



Central Coast Council  
Business Paper  
Confidential Session of the  
Ordinary Council Meeting  
**09 June 2020**





# COMMUNITY STRATEGIC PLAN 2018-2028

**ONE – CENTRAL COAST IS THE COMMUNITY STRATEGIC PLAN (CSP) FOR THE CENTRAL COAST LOCAL GOVERNMENT AREA**

**ONE – CENTRAL COAST DEFINES THE COMMUNITY'S VISION AND IS OUR ROADMAP FOR THE FUTURE**

**ONE – CENTRAL COAST BRINGS TOGETHER EXTENSIVE COMMUNITY FEEDBACK TO SET KEY DIRECTIONS AND PRIORITIES**

One - Central Coast will shape and inform Council's business activities, future plans, services and expenditure. Where actions are the responsibility of other organisations, sectors and groups to deliver, Council will work with key partners to advocate on behalf of our community.

Ultimately, every one of us who live on the Central Coast has an opportunity and responsibility to create a sustainable future from which we can all benefit. Working together we can make a difference.

## RESPONSIBLE

**WE'RE A RESPONSIBLE COUNCIL AND COMMUNITY, COMMITTED TO BUILDING STRONG RELATIONSHIPS AND DELIVERING A GREAT CUSTOMER EXPERIENCE IN ALL OUR INTERACTIONS.**

We value transparent and meaningful communication and use community feedback to drive strategic decision making and expenditure, particularly around the delivery of essential infrastructure projects that increase the safety, liveability and sustainability of our region. We're taking a strategic approach to ensure our planning and development processes are sustainable and accessible and are designed to preserve the unique character of the coast.

**Good governance and great partnerships**

**G2** Communicate openly and honestly with the community to build a relationship based on transparency, understanding, trust and respect

There are 5 themes, 12 focus areas and 48 objectives

### COMMUNITY STRATEGIC PLAN 2018-2028 FRAMEWORK

All council reports contained within the Business Paper are now aligned to the Community Strategic Plan. Each report will contain a cross reference to a Theme, Focus Area and Objective within the framework of the Plan.

**THEME: BELONGING**

- FOCUS AREA: OUR COMMUNITY**
  - Objective A1: Build a safe and accessible community where people have a sense of belonging and connection to their place.
  - Objective A2: Create a sense of community and belonging through shared experiences and activities.
  - Objective A3: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective A4: Create a sense of community and belonging through shared experiences and activities.
- FOCUS AREA: COMMUNITY CONNECTION AND LOCAL IDENTITY**
  - Objective B1: Support a sense of connection through the celebration of shared history and heritage, the arts and local culture.
  - Objective B2: Promote and enhance local identity, community and local pride through shared experiences and activities.
  - Objective B3: Create a sense of connection through shared experiences and activities.
  - Objective B4: Support a sense of connection through shared experiences and activities.

**THEME: SMART**

- FOCUS AREA: A GROWING AND COMPETITIVE REGION**
  - Objective C1: Support economic development in growth areas and create jobs and opportunities for all.
  - Objective C2: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective C3: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective C4: Support a range of social and health services that support community wellbeing and sustainable growth.
- FOCUS AREA: A PLACE OF OPPORTUNITY FOR PEOPLE**
  - Objective D1: Create a sense of connection through shared experiences and activities.
  - Objective D2: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective D3: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective D4: Support a range of social and health services that support community wellbeing and sustainable growth.

**THEME: GREEN**

- FOCUS AREA: ENVIRONMENTAL RESOURCES FOR THE FUTURE**
  - Objective E1: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective E2: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective E3: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective E4: Support a range of social and health services that support community wellbeing and sustainable growth.
- FOCUS AREA: COASTAL AND RIVERINE RESOURCES**
  - Objective F1: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective F2: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective F3: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective F4: Support a range of social and health services that support community wellbeing and sustainable growth.

**THEME: RESPONSIBLE**

- FOCUS AREA: GOOD GOVERNANCE AND GREAT PARTNERSHIPS**
  - Objective G1: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective G2: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective G3: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective G4: Support a range of social and health services that support community wellbeing and sustainable growth.
- FOCUS AREA: BELONGING, ESSENTIAL INFRASTRUCTURE**
  - Objective H1: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective H2: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective H3: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective H4: Support a range of social and health services that support community wellbeing and sustainable growth.
- FOCUS AREA: BALANCED AND SUSTAINABLE DEVELOPMENT**
  - Objective I1: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective I2: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective I3: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective I4: Support a range of social and health services that support community wellbeing and sustainable growth.

**THEME: LIVEABLE**

- FOCUS AREA: RELIABLE PUBLIC TRANSPORT AND CONNECTIONS**
  - Objective J1: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective J2: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective J3: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective J4: Support a range of social and health services that support community wellbeing and sustainable growth.
- FOCUS AREA: SAFE AND SOUND FOR THE FUTURE**
  - Objective K1: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective K2: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective K3: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective K4: Support a range of social and health services that support community wellbeing and sustainable growth.
- FOCUS AREA: HEALTHY FOR A GROWING COMMUNITY**
  - Objective L1: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective L2: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective L3: Support a range of social and health services that support community wellbeing and sustainable growth.
  - Objective L4: Support a range of social and health services that support community wellbeing and sustainable growth.



# Meeting Notice

**The Confidential Session of the  
Ordinary Council Meeting  
of Central Coast Council  
will be held remotely - online,  
Tuesday 9 June 2020 at 6.30 pm,  
for the transaction of the business listed below:**

## **2 GENERAL REPORTS**

### 2.4 Grant Funding Update as at 31 March 2020

Attachment 3 – CONFIDENTIAL – External Funding Applications Under  
Consideration – 21 May 2020..... 4

### 2.5 Central Coast Stadium - Car Park

Attachment 1 – CONFIDENTIAL – Legal Advice Stadium Site..... 5  
Attachment 2 – CONFIDENTIAL – Financial Summary ..... 9  
Attachment 4 – CONFIDENTIAL - CCC Stadium Car Park Concept.....14

## **7 CONFIDENTIAL ITEMS**

7.1 Gosford Long Term Car Park ..... 25

Gary Murphy  
**Chief Executive Officer**

CONFIDENTIAL  
External Funding Applications Under Consideration  
as at 21 May 2020



Council has the following projects under consideration for external funding as at 21 May 2020. Total amount of submissions under consideration: \$10,000

<b>Woy Woy War Memorial Restoration</b>	
<b>Status:</b> Under Consideration	
<b>Project Description:</b> Restoration of Woy Woy War Memorial, with attention given to Sandstone Cenotaph.	
<b>Funding Source:</b> NSW Government	<b>Unit:</b> Open Space and Recreation
<b>Funding Program:</b> Community War Memorials Fund	
<b>Type:</b> Application	<b>Total Project Cost:</b> \$10,000
<b>Date:</b> 30/03/2020	<b>Funding Sought:</b> \$10,000
<b>Additional Notes:</b>	



## Legal Advice

### **CONFIDENTIAL AND SUBJECT TO CLIENT LEGAL PRIVILEGE**

<b>Matter:</b>	<b>Grahame Park – Central Coast Stadium</b>
<b>To:</b>	<b>Ben Brown</b>
<b>From:</b>	<b>Shireen Delaney, Senior Solicitor</b>
<b>Date:</b>	<b>21 January 2020</b>

#### **Instructions**

I refer to your Request for Legal Advice received on 8 January 2020, in respect of the proposed development of the Central Coast Stadium Site known as ‘Grahame Park’.

You have asked whether the proposed development of the Stadium Site which consists of the Western Development and the Eastern Development, conflicts with the Grahame Park Plan of Management (**‘POM’**). Further, you have asked if a conflict is established, how can Central Coast Council (**‘CCC’**) address those issues and whether, CCC can proceed with these development opportunities.

#### **Executive Summary**

1. The Stadium Site is owned by Council and is classified as community land. The Graham Park Plan of Management applies to the Stadium Site. Section 35 of the *Local Government Act 1993* (**‘LG Act’**) requires community land to be managed in accordance with the plan of management applying to the land. Any dealings such as leases and licences must also be expressly authorised in the relevant plan of management.
2. The proposed redevelopment is not consistent with the Graham Park POM, except for ancillary uses such as the proposed new catering facilities.
3. A new POM should be adopted for the Stadium Site which makes provision for the additional development and use and which expressly authorises any proposed leases, licences or other dealings.
4. We also recommend that the Stadium Site is recategorised in the new POM to General Community Use (it is currently categorised under the Graham Park POM as a Sportsground). This will enable CCC to use the land for a broader range of purposes.



**Background/Context**

I am instructed that CCC is proposing the following new developments on the Stadium Site:

- o **Western Development:** On the western side of the Stadium Site, CCC is considering building a 5 storey multideck carpark with an Astro Turf Sports field on the roof, a 1000 sqm commercial kitchen and 1,500 sqm commercial premises which may be Leased out by management for events. We note your instructions that the commerical kitchen will only be leased out during events held at the Stadium Site;
- o **Eastern Development:** On the eastern side, construction of a 1000 sqm food and Beverage Retail activation on Dane Drive. I note your instructions that the Eastern Development is intended to be operated 7 days a week as a retail precinct and its opening hours will not be confined to the time period where events are held at the Stadium Site

**Advice**

**1 Grahame Park Plan of Management**

The Graham Park POM was adopted in December 2013.

Section 35 of the LG Act requires community land to be managed in accordance with the plan of management applying to the land. Any leases and licences over community land must be expressly authorised in the applicable plan of management (s46 LG Act). Grahame Park is located in an area incorporating a mix of residential, community and commercial development. The complex has extensive sporting infrastructure facilities. I am instructed that the land is classified as community land under the LG Act and categorised as a sportsground under the Graham Park POM.

The objectives of land categorised as a sportsground under section 36F of the LGA are:

- a. To encourage, promote and facilitate recreational pursuits in the community involving organised and informal sporting activities and games; and
- b. To ensure that such activities are managed having regard to any adverse impact on nearby residences.

The POM states that the governance outcomes for Grahame Park includes such matters (among other things) maximisation of the economic and social benefits for Gosford City. This outcome is particularly beneficial for the proposed development CC is considering.

The POM refers to the ongoing improvement and development of Grahame Park as a regional sporting venue presenting events of local, state, national and international significance. Furthermore, all development and improvements must be in keeping with Grahame Park’s function as a regional facility for sporting, cultural, entertainment and



community activities. There are a number of permissible activities and ancillary activities, catering is listed as a permissible ancillary activity.

In my view, the proposed food and beverage retail precinct that is central to the Eastern Development is not a permissible activity under the POM. While catering is mentioned as an ancillary activity, the establishment of a food and beverage retail precinct is an activity that is significantly more than just catering. Given the proposed 7 day a week operating hours of the restaurants this would take it outside of its connection with the timing of sporting events.

Similarly, the proposed multi storey 7 days a week fee paying car park as part of the Western Development is not consistent with the POM and is not a permissible activity. While the proposed car park may be used in connection with sporting events, I consider that the commercial nature of its operation and its operating hours diminishes its connection with the core objectives for management of community land categorised as a sportsground.

I note you have asked for Legal to only review the POM, however there are other relevant CCC documents and legislation that form part of the overarching framework that will be relevant in considering the proposed development. These include the LGA and the Central Coast Council Community Strategic Plan ('SP') and the Gosford Local Environment Plan ('LEP').

## 2 Central Coast Council Community Strategic Plan

The SP (which is referred to in the POM) has a number of corporate objectives that will need to be considered as part of the development and the development itself will need to be consistent with those corporate objectives. For example, Objective B2 is a corporate objective that seeks to promote and provide more sporting, community and cultural events and festivals, day and night, throughout the year. Objective L1 seeks to promote healthy living and ensure sport, leisure, recreation and aquatic facilities and open spaces are well maintained and activated.

The establishment of a food and beverage retail precinct would enhance, promote and complement the sporting facilities available at the Stadium Site. The proposed Western Development and the Eastern Development is consistent with the corporate objectives that apply to recreational activities and facilities.

## 3 Gosford Local Environmental Plan

The Stadium Site has been allocated as Zone RE1 Public Recreation in the LEP. The objectives of the zone are:

- To enable land to be used for public open spaces or recreational purposes.
- To provide a range of recreational settings and activities and compatible land uses.



- To protect and enhance the natural environment for recreational purposes.
- To identify areas suitable for development for recreation, leisure and cultural purposes.
- To ensure that development is compatible with the desired future character of the zone.

Car parks and restaurants or cafes; kiosks; recreation facilities (indoor); recreation facilities (major); recreation facilities (outdoor) are permissible with consent. In my view, the both the Western and Eastern Development are consistent with the permissible uses under the RE1 Public Recreation zoning.

#### 4 Registered Dealings on Certificate of Title for Grahame Park

I have conducted a title search for the Stadium Site ('**Lot 1 DP 111876**') and there are a number of easements for services, an easement for support, easement for an air duct, easement to occupy airspace, and a number of leases affecting the title including a lease to Ausgrid and to the Central Coast Leagues Club (Dealing Number AB891211K).

Any proposed development would need to consider those easements and leases registered on title.

#### 5 Lease to Central Coast Leagues Club

As mentioned above, there is a lease to the Central Coast Leagues Club ('**Leagues Club**') registered on title which needs to be considered in any development proposal. The lease dealing number AB891211K is on the Certificate of Title for both Lot 1 of DP 1011876 (the Stadium Site) and Lot 2 of DP 1011876 (the Bowling Club site). However, the registered lease describes the leased area as only Lot 2. We have reviewed the lease document and there does not appear to be any rights or other provisions that affect Lot 1. We suggest you clarify whether the lease affects the Stadium Site with the stadium manager as soon as possible as there may be an error on the title which needs to be rectified.

We note that if the Leagues Club has a lease that affects the Stadium Site, clause 32(b) of the lease gives CCC the right to terminate the lease where it wishes to resume or take the land for public purposes. If Council resumes the whole or any part of the leased land, and the resumption substantially and adversely effects the use and occupation of the premises by the Lessee, CCC is entitled to terminate the Lease by one month's notice in writing. Clause 32(b) of the Lease provides that if the Lease is terminated under that clause, CCC will not have to pay compensation to the Leagues Club. This issue should be considered in more detail if it is established the lease affects the Stadium Site.

**Shireen Delaney**  
**Senior Solicitor**

**Financial Summary**Cost & Contribution Summary

Description	\$
Site Preparation and Demolition Works	\$559,771
Building Works	\$22,875,601
Kitchen/Utilities- Warm Shell	\$5,049,315
Commercial (Function Space), Office, - Warm Shell	\$5,595,829
L4 Corridor- Connecting Carpark to Stadium	\$237,596
Rooftop- Sports field	\$5,017,714
External Works to Carpark	\$882,220
Parking Metering (Ground Sensors) 'PS'*	\$494,289
Slip Lane- Central Coast Highway 'PS'*	\$511,686
Construction Contingency	\$1,236,721
<b>Total Construction Costs</b>	<b>\$42,460,742</b>
Professional Fees	\$3,073,249
Project Contingency	\$1,153,631
Statutory Fees	\$555,605
Legal & Project Manager	\$869,165
<b>Total Development Cost</b>	<b>\$48,112,392</b>
Federal Government Contribution:	(\$30,000,000)
Council Contribution:	\$18,112,392

\*Provisional Sum Allowances

Financial Assumptions

The financial metrics have been based on comparable market rates for both the car park, commercial function space and office space to demonstrate the commercial viability of the development.

Description	Area (SQM)	(\$) Revenue	(\$) Outgoings
Car Park	17,080	\$10 per space per day	\$10 psm p.a
Commercial Function Space	990	\$400 psm p.a.	\$50 psm p.a
Commercial Kitchen	1,951	\$0	\$0
Office	460	\$0	\$0
Rooftop Event Space	4,070	\$0	\$0

Note, outgoings are included in the Gross Rental amounts.

The commercial kitchen will be utilized by the existing stadium catering resources and subsequently a \$/psm has not been allocated in the above assumptions or subsequent financial analysis.

## 2.5 Central Coast Stadium - Car Park

### Attachment 2

### Confidential - Financial Summary

Equally, as both the office and rooftop event space are existing features of the site, neither revenue or outgoings have been included throughout this assessment.

#### Project Financial Metrics

Description	Metric
Yield on Cost (YoC)*:	1.16%
Internal Rate of Return (IRR)*	-1.51%
Cashflow Period Assessed	10 years
Payback Period^	32 Years

\*Both the YoC and IRR are based on the current Base Case which assumes a 60% occupancy rate for the carpark.

^The Payback has been calculated based on net income and does not include the Capitalised Value.

#### Gross Revenue Per Carpark Occupancy

	Cars	Rate (\$) per day	100% Occupancy	90% Occupancy	80% Occupancy	70% Occupancy	60% Occupancy	50% Occupancy
<b>TOTALS:</b>	488	\$10	\$1,268,800	\$1,141,920	\$913,536	\$639,475	\$383,685	\$191,843

Daily totals based on 260 days a year. i.e. 5 days a week.  
Base Case is utilizing 60% Occupancy

The project financial metrics has been based on 60% Occupancy at the \$10 a day daily rate.

For comparison purposes only, the above table outlines how modifications to the carpark occupancy rate would affect the Car Park's Gross Revenue.

#### Project Sensitivity Analysis (Gross Revenue, Net Profit & IRR)

	Area (SQM)	100% Car Park Occupancy	90% Car Park Occupancy	80% Car Park Occupancy	70% Car Park Occupancy	60% Car Park Occupancy	50% Car Park Occupancy
Car Park (Gross Rev.)	17,080	\$1,268,800	\$1,141,920	\$913,536	\$639,475	\$383,685	\$191,843
Function Centre (Gross Rev.)	990	\$378,000	\$378,000	\$378,000	\$378,000	\$378,000	\$378,000
Office (Gross Rev.)	460	\$0	\$0	\$0	\$0	\$0	\$0
Commercial Kitchen (Gross Rev.)	1,951	\$0	\$0	\$0	\$0	\$0	\$0
Playing Field (Gross Rev.)	4,070	\$0	\$0	\$0	\$0	\$0	\$0
<b>GROSS REVENUE (Initial Year):</b>		<b>\$1,646,800</b>	<b>\$1,519,920</b>	<b>\$1,291,536</b>	<b>\$1,017,475</b>	<b>\$761,685</b>	<b>\$569,843</b>
<b>NET PROFIT:</b>		\$21,503,292	\$18,105,965	\$11,992,606	\$4,653,831	-\$2,195,692	-\$7,330,548
<b>IRR:</b>		9.89%	8.68%	6.52%	2.74%	-1.51%	-5.88%

The above sensitivity analysis outlines the sensitivity to the potential overall Gross Revenue, Net Profit and IRR based on modifications to the Car Park's Gross Revenue.

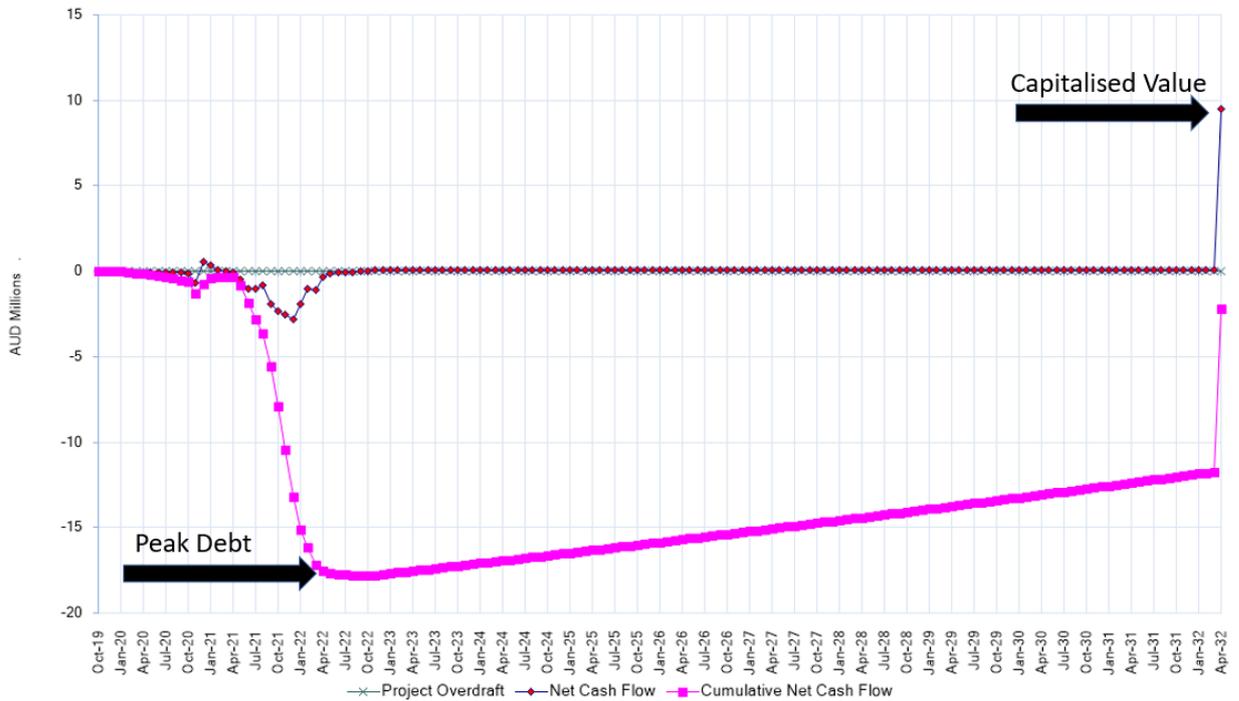
#### Project Cumulative Cash Flow

## 2.5 Central Coast Stadium - Car Park

Attachment 2

Confidential - Financial Summary

### Project Cash Flow & Overdraft



The Project Cumulative Cash flow demonstrates the projects capital outlay (Council Contribution peak debt of (\$18,112,392)) and potential net rental return over the 10-year Cashflow period of \$6,445,818. It also highlights the projects potential book value \$9,470,882 once capitalised in the 10<sup>th</sup> year.

Impact on Employment 'During Construction'

Central Coast Council area - Impact of \$45.0 million new sales in 'Building Construction' output (Type 1 & 2 combined impact)				
Employment impacts				
Industry sectors (1-digit ANSIC)	Existing jobs in the Central Coast Council area*	Jobs created in the Central Coast Council area	Jobs created outside of the Central Coast Council area	Jobs created for Central Coast Council area residents
Agriculture, Forestry and Fishing	1,150	3	3	3
Mining	719	0	2	0
Manufacturing	8,878	23	16	21
Electricity, Gas, Water and Waste Services	1,493	2	3	2
Construction	13,761	209	2	186
Wholesale Trade	2,791	12	7	11
Retail Trade	14,859	38	12	34
Accommodation and Food Services	10,746	14	8	12
Transport, Postal and Warehousing	3,670	8	9	8
Information Media and Telecommunications	1,700	0	5	0
Financial and Insurance Services	2,529	6	8	5
Rental, Hiring and Real Estate Services	2,092	2	2	2
Professional, Scientific and Technical Services	5,391	11	19	10
Administrative and Support Services	4,174	2	9	2
Public Administration and Safety	6,536	0	4	0
Education and Training	10,165	3	9	3
Health Care and Social Assistance	22,618	3	9	3
Arts and Recreation Services	2,498	2	2	2
Other Services	5,474	17	7	15
<b>Total Industries</b>	<b>121,245</b>	<b>355</b>	<b>136</b>	<b>318</b>

Source: National Institute of Economic and Industry Research (NIEIR) @2019. Compiled and presented in economy.id by [id](#) The population experts

The direct addition of \$45.0m annual output in the Construction sector in the Central Coast Council area economy is estimated to lead to a corresponding direct addition of 130 jobs in the local Construction sector. From this direct expansion in the economy it is anticipated that there would be flow on effects into other related intermediate industries, creating an additional 138 jobs.

This addition of jobs in the local economy would lead to a corresponding increase in wages and salaries, a proportion of which would be spent on local goods and services, creating a further 87 jobs through consumption impacts.

Overall, the combination of all direct, industrial and consumption effects would result in a total estimated increase of 355 jobs located in the Central Coast Council area. This represents a multiplier of 2.74.

Impact on Output 'During Construction'

The direct addition of \$45.0m annual output in the Construction Services sector in the Central Coast area economy would lead to an increase in indirect demand for intermediate goods and services across related industry sectors.

The combination of all direct, industrial and consumption effects would result in total estimated rise in output of \$32.94m in the Central Coast Council area economy, representing a multiplier of 1.73.

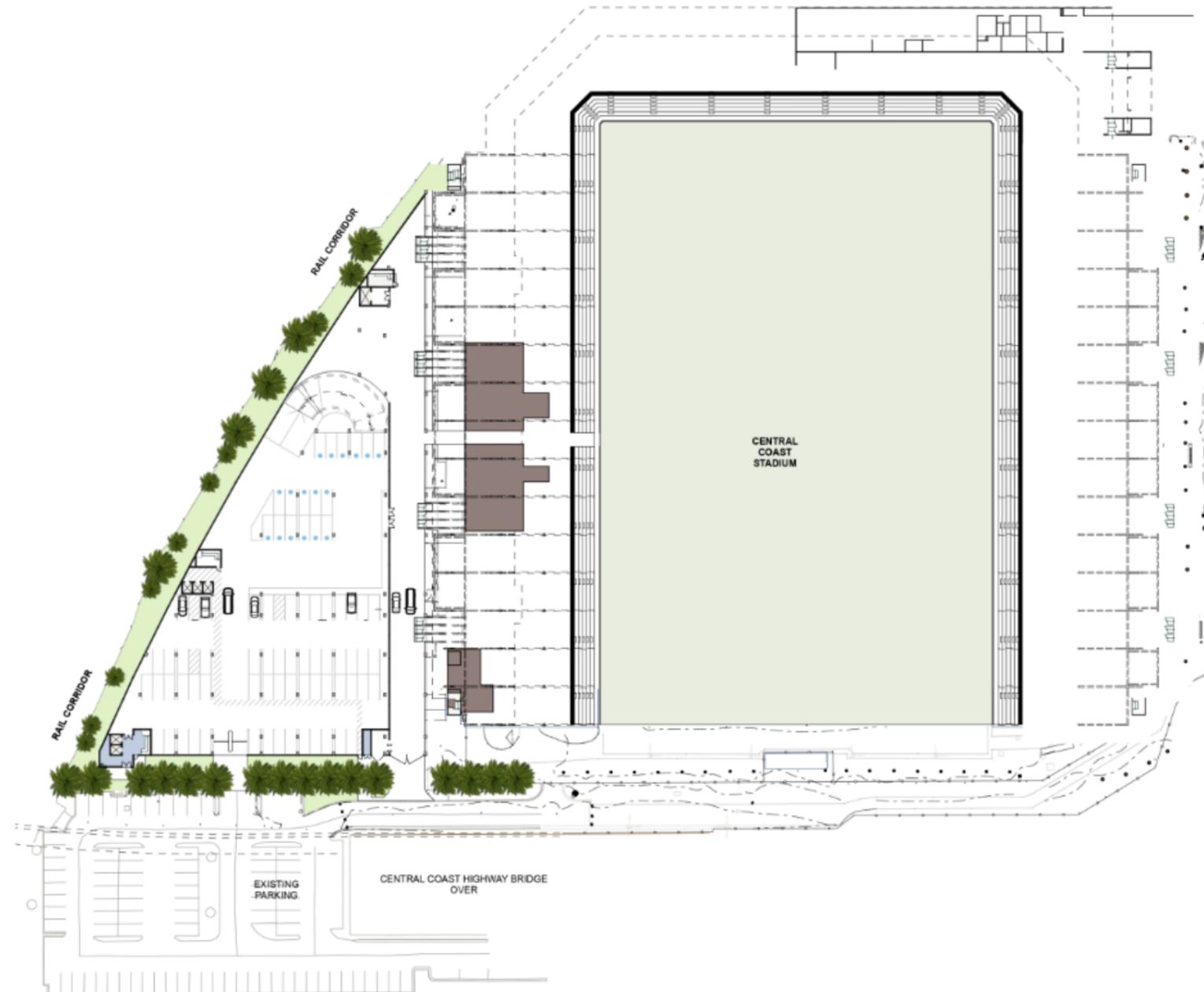
Impact on Value Added 'During Construction'

The direct addition of \$45.0m annual output in the Construction services sector of the Central Coast Council area economy would lead to a corresponding direct increase in value added of \$10.43m. A further \$12.22m in value added would be generated from related intermediate industries. These indirect industrial impacts represent an added multiplier of 2.17.



Central Coast Council  
Central Coast Stadium - Carpark  
Concept Package





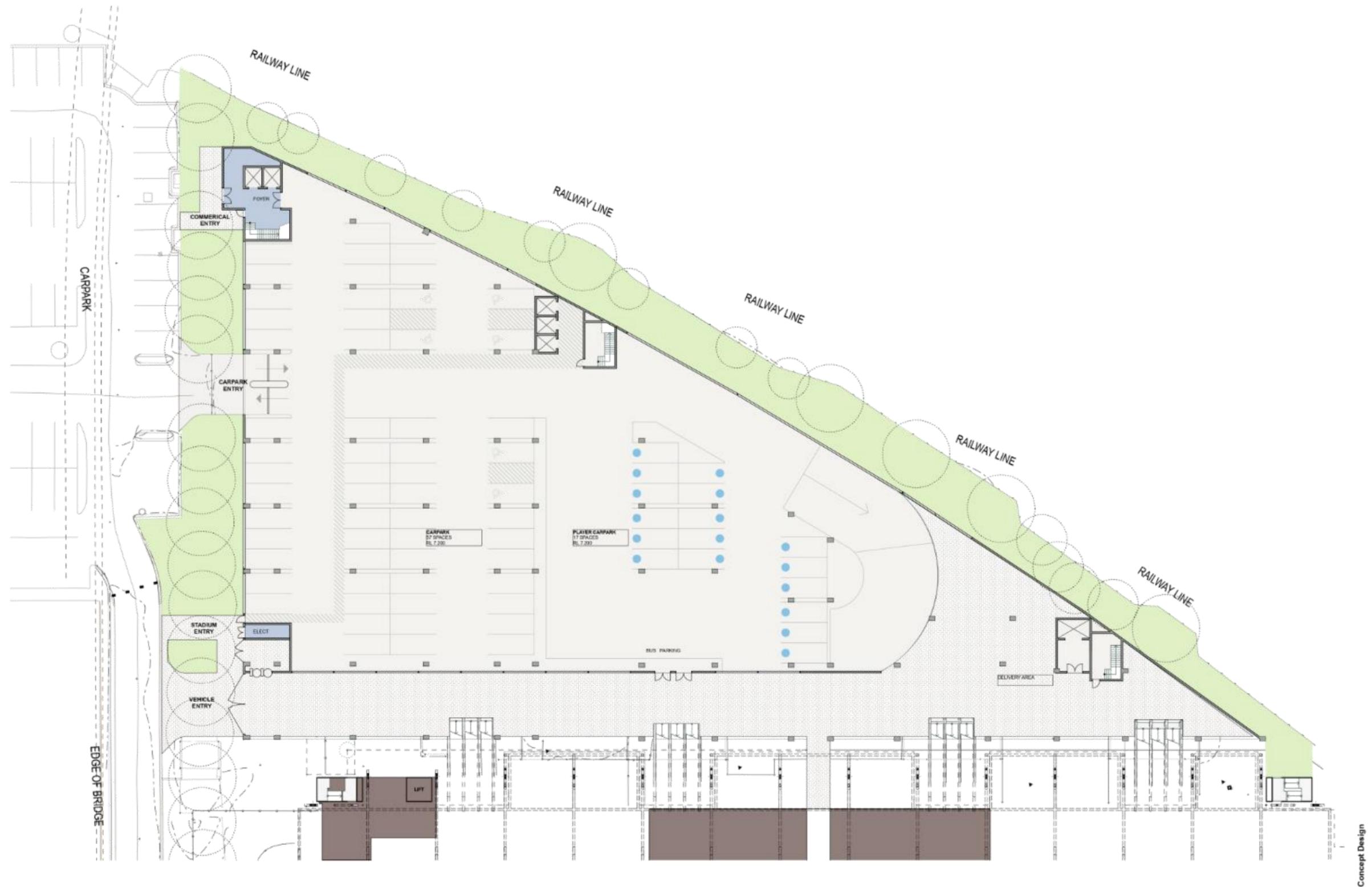
**PROPOSED STADIUM CARPARK**  
 CARPARK - CLASS 7  
 KITCHEN - CLASS 8  
 COMMERCIAL SPACE - CLASS 5

