Flood Assessment

Development Application
Racecourse Road, West Gosford

Waluya PTY LTD

7/05/2024

22-1063

Commercial in Confidence

Document Registration

Document Title	Flood Assessment
Document File Name	REP002-05-22-1063- Flood Assessment.docx
Section	Civil / Urban Water Management
Document Author	Darren Galia / Tim Michel

Issue	Description	Date	Author	Checked	Approved
01	Final for DA Approval	15/12/22	Darren Galia	☒	☒
02	Final for LEC	06/02/24	Darren Galia	☒	☒
03	Minor amendments	20/03/24	Tim Michel	☒	☒
04	Inc. response to WMAwater comments	23/04/24	Tim Michel	☒	☒
05	Minor amendments (post conciliation conference)	07/05/24	Tim Michel	☒	☒

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1. Introduction

1.1. Overview

AT&L have been engaged by Waluya (the client) to prepare this Flood Assessment to support a Development Application (DA) for a proposed bus depot on Racecourse Road, West Gosford, NSW (the site). This report documents the findings of hydrology and hydraulic modelling of the site under existing and proposed conditions. Refer to **Appendix A** for detailed site survey and **Appendix B** for proposed site layout.

This report has been updated to address matters raised in the Statement of Facts and Contentions (SoFACs) for the Land and Environment Court of NSW Case Number 2023/00266853.

1.2. Project Scope

The project scope and objectives are:

1. Prepare a hydraulic model (TUFLOW) and determine site flood characteristics for the 1% Annual Exceedance Probability (AEP) event, 0.2% AEP (adopted as a proxy to assess potential climate change impacts) and the Probable Maximum Flood (PMF) event.
2. Prepare an additional scenario to assess the blockage of the drainage system in the 1% AEP.
3. Import survey data and grading design to allow detailed hydraulic modelling of the site in existing and proposed conditions.
4. Incorporate proposed surfaces, buildings and relevant flood affecting structures.
5. Comment on flood characteristics and model outcomes in existing and proposed conditions.
6. Provide a summary of compliance against the Central Coast Council Floodplain Management development controls.

1.3. Relevant Guidelines

This report has been prepared in accordance with the following guidelines and policies:

- *Central Coast Development Control Plan 2022* (DCP).
- *Central Coast Local Environment Plan 2022* (LEP) (2022).
- Ball J, Babister M, Nathan R, Weeks W, Weinmann E, Retallick M, Testoni I, (Editors), 2019, *Australian Rainfall and Runoff: A Guide to Flood Estimation*, Commonwealth of Australia
- NSW Department of Planning and Environment (2023), *Flood Risk Management Manual*.

1.4. Statement of Facts and Contentions (2023)

An extract of matters pertaining to flooding raised in the SOFACs (2023) are provided in **Table 1** along with a summary of the sections of this report in which they are addressed.

Table 1: Response to SOFACs

Contention	Section of Report
2. The Application is not compatible with the flood hazard of the Site and is likely to significantly adversely affect flood behaviour	
2.1. The Application as presented is not compatible with the flood hazard of the Site and is likely to significantly adversely affect flood behaviour resulting in detrimental increases in the flood affection of Racecourse Road, contrary to clause 5.40 of the Regional SEPP.	See Section 3.4.4
2.2. This impact is also not acceptable having regard to s 4.15(1) of the EP&A Act.	See Section 3.4.3
2.3. The submitted flood modelling is not adequate and its results do not fully and accurately determine the flood hazard and the increase to the flood hazard.	See Section 3.4.3
2.4. Part of the Site is at or below the flood planning level under clause 5.40(2) of the Regional SEPP. The flood planning level is as defined in the Floodplain Development Manual published by the NSW Government in April 2005. Part of the Site is mapped on Council's mapping tool as within the 1 in 100 year flood extent.	See Section 2.6
2.5. The submitted Flood Impact Assessment (FIA) identifies that the post-development PMF (probable maximum flood) map indicates a depth by velocity product in excess of 0.6 across Racecourse Road in one location which would equate to a minimum of H3 hazard under the Department's Flood hazard: Flood risk management guideline no. FB03 (2023), which is unsafe for vehicles, children and the elderly.	See Section 3.4.4
2.6. The proposed internal stormwater and on-site detention systems were excluded in the flood model presented in the FIA and the input rainfall to the flood model was artificially reduced. However, the impact of these systems on flooding is not linear and cannot be accurately estimated with this simplification.	See Section 3.4.2.2
2.7. The flood model in the FIA assumes the proposed internal stormwater will be 100% effective. Blockage of the stormwater network is not assessed in the FIA. Any blockages to the stormwater network would further exacerbate the flood hazard.	See Section 3.2.1
2.8. The proposed buildings are not included in the flood model terrain in the FIA. It is not clear whether the proposed buildings are in the main overland flow path and their impact on flood behaviour.	See Section 3.4.2.2
7. Inadequate consideration of the flooding impacts of the development	
7.1. The FIA and submitted flood modelling do not adequately assess the flood impacts of the development.	See Section 3.4.4

Contention	Section of Report
Particulars 7.2. The FIA modelling excludes the proposed internal stormwater system and on-site detention system and the input rainfall to the flood model was artificially reduced. However, the impact of these systems on flooding is not linear and cannot be accurately estimated with this simplification.	See Section 3.2.1
7.3. The FIA modelling assumes the internal stormwater network would be 100% effective. Insufficient consideration has been given to the potential for blockages of the stormwater network.	See Section 3.2.1
7.4. Insufficient information has been provided identifying the operation of the Site in the event of flooding impacts to the road network.	See Section 3.4.4.5
7.5. Insufficient information has been provided to confirm that the acoustic screens have been included in the flood modelling.	See Section 3.4.2.2
7.6. Insufficient information has been provided on how overland flows re-directed into the on-site detention system will impact overland flood risk on the Site.	See Section 3.4.2.2
7.7. The FIA does not provide sufficient details on how the proposed development is represented in the terrain data, especially the proposed buildings in the hydraulic model.	See Section 3.4.2.2
7.8. The FIA mapping results do not accurately portray the overland flow since the creek/ drainage lines are shown to be discontinuous due to the filtering of low flood depths.	See Section 3.4.2.13.4.4
7.9. Insufficient information is provided to demonstrate the suitability of the proposed finished floor levels noting the overland flow from the east.	See Section 3.4.4.2
7.10. Insufficient information has been provided to demonstrate compliance with CCC DCP Chapter 3.1 Part C Section B – Floor Levels and CCC DCP Chapter 3.1 Part C Section C – Flood Impacts.	Refer to Appendix E
7.11. The development does not satisfy the flood control target matrix in the CCC DCP Chapter 3.1 Part C Table 4.	Refer to Appendix E
7.13. Identification of an alternative road access given potential flooding of the local road network including the intersection of Central Coast Highway and Racecourse Road.	See Section 3.4.4.5

1.5. Response to WMAwater Comments

Comments provided by WMAwater in their letter to DPHI dated 15 April 2024 have been addressed in this report. A summary of our response to these comments is provided in **Table 2**.

Table 2: Response to WMAwater comments (15 April 2024)

Contention	WMAwater comment	AT&L Response
2. The Application is not compatible with the flood hazard of the Site and is likely to significantly adversely affect flood behaviour 2.1. The Application as presented is not compatible with the flood hazard of the Site and is likely to significantly adversely affect flood behaviour resulting in detrimental increases in the flood affection of Racecourse Road, contrary to clause 5.40 of the Regional SEPP.	The hazard in the 1% event appears to be resolved in the updated modelling however the results as presented make it difficult to determine this certainly. An increase in hazard can clearly be seen in the PMF event. Overall, the proponent may have addressed this contention. The increase of hazard does not appear to be significant on Racecourse Road.	Noted and agreed regarding hazard in the 1% AEP event. Noted and acknowledged regarding increase in hazard in the PMF event. The extent of the increase in PMF on Racecourse Road is limited to the area in the vicinity of the proposed southern driveway. Racecourse Rd experiences high hazard flooding in the PMF (H5, H6) under existing conditions and proposed conditions. Whilst the extent of hazard would change slightly for a short duration within a localised section of Racecourse Road, there would be no significant negative impact in terms of flood affectation and risk to road users.
The submitted flood modelling is not adequate and its results do not fully and accurately determine the flood hazard and the increase to the flood hazard.	There are multiple areas in the flood modelling and results that do not meet best practice guidelines or are not explained fully in the report how they were implemented.	Refer to responses below:
	- The implementation of the stormwater network into the Tuflow model is not described. The outline of the detention basins and engineering drawings of the stormwater network are provided.	Refer to **Section 3.4.2.2**. The proposed pit and pipe network has been modelled in the form of 1d_pit and 1d_pipe elements. The proposed OSD tanks have been modelled as a z-shape boundary reducing surface levels artificially to the OSD base invert level. The OSD tank outlet controls have been modelled as 1d_pipes.
	- The assessment of the critical duration of the catchment is not provided. The hydrologic rainfall runoff model (to predict inputs for hydraulic model), has changed to a rain on grid approach. However, the 15 minute storm duration may no longer be critical for this site. A longer duration is likely to be critical due to the high Initial loss used.	Refer to **Section 3.3.** An ensemble of storm durations and temporal patterns have been modelled in TUFLOW to determine the critical storm duration for the local catchment draining towards the site. Initial and continuing losses have been derived from the ARR Data Hub and are presented in Table 4. It is noted these values are lower than losses from FFA gauges

Contention	WMAwater comment	AT&L Response
		nearest to the site (which are documented in the Brisbane Water Estuary Catchment Overland Flood Study). The resultant critical storm durations for the 1% AEP, 0.2% AEP and PMF events are documented in **Table 5**.
	- The impact on hazard and velocity of the site is not displayed in the figures and as such the impact on the site to hazard on Racecourse Road is difficult to determine.	Mapping presenting impact on hazard for the 1% AEP, 0.2% AEP and PMF events is included in **Appendix D**.
	- The losses are given as "Initial Loss Pervious Area (mm/hr) 58". The proponent should clarify how these losses were input into the model, as the unit mm rather than "mm/hr" is usually associated with initial losses.	The initial losses have been input to the model as 58mm (not 58mm/hr). Refer to **Table** 4442.
	- The proponent should also clarify if they have used a Preburst depth as an initial loss of 58mm is larger than the IFD depth used meaning no pervious areas would runoff, this is what appears to be the results in the 1% events.	Pre burst rainfall depths have been adopted as per the ARR Data Hub, refer to **Table 3**.
	- In NSW there is a hierarchical approach for loss selection that is recommended in "Review of ARR Design Inputs for NSW" (Babister et. al., 2019). The proponent could use the second highest approach in the hierarchical approach "Use the average calibration losses from other studies in the catchment if available and appropriate for the study."	Refer to **Section 2.5.** The default ARR Data Hub initial and continuing losses have been adopted, with probability neutral burst initial losses.
2.4. Part of the Site is at or below the flood planning level under clause 5.40(2) of the Regional SEPP. The flood planning level is as defined in the Floodplain Development Manual published by the NSW Government in April 2005. Part of the Site is mapped on Council's mapping tool as within the 1 in 100 year flood extent.	The proponent argues that the flood storage on the site is disconnected from the main floodway and areas on the site are localised low points. This is largely true for the 1% AEP event. However, it is noted that a more pronounced flow path flows through the site in more rare events, particularly the PMF. This can be seen on the flood precinct, Precinct 1 map.	Refer to **Section 2.6**. A pronounced flow path is evident through the site in the PMF. As shown in the flood mapping of the proposed development scenario, this flow path will be significantly altered as a result of the proposed site grading and finished pavement levels.

Contention	WMAwater comment	AT&L Response
2.5. The submitted Flood Impact Assessment (FIA) identifies that the post-development PMF (probable maximum flood) map indicates a depth by velocity product in excess of 0.6 across Racecourse Road in one location which would equate to a minimum of H3 hazard under the Department's Flood hazard: Flood risk management guideline no. FB03 (2023), which is unsafe for vehicles, children and the elderly.	The PMF event still has the hazard increasing significantly across racecourse road, although less than before. It also has lower hazard in the undeveloped scenario, but this is likely due to the modelling changes made as discussed above.	Refer to **Section 3.4.4**. Mapping presenting impact on hazard for the 1% AEP, 0.2% AEP and PMF events is included in **Appendix D**. This demonstrates that Racecourse Rd experiences high hazard flooding in the PMF (H5, H6) under existing conditions and proposed conditions. Whilst the extent of hazard would change slightly for a short duration within a localised section of Racecourse Road, there would be no significant negative impact in terms of flood affectation and risk to road users.
2.6. The proposed internal stormwater and on-site detention systems were excluded in the flood model presented in the FIA and the input rainfall to the flood model was artificially reduced. However, the impact of these systems on flooding is not linear and cannot be accurately estimated with this simplification.	These appear to have been input into the model. More detail should be provided on how they are input into the Tuflow model.	Refer to **Section 3.4.2.2** The proposed pit and pipe network has been modelled in the form of 1d_pit and 1d_pipe elements. The proposed OSD tanks have been modelled as a z-shape boundary reducing surface levels artificially to the OSD base invert level. The OSD tank outlet controls have been modelled as 1d_pipes.
2.7. The flood model in the FIA assumes the proposed internal stormwater will be 100% effective. Blockage of the stormwater network is not assessed in the FIA. Any blockages to the stormwater network would further exacerbate the flood hazard.	This appears to be addressed with the blockage scenario.	No further action required.
2.8. The proposed buildings are not included in the flood model terrain in the FIA. It is not clear whether the proposed buildings are in the main overland flow path and their impact on flood behaviour.	These appear to be incorporated into the flood modelling. However, the report should demonstrate how they were input into the Tuflow model.	Refer to **Section 3.4.2.2**. Buildings have been in the flood models by: ▪ Assigning elevations to external buildings above the generated topographic grid to model flow obstructions. ▪ Assigning high roughness coefficient embedded in the materials file for proposed building structures to model flow through buildings.

Contention	WMAwater comment	AT&L Response
7. Inadequate consideration of the flooding impacts of the development 7.1. The FIA and submitted flood modelling do not adequately assess the flood impacts of the development. 7.2. The FIA modelling excludes the proposed internal stormwater system and on-site detention system and the input rainfall to the flood model was artificially reduced. However, the impact of these systems on flooding is not linear and cannot be accurately estimated with this simplification. 7.3. The FIA modelling assumes the internal stormwater network would be 100% effective. Insufficient consideration has been given to the potential for blockages of the stormwater network.	See our comments on Contention 2.1-2.7	Refer to responses above and further details in **Section 3.2.1** and **Section 3.4.4**.
7.4. Insufficient information has been provided identifying the operation of the Site in the event of flooding impacts to the road network.	The proponent states there would be minimum impact to the site in a flood event but doesn't specifically address how the operation of the site would be impacted. The conclusion that there would be minimum impact on the site may be challenged if the runoff volumes and peak flows are incorrect.	A Flood Emergency Response Plan (FERP) has been prepared by AT&L and incorporated into the Preliminary Operational Management Plan for the Site (Urbis, 3 April 2024). The FERP outlines flood behaviour and operational procedures (during both construction and operation) to address the risk of flooding within the site and adjacent to the site.
7.5. Insufficient information has been provided to confirm that the acoustic screens have been included in the flood modelling.	Additional detail should be provided on how acoustic screens are included in the model.	Refer to **Section 3.4.2.2**. The proposed acoustic screens have been modelled as fully blocked z-shape obstructions.
7.6. Insufficient information has been provided on how overland flows re-directed into the on-site detention system will impact overland flood risk on the Site.	The detention basins are included in the flood modelling however, it is still not discussed how overland flows redirected into the on-site detention system will impact overland flood risk on site.	Refer to Section **3.4.2.2**. The flood levels and depths are presented in the flood mapping. Flood hazard in the vicinity of the southern OSD tank is generally H1 or H2 in the 1% AEP and 0.2% AEP events. In the PMF there would be some H3 hazard in the vicinity of the proposed sag point.

Contention	WMAwater comment	AT&L Response
7.7. The FIA does not provide sufficient details on how the proposed development is represented in the terrain data, especially the proposed buildings in the hydraulic model.	The proponent has sufficiently addressed this by increasing the Mannings roughness to simulate flow through proposed buildings.	No further action required.
7.8. The FIA mapping results do not accurately portray the overland flow since the creek/ drainage lines are shown to be discontinuous due to the filtering of low flood depths.	This would be addressed by the change to a rain on grid modelling approach.	The direct rain on grid modelling methodology has been adopted with a filter depth of 20mm applied to the mapping.
7.9. Insufficient information is provided to demonstrate the suitability of the proposed finished floor levels noting the overland flow from the east.	The updated modelling shows proposed buildings with finished floor levels not affected by the 1% level, noting the modelling limitations above potentially artificially reduce these levels.	Refer to **Section 3.4.4.2**. The revised modelling shows the proposed buildings would not be affected by flooding in the 1% AEP event.
7.10. Insufficient information has been provided to demonstrate compliance with CCC DCP Chapter 3.1 Part C Section B – Floor Levels and CCC DCP Chapter 3.1 Part C Section C – Flood Impacts.	CCC DCP Chapter 3.1 Part C Section B – Floor Levels – The proponents new modelling shows floor levels above the FPA within the site.	No further action required.
	CCC DCP Chapter 3.1 Part C Section C – Flood Impacts – See our comments on contention 2.1-2.3, Particularly the impact on hazard during a PMF event.	Refer to hazard impact mapping contained in **Appendix D**.
7.11. The development does not satisfy the flood control target matrix in the CCC DCP Chapter 3.1 Part C Table 4.	See our comments on Contention 2.1-2.3 and 7.10	Refer to **Appendix E**
7.13. Identification of an alternative road access given potential flooding of the local road network including the intersection of Central Coast Highway and Racecourse Road.	This is assessed by the proponent although relies on the assumption that the critical duration of the PMF is approx. 15 minutes which has not been justified as discussed above.	Refer to **Section 3.4.4.5**

2. Site Characteristics and Overview

2.1. Location and Site Description

The site is approximately 2.12ha and located on Racecourse Road, West Gosford, within the Central Coast Local Government Area (LGA). The site is formed by the following allotments:

- 6/DP801261 and 71/DP810836.
- 72- 74/DP810836.
- 20/82/DP758466 and 18/DP1100223.
- 1/DP651249, 11/82/DP758466, 12/DP110010, 13/DP1100206, 14 - 15/DP1100206 and 16/DP1079150.

Figure 1: Site Extent (imagery from Planning Portal, dated 13 December 2022)

2.2. Current Land Use and Zoning

The Site remains largely undeveloped, with a commercial and residential building on site. It is characterised by poorly maintained and highly disturbed soils that were utilised for storage in the early 2010's. Since that period sparce vegetation has regrown in area but it is evident that the soil has become highly compacted with high potential to generate runoff.

The site is zoned as B6 Enterprise Corridor under the Central Coast LEP 2022 with the following development permitted with consent:

Business premises; Community facilities; Garden centres; Hardware and building supplies; Hotel or motel accommodation; Landscaping material supplies; Light industries; Oyster aquaculture; Passenger transport facilities; Plant nurseries; Roads; Sewage reticulation systems; Shop top housing; Tank-based aquaculture; Warehouse or distribution centres; Waste or resource management facilities; Water recycling facilities; Water reticulation systems; Any other development not specified in item 2 or 4.

2.3. Catchment Characteristics

We note the following regarding the catchments upstream and downstream of the site:

- The site is located approximately 400 metres east of Narara Creek and is upstream of *The Entertainment Grounds.*
- The area downstream of the site is subject to inundation in a 1% AEP flood from Narara Creek and is likely to be considered flood storage.
- Narara Creek discharges to Brisbane Waters and is prone to mainstream flooding.
- The catchment upstream of the Site is predominately residential, warehouses and densely vegetated bushland on steep slopes >15%. Refer to **Figure 2** for catchment plan.

