Client

GOLDCORAL PTY LTD

Status: FOR APPROVAL

Original Issue Signatures

Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project

RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title

EARTHWORKS SITE SECTIONS
SHEET 2

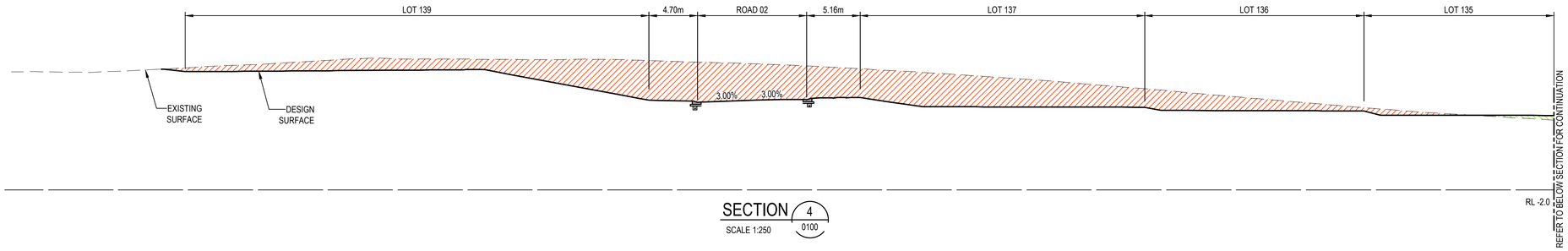
ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0122

Issue: 03

Date Plotted: 3 Apr 2024 - 02:57PM File Name: C:\Users\santosj7508\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0121-EarthworksSiteSections.dwg



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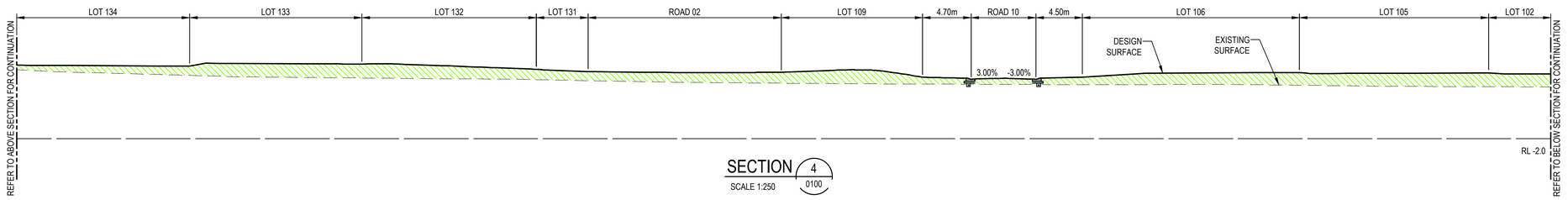

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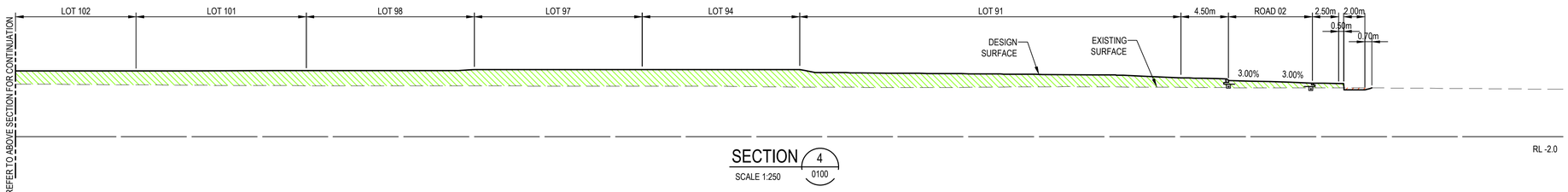

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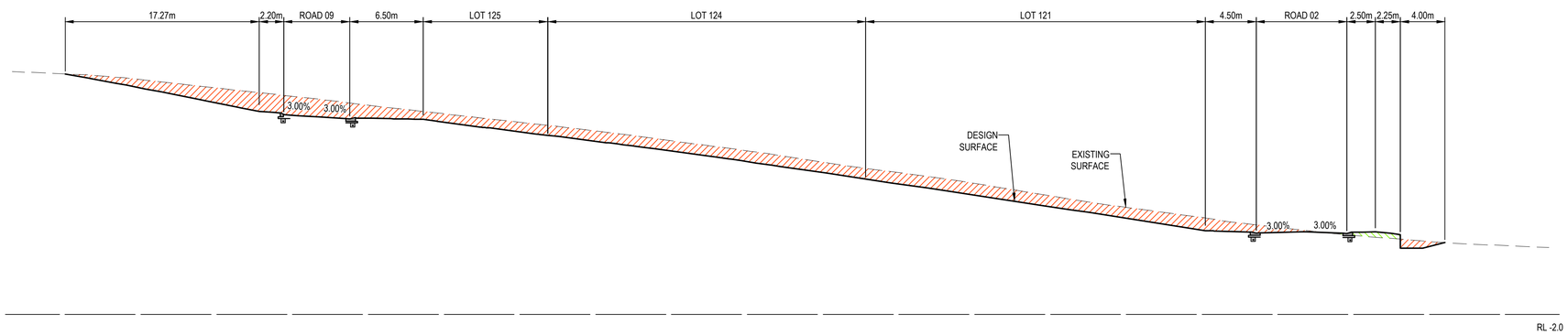


SECTION 5 (0100)
SCALE 1:250

LEGEND:

FILL AREA

CUT AREA

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	GP	LP	LP	02.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales

0 5 10 15 20 25m

1 : 250

Surveyor

ROBERT A HARRIES
SURVEYOR

Client

GOLDCORAL PTY LTD

Status

FOR APPROVAL

Original Issue Signatures			
Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project

RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title

EARTHWORKS SITE SECTIONS
SHEET 3

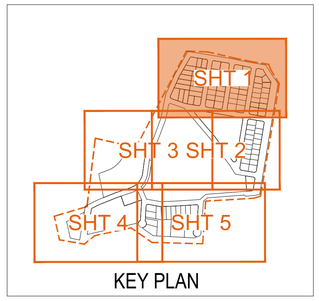
ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0123

Issue: 03

Date Plotted: 3 Apr 2024 - 02:57PM File Name: C:\Users\santosj7508\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0121-EarthworksSiteSections.dwg



KEY PLAN

LEGEND

- PROPOSED CONTOUR
- EXISTING CONTOUR
- PROPOSED MOUNTABLE KERB / LAYBACK KERB
- PROPOSED BARRIER KERB & CHANNEL
- PROPOSED SEMI-MOUNTABLE KERB
- PROPOSED EDGE RESTRAINT
- EARTHWORKS EXTENTS
- PROPOSED STORMWATER RETICULATION AND STRUCTURE
- PROPOSED SEWERAGE LINE, MANHOLE AND
- PROPOSED WATER RETICULATION
- PROPOSED STORMWATER OUTLET SCOUR PROTECTION
- PROPOSED RETAINING WALL
- PROPOSED GABION WALL
- PROPOSED PAVEMENT
- PROPOSED BIO
- MIDDEN LOCATION
- POTENTIAL FOOTPATH LOCATION
- PROPOSED BOARDWALK
- STAGE BOUNDARY

ROCLA CDS GPT UNIT INSTALLED PRIOR TO DISCHARGE

BIO-SWALE CATCHMENT A. MIN. FILTER MEDIA AREA 300m²

ROCLA CDS GPT UNIT INSTALLED PRIOR TO DISCHARGE

ROCLA CDS GPT UNIT INSTALLED PRIOR TO DISCHARGE

BIO-SWALE CATCHMENT B. MIN. FILTER MEDIA AREA 470m²

STAGE 1

ROAD 02 ROAD 05 ROAD 03 ROAD 07 ROAD 06

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

Scales

0 5 10 20 30 40 50m

1 : 500

100mm on Original

Surveyor

ROBERT A HARRIES
SURVEYOR

Client

GOLDCORAL PTY LTD

Status

FOR APPROVAL

Original Issue Signatures			
Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project

RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title

ROADWORKS AND DRAINAGE
LAYOUT PLAN
SHEET 1

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number 30180356

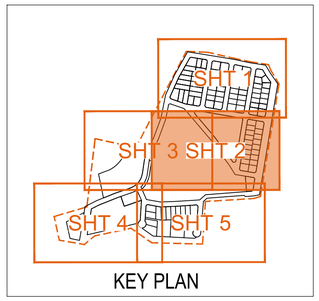
Drawing No. IRG-AAP-DA-00-DRG-CV-0201

Issue 03

Date Plotted: 15 Apr 2024 - 09:04PM File Name: C:\Users\lpaz2589\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0201-RoadworksAndDrainagePlan.dwg

LEGEND

- PROPOSED CONTOUR (5.0)
- EXISTING CONTOUR (5.0)
- PROPOSED MOUNTABLE KERB / LAYBACK KERB
- PROPOSED BARRIER KERB & CHANNEL
- PROPOSED SEMI-MOUNTABLE KERB
- PROPOSED EDGE RESTRAINT
- EARTHWORKS EXTENTS
- PROPOSED STORMWATER RETICULATION AND STRUCTURE (SWD)
- PROPOSED SEWERAGE LINE, MANHOLE AND (S)
- PROPOSED WATER RETICULATION (W)
- PROPOSED STORMWATER OUTLET SCOUR PROTECTION
- PROPOSED RETAINING WALL
- PROPOSED GABION WALL
- PROPOSED PAVEMENT
- PROPOSED BIO
- MIDDEN LOCATION
- POTENTIAL FOOTPATH LOCATION
- PROPOSED BOARDWALK
- STAGE BOUNDARY



KEY PLAN

ROAD 07 · ROAD 06 · ROAD 02 · ROAD 03 · IRON GATES ROAD

ROCLA CDS GPT UNIT INSTALLED PRIOR TO DISCHARGE

BIO-SWALE CATCHMENT B. MIN. FILTER MEDIA AREA 470m²

SEWER PUMP STATION

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

Scales

0 5 10 20 30 40 50m

1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL

Original Issue Signatures

Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: ROADWORKS AND DRAINAGE LAYOUT PLAN SHEET 2

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

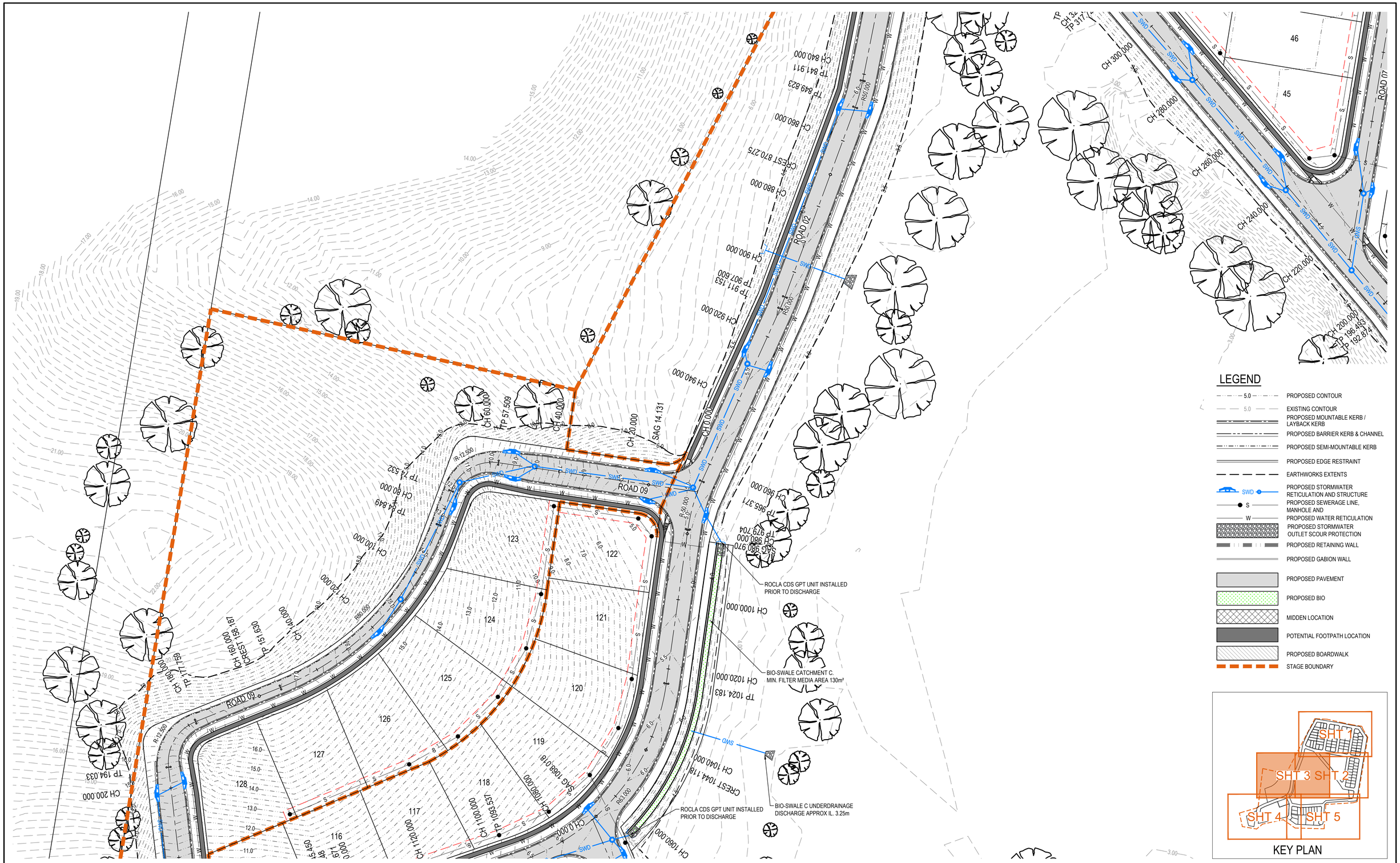
Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0202

Issue: 03

100mm on Original

Date Plotted: 16 Apr 2024 - 08:35PM File Name: C:\Users\lpaz2589\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0201-RoadworksAndDrainagePlan.dwg



LEGEND

- PROPOSED CONTOUR (5.0)
- EXISTING CONTOUR (5.0)
- PROPOSED MOUNTABLE KERB / LAYBACK KERB
- PROPOSED BARRIER KERB & CHANNEL
- PROPOSED SEMI-MOUNTABLE KERB
- PROPOSED EDGE RESTRAINT
- EARTHWORKS EXTENTS
- PROPOSED STORMWATER RETICULATION AND STRUCTURE (SWD)
- PROPOSED SEWERAGE LINE, MANHOLE AND (S)
- PROPOSED WATER RETICULATION (W)
- PROPOSED STORMWATER OUTLET SCOUR PROTECTION
- PROPOSED RETAINING WALL
- PROPOSED GABION WALL
- PROPOSED PAVEMENT
- PROPOSED BIO
- MIDDEN LOCATION
- POTENTIAL FOOTPATH LOCATION
- PROPOSED BOARDWALK
- STAGE BOUNDARY

KEY PLAN

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

Scales

N

0 5 10 20 30 40 50m

1 : 500

100mm on Original

Surveyor

ROBERT A HARRIES
SURVEYOR

Client

GOLDCORAL PTY LTD

Status: FOR APPROVAL

Original Issue Signatures

Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project

RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title

ROADWORKS AND DRAINAGE
LAYOUT PLAN
SHEET 3

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0203

Issue: 03

Date Plotted: 15 Apr 2024 - 09:04PM File Name: C:\Users\lpaz2589\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0201-RoadworksAndDrainagePlan.dwg

LEGEND

- PROPOSED CONTOUR
- EXISTING CONTOUR
- PROPOSED MOUNTABLE KERB / LAYBACK KERB
- PROPOSED BARRIER KERB & CHANNEL
- PROPOSED SEMI-MOUNTABLE KERB
- PROPOSED EDGE RESTRAINT
- EARTHWORKS EXTENTS
- PROPOSED STORMWATER RETICULATION AND STRUCTURE
- PROPOSED SEWERAGE LINE, MANHOLE AND
- PROPOSED WATER RETICULATION
- PROPOSED STORMWATER OUTLET SCOUR PROTECTION
- PROPOSED RETAINING WALL
- PROPOSED GABION WALL
- PROPOSED PAVEMENT
- PROPOSED BIO
- MIDDEN LOCATION
- POTENTIAL FOOTPATH LOCATION
- PROPOSED BOARDWALK
- STAGE BOUNDARY