464 PARKING SPACES  
 - including 24 ACCESSIBLE

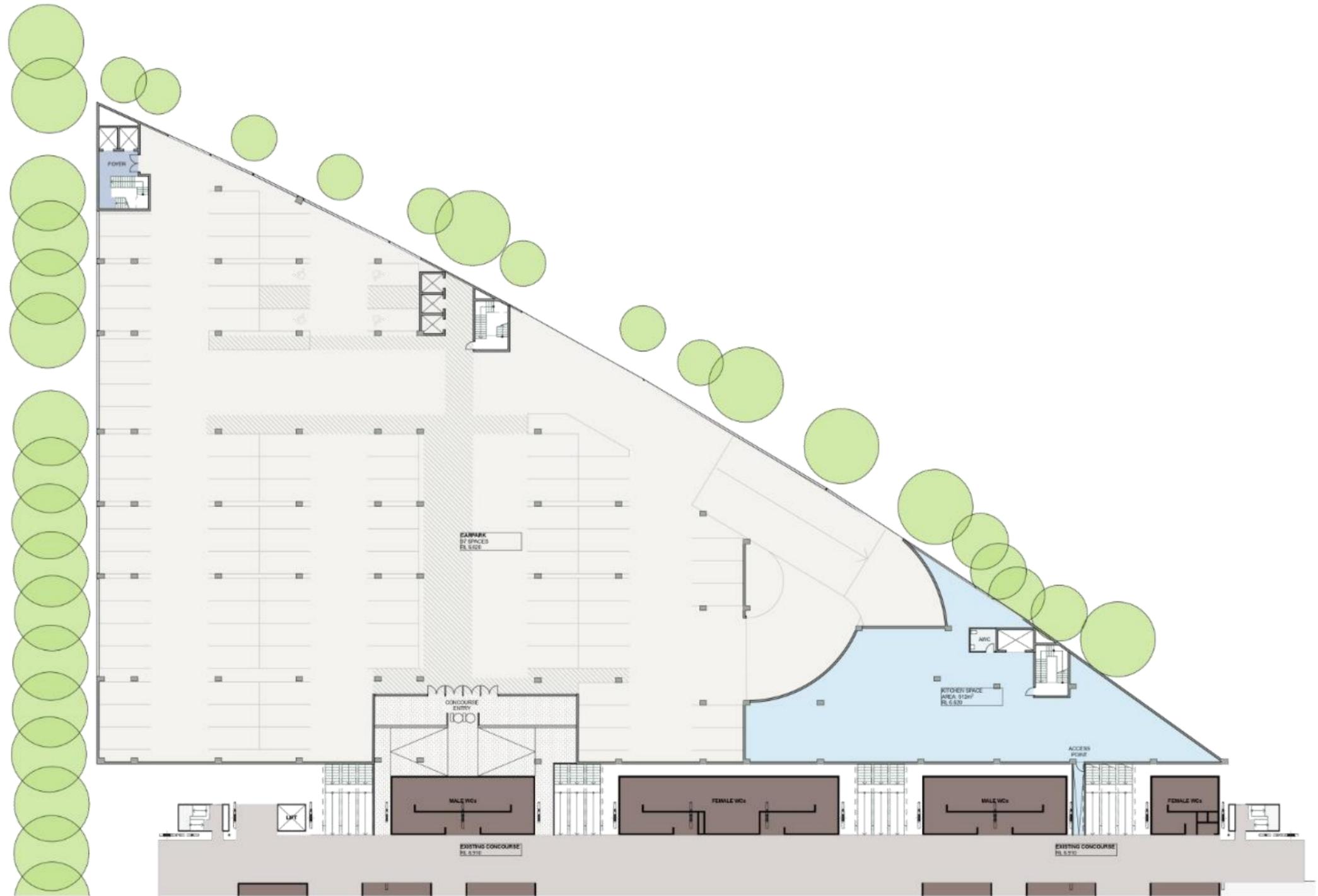
AREAS  
 1,450m<sup>2</sup> COMMERCIAL OFFICE/MEETING SPACE  
 1,951m<sup>2</sup> KITCHEN / BACK OF HOUSE  
 4,070m<sup>2</sup> WARM UP FIELD  
 25,602m<sup>2</sup> TOTAL FLOOR AREA

Concept Design

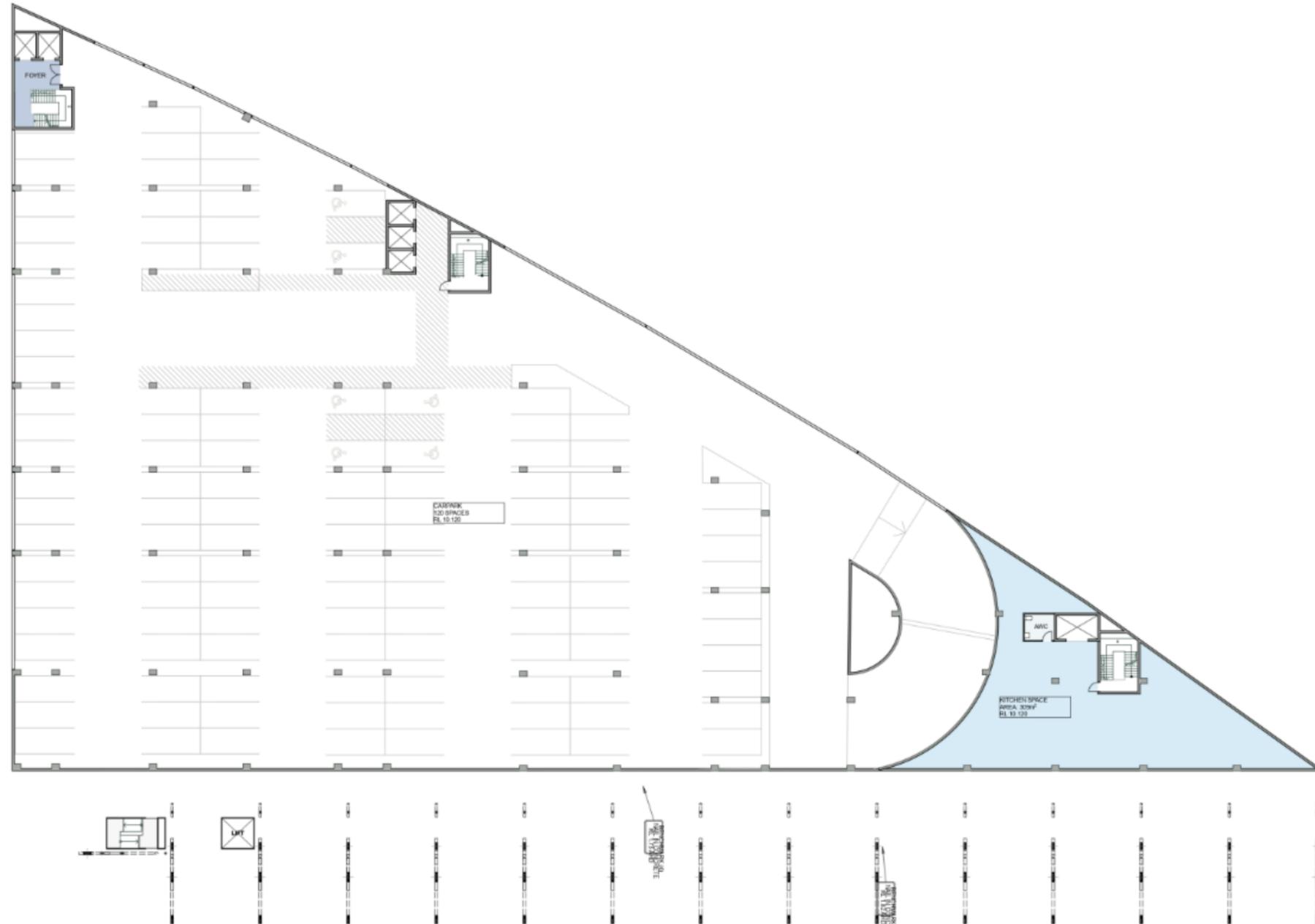




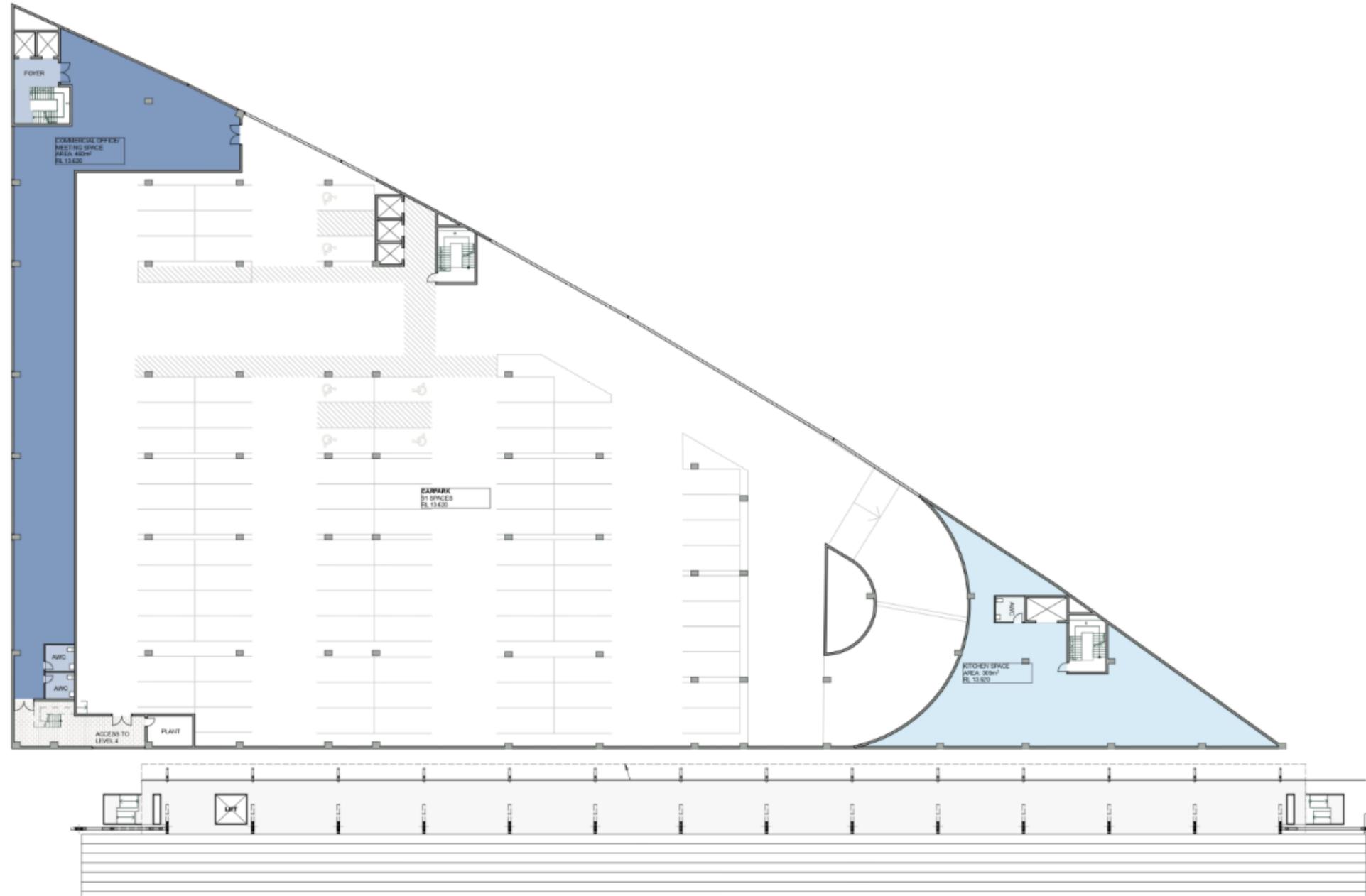
Concept Design



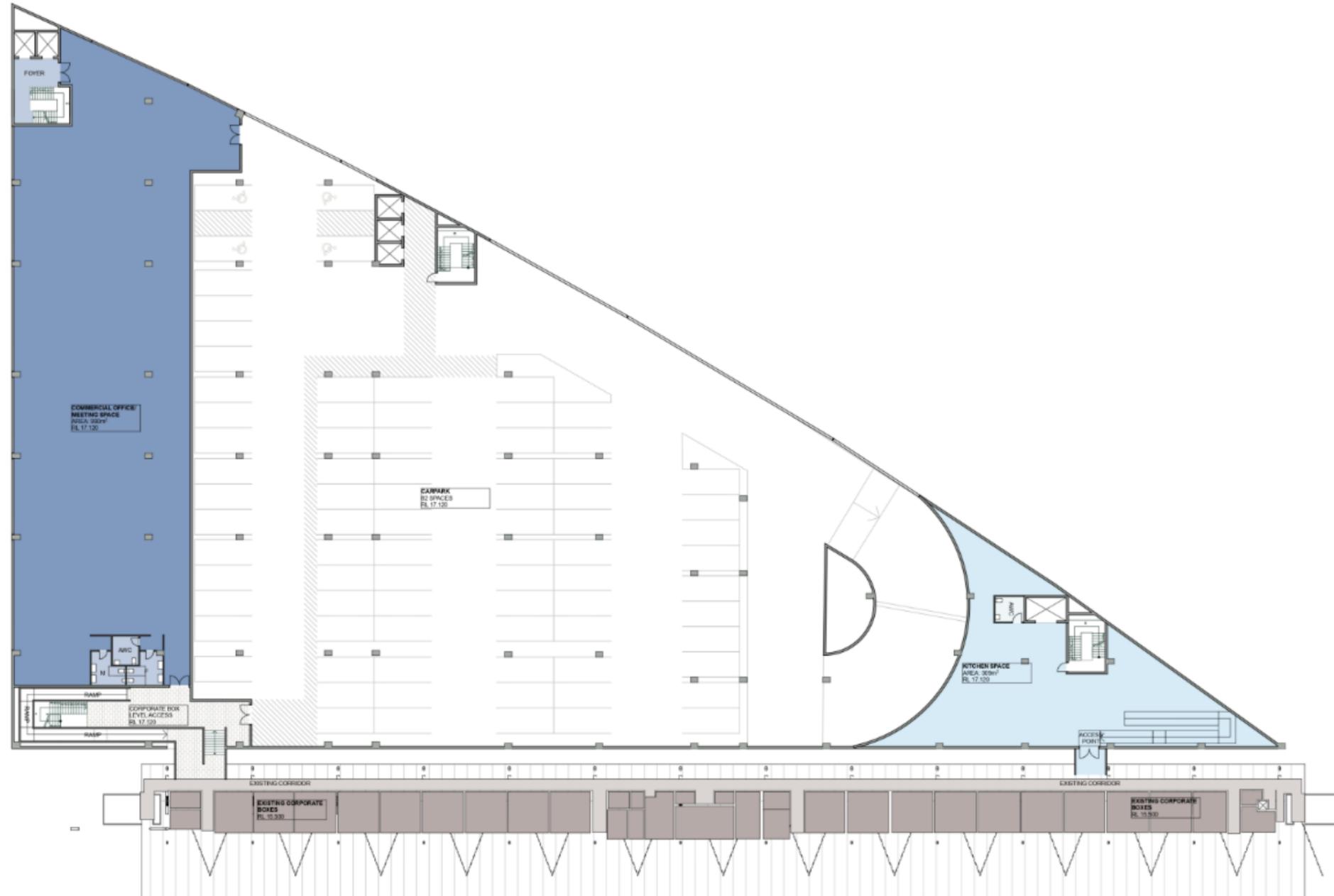
Concept Design



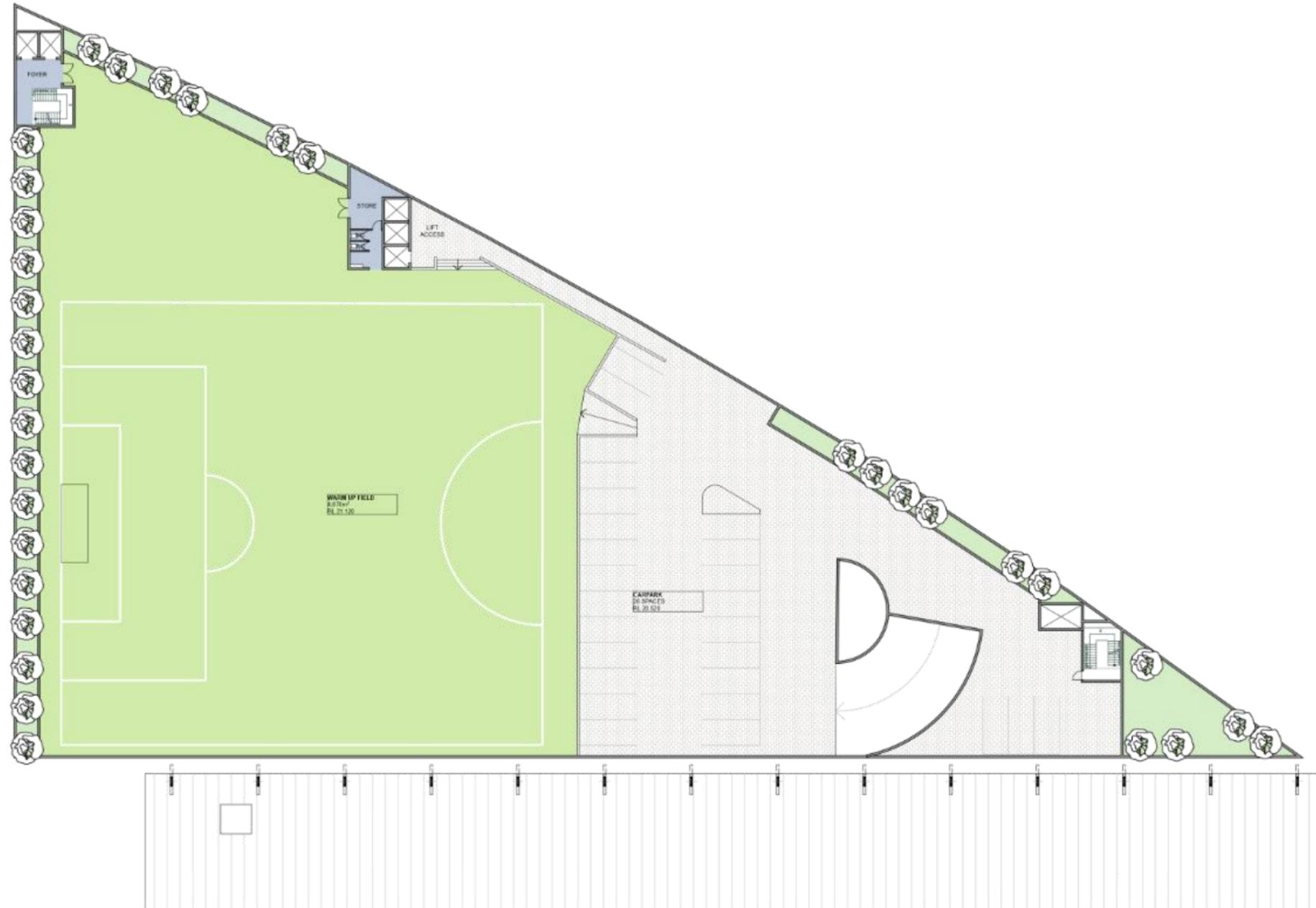
Concept Design



Concept Design



Concept Design



Concept Design



01 View 1 - Facade Option 1  
SCALE 1:100 @ A1



02 View 2 - Facade Option 1  
SCALE 1:100 @ A1

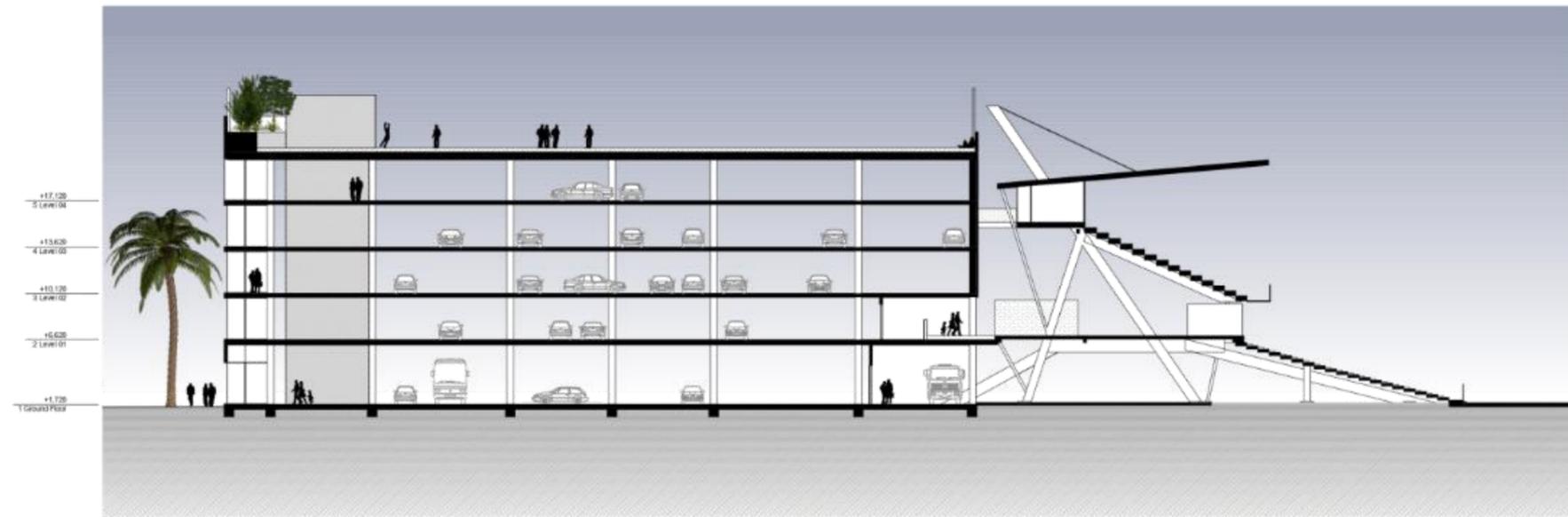


03 View 3 - Facade Option 1  
SCALE 1:100 @ A1



04 View 4 - Facade Option 1  
SCALE 1:100 @ A1

Concept Design



Section AA  
Scale 1:500

Concept Design



**Item No:** 7.1  
**Title:** Gosford Long Term Car Park  
**Department:** Innovation and Futures

---

9 June 2020 Confidential Session of the Ordinary Council Meeting

Reference: CPA/2823 - D13936477  
Author: Ben Brown, Property Development Manager  
Manager: Jamie Barclay, Unit Manager, Economic Development and Project Delivery  
Executive: Ricardo Martello, Executive Manager Innovation and Futures

### **Summary**

The purpose of this report is to provide Council with the preliminary findings associated with the proposed Gosford CBD Western Car Park on-grade carpark and seek endorsement to continue with detailed design development and progress with lodging the relevant planning documentation.

The proposed project has been identified by Council as a suitable location to construct an on-grade carpark, which along with the proposed Central Coast Stadium car park, will fulfil the overall long-term parking requirements for the Gosford CBD.

### **Recommendation**

- 1 That Council adopt the Gosford CBD Western Car Park project and its design intent.**
- 2 That Council authorise the Chief Executive Officer to continue with detailed design development to complete all necessary studies and design to tender documentation.**
- 3 That Council enters into a Memorandum of Understanding 'MOU' with both property owners to further negotiations and to continue design development with each party.**
- 4 That Council eventually executes an Agreement to Lease or equivalent to finalise negotiations with both property owners.**
- 5 That Council authorise the Chief Executive Officer or his representative to discuss the proposed project with the RMS and other relevant authorities.**

- 6** *That Council authorise the Chief Executive Officer or his representative discuss the proposed project with the surrounding properties located around the Gosford CBD Western Car Park site, whom may be affected by the proposed infrastructure.*
- 7** *That Council proceed with either an ISEPP or Ancillary Use Planning Pathway with a Planning Proposal being the last preferred option.*
- 8** *That Council continue with GHD's engagement and spend the amount as noted in Confidential Attachment 3 which will ensure risk mitigation via design progression.*
- 9** *That Council seek funding from both the Local, State and Federal Member to potentially fund the project partially or in its entirety.*
- 10** *That this report remains confidential as it contains commercial information of a confidential nature that if disclosed, may provide a commercial advantage to separate entities whom are mentioned in this report. Release of the confidential information may also affect public opinion prior to detailed design development being finalised and consultation being undertaken.*

## **Background**

The Central Coast Parking Strategy identified the immediate need for additional long-stay parking in proximity to the Gosford CBD to accommodate existing demand.

Council identified several locations for the provision of car spaces within the Gosford CBD. Unfortunately, some of these locations were eliminated from further investigation due to either site constraints or perceived protracted negotiations with private landowners.

Therefore, three sites were shortlisted for further investigation. They included:

- i. Central Coast Stadium - Multi storey parking with a potential to yield 500 spaces;
- ii. Gosford CBD Eastern Car Park - Multi storey parking with a potential yield of 800 spaces; and
- iii. Gosford CBD Western Car Park- On grade accessed via a tunnel with a potential yield of 1,500 spaces.

Site (i) - The Central Coast Stadium is separately up for Council Resolution as a preferred location for immediate design development and future construction.

Site (ii) - Gosford CBD Eastern Car Park is not an ideal carpark location compared to the other two sites due to increased car congestion within the CBD, difficult typography constraints, high construction costs and undesirable highest and best use implications.

## 7.1 Gosford Long Term Car Park (contd)

Site (iii) - Gosford CBD Western Car Park offers an opportunity to develop a 1,500 on grade car park accessed via a tunnel. This proposal along with the Central Coast Stadium car park proposal would eliminate the future Gosford parking shortfall within the CBD.

### The Site

The two main private sites that are considered as part of this project include:

- 4 Racecourse Road, Gosford
- 1A Donnison Street West, West Gosford



Figure 1- Site Area

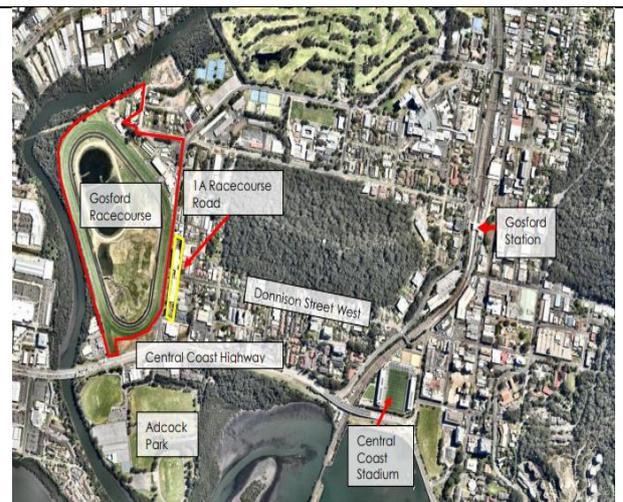


Figure 2- Geographic Area

The proposed carpark will be located within the grounds of 4 Racecourse Road. The site currently consists of both grassed areas and marsh vegetation.

Outside of the Racecourse grounds the proposed tunnel would open at the intersection of Young Street and 1A Donnison Street West. The tunnel will slightly encroach the site at 1A Donnison Street West. The encroachment will allow the existing Toyota Coaster 'Park and Ride' bus enough height to enter the tunnel. The encroachment is minimal and will only have a slight non detrimental impact on the site's development potential.

### *Other Affected Premises*

The five sites surrounding the proposed tunnel on Donnison Street West would also need to be consulted. The tunnel would require a modified one-way road to be built around its opening to provide accessibility to these premises. Currently, the road has been designed to allow up to an 8.8 metre garbage truck to converse one way.

As conceptually designed, the new road would encroach into the existing footpath and further design development would take place with these owners to reduce these impacts and to obtain any required consent.



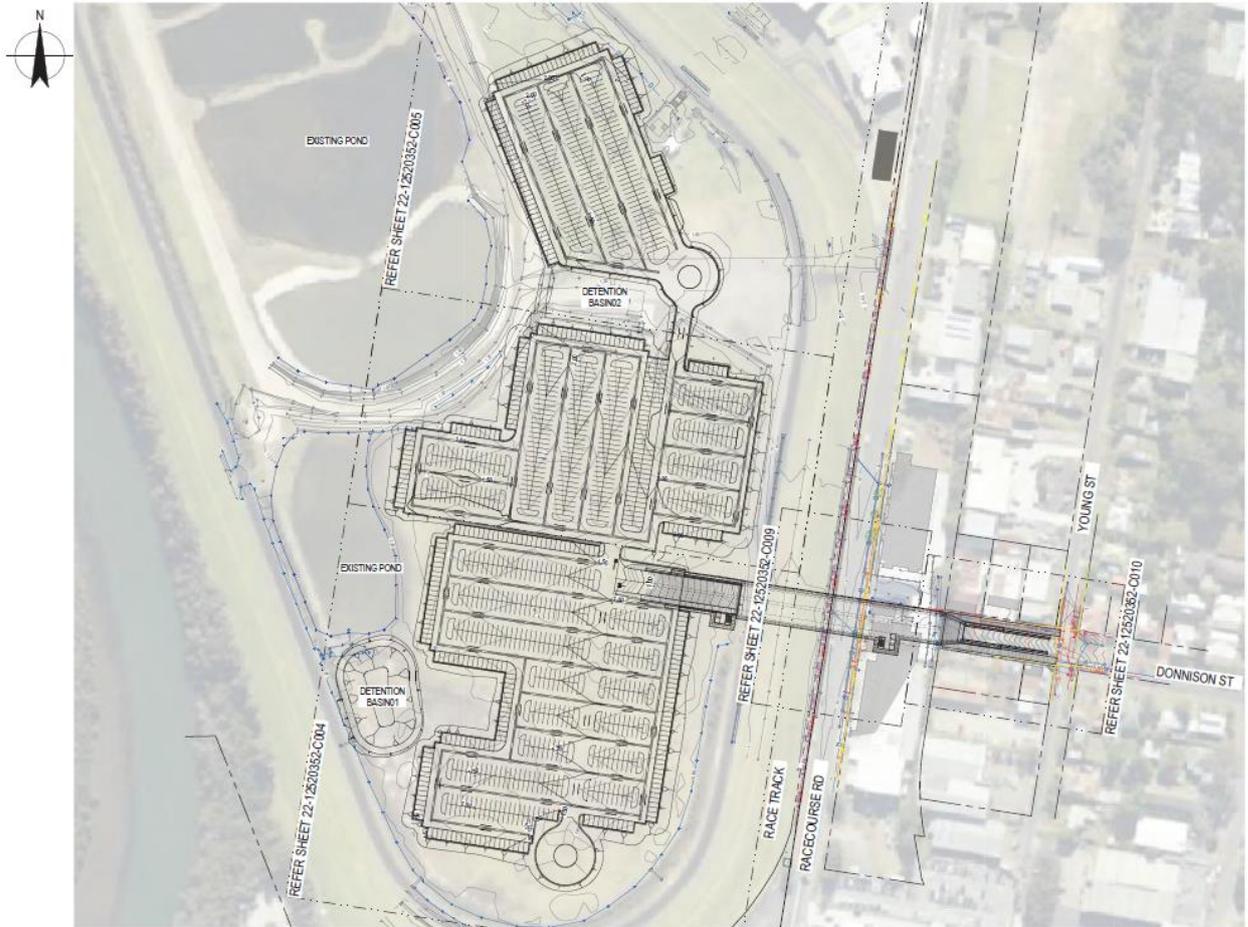


Figure 4- Proposed Project Plan 'Overlay'

Discussions were held with both property owners during the month of November 2019 to gauge their reception of the proposal. Both parties were satisfied, as all parties including Council deemed the project as being mutually beneficial. The individual parties deemed the benefits as follows:

*Council* - Provision of commuter carparking to Gosford and alleviate the current and long-term Gosford carpark shortfall;

*Racecourse* - Utilisation of the carpark outside key commuter carparking hours for race day events, sporting events, concerts, food stalls/markets and sports activities;

*Property Owner* - This property is potentially considering a mixed-use project comprising of retail, commercial, residential and hotel accommodation and as such the carpark could increase visitations for their completed project.

As all parties were accepting of the proposal, further concept development and due diligence was undertaken by our holistic design consultant 'GHD' to de-risk the project to the extent that further direction via Council Resolution could be obtained. (Refer to Confidential Attachment 1 for GHD's Design Summary.)

**Planning/Legal Overview**

A review of the planning parameters has been tabulated below for 4 Racecourse Road.

The planning review below has only considered 4 Racecourse Road and not 1A Donnison Street West. 1A Donnison Street West has not been outlined in the table as the proposed Council works to this site are limited to subterranean tunnel construction and an associated lift core.

RACECOURSE ROAD	
Street Address	4 Racecourse Road
Lot/ DP	Lot 100/ DP 1221111
Land Ownership	Gosford Race Club Ltd
Statutory Provisions	LEP 2014
Zoning	RE2- Private Recreation
Permissible Development	<p><b>Zone RE2 Private Recreation</b></p> <p><b>1. Objectives of Zone</b></p> <ul style="list-style-type: none"> <li>• To enable land to be used for private open space or recreation purposes.</li> <li>• To provide a range of recreational settings and activities.</li> <li>• To protect and enhance the natural environment for recreational purposes.</li> <li>• To ensure that development does not have an unacceptable impact on the amenity of nearby properties.</li> <li>• To ensure that development is compatible with the desired future character of the zone.</li> </ul> <p><b>2. Permitted without Consent</b></p> <ul style="list-style-type: none"> <li>• Nil</li> </ul> <p><b>3. Permitted with Consent</b></p> <ul style="list-style-type: none"> <li>• Aquiculture, Community facilities, Entertainment facilities, Environmental protection works, kiosks, recreation areas, recreation facilities (indoors), recreation facilities (outdoors), registered clubs, restaurants or cafes, roads</li> </ul>

RACECOURSE ROAD	
	<p><b>4. Prohibited</b></p> <p>Any development not specified in item 2 or 3.</p>

External legal planning advice was obtained from HWL Ebsworth Lawyers 'HWL' (*confidential attachment 2*) to understand the best planning pathway to deliver this project. HWL identified several avenues for planning approval. These included:

*Option 1 - Ancillary Use, Development Application*

The development of a 1,500 at grade carpark for the use of the Racecourse patrons is permissible with development consent as an ancillary use to the primary land use under the current Gosford LEP 2013 planning controls. However, the predominate use must be for the Racecourse patrons and limited to a carpark operated by Council. As such, any argument for this pathway would be based on merit.

*Option 2 - ISEPP*

ISEPP under part 5 of the EPA act would be a permissible pathway. Under this pathway, as the tunnel would converse under the Racecourse Road, the RMS would be the determining authority.

*Option 3 - Exempt Development*

This is not a permissible option under the current planning controls.

*Planning Proposal*

If either Option 2 or 1 respectively were not deemed viable, Council could request a LEP modification via a Planning Proposal pathway. This would be the least preferable option as it extends the planning approval pathway process and has greater uncertainty.

*Legal*

HWL have also been engaged to prepare Memorandum of Understandings 'MOU' between Council and all affected property owners respectively. The intent of the MOUs is to obtain stakeholders non-legally binding commitment to the project. The MOU will ensure that all parties are committed to the project prior to Council committing further funds towards this project. It would be envisaged that both MOUs would be executed post Council Resolution.

Closer to tender award the MOUs will be substituted with Agreement to Lease or other formal legal instruments which will solidify all parties' position/agreement to the project during construction and longer-term lease/licence commitments.