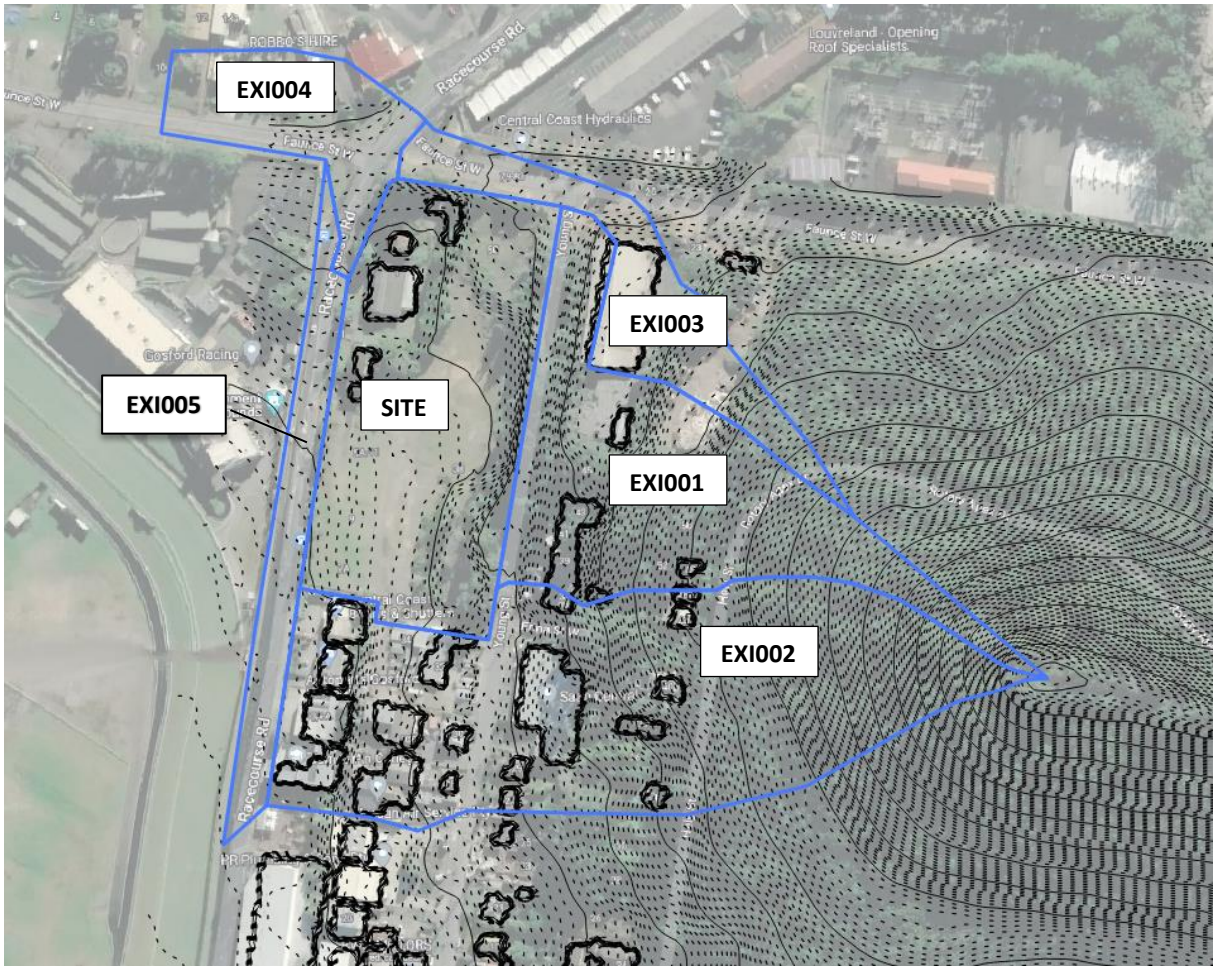


Figure 2: Catchment Plan

2.4. Site Flood Mechanisms

Investigations of the publicly available flood map data suggests that the site is not subject to flood overbank flow from Narara Creek or storm surge causing high ocean levels and upstream flows that back up onto the site. The site is affected by localised overland flows from the upslope catchment to the east. Overland flow generally traverses the site in an east to west direction.

2.5. Available Flood Studies

2.5.1. *Updated Narara Creek Flood Study* (Golder Associates, 2018)

The *Updated Narara Creek Flood Study* (Golder Associates, 2018) documents the extents of flooding within the Narara Creek catchment for a range of design storm events from the 50% AEP to the 0.5% AEP and the PMF.

2.5.2. *Brisbane Water Estuary Catchments Overland Flood Study* (Cardno, 2021)

The *Brisbane Water Estuary Catchments Overland Flood Study* (Cardno, 2021) documents the hydrological and hydraulic modelling methodology undertake to determine the extents of flooding within Brisbane Waters Estuary. The following observations were considered:

- The Loss methodology adopted for the catchment adopts the NSW Flood Frequency Analysis (FFA) reconciled losses with appropriate scrutiny. This was undertaken by assessing the good quality gauges located north of the study area.
- The loss parameters reviewed are summarised in **Figure 3**. Using these losses, flows were compared for several catchments in the XPRAFTS hydrologic model with high proportion of residential properties. The adjacent catchment (**211013 [H26]**) losses provided the most realistic flows within the range of flows expected from the FFA.
- Council's published data concluded that adopting the default ARR 2019 Data Hub losses is likely overestimating the flows as the storm burst depths obtained from the Narara rainfall gauge are already higher than those provided on the ARR Data Hub.
- Probability Neutral Burst initial losses from the ARR Data Hub were adopted.

Table 7-1 Loss Parameters

Station	Initial Loss (mm)	Continuing Loss (mm/hr)
Default ARR Data Hub	58	3.2
FFA 211013 [H26] (Adjacent)	64.3	4.81
FFA 211009 [H28]	50.0	3.92
FFA 211014 [H25]	18.2	5

Figure 3: Brisbane Water Estuary Catchments Overland Flood Study Loss Parameters extract (Cardno, 2021)

2.6. Existing Flood Maps

An extract of the existing flood maps available online for the site is provided in **Figure 4443** (showing Flood Planning Areas, Flood Storage and High Hazard flooding) and **Figure 555** (Probable Maximum Flood extent). Our observations are as follows:

- The model resolution is 5m x 5m, suitable for large catchment studies but inadequate for accurately representing the site's topography.
- The flood storage on site appears disconnected from the main floodway, Narara Creek, which contradicts the definition of flood storage in the Floodplain Development Manual FB02 (2023). Therefore, removing the described flood storage on site is unlikely to impact the wider catchment and can be managed through onsite detention.
- Areas labelled as flood storage and flood planning on the site are localised low points where water collects behind buildings or in existing low areas. An assessment of the existing overland flow patterns suggests that the water trapped behind these buildings originates from the site itself rather than from the upstream catchment. Addressing this issue requires onsite detention measures and should not be categorised as flood planning.
- Whilst Council's online mapping indicates no pronounced overland flow paths through the Site for the 1% AEP event, more pronounced flow paths through the Site are evident in the Probable Maximum Flood (refer to **Figure 555**).

Figure 4: Extract of Central Coast Council Online Flood Mapping – Precincts 1, 2 and 3.

Figure 5: Extract of Central Coast Council Online Flood Mapping – Precinct 4.

2.7. Proposed Development

A proposed site development layout is provided in **Appendix B** and includes:

- The creation of two buildings for offices, maintenance and washing.
- A bus parking lot for approximately 94 vehicles.
- A car parking lot for approximately 119 cars.
- A landscape buffer surrounding the property.
- On-Site Detention (OSD) designed to attenuate flows for all storms up to and including the 1% AEP in accordance with Councils specifications.
- A pit and pipe network to convey local flows in accordance with Council specifications.

3. Hydrology and Hydraulic Modelling

3.1. Overview

AT&L have prepared this Flood Assessment to a support a development application (DA) for a proposed bus depot on Racecourse Road, West Gosford, NSW (the site). This section documents the findings of hydrology and hydraulic modelling of the site in existing and proposed conditions.

3.2. Scenarios

3.2.1. Catchment Conditions

The hydraulic model was setup to represent the following flood condition scenarios:

1. E01: Existing conditions, the catchment in its current state as described in **Section 2.3**.
2. P01: Proposed conditions, the catchment in its current state as described in **Section 2.3** and the site as describes in Section 2.7.
3. P02: Proposed conditions, the catchment in its current state as described in **Section 2.3**, the site as describes in Section 2.7 and the drainage network with blockages of 50% for sag pits and 20% for on grade pits.

3.2.2. Storm Events

The hydrological modelling scenarios adopted for this assessment include:

- 1% AEP event (the defined flood event)
- 0.2% AEP (adopted as a proxy to assess the potential impact of climate change on flood producing rainfall events, i.e., a potential increase in rainfall intensity).
- Probable Maximum Flood (PMF) event.

Assessment of mainstream flooding of Narara Creek and the potential impacts of sea level rise on mainstream flooding of Narara Creek was not included as part of this assessment.

3.3. Catchment Hydrology

Catchment hydrology has been modelled using a direct rainfall on grid approach. An ensemble of storms durations and temporal patterns was modelled in TUFLOW to determine the critical storm duration for the site in the 1% AEP, 0.2% AEP and PMF events ranging between (and including) the 15 minute and 120 minute design events. Modelling assumptions were derived from the following sources:

- Intensity Frequency Duration (IFD) data were derived from the Bureau of Meteorology Datahub in accordance with ARR2019. Longitude: 151.329 Latitude: - 33.422. Refer to **Appendix C** for IFD Table.
- Pre-burst rainfall depths were in adopted from ARR Data hub and are in accordance with Council's *Brisbane Water Estuary Catchments Overland Flood Study* (Cardno, 2021).
- Probability neutral burst initial loss parameters have been adopted in accordance with the ARR Data Hub, refer to **Table 3**.

Table 3: Summary of Probability Neutral Burst Initial Loss Parameters

Duration (min)	Burst Initial Loss (mm)					
	50% AEP	20% AEP	10% AEP	5% AEP	2% AEP	1% AEP
60	30.3	16.9	16.5	17.6	18.6	17.7
90	35.2	19.8	19.3	20.3	19.5	14.5
120	34.8	18.9	18.2	19.8	19.5	16.6
180	37.7	21.5	19.1	18.8	18.1	13.0
360	33.5	20.8	19.2	16.8	15.8	11.3

- The Probable Maximum Precipitation (PMP) intensities and temporal distribution were determined using the Bureau of Meteorology *Generalised Short Duration Method (1994)*.
- Initial and continuing losses are derived from ARR Datahub and are lower than the losses adopted in the *Brisbane Water Estuary Catchments Overland Flood Study* (Cardno, 2021). Refer to **Table 4442** for Initial and Continuing Losses Parameters adopted in the TUFLOW models.

Table 4: Summary of IL-CL parameters

Element	Value
Initial Loss Pervious Area (mm)	58
Continuing Loss Pervious Area (mm/hr)	3.2
Initial Loss Impervious Area (mm)	1
Continuing Loss Impervious Area (mm/hr)	0

- Refer to Civil Report REP002-01-22-1063-Civil Report for OSD Design and Results.

The resultant critical durations selected for the site are provided in **Table 5**.

Table 5: Critical Storm Duration Results

Flood Event	Existing Duration (min)	Proposed Duration (min)
1% AEP	45	120
0.2% AEP	45	60
PMF	15	15

We note that the site has a quick response time due to the steepness of the upstream catchment slopes and roughness. It is unlikely that the overland flows from the site and upstream catchment will coincide with the mainstream flooding of Narara Creek, which would likely have a much larger response time. A detailed assessment of Narara Creek has not been undertaken as part of this assessment.

Runoff volume checks for the 1% AEP, 0.2% AEP and PMF events have been undertaken for all assessed durations. Volume checks for the critical duration storm are summarised in **Table 665**.

Table 6: Runoff Volume Check

Parameter	P01 1% AEP	P01 0.2% AEP	P01 PMF
Inflow (rainfall minus losses)	43,035	43,516	79,281
Outflow (1d and 2d elements)	40,745	41,314	76,604
Runoff left on grid	2,541	2,457	2,934
Volume Balance Error	-1	2	4
Total Volume error %	0	0	0

3.4. Hydraulic Modelling

TUFLOW 1d/2d Hydraulic model was used to determine the existing and proposed development flood characteristics, including flood water levels, depth and VD products for each scenario nominated in **Section 3.2**.

3.4.1. Terrain Data

The 3D surface for existing and conditions was generated from a combination of:

- LIDAR Data of the existing topography surrounding the site and catchment area from the ELVIS – Elevation and Depth – Foundation Spatial Data (https://elevation.fsdf.org.au/).
- Detailed survey of the site and surrounding roads by Beveridge Williams (2022) surveyors.
- Proposed site grading has been adopted in the proposed condition model based on the civil works package documented by AT&L.

3.4.2. TUFLOW Modelling Setup

3.4.2.1. Existing Conditions

The existing conditions model construction consisted of:

a) Creating a 1m x 1m topographic grid based on the available Lidar and survey information outlined in **Section 3.4.1**.

b) Establishment of model boundary extents which generally align with catchment ridgelines.

c) Establishment of boundary conditions and extents downstream of the site on Racecourse Road. The downstream boundary extent slope has been calculated to be 0.01.

d) Incorporating rainfall intensities onto rainfall on grid as outlined in **Section 3.3**.

e) Initial and continuing losses for pervious and impervious areas were incorporated within the 2d_mat layer and the materials database as nominated in **Section 3.3.**

f) Assigning elevations to existing buildings above the generated topographic grid to model flow obstructions.

g) Assigning a water depth filter of 0.01m to remove water that is not considered flood flows. We note that this is not in accordance with industry standard which typically applies a filter of 0.02m for urban areas.

h) Assigning existing site Manning's roughness coefficients based on Google Street Maps and Nearmap aerial imagery. Manning's Roughness values are summarised in **Table 7763**.

i) Inclusion of Council's pit and pipe system based on available survey data as 1d elements.

j) Initial and continuing losses were applied based on pervious/impervious areas. Refer to **Table 4** for IL-CL parameters.

Table 7: Manning's Roughness Values.

Surface Type	Manning's Roughness Value
Asphalt	0.015
Concrete	0.012
Earth Channel Gravelly	0.025
Earth Channel Weedy	0.030
Floodplain Pastures / Average Lawn	0.035
Floodplain Light Brush / Spare Vegetation	0.050
Floodplain Heavy Brush / Dense Vegetation	0.075
Natural Streams / Rivers	0.035
Ponds and other water	0.010
Buildings	1.000

3.4.2.2. Proposed Conditions

All elements and parameters described in **Section 3.4.2.1** were used in the proposed scenario with the following additions and modifications:

a) Creating a 1m x 1m topographic grid based on the proposed earthworks and existing case surface.

b) Assigning Manning's roughness coefficients and Initial and Continuing losses based on **Section 2.7**.

c) Assigning elevations to external buildings above the generated topographic grid to model flow obstructions.

d) Assigning high roughness coefficient embedded in the materials file for proposed building structures to model flow through buildings.

e) Incorporating acoustic noise barriers as a fully blocked z-shape obstruction.

f) Incorporating proposed pit and pipe network for the site in the form of 1d_pit and 1d_pipe.

g) Incorporating proposed onsite detention tanks as a z-shape boundary reducing surface levels artificially to the OSD base invert level.

h) Incorporating proposed onsite detention tanks with 1% AEP control orifice plate as 1d_pipes.

i) Applying roof drainage runoff directly to piped network up to the 5% AEP storm event with remaining flows modelled as overland flow.

j) Inclusion of a 3m wide bypass swale within the eastern boundary of the site to ensure overland flows are diverted around the site.

3.4.3. TUFLOW Modelling Results

Mapping of TUFLOW model results for water level, depth, hazard, and impact for the 1% AEP, 0.2% AEP and PMF events are provided in **Appendix D**.

3.4.4. Discussion

We note the following regarding the modelled flood behaviour:

3.4.4.1. Existing Conditions

- The primary source of site flooding is overland flows from the upstream catchments north and east of the site. These flows originate from Waterview Park and travel overland through residential properties, eventually overtopping Young Street onto the site.
- The site does not appear to be affected by tidal tailwater conditions or mainstream flooding from Narara Creek.
- The site discharges uncontrolled flows onto Racecourse Road. These flows overtop Racecourse Road and flow onto the entertainment grounds in the PMF event.

- A portion of the site experiences flood detention due to the existing topography and blockage of buildings in the northern portion of the site.
- Racecourse Road, west of the site, experiences high flood hazard in the PMF event, this hazard is associated with the upstream catchment to the north.

3.4.4.2. Proposed Conditions

- The proposed development does not have impacts on upstream or adjacent properties.
- The provision of an OSD system to capture and attenuate flows for events up to and including the 1% AEP design event from the site results in a beneficial outcome for the downstream receiving environment, being Racecourse Road and The Entertainment Grounds.
- Proposed condition flood extents retain the existing condition flood characteristics offsite.
- For flood affected areas on site, a minimum 150 mm freeboard for non-habitable areas should be provided consistent with Central Coast Council DCP.
- There is a negligible increase in water depth on Racecourse Road immediately downstream of the site which is attributed to the concentration of flows. This impact affects approximately 90 m^2. No private properties are affected.

3.4.4.3. Proposed Conditions (Blockage Scenario)

The proposed blockage scenario serves as a sensitivity test for the site to assess various risk scenarios. It is not common practice within the industry to conduct an impact assessment specifically for a sensitivity test.

In the blockage scenario, flood characteristics remain consistent with the proposed conditions. It's important to note that a 50% blockage of all pipes in the drainage network is considered highly improbable but can be addressed through on-site maintenance strategies.

- The drainage system incorporates a blockage of 50% for sag pits and 20% for on-grade pits.
- The proposed development does not have impacts on upstream or adjacent properties.
- There is an increase in water levels on Racecourse Road in the order of 20mm – 50mm. This increase does not increase hazards on the road and considered acceptable.
- Attenuation of flows still occurs with the onsite detention system.
- Proposed condition flood extents retain the existing condition flood characteristics offsite.

3.4.4.4. Flood Hazard

TUFLOW model results of the proposed development condition indicate that:

- Flood hazard across the site is safe and traversable in the 1% AEP and 0.2% AEP flood event. The VxD product across the site for these design storm events is H1, which is considered 'generally safe for people, vehicles and buildings' (refer to **Figure 6664**).

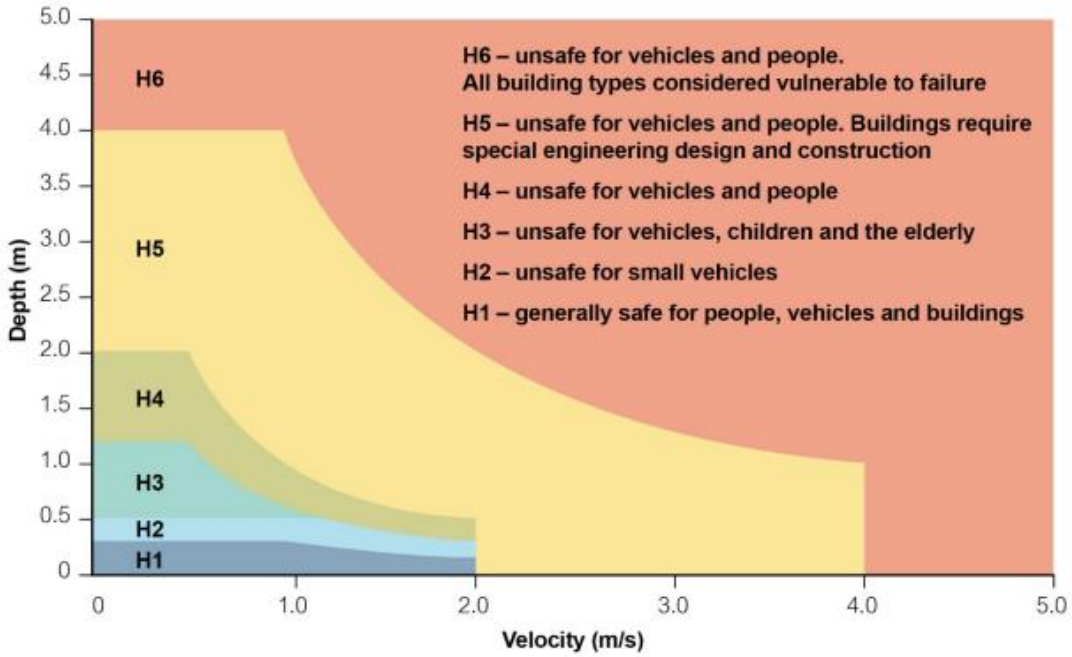


Figure 1 General flood hazard vulnerability curve

Note: Categories H1 to H4 in this guideline are equivalent to low hazard and H5 to H6 equivalent to high hazard in the 2005 *Floodplain development manual* (DIPNR 2005).

Source: Figure 6 AIDR 2017b.

Figure 6: General flood hazard vulnerability curve (NSW DPE Flood risk management guideline FB03)

- Hazards on Racecourse Road would increase during the PMF event at the proposed driveway on Racecourse Road. This is attributed to overland flow from the local catchment east of the site flowing through the carpark and draining through the site by way of the proposed driveway. We note that due to the constriction of flows and relatively steep gradient of the driveway (up to 17%), water temporarily traverses the driveway at a high hazard and would impact Racecourse Road for several minutes before subsiding.
- Due to the short duration of the storm, this high hazard is only present for around five (5) minutes prior to returning to a safe level.
- To mitigate the risk of high hazard flooding along the driveway in flood events exceeding the 0.2% AEP (equivalent to a 1 in 500 year AEP), automated gates at the top and bottom of the southern driveway would be installed to prevent access to the driveway to pedestrians and vehicles for the duration of inundation of the driveway (refer to **Figure 7775**). The operation and maintenance of the gates, as well as the trigger points at which they would need to automatically close and lock, would be incorporated into the Operational Management Plan for the site.