STAGE 2

ROCLA CDS GPT UNIT INSTALLED PRIOR TO DISCHARGE

BIO-SWALE CATCHMENT E.
MIN. FILTER MEDIA AREA 700m²

KEY PLAN

SHT 1
SHT 3 SHT 2
SHT 4
SHT 5

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales

0 5 10 20 30 40 50m

1 : 500

Surveyor

ROBERT A HARRIES
SURVEYOR

Client

GOLDCORAL PTY LTD

Status

FOR APPROVAL

Original Issue Signatures			
Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project

RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title

ROADWORKS AND DRAINAGE
LAYOUT PLAN
SHEET 4

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0204

Issue: 03

Date Plotted: 15 Apr 2024 - 09:04PM File Name: C:\Users\lpaz2589\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0201-RoadworksAndDrainagePlan.dwg

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales

0 5 10 20 30 40 50m

1 : 500

Surveyor

ROBERT A HARRIES
SURVEYOR

Client

GOLDCORAL PTY LTD

Status

FOR APPROVAL

Original Issue Signatures			
Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project

RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title

ROADWORKS AND DRAINAGE
LAYOUT PLAN
SHEET 5

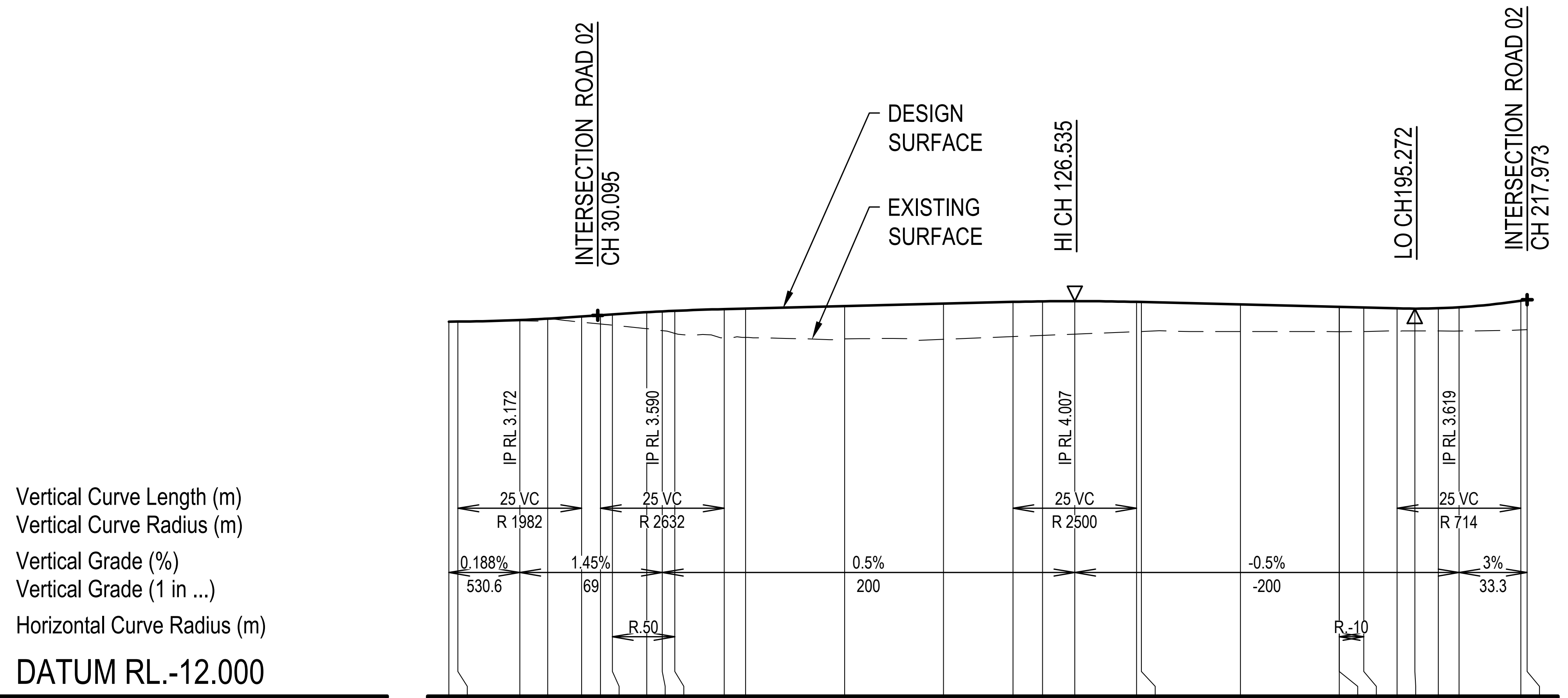
ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0205

Issue: 03

Date Plotted: 16 Apr 2024 - 08:35PM File Name: C:\Users\lpaz2589\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0201-RoadworksAndDrainagePlan.dwg



DESIGN LEVELS ON ROAD CENTRELINE	3.145	3.149	3.212	3.266	3.354	3.409	3.443	3.528	3.561	3.584	3.653	3.674	3.774	3.874	3.945
DESIGN LIP OF KERB (LHS)	3.040	3.043	3.104	3.160	3.247	3.302	3.336	3.421	3.454	3.478	3.546	3.568	3.668	3.768	3.838
DESIGN LIP OF KERB (RHS)								3.421	3.454	3.478	3.546	3.568	3.668	3.768	3.838
EXISTING SURFACE ON ROAD CENTRELINE	3.138	3.151	3.176	3.229	3.123	3.051	3.003	2.862	2.784	2.672	2.484	2.512	2.450	2.432	2.543
CUT / FILL DEPTH	0.007	-0.002	0.036	0.037	0.230	0.358	0.439	0.666	0.777	0.912	1.169	1.163	1.324	1.443	1.401
PEGGED CHAINAGE	0.000	1.838	14.338	20.000	26.838	30.653	33.068	40.000	43.153	45.687	55.653	60.000	80.000	100.000	114.035

DESIGN LEVELS ON ROAD CENTRELINE	3.967	3.976	3.945	3.940	3.840	3.740	3.740	3.715	3.681	3.672	3.688	3.728	3.994	4.032
DESIGN LIP OF KERB (LHS)	3.861	3.869	3.838	3.833	3.733	3.633	3.633	3.609	3.575	3.566	3.582			
DESIGN LIP OF KERB (RHS)	3.861	3.869	3.838	3.833	3.733	3.633	3.633	3.609	3.575	3.566	3.582	3.624		
EXISTING SURFACE ON ROAD CENTRELINE	2.591	2.643	2.742	2.750	2.747	2.741	2.741	2.749	2.747	2.772	2.769	2.769	2.814	2.824
CUT / FILL DEPTH	1.377	1.333	1.203	1.190	1.093	0.999	0.999	0.966	0.934	0.901	0.919	0.960	1.179	1.208
PEGGED CHAINAGE	120.000	126.535	139.035	140.000	160.000	179.990	180.000	184.965	191.700	195.272	200.000	204.200	216.700	217.973

ROAD 01 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:200

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales

HORI. 0 10 20 40 60 80 100m
1 : 1000

VERT. 0 5 10 15 20m
1 : 200

Surveyor

ROBERT A HARRIES
SURVEYOR

Client

GOLDCORAL PTY LTD

Status

FOR APPROVAL

Original Issue Signatures

Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project

RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title

ROAD LONGITUDINAL
SECTIONS
SHEET 1

ARCADIS
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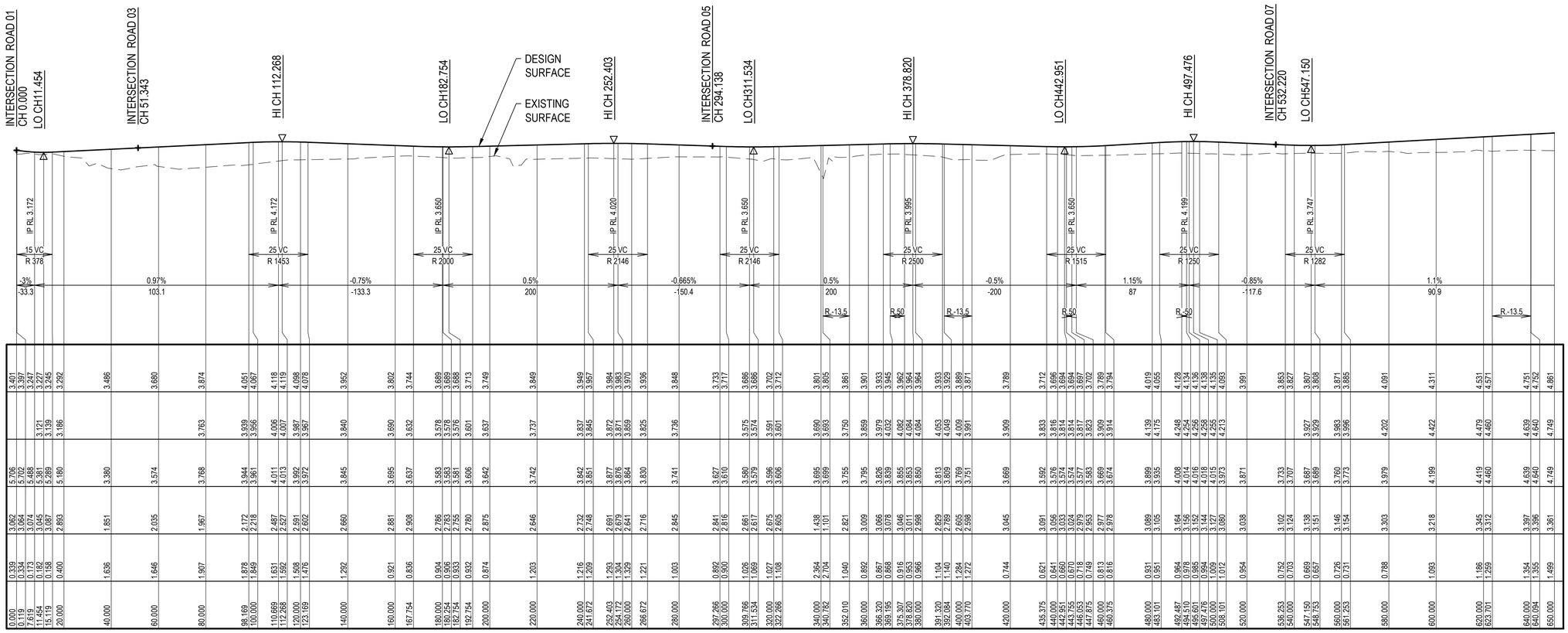
Project Number 30180356

Drawing No. IRG-AAP-DA-00-DRG-CV-0251

Issue 03



ROAD 02 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:200

03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23
Issue	Description	DR	CH	VE	Date

Scales
HORI 0 10 20 40 60 80 100m
1 : 1000
VERT 0 5 10 15 20m
1 : 200

Surveyor
ROBERT A HARRIES
SURVEYOR

Client
GOLDCORAL PTY LTD

Status
FOR APPROVAL

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Original Issue Signatures

Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project
RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title
ROAD LONGITUDINAL
SECTIONS
SHEET 2

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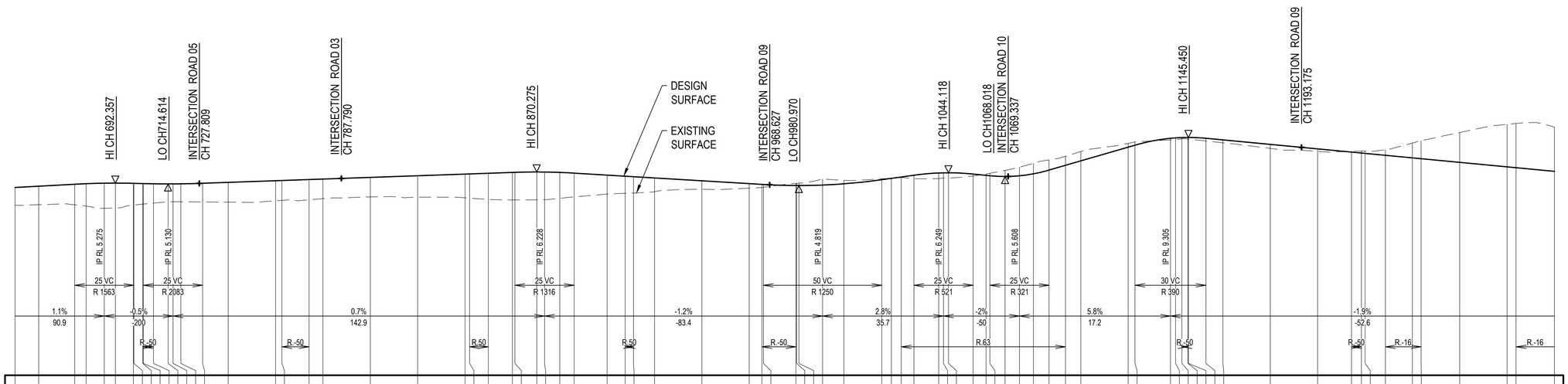
Project Number 30180356

Drawing No.
IRG-AAP-DA-00-DRG-CV-0252

Issue
03

100mm on Original



DATUM RL.-11.000

DESIGN LEVELS ON ROAD CENTRELINE	4.861	4.971	5.138	5.183	5.225	5.232	5.213	5.213	5.194	5.192	5.176	5.166	5.167	5.173
DESIGN LIP OF KERB (LHS)	4.749	4.859	5.026	5.072	5.112	5.121	5.102	5.101	5.082	5.081	5.064			
DESIGN LIP OF KERB (RHS)	4.749	4.859	5.026	5.072	5.112	5.121	5.102	5.101	5.082	5.081	5.064	5.055	5.057	5.062
EXISTING SURFACE ON ROAD CENTRELINE	3.361	3.410	3.400	3.290	3.107	3.133	3.373	3.377	3.456	3.461	3.544	3.657	3.663	3.658
CUT / FILL DEPTH	1.499	1.560	1.737	1.893	2.118	2.099	1.840	1.836	1.738	1.731	1.632	1.510	1.505	1.516
PEGGED CHAINAGE	650.000	660.000	675.169	680.000	687.669	692.357	700.000	700.169	703.938	704.197	708.434	714.614	716.697	720.000

DESIGN LEVELS ON ROAD CENTRELINE	5.218	5.293	5.433	5.452	5.532	5.573	5.713	5.853	5.993	6.006	6.062	6.133	6.141	6.173
DESIGN LIP OF KERB (LHS)		5.182	5.322					5.742	5.882	5.895	5.950	6.022	6.029	6.061
DESIGN LIP OF KERB (RHS)	5.106	5.182	5.322	5.340	5.421	5.462	5.602	5.742	5.882	5.895	5.950	6.022	6.029	6.061
EXISTING SURFACE ON ROAD CENTRELINE	3.644	3.624	3.735	3.775	3.821	3.919	4.066	4.049	3.992	3.963	3.854	3.806	3.808	3.820
CUT / FILL DEPTH	1.574	1.669	1.698	1.677	1.711	1.654	1.647	1.804	2.001	2.044	2.208	2.327	2.333	2.353
PEGGED CHAINAGE	729.197	740.000	760.000	762.658	774.154	780.000	800.000	820.000	840.000	841.911	849.823	860.000	861.063	870.275