## 7.1 Gosford Long Term Car Park (contd)

Post resolution discussions will be held in due course with the RMS to discuss the proposed tunnel construction under the RMS Road with a view of obtaining their formal endorsement to proceed via the ISEPP pathway.

### Traffic

Our appointed Traffic Engineer 'Seca Solution' confirmed via a Traffic Modelling report that the proposal would have a limited impact on the surrounding road network. The main impact would involve an extended right-hand turn signal on Racecourse Road to allow cars to enter the Central Coast Highway. An extended right-hand turn signal would need to be negotiated with the RMS.

Seca Solutions also commented that the conceptual design including the tunnel is suitable to accommodate 1,500 cars as well as the increase in anticipated traffic movements.

Given the capacity of the carpark it would be preferable to implement a 'Park and Ride' shuttle into the CBD. Along with pedestrian and cycle paths, the Park and Ride shuttle would alleviate traffic congestion entering the CBD.



Figure 5- Indicative Park & Ride Route

**Finance**

Refer to *Confidential Attachment 3* for further information in relation to the financial requirements for this project including the required amount essential to obtain the relevant planning/ authority approvals.

**Flood Assessment**

Under the current DCP controls the proposed design will need to comply with a 1:100 AEP flood event.

The current design has only been designed to a 1:10 AEP level. As such, the below table outlines how the current design compares against Council's DCP 2013 Controls, and where it doesn't comply, the proposed mitigation response.

Where compliance has not been achieved, it is envisaged mitigation measures will be captured in the next phase of design progression post Council Resolution.

2013 DCP Requirements & Mitigation Response

Requirement	Achieved	Comment
<p>a. Any development is to be in accordance with the current Floodplain Management Map held by Council for this area;</p> <ul style="list-style-type: none"> <li>• Significant water interchange occurs between the Narara Creek floodway and the flood storage areas; and this is not to be impeded</li> <li>• No filling should be permitted to reduce the volume in the storage area</li> <li>• All development should be flood compatible.</li> </ul>	No	This could be reviewed and may require compensatory flood storage to offset any land form adjustments within the Gosford Racecourse. Full flood assessment required during Development Application (DA) stage.
<p>b. No development is to be constructed in the floodway or medium – high hazard areas of the floodplain</p>	No	Carpark area is within the flood storage area and high hazard area in the 1 in 100 AEP. This provisional hazard could be altered through flood mitigation. Full assessment during DA stage
<p>c. The proposed development should not create cumulative impacts upstream or downstream or within the flood storage area of Narara Creek</p>	No	Some off site impacts noted in the events assessed, thus cumulative impacts could present. This could be reviewed and may require compensatory flood storage to offset any land form adjustments within the Gosford Racecourse. Full flood assessment required during Development Application (DA) stage.
<p>d. Development must not result in significant impact of the conveyance of floodwaters</p>	TBC	Requires assessment during DA stage

Requirement	Achieved	Comment
e. No filling of the land is permitted that would reduce flood storage capacity	No	Currently volume of fill greater than cut volumes. This could be reviewed and may require compensatory flood storage to offset any land form adjustments within the Gosford Racecourse. Full flood assessment required during Development Application (DA) stage.
f. All "temporary use" development must; <ul style="list-style-type: none"> <li>• Be able to be removed prior to the onset of a flood; or</li> <li>• Must be able to be shown to withstand a 1% (1 in 100 AEP) flood event and not create blockage, become debris or create damage either on site or down stream of the flood event.</li> </ul>	TBC	Requires assessment and consideration during further development phases
g. Interchange of floodwaters is not to be impeded	Yes	The car park is located in a part of the Gosford Racecourse that would permit the interchange of flood waters.
h. A Site Specific Evacuation Plan must be provided addressing the following matters: <ul style="list-style-type: none"> <li>• Site Access and Emergency Exit Locations</li> <li>• All weather car parking, access and egress</li> <li>• Proposed hours of operation for event</li> <li>• Lighting</li> <li>• Flood Warning System</li> <li>• Vehicle and people evacuation plan, considering appropriate warning times, the nature of the event, vehicle instability due to buoyancy</li> <li>• Proposed plan for removal of structures/vehicles/people etc if site unattended (for example out of event hours)</li> <li>• Stability of structures unable to be removed in the event of a flood</li> <li>• Environmental management matters relating to temporary toilet and shower facilities, display items (including gas bottles), garbage etc in the event of a flood</li> <li>• Any other matter required by Council</li> </ul>	TBC	To be developed during the DA stage considering the points listed.

In relation to the requirement under point (f) above, GHD has undertaken a further flood assessment of a 1:100 year event (*refer to Confidential Attachment 4*). Under this scenario the level of the carpark was raised by 2.2 metres. Whilst flood immunity was achieved, there was significant afflux downstream which would prohibit this proposal. As such, any future design

## 7.1 Gosford Long Term Car Park (contd)

would need to be a compromise between what can be achieved and what is compliant. Further discussions will take place with Council's Assessment team to resolve this requirement.



Figure 6 demonstrates the existing implication of a 1 in 10 AEP flooding effect on the Racecourse. As demonstrated the Racecourse floods on its southern part of the site and an on-grade carpark without any adjustments to its base height level would inundate the Racecourse with flood waters.



## 7.1 Gosford Long Term Car Park (contd)

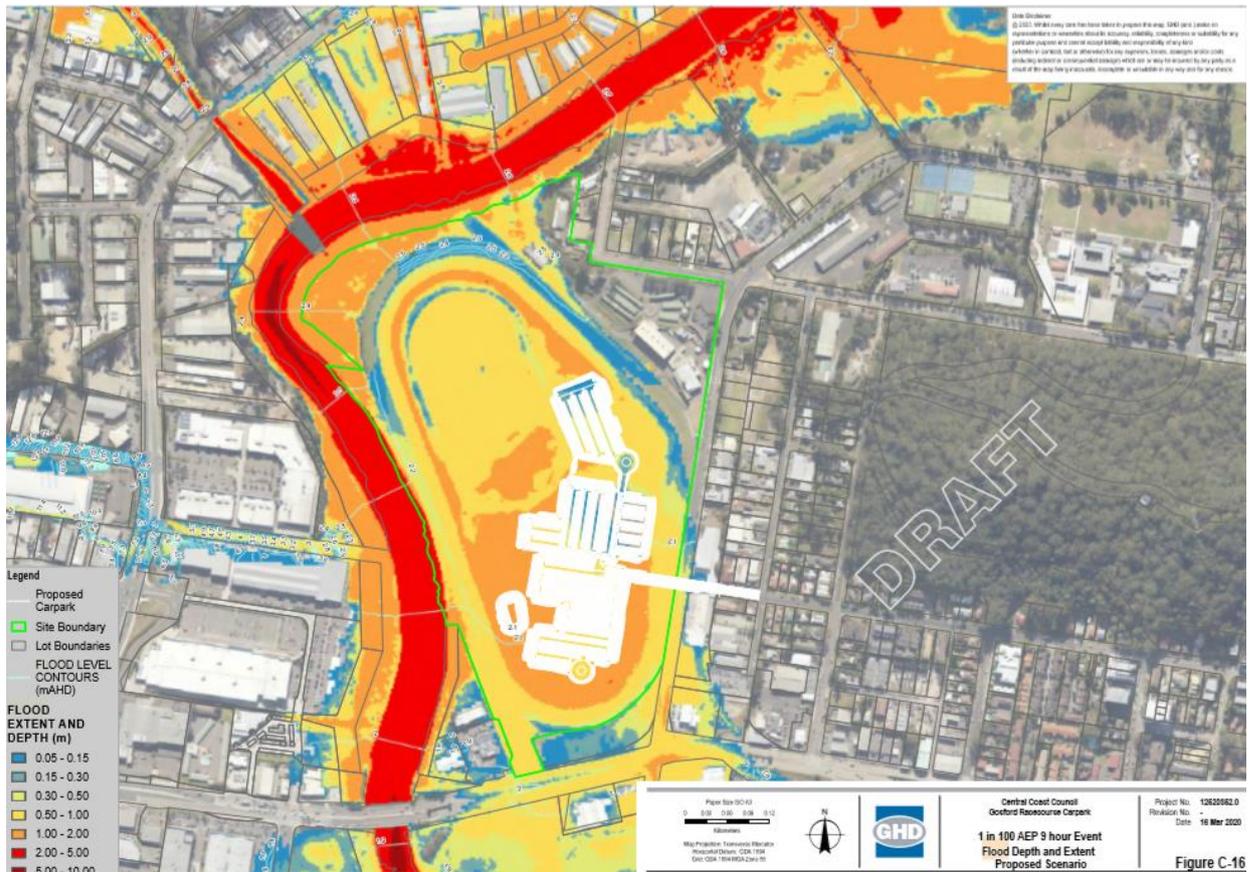


Figure 8- Proposed Project 1 in 100 AEP 9 Hour Event

Figure 8 demonstrates the effect that a 1:100 year flood event has on the proposal. During this rain event the carpark is inundated with water. Any future proposal would need to be designed with the best endeavours to mitigate this occurrence.

### Flooding Conclusion

Overall, further assessment of flood mitigation measures to cater for a 1:100 year flood event (which could include levees, raised carparking height level, conveyance improvements, and/or compensatory storage) would need to be further investigated to determine if Council's flood controls can be satisfied. Each of the mitigation measures would need to be assessed further, in accordance with the approaches in the NSW Flood plan Development Manual 2005. It is envisaged these issues will be mitigated with future design progression.

### Proposed Project- 'Pros & Cons' Summary

Pros	Cons
Low cost per Car Space compared to the other investigated sites ( <i>Refer to Finance attachment</i> )	Planning Proposal (least preferred option) could be required which will add additional months to the programme
Existing 'Park and Ride' Bus loop can be extended to this site	Proposal's planning pathway may not be endorsed by the RMS or Regional Planning Committee.

## 7.1 Gosford Long Term Car Park (contd)

Pros	Cons
Reduced vehicular traffic within the CBD	Consideration of distance to CBD.
Minimal traffic upgrade modifications required	Flooding concerns and required mitigation measures required to obtain planning approval.
Proposal solves the long-term Gosford Carpark Shortfall	
Eliminates the requirement of a future multideck carpark within the CBD. Land which could be better utilised to its highest and best use.	

The above table outlines the positive and negative attributions of the proposed project.

This project has numerous attributes which would benefit the residents of Gosford, and it is our opinion that proceeding with the intent to obtain Planning Approval would be a positive contribution to Council's overall parking strategy, even if the proposal did not proceed to construction.

### Programme Overview

*Target Programme via 'Different Planning Pathways'*

STAGE	DESCRIPTION	PLANNING PROPOSAL	ISEPP	ANCILLARY
<b>Option Development/ Concept Design</b>	Option Design	Complete	Complete	Complete
	Fee Proposals from Consultants	Complete	Complete	Complete
	Development of Concept Design	Complete	Complete	Complete
	Council Resolution	June 2020	June 2020	June 2020
<b>Authority Approval &amp; Detailed Design</b>	Preparation of Flood Model	May-July 2020	May-July 2020	May-July 2020
	Preparation for Planning Proposal	July-Sep 2020	N/A	N/A
	Planning Proposal Lodged	October 2020	N/A	N/A
	Gateway Determination	February 2021	N/A	N/A
	Detailed Studies & Design Development	March-May 2021	Aug-Oct 2020	Aug-Oct 2020
	Assessment	June 2021	November 2020	Nov-Apr 2021
	Decision	August 2021	December 2020	N/A
	DA Assessment	September-March 2022	N/A	April 2021
<b>Construction</b>	Tender	April 2022	January 2021	May 2021
	Evaluation & Award	May 2022	February 2021	June 2021

## 7.1 Gosford Long Term Car Park (contd)

---

STAGE	DESCRIPTION	PLANNING PROPOSAL	ISEPP	ANCILLARY
	Construction	May 2022- October 2023	Mar 2021-August 2022	Jul 2021- December 2022
	Practical Completion	October 2023	August 2022	December 2022

The above target programme outlines the different planning pathways effect on the Practical Completion Date. ISEPP is the preferred planning pathway and is the pathway which achieves the earliest practical completion date.

NSW Government Development Framework

PROJECT PHASE		GATEWAY REVIEW	KEY QUESTION	REVIEW DELIVERABLE
NEEDS CONFIRMATION	0 ▶	GO/NO GO	HOW HAS THE PROJECT DEMONSTRATED THAT THE SERVICE NEED IS ALIGNED TO GOVERNMENT POLICY?	EVIDENCE THE PROBLEM & SERVICE NEED EXISTS REGISTRATION ON GCA REPORTING & ASSURANCE PORTAL COMPLETED GATE 0 TEMPLATE OR EQUIVALENT
NEEDS ANALYSIS	1 ▶	STRATEGIC OPTIONS	HOW WELL HAS THE PROJECT ANALYSED A RANGE OF OPTIONS TO MEET THE SERVICE NEED AND MAXIMISE BENEFITS AT OPTIMAL COST?	WELL DEFINED SERVICE NEED EVIDENCE OF HOW THE PROJECT SCOPE MEETS THE SERVICE NEED OPTIONS ANALYSIS APPROPRIATE LEVEL OF COST BENEFIT ANALYSIS
INVESTMENT DECISION	2 ▶	BUSINESS CASE	HOW WELL HAS THE PROJECT PROVEN THAT THE PREFERRED OPTION BEST MEETS THE SERVICE NEED AND MAXIMISES BENEFITS AT OPTIMAL COST?	FINAL BUSINESS CASE DETAILED RISK REGISTER DETAILED COST PLAN DETAILED COST BENEFIT ANALYSIS PROCUREMENT AND DELIVERY STRATEGY
PROCURE	3 ▶	READINESS FOR MARKET	HOW WELL HAS THE PROJECT DEVELOPED A PROCUREMENT AND DELIVERY APPROACH TO REALISE THE BENEFITS OUTLINED IN THE FINAL BUSINESS CASE?	CLEAR SCOPE DEFINITION PROCUREMENT DOCUMENTATION PROCUREMENT AND COMMERCIAL APPROACH EVALUATION STRATEGY PROBITY PLAN
	4 ▶	TENDER EVALUATION	IS A SCOPE BEING PROCURED THAT WILL DELIVER THE BENEFITS OUTLINED IN THE FINAL BUSINESS CASE AND IS THE PROJECT READY TO PROCEED TO DELIVERY?	EVALUATION REPORT PROBITY REPORT SUMMARY OF DEPARTURES AND VARIATIONS EVIDENCE OF DELIVERY READINESS AND HANDOVER APPROACH
DELIVER & INITIAL OPERATIONS	5 ▶	READINESS FOR SERVICE	HOW WELL HAS THE PROJECT DELIVERY TEAM AND ASSET OWNER AND/OR OPERATOR PLANNED A HANDOVER THAT WILL ENSURE THE BENEFITS OUTLINED IN THE FINAL BUSINESS CASE ARE ACHIEVED?	INDEPENDENT VERIFIER REPORTS CONFIRMING SCOPE DELIVERY TESTING AND COMMISSIONING DOCUMENTATION OPERATIONAL READINESS DOCUMENTATION HANDOVER STRATEGY
BENEFITS REALISATION	6 ▶	BENEFITS REALISATION	HOW WELL HAVE THE BENEFITS OUTLINED IN THE FINAL BUSINESS CASE BEEN REALISED AND WHAT LESSONS CAN BE LEARNT FROM THIS?	EVIDENCE OF OPERATIONAL PERFORMANCE BENEFITS REALISATION PLAN RECORD OF LESSONS LEARNT

## **7.1 Gosford Long Term Car Park (contd)**

---

In accordance with the NSW Government's Development Framework, the Project is currently at Gateway review 1 'Strategic Options'.

It is anticipated that Council will submit another Council report at the conclusion of Gateway review 2 'Business Case' once the various variables have been de-risked.

### **Conclusion**

The 1,500 space carpark proposed for the Racecourse Grounds along with the Central Coast Stadium carpark proposal would solve the long term 2,000 car park shortage within the Gosford CBD.

The Racecourse proposal would require further flood modelling and mitigation measures to negate the flooding concerns as well as requiring further design progression prior to proceeding with any planning pathway.

Whilst there is both planning and design risk associated with this project, it is of our opinion that working through these risks over the next 6 months will bring design resolution and enable us to solve the planning pathway risks.

When the overall positive and negative attributions of the project are considered, the positive contributions of the project outweigh the negative, especially in the areas of cost of individual car space, utilisation of unused land and removal of congestion from the CBD.

Considering the above, we request that Council endorse this proposal with a view of design progression and finalising and lodging the authority approval via an ISEPP planning pathway.

### **Link to Community Strategic Plan**

Theme 2: Smart

### **Goal C: A growing and competitive region**

S-C2: Revitalise Gosford City Centre, Gosford Waterfront and town centres as key destinations and attractors for business, local residents, visitors and tourists.

### **Attachments**

- |          |  |           |
|----------|--|-----------|
| <b>1</b> | Confidential - GHD Concept Design Report D13936252 - |           |
| <b>2</b> | Confidential - HWL Legal Advice -                    | D13936264 |
| <b>3</b> | Confidential - Finance Summary -                     | D13936291 |
| <b>4</b> | Confidential - GHD Concept Design Addendum -         | D13936298 |



## **Central Coast Council (NSW)**

### **CCC - Gosford Racecourse Multidisciplinary Services Concept Design Report**

March 2020

## Table of contents

1.	Introduction .....	1
1.1	Purpose of this report.....	1
1.2	Background.....	1
1.3	Reliance / reference documents.....	1
1.4	Limitations.....	1
2.	Basis of design.....	3
3.	Tunnel alignment.....	4
3.1	Road design.....	4
4.	Tunnel design.....	6
4.1	Tunnel overview.....	6
4.2	Structural design.....	6
4.3	Durability and maintenance .....	7
4.4	Ventilation design.....	8
4.5	Waterproofing and drainage .....	8
4.6	Preliminary geotechnical design.....	9
5.	Donnison Street West .....	10
5.1	Property access.....	10
5.2	Intersection at Donnison Street and Young Street .....	10
5.3	Interface with proposed development at 1A Donnison Street .....	10
6.	Carpark.....	11
6.1	Carpark civil design.....	11
6.2	Stormwater drainage.....	11
6.3	Flood assessment.....	12
7.	Services.....	18
8.	Tunnel construction sequence .....	19
9.	Safety in design.....	21

## Table index

Table 2-1	Design basis .....	3
Table 4-1	Durability requirements.....	7
Table 4-2	Pile socket design parameters.....	9
Table 6-1	DCP Requirements.....	14

## Figure index

Figure 6-1 Flood Hazard Classification (Kinhill, 1991) ..... 17

## Appendices

- Appendix A – Concept drawings
- Appendix B – Geotechnical technical advice note
- Appendix C – Flood assessment figures

# 1. Introduction

## 1.1 Purpose of this report

Central Coast Council (Council) has engaged GHD to investigate the feasibility of constructing a 1,500 space on grade carpark in the middle of the Gosford Racecourse, accessed via a tunnel from Donnison Street under Racecourse Road. This report presents the key components for a high level concept design that was selected as a result of the Options Shortlisting Summary Report, GHD 24/01/2020 and a subsequent workshop with Council. The concept design has been progressed to the level detailed in this report in an attempt to further de-risk the project and to allow a more accurate cost estimate (to be completed by Council).

## 1.2 Background

Council has been presented an opportunity by the planned redevelopment of the existing cold stores site into the proposed Connexions site. They plan to construct a tunnel from Donnison Street under the development site, Racecourse Road and the racetrack that will enable the development of 1,500 on-grade car parking spaces within the grounds of Gosford Racecourse.

It is anticipated that the carpark would be used primarily as a commuter carpark, with access to both Gosford train station and Gosford CBD provided via a Park & Ride bus service. The carpark will also be made available for event parking for the racecourse and the Central Coast Stadium.

## 1.3 Reliance / reference documents

The following documents form the basis of the concept design:

- Options Shortlisting Summary Report, GHD 24/01/2020
- Site Survey, Bannister & Hunter, 10/01/2020 (CAD reference: 58658-01C REV A)
- Ecological Assessment Report, GHD, 24/03/2020
- Geotechnical and Contamination Report, GHD 24/03/2020
- Updated Narara Creek Flood Study, Golder, 05/07/2018
- Response to Gosford City Council's request for further information DA 44154/2013 car parking within Gosford racecourse, ADW Johnson, 25/09/2013

## 1.4 Limitations

This report has been prepared by GHD for Central Coast Council and may only be used and relied on by Central Coast Council for the purpose agreed between GHD and the Central Coast Council as set out in this report.

GHD otherwise disclaims responsibility to any person other than Central Coast Council arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this report were limited to those specifically detailed in the report and are subject to the scope limitations set out in the report.

The opinions, conclusions and any recommendations in this report are based on conditions encountered and information reviewed at the date of preparation of the report. GHD has no responsibility or obligation to update this report to account for events or changes occurring subsequent to the date that the report was prepared.

The opinions, conclusions and any recommendations in this report are based on assumptions made by GHD described in this report. GHD disclaims liability arising from any of the assumptions being incorrect.

GHD has prepared this report on the basis of information provided by Central Coast Council and others who provided information to GHD (including Government authorities), which GHD has not independently verified or checked beyond the agreed scope of work. GHD does not accept liability in connection with such unverified information, including errors and omissions in the report which were caused by errors or omissions in that information.

## 2. Basis of design

The following criteria has been agreed with Council to form the basis of our concept design.

**Table 2-1 Design basis**

Design element	Criteria	Comment
Minimum cover beneath racetrack	1.2 m	Current estimate pending confirmation from the Racecourse
Design vehicle (headroom in tunnel)	Bus (3 m clearance)	This is to suit the Toyota Coaster currently used by Council's Park and Ride service.
Flood immunity – tunnel	N/A	Due to the high water table at the proposed location, it is predicted that the tunnel will flood during rainfall events that exceed the capacity of the passive drainage and waterproofing systems in the tunnel. This is discussed in more detail in Section 4.
Flood impact	Max. 10 mm afflux	DCP requirements
Flood immunity	1 in 10 Annual Exceedance Probability (AEP) immunity	As agreed with Council as previous flood mapping (Golder report) shows minimal flooding at the 1 in 10 AEP flood event.
Carpark Drainage	1 in 20 AEP	CCC Civil specifications require car parks to be designed to 1 in 20 AEP (Table 10.1).
Access to Donnison Street properties	Access to be provided for a service truck (8.8 m length)	Required for garbage disposal etc.

## 3. Tunnel alignment

### 3.1 Road design

The civil design of the tunnel road geometry encompasses the vertical and horizontal alignment, and the road cross section. A summary of the adopted design parameters is provided below:

- Vertical alignment:
  - Ramp gradients:
    - In order to fit the tunnel between the Donnison/Young Street intersection and the carpark, higher than normal ramp grades are required. The current alignment has a 1:6.5 (15%) ramp grade which is in accordance with AS2890.2:2018 Parking Facilities – Part 2: Off-street commercial vehicle facilities. Due to the low proportion of heavy vehicles for the proposed alignment (limited clearance) this may be acceptable for road traffic.
    - It is noted in Austroads Guide to Road Tunnels 2015, page 20 that “surface developments”...will often require steeper than normal grades [in tunnels]. Steeper grades reduce lane capacity, but as the speed environment is lower such grades may be acceptable where their length is short, the traffic demand is relatively low, or the proportion of heavy vehicles is low”. At the proposed tunnel site, “surface developments” include the existing infrastructure and street intersections.
    - It is noted that the 15% grade on the footpath ramp is not compliant with Disability Discrimination Act (DDA) requirements. Therefore an elevator will need to be provided on both sides of Racecourse Road to provide wheelchair access.
  - Vertical clearance:
    - The vertical clearance of the tunnel, from road surface level to the underside of the services clear zone, is 3.0 metres to accommodate a minibus design vehicle. This means only cars and light vans will have access to the tunnel.
    - It is noted in Austroads Guide to Road Design Part 3 Geometric Design, Table 8.1 that the typical minimum vertical clearance over “other roads” (not main or arterial roads) is 4.6 metres.
    - It is recommended that low clearance signs are included at the tunnel approaches. Furthermore, overhead services should be protected with a protection barrier at the tunnel entrances. Alternatively, the services could be included in the base slab though this may increase the base slab depth.
    - As the median is vehicle-mountable, a break in the overhead services is required to reduce risk of damage by vehicles. This is preferable to installing a barrier on the median, as this restricts egress options for tunnel users in event of a fire.
- Horizontal alignment:
  - The proposed tunnel control line is straight between the Donnison/Young Street intersection and the carpark portal.
  - The road narrows at the East ramp as discussed below.

- Cross section (typical):
  - The tunnel cross section comprises two lanes separated by a median, and a pedestrian footpath.
  - Each lane is 3.5 m wide with a 1.5 m shoulder (outside) and 0.5 m shoulder (inside), for a total lane width of 5.5 m between kerbs.
  - The median width is 1.5 m wide and the proposed footpath width is 2.5 m.
  - The road crossfall is 2% for drainage. Drainage is discussed in more detail below.
- Cross section (East ramp):
  - The tunnel cross section at the East ramp narrows to ensure the tunnel width and the street access can fit between property boundaries on Donnison Street.
  - Each lane reduces to 3.5 m width with no footpath and no median, for a total width of 7.0 m between kerbs.
  - It is noted that additional formation height may be required at the end of Donnison Street to accommodate the tunnel roof height. The maximum increase in existing surface level is approximately 1.7 metres, which will require the construction of ramped driveways for access into the private properties at the end of Donnison Street. This is discussed in more detail in Section 5 below.

## 4. Tunnel design

### 4.1 Tunnel overview

The proposed Racecourse Road tunnel utilises a top-down construction methodology. The tunnel walls are proposed as 1200 mm diameter continuous secant bored piles at 1000 mm centres, with 800 mm reinforced concrete walls on the inside. These piles are socketed into rock a minimum of 3 metres. The piles are capped with 1100 mm deep capping beams in order to support the precast concrete girders, which form the tunnel roof. The roof comprises 1100 mm deep precast beams with 200 mm thick cast in situ topping slab and form a monolithic structural connection with the tunnel walls. The roof is covered with infill material to design surface level, with the existing surface reinstated after construction.

The cross section of the tunnel varies at the East ramp to fit the proposed access road and ramp width in between the existing property boundaries. At this ramp location, two 3.5 m wide traffic lanes are proposed. The road widens to two 5.5 m wide lanes towards the bottom of the ramp structure, with a 1.5 m wide median. At the elevator and stairwell core location, the tunnel width between bored piles widens further to accommodate a 2.5 m wide footpath. The bored pile wall continues around the outside perimeter of the elevator and stairwell core, which has a footprint of 8.4 m x 5.3 m. This footprint area is provisional and may be reduced during the detailed design stage. An additional elevator and lift core is provided on the west side of Racecourse Road for wheelchair access. The footpath continues from this location to the west tunnel portal.

### 4.2 Structural design

The tunnel concept design has been carried out in accordance with the relevant Australian Standards, including the following:

- AS1170-2002 Design loads series
- AS1657-2018 Fixed platforms, walkways, stairs and ladders - design, construction and installation
- AS2159-2009 Piling - Design and installation
- AS3600-2018 Concrete structures
- AS4825-2011 Tunnel fire safety
- AS5100-2017 Bridge design series

The structural design process assumed a staged construction process as per the concept design drawings and described in Section 8. The design loads were taken as follows:

- Maximum ground cover above tunnel 1.2 m. Ground density = 20 kN/m<sup>3</sup>.
- Reinforced concrete density (including reinforcement) = 25.5 kN/m<sup>3</sup>.
- Precast concrete density (including reinforcement) = 26.5 kN/m<sup>3</sup>.
- Combined thickness of asphalt wearing surface and waterproof membrane 60 mm. Wearing surface density = 22.0 kN/m<sup>3</sup>.
- Traffic design loads as per AS5100. Design lanes, accompanying lane factors, dynamic load allowance, horizontal (braking and centrifugal) forces, fatigue, load factors, deflection, and distribution through fill have been calculated in accordance with AS5100 Part 2.

- Load factors to AS5100 Part 2.
- As noted in the geotechnical report, groundwater level can vary according to a number of factors. Therefore, the assessment has been carried out by conservatively considering the groundwater level at the ground surface.

These design loads were input into representative models of the tunnel structure in the following software packages:

- Tunnel structure modelled in finite element analysis (FEA) program Strand7
- Pile and ground interaction behaviour modelled in FEA program Plaxis 2D

Structural actions from these models have been used to inform the concrete dimensions and preliminary reinforcement arrangements as shown on the concept design drawings (Appendix A). The results from Plaxis 2D were used to inform the pile design and socket length. It is noted that the slab to pile connection is important as the design case with lowered groundwater results in the slab effectively spanning between piles due to reduced stiffness in the soil. If required, additional lateral support (e.g. ground anchors, waler beam) and ground improvement options (e.g. removal and replacement of soft soil) may be investigated during the detailed design stage.

### 4.3 Durability and maintenance

Table 4-1 summarises the materials and protective measures adopted for the tunnel structure, piles, traffic barriers and associated structures. All proposed protection has been specified to achieve a design life of 100 years.

**Table 4-1 Durability requirements**

Material	Requirements			
Concrete	<i>Element</i>	<i>Class</i>	<i>Exposure</i>	<i>Cover (mm)</i>
	Blinding concrete	N20/20	B2	N/A
	Precast roof beams	S50/20	B2	50
	In situ concrete	S40/20	B2	70
	Cast-in-place piles	S40/20	B2	90
Steel	Steel to be manufactured in accordance with following standards:			
	<i>Element</i>	<i>Min. steel grade</i>	<i>Applicable standard</i>	<i>Galvanising standard</i>
	UB/UC/PFC/EA/UA	300	AS 3679.1	AS 4680
	SHS/RHS	450LO	AS 1163	AS 4680
	CHS	350LO	AS 1163	AS 4680
	Plates	250	AS 3678	AS 4680
	Bolts	Class 4.6	AS 1111	AS 1214
	Nuts	Class 5	AS 1112	AS 1214
	Washers	Class 4.6	AS 1237	AS 1214
Reinforcement	Grade D500N deformed bars to AS/NZS 4671.			
Prestressing strands	7-wire ordinary 15.2 mm 1750 Relax 2 to AS 4672.1			

The use of elements with a design life less than 100 years has been minimised in order to reduce maintenance requirements:

- Temporary mortar pads or shims will be used in place of elastomeric bearings for the support of precast beams before the connection with capping beam is made.
- The base slab will require joints to allow for differential movement of supporting soil and longitudinal movements due to thermal effects and shrinkage. These joints are typically formed with compressible filler and sealant, and will be specified in later design stages.

- Manhole access will be provided into the drainage pump room for maintenance. Regular maintenance of pump systems will be required to ensure ongoing operation and drainage in the tunnel.
- The elevators will require ongoing maintenance. Careful detailing of the elevator systems will be required, with electronics and emergency backup systems located above flood level and protected in order to reduce risk of flood damage. Following heavy rainfall events, lift components will require inspection to ensure safe working condition.

#### 4.4 Ventilation design

A ventilation assessment was conducted in order to ensure that the concentration of emissions produced by vehicles in the tunnel do not exceed limits imposed by air quality requirements. In particular, the assessment aimed to assess the impact of the controlling pollutant NO<sub>2</sub> (nitrogen dioxide) on the air quality in the tunnel. This assessment assumed the following parameters:

- Bidirectional tunnel with single traffic lane each way.
- Design vehicle for ventilation assessment is a light vehicle such as passenger and light commercial vehicles (LCV's). Typical emissions performance has been assumed for design LCV's. No heavy vehicles (HV's) have been included in the ventilation model.
- Assumed vehicle speed of 20 km/hr in the tunnel. It is noted that the worst-case ventilation design case is with stationary traffic i.e. queuing vehicles.
- Peak traffic volume of 500 vehicles/hr during morning or afternoon peak periods.

The assessment found that NO<sub>2</sub> concentrations are predicted to comply with in-tunnel requirements due to passive ventilation. Therefore there is no need for forced ventilation, such as jet fans, to be installed in the tunnel.

If any adjustments are made to the tunnel alignment or cross section in the detailed design stage, the ventilation model shall be revised to determine the impacts. It is noted that typical diameters of tunnel jet fans are 1.2 m and 1.5 m. If jet fans need to be incorporated in a later design stage, it will significantly affect the vertical road alignment.

#### 4.5 Waterproofing and drainage

Waterproofing and drainage for the tunnel is a key design consideration, particularly due to the high water table level. The tunnel drainage design will accommodate rainfall events up to a certain return interval in the sump pump design. Surface runoff to the ramps up to this return interval will be prevented from entering the tunnel with drains at the tunnel ramp entrances. However, it will not be possible to drain the tunnel during large rainfall events due to the very low elevation in the tunnel and the high natural ground water level. In major rainfall events, the tunnel will be flooded and should be closed to all traffic. The exact AEP rainfall event immunity will need to be confirmed during the detailed design and will depend on the adopted tunnel drainage systems, including cut-off drains and pump systems.

In order to ensure no significant ground water ingress into the tunnel through the structure, it will be designed as a "watertight structure". Note that "watertight" does not necessarily mean no ground water inflow. Rather, a "watertight structure" has a negligible amount of water inflow which can be managed easily and will not alter the ground conditions or the existing water table level. A low-point sump pump is required in the tunnel for use in light rainfall events to remove surface water runoff from the open tunnel ramps. Note that permanent pumping for removing any water leaking through the tunnel walls is not deemed acceptable as it may lower the water table level.

A watertight structure requires careful detailing and a high quality of construction, with low permeability concrete and waterproofing membranes. In the detailed design stage, it will be required to define the waterproofing performance i.e. maximum litres of water inflow per day per metre of tunnel, to ensure there is no impact to the ground water table and the operations of the tunnel during its design life will not be affected.

It is recommended that a project-specific concrete specification is developed to ensure the concrete can be constructed to achieve an effective waterproof requirement in the environment. This specification shall aim to reduce the water-cement ratio of the concrete and require the use of chemical admixtures such as super-plasticisers to reduce permeability. Additional requirements for the construction shall include minimum standards for concrete compaction, formwork design, curing techniques and construction quality control.