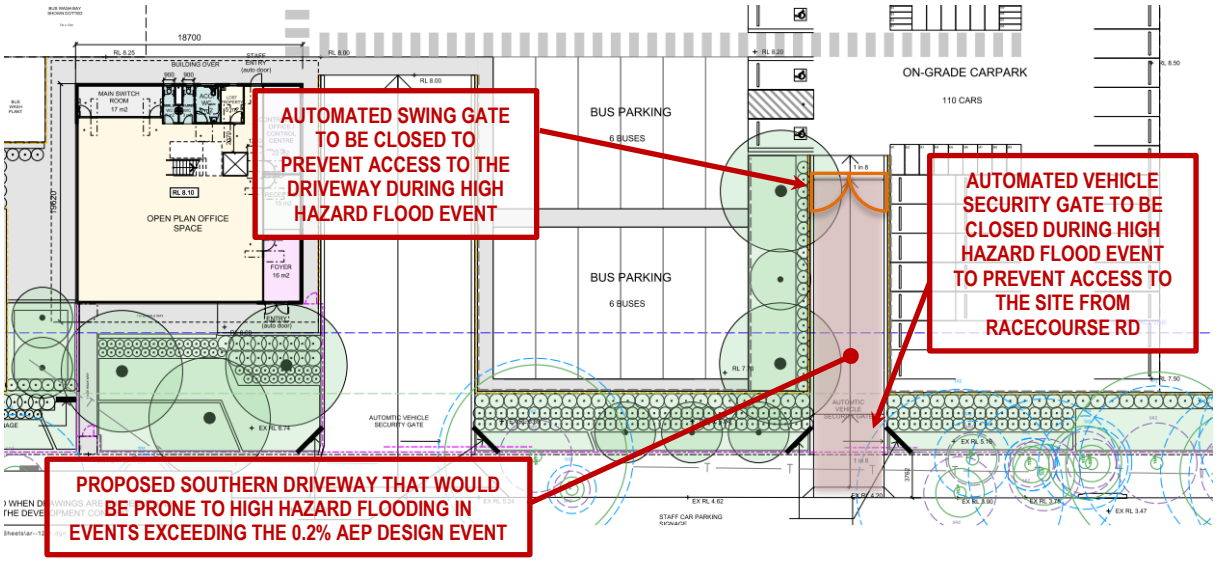


Figure 7: Extract of Ground Floor Plan showing proposed gates to prevent access to southern driveway during a high hazard flood event

3.4.4.5. Alternative Route Access and Evacuation

This assessment is based on the proposed development outlined in **Section 2.7** and supported flood maps contained in **Appendix D**, which indicate that the development is expected to have negligible impact on flood levels adjacent to the site.

There may be a brief period where the driveway should not be traversed during a PMF (1:1,000,00 – 1:10,000,000 probability) due to high hazard and buses would need to queue along Racecourse Road for up to 5 minutes until inundation of the driveway and the local road network has subsided.

Flood affectation at the intersection of Central Coast Highway and Racecourse Road is a regional flood issue. It is due to mainstream flooding of Narara Creek and its interaction with Henry Kendall Bridge forcing the upstream catchment to act as a basin in extreme flood events. The proposed development outlined in **Section 2.7** does not materially alter the current regional flood regime due to its scale.

Additionally, the Brisbane Water Foreshore Floodplain Risk Management Plan (2015) demonstrates that access to the site from the northeast along Faunce Street West and Showground Road is available in the PMF flood event. We recommend, that should evacuation be temporarily unavailable, patrons can shelter in place until it is safe to move around.

4. Summary and Recommendations

AT&L have updated this report to address the matters raised in the Statement of Facts and Contentions for the Land and Environment Court of NSW Case Number 2023/00266853.

A summary of changes arising from the Statement of Facts and Conditions is provided below:

1) Catchment hydrology has been updated from a point hydrograph method to a Rainfall on Grid method to ensure that overland flow paths are represented accurately.
2) Inclusion of acoustic noise walls and proposed buildings to the 2d model domain.
3) Inclusion of the proposed development and Council's existing drainage network.
4) Additional modelling of the proposed stormwater drainage system with 50% blockage to sag pits and 20% blockage to on-grade pits**.**

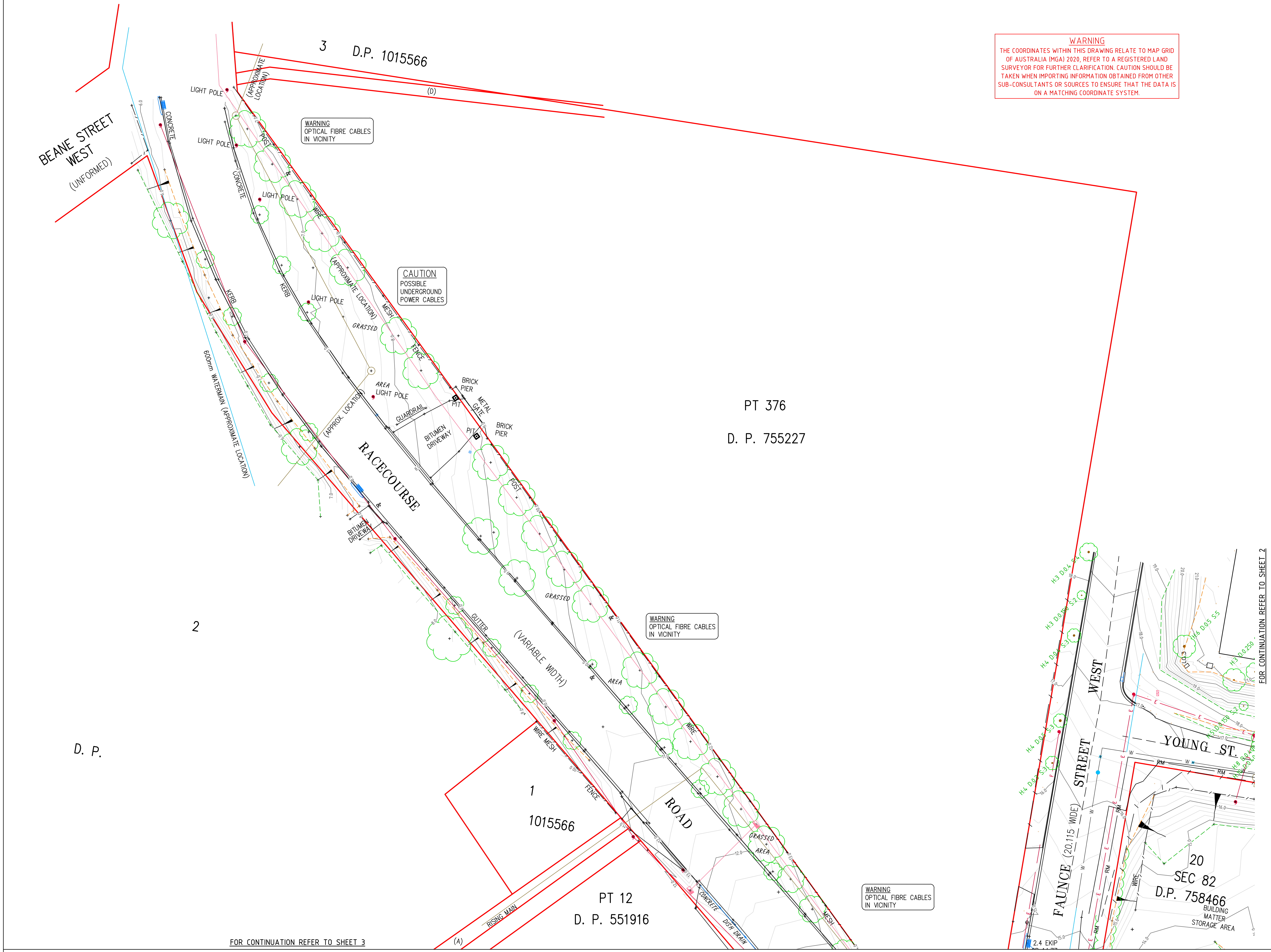
The hydrology and hydraulic modelling demonstrates that the proposed development is prone to inundation with a rapid response time because of the relatively small local catchment to the east of the site, which is characterised by steep slopes and rough terrain. This suggests that the overland flows from the site and upstream catchment are unlikely to coincide with the mainstream flooding of Narara Creek, which typically has a longer response time.

Overall, the assessment of flooding indicates that the proposed development is capable of effectively managing flood flows through the site. Flood modelling undertaken by AT&L demonstrates:

1) The site is compatible with the matters raised in the Statement of Facts and Contentions.
2) PMF event flows can generally be conveyed across the site safely by way of overland flow, with the exception of high hazard flow in the proposed southern driveway. Measures to mitigate the risk of high hazard flooding of the southern driveway are outlined in **Section 3.4.4.4**.
3) Freeboard requirements to the buildings is achievable.

The *Brisbane Water Foreshore Floodplain Risk Management Plan* (2015) demonstrates that access to the site from the northeast along Faunce Street West and Showground Road is available in the PMF flood event. It is noted that in the event of rainfall events that are likely to cause flooding in excess of the 1% AEP design event, patrons can safely take shelter in the buildings on-site. Further details of flood emergency planning requirements for the site are documented in a site specific *Flood Emergency Response Plan* (AT&L, March 2024).

Appendix A – Site Survey



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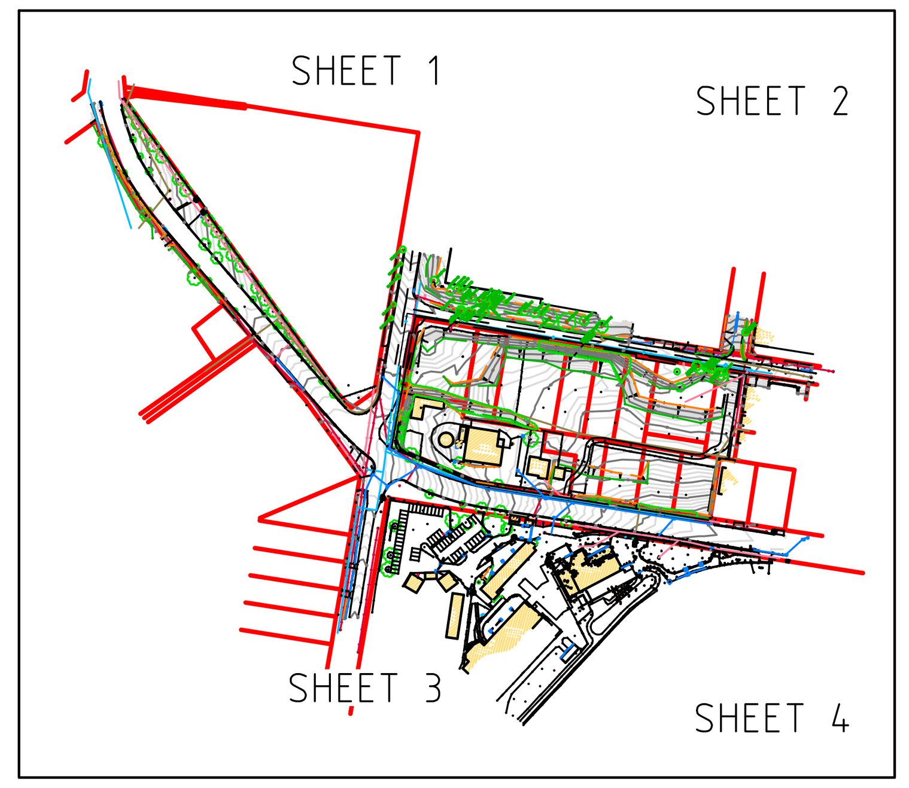

KEY PLAN

LEGEND

Bench Mark	
Comms Underground	UC
Comms Pit/Manhole	
Comms Pillar	
Drainage Grated Pit	
Drainage Kerb Inlet Pit	
Electrical Power Pole	
Electrical Underground Cable	UE
Fence	
Gate	
Road Bollard	
Sewer Manhole	
Sewer Pipe	S
Sign Post	
Tree (Height, Trunk Diameter, Spread)	
Water Meter	
Water Tap	
Water Stop Valve	
Water Hydrant	
Bottom of Bank	
Top of Bank	

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ORIGIN OF LEVELS: PM 19232
R.L. 14.428 (AHD)

VER	BY	AMENDMENTS	DATE
A	M.W.	NEW DETAIL ADDED TO EXISTING SURVEY	08.12.22
B	M.W.	ADDITIONAL DRAINAGE ADDED	21.07.23
C			
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Beveridge Williams
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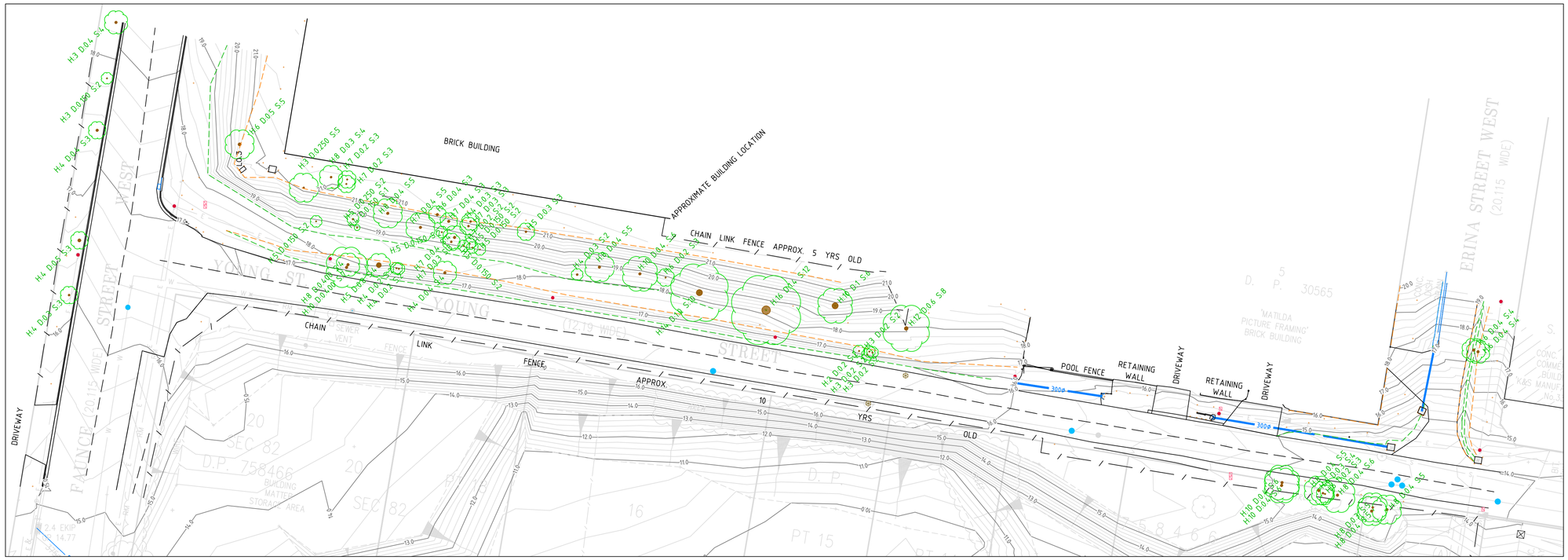
DETAILS:
DETAIL SURVEY PLAN FOR DEVELOPMENT APPLICATION PURPOSES
RACECOURSE ROAD
WEST GOSFORD

ORIGINAL SCALE 1:400 SHEET SIZE A1
CAD REFERENCE: 2202624-DET-001-B
0 8 16 24
SCALE ON ORIGINAL DRAWING AT 1:400

SURVEYOR:	J.C. & P.K.
DRAWN:	C.A. & M.W.
CHECKED:	R.P.
SURVEY DATE:	23.09.05 & 06.12.22
VERTICAL DATUM:	AHD
HORIZONTAL DATUM:	MGA

PROJECT No. 2202624
DRAWING REF. DET-001
VERSION B
SHEET 1 OF 4



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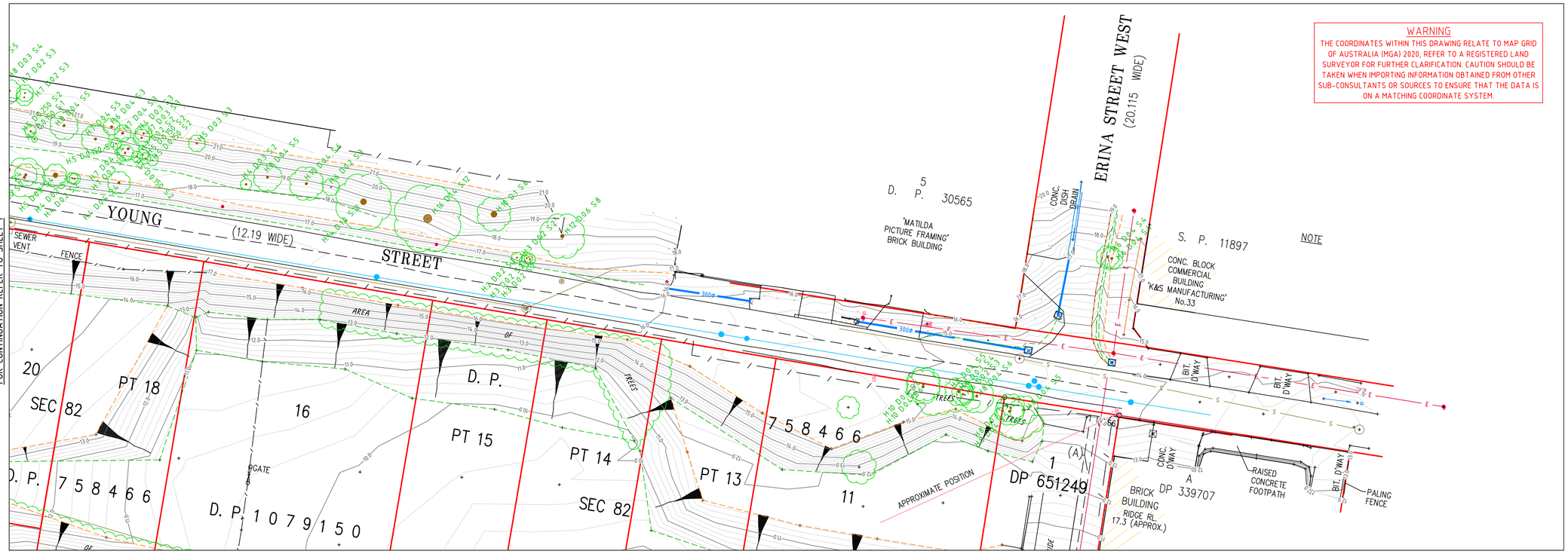

FOR CONTINUATION REFER TO SHEET 1

FOR CONTINUATION REFER TO SHEET 4

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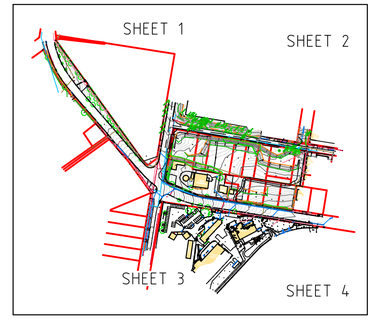