DESIGN LEVELS ON ROAD CENTRELINE	6.169	6.137	6.078	5.911	5.820	5.777	5.671	5.431	5.191	5.127	5.119	5.030	5.030	5.029
DESIGN LIP OF KERB (LHS)	6.055	6.025	5.966	5.799	5.708	5.665	5.559	5.319	5.079	5.015	5.008	4.918	4.918	4.918
DESIGN LIP OF KERB (RHS)	6.055	6.025	5.966	5.799	5.708	5.665	5.559	5.319				3.567	3.565	3.556
EXISTING SURFACE ON ROAD CENTRELINE	3.827	3.945	4.068	4.301	4.371	4.394	4.507	4.715	4.801	4.853	4.873	5.209	5.214	5.229
CUT / FILL DEPTH	2.342	2.192	2.010	1.610	1.448	1.383	1.164	0.716	0.390	0.274	0.246	-0.179	-0.184	-0.200
PEGGED CHAINAGE	873.563	880.000	886.063	900.000	907.600	911.153	920.000	940.000	960.000	965.371	965.972	979.704	980.000	980.970

DESIGN LEVELS ON ROAD CENTRELINE	5.069	5.174	5.519	5.632	5.749	5.899	6.087	6.099	6.103	5.999	5.890	5.858	5.794	5.851
DESIGN LIP OF KERB (LHS)	4.959	5.063	5.408	5.521	5.638	5.788	5.975	5.987	5.992	5.888	5.778			
DESIGN LIP OF KERB (RHS)	4.959	5.063	5.408	5.521	5.638	5.788	5.975	5.987	5.992	5.894	5.793	5.764	5.709	5.771
EXISTING SURFACE ON ROAD CENTRELINE	5.573	5.476	5.597	5.649	5.697	5.607	5.620	5.646	5.658	5.830	6.001	6.062	6.302	6.577
CUT / FILL DEPTH	-0.504	-0.301	-0.078	-0.017	0.053	0.292	0.467	0.454	0.445	0.169	-0.111	-0.204	-0.508	-0.726
PEGGED CHAINAGE	990.972	1000.000	1015.972	1020.000	1024.183	1029.534	1040.000	1042.034	1044.118	1054.534	1060.000	1061.607	1068.018	1074.107

DESIGN LEVELS ON ROAD CENTRELINE	6.018	6.333	6.735	7.110	8.270	8.435	9.016	9.052	9.080	9.090	9.090	9.020	8.884	8.504
DESIGN LIP OF KERB (LHS)		6.251	6.653	7.028	8.188	8.353	8.927	8.971	8.999	9.009	9.009	8.938	8.803	8.423
DESIGN LIP OF KERB (RHS)	5.936	6.251	6.653	7.028	8.188	8.353	8.927	8.971	8.999	9.009	9.009	8.938	8.803	4.470
EXISTING SURFACE ON ROAD CENTRELINE	6.900	7.186	7.496	7.900	8.592	8.713	8.880	8.903	8.968	8.956	8.952	8.791	8.636	8.161
CUT / FILL DEPTH	-0.882	-0.853	-0.762	-0.791	-0.322	-0.278	0.137	0.150	0.112	0.134	0.138	0.229	0.249	0.343
PEGGED CHAINAGE	1080.000	1086.607	1093.537	1100.000	1120.000	1122.853	1137.853	1140.000	1142.671	1145.248	1145.450	1152.853	1160.000	1180.000

DESIGN LEVELS ON ROAD CENTRELINE	8.124	7.852	7.773	7.744	7.580	7.364	7.294	6.984	6.604	6.532	6.224
DESIGN LIP OF KERB (LHS)	8.030	7.741	7.661	7.633	7.468	7.228	7.151	6.828	6.737	6.655	6.308
DESIGN LIP OF KERB (RHS)	4.840	7.741	7.661	7.633	7.467	7.212	7.129	6.798	6.451	6.392	6.139
EXISTING SURFACE ON ROAD CENTRELINE	7.916	7.922	7.943	7.939	8.053	8.623	8.805	9.511	10.196	10.274	9.956
CUT / FILL DEPTH	0.208	-0.070	-0.170	-0.195	-0.472	-1.259	-1.511	-2.527	-3.592	-3.742	-3.732
PEGGED CHAINAGE	1200.000	1214.318	1218.485	1220.000	1228.614	1240.000	1243.682	1260.000	1280.000	1283.787	1300.000

ROAD 02 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:200

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

Scales
HORI 0 10 20 40 60 80 100m
1 : 1000
VERT 0 5 10 15 20m
1 : 200

Surveyor
ROBERT A HARRIES
SURVEYOR

Client
GOLDCORAL PTY LTD

Status
FOR APPROVAL

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Original Issue Signatures			
Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project
RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title
ROAD LONGITUDINAL
SECTIONS
SHEET 3

ARCADIS

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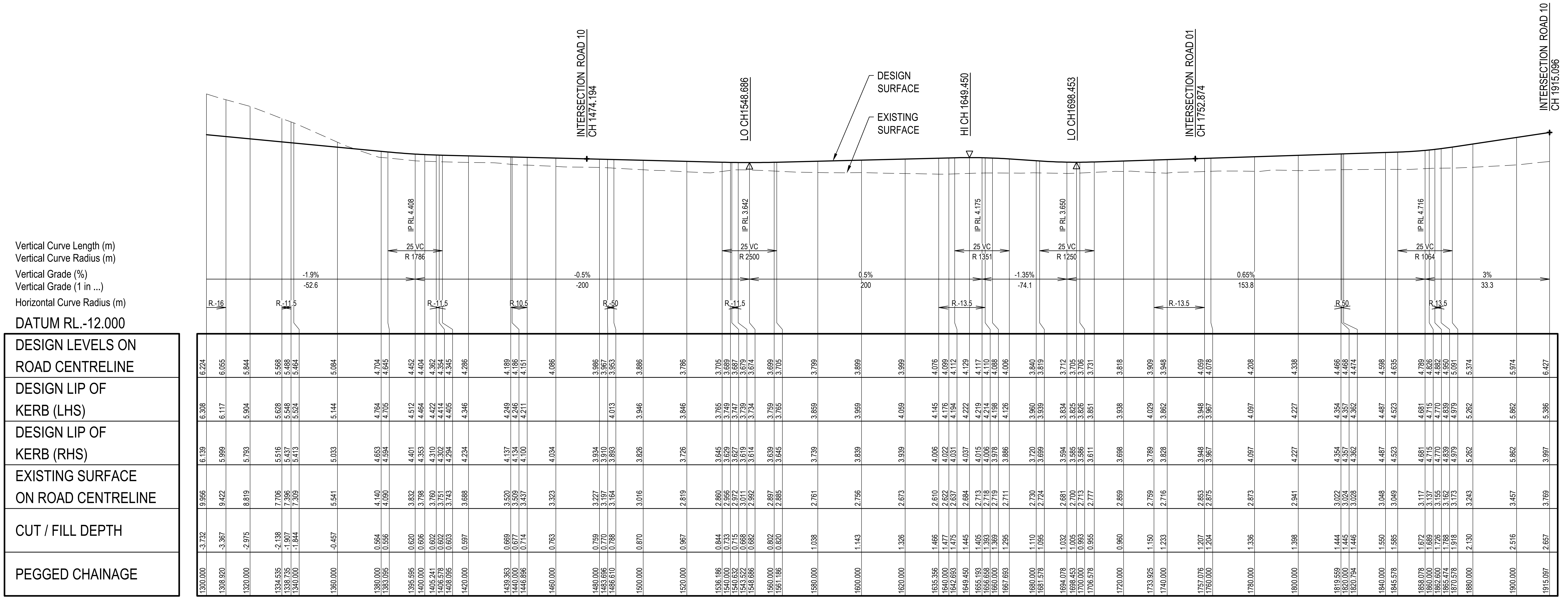
Project Number 30180356

Drawing No.
IRG-AAP-DA-00-DRG-CV-0253

Issue
03

100mm on Original

Date Plotted: 15 Apr 2024 - 09:05PM File Name: C:\Users\lpaz2589\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0251-RoadLongitudinalSections.dwg



ROAD 02 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:200

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

Scales
HORI 0 10 20 40 60 80 100m
1 : 1000
VERT 0 5 10 15 20m
1 : 200

Surveyor
ROBERT A HARRIES
SURVEYOR

Client
GOLDCORAL PTY LTD

Status
FOR APPROVAL

Original Issue Signatures

Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project
RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title
ROAD LONGITUDINAL
SECTIONS
SHEET 4

ARCADIS

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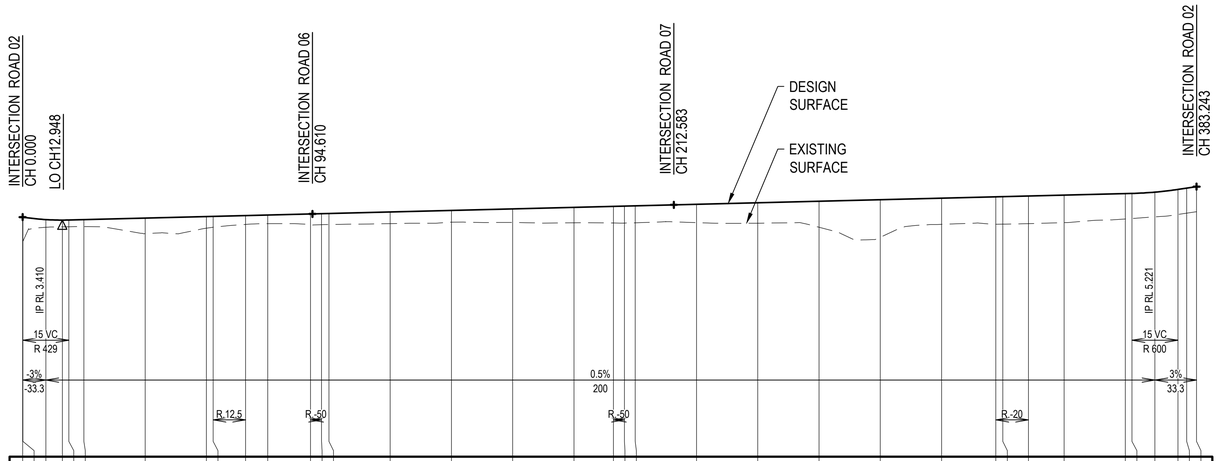
Project Number 30180356

Drawing No.
IRG-AAP-DA-00-DRG-CV-0254

Issue
03



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

DATUM RL.-12.000

DESIGN LEVELS ON ROAD CENTRELINE	3.638	3.455	3.476	3.442	3.448	3.472	3.572	3.672	3.683	3.736	3.772	3.842	3.860	3.872	3.972	4.072	4.172	4.272	4.337	4.355	4.372	4.472	4.572	4.672	4.772	4.872	4.961	4.972	5.014	5.072	5.172	5.183	5.267	5.446	5.530	5.628
DESIGN LIP OF KERB (LHS)				3.336	3.361	3.461	3.561	3.572		3.625	3.661	3.731	3.749	3.761	3.861	3.961	4.061	4.161	4.225	4.243	4.261	4.361	4.461	4.561	4.661	4.761	4.849	4.861	4.903	4.961	5.061	5.071					
DESIGN LIP OF KERB (RHS)				3.336	3.361	3.461	3.561	3.572		3.625	3.661					3.961	4.061	4.161	4.225	4.243	4.261			4.561	4.661	4.761	4.849	4.861	4.903	4.961	5.061	5.071	5.157			
EXISTING SURFACE ON ROAD CENTRELINE	2.912	2.957	2.970	3.001	3.006	3.018	2.560	2.919	2.977	3.161	3.209	3.119	3.140	3.154	3.213	3.304	3.285	3.269	3.254	3.240	3.268	3.279	3.238	2.976	2.925	3.166	3.171	3.175	3.211	3.276	3.518	3.548	3.651	3.810	3.892	3.987
CUT / FILL DEPTH	1.626	1.579	0.505	0.442	0.441	0.454	1.012	0.753	0.706	0.575	0.564	0.723	0.720	0.719	0.759	0.768	0.887	1.003	1.083	1.106	1.106	1.193	1.334	1.696	2.447	1.706	1.790	1.797	1.803	1.796	1.654	1.635	1.617	1.636	1.638	1.641
PEGGED CHAINAGE	0.000	0.389	7.591	12.948	15.091	20.000	40.000	60.000	62.188	72.788	80.000	94.003	97.597	100.000	120.000	140.000	160.000	180.000	192.874	196.493	200.000	220.000	240.000	260.000	280.000	300.000	317.728	320.000	338.385	340.000	360.000	362.168	369.668	377.168	380.000	383.243

ROAD 03 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:200

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales
HORI. 0 10 20 40 60 80 100m
1 : 1000
VERT. 0 5 10 15 20m
1 : 200

Surveyor
ROBERT A HARRIES
SURVEYOR

Client
GOLDCORAL PTY LTD

Status
FOR APPROVAL

Original Issue Signatures

Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project
RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title
ROAD LONGITUDINAL SECTIONS
SHEET 5

ARCADIS
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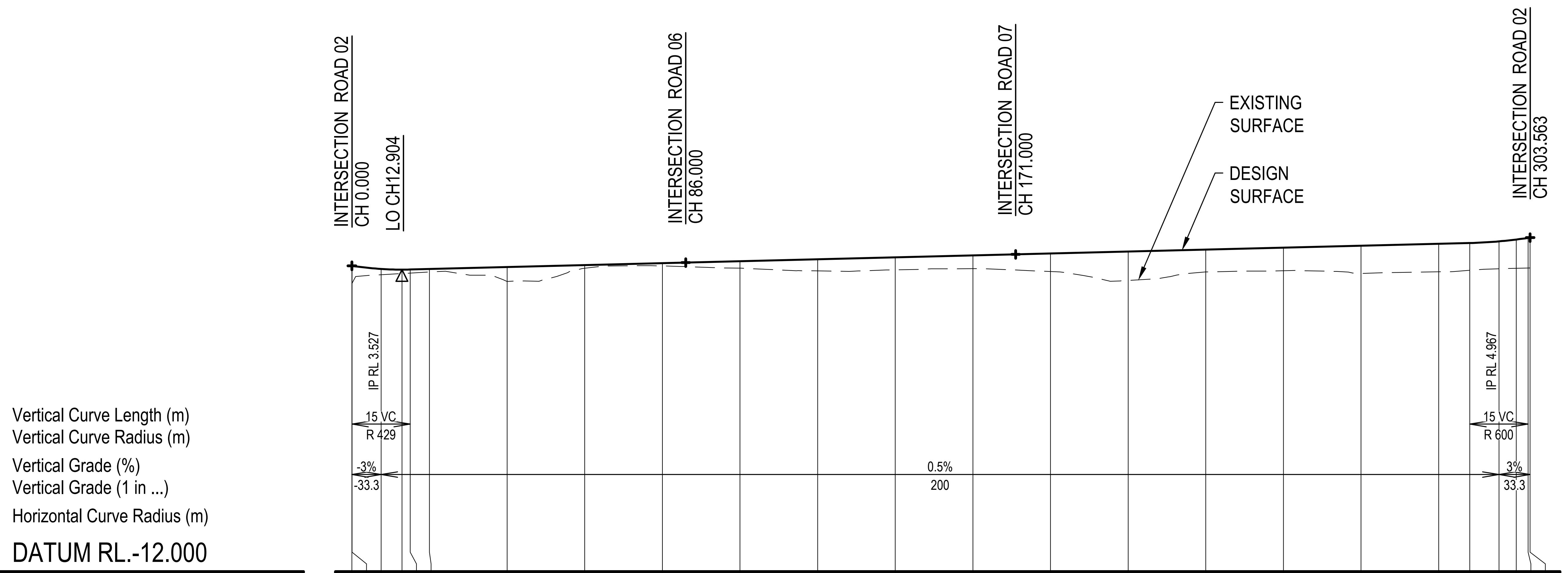
Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0255

Issue: 03

Date Plotted: 15 Apr 2024 - 09:05PM File Name: C:\Users\lpaz2589\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0251-RoadLongitudinalSections.dwg



DESIGN LEVELS ON ROAD CENTRELINE	3.754	3.752	3.593	3.560	3.565	3.590	3.690	3.790
DESIGN LIP OF KERB (LHS)					3.483	3.508	3.608	3.708
DESIGN LIP OF KERB (RHS)					3.483	3.508	3.608	3.708
EXISTING SURFACE ON ROAD CENTRELINE	2.835	2.853	3.297	3.357	3.382	3.439	2.953	3.628
CUT / FILL DEPTH	0.919	0.900	0.296	0.202	0.183	0.151	0.737	0.162
PEGGED CHAINAGE	0.000	0.047	7.547	12.904	15.047	20.000	40.000	60.000