#### 4.6 Preliminary geotechnical design

The ground strata is composed primarily of alluvium, with rock level higher at the east side of Racecourse Road. Further description is provided in the Geotechnical Report (March 2020). The preferred substructure design consists of secant bored piles socketed into rock.

The preliminary geotechnical design for the option development has been carried out on the typical cross section outlined in Section 3.1 by adopting ground conditions assessed from the geotechnical investigation works. The outcome of this design and incorporated assumptions are provided in Technical Advice Note TAN001 presented as Appendix B.

A socket into rock is required to resist uplift (buoyancy) forces caused by the high water table. The minimum required rock socket length is estimated at 3.0 m as shown in Table 4-2 below.

**Table 4-2 Pile socket design parameters**

Unit	Type	Assumed rock layer thickness	Design UCS (MPa)	Ultimate End Bearing (MPa)	Ultimate shaft adhesion in compression (kPa)	Ultimate shaft Adhesion in tension (kPa)
4A	VL Claystone	1.5 m	2	3	150	120
4C	M-H Sandstone	1.5 m	12	30	1200	960

It is also noted that the roof and base slabs will have fixed connection to the pile walls in order to resist water uplift forces.

In the detailed design, further design development will be required by taking into consideration the revised tunnel configuration, refined construction sequence and additional geotechnical investigation data. In addition, the detailed design will also include the following:

- Design of transition zone which includes a section where the retention wall will not be supported by the roof slab due to height limitation (i.e. cantilever section).
- Design of "dive" wall section by considering earth pressure, hydrostatic pressure and applied surface loading.
- Impact of tunnel excavation to the nearby structure with respect to the drawdown-induced settlement during the construction dewatering and excavation-induced ground movement.

Depending on the outcomes of the detailed design, the following can be considered to reduce the predicted ground movements:

- Additional support incorporated to the proposed retention wall (i.e. secant pile wall) such as ground anchors, waler beam.
- Improvement of the existing ground where practicable, for example: removal of shallower soft soil and replacement with cement stabilised sand.

## 5. Donnison Street West

### 5.1 Property access

Donnison Street is a local two way road within an industrial area of Gosford. The western section of the road is impacted by the tunnel and provides access to 5 properties. In order to ensure vehicle access is maintained a 3.5 m wide ring road around the tunnel portal has been provided. An additional 2.2 m shoulder/verge within the ring road would allow an 8.8 m garbage truck to service each lot and navigate the road safely.

Driveway interfaces to each property have not been fully investigated. It is noted that No. 2 and 5 Donnison Street both currently have their driveways at the same location as the tunnel roof structure. It may be possible to shift the driveway of 5 Donnison Street further to the east, however this will not be possible for 2 Donnison Street. No information on the current or future operations of these premises has been considered.

Due to the spatial requirements of the tunnel and the ring road, no pedestrian access can be provided to this part of Donnison Street.

It is recommended Council undertake early engagement with surrounding landowners to ascertain functionality of each lot. This will allow designers to use the appropriate design vehicle during detail design to ensure access in a forward direction as per Councils DCP requirements.

### 5.2 Intersection at Donnison Street and Young Street

The tunnel regrading starts at the Donnison and Young Street intersection, the existing intersection cross fall is continued for approximately 8 – 10 m before the ramp grade increases and the retaining walls start. This is to provide sufficient sight distance when approaching the intersection. The current layout of the intersection requires Donnison Street to give way to Young Street. It is recommended that Council engage a traffic management team to determine the best configuration or upgrades at the intersection. It may be a consideration to allow no right turn out of the tunnel onto Young Street to prevent users using the private business laneway access onto the Central Coast Highway.

### 5.3 Interface with proposed development at 1A Donnison Street

Due to the constraints listed above, and to maintain access for Council's required design vehicle, the tunnel structure will intrude into the property of 1A Donnison Street by approximately 8 - 10 m for the width of the tunnel. The maximum height above the existing ground surface is 2.1 m, however this is accentuated by a drainage easement running along the back of the property. Engagement will be required with the owners of this property prior to further design development.

## 6. Carpark

### 6.1 Carpark civil design

During the concept design stage, it was agreed with Council that the carpark required flood immunity for the 1 in 10 AEP flood event. This required the carpark to be designed above the Reduce Level of RL 1.2 m.

The carpark layout was provided by Council, however had to be modified slightly as the exit ramp of the tunnel was lifted to suit the flood immunity level. This subsequently required the ramp to extend further into the carpark. The modified layout is compliant with Australia Standard AS/NZs 2890.1:2004 Parking Facilities – Part 1: Off-street car parking for the modified layout, applying user class 2.

Initially the carpark was to be designed 'on-grade'. However, as the carpark is required to be above RL1.2 m to achieve the agreed flood immunity, some sections of the carpark were in approximately 300 – 500 mm of fill before applying longitudinal and cross fall grades. To avoid excessive filling, the carpark was designed using the following criteria:

- 0.5% min longitudinal grade along the centre of the aisle
- 1% min crossfall grade for car parks
- Edge restraint kerb around the perimeter of the carpark
- 0.5 m verge behind kerb restraint with 1 in 6 fill batters and 1 in 4 cut batter

### 6.2 Stormwater drainage

The car park stormwater drainage design is in accordance with the Central Coast Council Civil Works Specification Design Guidelines. The drainage network consist of grading the carpark at 1% minimum to the centre of the aisle. A concrete dish drain runs along the centre line of aisles with grated surface inlet pits installed at regular intervals to minimise surface flow depth and width. Stormwater from the central and southern sections of the carpark is conveyed through a pit and pipe network that discharges into a new detention basin (Basin 01) to the south of the existing ponds.

Discharging into the existing ponds would require further investigations into the size, depths and capacity. Anecdotal information supplied by the Racecourse curator indicates that the ponds do not drain freely when high tail water events occur in the adjacent creek, which will hamper the ability to drain the carpark surface in long duration events. A new detention basin was designed as the pipe network is approximately 1.8 m deep at the discharge point, due to the required pipe grade (0.5%) and cover (600 mm).

The proposed location of the carpark lies on very flat and flood prone ground. A pit and pipe system was not suitable for the northern part of the carpark. Concrete dish drains and overland flow were used to direct flow into the new detention basin (Basin 02).

Basin 02 utilises the area between the north and central sections of the carpark. An earth mound at the western end encloses this area. It was set a lower level to ensure that any over spill will be directed to the existing ponds and eventually the adjacent creek.

### 6.3 Flood assessment

A preliminary flood assessment has been completed for the proposed car parking area within the Gosford Racecourse and tunnel underneath Racecourse Road. This assessment focussed flooding in the Narara Creek catchment at the Gosford Racecourse, focussing on the following flood events:

- 1 in 10 AEP 9 hour storm duration
- 1 in 100 AEP 9 hour storm duration
- 1 in 1000 AEP 3 hour storm duration
- PMF 2 hour storm duration

#### 6.3.1 Available Data

The Gosford Racecourse site is impacted by flooding due to three flooding mechanisms, namely:

- Riverine flooding from the wider Narara Creek catchment, due to the Narara Creek surcharging its banks.
- Local overland flooding due to rainfall in the immediate Gosford City and racecourse area.
- Tidal inundation due to storm surge backwater from Brisbane Water.

Council has undertaken detailed modelling to understand each of these different flooding mechanisms and the inundation this will cause across the Gosford Racecourse site (as well as the wider floodplain). This is documented in the following reports:

- Lower Narara Creek Floodplain Management Plan (Kinhill, 1991)
- Gosford CBD Local Overland Flow Flood Study (Cardno, 2011)
- Brisbane Water Foreshore Floodplain Risk Management Plan (Cardno, 2015)
- Updated Narara Creek Flood Study (Golder, 2018)

It is understood the Council are currently undertaking an update to the Narara Creek Floodplain Risk Management Plan. As this is still being updated, Council has advised that the Lower Narara Creek Floodplain Management Plan (Kinhill, 1991) remains the adopted Floodplain Management Plan for riverine catchment flooding.

The models from the Updated Narara Creek Flood Study (Golder, 2018) study have been made available to GHD for the present study. As the proposed scope focusses on the less frequent, larger magnitude events, only riverine catchment flooding has been focussed on for this study at this stage of the assessment.

#### 6.3.2 Existing Flooding Environment

The assessment has focussed on extracting flooding information from the Narara Creek catchment TUFLOW flood model developed for the Updated Narara Creek Flood Study (Golder, 2018). This model utilises a 5 m rectilinear grid which is considered appropriate to undertake assessment of the proposed carpark and tunnel. The model was simulated to reflect the existing catchment conditions to provide Narara Creek flooding data. The resulting flood level and extent, flood velocity and flood hazard maps from these simulations are presented in Figure C 1 to Figure C 12 in Appendix C.

The figures shown that in the events modelled (1 in 10 AEP and rarer), the Gosford Racecourse and Racecourse Road are inundated, with depths of 500 mm in the 1 in 100 AEP event. In the 1 in 10 AEP event, the site sees limited inundation, mainly confined to the southern portion of the racecourse property. The flooding inundation is due to river levels rising and breaching the bank in the river and subsequent low spot in the racecourse track that exists at the south-western extent of the property. During the 1 in 100 AEP (and rarer), the floodwaters enter both by the northern extent of the property and the south western extent. This results in widespread inundation of the racecourse area. Peak flood velocities around the floodplain through the Gosford Racecourse property are generally less than 0.5 m/s and with a Hazard Classification of generally H3 (unsafe for vehicles, children and elderly).

The current floodplain classification for the site is shown in Figure 6-1, this figure has been replicated from the Lower Narara Creek Floodplain Management Plan (Kinhill, 1991). This plan also covers the catchment and details recommended floodplain management measures. The SES has developed a Local Flood Plan for the Gosford City area that is a sub-plan of the Gosford City Local Emergency Management Plan (EMPLAN). The sub-plan cover the Narara Creek catchment (including the Gosford area). This plan covers a comprehensive range of emergency management measures including preparedness, response and planning and details that Racecourse Road is classified as experiencing 'Flash Flooding' according to the Plan.

### 6.3.3 Carpark proposal

The proposal covered by this report includes the provision for a 1,500 vehicle capacity on-grade car park including tunnel entrance and exit under Racecourse Road via Donnison Street. In terms of flood related design parameters:

- The carpark would be flood free in a 1 in 10 AEP event
- The tunnel entrance would be flood free in events more frequent than 1 in 10 AEP

The proposed car park and tunnel were represented in the model terrain by modifying the terrain at the location of the tunnel entry and exit portals, and for the car park foot print where terrain levels have been set to approximately 1.4 m AHD to 1.9 m AHD. The terrain has been modified to reflect the finished surface level of the ground or retaining walls or any elements that would be a retaining wall. The ground levels of the road approaching the tunnel have been configured in the model.

The TUFLOW model was simulated for the events noted above, the results from these simulations for flood level and extent, flood velocity and flood hazard are presented below in Figure C 13 to Figure C 24 in Appendix C.

These results demonstrate that the inundation extent noted in the existing scenario simulation change within the Racecourse property in the 1 in 10 AEP event with the car park included in the model terrain. In the 1 in 100 AEP event with the proposed car park included in the model terrain the flooding extents remain unchanged, the Racecourse property is widely inundated in this event. Conversely, the velocities and hazard remain unchanged from the existing scenario in the 1 in 100 AEP.

The resulting flood impact due to the proposed development is shown in in Figure C 25 to Figure C 28 in Appendix C.

The results show that some minor change to the flood levels beyond the site boundary would occur for the events simulated. In a 1 in 10 AEP event the flood level increases are in the order of 95 mm within the Racecourse property boundary. No increase greater than 10 mm exist beyond the Racecourse property. In the 1 in 100 AEP the increases are around 30 mm, while in the 1 in 1000 AEP these increases are 11 mm beyond the Racecourse property. In the PMF event these increases are around 14 mm beyond the Racecourse property. During these rare to extreme flooding events, the Gosford Racecourse and surrounding floodplain is widely inundated by flood waters with flood depths over 1 m in the area of the proposed car park, in the events 1 in 100 AEP and greater.

#### 6.3.4 Qualitative DCP Assessment

Table 6-1 presents an assessment against the Council's Development Control Plan (DCP, 2013) Part 5.16 Location Specific Development Controls – West Gosford, Temporary Use of Gosford Racecourse.

**Table 6-1 DCP Requirements**

Requirement	Achieved	Comment
a. Any development is to be in accordance with the current Floodplain Management Map held by Council for this area: <ul style="list-style-type: none"> <li>• Significant water interchange occurs between the Narara Creek floodway and the flood storage areas; and this is not to be impeded</li> <li>• No filling should be permitted to reduce the volume in the storage area</li> <li>• All development should be flood compatible.</li> </ul>	No	This could be reviewed and may require compensatory flood storage to offset any land form adjustments within the Gosford Racecourse. Full flood assessment required during Development Application (DA) stage.
b. No development is to be constructed in the floodway or medium – high hazard areas of the floodplain.	No	Carpark area is within the flood storage area and high hazard area in the 1 in 100 AEP. This provisional hazard could be altered through flood mitigation. Full assessment during DA stage
c. The proposed development should not create cumulative impacts upstream or downstream or within the flood storage area of Narara Creek.	No	Some off site impacts noted in the events assessed, thus cumulative impacts could present. This could be reviewed and may require compensatory flood storage to offset any land form adjustments within the Gosford Racecourse. Full flood assessment required during Development Application (DA) stage.
d. Development must not result in significant impact of the conveyance of floodwaters.	TBC	Requires assessment during DA stage

Requirement	Achieved	Comment
e. No filling of the land is permitted that would reduce flood storage capacity.	No	Currently volume of fill greater than cut volumes. This could be reviewed and may require compensatory flood storage to offset any land form adjustments within the Gosford Racecourse. Full flood assessment required during Development Application (DA) stage.
f. All "temporary use" development must: <ul style="list-style-type: none"> <li>• Be able to be removed prior to the onset of a flood; or</li> <li>• Must be able to be shown to withstand a 1% (1 in 100 AEP) flood event and not create blockage, become debris or create damage either on site or down stream of the flood event.</li> </ul>	TBC	Requires assessment and consideration during further development phases
g. Interchange of floodwaters is not to be impeded.	Yes	The car park is located in a part of the Gosford Racecourse that would permit the interchange of flood waters.
h. A Site Specific Evacuation Plan must be provided addressing the following matters: <ul style="list-style-type: none"> <li>• Site Access and Emergency Exit Locations</li> <li>• All weather car parking, access and egress</li> <li>• Proposed hours of operation for event</li> <li>• Lighting</li> <li>• Flood Warning System</li> <li>• Vehicle and people evacuation plan, considering appropriate warning times, the nature of the event, vehicle instability due to buoyancy</li> <li>• Proposed plan for removal of structures/vehicles/people etc. if site unattended (for example out of event hours)</li> <li>• Stability of structures unable to be removed in the event of a flood</li> <li>• Environmental management matters relating to temporary toilet and shower facilities, display items (including gas bottles), garbage etc. in the event of a flood</li> <li>• Any other matter required by Council</li> </ul>	TBC	To be developed during the DA stage considering the points listed.

### 6.3.5 Summary

In summary, as part of the flooding assessment for this project the following tasks have been completed;

- A review of existing flood mechanisms for the Racecourse site.
- Re-running of the Council's Updated Narara Creek Flood Study (Golder, 2018) TUFLOW model to simulate existing catchment flood conditions, for the 1 in 10, 1 in 100 and 1 in 1000 AEP and PMF events.

- Including in the Council's Updated Narara Creek Flood Study (Golder, 2018) TUFLOW model the proposed carpark and tunnel. This scenario was simulated for the 1 in 10, 1 in 100 and 1 in 1000 AEP and PMF events.
- The outputs from these results were compared for change in flood level. The outputs from these simulations have been included in the figures in Appendix C including flood level and extent, flood velocity and flood hazard. The events including the 1 in 10, 1 in 100, 1 in 1000 AEP and PMF events have been included in these figures.
- A qualitative assessment against the DCP controls for the site has been covered in Table 6-1 above.

It is recommended that during any subsequent stages of the project, future flood assessments undertaken for this proposed work consider more frequent flooding events as well as overland flooding from the local catchment area.

Further to this, the proposed development was assessed against Council's DCP (DCP, 2013) Part 5.16 Location Specific Development Controls – West Gosford, Temporary Use of Gosford Racecourse. From this DCP, the two most important things to note are:

1. No development is to be constructed in the floodway or medium – high hazard areas of the floodplain (see Council's Development Control Plan (DCP, 2013) Part 5.16 Location Specific Development Controls – West Gosford, Temporary Use of Gosford Racecourse).
2. A Site Specific Evacuation Plan would be required and needs to address a number of matters relating to flooding.

It is considered that the current proposal would not meet the controls listed in the table above. Further assessment of flood mitigation measures (which could include levees, conveyance improvements, and/or compensatory storage) would need to be investigated to determine if Council's flood controls can be satisfied. Each of the mitigation measures would need to be assessed further, in accordance with the approaches in the NSW Floodplain Development Manual 2005.

In conclusion, the feasibility of the proposed car park, with respect to flooding, will require further assessment. Due to its proposed location within a high hazard flood storage area, a number of challenges are posed with respect to the management of flooding and addressing of the flood controls within the DCP.



## 7. Services

The current tunnel design has assumed 800 mm vertical clearance for services (below beam soffit). This includes lighting, electricity, communications and provision for other services to be considered in the detailed design stage.

Existing services such as electricity, drainage, sewerage and others which intersect with the proposed tunnel can be dealt with by relocating above the tunnel where possible, between the surface level and tunnel roof level. Where this is not possible, services may be relocated through the tunnel wall and positioned between precast girders, affixed to support beams. The latter option requires an additional consideration of waterproofing at the interface between the tunnel wall and service.

Council have advised GHD of a proposed new sewer line to be installed on the western side of Racecourse road. This sewer is to be connected to a proposed sewer pump station on the southern end of Racecourse Road. The design of this sewer line is currently being undertaken by others. Council will need to inform the sewer designers of the available 'space' between the top of the tunnel to the road. As the proposed sewer is running perpendicular to the tunnel, the grade of the sewer pipe will dictate the level of the sewer above the tunnel. This may require a re-route of the sewer or that it is to be treated as a rising main to address shallow grades in the alignment.

It is recommended that the adopted 800 mm services clearance in the tunnel should be reviewed during the detailed design stage, as it may be possible to optimise the clearance height further depending on the dimensions of lighting, cable trays and other applicable products available in the market. As noted in Section 3.1, an alternative option is to embed the services in the base slab and position lighting between precast beams, which would substantially reduce the required depth of the overhead clearance zone for services.

## 8. Tunnel construction sequence

The tunnel walls are formed with contiguous secant bored piles using the top-down construction methodology. This means the tunnel roof structure is formed with precast beams and cast in situ slab prior to excavation beneath the 'roof' for the tunnel, allowing minimum closure duration for Racecourse Road and the main race course. The proposed construction sequence is as follows:

1. Construct secant pile walls.
  - i) Pile walls be constructed progressively along the tunnel according to the construction stage, as shown on the concept design drawings, with piles bored from ground level.
  - ii) At the interface between each construction stage along the tunnel alignment, a cut-off wall into an impermeable ground layer will be required to prevent water ingress. Cut-off walls are also required at the ramp excavation ends.
2. Excavate to below capping beam level.
  - i) Piles will be cut off below capping beam level with reinforcement protruding in order to form a connection with the capping beam.
  - ii) Temporary pumping will be required from this step until tunnel completion for dewatering.
3. Construct capping beam.
  - i) Following capping beam construction, mortar pads constructed or shims installed for supporting roof beams. Capping beams will also have reinforcement protruding in order to form an integral connection with the roof.
4. Land precast roof beams.
  - i) Precast roof beams will be constructed off-site and transported to site. Due to the use of precast beams, these can increase speed of construction thus allowing Racecourse Road to be opened to road users sooner.
  - ii) The tops of precast beams will have aggregate and reinforcement ligatures exposed in order to allow for a construction joint to be formed with the topping slab.
5. Construct roof slab and top with waterproofing membrane. During this stage a monolithic connection will be formed between the roof structure and pile capping beams.
  - i) The exposed faces of the capping beam and roof structure will be covered with waterproofing membrane.
6. Backfill on top of tunnel roof structure.
  - i) Following this stage, surface infrastructure can be reinstated while construction work proceeds beneath the tunnel roof.
7. Excavate to below base slab level.
  - i) Spoil will be transported through the tunnel to the portals for removal.
8. Construct base slab with underlying waterproofing membrane.
9. Construct tunnel walls and line with waterproofing membrane.
10. Install overhead services.

For the ramp sections, a different construction sequence applies (requiring temporary propping for pile support) and is shown in the concept design drawings.

The proposed construction stages along the tunnel alignment are as follows:

- Construction Stage 1: West tunnel entrance to west side of main race track (main race track to remain open).
- Construction Stage 2: Tunnel from main race track to middle of Racecourse Road (west side of road closed to traffic). Traffic to be diverted onto remaining lane on Racecourse Road with traffic controls.
- Construction Stage 3: East side of Racecourse Road and private property to end of Donnison Street.
- Construction Stage 4: Donnison Street tunnel approach ramp.

A number of the above construction stages may be completed concurrently along the tunnel alignment in order to increase speed of construction. For example, Stages 1 and 4 (tunnel approach ramps) may be constructed simultaneously. Alternatively, Stages 3 and 4 could be constructed simultaneously (East approach ramp and private property). The only stages which cannot be constructed at the same time are Stages 2 and 3 as these both comprise part of Racecourse Road. It is also suggested that Stages 1 and 2 are not constructed at the same time as it will not permit use of the racecourse. However, it is recommended that the relevant stakeholders are engaged to confirm the preferred construction staging along the tunnel.

## 9. Safety in design

Civil design safety considerations:

- Ramp grade and cross section at East ramp (two 3.5 m wide lanes), risk of breakdown and any potential impact on vehicle access.
  - Should a vehicle breakdown within the tunnel, this could potentially cause a backlog of vehicles trying to enter/exit the carpark via the tunnel. Other vehicles travelling within the tunnel could be idle in the tunnel as it is blocked.
  - This limitation may affect the access for any emergency vehicle and tow trucks entering the tunnel during this event.
- Proximity to Donnison and Young Street intersection affecting sight lines for vehicles exiting the tunnel.
- Adequate carpark lane widths etc. to reduce risk of crashes.
- Flood hazard increases risk to persons and property. Potential for floodwater to impact both life and property due to height and velocity of the flooding.
- Horses breaking the track barrier and entering carpark, risk to person and property.

Tunnel safety considerations:

- Traffic safety considerations:
  - Road speed through tunnel is limited to 20 km/hr due to road geometry.
  - Lighting will be required in the tunnel for egress and everyday vehicle use. Tunnel lighting design will transition from brighter outdoor light setting to tunnel environment in order to reduce risk of disorienting road users.
  - Due to the absence of single slope barriers on the East tunnel ramp (due to constrained width between property boundaries), the tunnel wall in this location will be designed to resist collision loads from traffic.
- Fire Life Safety (FLS) requirements:
  - As the tunnel is less than 120 metres in length, it is classified as a “short tunnel” to Clause 1.4 of AS4825 *Tunnel Fire Safety* (2011). During the detailed design stage, a Fire Engineering Brief (FEB) will be developed in consultation with the relevant stakeholders (Council, designer, third party reviewer) which describes the fire safety aspects of the tunnel and the scope of work for the fire engineering analysis. The FEB is complemented by a Fire Engineering Report (FER) which describes the fire engineering design, such as fire hazards and safety measures.
  - Egress via the tunnel portals is deemed acceptable. Although the road narrows at the East ramp approach, egress via the portals is acceptable provided there are no obstructions impeding egress over the central median, such as columns or railing.
  - Emergency services will require fire hydrants outside each tunnel portal with hose reels. A fire hydrant may also be required in the middle of the tunnel.
  - A communication system will be required, which would likely include one motorist emergency phone outside each tunnel portal on both sides of the road. Wayfinding markers will be required to locate emergency phones.
  - Video surveillance system is not required from a FLS point of view, however police and traffic authorities may require a surveillance system.

- Structure fireproofing may require that reinforced concrete elements to be designed with increased concrete cover and may also require passive fireproofing materials such as cementitious fireproofing (concrete spray) or intumescent coating.
  - Services such as lighting will also require fire protection.
- Flooding considerations:
  - During large rainfall events, the tunnel will undergo flooding. Therefore flood depth markers and warning signs should be installed on both tunnel approach roads.
  - Services will require flood protection.

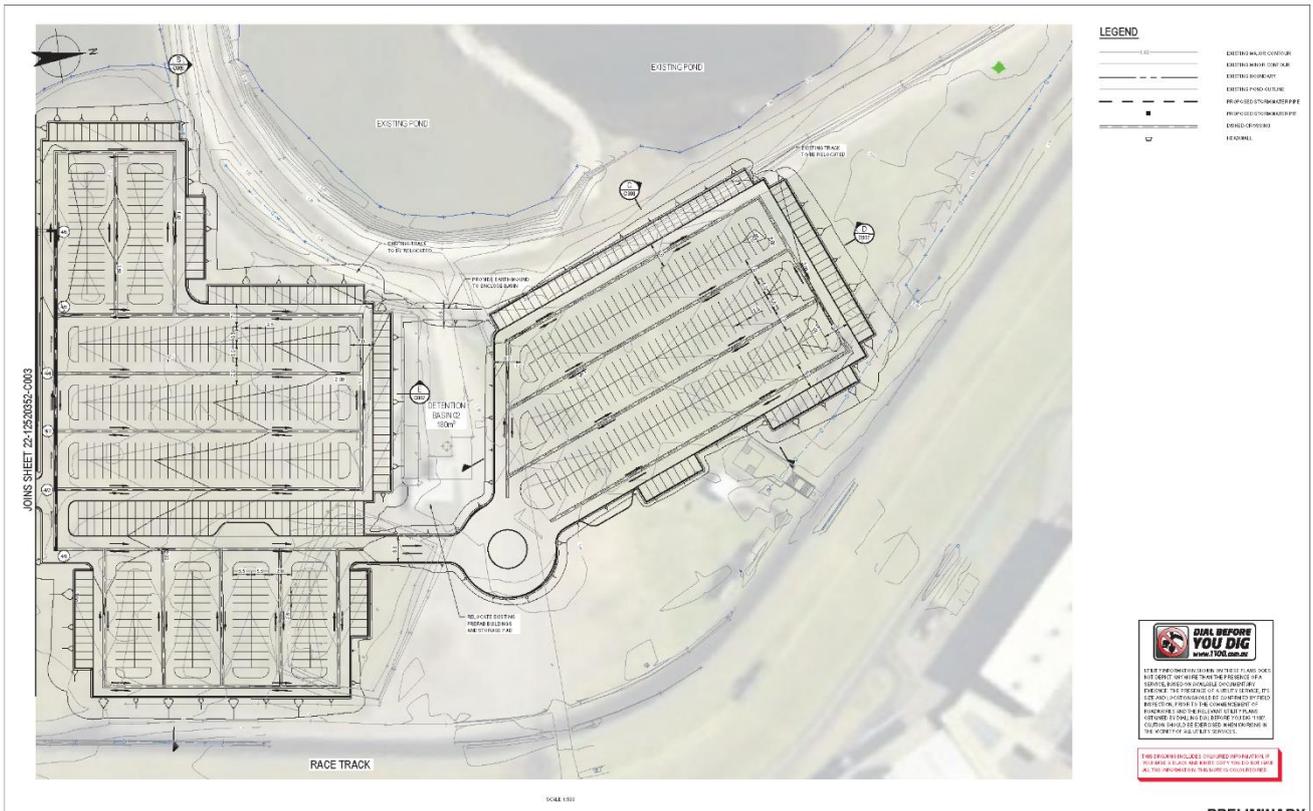


# Appendices

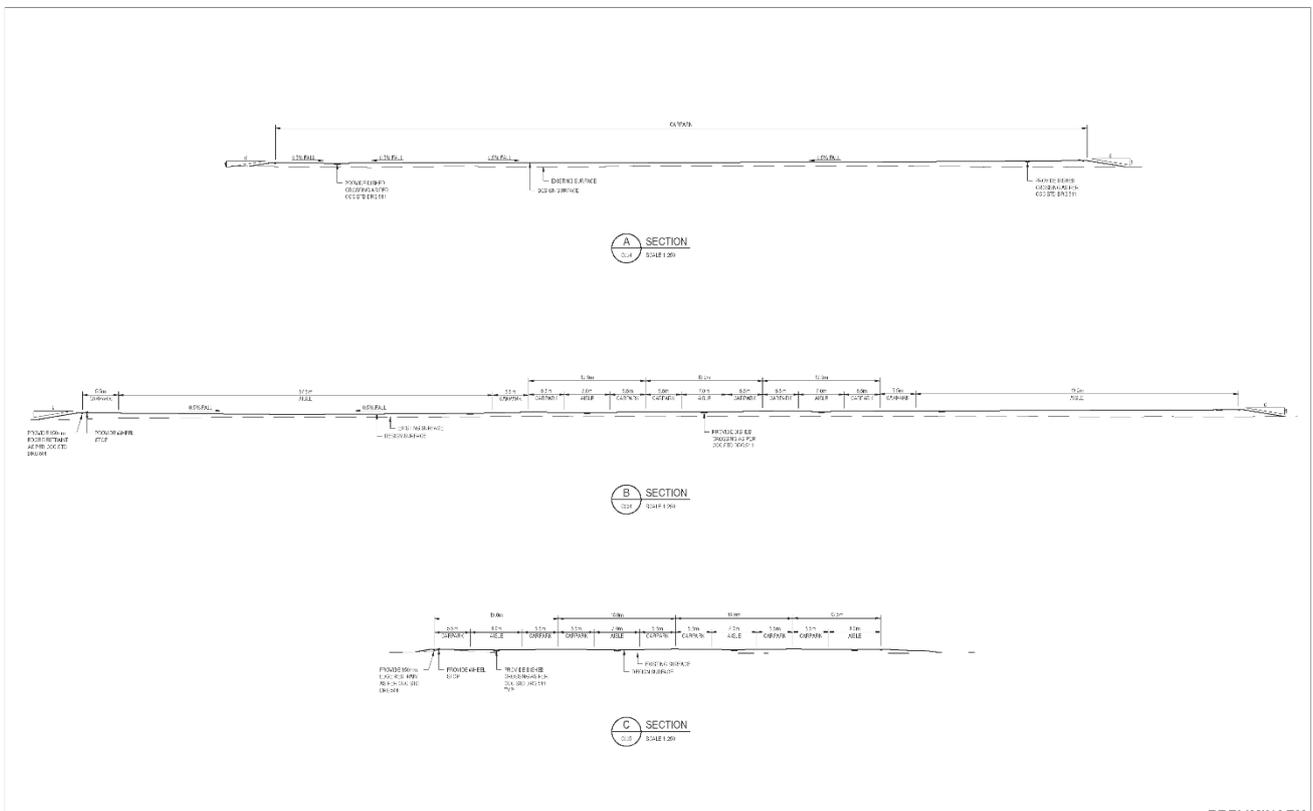
## **Appendix A** – Concept drawings







<p><b>PRELIMINARY</b></p>			
<p><b>DO NOT SCALE</b></p> <p>Drawn: R. LORRIND Checked: J. BETHLEA Date: 10/10/2014</p> <p>Design: R. LORRIND Checked: J. BETHLEA Date: 10/10/2014</p> <p>Scale: AS SHOWN</p>	<p><b>CENTRAL COAST COUNCIL</b> <b>RACECOURSE RD UNDERPASS</b> <b>DETAIL PLAN - SHEET 2 OF 2</b></p>	<p>Sheet No: <b>A1</b> Drawing No: <b>22-12520352 - C005</b> Rev: <b>A</b></p>	<p><b>GHD</b></p> <p>100 Stirling Drive, Tuggerah Business Park PO Box 200, Tuggerah NSW 2257 T: 61 61 424 4444 F: 61 61 424 4444 E: enquiries@ghd.com.au www.ghd.com.au</p>