KEY PLAN

LEGEND

- Bench Mark
- Comms Underground (UC)
- Comms Pit/Manhole
- Comms Pillar
- Drainage Grated Pit
- Drainage Kerb Inlet Pit
- Electrical Power Pole
- Electrical Underground Cable (UE)
- Fence
- Gate
- Road Bollard
- Sewer Manhole
- Sewer Pipe (S)
- Sign Post
- Tree (Height, Trunk Diameter, Spread)
- Water Meter
- Water Tap
- Water Stop Valve
- Water Hydrant
- Bottom of Bank
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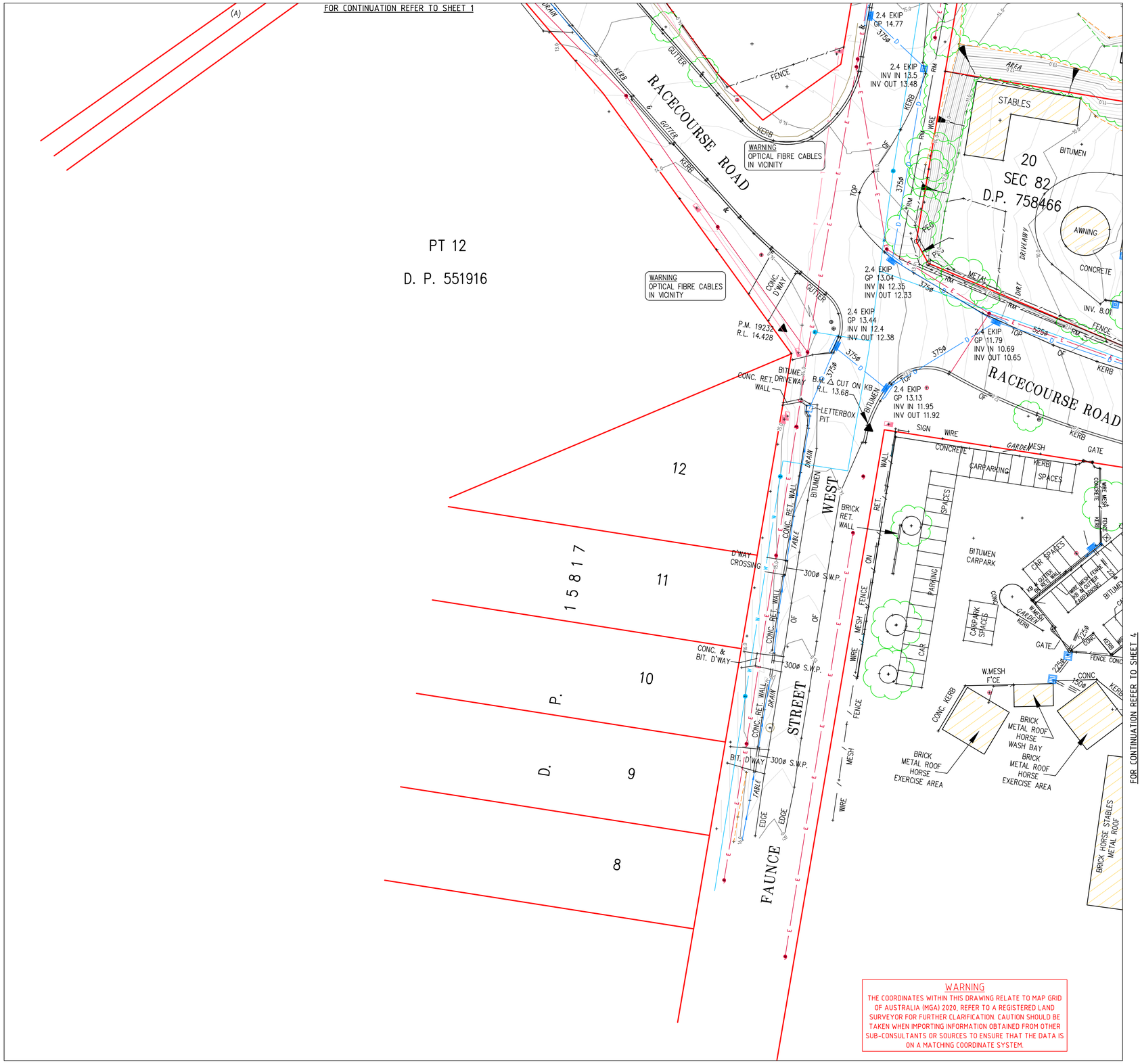

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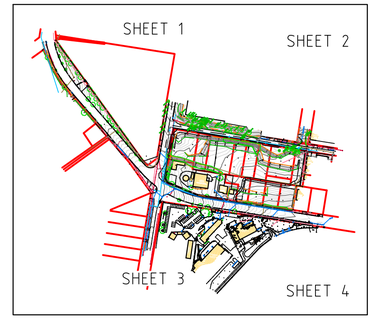

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4. THE CAD FILE USES METRES AS ITS BASE UNIT AND IS IN A "GROUND" COORDINATE SYSTEM. IF THE SURVEY IS STATED AS MGA, ANY POINT IN THE FILE WILL BE AN APPROXIMATE MGA COORDINATE.
5. SOME SYMBOLS REPRESENTING PHYSICAL STRUCTURES SUCH AS POWER POLES AND PITS ARE DIAGRAMMATIC ONLY AND DO NOT NECESSARILY REPRESENT THE ACTUAL SIZE AND EXTENT OF THESE FEATURES.
6. THE SURVEY INFORMATION SHOWN HERE WAS PREPARED FOR A SPECIFIC PURPOSE FOR THE CLIENT SHOWN. THIS INFORMATION IS NOT INTENDED TO BE USED FOR ANY OTHER PURPOSE OR BY ANYONE NOT AUTHORISED BY THIS CLIENT.
7. BOUNDARY DIMENSIONS AND AREAS HAVE BEEN DETERMINED BY CURRENT CADASTRAL SURVEY AND THE BOUNDARY AND EASEMENT LINES IN THE ELECTRONIC FILE HAVE BEEN INCLUDED USING THOSE SURVEYED DIMENSIONS. THE TITLE DIMENSIONS SHOWN ON THE HARD COPY PLAN TAKE PRECEDENCE OVER THE LINES IN THE ELECTRONIC FILE.
8. THE TITLE/S TO THE SUBJECT LAND HAS BEEN REVIEWED AND THE POSITION OF ALL EASEMENTS AFFECTING THE LAND ARE SHOWN. THE TERMS OF ANY EASEMENT, RESTRICTION ON THE USE OF LAND OR COVENANT AFFECTING THE LAND HAVE NOT BEEN INVESTIGATED. LEASES AND OTHER NOTATIONS MAY ALSO EXIST WHICH AFFECT THE LAND.
9. UNDERGROUND SERVICES OTHER THAN THOSE SHOWN HAVE NOT BEEN INVESTIGATED. PRIOR TO DEMOLITION, EXCAVATION OR CONSTRUCTION WORK ON THE SITE, THE RELEVANT SERVICE AUTHORITY SHOULD BE CONTACTED TO ESTABLISH DETAILED LOCATION AND DEPTH.
10. THIS SURVEY IS LIMITED TO IMPROVEMENTS AND OTHER DETAIL WHICH WERE VISIBLE AND ACCESSIBLE AT THE TIME OF SURVEY. THE LOCATION OF DETAIL SUCH AS PRIVATE UNDERGROUND SERVICE LINES AND BUILDING FOUNDATIONS WITHIN THE SITE IS UNKNOWN.
11. THE COORDINATES WITHIN THIS DRAWING RELATE TO THE DATUM SHOWN IN THE TITLE BLOCK. REFER TO A REGISTERED LAND SURVEYOR FOR FURTHER CLARIFICATION. CAUTION SHOULD BE TAKEN WHEN IMPORTING INFORMATION OBTAINED FROM OTHER SUB-CONSULTANTS OR SOURCES TO ENSURE THAT THE DATA IS ON A MATCHING COORDINATE SYSTEM.
12. CONTOURS SHOWN HEREON DEPICT THE GENERAL TOPOGRAPHY ONLY. EXCEPT AT SPOT LEVELS SHOWN, THEY DO NOT NECESSARILY REPRESENT THE EXACT LEVEL AT ANY PARTICULAR POINT.
13. ANY GUTTER, RIDGE, ROOF AND WINDOW DETAILS AND LEVELS SHOWN HAVE BEEN OBTAINED VIA INDIRECT SURVEY METHODS WHERE VISIBLE FROM GROUND LEVEL AND ARE SHOWN ON THIS PLAN IN THEIR APPROXIMATE LOCATION FOR THE PURPOSE OF GENERAL SITE ANALYSIS ONLY.
14. ANY TREE CANOPIES, TRUNK DIAMETERS AND HEIGHTS SHOWN ARE APPROXIMATE ONLY AND SHOULD BE VERIFIED BY FURTHER SURVEY WORKS IF CRITICAL TO DESIGN OR SITE ANALYSIS.
15. SMALL TREES, SHRUBS, GARDEN FEATURES, PATHWAYS AND OTHER MINOR DETAIL MAY NOT BE SHOWN ON THIS PLAN, FOR THE PURPOSES OF THIS SURVEY.

ORIGIN OF LEVELS: PM 19232
R.L. 14.428 (AHD)

VER	BY	AMENDMENTS	DATE
A	M.W.	NEW DETAIL ADDED TO EXISTING SURVEY	08.12.22
B	M.W.	ADDITIONAL DRAINAGE ADDED	21.07.23
C			
D			
E			
F			
G			

- THE POSITION OF SERVICES SHOWN ON THIS DRAWING ARE INDICATIVE ONLY AND HAVE BEEN PLOTTED FROM PLANS AND DRAWINGS SUPPLIED BY RELEVANT AUTHORITIES.
- SERVICE AUTHORITY PITS, MANHOLES, POLES, MARKER POSTS, ETC., WHERE SIGHTED AT TIME OF SURVEY, HAVE BEEN LOCATED. THE SURVEY DOES NOT INCLUDE INVESTIGATION OR LOCATION OF UNDERGROUND INFRASTRUCTURE.
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www.dialbeforeyoudig.com.au DIAL 1100 BEFORE YOU DIG

CLIENT: BUSWAYS GROUP PTY LTD

Beveridge Williams
Land Development Consultants
Registered Surveyors
Central Coast (02) 4351 2233 www.beveridgewilliams.com.au

DETAILS:
DETAIL SURVEY PLAN FOR
DEVELOPMENT APPLICATION PURPOSES
RACECOURSE ROAD
WEST GOSFORD

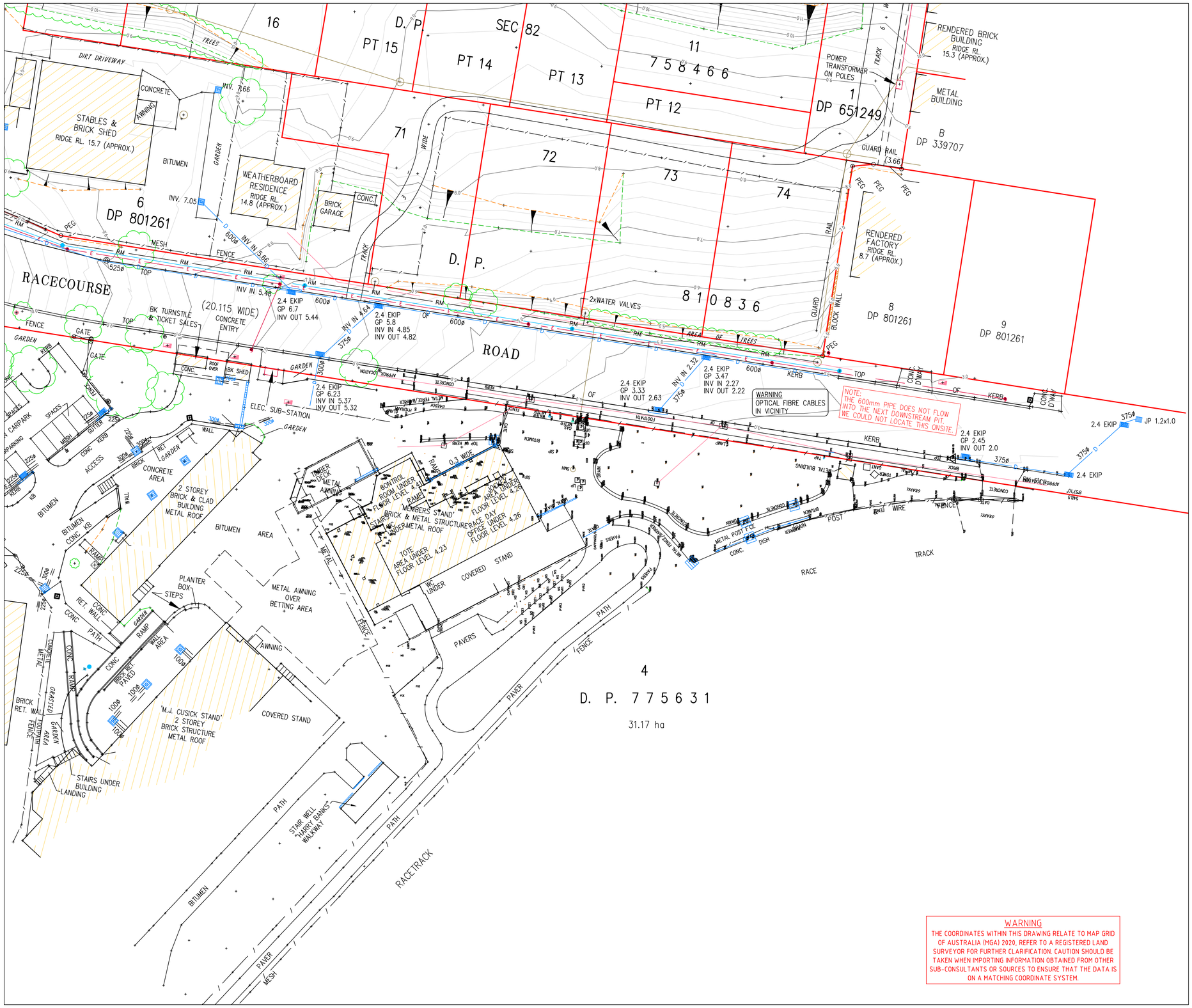
ORIGINAL
SCALE 1:400 SHEET SIZE A1
CAD REFERENCE: 2202624-DET-001-B
0 8 16 24
SCALE ON ORIGINAL DRAWING AT 1:400

SURVEYOR:	J.C. & P.K.
DRAWN:	C.A. & M.W.
CHECKED:	R.P.
SURVEY DATE:	23.09.05 & 06.12.22
VERTICAL DATUM:	AHD
HORIZONTAL DATUM:	MGA

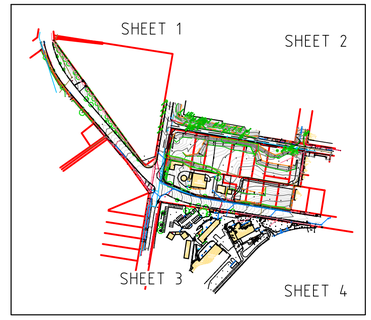
PROJECT No. 2202624
DRAWING REF. DET-001
VERSION B
SHEET 3 OF 4

FOR CONTINUATION REFER TO SHEET 2

FOR CONTINUATION REFER TO SHEET 3



MGA



KEY PLAN

LEGEND

Bench Mark
Comms Underground (UC)
Comms Pit/Manhole
Comms Pillar
Drainage Grated Pit
Drainage Kerb Inlet Pit
Electrical Power Pole
Electrical Underground Cable (UE)
Fence
Gate
Road Bollard
Sewer Manhole
Sewer Pipe (S)
Sign Post
Tree (Height, Trunk Diameter, Spread)
Water Meter
Water Tap
Water Stop Valve
Water Hydrant
Bottom of Bank
Top of Bank

NOTES:

1. HISTORICAL SURVEY DATA USED FROM SURVEY "19881A01L" DATED "23.05.2005"
2. BOUNDARIES ARE NOT FINAL AND FURTHER INVESTIGATION REQUIRED FOR BOUNDARIES IF THEY ARE REQUIRED FOR ANY DESIGN PURPOSES.
3. THESE NOTES AND LEGEND (IF SHOWN) FORM PART OF THE PLAN AND SURVEY AND MUST REMAIN WITH THE PLAN IN ANY REPRODUCTION IN WHOLE OR PART.
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15. SMALL TREES, SHRUBS, GARDEN FEATURES, PATHWAYS AND OTHER MINOR DETAIL MAY NOT BE SHOWN ON THIS PLAN, FOR THE PURPOSES OF THIS SURVEY.

ORIGIN OF LEVELS: PM 19232
R.L. 14.428 (AHD)

WARNING

THE COORDINATES WITHIN THIS DRAWING RELATE TO MAP GRID OF AUSTRALIA (MGA) 2020, REFER TO A REGISTERED LAND SURVEYOR FOR FURTHER CLARIFICATION. CAUTION SHOULD BE TAKEN WHEN IMPORTING INFORMATION OBTAINED FROM OTHER SUB-CONSULTANTS OR SOURCES TO ENSURE THAT THE DATA IS ON A MATCHING COORDINATE SYSTEM.

VER	BY	AMENDMENTS	DATE
A	M.W.	NEW DETAIL ADDED TO EXISTING SURVEY	08.12.22
B	M.W.	ADDITIONAL DRAINAGE ADDED	21.07.23
C			
D			
E			
F			
G			

- THE POSITION OF SERVICES SHOWN ON THIS DRAWING ARE INDICATIVE ONLY AND HAVE BEEN PLOTTED FROM PLANS AND DRAWINGS SUPPLIED BY RELEVANT AUTHORITIES.
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www.dialbeforeyoudig.com.au DIAL 1100 BEFORE YOU DIG

CLIENT: BUSWAYS GROUP PTY LTD

Beveridge Williams
Land Development Consultants
Registered Surveyors
Central Coast (02) 4351 2233 www.beveridgewilliams.com.au

DETAILS:
DETAIL SURVEY PLAN FOR
DEVELOPMENT APPLICATION PURPOSES
RACECOURSE ROAD
WEST GOSFORD

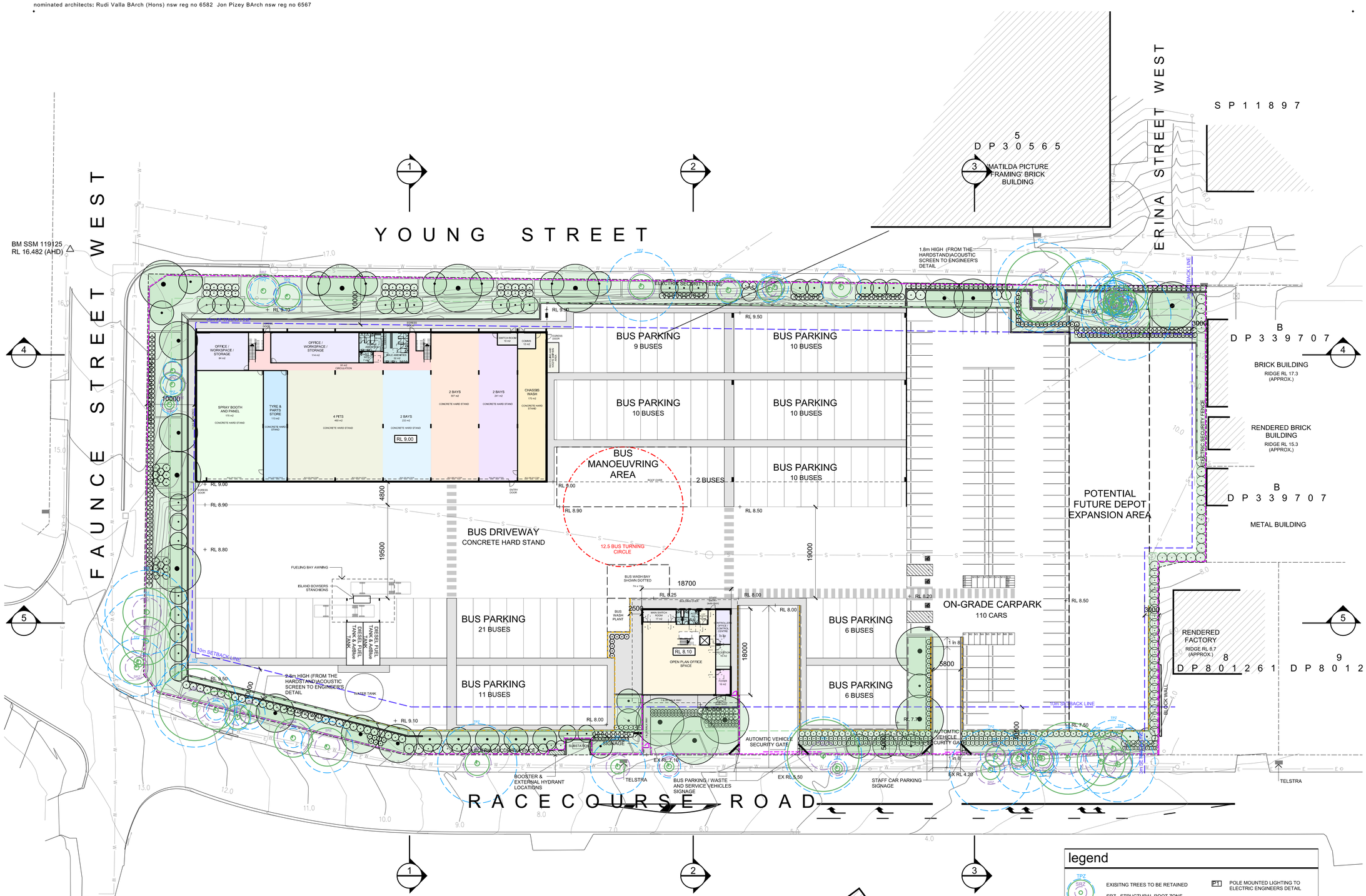
ORIGINAL
SCALE 1:400 SHEET SIZE A1
CAD REFERENCE: 2202624-DET-001-B
0 8 16 24
SCALE ON ORIGINAL DRAWING AT 1:400

SURVEYOR:	J.C. & P.K.
DRAWN:	C.A. & M.W.
CHECKED:	R.P.
SURVEY DATE:	23.09.05 & 06.12.22
VERTICAL DATUM:	AHD
HORIZONTAL DATUM:	MGA

PROJECT No. 2202624
DRAWING REF. DET-001
VERSION B
SHEET 4 OF 4

Appendix B – Proposed Development

nominated architects: Rudi Valla BArch (Hons) nsw reg no 6582 Jon Pizey BArch nsw reg no 6567



NOTE:
WORK WITHIN THE ROAD RESERVE ARE SHOWN FOR ASSESSMENT PURPOSES ONLY AND NOT FOR APPROVAL.