DESIGN LEVELS ON ROAD CENTRELINE	3.890	3.990	4.090	4.190	4.290	4.390	4.490	4.590
DESIGN LIP OF KERB (LHS)		3.908	4.008	4.108			4.408	4.508
DESIGN LIP OF KERB (RHS)	3.808	3.908	4.008	4.108			4.408	4.508
EXISTING SURFACE ON ROAD CENTRELINE	3.747	3.633	3.492	3.550	3.605	3.460	3.001	3.440
CUT / FILL DEPTH	0.142	0.357	0.598	0.639	0.684	0.929	1.488	1.150
PEGGED CHAINAGE	80.000	100.000	120.000	140.000	160.000	180.000	200.000	220.000

DESIGN LEVELS ON ROAD CENTRELINE	4.690	4.790	4.890	4.930	5.014	5.109	5.192	5.208
DESIGN LIP OF KERB (LHS)	4.608	4.708	4.808	4.848				
DESIGN LIP OF KERB (RHS)	4.608	4.708	4.808					
EXISTING SURFACE ON ROAD CENTRELINE	3.501	3.365	3.443	3.522	3.602	3.626	3.643	3.646
CUT / FILL DEPTH	1.188	1.424	1.447	1.408	1.413	1.483	1.549	1.562
PEGGED CHAINAGE	240.000	260.000	280.000	288.033	295.533	300.000	303.033	303.563

ROAD 05 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:200

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales

HORI. 0 10 20 40 60 80 100m
1 : 1000

VERT. 0 5 10 15 20m
1 : 200

Surveyor

ROBERT A HARRIES
SURVEYOR

Client

GOLDCORAL PTY LTD

Status

FOR APPROVAL

Original Issue Signatures

Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project

RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title

ROAD LONGITUDINAL
SECTIONS
SHEET 6

ARCADIS

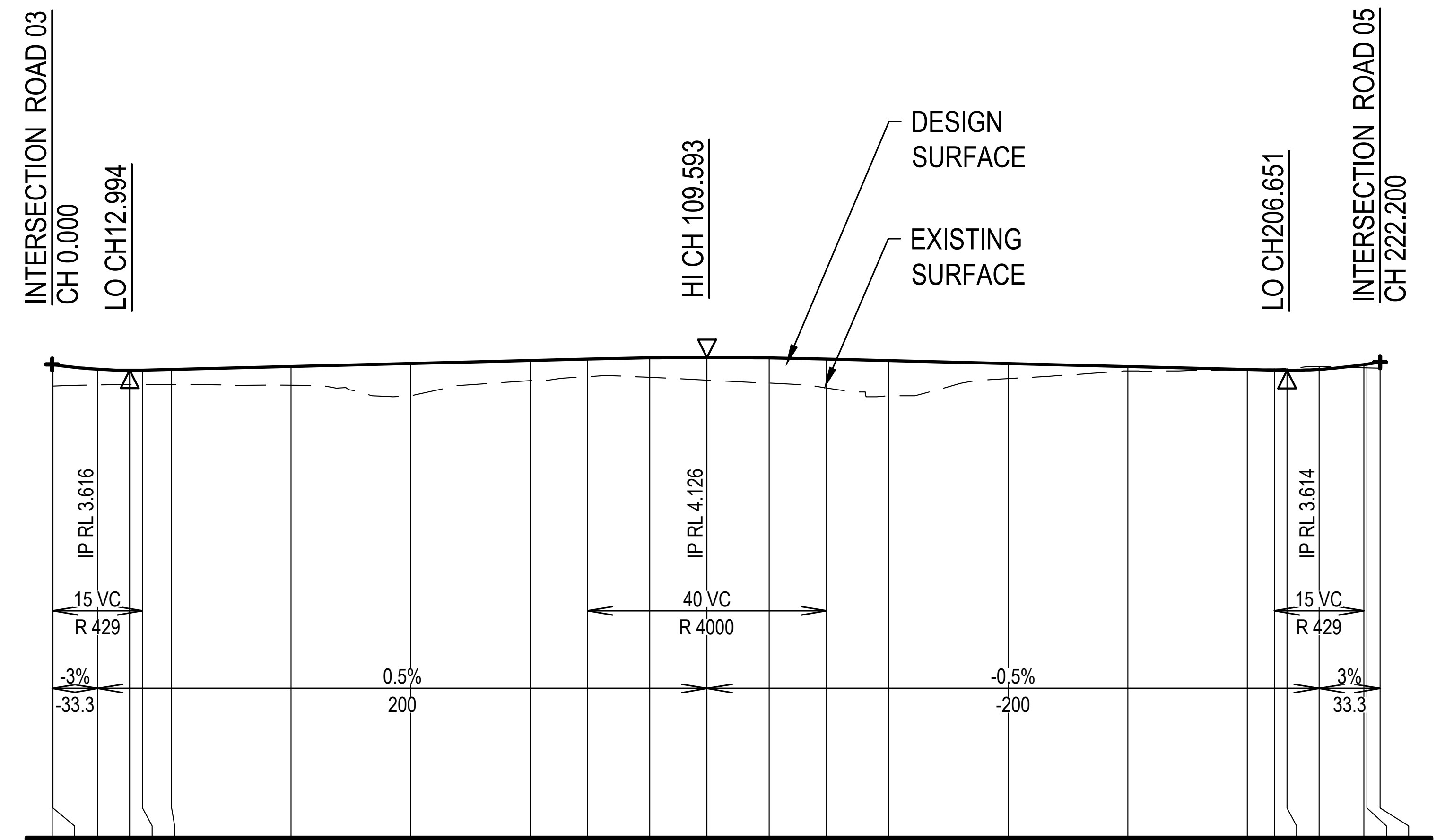
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289

Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number 30180356

Drawing No. IRG-AAP-DA-00-DRG-CV-0256

Issue 03



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

DATUM RL.-12.000

DESIGN LEVELS ON ROAD CENTRELINE	3.845	3.841	3.682	3.648	3.654	3.678	3.778	3.878
DESIGN LIP OF KERB (LHS)							3.696	3.796
DESIGN LIP OF KERB (RHS)			3.603	3.567	3.572	3.596	3.696	3.796
EXISTING SURFACE ON ROAD CENTRELINE	3.121	3.122	3.156	3.176	3.180	3.176	3.147	2.794
CUT / FILL DEPTH	0.724	0.719	0.526	0.472	0.474	0.502	0.630	1.084
PEGGED CHAINAGE	0.000	0.137	7.637	12.994	15.137	20.000	40.000	60.000

DESIGN LEVELS ON ROAD CENTRELINE	3.978	4.026	4.064	4.076	4.062	4.026	3.974	3.874
DESIGN LIP OF KERB (LHS)	3.896	3.944	3.983	3.994	3.981	3.944	3.892	3.792
DESIGN LIP OF KERB (RHS)	3.896	3.944	3.983	3.994	3.981	3.944	3.892	3.792
EXISTING SURFACE ON ROAD CENTRELINE	3.304	3.436	3.413	3.316	3.217	3.059	2.794	3.371
CUT / FILL DEPTH	0.674	0.590	0.651	0.760	0.845	0.967	1.180	0.503
PEGGED CHAINAGE	80.000	89.593	100.000	109.593	120.000	129.593	140.000	160.000

DESIGN LEVELS ON ROAD CENTRELINE	3.774	3.674	3.651	3.646	3.680	3.839	3.854	3.920
DESIGN LIP OF KERB (LHS)	3.692	3.592	3.570	3.564				
DESIGN LIP OF KERB (RHS)	3.692	3.592	3.570	3.564				
EXISTING SURFACE ON ROAD CENTRELINE	3.624	3.674	3.694	3.706	3.770	3.730	3.728	3.716
CUT / FILL DEPTH	0.150	-0.000	-0.043	-0.060	-0.090	0.108	0.126	0.203
PEGGED CHAINAGE	180.000	200.000	204.508	206.651	212.008	219.508	220.000	222.200

ROAD 06 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:200

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales

HORI. 0 10 20 40 60 80 100m
1 : 1000

VERT. 0 5 10 15 20m
1 : 200

Surveyor
ROBERT A HARRIES
SURVEYOR

Client
GOLDCORAL PTY LTD

Status
FOR APPROVAL

Original Issue Signatures			
Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project
RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title
ROAD LONGITUDINAL
SECTIONS
SHEET 7

ARCADIS
Arcadis Australia Pacific Pty Limited
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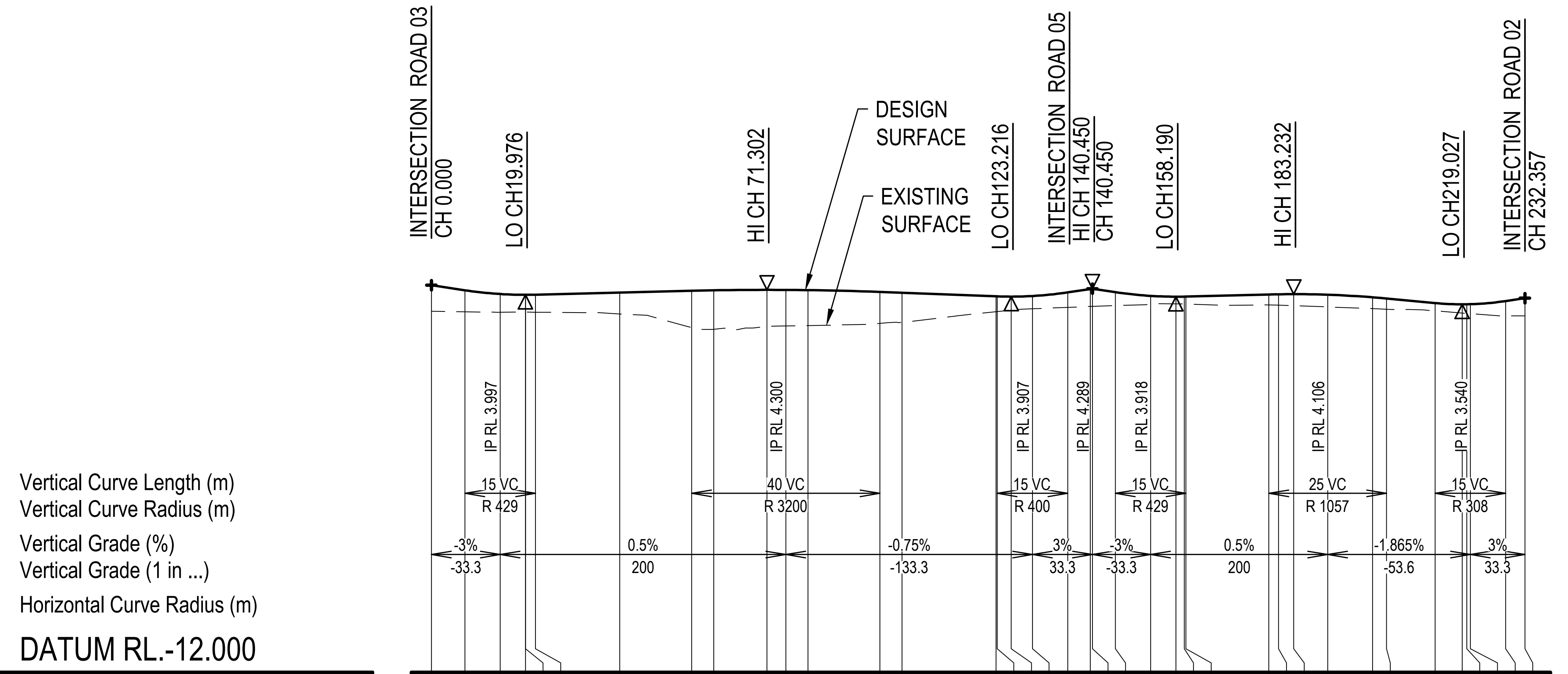
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number 30180356

Drawing No.
IRG-AAP-DA-00-DRG-CV-0257

Issue
03



DESIGN LEVELS ON ROAD CENTRELINE	4.435	4.222	4.062	4.029	4.029	4.034	4.124	4.200	4.220	4.240
DESIGN LIP OF KERB (LHS)							4.042	4.119	4.139	4.159
DESIGN LIP OF KERB (RHS)			3.983	3.947	3.947	3.953	4.042	4.119	4.139	4.159
EXISTING SURFACE ON ROAD CENTRELINE	3.327	3.308	3.291	3.293	3.293	3.289	3.219	2.632	2.565	2.684
CUT / FILL DEPTH	1.108	0.913	0.772	0.736	0.736	0.745	0.905	1.568	1.655	1.556
PEGGED CHAINAGE	0.000	7.119	14.619	19.976	20.000	22.119	40.000	55.302	60.000	71.302

DESIGN LEVELS ON ROAD CENTRELINE	4.238	4.228	4.150	4.115	3.965	3.963	3.952	3.977	4.132	4.276
DESIGN LIP OF KERB (LHS)	4.156	4.147	4.069	4.033	3.883	3.882	3.871			
DESIGN LIP OF KERB (RHS)	4.156	4.147	4.069	4.033	3.883	3.882	3.871			
EXISTING SURFACE ON ROAD CENTRELINE	2.709	2.724	2.815	2.858	3.312	3.317	3.378	3.437	3.496	3.534
CUT / FILL DEPTH	1.529	1.505	1.335	1.257	0.653	0.647	0.574	0.540	0.636	0.742
PEGGED CHAINAGE	75.302	80.000	95.302	100.000	120.000	120.216	123.216	127.716	135.216	140.000

DESIGN LEVELS ON ROAD CENTRELINE	4.289	4.143	3.983	3.950	3.954	3.955	4.043	4.052	4.057
DESIGN LIP OF KERB (LHS)				3.868	3.872	3.874	3.962	3.970	3.975
DESIGN LIP OF KERB (RHS)				3.868	3.872	3.874	3.962	3.970	3.975
EXISTING SURFACE ON ROAD CENTRELINE	3.537	3.571	3.628	3.646	3.644	3.644	3.599	3.592	3.568
CUT / FILL DEPTH	0.752	0.572	0.355	0.304	0.309	0.311	0.444	0.459	0.488
PEGGED CHAINAGE	140.450	145.333	152.833	158.190	160.000	160.333	177.948	180.000	183.232

DESIGN LEVELS ON ROAD CENTRELINE	4.032	3.924	3.873	3.680	3.626	3.628	3.631	3.765	3.888
DESIGN LIP OF KERB (LHS)	3.949	3.842	3.791	3.598					
DESIGN LIP OF KERB (RHS)	3.949	3.842	3.791	3.598					
EXISTING SURFACE ON ROAD CENTRELINE	3.515	3.440	3.411	3.348	3.257	3.242	3.230	3.130	3.135
CUT / FILL DEPTH	0.517	0.483	0.461	0.332	0.369	0.386	0.402	0.635	0.752
PEGGED CHAINAGE	190.448	200.000	202.948	213.276	219.027	220.000	220.776	228.276	232.357