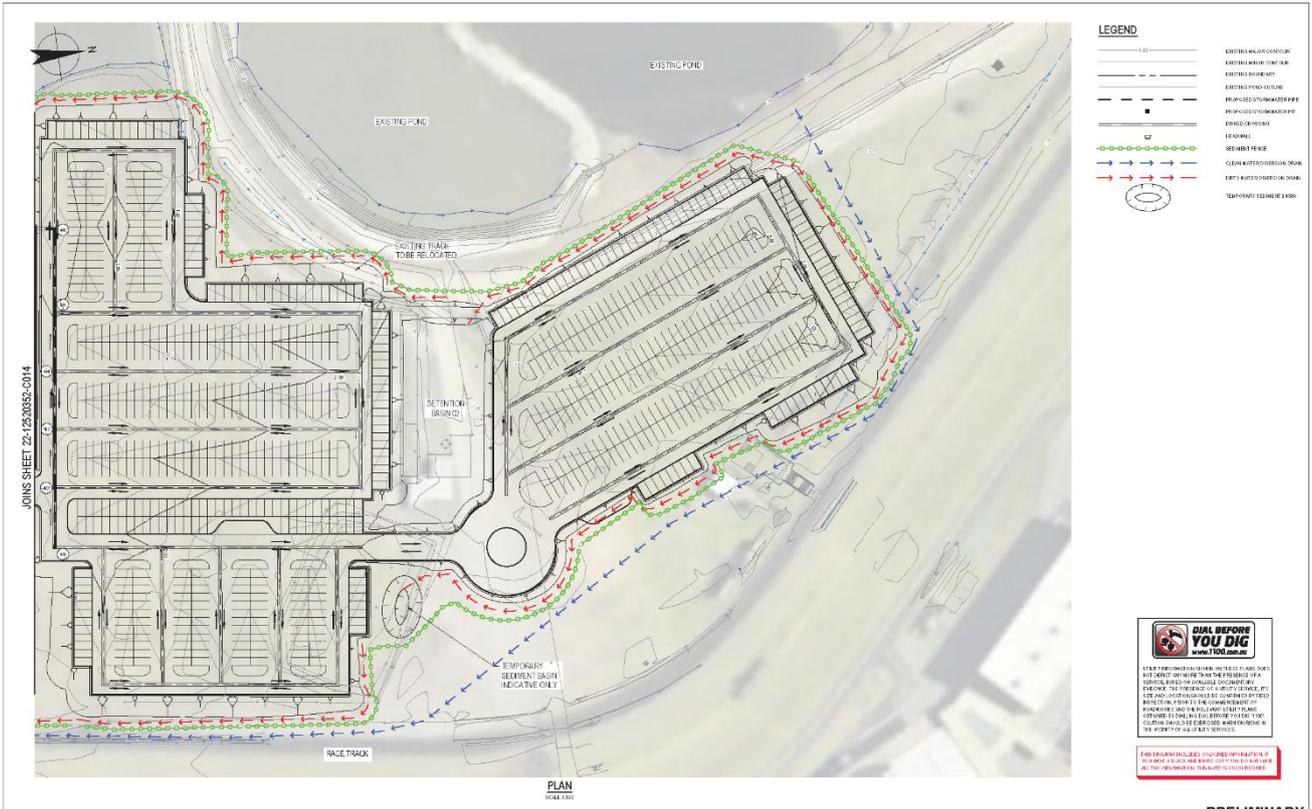


<p><b>PRELIMINARY</b></p>			
<p><b>DO NOT SCALE</b></p> <p>Drawn: R. LORRIND Checked: J. BETHLEA Date: 10/10/2014</p> <p>Design: R. LORRIND Checked: J. BETHLEA Date: 10/10/2014</p> <p>Scale: AS SHOWN</p>	<p><b>CENTRAL COAST COUNCIL</b> <b>RACECOURSE RD UNDERPASS</b> <b>TYPICAL SECTIONS</b> <b>SHEET 1 OF 2</b></p>	<p>Sheet No: <b>A1</b> Drawing No: <b>22-12520352 - C006</b> Rev: <b>A</b></p>	<p><b>GHD</b></p> <p>100 Stirling Drive, Tuggerah Business Park PO Box 200, Tuggerah NSW 2257 T: 61 61 424 4444 F: 61 61 424 4444 E: enquiries@ghd.com.au www.ghd.com.au</p>



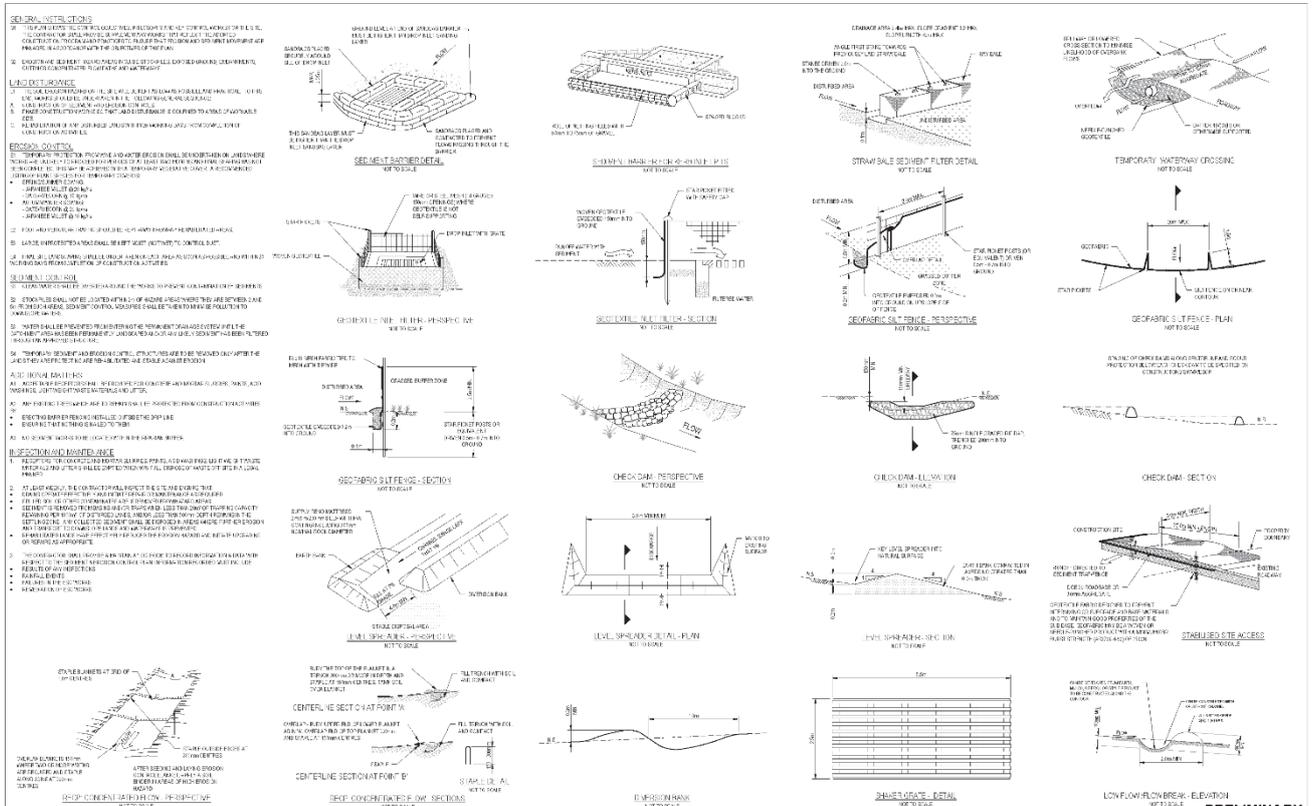






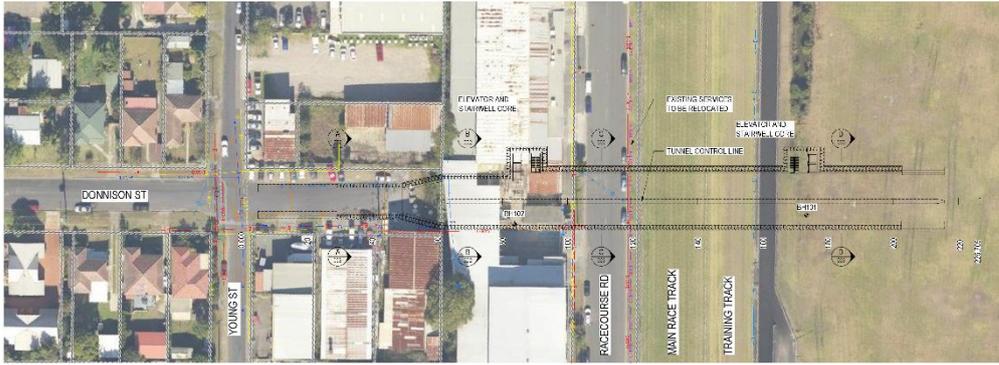
PRELIMINARY

<p><b>DO NOT SCALE</b></p> <p>Drawn: A. BROWN Design: P. BETHUNE                  Drafted: A. BETHUNE Checked: A. BETHUNE                  Date: 06/03/2020                  Scale: AS SHOWN</p>		<p>Client: CENTRAL COAST COUNCIL                  Project: RACECOURSE RD UNDERPASS                  Drawing No: 22-12520352 - C015</p>	<p>Revision: A                  Date: 06/03/2020</p>
--	--	--	--



PRELIMINARY

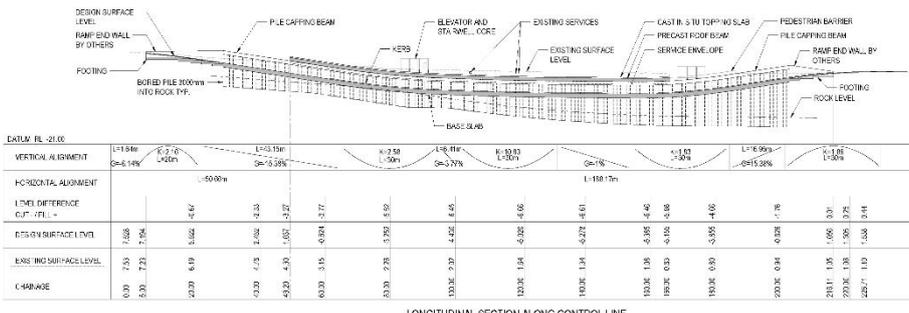
<p><b>DO NOT SCALE</b></p> <p>Drawn: A. BROWN Design: P. BETHUNE                  Drafted: A. BETHUNE Checked: A. BETHUNE                  Date: 06/03/2020                  Scale: AS SHOWN</p>		<p>Client: CENTRAL COAST COUNCIL                  Project: RACECOURSE RD UNDERPASS                  Drawing No: 22-12520352 - C016</p>	<p>Revision: A                  Date: 06/03/2020</p>
--	--	--	--



- GENERAL NOTES**
1. DIMENSIONS ARE IN METRES (DIMENSIONS AND LEVELS IN METRES, LEVELS ARE TO AND FROM)
  2. ALL WORKS TO BE PROPOSED UNDER THE DESIGN STAGE
  3. CONSIDER ALL EXISTING SERVICES TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION
  4. REFER TO CIVIL DESIGN DRAWINGS FOR SERVICE DETAILS
  5. CONCEPT DRAWINGS SHALL NOT BE USED FOR CONSTRUCTION

- LEGEND**
- DEVOTES BOREHOLE LOCATION
  - EXISTING DRAINAGE LINE
  - EXISTING GEMER MAIN
  - EXISTING WATER MAIN
  - EXISTING WATER MAIN (DEPT)
  - EXISTING ELECTRICAL
  - EXISTING ELECTRICAL (DEPT)
  - EXISTING TELEPHONE (DEPT)
  - EXISTING NEW (DEPT)

PLAN  
22-12520352

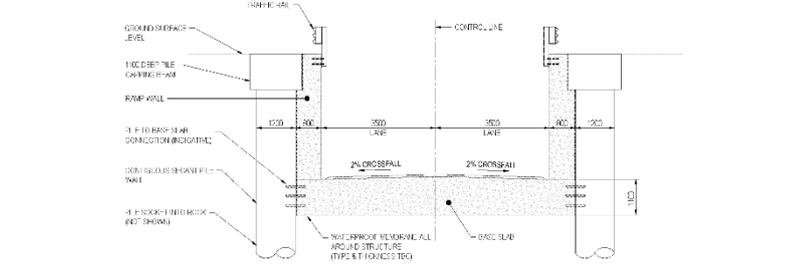


LONGITUDINAL SECTION ALONG CONTROL LINE  
22-12520352

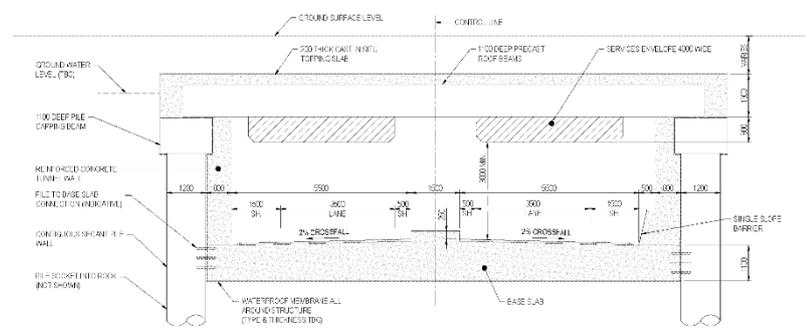
CONCEPT DESIGN

			<p><b>DO NOT SCALE</b></p> <p>Scale: 1:1000</p> <p>Author: J.A.</p> <p>Designer: J.A.</p> <p>Checker: J.A.</p> <p>Project: CENTRAL COAST COUNCIL RACECOURSE RD UNDERPASS GENERAL ARRANGEMENT PLAN AND ELEVATION</p> <p>Sheet: A1</p> <p>Drawing No: 22-12520352-ST001</p> <p>Rev: A</p>
--	--	--	---

NOTES



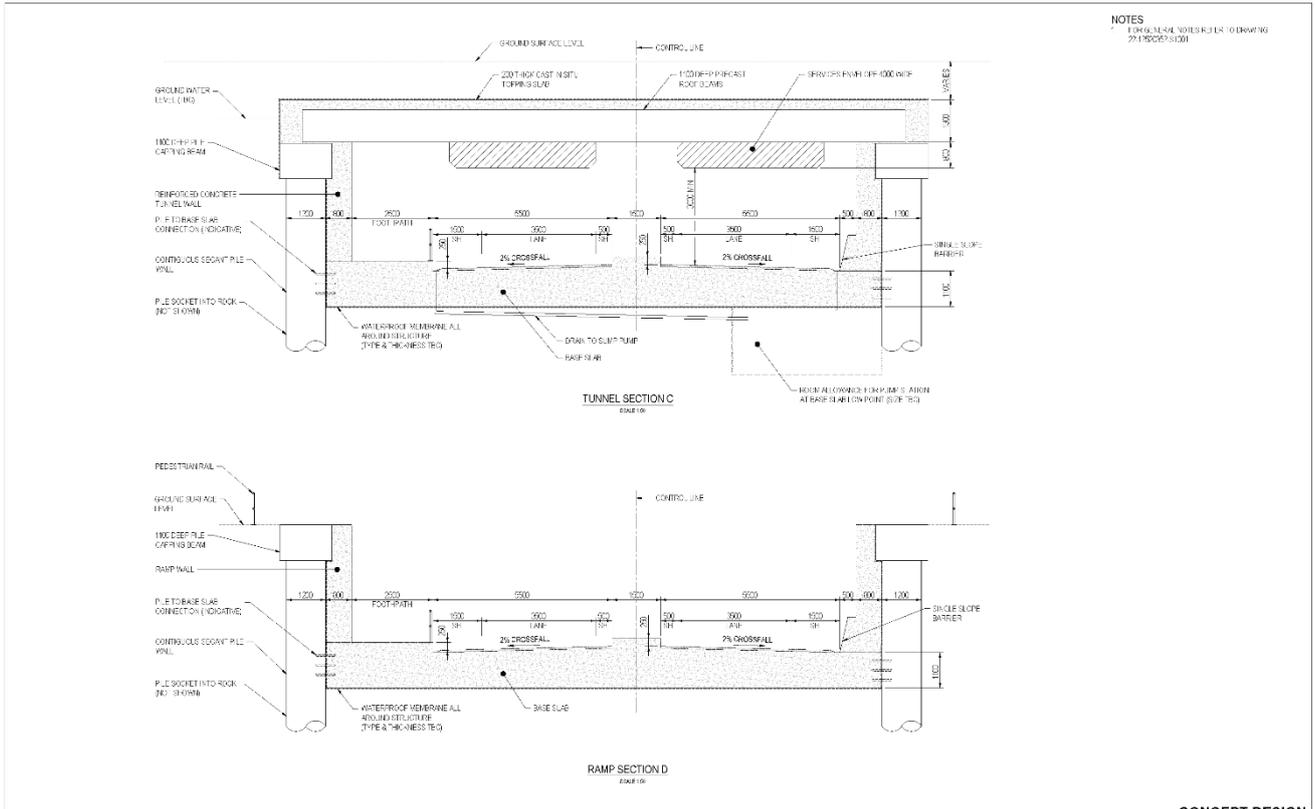
RAMP SECTION A  
22-12520352



TUNNEL SECTION B  
22-12520352

CONCEPT DESIGN

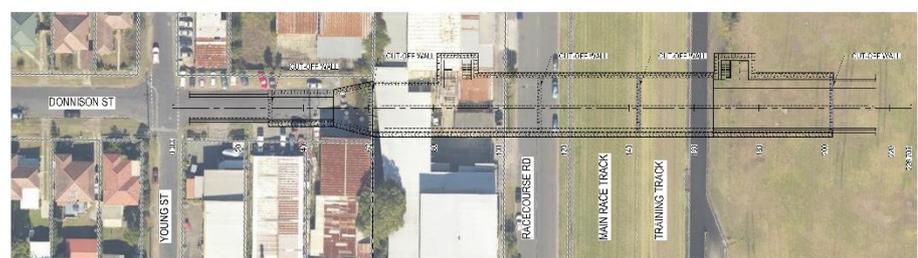
			<p><b>DO NOT SCALE</b></p> <p>Scale: 1:1000</p> <p>Author: J.A.</p> <p>Designer: J.A.</p> <p>Checker: J.A.</p> <p>Project: CENTRAL COAST COUNCIL RACECOURSE RD UNDERPASS GENERAL ARRANGEMENT SECTIONS - SHEET 1 OF 2</p> <p>Sheet: A1</p> <p>Drawing No: 22-12520352-ST002</p> <p>Rev: A</p>
--	--	--	--



NOTES  
1. FOR GENERAL NOTES REFER TO DRAWING 22-12520352-01

CONCEPT DESIGN

			<p><b>DO NOT SCALE</b></p> <p>Drawn by: [Name] Designer by: [Name] Checked by: [Name] Date: [Date]</p>	<p>Project No: 22-12520352-01 Drawing No: 22-12520352-ST003</p>
<p>A CONCEPT DESIGN</p>	<p>JA BA SA EA</p>			



NOTES  
1. FOR GENERAL NOTES REFER TO DRAWING 22-12520352-01



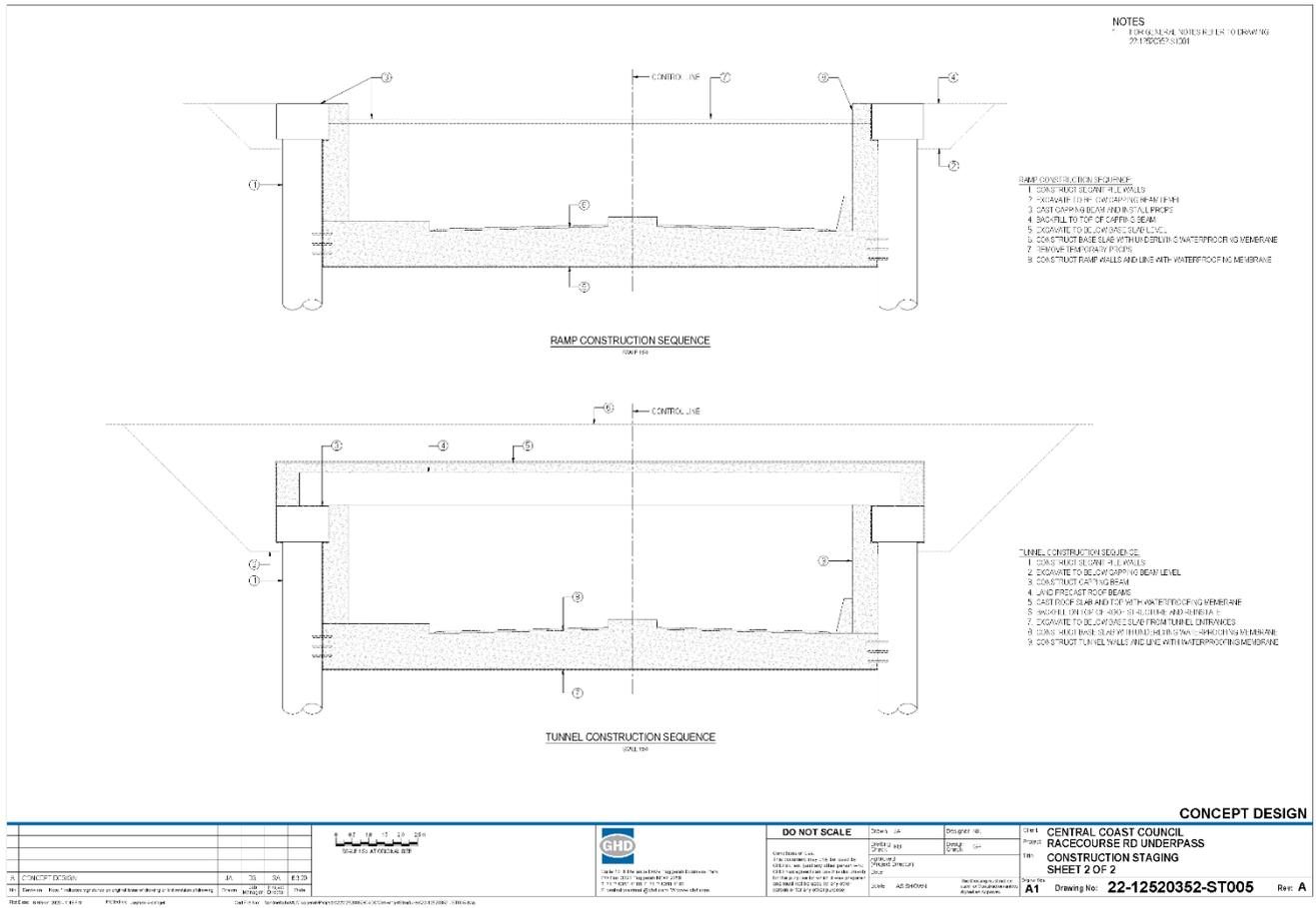
CONSTRUCTION STAGES:  
 STAGE 1 WEST RAMP STRUCTURE AND RACECOURSE TRAINING TRACK  
 STAGE 2 RACECOURSE MAIN TRACK AND WEST SIDE OF RACECOURSE ROAD (ONE LANE)  
 STAGE 3 EAST SIDE OF RACECOURSE ROAD (REMAINING LANES) AND RAMP STRUCTURE  
 STAGE 4 WEST RAMP STRUCTURE  
 STAGE 5 EXCAVATE TO BASE SLAB LEVEL  
 STAGE 6 CORE TRACK BASE SLAB AND TUNNEL WALLS  
 STAGE 7 CONSTRUCT BASE SLAB AND TUNNEL WALLS

NOTE THAT STAGES 1 AND 4 MAY BE CONSTRUCTED CONCURRENTLY

OUT-OFF WALL IS TO BE CONSTRUCTED FOR PAVEMENT BEHIND DONNISON RAMP AND DONNISON EAST ON TOP OF OUT-OFF WALLS TO BE REMOVED PRIOR TO CONSTRUCTION OF BASE SLAB.

CONCEPT DESIGN

			<p><b>DO NOT SCALE</b></p> <p>Drawn by: [Name] Designer by: [Name] Checked by: [Name] Date: [Date]</p>	<p>Project No: 22-12520352-01 Drawing No: 22-12520352-ST004</p>
<p>A CONCEPT DESIGN</p>	<p>JA BA SA EA</p>			



## **Appendix B** – Geotechnical technical advice note



## Technical Advice Note TAN – 001

6 March 2020

**To** Matthew Carroll

**Copy to** Harrison Fugate, Kim Chan, Firman Siahaan

**From** Bosco Poon

**Tel** +61 2 9462 4724

**Subject** **Gosford Racecourse – Preliminary Concept Design** **Job no.** 12520352  
**TAN – 001 – Preliminary geotechnical assessment for proposed access tunnel – Gosford Racecourse**

### 1 Introduction

Gosford Racecourse project comprises the development of the proposed on grade carpark in the middle of the existing Gosford Racecourse accessed via a proposed tunnel from Donnison Street. The proposed tunnel extends from west (Racecourse carpark) to east (Donnison St) for an approximate length of 257 m and is perpendicular to the Racecourse Rd. The proposed tunnel is to be constructed to provide at least 3 m of headroom to accommodate large vehicles (bus) by means of “cut and cover” method. Based on Options report dated 24 January 2020, it is understood that the proposed tunnel comprises a “dive” wall section with a gradient of 1V:6.5H over a length of approximately 72 – 79 m at both sides of the tunnel. The main tunnel extends for an indicative length of 106 m with a gradient of about 1.3% crossing below the race track and existing Racecourse Rd.

GHD has been engaged by Central Coast Council (CCC) to provide multidisciplinary consultancy services comprising site investigation works, options development and options report. Prior to the options development, GHD has undertaken a geotechnical and contamination investigation to assess subsurface profile and ground conditions. As part of the options development, three options for the proposed tunnel construction are presented on the basis of construction methodology: secant piles with bottom-up construction, secant piles with top-down construction and diaphragm walls with top-down construction. It is understood that the Option 2 (“secant bored piles with top-down construction”) has been selected as a preferred option.

As part of the options development, GHD geotechnical team has been requested to undertake a preliminary geotechnical assessment for Option 2 comprising:

- Serviceability (deformation) analysis for the assessment of ground-movement induced structural actions on the proposed tunnel.
- Ultimate/strength-based analysis for the tension pile design for the support against uplift pressure.
- Preliminary assessment to assess the transition between the tunnel section with secant piles support and the “dive box” structure without piles support.

The purpose of this Technical Advice Note (TAN) is to provide the summary of the outcome of the above preliminary geotechnical assessment for the proposed Gosford Racecourse project.



## Technical Advice Note TAN – 001

### 2 References

The following documents are referred to in this TAN:

1. *Reference R1*: Preliminary Geotechnical and Contamination Investigation Report by GHD: "Gosford Racecourse Multidisciplinary Services", reference 12520352-26771, dated 30/01/2020.
2. *Reference R2*: Options Shortlisting Summary Report by GHD: "Gosford Racecourse Multidisciplinary Services", reference 12520352-24345, Revision A, dated 24/01/2020.

### 3 Assumption and limitations

#### 3.1 General

This TAN has been prepared by GHD for CCC and may only be used and relied on by CCC for the purpose as outlined in Section 1 of this TAN.

GHD otherwise disclaims responsibility to any person other than CCC arising in connection with this report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this TAN were limited to those specifically detailed in the TAN and are subject to the scope limitations set out in the TAN.

GHD has prepared this TAN on the basis of information provided by CCC which GHD has not independently verified or checked. Such information includes, but is not limited to, geotechnical data relating to previous investigations by others within the project area. GHD does not accept liability in connection with such unverified information, including errors and omissions in the TAN which were caused by errors or omissions in that information.

The opinions, conclusions and any recommendations in this TAN are based on:

- Conditions encountered and information reviewed at the date of preparation of the TAN. GHD has no responsibility or obligation to update this TAN to account for events or changes occurring subsequent to the date that the TAN was prepared.
- Information obtained from, and testing undertaken at or in connection with, specific sample points. Site conditions at other parts of the site may be different from the site conditions found at the specific sample points.

Investigations undertaken in respect of this TAN are constrained by the particular site conditions, such as the location of roads, services and vegetation. As a result, not all relevant site features and conditions may have been identified in this TAN.

Site conditions may change after the date of this TAN. GHD does not accept responsibility arising from, or in connection with, any change to the site conditions. GHD is also not responsible for updating this TAN if the site conditions change.



## Technical Advice Note TAN – 001

### 3.2 Key assumptions for geotechnical assessment

The following assumptions have also been made for the purpose of our assessment:

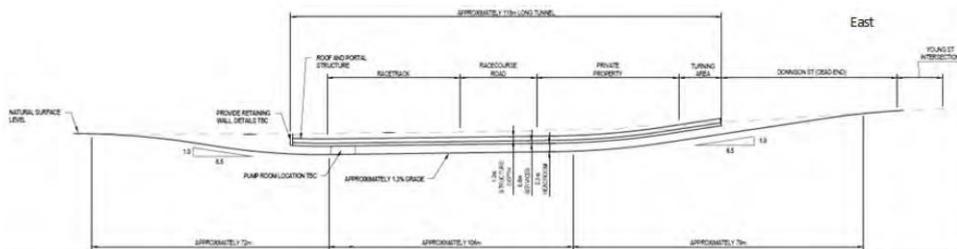
- In consultation with the structural team, the roof and base slabs were assumed to have fixed connection to the secant piles to allow full moment and shear transfer.
- It is our understanding that the pump room would not be continuous along the proposed tunnel alignment. We also understand that the detailed dimension of the pump room have not been supplied in the Options report (ref. R2). In our assessment we have allowed for the pump room with an assumed internal dimension of 4 m wide by 1.5 m high.
- Our assessment is based on the typical cross section for Option 2 which is presented in the Options report (ref. R2). A soil cover of 1.2 m has been adopted above the top of the roof slab.
- Our assessment has not considered cantilever pile wall section without the propping effect by the roof slab. Depending on the depth of excavation for this “cantilever” section, ground condition and structural properties, this scenario could potentially become a critical design case.
- Top of proposed secant piles was assumed to be rigidly connected to the underside level of the capping beam. Initial excavation from the ground surface up to the top of secant piles was assumed to be supported by a temporary batter of no steeper than 1V:2H.
- Smooth interface has been considered along the length of relevant structure where waterproof membrane was noted in the typical cross section.
- Surcharge due to traffic load where applied was assumed to be 20 kPa acting on the existing ground level.
- The rock profile adopted in the deformation assessment and analysis of tension pile was based on the geotechnical investigation data.



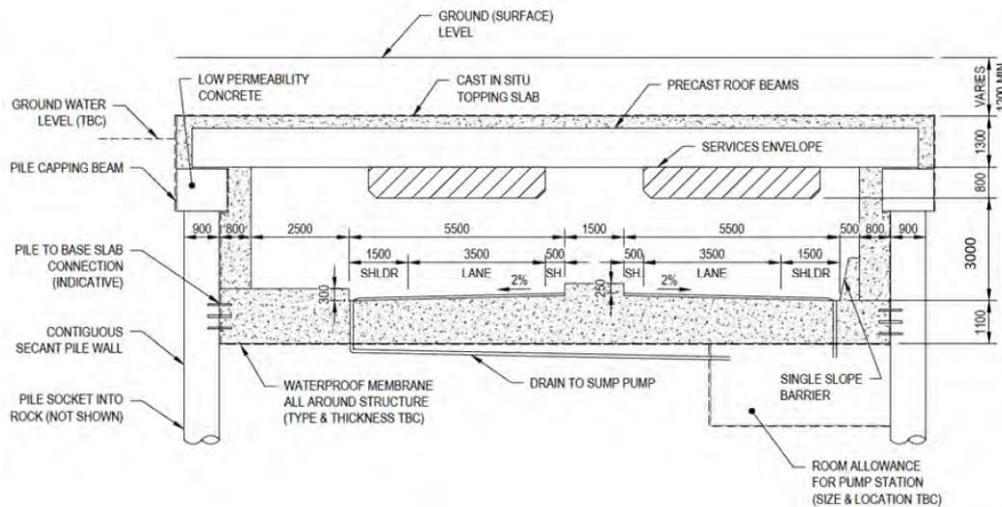
**Technical Advice Note TAN – 001**

**4 Adopted cross sectional model**

The general alignment for the proposed tunnel as given in the Options report (ref. R2) is shown in Figure 1 below. For our deformation (serviceability) analysis and the subsequent design of tension piles, the general cross section (Figure 2) of the proposed tunnel as presented in the Options report (ref. R2) has been adopted.



**Figure 1 – Long section showing approximate tunnel alignment**



**Figure 2 – Typical cross section for Option 2 (Secant piles with top-down construction)**

In the absence of detailed structural information for the “dive” structure of the tunnel, we have conservatively assumed the below configuration (Figure 3 and Figure 4) in the uplift assessment. The key details in relation to the adopted cross sections used in the uplift assessment are as follows:

- Side wall thickness = 0.5 m
- Base slab thickness = 1.1 m (as per Figure 2)
- Roof slab and surcharge were not considered



**Technical Advice Note TAN – 001**

- Side walls are fixed to the base slab

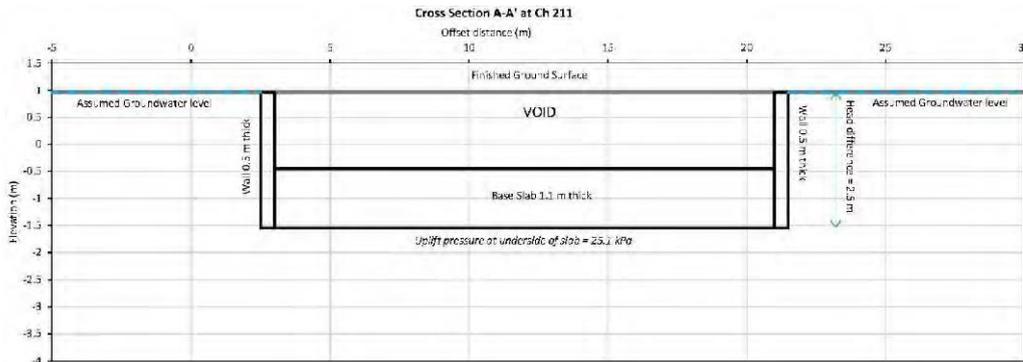


Figure 3 – Typical cross section (based on Ch. 211) assumed for uplift assessment

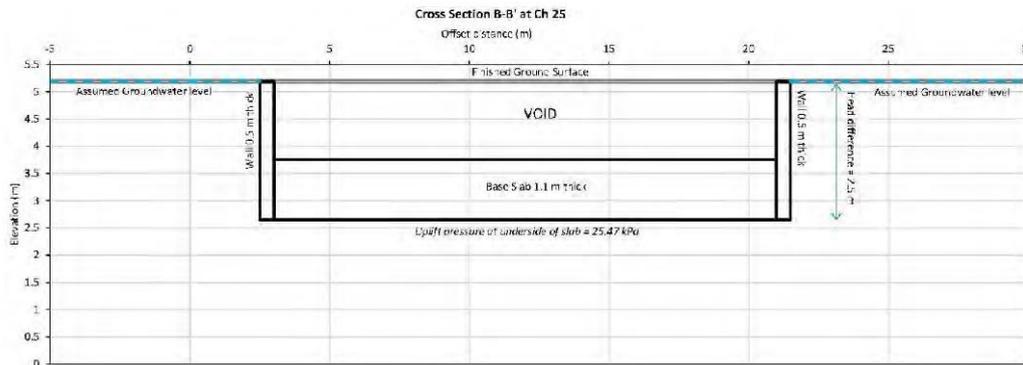


Figure 4 – Typical cross section (based on Ch. 25) assumed for uplift assessment

**5 Geotechnical model**

The subsurface profile adopted in our serviceability analysis is based on the results presented in the Geotechnical and Contamination Investigation Report (GCIR). The subsurface profile observed in borehole BH101 has been adopted where thicker soft clay layer and deeper rock strata have been noted during the geotechnical investigation.