NOTE:
MINOR CHANGES TO FORM AND CONFIGURATION MAY BE REQUIRED WHEN DRAWINGS ARE SUBSEQUENTLY PREPARED FOR CONSTRUCTION PURPOSES AFTER THE GRANT OF THE DEVELOPMENT CONSENT.

plotted: 19/03/24 plotted by: WJ\n file: P:\4611-00-BusGos\00Cad\Sheets\ar--0200.dgn

legend

- EXISITNG TREES TO BE RETAINED
- SRZ - STRUCTURAL ROOT ZONE
- TPZ- TREE PROTECTION ZONE
- PROPOSED TREES, SHRUBS AND GROUND COVER
- 1.8M HIGH ELECTRICITY SECURITY FENCE
- SAFETY BARRIER
- CRASH BARRIER
- UNDERGROUND SEWER MAIN AND SEWER MAN HOLE
- TELSTRA LINE
- ELECTRICITY OVERHEAD CABLES
- WATER MAIN
- B BICYCLE PARKING
- M MOTOCYCLE PARKING
- P1 POLE MOUNTED LIGHTING TO ELECTRIC ENGINEERS DETAIL
- W WALL MOUNTED LIGHTING TO ELECTRIC ENGINEERS DETAIL
- H LED SURFACE MOUNTED LIGHTING TO ELECTRIC ENGINEERS DETAIL
- RD RECESSED LED LIGHTING TO ELECTRIC ENGINEERS DETAIL
- BL LED BOLLARD TO ELECTRIC ENGINEERS DETAIL
- H 155W LED SURFACE MOUNTED LOWBAY, IP65, 400K

No. OF BUS BAYS:	96
No. OF CAR SPACES:	113
No. OF MOTOCYCLE SPACES:	15
No. OF BICYCLE SPACES:	10
OFFICE GFA (SQM):	711
GROUND FLOOR:	320
FIRST FLOOR:	391

amendments

no.	date	amendment	by	chk'd	verified init	verified chk'd
A01	16/12/22	DA ISSUE	GZ	GZ	JP	JP
A02	19/07/23	AMENDMENTS TO ADDRESS MITIGATION IDENTIFIED IN THE VIA	GZ	GZ	JP	JP
A03	31/01/24	RETAINING WALL COORDINATION	WJ	WJ	JP	JP
A04	07/02/24	ISSUE FOR COORDINATION	ML	WJ	JP	JP
A05	13/02/24	REVISED DA ISSUE	ML	WJ	JP	JP
A06	19/03/24	REVISED DA ISSUE	WJ	WJ	JP	JP

north point

dem

planning, urban design, architecture, landscape architecture, interior design

p: po box 5036 west chatswood nsw 1515
t: (02) 8966 6000
w: www.dem.com.au

project/client

Waluya Pty Ltd Gosford Transport
7A-11 Racecourse Rd, 5-9 Faunce St & Young St, West Gosford, NSW 2250

civil & structural engineer

buildling service

drawing title

site plan

da issue

original	scale	drawn	project no.
a1	1:400	ml	4548-00

drawing no. **ar--0200** rev no. a06

1565

Appendix C – IFD Table

Design Rainfall IFDs – Frequent and Infrequent

Table | Chart

Unit: mm/h

	Annual Exceedance Probability (AEP)						
Duration	**63.2%**	**50%#**	**20%***	**10%**	**5%**	**2%**	**1%**
1 min	131	150	216	265	317	393	456
2 min	109	126	183	227	272	335	388
3 min	101	116	169	208	249	307	355
4 min	95.1	109	157	194	232	286	331
5 min	89.9	103	148	182	218	269	312
10 min	70.9	81.3	117	143	171	212	246
15 min	59.0	67.7	97.3	119	143	178	206
20 min	50.9	58.5	84.2	104	124	154	179
25 min	45.0	51.7	74.6	91.9	110	137	159
30 min	40.5	46.6	67.3	82.9	99.5	123	144
45 min	31.6	36.4	52.8	65.1	78.2	97.0	113
1 hour	26.4	30.4	44.1	54.4	65.3	81.0	94.2
1.5 hour	20.5	23.5	34.1	42.0	50.3	62.4	72.4
2 hour	17.1	19.6	28.3	34.8	41.7	51.6	59.9
3 hour	13.3	15.3	21.9	26.8	32.1	39.6	45.9
4.5 hour	10.5	12.0	17.0	20.8	24.7	30.5	35.3
6 hour	8.89	10.1	14.3	17.4	20.7	25.5	29.4
9 hour	7.10	8.06	11.3	13.7	16.2	19.9	22.9
12 hour	6.06	6.87	9.59	11.6	13.8	16.8	19.3
18 hour	4.85	5.49	7.66	9.27	11.0	13.4	15.3
24 hour	4.12	4.68	6.53	7.91	9.36	11.4	13.0
30 hour	3.62	4.11	5.76	6.99	8.27	10.0	11.4
36 hour	3.25	3.69	5.19	6.30	7.47	9.03	10.3
48 hour	2.71	3.09	4.37	5.32	6.32	7.62	8.64
72 hour	2.05	2.35	3.36	4.10	4.88	5.87	6.64
96 hour	1.66	1.90	2.72	3.33	3.97	4.76	5.37
120 hour	1.39	1.59	2.27	2.78	3.31	3.97	4.48
144 hour	1.20	1.37	1.94	2.36	2.81	3.37	3.80
168 hour	1.05	1.20	1.67	2.03	2.41	2.89	3.26

Note:
The 50% AEP IFD **does not** correspond to the 2 year Average Recurrence Interval (ARI) IFD. Rather it corresponds to the 1.44 ARI.
* The 20% AEP IFD **does not** correspond to the 5 year Average Recurrence Interval (ARI) IFD. Rather it corresponds to the 4.48 ARI.

Design Rainfall IFDs – Rare

Table | Chart

Unit: mm/h

	Annual Exceedance Probability (1 in x)				
Duration	**1 in 100**	**1 in 200**	**1 in 500**	**1 in 1000**	**1 in 2000**
1 min	456	501	575	634	695
2 min	388	431	495	546	599
3 min	355	393	452	498	546
4 min	331	366	420	463	507
5 min	312	343	394	434	476
10 min	246	270	310	341	374
15 min	206	226	260	287	314
20 min	179	197	226	249	273
25 min	159	175	201	222	243
30 min	144	158	182	200	220
45 min	113	124	143	158	173
1 hour	94.2	104	119	132	144
1.5 hour	72.4	79.8	91.7	101	111
2 hour	59.9	66.0	75.7	83.4	91.4
3 hour	45.9	50.3	57.7	63.6	69.6
4.5 hour	35.3	38.6	44.2	48.6	53.3
6 hour	29.4	32.1	36.8	40.4	44.3
9 hour	22.9	25.0	28.6	31.5	34.5
12 hour	19.3	21.1	24.2	26.6	29.1
18 hour	15.3	16.7	19.2	21.1	23.2
24 hour	13.0	14.3	16.4	18.1	19.8
30 hour	11.4	13.0	15.2	16.9	18.8
36 hour	10.3	11.9	13.9	15.6	17.4
48 hour	8.64	10.0	11.7	13.1	14.6
72 hour	6.64	7.52	8.67	9.59	10.5
96 hour	5.37	5.96	6.80	7.45	8.12
120 hour	4.48	4.91	5.58	6.09	6.61
144 hour	3.80	4.17	4.73	5.17	5.61
168 hour	3.26	3.61	4.12	4.51	4.92

Appendix D – TUFLOW Flood Maps

Map Numbers

	Existing			Proposed			Proposed with blockage
	1% AEP	0.2% AEP	PMF	1% AEP	0.2% AEP	PMF	1% AEP
Flood Level	FLD-201	FLD-203	FLD-205	FLD-207	FLD-209	FLD-211	FLD-213
Flood Depth	FLD-202	FLD-204	FLD-206	FLD-208	FLD-210	FLD-212	FLD-214
Flood Hazard (Z0)	FLD-215	FLD-216	FLD-217	FLD-218	FLD-219	FLD-220	FLD-221
Flood Hazard (ZAEM1)	FLD-222	FLD-223	FLD-224	FLD-225	FLD-226	FLD-227	-
Impact (change in flood level)	-	-	-	FLD-228	FLD-229	-	FLD-230
Critical duration	FLD-231	FLD-232	FLD-233	FLD-234	FLD-235	FLD-236	-
Velocity	FLD-237	FLD-238	FLD-239	FLD-240	FLD-241	FLD-242	FLD-243
Impact (change in flood hazard)	-	-	-	FLD-244	FLD-245	FLD-246	FLD-247

Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Peak Water Level (mAHD)

<= 4.00	12.00 - 14.00	26.00 - 28.00	40.00 - 42.00
4.00 - 6.00	14.00 - 16.00	28.00 - 30.00	42.00 - 44.00
6.00 - 8.00	16.00 - 18.00	30.00 - 32.00	44.00 - 46.00
8.00 - 10.00	18.00 - 20.00	32.00 - 34.00	46.00 - 48.00
10.00 - 12.00	20.00 - 22.00	34.00 - 36.00	> 48.00
	22.00 - 24.00	36.00 - 38.00	
	24.00 - 26.00	38.00 - 40.00	

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
BUS DEPOT, RACECOURSE ROAD WEST GOSFORD

Drawing Title
EXISTING CONDITION 1% AEP EVENT FLOOD LEVELS

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number
22-1063

A4

Drawing No.
22-1063-FLD-201

Issue
F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Peak Flow Depth (m)

- 0.000 - 0.050
- 0.050 - 0.100
- 0.100 - 0.150
- 0.150 - 0.300
- 0.300 - 0.500
- 0.500 - 1.000
- > 1.000

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**EXISTING CONDITION
1% AEP EVENT
FLOOD DEPTHS AND LEVELS**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	A4
22-1063	
Drawing No.	Issue
22-1063-FLD-202	F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Peak Water Level (mAHD)

<= 4.00	12.00 - 14.00	26.00 - 28.00	40.00 - 42.00
4.00 - 6.00	14.00 - 16.00	28.00 - 30.00	42.00 - 44.00
6.00 - 8.00	16.00 - 18.00	30.00 - 32.00	44.00 - 46.00
8.00 - 10.00	18.00 - 20.00	32.00 - 34.00	46.00 - 48.00
10.00 - 12.00	20.00 - 22.00	34.00 - 36.00	> 48.00
	22.00 - 24.00	36.00 - 38.00	
	24.00 - 26.00	38.00 - 40.00	

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
BUS DEPOT, RACECOURSE ROAD WEST GOSFORD

Drawing Title
EXISTING CONDITION 0.2% AEP EVENT FLOOD LEVELS

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number
22-1063

A4

Drawing No.
22-1063-FLD-203

Issue
F

Coordinate System: EPSG:7856 / GDA2020 / MGA zone 56

Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Peak Flow Depth (m)

- 0.000 - 0.050
- 0.050 - 0.100
- 0.100 - 0.150
- 0.150 - 0.300
- 0.300 - 0.500
- 0.500 - 1.000
- > 1.000

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
BUS DEPOT, RACECOURSE ROAD WEST GOSFORD

Drawing Title
EXISTING CONDITION 0.2% AEP EVENT FLOOD DEPTHS AND LEVELS

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	A4
22-1063	
Drawing No.	Issue
22-1063-FLD-204	F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Peak Water Level (mAHD)

<= 4.00	12.00 - 14.00	26.00 - 28.00	40.00 - 42.00
4.00 - 6.00	14.00 - 16.00	28.00 - 30.00	42.00 - 44.00
6.00 - 8.00	16.00 - 18.00	30.00 - 32.00	44.00 - 46.00
8.00 - 10.00	18.00 - 20.00	32.00 - 34.00	46.00 - 48.00
10.00 - 12.00	20.00 - 22.00	34.00 - 36.00	> 48.00
	22.00 - 24.00	36.00 - 38.00	
	24.00 - 26.00	38.00 - 40.00	

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
BUS DEPOT, RACECOURSE ROAD WEST GOSFORD

Drawing Title
EXISTING CONDITION PMF EVENT FLOOD LEVELS

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	A4
22-1063	
Drawing No.	Issue
22-1063-FLD-205	**F**

Coordinate System: EPSG:7856 / GDA2020 / MGA zone 56

Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Peak Flow Depth (m)

- 0.000 - 0.050
- 0.050 - 0.100
- 0.100 - 0.150
- 0.150 - 0.300
- 0.300 - 0.500
- 0.500 - 1.000
- > 1.000

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**EXISTING CONDITION
PMF EVENT
FLOOD DEPTHS AND LEVELS**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	A4
22-1063	
Drawing No.	Issue
22-1063-FLD-206	**F**

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Peak Water Level (mAHD)

<= 4.00	12.00 - 14.00	26.00 - 28.00	40.00 - 42.00
4.00 - 6.00	14.00 - 16.00	28.00 - 30.00	42.00 - 44.00
6.00 - 8.00	16.00 - 18.00	30.00 - 32.00	44.00 - 46.00
8.00 - 10.00	18.00 - 20.00	32.00 - 34.00	46.00 - 48.00
10.00 - 12.00	20.00 - 22.00	34.00 - 36.00	> 48.00
	22.00 - 24.00	36.00 - 38.00	
	24.00 - 26.00	38.00 - 40.00	

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
BUS DEPOT, RACECOURSE ROAD WEST GOSFORD

Drawing Title
PROPOSED CONDITION 1% AEP EVENT FLOOD LEVELS

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number
22-1063

A4

Drawing No.
22-1063-FLD-207

Issue
F

Coordinate System: EPSG:7856 / GDA2020 / MGA zone 56

Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Peak Flow Depth (m)

- 0.000 - 0.050
- 0.050 - 0.100
- 0.100 - 0.150
- 0.150 - 0.300
- 0.300 - 0.500
- 0.500 - 1.000
- > 1.000

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**PROPOSED CONDITION
1% AEP EVENT
FLOOD DEPTHS AND LEVELS**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	**A4**
Drawing No.	Issue
22-1063-FLD-208	**F**

Coordinate System: EPSG:7856 / GDA2020 / MGA zone 56

Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Peak Water Level (mAHD)

<= 4.00	12.00 - 14.00	26.00 - 28.00	40.00 - 42.00
4.00 - 6.00	14.00 - 16.00	28.00 - 30.00	42.00 - 44.00
6.00 - 8.00	16.00 - 18.00	30.00 - 32.00	44.00 - 46.00
8.00 - 10.00	18.00 - 20.00	32.00 - 34.00	46.00 - 48.00
10.00 - 12.00	20.00 - 22.00	34.00 - 36.00	> 48.00
	22.00 - 24.00	36.00 - 38.00	
	24.00 - 26.00	38.00 - 40.00	

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
BUS DEPOT, RACECOURSE ROAD WEST GOSFORD

Drawing Title
PROPOSED CONDITION 0.2% AEP EVENT FLOOD LEVELS

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number
22-1063

A4

Drawing No.
22-1063-FLD-209

Issue
F

Coordinate System: EPSG:7856 / GDA2020 / MGA zone 56

Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Peak Flow Depth (m)

- 0.000 - 0.050
- 0.050 - 0.100
- 0.100 - 0.150
- 0.150 - 0.300
- 0.300 - 0.500
- 0.500 - 1.000
- > 1.000

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
BUS DEPOT, RACECOURSE ROAD WEST GOSFORD

Drawing Title
PROPOSED CONDITION 0.2% AEP EVENT FLOOD DEPTHS AND LEVELS

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	A4
22-1063	
Drawing No.	Issue
22-1063-FLD-210	**F**

Coordinate System: EPSG:7856 / GDA2020 / MGA zone 56

Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Peak Water Level (mAHD)

<= 4.00	12.00 - 14.00	26.00 - 28.00	40.00 - 42.00
4.00 - 6.00	14.00 - 16.00	28.00 - 30.00	42.00 - 44.00
6.00 - 8.00	16.00 - 18.00	30.00 - 32.00	44.00 - 46.00
8.00 - 10.00	18.00 - 20.00	32.00 - 34.00	46.00 - 48.00
10.00 - 12.00	20.00 - 22.00	34.00 - 36.00	> 48.00
	22.00 - 24.00	36.00 - 38.00	
	24.00 - 26.00	38.00 - 40.00	

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
BUS DEPOT, RACECOURSE ROAD WEST GOSFORD

Drawing Title
PROPOSED CONDITION PMF EVENT FLOOD LEVELS

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	A4
22-1063	
Drawing No.	Issue
22-1063-FLD-211	F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Peak Flow Depth (m)

- 0.000 - 0.050
- 0.050 - 0.100
- 0.100 - 0.150
- 0.150 - 0.300
- 0.300 - 0.500
- 0.500 - 1.000
- > 1.000

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**PROPOSED CONDITION
PMF EVENT
FLOOD DEPTHS AND LEVELS**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	A4
22-1063	
Drawing No.	Issue
22-1063-FLD-212	**F**

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Peak Water Level (mAHD)

- <= 4.00
- 4.00 - 6.00
- 6.00 - 8.00
- 8.00 - 10.00
- 10.00 - 12.00
- 12.00 - 14.00
- 14.00 - 16.00
- 16.00 - 18.00
- 18.00 - 20.00
- 20.00 - 22.00
- 22.00 - 24.00
- 24.00 - 26.00
- 26.00 - 28.00
- 28.00 - 30.00
- 30.00 - 32.00
- 32.00 - 34.00
- 34.00 - 36.00
- 36.00 - 38.00
- 38.00 - 40.00
- 40.00 - 42.00
- 42.00 - 44.00
- 44.00 - 46.00
- 46.00 - 48.00
- > 48.00

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
BUS DEPOT, RACECOURSE ROAD WEST GOSFORD

Drawing Title
PROPOSED CONDITION 1% AEP EVENT WITH BLOCKAGE FLOOD LEVELS

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	A4
22-1063	
Drawing No.	Issue
22-1063-FLD-213	F

Coordinate System: EPSG:7856 / GDA2020 / MGA zone 56

Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Peak Flow Depth (m)

- 0.000 - 0.050
- 0.050 - 0.100
- 0.100 - 0.150
- 0.150 - 0.300
- 0.300 - 0.500
- 0.500 - 1.000
- > 1.000

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**PROPOSED CONDITION
1% AEP EVENT WITH BLOCKAGE
FLOOD DEPTHS AND LEVELS**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	A4
22-1063	
Drawing No.	Issue
22-1063-FLD-214	**F**

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Hazard (Z0)

- 0.00 - 0.40
- 0.40 - 0.60
- 0.60 - 1.00

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**EXISTING CONDITION
1% AEP EVENT
HAZARD (Z0)**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number
22-1063

A4

Drawing No.
22-1063-FLD-215

Issue
F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Hazard (Z0)

- 0.00 - 0.40
- 0.40 - 0.60
- 0.60 - 1.00

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**EXISTING CONDITION
0.2% AEP EVENT
HAZARD (Z0)**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	**A4**
Drawing No.	Issue
22-1063-FLD-216	**F**

Coordinate System: EPSG:7856 / GDA2020 / MGA zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Hazard (Z0)

- 0.00 - 0.40
- 0.40 - 0.60
- 0.60 - 1.00

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**EXISTING CONDITION
PMF EVENT
HAZARD (Z0)**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	A4
Drawing No.	Issue
22-1063-FLD-217	F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Hazard (Z0)

- 0.00 - 0.40
- 0.40 - 0.60
- 0.60 - 1.00

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**PROPOSED CONDITION
1% AEP EVENT
HAZARD (Z0)**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number
22-1063

A4

Drawing No.
22-1063-FLD-218

Issue
F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Hazard (Z0)

- 0.00 - 0.40
- 0.40 - 0.60
- 0.60 - 1.00

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**PROPOSED CONDITION
0.2% AEP EVENT
HAZARD (Z0)**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	**A4**
Drawing No.	Issue
22-1063-FLD-219	**F**

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Hazard (Z0)

- 0.00 - 0.40
- 0.40 - 0.60
- 0.60 - 1.00

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**PROPOSED CONDITION
PMF EVENT
HAZARD (Z0)**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number
22-1063

A4

Drawing No.
22-1063-FLD-220

Issue
F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Hazard (Z0)