ROAD 07 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:200

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales

0 10 20 40 60 80 100m
HORI.
1 : 1000

0 5 10 15 20m
VERT.
1 : 200

Surveyor

ROBERT A HARRIES
SURVEYOR

Client

GOLDCORAL PTY LTD

Status

FOR APPROVAL

Original Issue Signatures

Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project

RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title

ROAD LONGITUDINAL
SECTIONS
SHEET 8

ARCADIS
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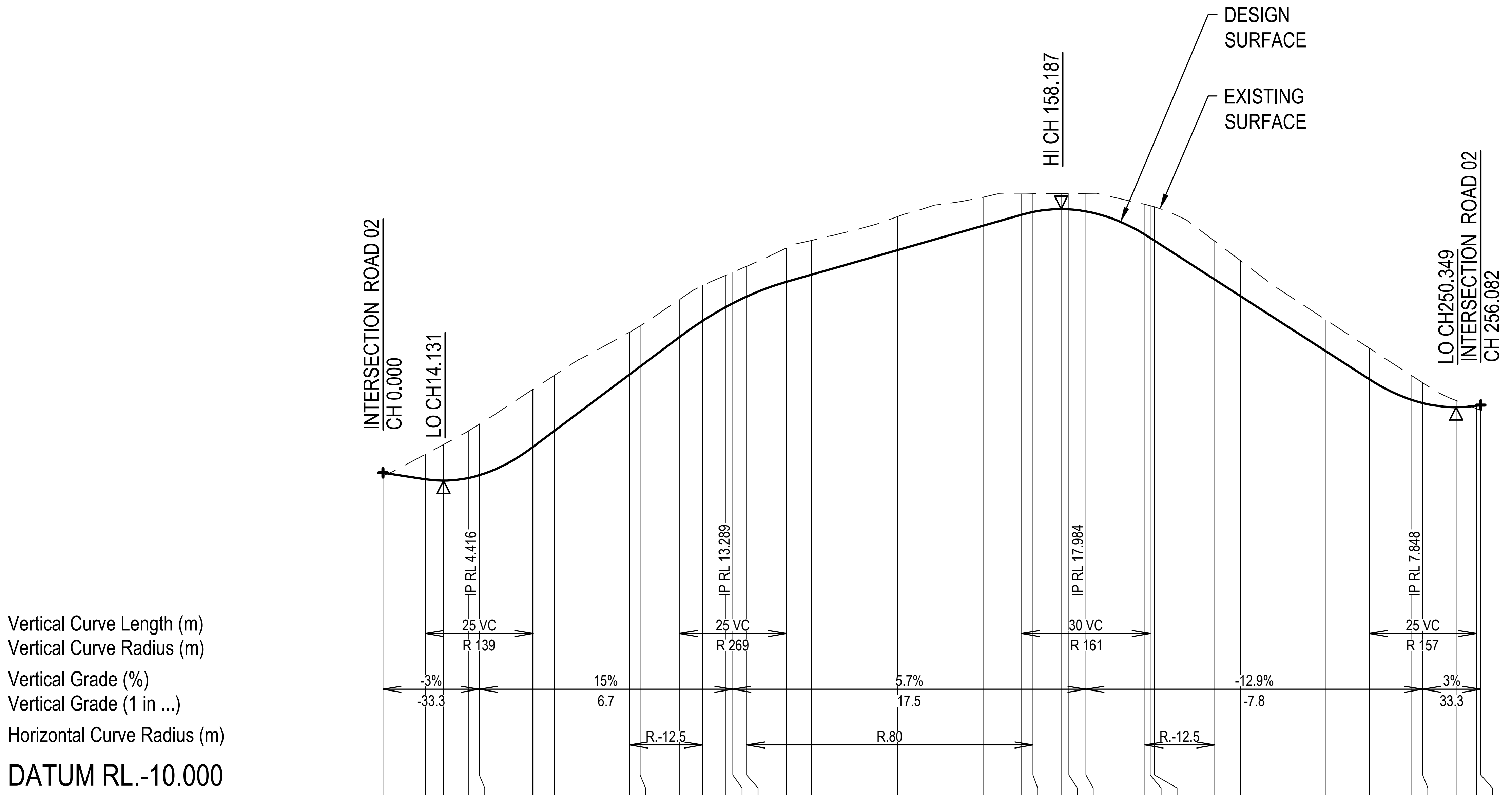
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0258

Issue: 03



DATUM RL.-10.000

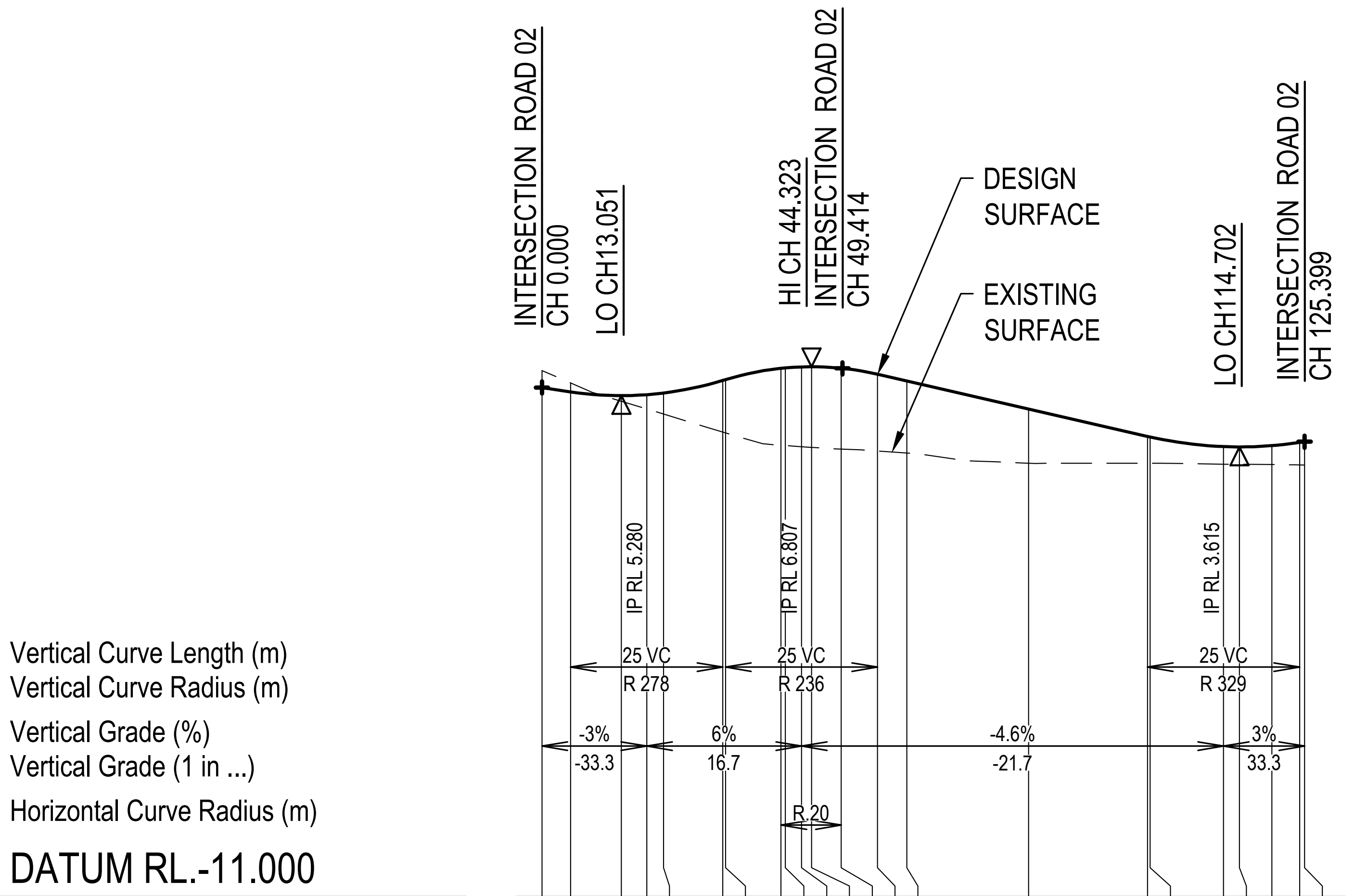
DESIGN LEVELS ON ROAD CENTRELINE	5.090	4.791	4.729	4.853	4.979	6.291	7.047	9.673	10.047	11.414	12.172	12.826
DESIGN LIP OF KERB (LHS)				4.741	4.890	6.180	6.935	9.584	9.963	11.349	12.119	12.775
DESIGN LIP OF KERB (RHS)			4.617	4.741	4.890	6.180	6.935	9.764	10.133	11.484	12.233	12.886
EXISTING SURFACE ON ROAD CENTRELINE	4.956	5.967	6.414	7.049	7.360	8.980	9.639	11.650	11.942	13.162	13.826	14.306
CUT / FILL DEPTH	0.134	-1.175	-1.685	-2.196	-2.381	-2.689	-2.592	-1.977	-1.895	-1.748	-1.654	-1.480
PEGGED CHAINAGE	0.000	9.964	14.131	20.000	22.464	34.964	40.000	57.509	60.000	69.112	74.532	80.000

DESIGN LEVELS ON ROAD CENTRELINE	12.998	13.313	14.001	14.337	15.477	16.617	17.129	17.258	17.391	17.381	17.287	16.204
DESIGN LIP OF KERB (LHS)	12.937	13.262	13.949	14.285	15.425	16.565	17.078	17.206	17.340	17.330	17.223	16.143
DESIGN LIP OF KERB (RHS)	13.048	13.373	14.061	14.397	15.537	16.677	17.189	17.318	17.451	17.441	17.334	16.272
EXISTING SURFACE ON ROAD CENTRELINE	14.445	14.723	15.577	15.929	17.035	17.944	18.095	18.106	18.124	18.125	18.127	17.617
CUT / FILL DEPTH	-1.447	-1.410	-1.576	-1.592	-1.558	-1.328	-0.965	-0.848	-0.732	-0.743	-0.840	-1.413
PEGGED CHAINAGE	81.612	84.849	94.112	100.000	120.000	140.000	148.993	151.630	158.187	160.000	163.993	177.759

DESIGN LEVELS ON ROAD CENTRELINE	16.049	15.919	14.109	13.339	10.759	9.461	8.493	8.345	8.153	8.223	8.254
DESIGN LIP OF KERB (LHS)	15.985	15.854	14.015	13.233	10.648	9.349					
DESIGN LIP OF KERB (RHS)	16.120	15.992	14.175	13.284	10.648	9.349	8.382	8.254			
EXISTING SURFACE ON ROAD CENTRELINE	17.556	17.498	15.892	14.994	12.220	10.907	9.623	9.291	8.465	8.088	8.007
CUT / FILL DEPTH	-1.506	-1.578	-1.783	-1.654	-1.461	-1.446	-1.129	-0.946	-0.313	0.135	0.247
PEGGED CHAINAGE	178.993	180.000	194.033	200.000	220.000	230.066	240.000	242.566	250.349	255.066	256.082

ROAD 09 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:200



DATUM RL.-11.000

DESIGN LEVELS ON ROAD CENTRELINE	5.796	5.655	5.530	5.561	5.617	6.030	6.057	6.428	6.442	6.476	6.482
DESIGN LIP OF KERB (LHS)			5.418	5.454	5.505	5.918	5.946	6.317	6.330		
DESIGN LIP OF KERB (RHS)				5.454	5.505	5.918	5.946	6.317	6.330	6.368	6.377
EXISTING SURFACE ON ROAD CENTRELINE	6.356	5.947	5.346	5.091	4.921	4.333	4.306	3.897	3.886	3.846	3.824
CUT / FILL DEPTH	-0.560	-0.293	0.184	0.470	0.696	1.697	1.751	2.531	2.556	2.629	2.657
PEGGED CHAINAGE	0.000	4.718	13.051	17.218	20.000	29.718	30.172	39.308	40.000	42.672	44.323

DESIGN LEVELS ON ROAD CENTRELINE	6.431	6.232	6.010	5.090	4.190	4.170	3.852	3.842	3.884	3.990	4.015
DESIGN LIP OF KERB (LHS)				5.008	4.108	4.089	3.779	3.760			
DESIGN LIP OF KERB (RHS)	6.333	6.143	5.928	5.008	4.108	4.089					
EXISTING SURFACE ON ROAD CENTRELINE	3.771	3.707	3.644	3.309	3.304	3.304	3.276	3.270	3.260	3.249	3.245
CUT / FILL DEPTH	2.660	2.525	2.367	1.781	0.886	0.866	0.576	0.571	0.624	0.741	0.770
PEGGED CHAINAGE	49.199	55.172	60.000	80.000	99.570	100.000	112.070	114.702	120.000	124.570	125.399

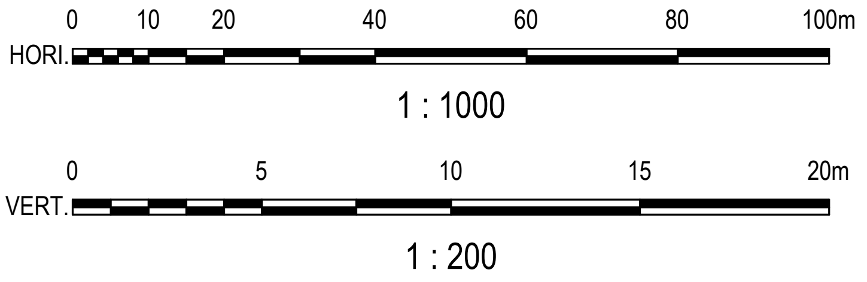
ROAD 10 LONGITUDINAL SECTION

SCALE: HORIZONTAL - 1:1000
VERTICAL - 1:200

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales



Surveyor

ROBERT A HARRIES
SURVEYOR

Client

GOLDCORAL PTY LTD

Status

FOR APPROVAL

Original Issue Signatures

Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project

RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title

ROAD LONGITUDINAL
SECTIONS
SHEET 9

ARCADIS

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Level 16, 580 George Street
SYDNEY NSW 2000
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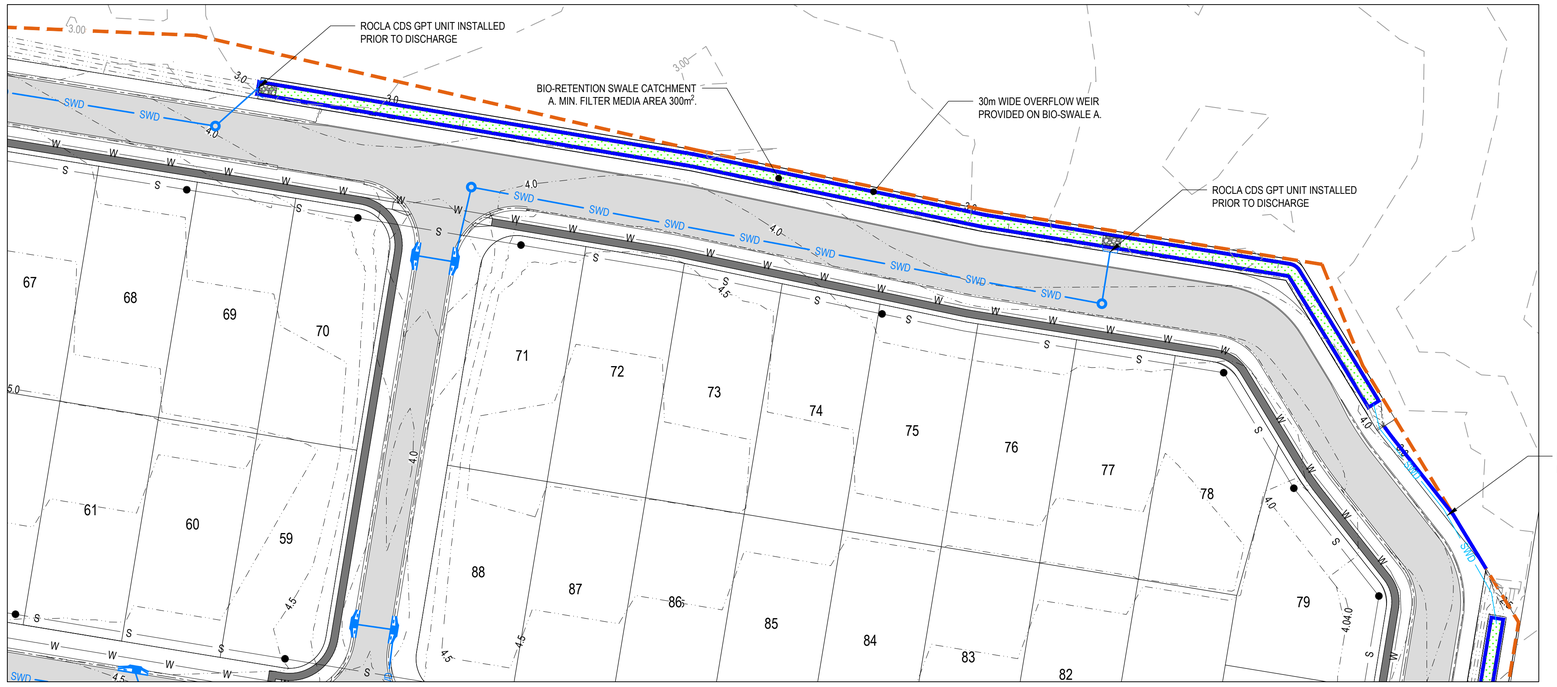
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number 30180356