The geotechnical design parameters were generally adopted on the basis of results of our geotechnical investigation and laboratory testing summarised in the GCIR as well as our local experience in the vicinity of the site (Chan and Stone, 1985). The at-rest earth pressure coefficient ( $K_0$ ) for the lightly overconsolidated layer including Unit 2A (soft clay) was assessed based on the published  $K_0$  correlation



## Technical Advice Note TAN – 001

(Ladd et al, 1977; Brooker and Ireland, 1965) with soil plasticity index and initial over-consolidation ratio (OCR). The OCR values for soft clay layer were obtained from the undrained shear strength (measured by using hand vane) based on SHANSEP (Ladd and Foott, 1974). The values were then checked against the information from our past experience in the locality.

Although groundwater depths recorded during the limited drilling investigation varied from 1 m to 1.9 m below the existing ground level (EGL), we have conservatively adopted a groundwater level at the EGL in our assessment.

As per the Options report (ref. R2), it is understood that the groundwater dewatering will be carried out during the construction. As such, the groundwater was lowered to the base of respective excavation levels in various stages of construction modelled in our analysis.

For the backfill materials (i.e. above the roof slab), the following typical properties have been adopted:

- Effective friction angle = 30°
- Effective cohesion = 5 kPa
- Young's Modulus  $E'$  = 25 MPa

Summary of the subsurface profile and design parameters adopted in our assessment are shown in Table 1. Typical plot of this profile as shown in the GCIR (ref. R1) is also indicated in Figure 8.



Technical Advice Note TAN – 001

Table 1 – Adopted subsurface profile (based on BH101 in GCIR) and design parameters

Unit	Depth to base (m)	Unit Weight (kN/m <sup>3</sup> )	Drained Design Parameters		Compressibility/Stiffness Parameters				Over Consolidation Ratio (OCR)	At-rest earth pressure coefficient K <sub>0</sub>	Ultimate Shaft Adhesion	
			Friction Angle (°)	Cohesion (kPa)	CR = $C_c / (1 + e_0)$	CRR = $C_r / (1 + e_0)$	E <sub>50</sub> (Young's Modulus for loading) MPa	E <sub>ur</sub> (Modulus for unload/reload) MPa			Compression (kPa)	Tension (kPa)
1 – Fill (Sandy Clay)	0.5	16	30	5	Not used	Not used	4	12	Not used	0.5	Not used	
2A – Very soft to soft Alluvial clay	3.8	16	26	0	0.35	0.055	Not used	Not used	2.1 to 6.5	0.78 to 1.28		
2B – Loose Sand	7.8	17	30	0	Not used	Not used	5	15	Not used	0.5		
2C – Med. Dense Sand	10	19	32	0			15	45		0.47		
2C – Stiff Clay	11	19	26	2			15	45		0.56		
3 – Residual Clay	13	20	26	5			40	120		0.56		
4A/4B – V. Low to Low strength rock	14.3	22	30	20			100	100		0.5		
4C – Medium to High Strength Sandstone	Not proven	24	40	100	900	900	0.36	1200	960			

Note:  
 1. OCR and K<sub>0</sub> vary with depths. Discretization of soft clay layer has been incorporated in our analysis.



## Technical Advice Note TAN – 001

### 6 Assumed structural properties

The following properties were assumed for the reinforced concrete materials in the absence of structural design information:

- Unit weight = 24 kN/m<sup>3</sup>
- E (uncracked concrete/short term) = 30 GPa
- E (cracked concrete/long term) = 18 GPa

After consultation with the structural team, 1.2 m diameter secant pile was adopted in lieu of 0.9 m diameter pile, originally shown in the Options report (ref. R2). For this pile, we have assumed a typical spacing of 2 m between the “hard/structural” piles (i.e. piles with reinforcement) which are usually constructed after the construction of “green” piles has been completed in a “hit and miss” pattern (see Figure 5 below).

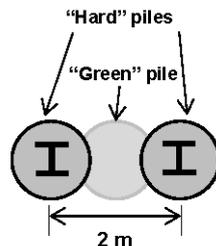


Figure 5 – Adopted arrangement of secant pile walls (Note: shown reinforcement type in indicative only)

In our 2-dimensional plane-strain analysis, the secant piles on each side of the proposed tunnel were modelled as a rectangular element which was continuous in the out-of-plane direction. The equivalent width ( $d_{eq}$ ) and Young's Modulus ( $E_{eq}$ ) had to be analysed to satisfy the equivalence of both axial ( $E \cdot A$ ) and flexural rigidity ( $E \cdot I$ ) as per equations (1) and (2) below, respectively.

$$\frac{E_{pile} A_{pile}}{s} = E_{eq} d_{eq} \quad (1)$$

$$\frac{E_{pile} I_{pile}}{s} = E_{eq} \frac{d_{eq}^3}{12} \quad (2)$$

where  $E_{pile}$ ,  $A_{pile}$ ,  $I_{pile}$  are the Young's Modulus, cross sectional area and moment of inertia of circular piles, respectively;  $s$  is the c/c spacing between “hard” piles. The adopted  $d_{eq}$  and  $E_{eq}$  values are:

- $d_{eq} = 1.04$  m
- $E_{eq} = 16.3$  GPa (uncracked)
- $E_{eq} = 9.8$  GPa (cracked)

The roof and base slabs were also modelled as rectangular element with the following thicknesses. The slab thickness for pump room was assumed to be the same as that of base slab.

- Roof slab = 1.3 m thick



## Technical Advice Note TAN – 001

- Base slab = 1.1 m thick

### 7 Assessment methodology

#### 7.1 Deformation assessment

A deformation assessment has been carried out by means of a multi-stage Finite Element Analysis (FEA) using the commercially available software program PLAXIS 2D. Adopted constitutive models for various soil/rock materials were as follows

- Unit 2A (very soft/soft clay) modelled by using Soft Soil model.
- Units 1, 2B and 2C modelled by using Hardening Soil model
- Added fill materials and Units 4A to 4C modelled by using Mohr Coulomb model

As outlined in Section 6, the structural components were modelled as rectangular elements with linear elastic and non-porous behaviour.

For the purpose of our assessment, we have conducted 2 sets of FEA. In the first set, a surcharge of 20 kPa was considered on the EGL. In the second set, no surcharge was applied on the EGL.

The adopted construction stages in the FEA are shown in Appendix A.

#### 7.2 Adopted consideration for pile analysis

Socket embedment of "hard" piles was checked by comparing the ultimate geotechnical uplift capacity of pile against the factored tensile force induced by the uplift pressure analysed in the FEA. The following assumptions were employed in our analysis:

- Geotechnical reduction factor ( $\phi_g$ ) of 0.4
- Shaft adhesion in tension was taken as 0.8 times shaft adhesion in compression
- Shaft adhesion from the soil layers and end bearing have not been considered in our analysis

#### 7.3 Adopted consideration for uplift assessment without pile support

A simplified uplift assessment has been carried out to assess the extent of the "dive box" structure without secant bored piles required to provide uplift resistance (Section 7.2). From this assessment, we have analysed the ratio of total structure weight to the buoyant force acting along the base slab. The assessed ratio is then compared against a minimum ratio of 1.2.



## Technical Advice Note TAN – 001

### 8 Analysis results

#### 8.1 Deformation Assessment

The deformed FEA mesh for the long term conditions is shown in Figure 6 below.

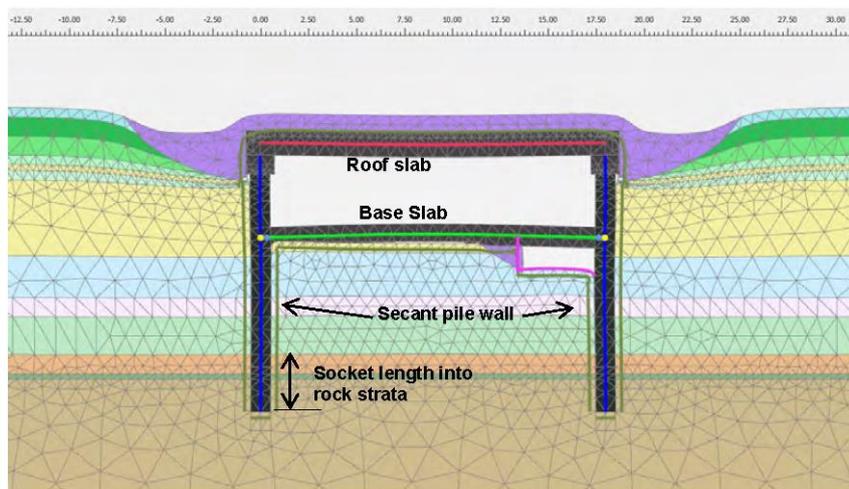


Figure 6 – Deformed mesh from FEA analysis considering no traffic surcharge (Note: shown deflection is based on 30 times exaggeration)

The summary of assessed ground-movement induced structural actions (axial force, bending moment and shear force) along with the assessed movements of the structural components are presented in Table 2 below.

Table 2 – Summary of assessed maximum structural actions and movements

Structural Component	Surface loading condition	Maximum Structural Actions (unfactored)			Maximum movement (mm)	Reference Plots
		Axial Force <sup>(1)</sup>	Bending Moment	Shear Force		
Secant Pile Walls (side with pump room)	With 20 kPa surcharge	-2260 kN/pile	1900 kN.m/pile	1820 kN/pile	2.7	Appendix B (Part B4)
	Without 20 kPa surcharge	-1810 kN/pile	1550 kN.m/pile	1470 kN/pile	2.9	Appendix B (Part B2)
Secant Piles (side without pump room)	With 20 kPa surcharge	-2640 kN/pile	-1940 kN.m/pile	2190 kN/pile	2.8	Appendix B (Part B3)
	Without 20 kPa surcharge	-2220 kN/pile	-1590 kN.m/pile	1940 kN/pile	2.8	Appendix B (Part B1)



## Technical Advice Note TAN – 001

Structural Component	Surface loading condition	Maximum Structural Actions (unfactored)			Maximum movement (mm)	Reference Plots
		Axial Force <sup>(1)</sup>	Bending Moment	Shear Force		
Roof slab	With 20 kPa surcharge	Not reported	-1830 kN.m/m	1900 kN/m	11.5 <sup>(2)</sup>	Appendix C
	Without 20 kPa surcharge	Not reported	-1760 kN.m/m	1610 kN/m	11 <sup>(2)</sup>	Appendix C
Base slab	With 20 kPa surcharge	Not reported	1340 kN.m/m	-1890 kN/m	-7.2 <sup>(2)</sup>	Appendix D (Part D2)
	Without 20 kPa surcharge	Not reported	1300 kN.m/m	-1860 kN/m	-7.4 <sup>(2)</sup>	Appendix D (Part D1)

**Note:**

- Negative value indicates member in compression; Positive value indicates member in tension.
- For roof and base slabs, negative value indicates upward movement; Positive value indicates downward movement.

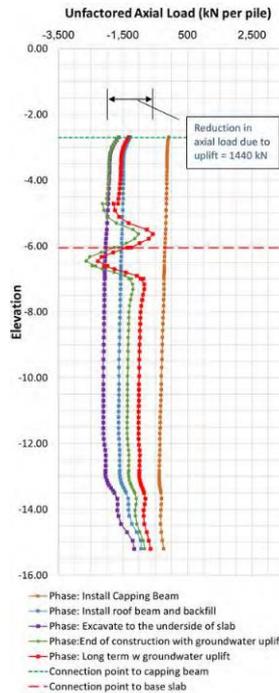
### 8.2 Pile analysis

The introduction of buoyancy force on the base slab following the subsequent stabilisation of groundwater condition at the end of construction is anticipated to induce uplift force on the secant piles connected to the base slab. The tension (uplift) force assumed in our analysis was based on the assessed maximum reduction in the axial force within the pile. This is shown in Figure 7 below.

On this basis, a factored uplift load of 2160 kN has been assessed. By assuming a minimum socket length of 3 m into the bedrock strata (ref. Table 1), the ultimate uplift capacity of 2440 kN has been analysed.



**Technical Advice Note TAN – 001**



**Figure 7 – Plot of induced axial forces on the secant pile which shows the influence of uplift force**

**8.3 Transition between tunnel with pile support and dive box without pile support**

To satisfy a minimum ratio of 1.2 of the total structure weight to buoyancy force, the section of tunnel which would require additional support in the form of secant piles was assessed to extend from Ch. 211 (western side) to Ch. 25 (eastern side). The cross sections of assessed “dive” box structure where pile support is not required from uplift consideration are shown in Figure 3 and Figure 4.

This extent is indicated in Figure 8 below. Figure 8 also shows the toe levels of the secant piles which were analysed as per consideration outlined in Section 7.2. The toe levels were measured 3 m below the inferred top of bedrock strata (ref. R1) superimposed in Figure 8.



Technical Advice Note TAN – 001

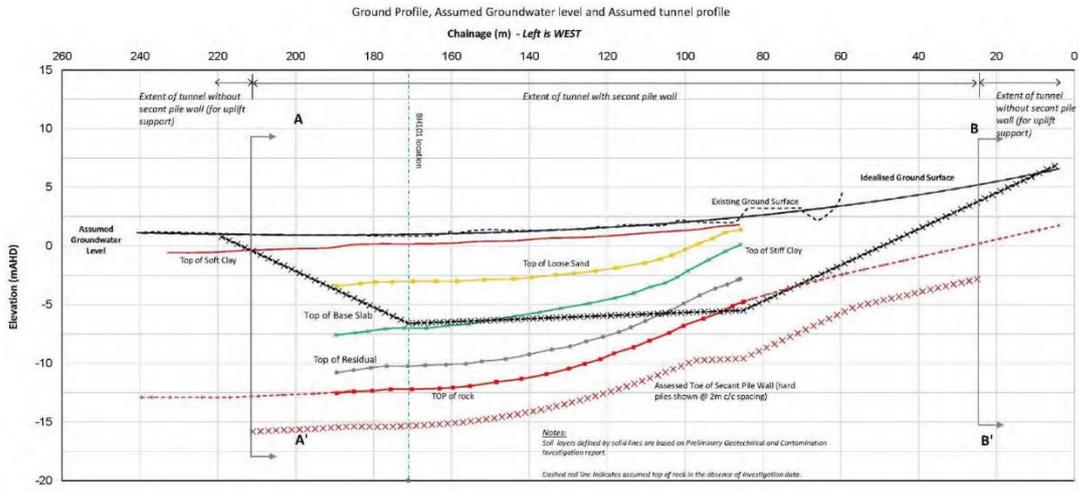


Figure 8 – Long section showing the extent of secant piles required to provide uplift support



## Technical Advice Note TAN – 001

### 9 Conclusion and Limitations

This TAN presents the results of our preliminary geotechnical assessment for the concept design of the proposed Gosford racecourse tunnel. The unfactored structural actions obtained in our assessment should be used by structural designer along with appropriate load factors for the checking against the relevant structural capacity.

The following limitations should be noted:

- For the “dive” wall section, the structural components must still be sufficiently designed to support the earth pressure, hydrostatic pressure and applied surface loading (if present) with acceptable deformation. These must be checked by structural designer against the relevant structural capacity.
- As previously noted in Section 3.2, this preliminary assessment has not considered a cantilever pile wall section without the roof slab. This design can be carried out in subsequent detailed design stage. Depending on the height of the cantilever section, the potential movements of the pile wall can be reduced (if required) by various measures including:
  - Additional support incorporated to the proposed retention wall (i.e. secant pile wall) such as ground anchors, waler beam.
  - Improvement of the existing ground where practicable, for example: removal of shallower soft soil and replacement with cement stabilised sand.
- The following impacts of the tunnel excavation to the nearby structures have not been considered:
  - Drawdown-induced settlement during construction dewatering
  - Excavation-induced ground movement
- The ground/groundwater conditions assumed for the assessment were based on limited geotechnical investigation data. As inferred in Figure 8, some variability in ground/groundwater conditions can potentially occur. To reduce design risk in relation to this variability, it is recommended that additional geotechnical investigation is carried out to refine the model for the detailed design.

Sincerely

GHD Pty Ltd

### Bosco Poon

Technical Director - Geotechnics

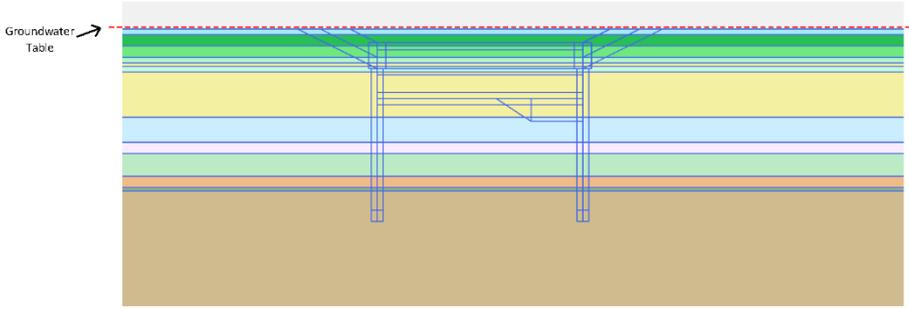
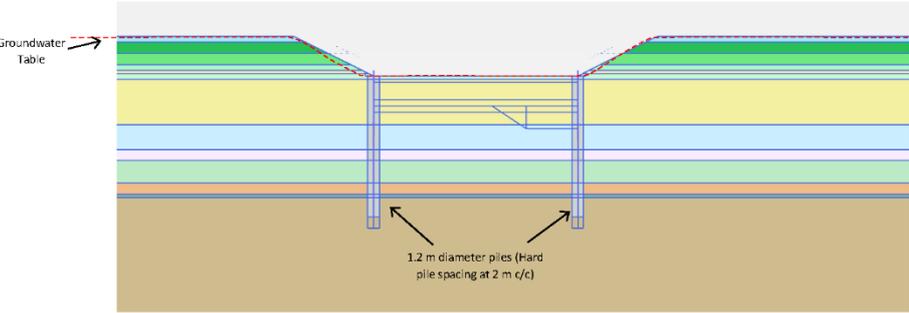
+61 2 9462 4724

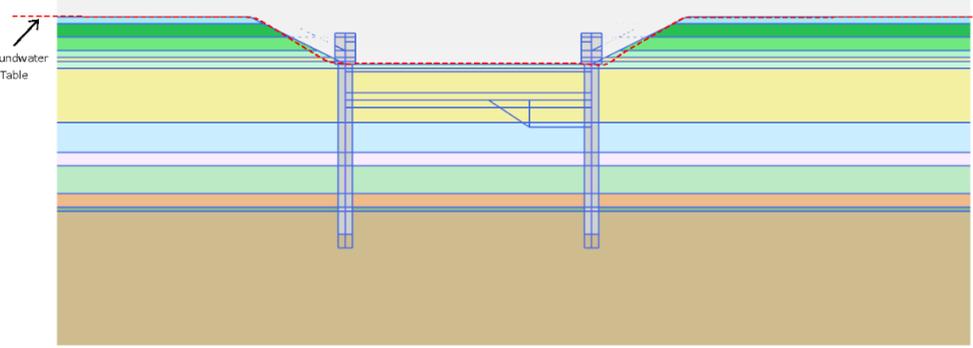
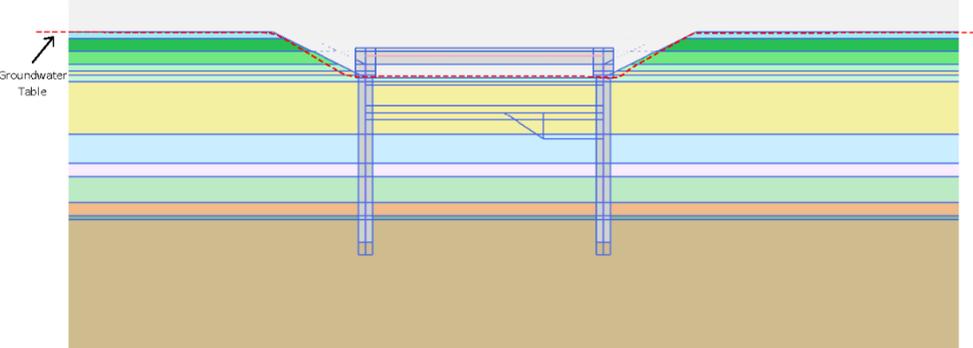


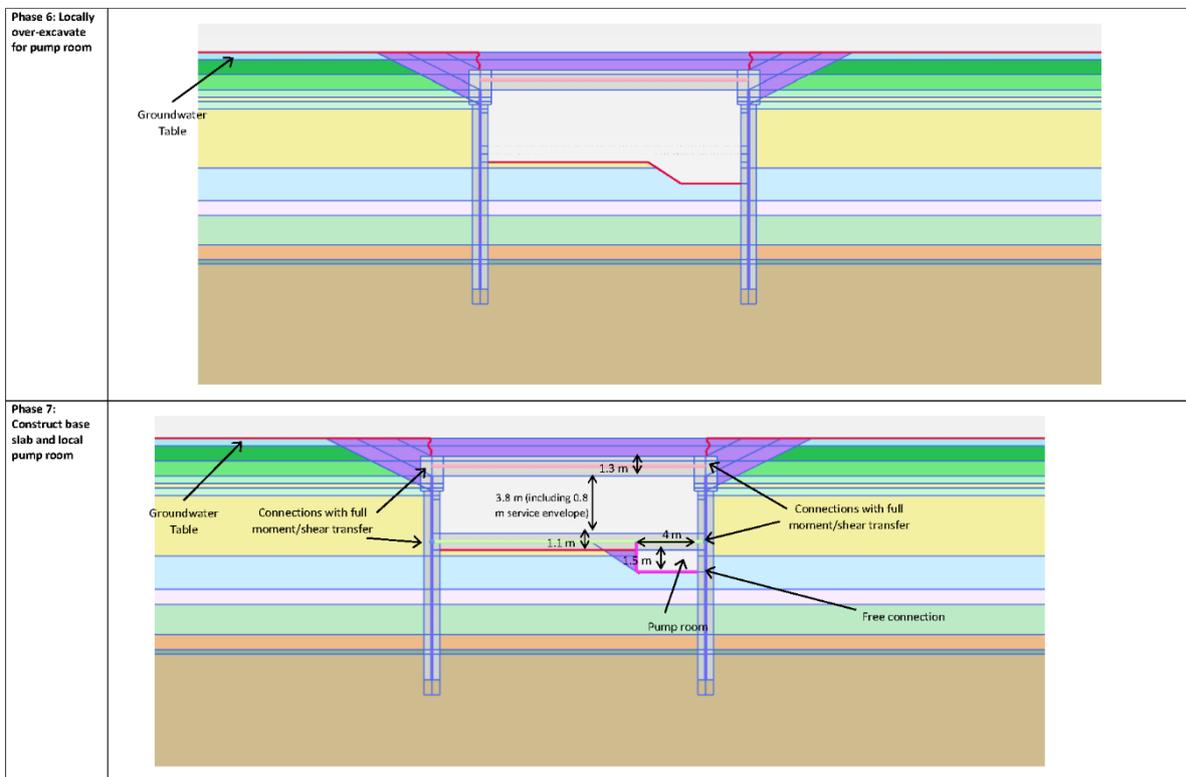
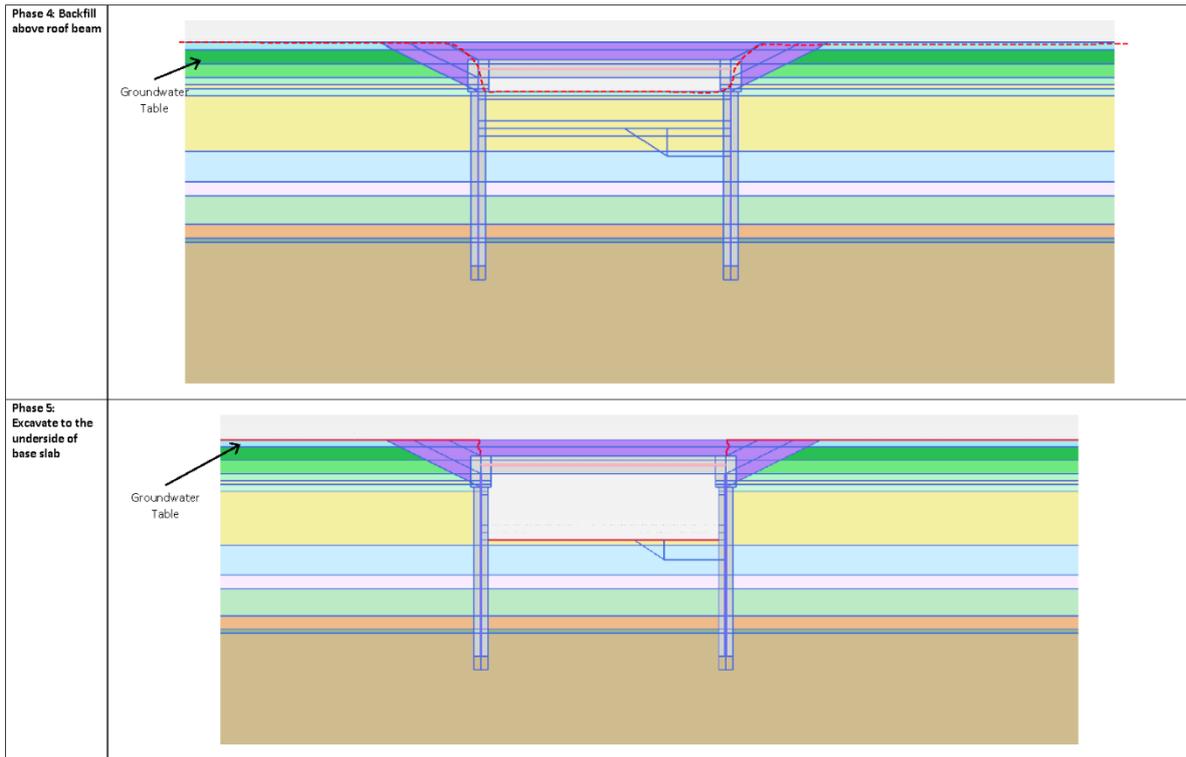
**Technical Advice Note TAN – 001**

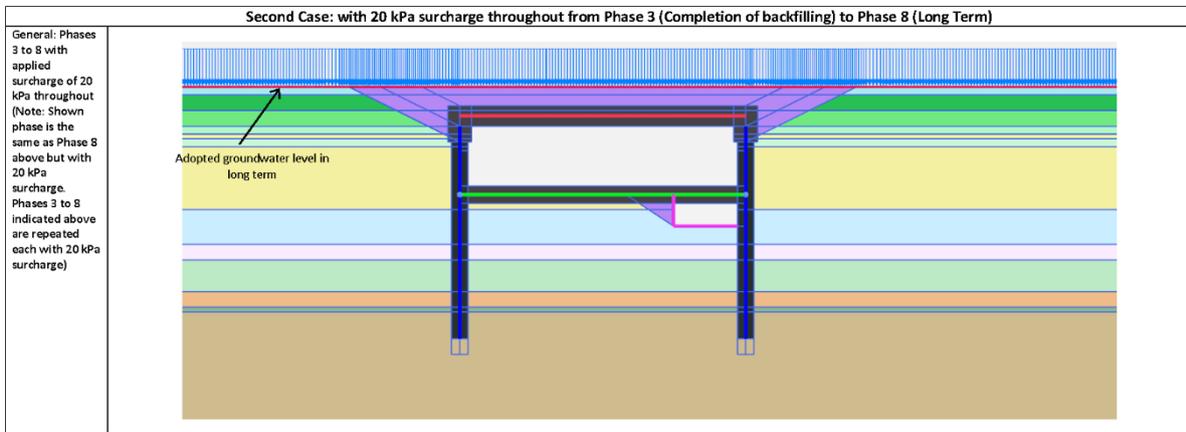
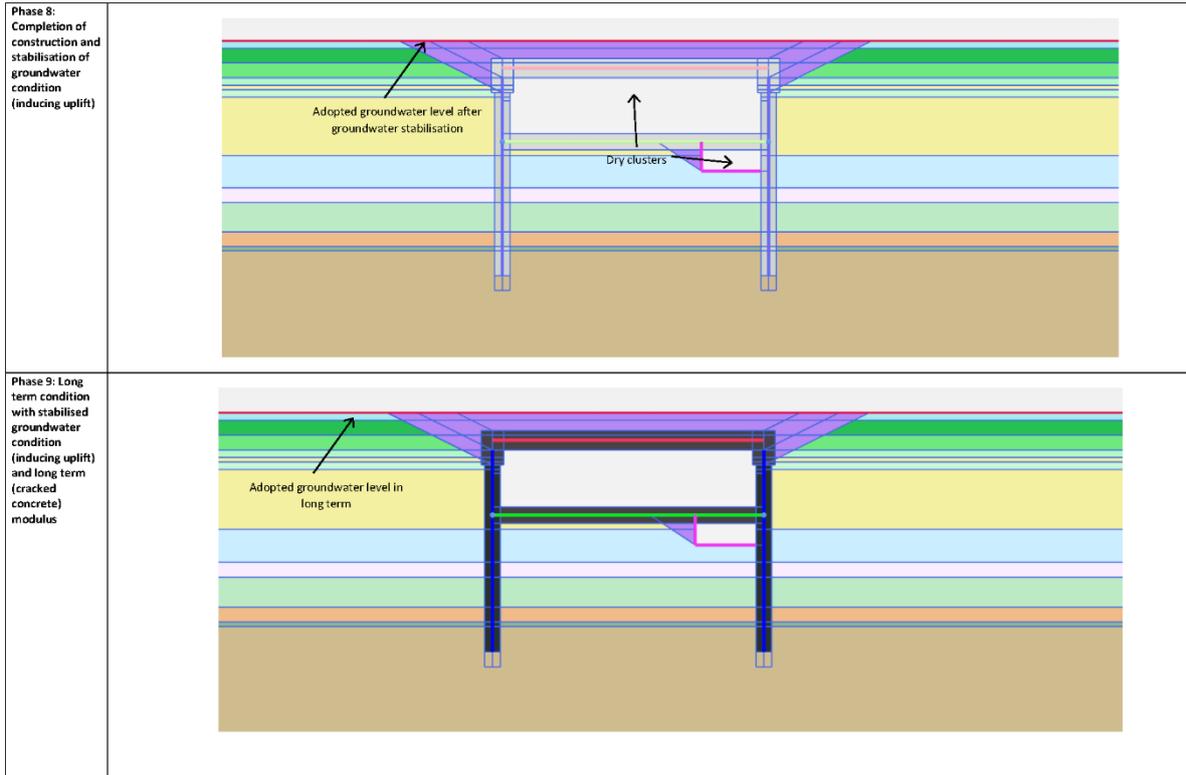
Appendix A – Adopted Construction Sequence in FEA

Attachment A – Construction Staging

Staging	Delineation
<b>First Case: without 20 kPa surcharge (critical case for system subjected to uplift pressure)</b>	
Initial Stage	 <p>Groundwater Table</p>
Phase 1: Install secant pile wall and then excavate to the underside of capping beam	 <p>Groundwater Table</p> <p>1.2 m diameter piles (Hard pile spacing at 2 m c/c)</p>

Phase 2: Install capping beam	 <p>Groundwater Table</p>
Phase 3: Install roof beam	 <p>Groundwater Table</p>