- 0.00 - 0.40
- 0.40 - 0.60
- 0.60 - 1.00

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**PROPOSED CONDITION
1% AEP EVENT WITH BLOCKAGE
HAZARD (Z0)**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	**A4**
Drawing No.	Issue
22-1063-FLD-221	**F**

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

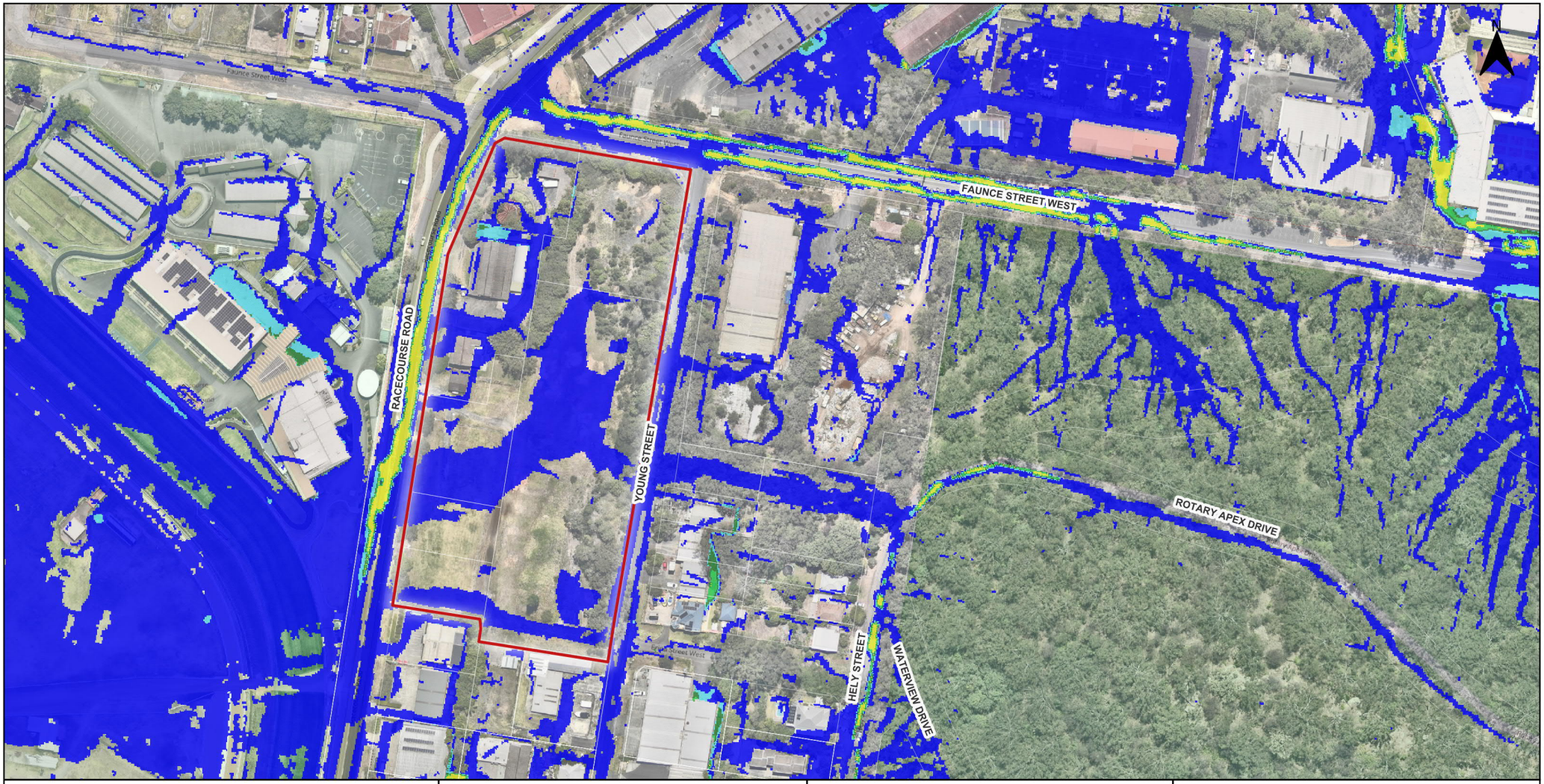
Drawing Title
**EXISTING CONDITION
1% AEP EVENT
HAZARD (ZAEM1)**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	A4
Drawing No.	Issue
22-1063-FLD-222	F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56



Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

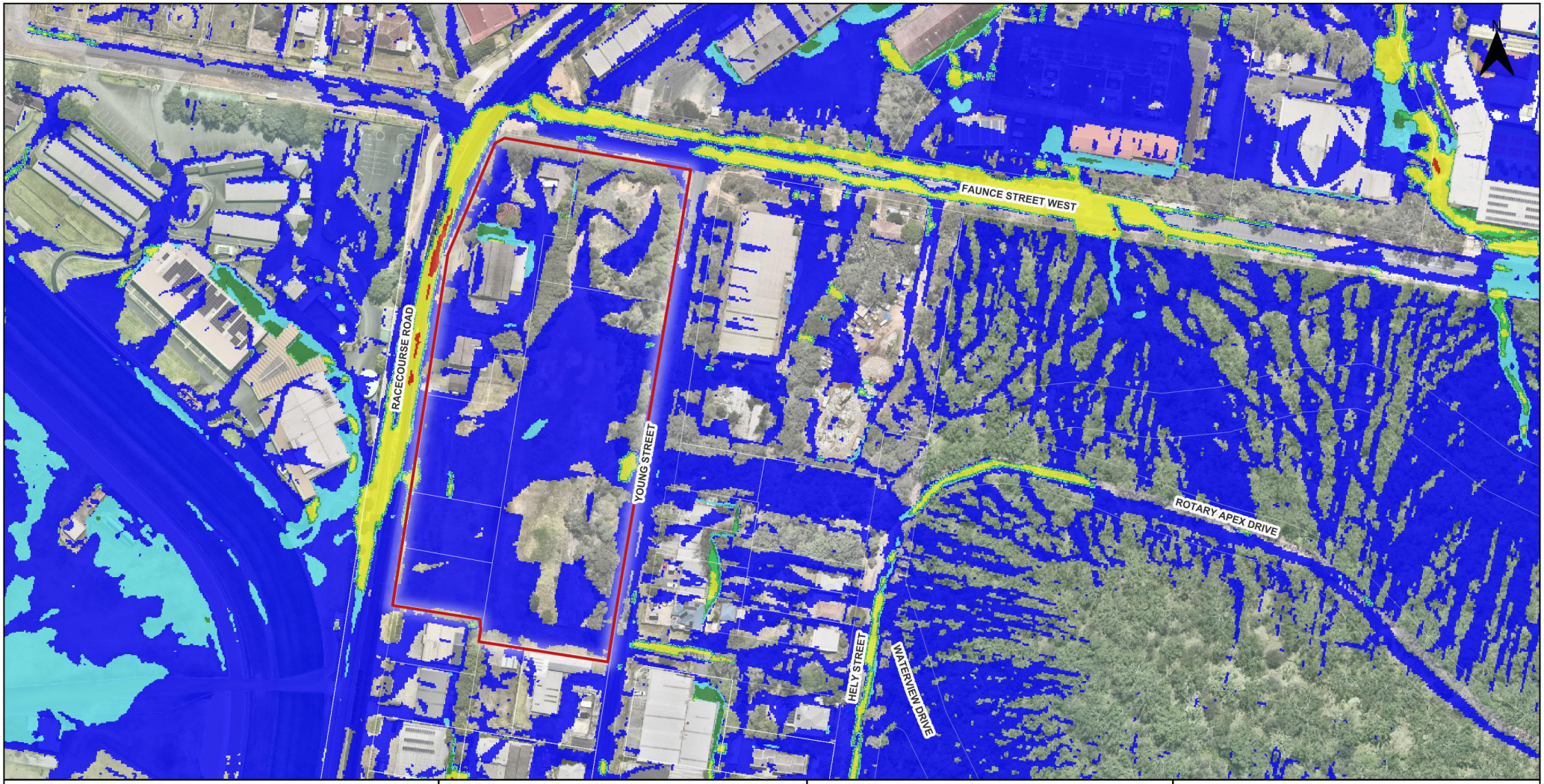
Drawing Title
**EXISTING CONDITION
0.2% AEP EVENT
HAZARD (ZAEM1)**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	A4
Drawing No.	Issue
22-1063-FLD-223	F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56



Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**EXISTING CONDITION
PMF EVENT
HAZARD (ZAEM1)**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	A4
Drawing No.	Issue
22-1063-FLD-224	F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**PROPOSED CONDITION
1% AEP EVENT
HAZARD (ZAEM1)**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	**A4**
Drawing No.	Issue
22-1063-FLD-225	**F**

Coordinate System: EPSG:7856 / GDA2020 / MGA zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

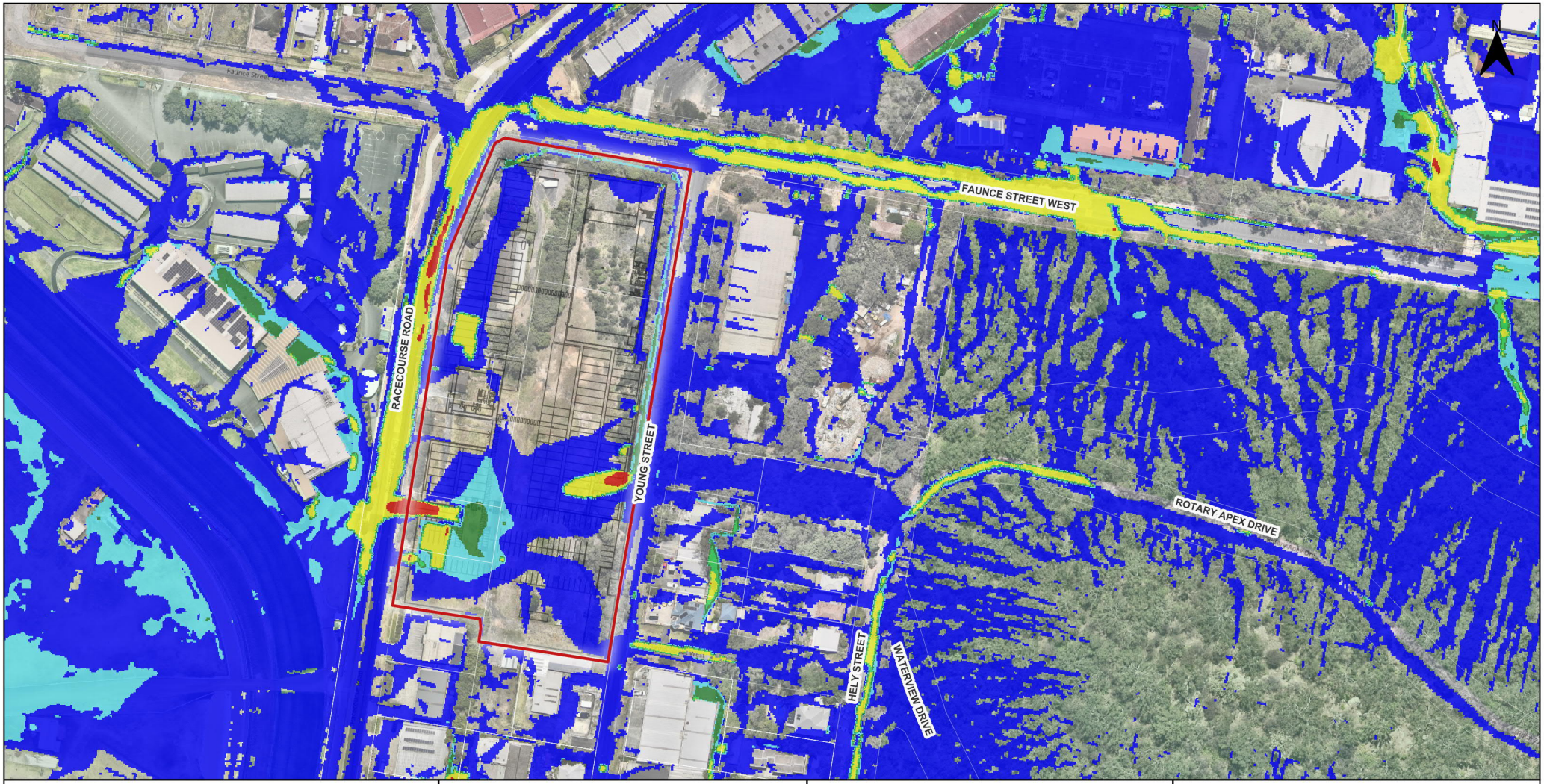
Drawing Title
**PROPOSED CONDITION
0.2% AEP EVENT
HAZARD (ZAEM1)**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	A4
Drawing No.	Issue
22-1063-FLD-226	F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56



Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Hazard (ZAEM1)

- H1
- H2
- H3
- H4
- H5
- H6

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD

Drawing Title
PROPOSED CONDITION
PMF EVENT
HAZARD (ZAEM1)

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	A4
Drawing No.	Issue
22-1063-FLD-227	F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Impact (m)

- <= -0.30
- -0.30 - -0.15
- -0.15 - -0.10
- -0.10 - -0.05
- -0.05 - -0.02
- -0.02 - -0.01
- -0.01 - 0.01
- 0.01 - 0.02
- 0.02 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- > 0.30

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**IMPACT
1% AEP EVENT
FLOOD LEVEL DIFFERENCE**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	A4
Drawing No.	Issue
22-1063-FLD-228	F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Impact (m)

- <= -0.30
- -0.30 - -0.15
- -0.15 - -0.10
- -0.10 - -0.05
- -0.05 - -0.02
- -0.02 - -0.01
- -0.01 - 0.01
- 0.01 - 0.02
- 0.02 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- > 0.30

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**IMPACT
0.2% AEP EVENT
FLOOD LEVEL DIFFERENCE**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	A4
Drawing No.	Issue
22-1063-FLD-229	F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Impact (m)

- <= -0.30
- -0.30 - -0.15
- -0.15 - -0.10
- -0.10 - -0.05
- -0.05 - -0.02
- -0.02 - -0.01
- -0.01 - 0.01
- 0.01 - 0.02
- 0.02 - 0.05
- 0.05 - 0.10
- 0.10 - 0.15
- 0.15 - 0.30
- > 0.30

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**IMPACT
1% AEP EVENT WITH BLOCKAGE
FLOOD LEVEL DIFFERENCE**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	A4
Drawing No.	Issue
22-1063-FLD-230	F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Critical Duration

- 15min
- 25min
- 30min
- 45min
- 60min
- 90min
- 120min

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**EXISTING CONDITION
1% AEP EVENT
CRITICAL DURATION**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number
22-1063

A4

Drawing No.
22-1063-FLD-231

Issue
F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Critical Duration

- 15min
- 25min
- 30min
- 45min
- 60min
- 90min
- 120min

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**EXISTING CONDITION
0.2% AEP EVENT
CRITICAL DURATION**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number
22-1063

A4

Drawing No.
22-1063-FLD-232

Issue
F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56

1600

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Critical Duration

- 15min
- 25min
- 30min
- 45min
- 60min
- 90min
- 120min

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD

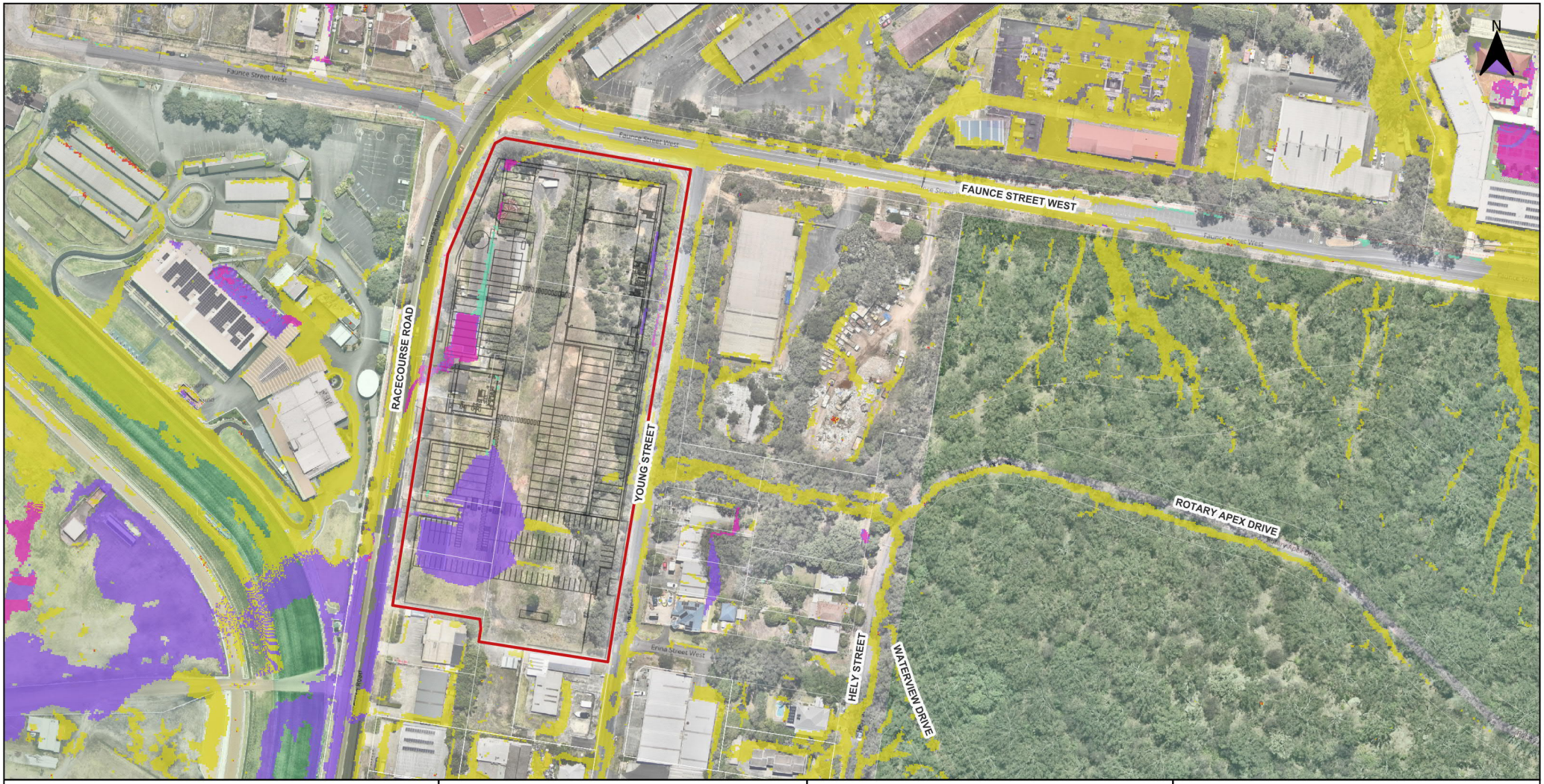
Drawing Title
EXISTING CONDITION
PMF EVENT
CRITICAL DURATION

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	**A4**
Drawing No.	Issue
22-1063-FLD-233	**F**

Coordinate System: EPSG:7856 / GDA2020 MGA zone 56



Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Critical Duration

- 15min
- 25min
- 30min
- 45min
- 60min
- 90min
- 120min

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**PROPOSED CONDITION
1% AEP EVENT
CRITICAL DURATION**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number
22-1063

A4

Drawing No.
22-1063-FLD-234

Issue
F

Coordinate System: EPSG:7856 / GDA2020 MGA zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Critical Duration