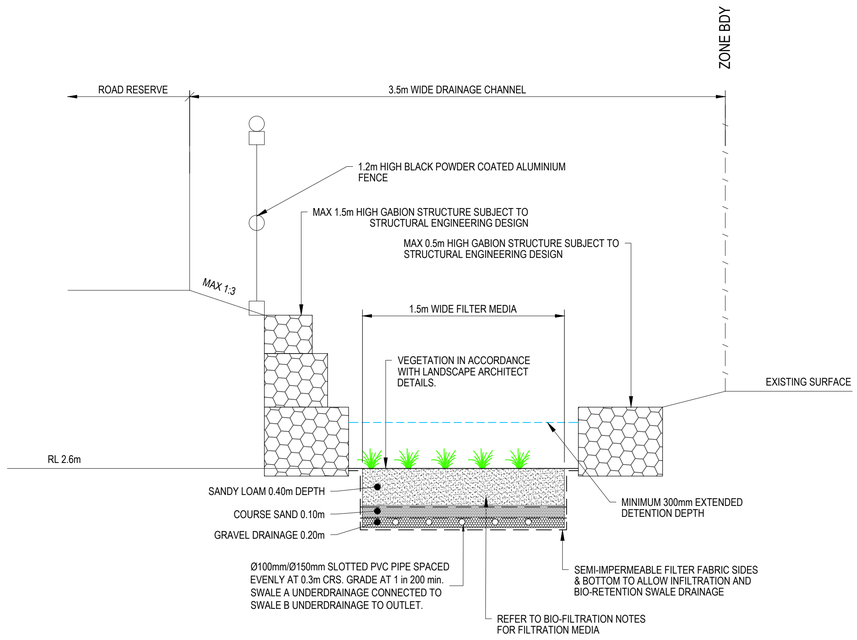
Drawing No. IRG-AAP-DA-00-DRG-CV-0259

Issue 03

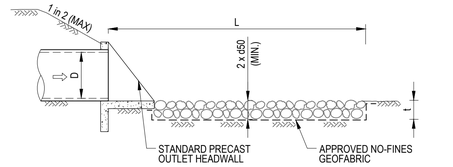
Date Plotted: 15 Apr 2024 - 09:05PM File Name: C:\Users\lpaz2589\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0251-RoadLongitudinalSections.dwg



SWALE A
SCALE 1 : 500



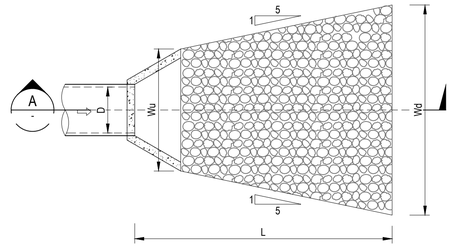
TYPICAL BIO-RETENTION SWALE SECTION
NTS



TYPICAL STORMWATER OUTLET SECTION
N.T.S.

A

DETAIL 'A'
NTS



TYPICAL STORMWATER OUTLET PLAN
NTS

LEGEND

- PROPOSED CONTOUR (5.0)
- EXISTING CONTOUR (5.0)
- PROPOSED MOUNTABLE KERB / LAYBACK KERB
- PROPOSED BARRIER KERB & CHANNEL
- PROPOSED SEMI-MOUNTABLE KERB
- PROPOSED EDGE RESTRAINT
- EARTHWORKS EXTENTS
- PROPOSED STORMWATER RETICULATION AND STRUCTURE (SWD)
- PROPOSED SEWERAGE LINE, MANHOLE AND (S)
- PROPOSED WATER RETICULATION (W)
- PROPOSED STORMWATER OUTLET SCOUR PROTECTION
- PROPOSED RETAINING WALL
- PROPOSED GABION WALL
- PROPOSED PAVEMENT
- PROPOSED BIO
- MIDDEN LOCATION
- POTENTIAL FOOTPATH LOCATION
- PROPOSED BOARDWALK
- STAGE BOUNDARY

NOTES

1. FILTER MEDIA LAYER SHALL CONFORM WITH THE SPECIFICATIONS OF FAWB GUIDELINES FOR BIOFILTRATION MEDIA (VERSION 3.01) & WATER BY DESIGN SPECIFICATIONS "BIO RETENTION TECHNICAL DESIGN GUIDELINES VERSION 1". THE MINIMUM ORGANIC CONTENT OF THE FILTER MEDIA SHALL BE 3%.
2. TRANSITION & DRAINAGE MEDIA LAYER SHALL CONFORM WITH THE SPECIFICATIONS OF FAWB GUIDELINES FOR BIOFILTRATION MEDIA (VERSION 3.01) & WATER BY DESIGN SPECIFICATIONS "BIO RETENTION TECHNICAL DESIGN GUIDELINES VERSION 1".
3. THE CONTRACTOR IS RESPONSIBLE FOR UNDERTAKING DETAILED SURVEY OF EACH LAYER OF THE MEDIA INSTALLED INCLUDING THE SUBGRADE & FINISHED LEVEL SURVEYS. THE DIGITAL SURVEY DATA FOR EACH LAYER IS TO BE ISSUED TO THE SUPERINTENDENT FOR REVIEW PRIOR TO THE SUBSEQUENT LAYER BEING INSTALLED. THE REQUIRED TOLERANCES FOR CONSTRUCTION OF THE MEDIA LAYERS IS INCLUDED IN THE WATER BY DESIGN CONSTRUCTION & ESTABLISHMENT SIGN OFF FORMS – BIORETENTION SYSTEMS (VERSION 1.1). ALL COSTS ASSOCIATED WITH THE DETAILED SURVEY OF THE BIORETENTION SYSTEMS, THE STAGED CONSTRUCTION APPROACH DUE TO THE SURVEY REVIEW PROCESS, & ANY REWORKS REQUIRED AS A RESULT OF THE SURVEY REVIEWS ARE DEEMED INCLUDED IN THE LUMP SUM CONTRACT PRICE FOR THE PROJECT.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CO-SIGNING THE WATER BY DESIGN CONSTRUCTION & ESTABLISHMENT SIGN OFF FORMS – BIORETENTION SYSTEMS (VERSION 1.1) AT THE TIME OF CONSTRUCTION OF THE BIORETENTION SYSTEMS AS WELL AS MANAGING & COMPLYING WITH THE RELEVANT HOLD & WITNESS POINTS SPECIFIED IN THESE FORMS.
5. THE MINIMUM HYDRAULIC CONDUCTIVITY OF ANY LAYER OF BIO BASIN MEDIA SHALL BE 100mm/h.
6. MAXIMUM FILTER MEDIA NITROGEN 400mg/kg.
7. MAXIMUM FILTER MEDIA ORTHOPHOSPHATE 40mg/kg.
8. MINIMUM 300mm EXTENDED DETENTION DEPTH.
9. BIOSWALE A UNDERDRAIN TO CONNECT TO BIOSWALE B UNDERDRAIN. WIER FLOWS TO DISCHARGE NORTH ALONG LENGTH OF BIOSWALE. SEMI IMPERMEABLE LINER TO ALLOW INFILTRATION TO MARTENS AND ASSOCIATES SPECIFICATIONS.

BIO-FILTRATION NOTES

MINIMUM FILTER DEPTH IS TO BE 0.70m AND IS TO CONSIST OF THE FOLLOWING MEDIA:

- 400MM OF LOAMY SANDY MATERIAL WITH A HYDRAULIC CONDUCTIVITY OF 100mm/h AND A PARTICLE SIZE DISTRIBUTION AS FOLLOWS:
- 100mm TRANSITION LAYER - COARSE SAND, CONSTANT DEPTH, NOM. SIZE 0.5-2.0
- 200mm (MIN.) DRAINAGE LAYER - FINE AGGREGATE, CONSTANT DEPTH, NOM. SIZE 2-5
- CONTRACTOR TO ERECT SIGNAGE IDENTIFYING THE PURPOSE OF THE BIO-RETENTION BASIN AS PER COUNCIL REQUIREMENTS.

CONTRACTOR TO INSTALL GEOFABRIC LAY TOPSOIL (25mm THICK) 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 ARE CONSTRUCTED. ALTERNATIVELY THE BIO-RETENTION BASIN SHALL BE RETAINED AS A SEDIMENT BASIN UNTIL 80% OF BUILDINGS ARE CONSTRUCTED.

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales

0 5 10 20 30 40 50m

1 : 500

Surveyor

ROBERT A HARRIES
SURVEYOR

Client

GOLDCORAL PTY LTD

Status

FOR APPROVAL

Original Issue Signatures			
Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project

RESIDENTIAL DEVELOPMENT
LOT 277 IRON GATES ROAD
EVANS HEAD

Title

DETENTION BASIN
PLAN AND DETAILS
SHEET 1

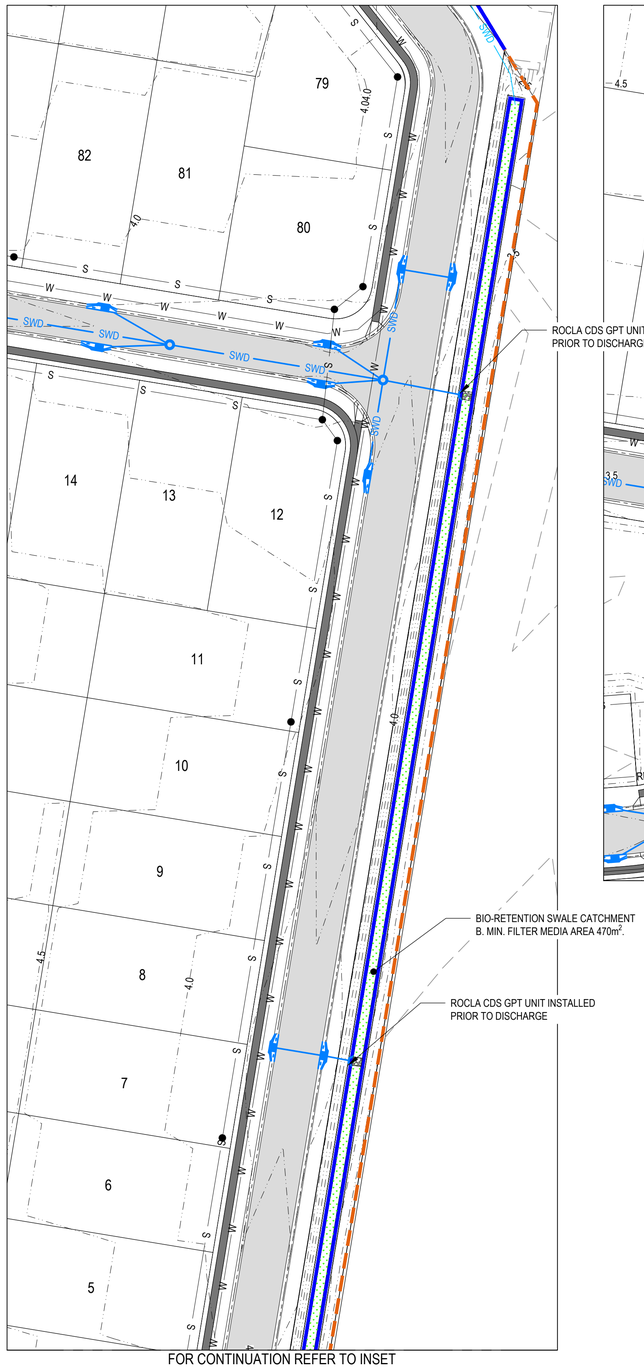
ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0491

Issue: 03

Date Plotted: 16 Apr 2024 - 08:17PM File Name: C:\Users\lpaz2589\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0491-DetentionBasinPlan.dwg



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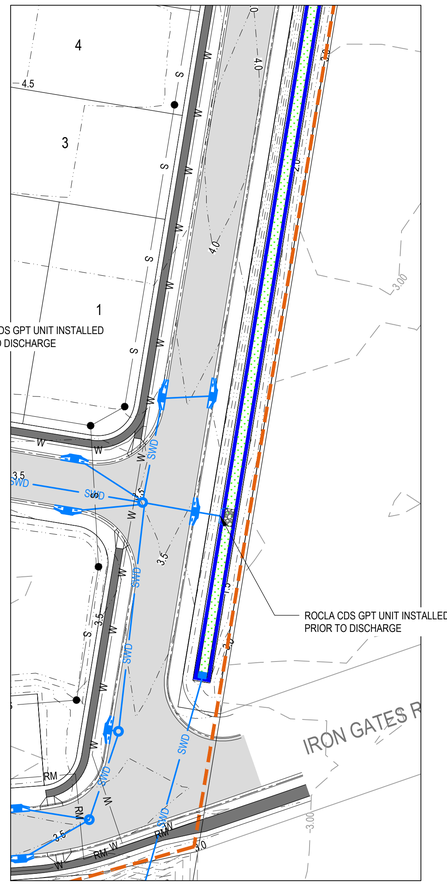

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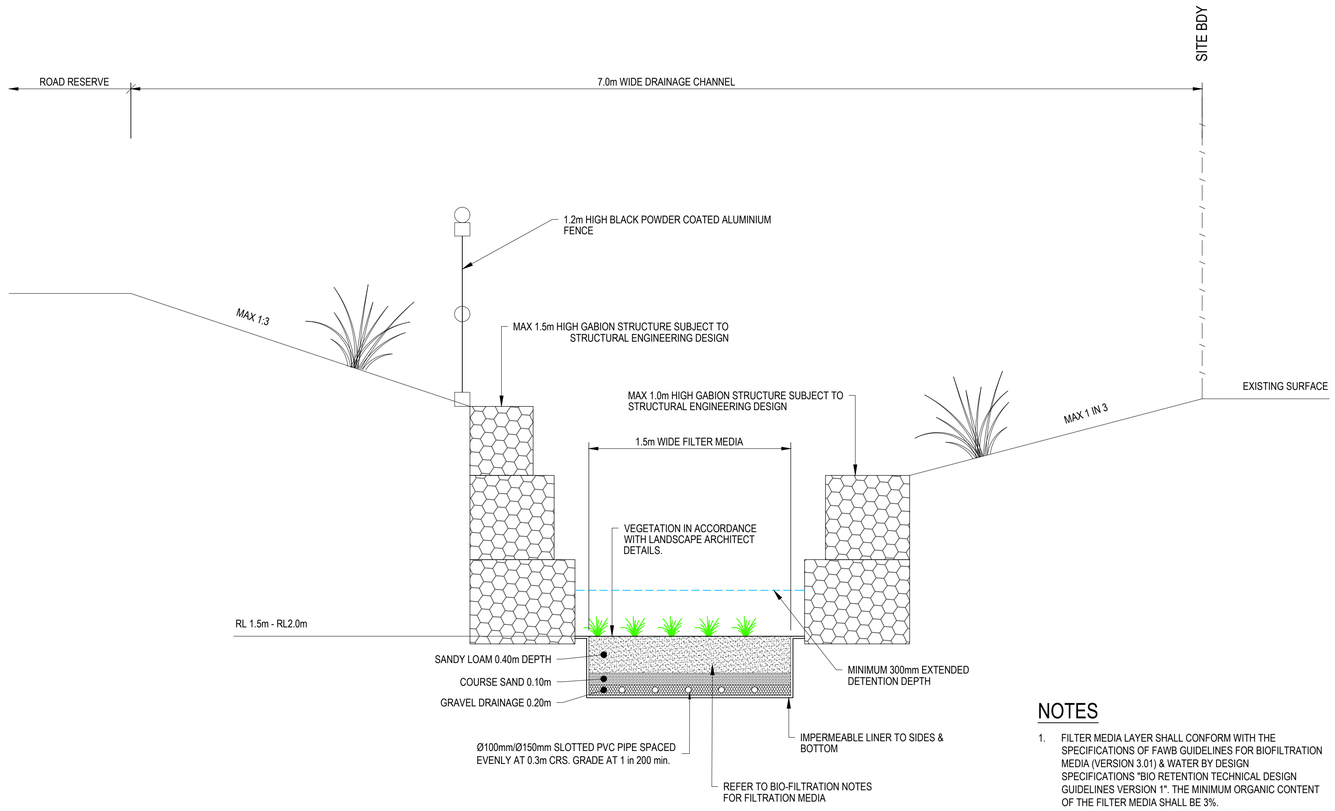
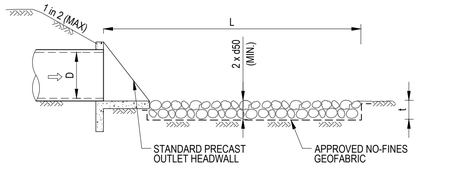
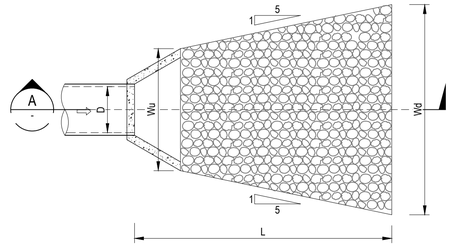


TYPICAL BIO-RETENTION SWALE SECTION
NTS



TYPICAL STORMWATER OUTLET SECTION
N.T.S.