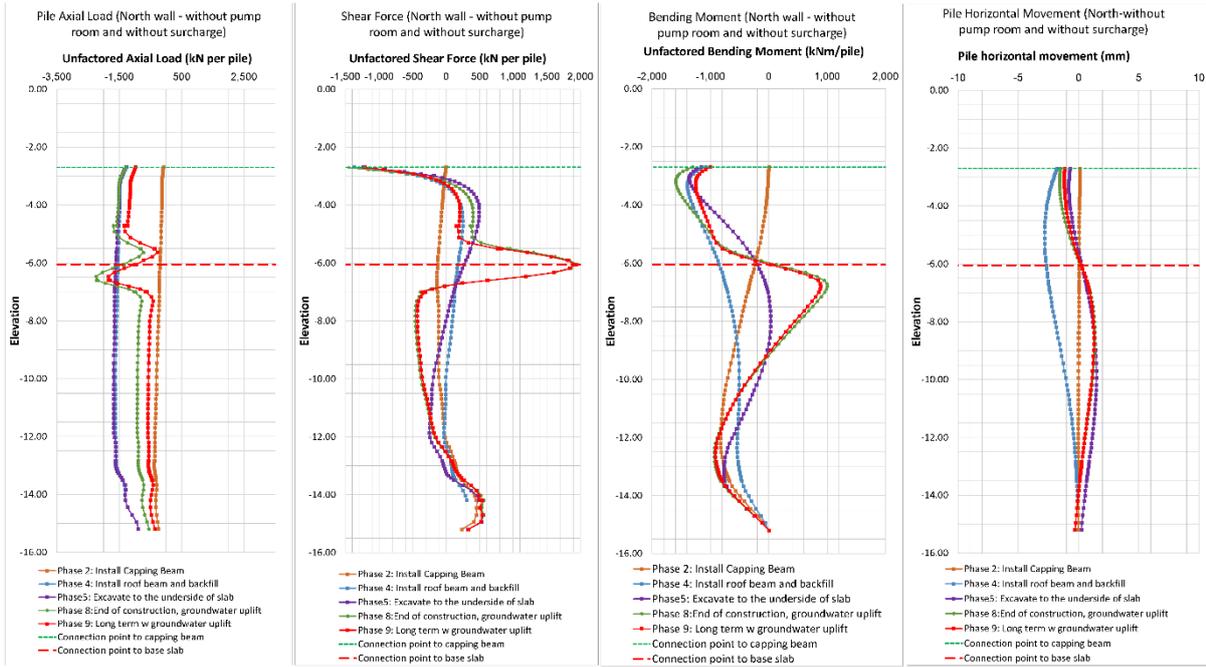




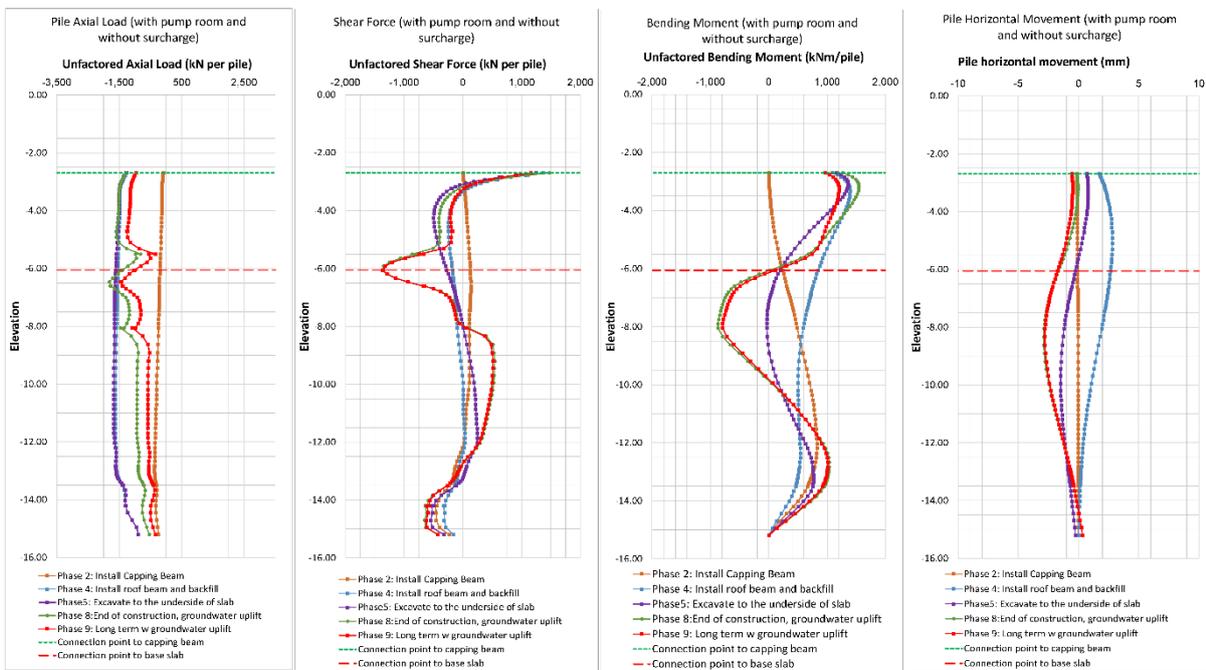
**Technical Advice Note TAN – 001**

Appendix B – Assessed performance of secant pile wall

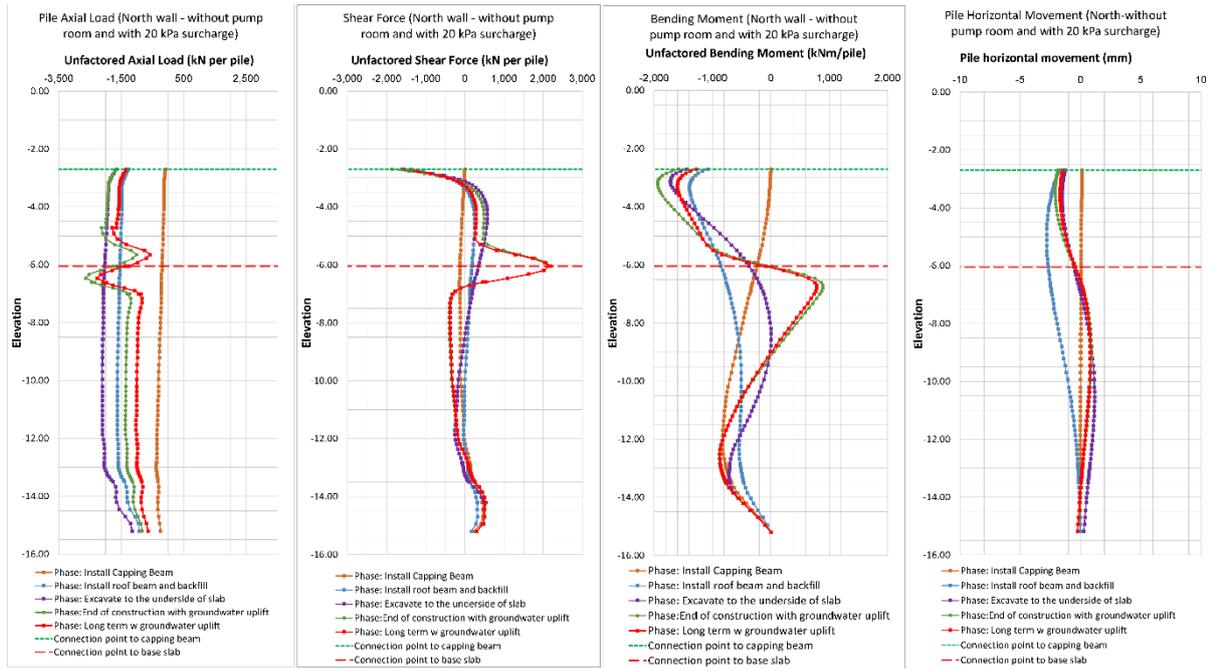
B1 - Northern pile (no connected pump room) without 20 kPa surcharge



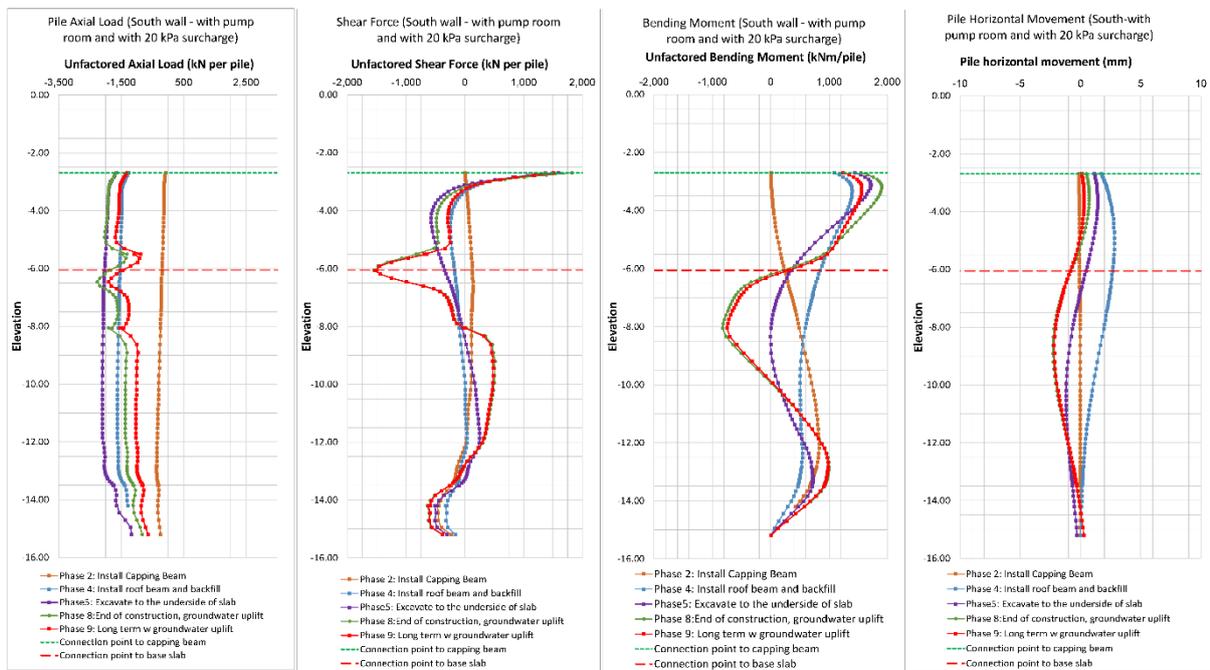
B2 - Southern pile (next to pump room) without 20 kPa surcharge



B3 - Northern pile (no pump room) with 20 kPa surcharge



B4 - Southern pile next to pump room with 20 kPa surcharge

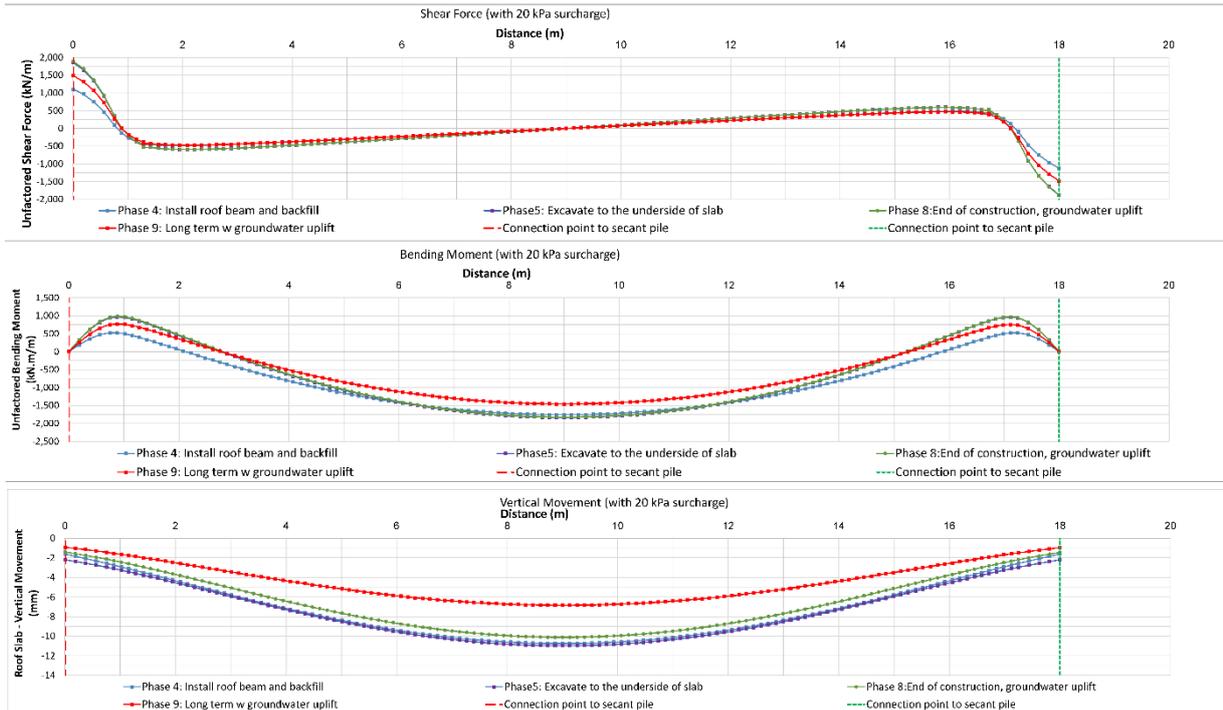




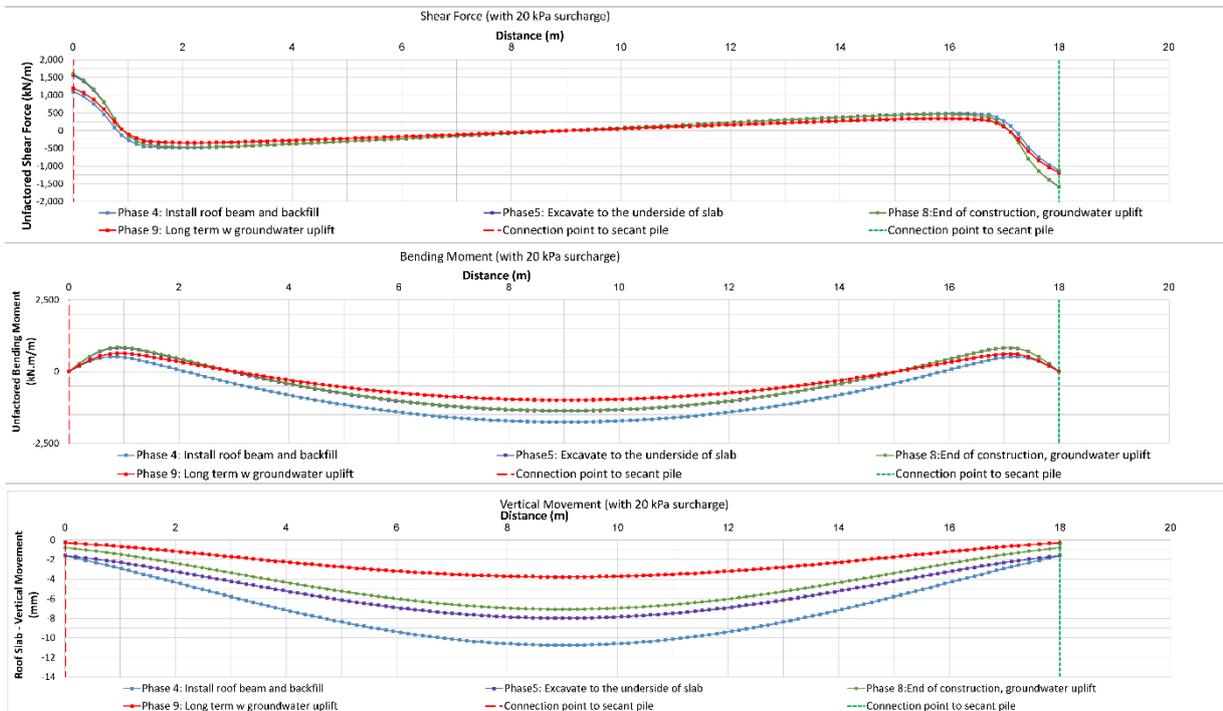
## Technical Advice Note TAN – 001

Appendix C – Assessed performance of roof slab

C - Roof Slab (with 20 kPa surcharge)



C - Roof Slab (without 20 kPa surcharge)

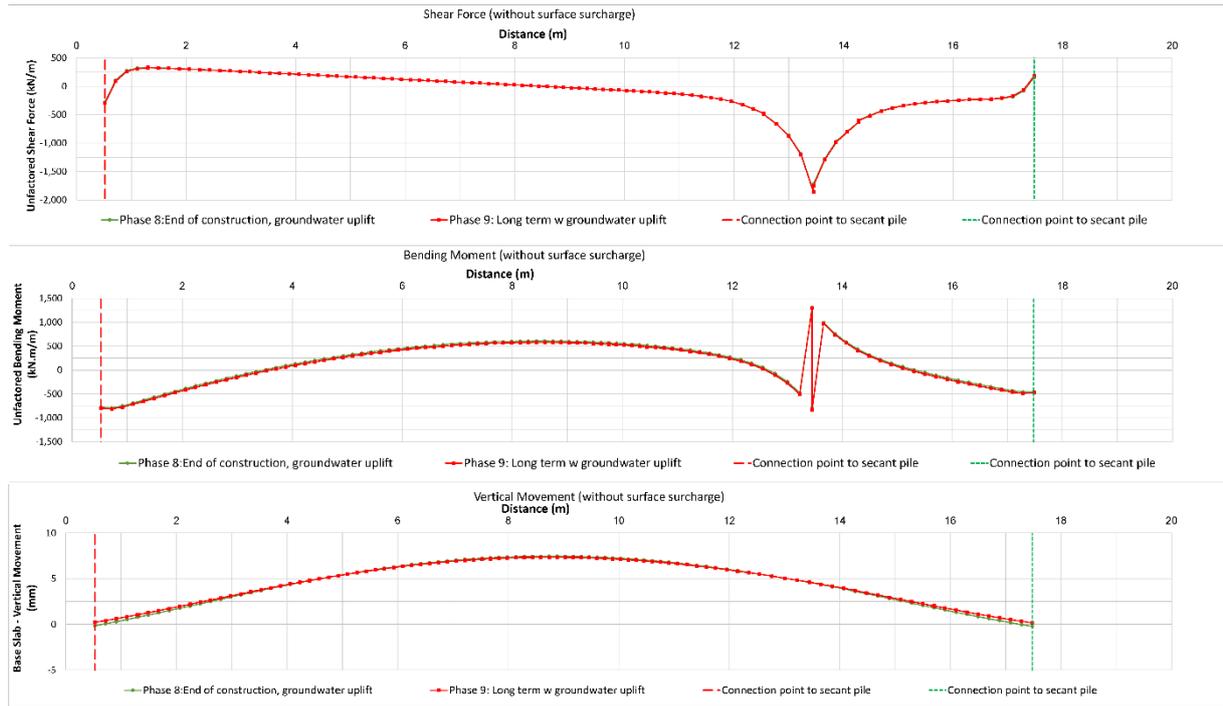




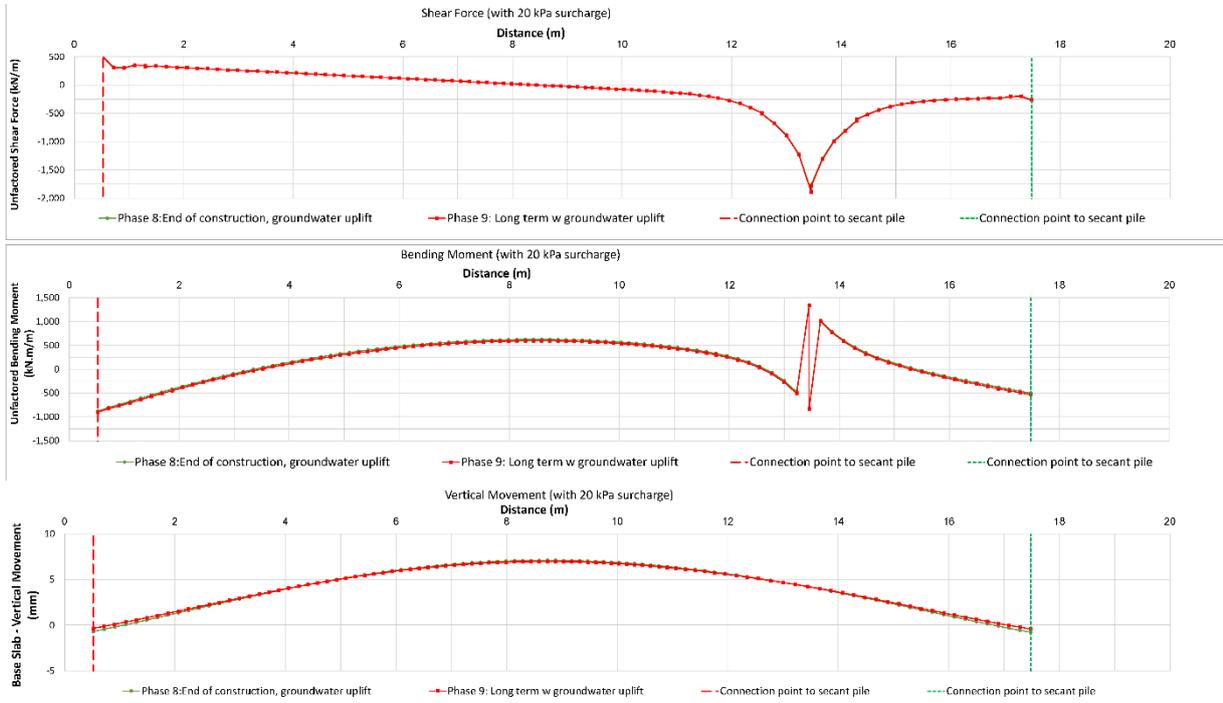
**Technical Advice Note TAN – 001**

Appendix D – Assessed performance of base slab

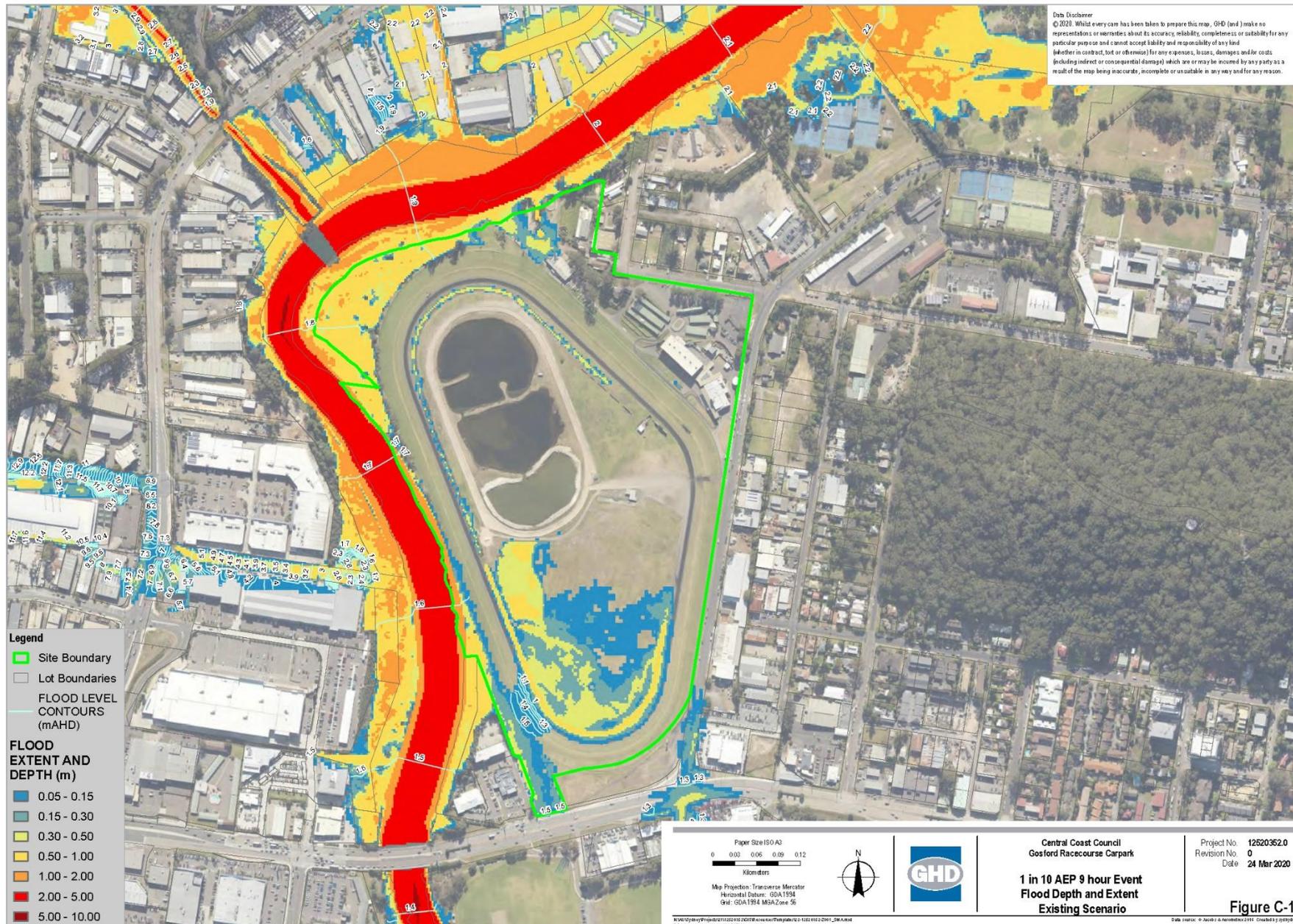
D1 -Base Slab (without surface surcharge)



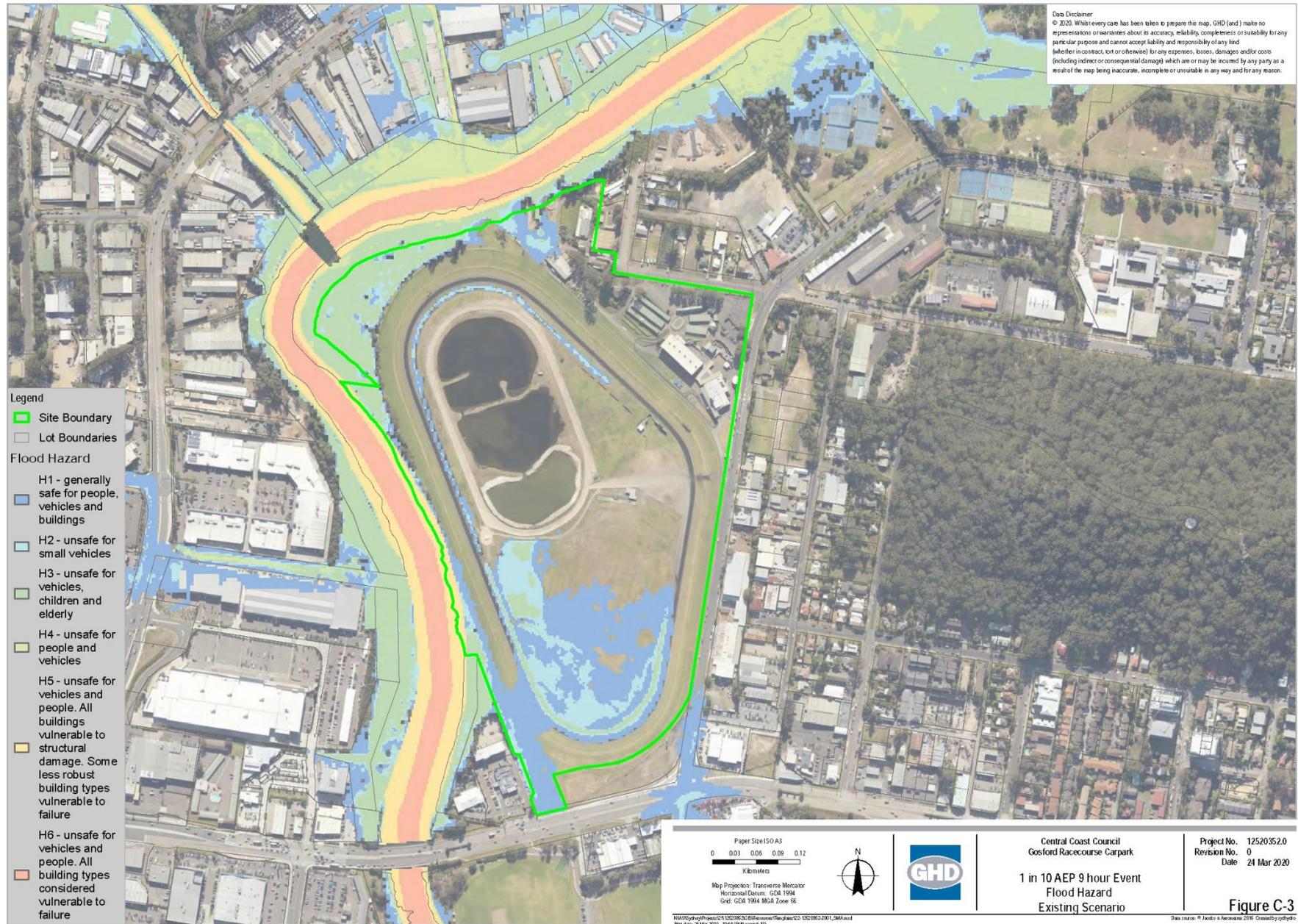
D2 -Base Slab (with 20 kPa surface surcharge)

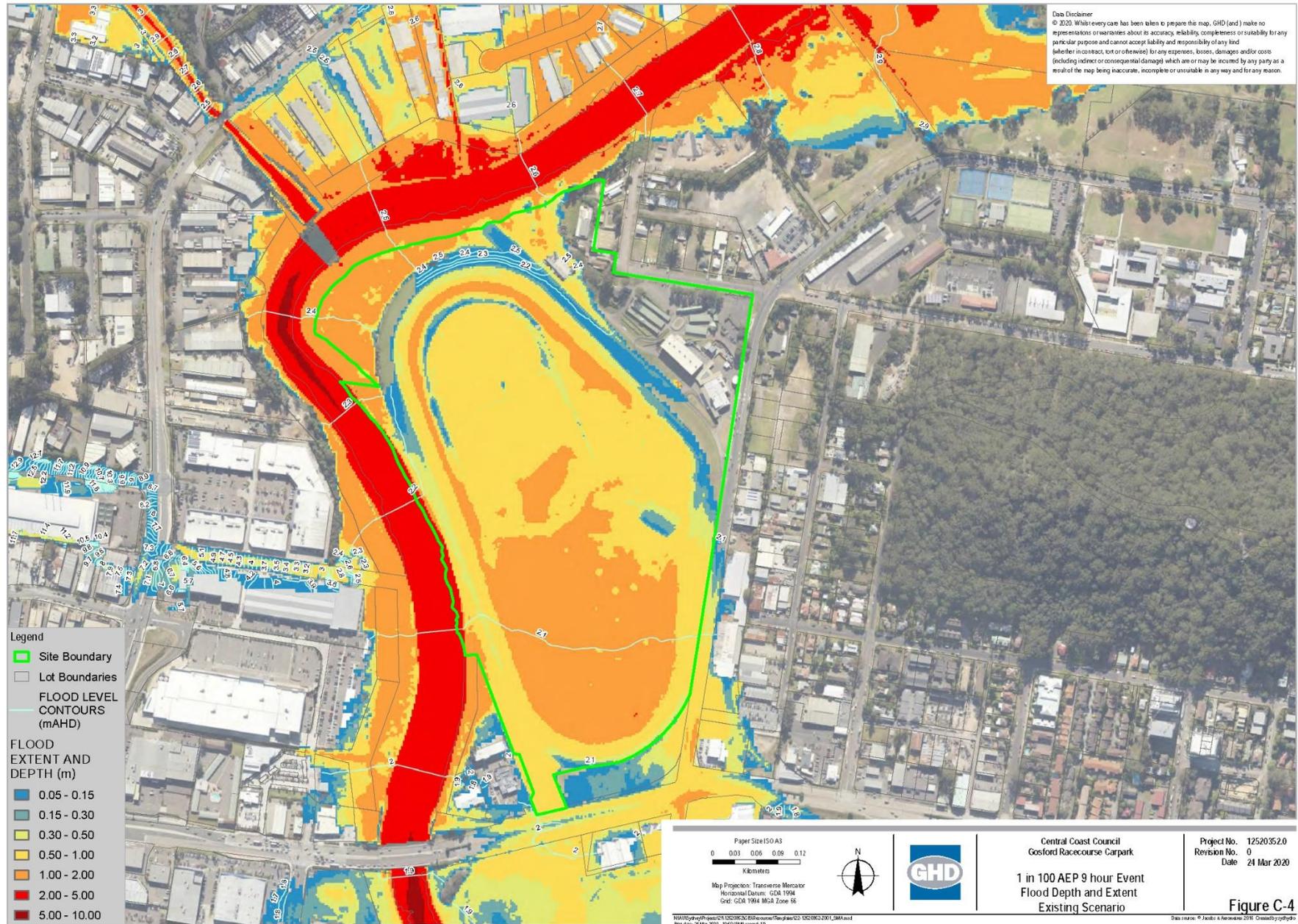


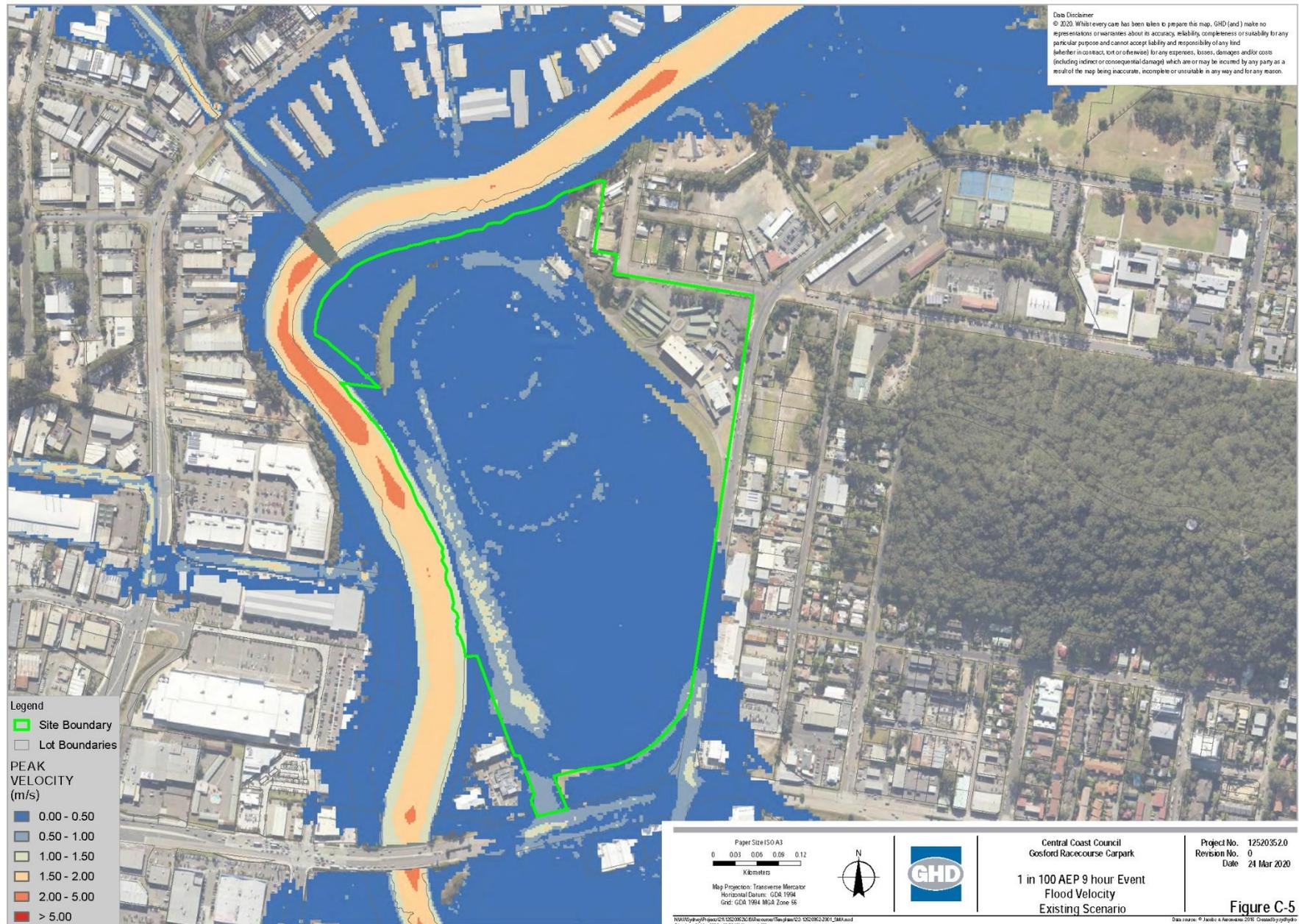
## **Appendix C** – Flood assessment figures