- 15min
- 25min
- 30min
- 45min
- 60min
- 90min
- 120min

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

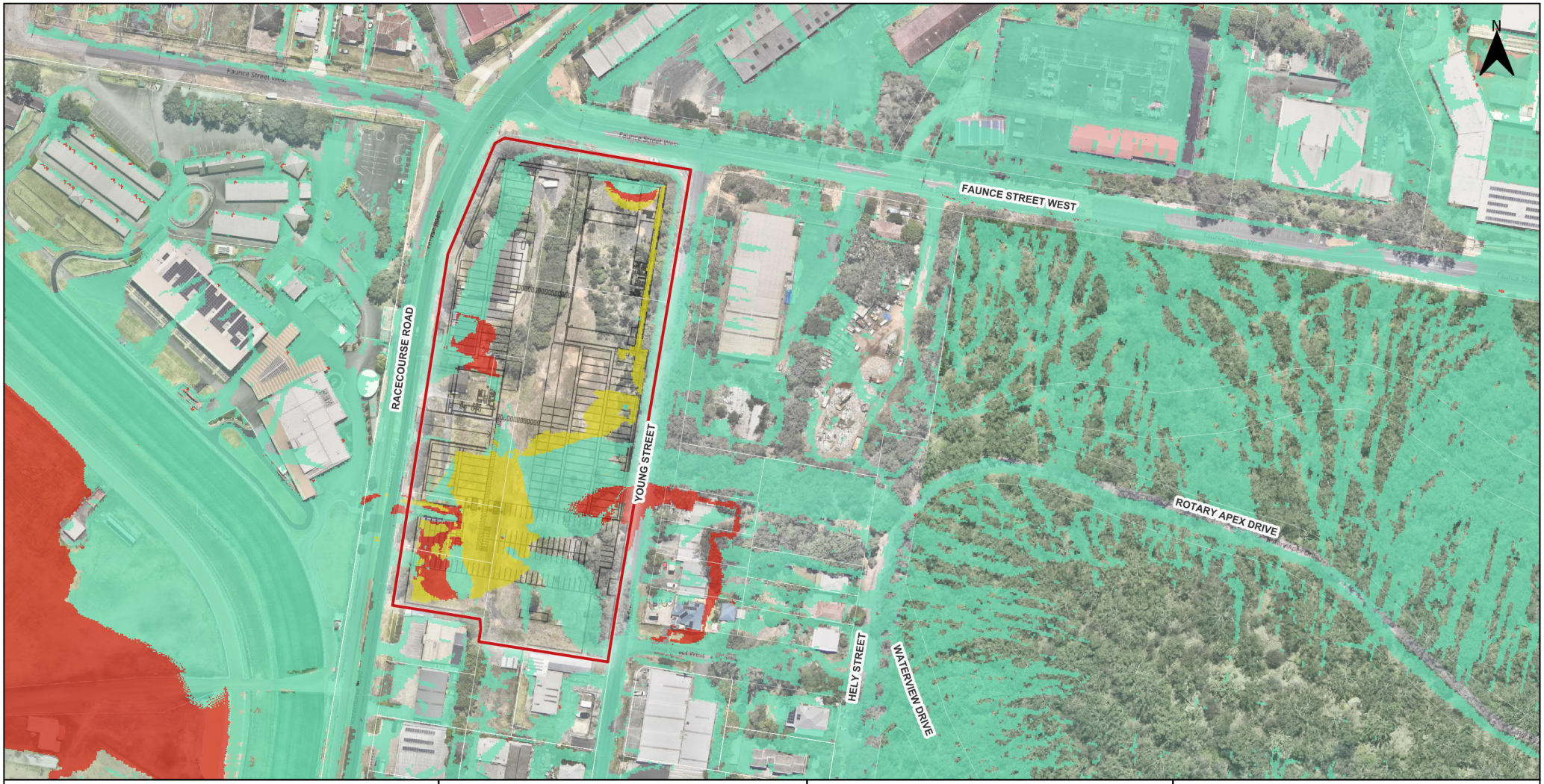
Drawing Title
**PROPOSED CONDITION
0.2% AEP EVENT
CRITICAL DURATION**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	**A4**
Drawing No.	Issue
22-1063-FLD-235	**F**

Coordinate System: EPSG:7856 / GDA2020 MGA zone 56



Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Critical Duration

- 15min
- 25min
- 30min
- 45min
- 60min
- 90min
- 120min

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**PROPOSED CONDITION
PMF EVENT
CRITICAL DURATION**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

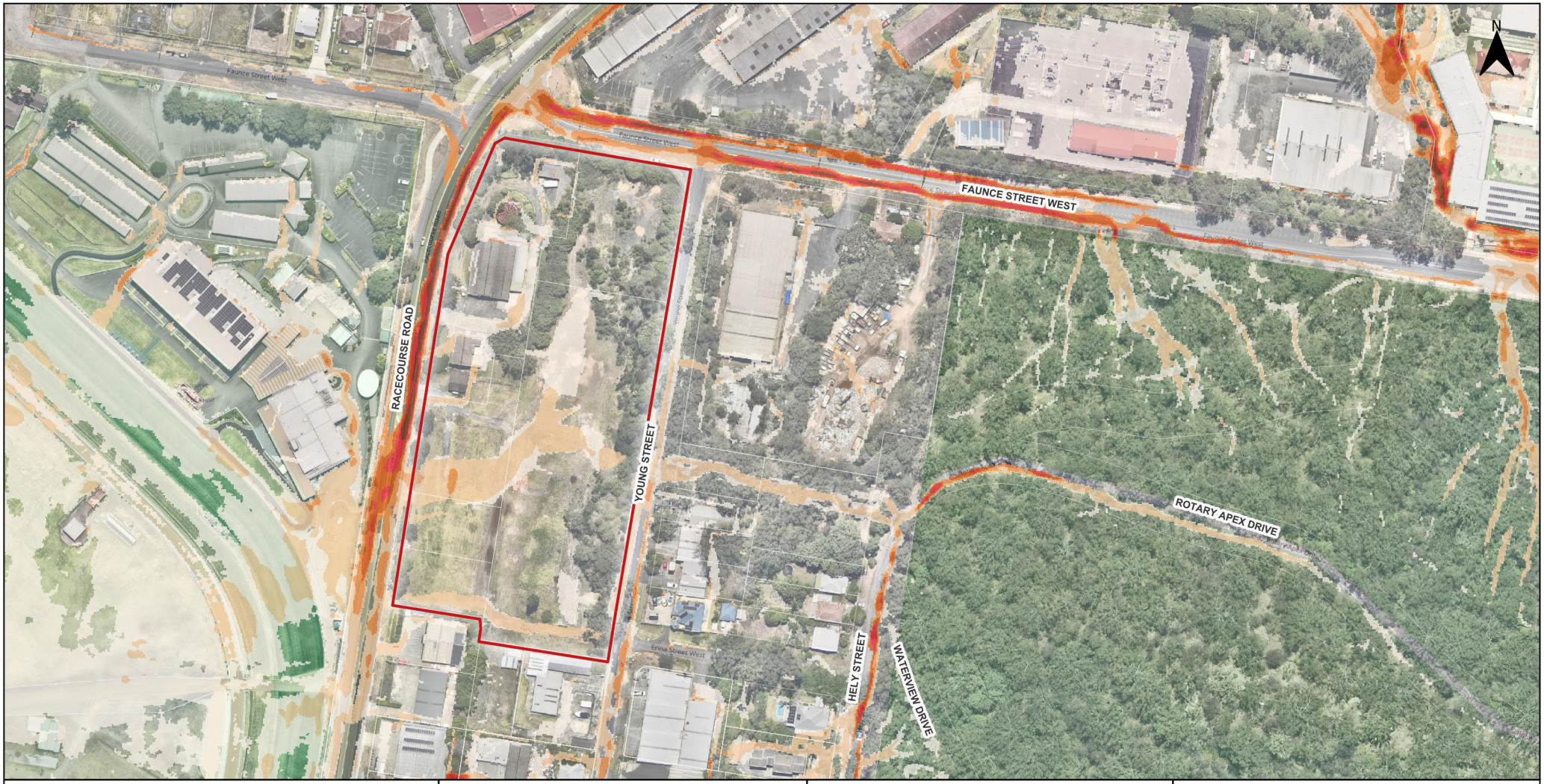
Project Number
22-1063

A4

Drawing No.
22-1063-FLD-236

Issue
F

Coordinate System: EPSG:7856 / GDA2020 MGA Zone 56



Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 2.50
- > 2.50

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
BUS DEPOT, RACECOURSE ROAD WEST GOSFORD

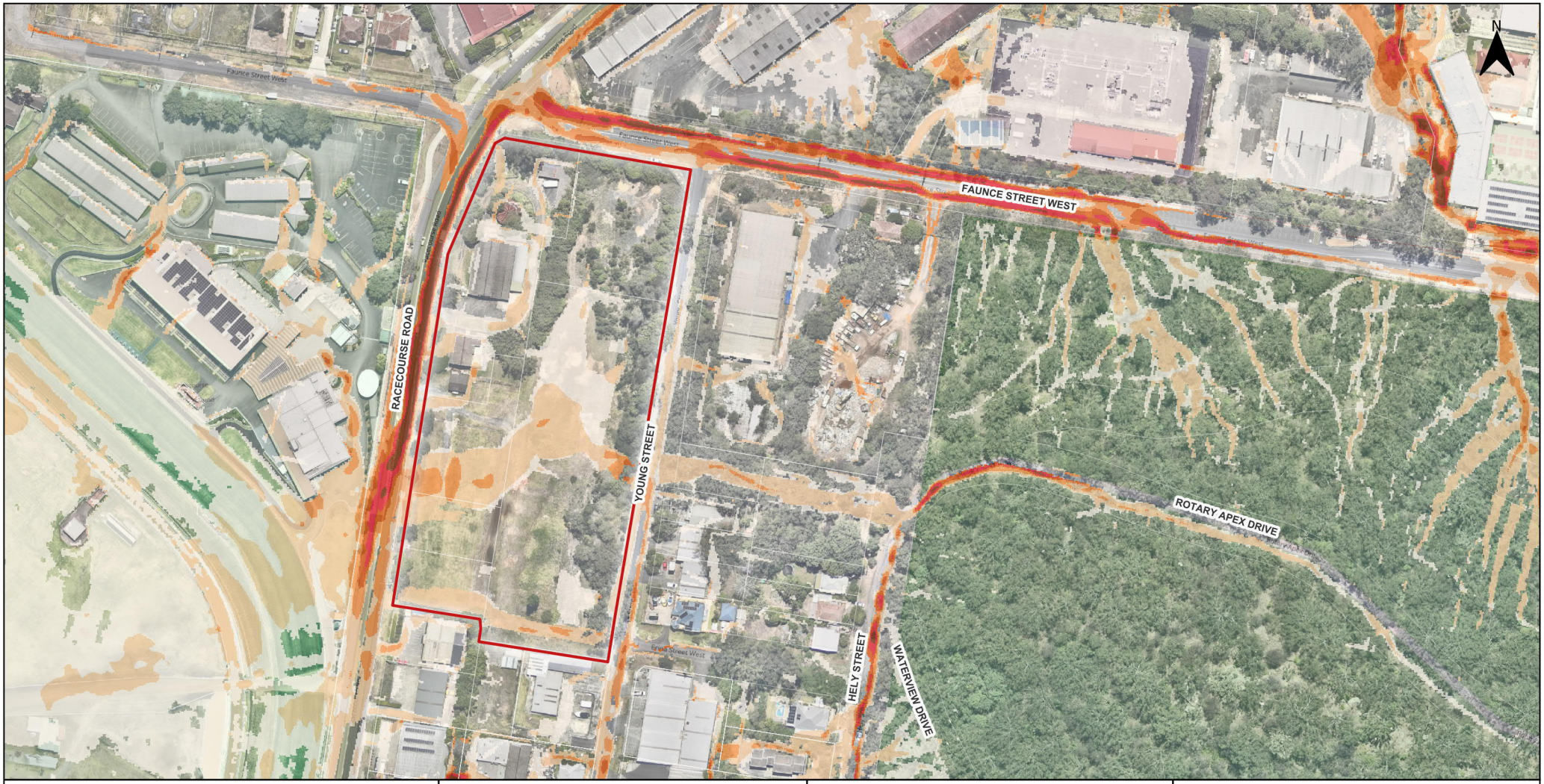
Drawing Title
EXISTING CONDITION 1% AEP EVENT VELOCITY

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	A4
Drawing No.	Issue
22-1063-FLD-237	F

Coordinate System: EPSG:7856 / GDA2020 MGA zone 56



Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 2.50
- > 2.50

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
BUS DEPOT, RACECOURSE ROAD WEST GOSFORD

Drawing Title
EXISTING CONDITION 0.2% AEP EVENT VELOCITY

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	A4
Drawing No.	Issue
22-1063-FLD-238	F

Coordinate System: EPSG:7856 / GDA2020 MGA zone 56

Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 2.50
- > 2.50

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

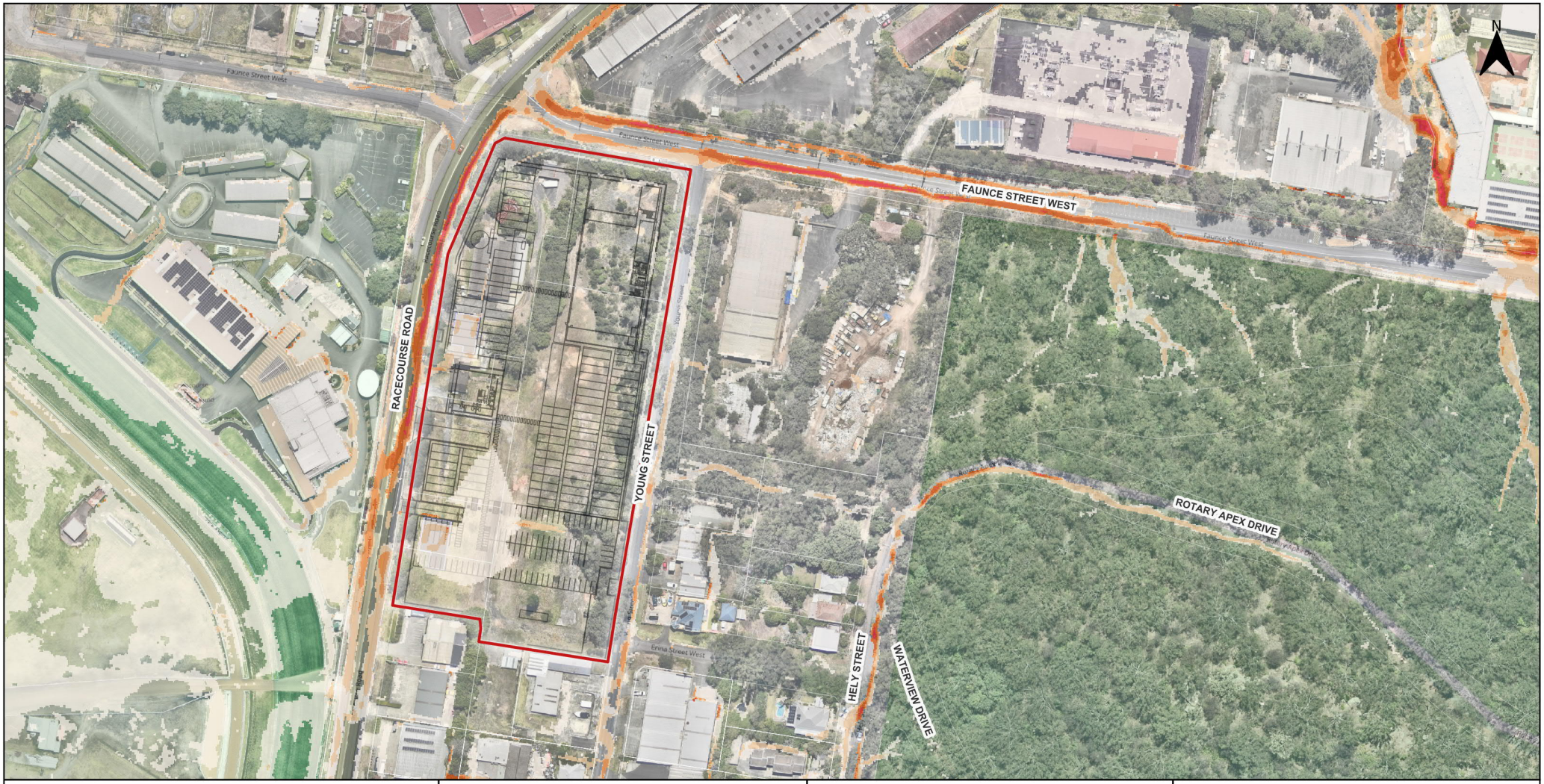
Drawing Title
**EXISTING CONDITION
PMF EVENT
VELOCITY**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	A4
Drawing No.	Issue
22-1063-FLD-239	F

Coordinate System: EPSG:7856 / GDA2020 / MGA zone 56



Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 2.50
- > 2.50

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
BUS DEPOT, RACECOURSE ROAD WEST GOSFORD

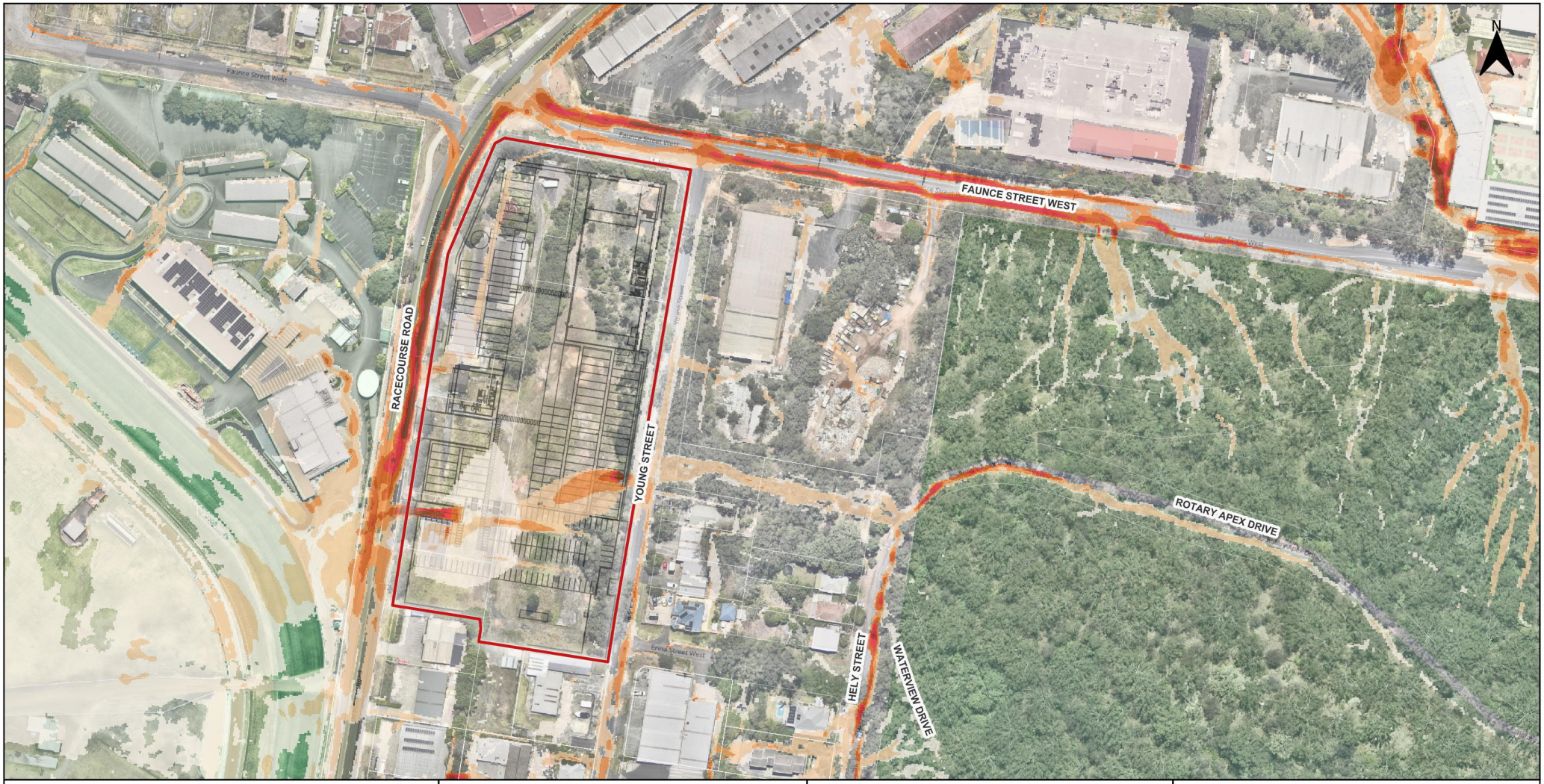
Drawing Title
PROPOSED CONDITION 1% AEP EVENT VELOCITY

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	A4
Drawing No.	Issue
22-1063-FLD-240	F

Coordinate System: EPSG:7856 / GDA2020 MGA zone 56



Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 2.50
- > 2.50

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
BUS DEPOT, RACECOURSE ROAD WEST GOSFORD