TYPICAL STORMWATER OUTLET PLAN
NTS

DETAIL 'A'
NTS

LEGEND

- PROPOSED CONTOUR (5.0)
- EXISTING CONTOUR (5.0)
- PROPOSED MOUNTABLE KERB / LAYBACK KERB
- PROPOSED BARRIER KERB & CHANNEL
- PROPOSED SEMI-MOUNTABLE KERB
- PROPOSED EDGE RESTRAINT
- EARTHWORKS EXTENTS
- PROPOSED STORMWATER RETICULATION AND STRUCTURE (SWD)
- PROPOSED SEWERAGE LINE, MANHOLE AND (S)
- PROPOSED WATER RETICULATION (W)
- PROPOSED STORMWATER OUTLET SCOUR PROTECTION
- PROPOSED RETAINING WALL
- PROPOSED GABION WALL
- PROPOSED PAVEMENT
- PROPOSED BIO
- MIDDEN LOCATION
- POTENTIAL FOOTPATH LOCATION
- PROPOSED BOARDWALK
- STAGE BOUNDARY

NOTES

1. FILTER MEDIA LAYER SHALL CONFORM WITH THE SPECIFICATIONS OF FAWB GUIDELINES FOR BIOFILTRATION MEDIA (VERSION 3.01) & WATER BY DESIGN SPECIFICATIONS "BIO RETENTION TECHNICAL DESIGN GUIDELINES VERSION 1". THE MINIMUM ORGANIC CONTENT OF THE FILTER MEDIA SHALL BE 3%.
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8. MINIMUM 300mm EXTENDED DETENTION DEPTH.
9. BIOSWALE B UNDERDRAIN TO DISCHARGE SOUTH UNDER ROAD 1. IMPERMEABLE LINER TO PREVENT INFILTRATION.

BIO-FILTRATION NOTES

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- 200mm (MIN.) DRAINAGE LAYER - FINE AGGREGATE, CONSTANT DEPTH, NOM. SIZE 2-5
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Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

Scales: 0 5 10 20 30 40 50m — 1 : 500

Surveyor: ROBERT A HARRIES SURVEYOR

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL

Original Issue Signatures			
Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: DETENTION BASIN PLAN AND DETAILS SHEET 2

ARCADIS
Arcadis Australia Pacific Pty Limited
Level 16, 580 George Street
SYDNEY NSW 2000
ABN 76 104 485 289
Tel No: +61 2 8907 9000
www.arcadis.com/au

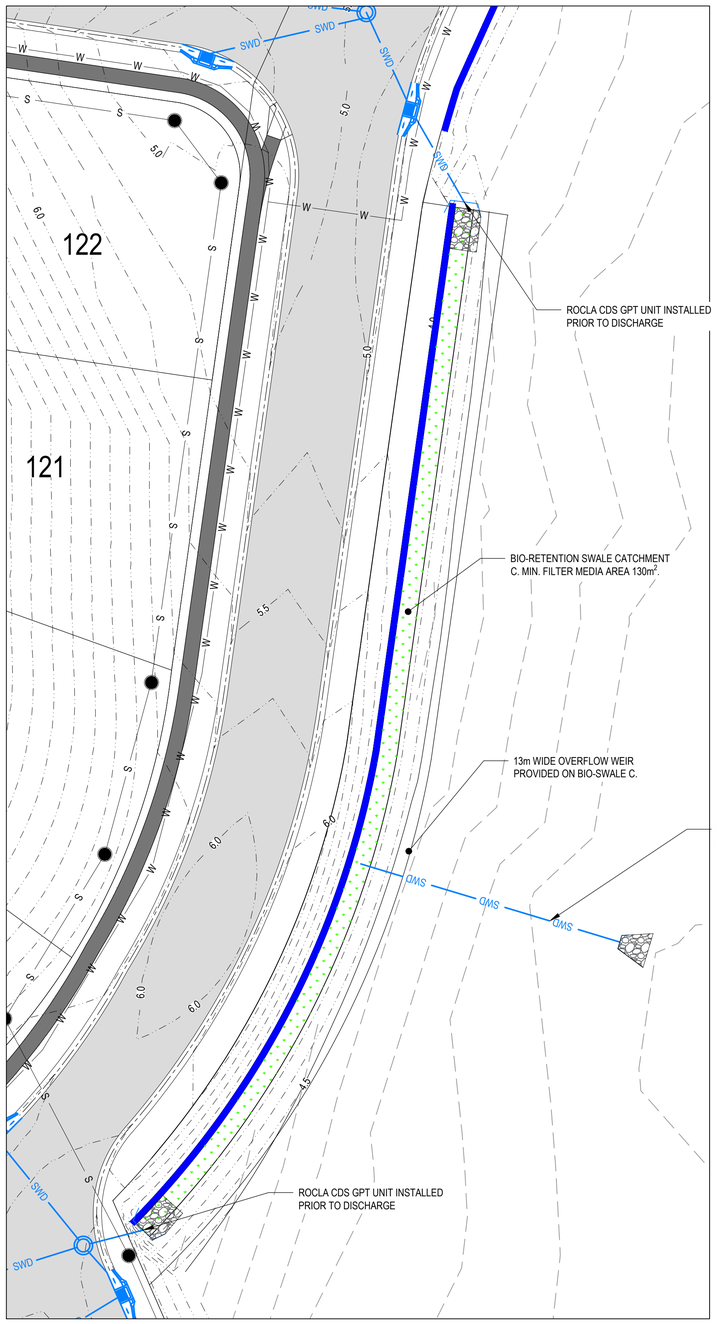
Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0492

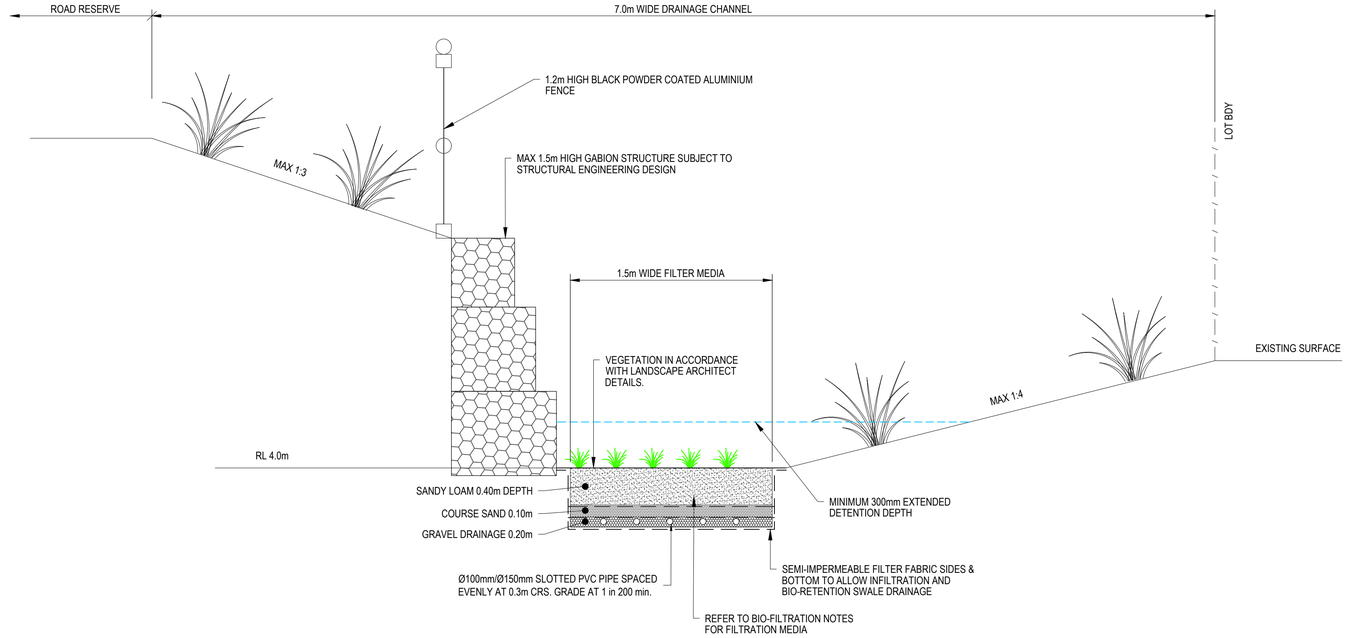
Issue: 03

100mm on Original

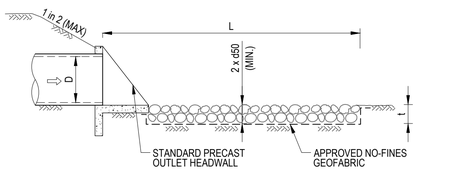
Date Plotted: 16 Apr 2024 - 08:36PM File Name: C:\Users\lpaz2589\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0491-DetentionBasinPlan.dwg



SWALE C
SCALE 1 : 250



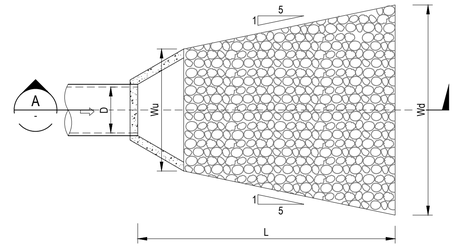
TYPICAL BIO-RETENTION SWALE SECTION
NTS



TYPICAL STORMWATER OUTLET SECTION
N.T.S.

A

DETAIL 'A'
NTS



TYPICAL STORMWATER OUTLET PLAN
NTS

LEGEND

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100mm on Original

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Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: DETENTION BASIN PLAN AND DETAILS SHEET 3

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Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0493

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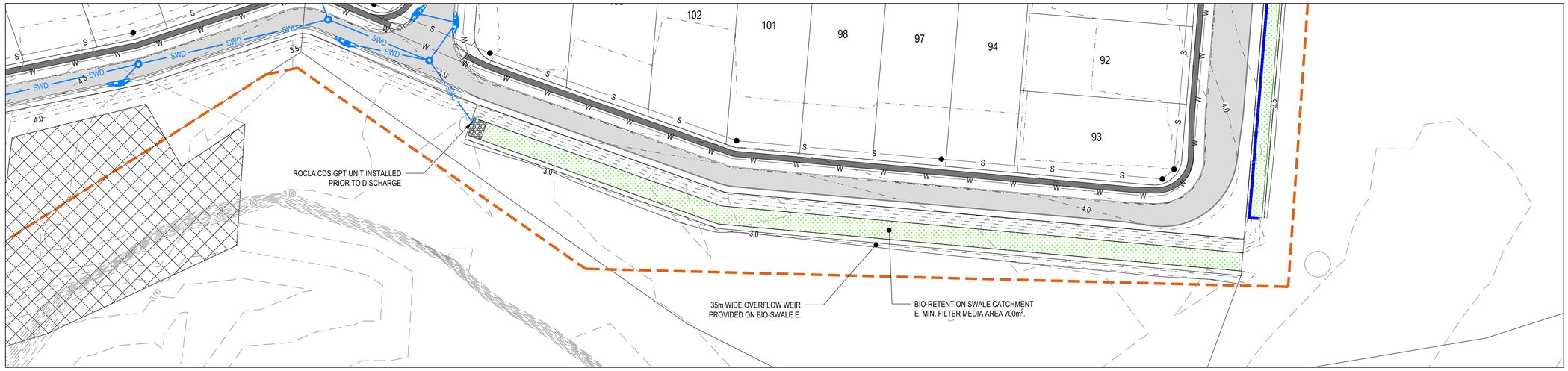

SWALE E
SCALE 1 : 500

LEGEND

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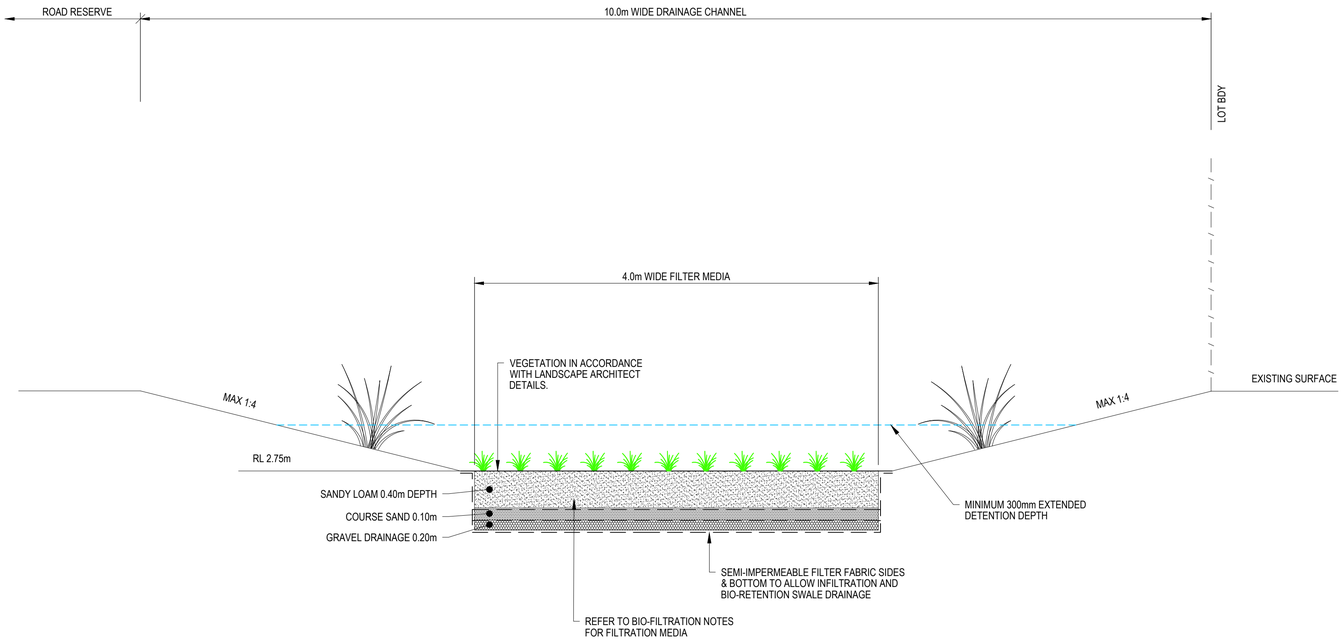
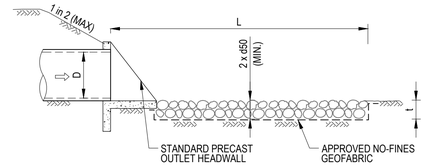


TYPICAL BIO-RETENTION SWALE SECTION
NTS



TYPICAL STORMWATER OUTLET SECTION
N.T.S.

A

DETAIL 'A'
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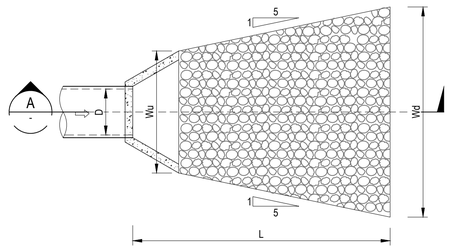

TYPICAL STORMWATER OUTLET PLAN
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100mm on Original

Scales: 0 5 10 15 20 25m — 1 : 250

Surveyor: ROBERT A HARRIES SURVEYOR

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL

Original Issue Signatures			
Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: DETENTION BASIN PLAN AND DETAILS SHEET 4

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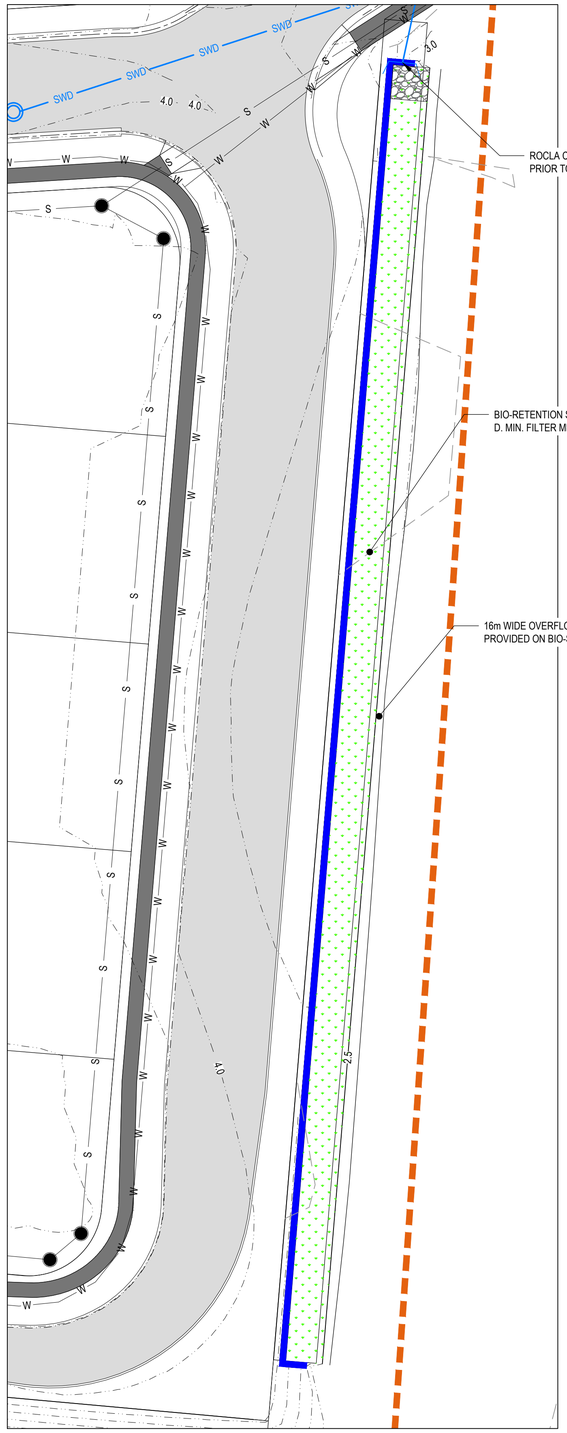
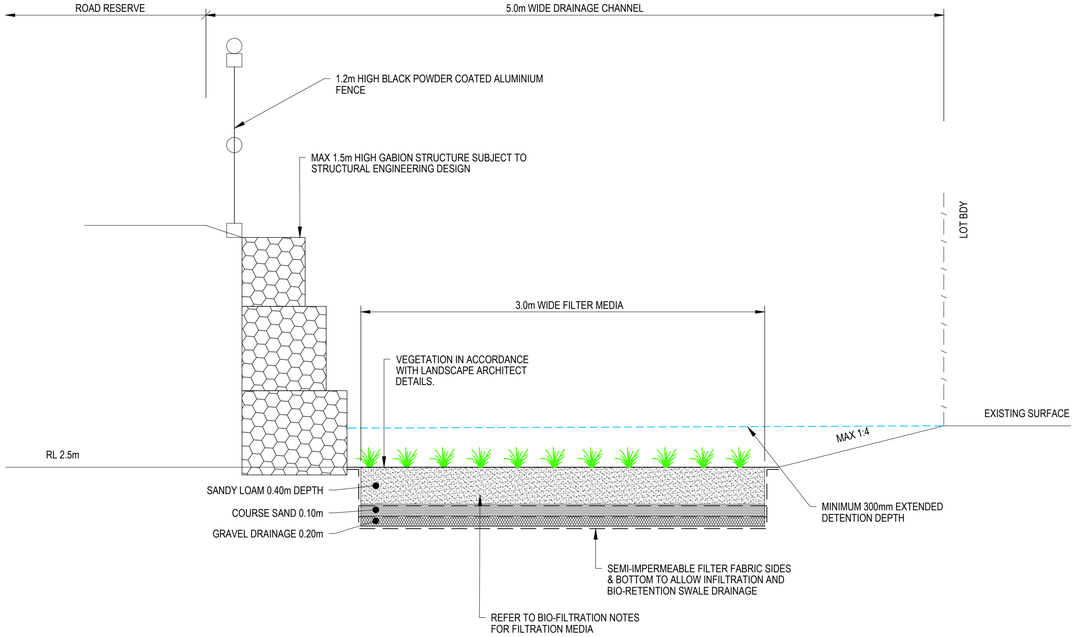


SWALE D
SCALE 1 : 250



TYPICAL BIO-RETENTION SWALE SECTION
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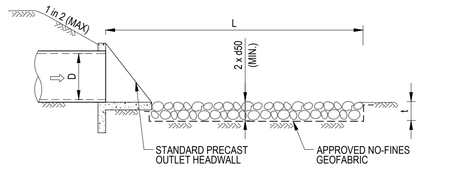

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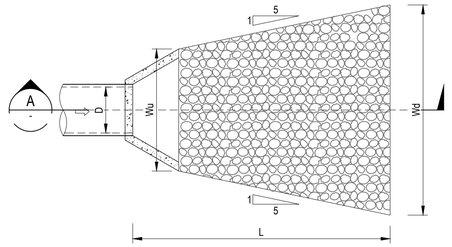

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- STAGE BOUNDARY

NOTES

1. FILTER MEDIA LAYER SHALL CONFORM WITH THE SPECIFICATIONS OF FAWB GUIDELINES FOR BIOFILTRATION MEDIA (VERSION 3.01) & WATER BY DESIGN SPECIFICATIONS "BIO RETENTION TECHNICAL DESIGN GUIDELINES VERSION 1". THE MINIMUM ORGANIC CONTENT OF THE FILTER MEDIA SHALL BE 3%.
2. TRANSITION & DRAINAGE MEDIA LAYER SHALL CONFORM WITH THE SPECIFICATIONS OF FAWB GUIDELINES FOR BIOFILTRATION MEDIA (VERSION 3.01) & WATER BY DESIGN SPECIFICATIONS "BIO RETENTION TECHNICAL DESIGN GUIDELINES VERSION 1".
3. THE CONTRACTOR IS RESPONSIBLE FOR UNDERTAKING DETAILED SURVEY OF EACH LAYER OF THE MEDIA INSTALLED INCLUDING THE SUBGRADE & FINISHED LEVEL SURVEYS. THE DIGITAL SURVEY DATA FOR EACH LAYER IS TO BE ISSUED TO THE SUPERINTENDENT FOR REVIEW PRIOR TO THE SUBSEQUENT LAYER BEING INSTALLED. THE REQUIRED TOLERANCES FOR CONSTRUCTION OF THE MEDIA LAYERS IS INCLUDED IN THE WATER BY DESIGN CONSTRUCTION & ESTABLISHMENT SIGN OFF FORMS – BIORETENTION SYSTEMS (VERSION 1.1). ALL COSTS ASSOCIATED WITH THE DETAILED SURVEY OF THE BIORETENTION SYSTEMS, THE STAGED CONSTRUCTION APPROACH DUE TO THE SURVEY REVIEW PROCESS, & ANY REWORKS REQUIRED AS A RESULT OF THE SURVEY REVIEWS ARE DEEMED INCLUDED IN THE LUMP SUM CONTRACT PRICE FOR THE PROJECT.
4. THE CONTRACTOR SHALL BE RESPONSIBLE FOR CO-SIGNING THE WATER BY DESIGN CONSTRUCTION & ESTABLISHMENT SIGN OFF FORMS – BIORETENTION SYSTEMS (VERSION 1.1) AT THE TIME OF CONSTRUCTION OF THE BIORETENTION SYSTEMS AS WELL AS MANAGING & COMPLYING WITH THE RELEVANT HOLD & WITNESS POINTS SPECIFIED IN THESE FORMS.
5. THE MINIMUM HYDRAULIC CONDUCTIVITY OF ANY LAYER OF BIO BASIN MEDIA SHALL BE 100mm/h.
6. MAXIMUM FILTER MEDIA NITROGEN 400mg/kg.
7. MAXIMUM FILTER MEDIA ORTHOPHOSPHATE 40mg/kg.
8. MINIMUM 300mm EXTENDED DETENTION DEPTH.
9. BIOSWALE D WEIR FLOWS TO DISCHARGE EAST ALONG LENGTH OF BIOSWALE. SEMI IMPERMEABLE LINER TO ALLOW INFILTRATION TO MARTENS AND ASSOCIATES SPECIFICATIONS.

BIO-FILTRATION NOTES

MINIMUM FILTER DEPTH IS TO BE 0.70m AND IS TO CONSIST OF THE FOLLOWING MEDIA:

- 400MM OF LOAMY SANDY MATERIAL WITH A HYDRAULIC CONDUCTIVITY OF 100mm/h AND A PARTICLE SIZE DISTRIBUTION AS FOLLOWS:
- 100mm TRANSITION LAYER - COARSE SAND, CONSTANT DEPTH, NOM. SIZE 0.5-2.0
- 200mm (MIN.) DRAINAGE LAYER - FINE AGGREGATE, CONSTANT DEPTH, NOM. SIZE 2-5
- CONTRACTOR TO ERECT SIGNAGE IDENTIFYING THE PURPOSE OF THE BIO-RETENTION BASIN AS PER COUNCIL REQUIREMENTS.

CONTRACTOR TO INSTALL GEOFABRIC LAY TOPSOIL (25mm THICK) 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 ARE CONSTRUCTED. ALTERNATIVELY THE BIO-RETENTION BASIN SHALL BE RETAINED AS A SEDIMENT BASIN UNTIL 80% OF BUILDINGS ARE CONSTRUCTED.

Issue	Description	DR	CH	VE	Date
03	AMENDED FPL DESIGN	JS	LP	LP	15.04.24
02	AMENDED LAYOUT DESIGN	HP	LP	LP	10.11.23
01	ORIGINAL ISSUE	JS	LP	LP	12.06.23

100mm on Original

Scales: 0 5 10 15 20 25m — 1 : 250

Surveyor: ROBERT A HARRIES SURVEYOR

Client: GOLDCORAL PTY LTD

Status: FOR APPROVAL

Original Issue Signatures			
Drawn	J. SANTOS	Original Size	A1
Designed	MA. STA.CRUZ	Height Datum	AHD
Project Manager	L. PRIZEMAN	Grid	GDA94
Verified	L. PRIZEMAN		

Project: RESIDENTIAL DEVELOPMENT LOT 277 IRON GATES ROAD EVANS HEAD

Title: DETENTION BASIN PLAN AND DETAILS SHEET 5

ARCADIS
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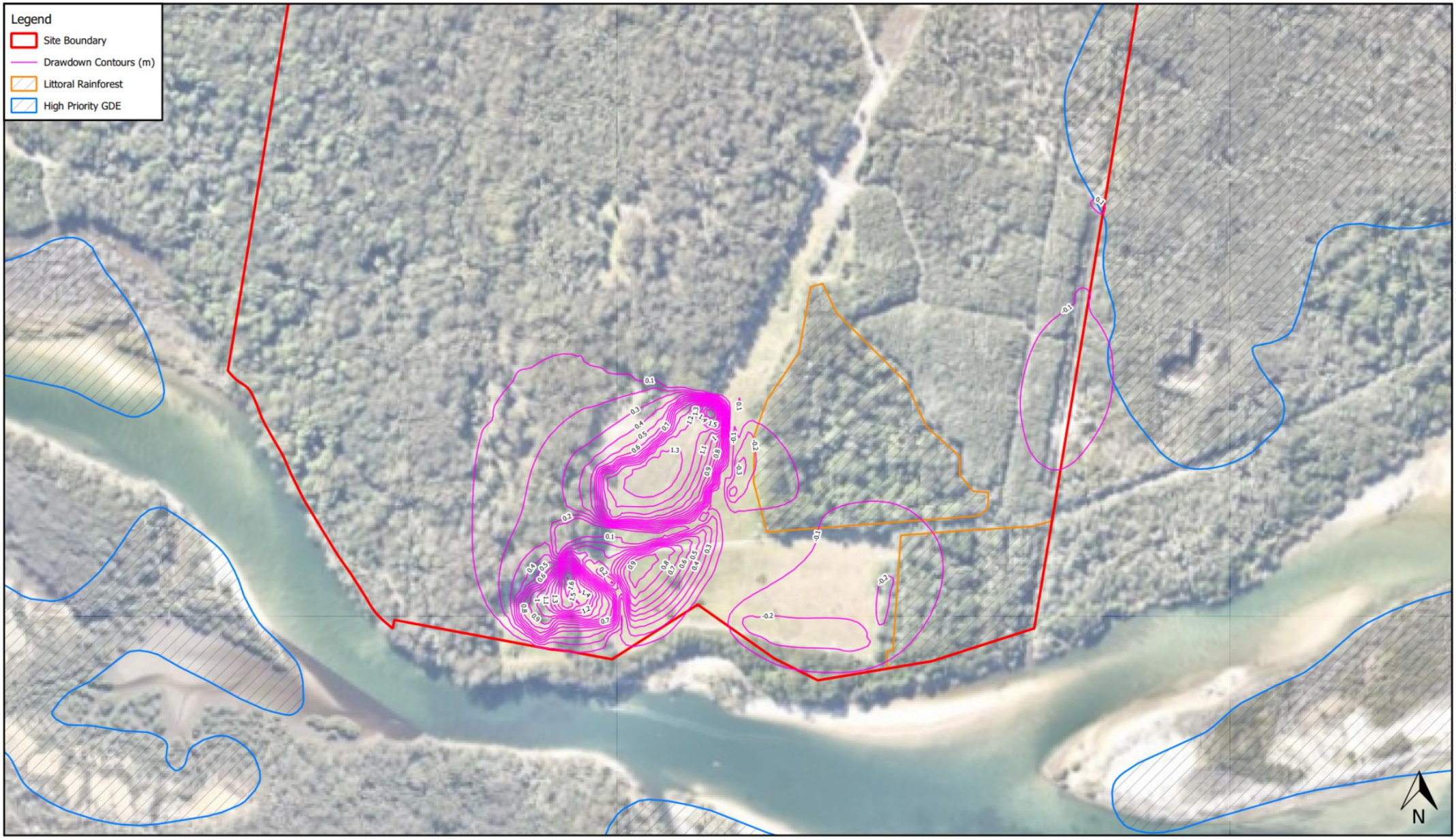
Project Number: 30180356

Drawing No.: IRG-AAP-DA-00-DRG-CV-0495

Issue: 03

Date Plotted: 16 Apr 2024 - 08:17PM File Name: C:\Users\lpaz2589\DC\ACCDocs\Arcadis ACC US\AAU-30180356-Iron Gates Residential\Project Files\10_WIP\10_CV\Stage_01\Drawings\IRG-AAP-DA-00-DRG-CV-0491-DetentionBasinPlan.dwg

ATTACHMENT D – UPDATED GROUNDWATER IMPACT PLOT



0 40 80 120 160 200 m

1:4000 @ A3

Viewport A

Notes:
- Aerial from Nearmap (2023).

Map Title / Figure:

Development Conditions Drawdown from Existing Levels

240 Iron Gates Drive, Evans Head, NSW	Site
Proposed Subdivision	Project
Updated Groundwater Model	Sub-Project
Goldcoral Pty Ltd	Client
16/04/2024	Date

martens
Environment | Water | Geotechnics | Civil | Projects

Project No: P2209002 Map Set: MS13-R01 EPSG: 28356