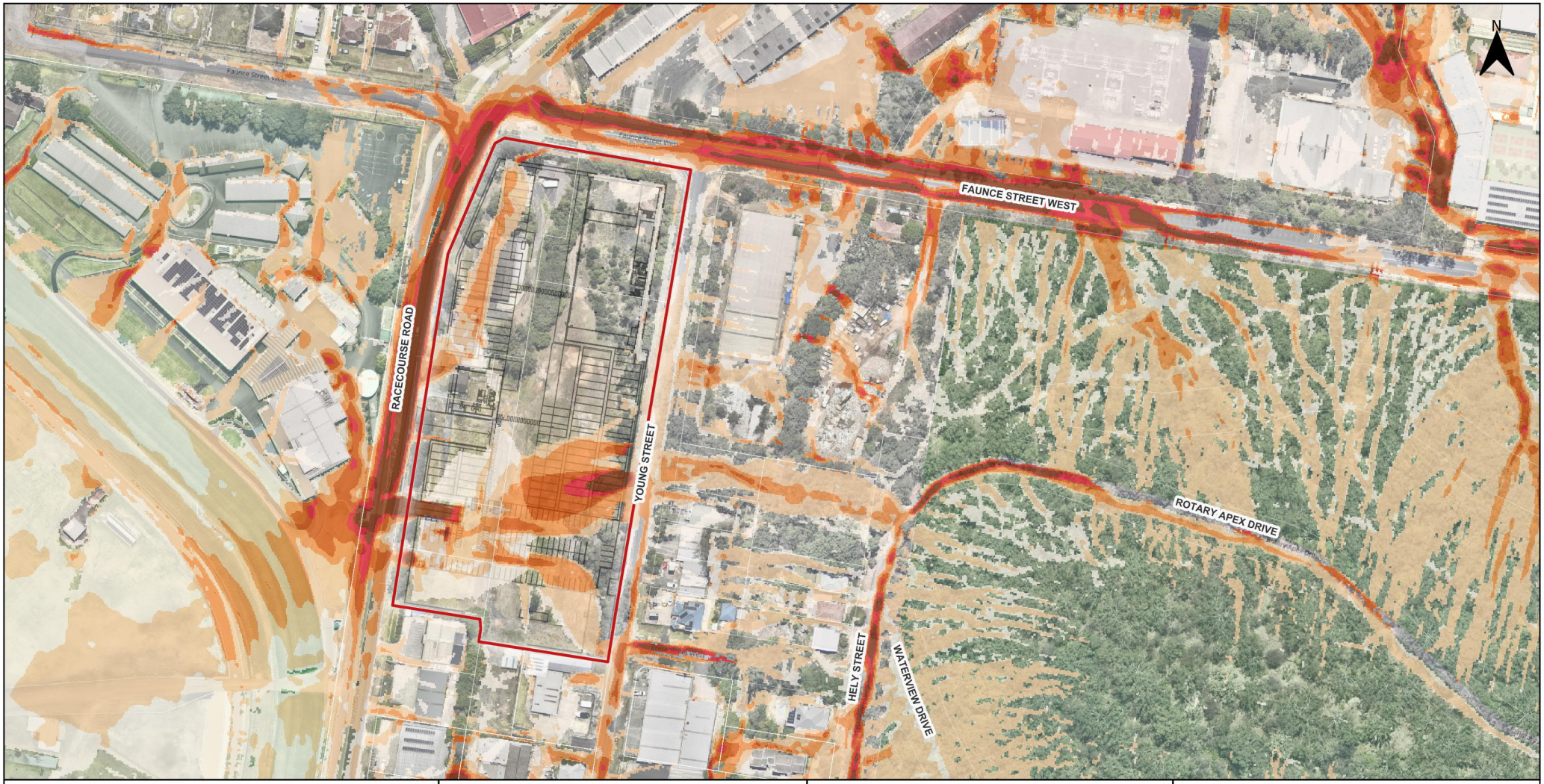
Drawing Title
PROPOSED CONDITION 0.2% AEP EVENT VELOCITY

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	A4
Drawing No.	Issue
22-1063-FLD-241	F

Coordinate System: EPSG:7856 / GDA2020 MGA zone 56



Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 2.50
- > 2.50

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
BUS DEPOT, RACECOURSE ROAD WEST GOSFORD

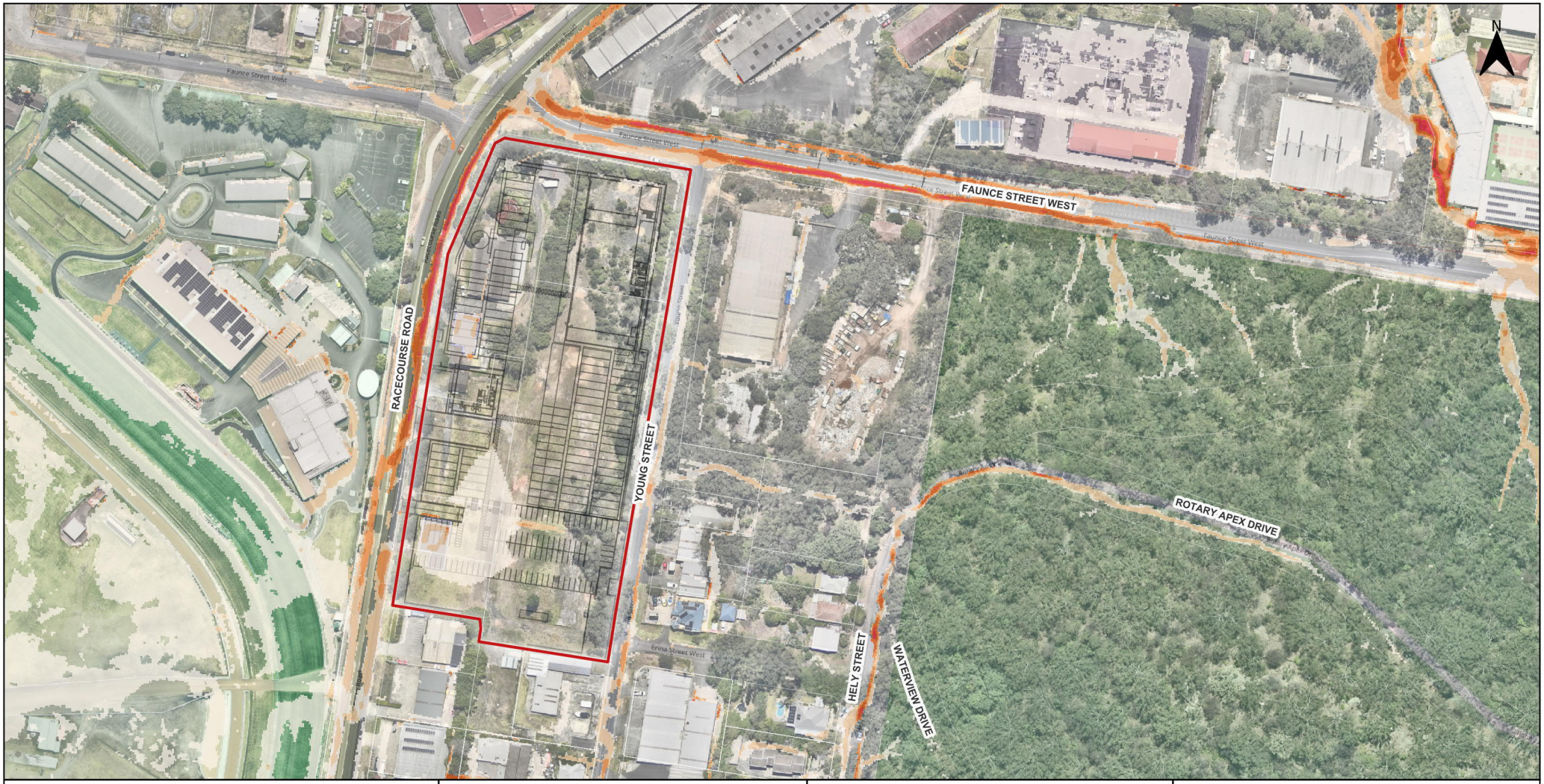
Drawing Title
PROPOSED CONDITION PMF EVENT VELOCITY

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	A4
Drawing No.	Issue
22-1063-FLD-242	F

Coordinate System: EPSG:7856 / GDA2020 / MGA zone 56



Legend

- Cadastre
- Site Extent
- Flood Level Contour - 1m interval (mAHD)
- Proposed Design Layout

Velocity (m/s)

- 0.00 to 0.50
- 0.50 to 1.00
- 1.00 to 1.50
- 1.50 to 2.00
- 2.00 to 2.50
- > 2.50

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**PROPOSED CONDITION
1% AEP EVENT WITH BLOCKAGE
VELOCITY**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	**A4**
Drawing No.	Issue
22-1063-FLD-243	**F**

Coordinate System: EPSG:7856 / GDA2020 / MGA zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Change in Hazard Category

- <= -3.0
- -3.0 to -2.0
- -2.0 to -1.0
- -1.0 to 0.0
- 0.0 to 1.0
- 1.0 to 2.0
- 2.0 to 3.0
- > 3.0

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**IMPACT
1% AEP EVENT
CHANGE IN HAZARD (ZAEM1)**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number
22-1063

A4

Drawing No.
22-1063-FLD-244

Issue
F

Coordinate System: EPSG:7856 / GDA2020 MGA zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Change in Hazard Category

- <= -3.0
- -3.0 to -2.0
- -2.0 to -1.0
- -1.0 to 0.0
- 0.0 to 1.0
- 1.0 to 2.0
- 2.0 to 3.0
- > 3.0

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**IMPACT
0.2% AEP EVENT
CHANGE IN HAZARD (ZAEM1)**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number
22-1063

A4

Drawing No.
22-1063-FLD-245

Issue
F

Coordinate System: EPSG:7856 / GDA2020 / MGA zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Change in Hazard Category

- <= -3.0
- -3.0 to -2.0
- -2.0 to -1.0
- -1.0 to 0.0
- 0.0 to 1.0
- 1.0 to 2.0
- 2.0 to 3.0
- > 3.0

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**IMPACT
PMF EVENT
CHANGE IN HAZARD (ZAEM1)**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number
22-1063

A4

Drawing No.
22-1063-FLD-246

Issue
F

Coordinate System: EPSG:7856 / GDA2020 / MGA zone 56

Legend

- Cadastre
- Site Extent
- Proposed Design Layout

Change in Hazard Category

- <= -3.0
- -3.0 to -2.0
- -2.0 to -1.0
- -1.0 to 0.0
- 0.0 to 1.0
- 1.0 to 2.0
- 2.0 to 3.0
- > 3.0

Issue	Date	By	Chkd	Appd	Authd
F	2024-04-30	AA	DG	TM	GJ

1:2500

0 50 100 m

Client
WALUYA PTY LTD

Project Name
**BUS DEPOT,
RACECOURSE ROAD
WEST GOSFORD**

Drawing Title
**IMPACT
1% AEP EVENT WITH BLOCKAGE
CHANGE IN HAZARD (ZAEM1)**

at&l
Level 7, 153 Walker Street
North Sydney
NSW 2060
P 02 9439 1777
www.atl.net.au
ABN 96 130 882 405

Status
FOR DEVELOPMENT APPLICATION

Project Number	
22-1063	A4
Drawing No.	Issue
22-1063-FLD-247	F

Coordinate System: EPSG:7856 / GDA2020 / MGA zone 56

Appendix E – Central Coast Council DCP requirements

This table presents the requirements and descriptions related to flood impacts, building components, local overland flooding, environmental controls, filling, and sea level rise as outlined in the Central Coast Development Control Plan 2022.

Table 4 Flood Control Target Matrix

Development	Development Types					
Control Targets	Pools & Spas	Residential Buildings (Rural)	Residential Buildings (Urban)	Group homes, seniors housing, emergency facilities	Commercial, Industrial	Subdivisions (Urban & Rural)
Floor levels	-	B	B	A	B	-
Flood Impacts	C	C	C	C	C	C
Subdivisions	-	-	-	-	-	D
Access Parking	-	E	-	F	E	E
Fencing	-	G	G	G	G	G

Requirement	Response
B - Floor Levels	
Non-habitable floor levels: Garage, laundry, or public toilets/sporting amenities to have floor levels at least 300mm (desirable 500mm) above surrounding finished ground level. Materials, equipment, or contents are not to be stored below the FPL unless they are flood compatible, capable of withstanding the forces of floodwater, debris and buoyancy, and not prone to causing pollution or an environment hazard.	
C – Flood Impacts	
i. Floodplain Risk Management Plan	
If the subject land falls within the area of an existing Floodplain Risk Management Plan, then the development must comply with specific conditions of the plan	The proposed development falls within the Brisbane Water Flood Risk management plan. Flood mapping demonstrates the site to be outside the flood risk area and does not require further assessment.
ii. Flood Impacts The development must not:	

Requirement	Response
Affect the safe occupation of any flood prone land.	The proposed development application does not impact the safe occupation of any flood prone land by ensuring the impacts of development are limited to the site.
Be sited on the land such that flood risk is increased.	The proposed development application incorporates measures to decrease flood affectation and risk.
Adversely affect flood behaviour by raising predevelopment flood level by more than 10mm.	The proposed development application does not adversely affect flood behaviour by raising development flood levels by more than 10mm. Refer to Flood maps.
Result in an increase in the potential of flooding detrimentally affecting other development or properties.	The proposed development application does not adversely affect flood behaviour by raising development flood levels by more than 10mm. Refer to Flood maps.
Significantly alter flow distributions and velocities to the detriment of other properties or the environment of the floodplain.	The proposed development incorporates Onsite detention to manage site runoff. The 100 year ARI flood maps demonstrate flows distribution does not impact offsite properties.
Significantly and detrimentally affect the floodplain environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of any riverbank or watercourse.	The proposed development application does not adversely affect the flood plain. Refer to Civil report for stormwater management strategy with flows directly connected to Council's drainage network.
Be likely to result in unsustainable social and economic costs to the flood affected community or general community as a consequence of flooding (including: damage to public property and infrastructure, such as roads, stormwater, water supply, sewerage, and utilities).	The proposed development application does not adversely affect flood behaviour by raising development flood levels by more than 10mm. Refer to Flood maps.
Be incompatible with the flow of floodwaters on flood prone land (considering any structures, filling, excavation, landscaping, clearing, fences, or any other works).	The proposed development does not impact floodwater on flood prone lands. No structures or landform modifications are proposed that would impact the flow of flood waters outside of the existing flow regime.
Cause or increase any potential flood hazard (considering the number of people, their frailty, as well as emergency service and welfare personnel).	The proposed development is located in an area that experiences high flood hazard > 0.6 on Racecourse Road. Refer to Section 3.4.4.
iii. Building components	
Limit use to that which is compatible with the level of flood hazard (considering likelihood and consequences of flooding).	The proposed development applicate is located above the FPL and can be managed appropriately.
Building components located below FPL are to maintain strength and durability when wet, facilitate easy cleaning after inundation, and resist the forces of floodwater, debris and buoyancy.	The proposed development applicate is located above the FPL and can be managed appropriately.
All electrical fixtures (including meter box) to be above the FPL	The proposed development applicate is located above the FPL and can be managed appropriately.

Requirement	Response
The sewer gully trap is to be located at or above the 100 year ARI flood level (without freeboard). All other internal sewer fixtures (floor waste, WC pans, rim of shower, bath, laundry tub, and basins) are to be located at least 150mm above this level.	The proposed development applicate is located above the FPL and can be managed appropriately.
Free standing Rainwater tanks are to be elevated above 100 year ARI flood level (without freeboard) or anchored to resist buoyancy and impact forces	Rainwater tanks are located outside the 100 year ARI flood level.
iv. Local Overland Flooding If any part of the land is affected by Local Overland Flooding then hydraulic calculations (by a skilled flood specialist) will be required as follows:	
Along all overland flowpaths that convey significant overland flows (≥ 0.5m3/s or deeper than 0.3m). Flow depths, velocities and flow rates and must be shown on the Water Cycle Management Plan.	Refer to hydraulic modelling results in presented in Appendix D.
Overland flow paths shall be designed to limit 100y ARI flood velocities to a maximum of 2 metres per second. This may require the provision of regular drop structures (such as rough placed rock weirs) to reduce velocities.	This requirement is not relevant to the site as it is not located within a significant overland flow path.
Flow conveyance along these overland flowpaths may be achieved through a combination of the following: naturally functioning streams, open channels incorporating natural features (i.e. pool & riffle sequences consisting of reeds, rocks and native vegetation), stream buffer zones, and swales. Details must be shown on the Water Cycle Management Plan.	This requirement is not relevant to the site as it is not located within a significant overland flow path.
Pipes are typically prone to blockage. A minimum 50% blockage factor shall be applied to all pipe and culvert capacities as part of hydraulic calculations. As such pipes are considered appropriate for managing low flows, with the bulk of flood flows travelling safely overland	Refer to Section 3.4.4.3
Overland flowpaths must not be obstructed by parked cars, retaining walls, landscaping, and where side passages are used, they are to be kept clear of obstructions such as hot water heaters, air conditioners, fencing, rainwater tanks, and garbage bins.	This requirement is not relevant to the site as it is not located within a significant overland flow path.
Where significant overland flow crosses a property boundary (≥ 0.5m^3/s or deeper than 0.3m), flowthrough fencing (pool type fencing) is to be provided in the bottom part of the fencing to a height required to pass the flow. The width and height of flow-through fencing shall make allowance for 50% blockage. The overland flow paths shall be dispersed where possible to limit the concentrated impact on downstream or down slope properties.	This requirement is not relevant to the site as it is not located within a significant overland flow path.

Requirement	Response
Significant overland flow paths may be classified as creeks, whereby minimum setbacks must be observed between buildings and watercourses (refer to Section 3.1.13)	This requirement is not relevant to the site as it is not located within a significant overland flow path.
v. Filling	
Filling is not to be undertaken within the Flood Planning Area without Council's approval, including any cut and fill works on site.	Refer to Section 2.6 for existing flood planning record. Note the site should not be categorised as flood storage.
Filling of the land within the Flood Planning Area is not permitted unless: It is allowable as part of an adopted Floodplain Risk Management Plan Or it can be demonstrated (by a skilled flood specialist) that the cumulative effect of filling the area would not raise the flood level by more than 10mm and that the land can be considered 'flood fringe'	Refer to 1% AEP flood impact maps of offsite impacts and Section 2.6
Unless a Floodplain Risk Management Plan for the catchment has been adopted, which allows filling to occur, filling in flood prone areas is not permitted unless a report from a suitably qualified civil engineer is submitted to Council that certifies that the development will not increase flood affectation elsewhere	Refer to Flood Impact maps which demonstrate no increases in flood affectation > 10mm offsite.
Filling of individual sites in isolation, without consideration of the cumulative effects is not permitted. The NSW Government's Floodplain Development Manual states that a case by case decision making approach cannot take into account the cumulative impact of flooding behaviour, and associated risks, caused by individual developments. Any proposal to fill a site must be accompanied by an analysis of the effect on flood levels of similar filling of developable sites in the area.	The proposed development application is located outside the FPL as proposed in Section 2.6. The development is located on the upper reaches of the catchment with no future development permitted upstream.
Any filling proposal must include adequate provision for drainage of surface water erosion and siltation control and be so placed and graded as to prevent the shedding of surface water direct to adjoining properties	Refer to Civil Plans 22-1063-DA demonstrating stormwater management plans and grading compliance.
vi. Sea Level Rise	
For low-lying land below RL 4.0m AHD the development applications must assess the ongoing viability of the land, including the viability of road access to the land, associated with the adopted sea level rise figure for planning purposes of +0.9m by the year 2100, assuming a design life for the development. This will be particularly relevant for low-lying coastal or estuarine development.	Sea Level Rise assessment is not applicable to this Development Application as the site is above RL 4.0m AHD.

Requirement	Response
E - Access and Parking in 100 year ARI Flood Event	
All access roads and driveways, and external parking areas to be above the 100 year ARI Flood Level (FPL less 0.5m) to provide the ability to safely receive and evacuate occupants or contents without having to cross floodwaters in most flood events (assuming 50% blockage of any pipes, culverts or bridges). For rural subdivision refer to section 3.1.15.	Access roads and driveways, and external parking areas are located outside of the 100 year ARI Flood Planning Level. Internal car parking is generally located outside of the 100 year ARI site overland flow path, with acceptable shallow depths.
G - Fencing	
Fencing within a floodway will not be permissible except for security/ permeable/ open type/ safety fences of a type approved by Council. Fencing in certain areas may also be restricted by current Floodplain Risk Management Plans. Part 3 Environmental Controls Chapter 3.1 Floodplain Management Central Coast Development Control Plan 2022 Page 47	The requirement is not applicable as the site is located outside of the floodway.
Council will require a Development Application for all new solid (nonporous) and continuous fences above 0.6m high, within the 100 year ARI storm event extents unless otherwise stated by exempt and complying development provisions which may be incorporated into in State Environmental Planning Policies or Councils Environmental Planning Instruments from time to time. An applicant will need to demonstrate that the fence would create no impediment to the flow of floodwaters. Appropriate fences must satisfy the following: - An open collapsible hinged fence structure, or flow through fencing (pool type fencing) is to be provided in the bottom part of the fencing to a height required to pass the flow. The width and height of flow-through fencing shall make allowance for 50% blockage; Other than a brick or other masonry type fence (which will generally not be permitted); A fence type and siting criteria as prescribed by Council. Other forms of fencing will be considered by Council on merit.	The proposed development application is outside the 100 year ARI storm event. Refer to Section 2.6 for details regarding existing flood planning mapping.

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