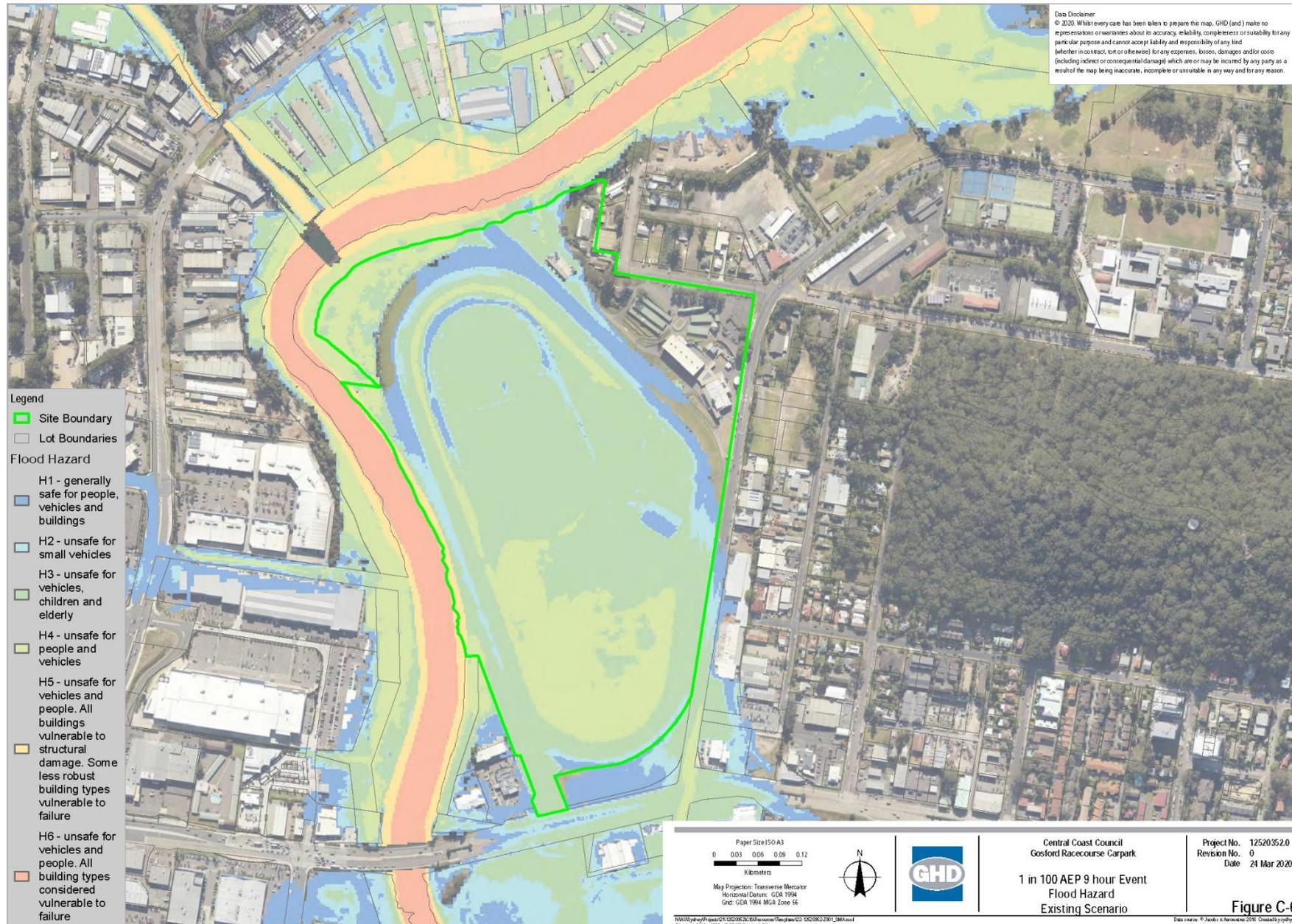


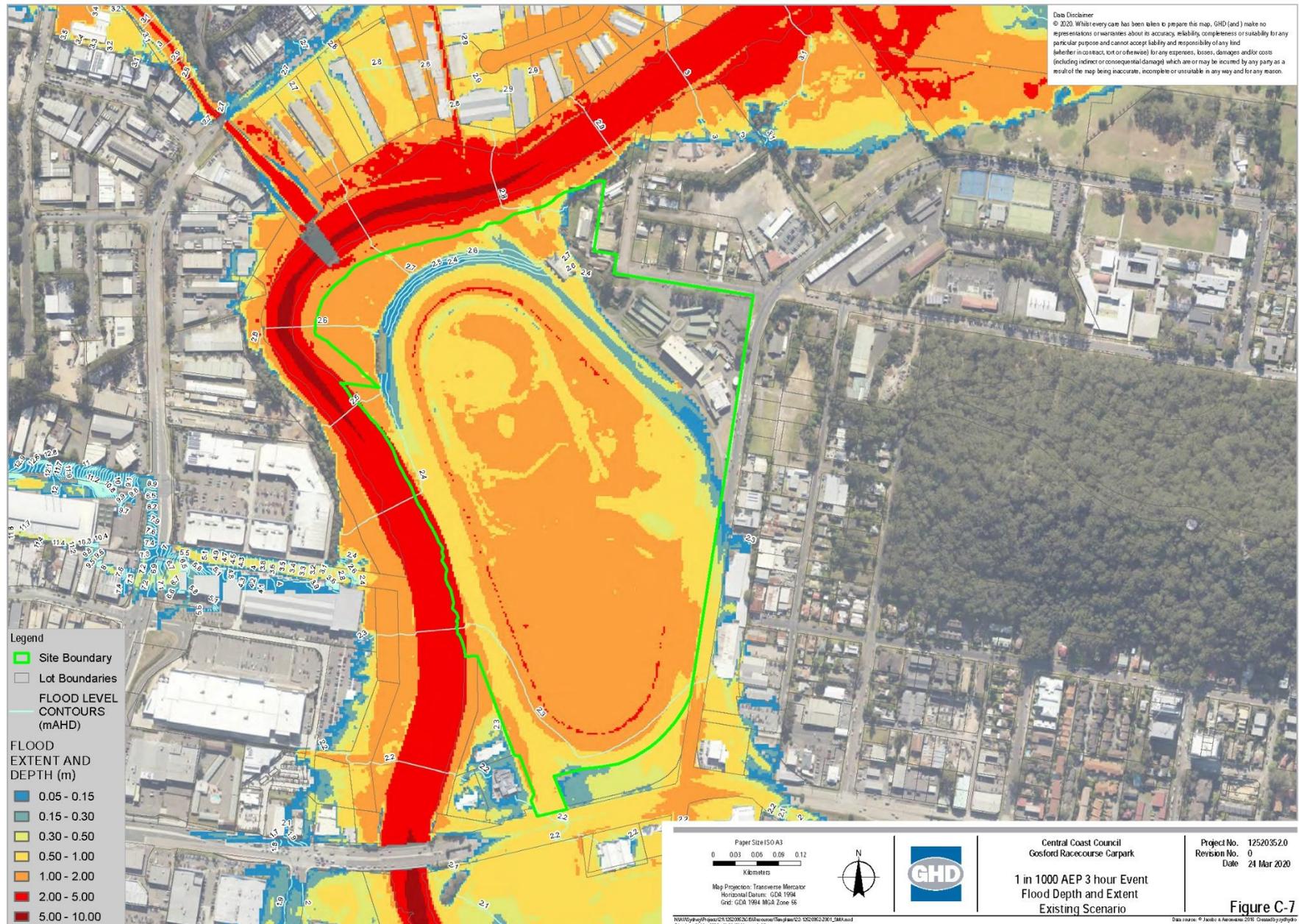


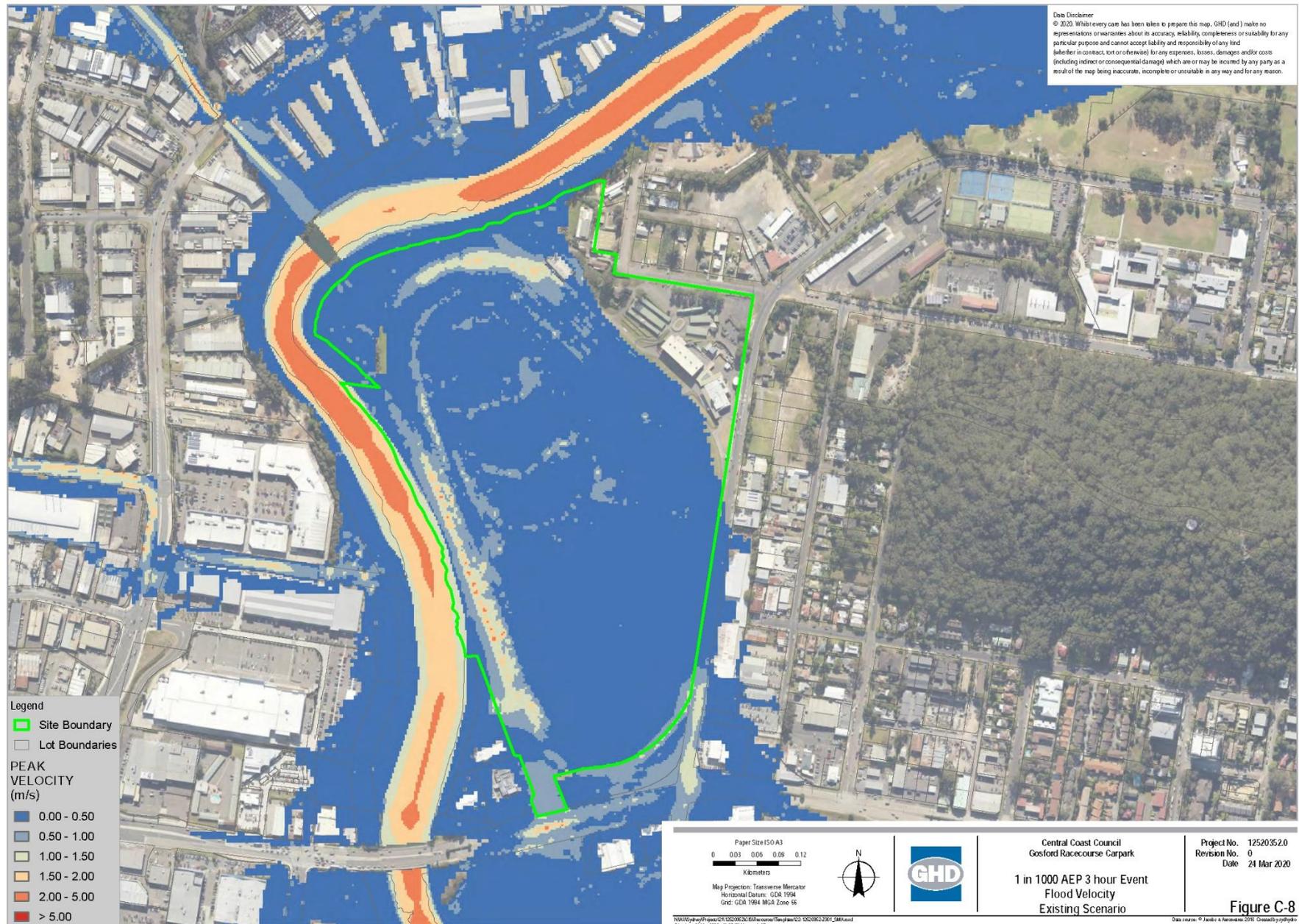




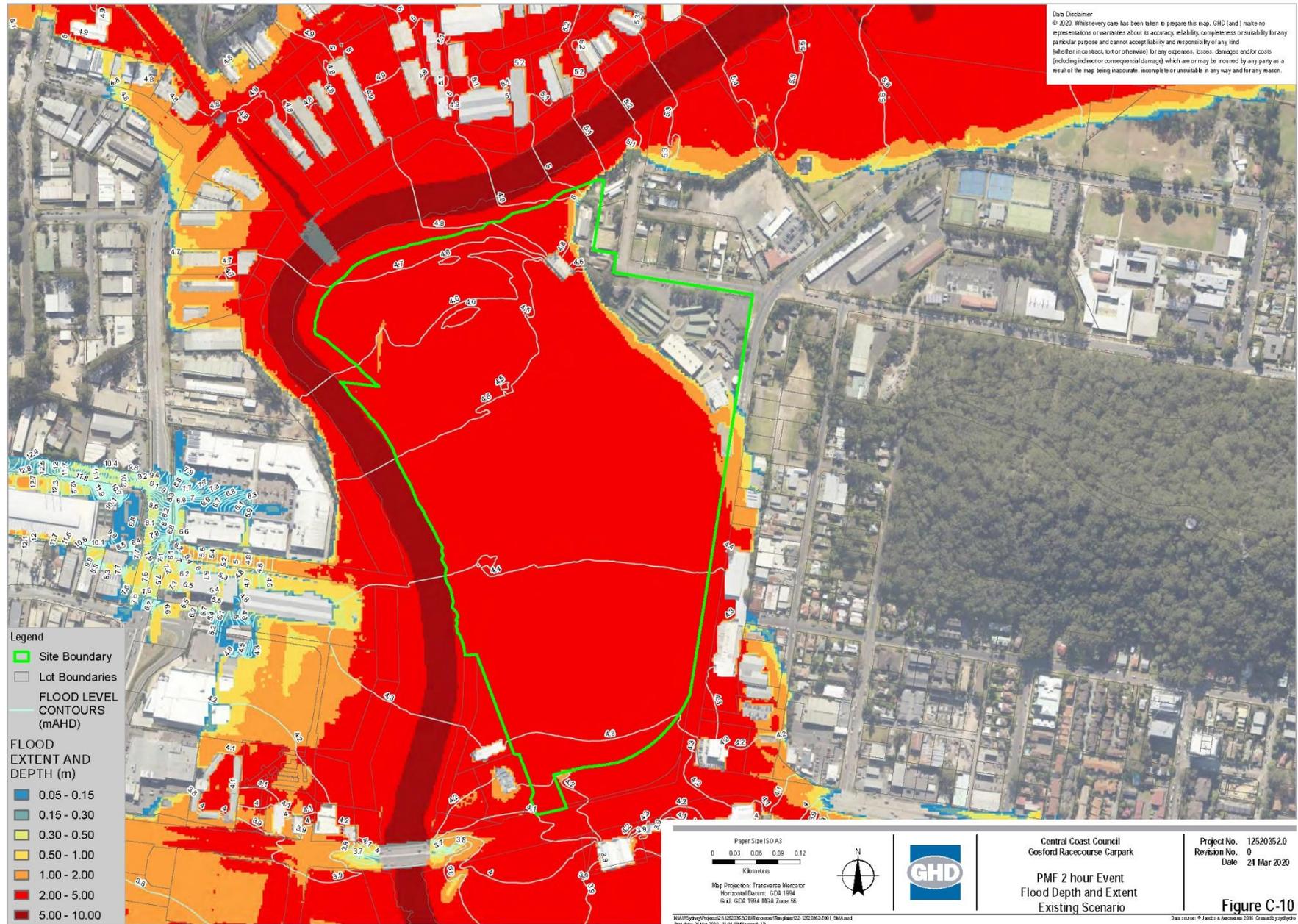




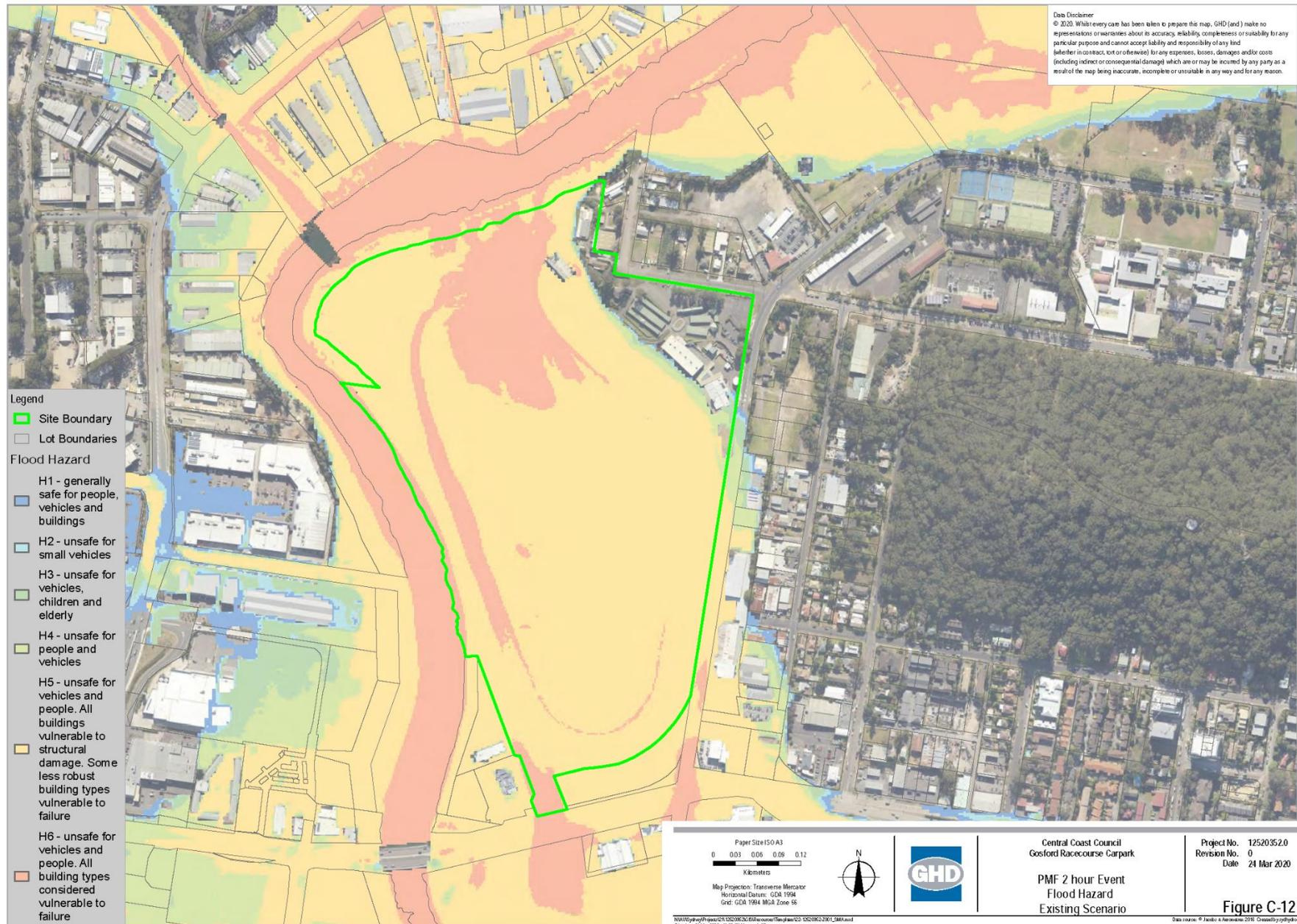


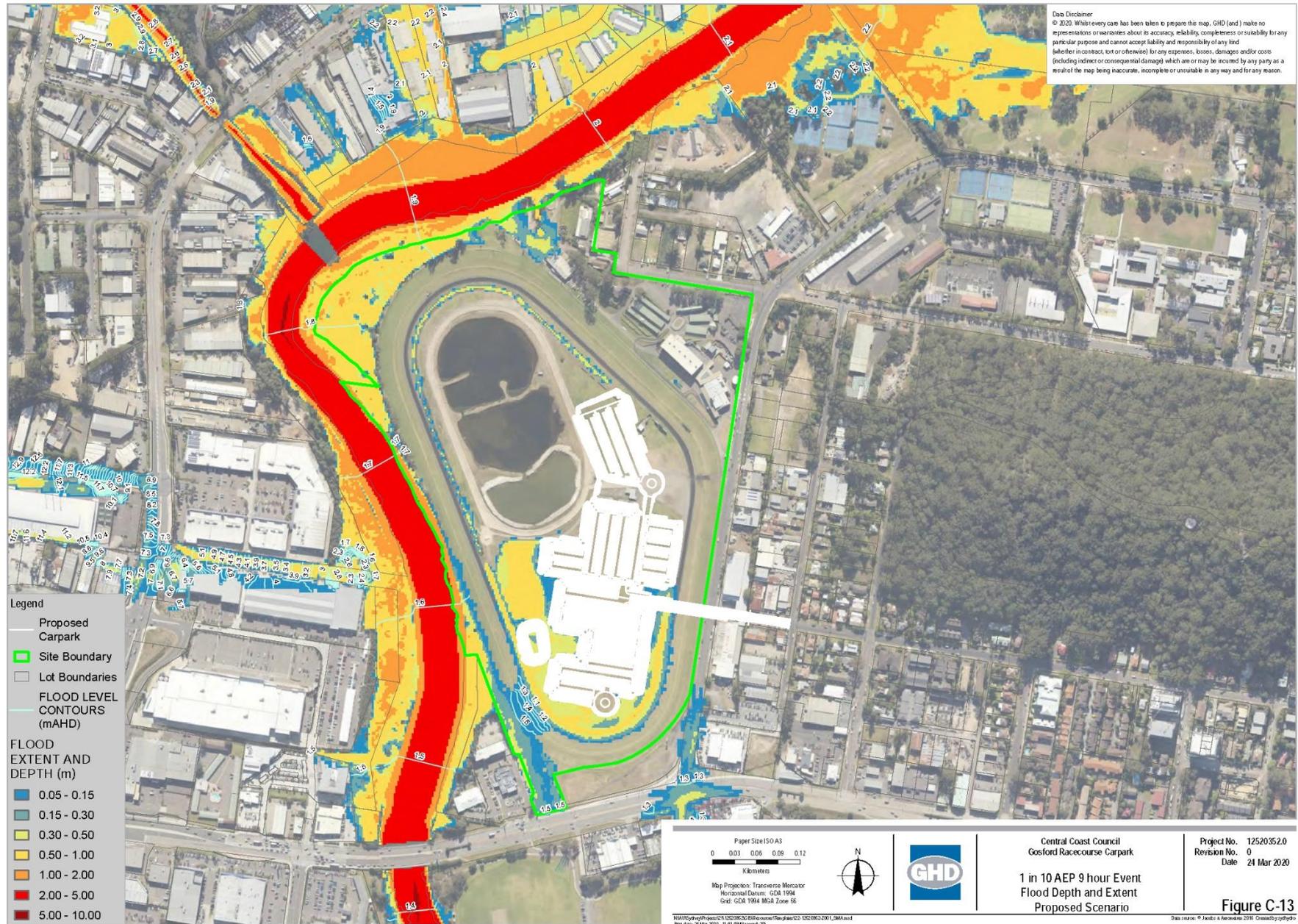


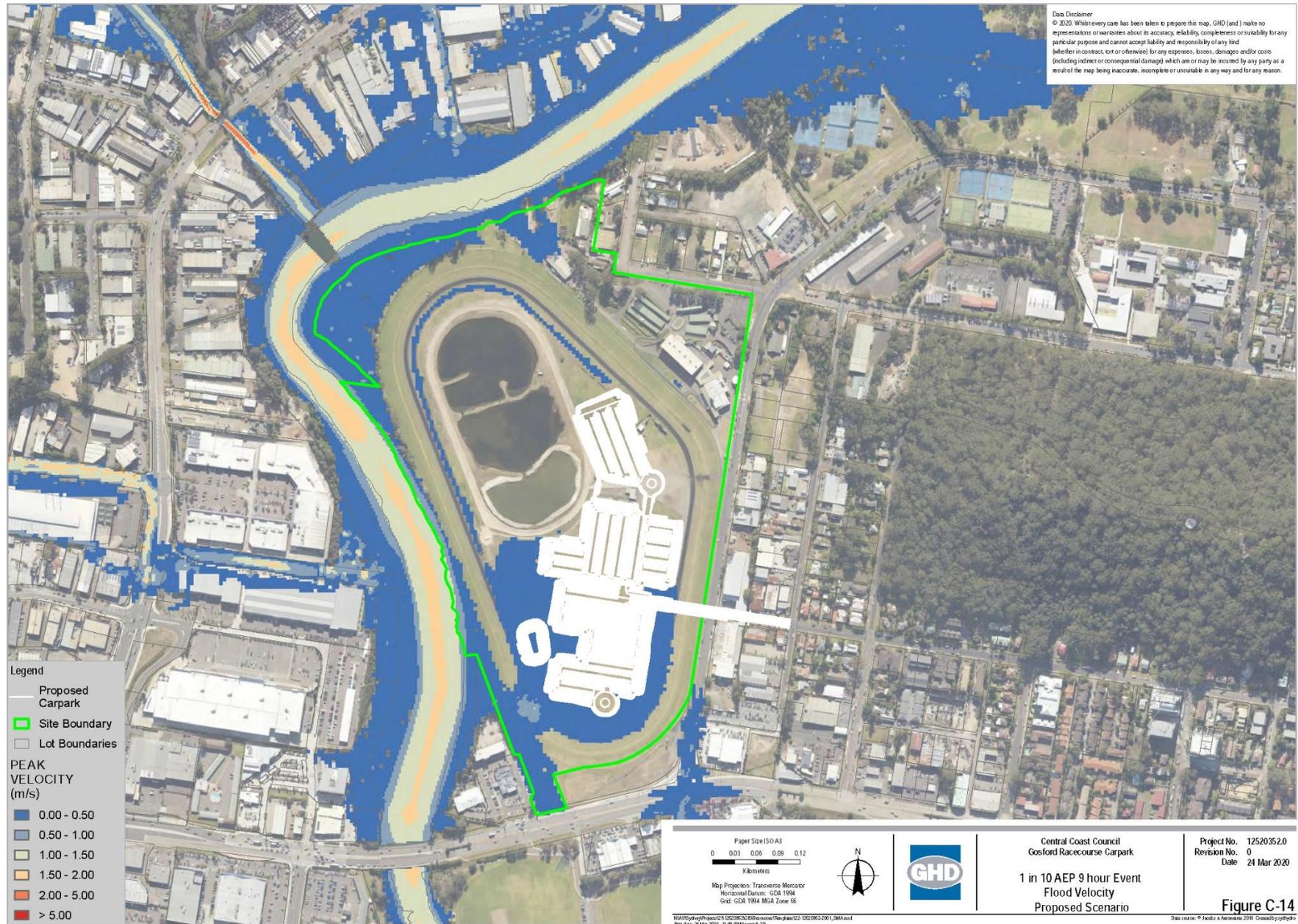


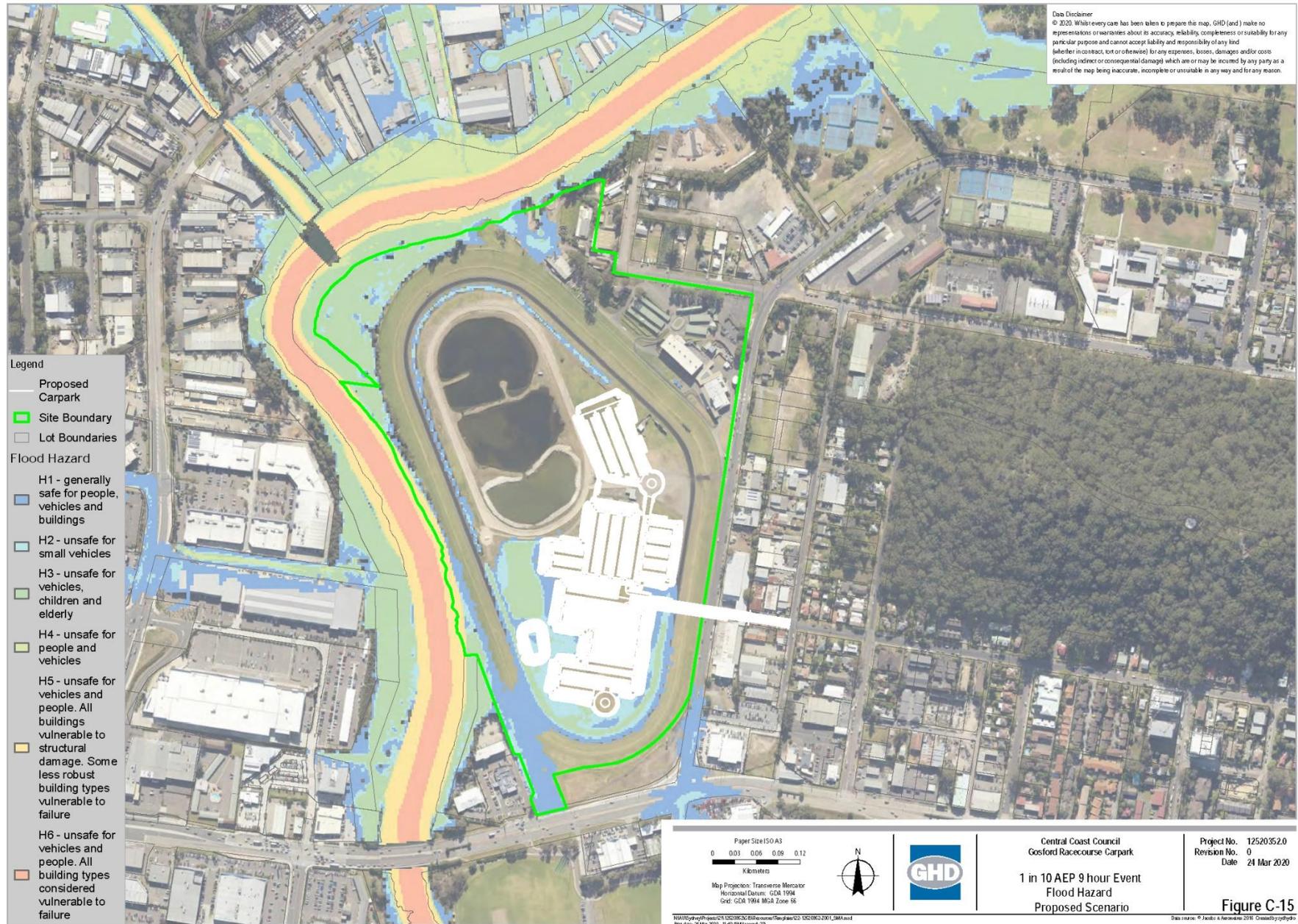


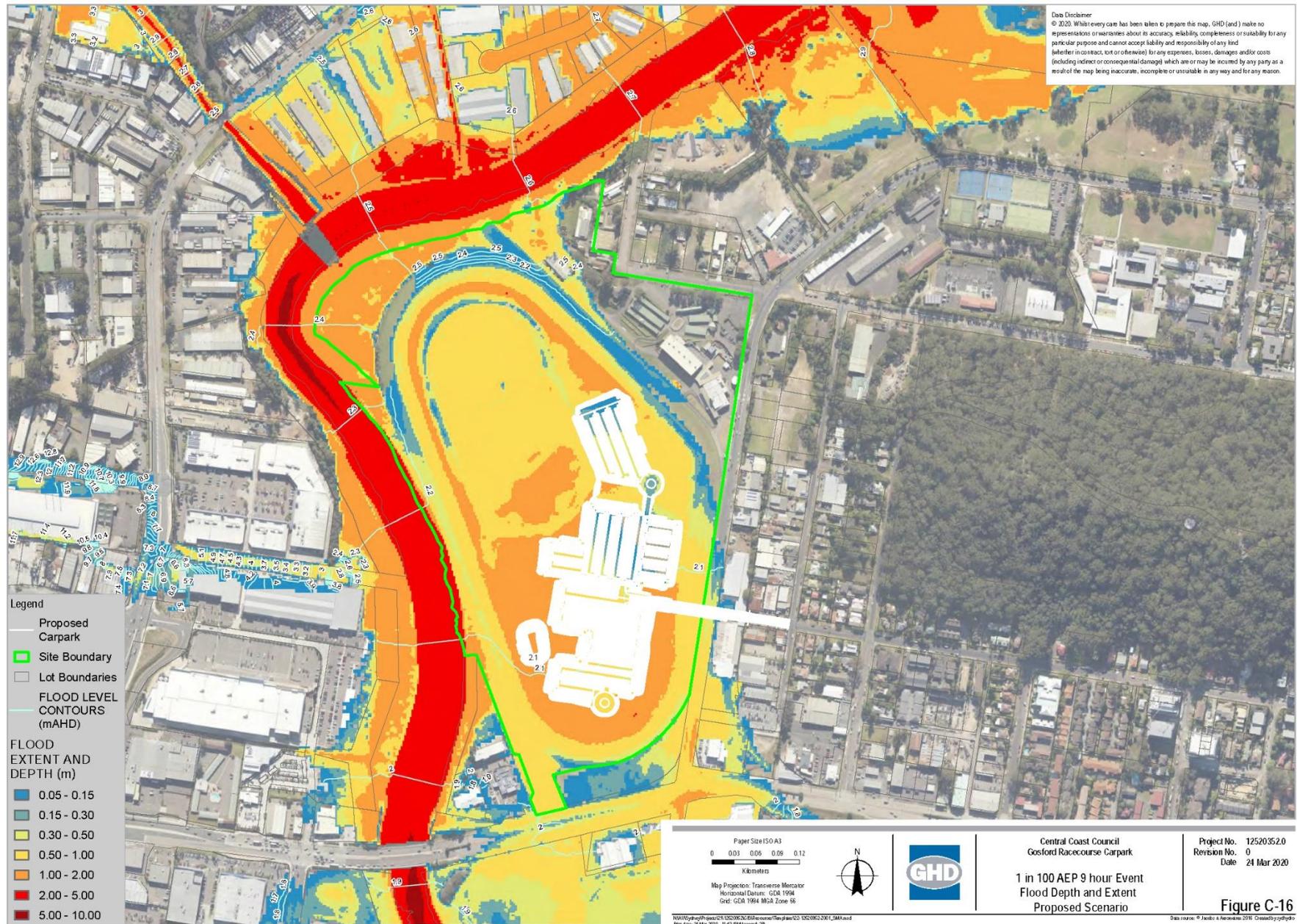




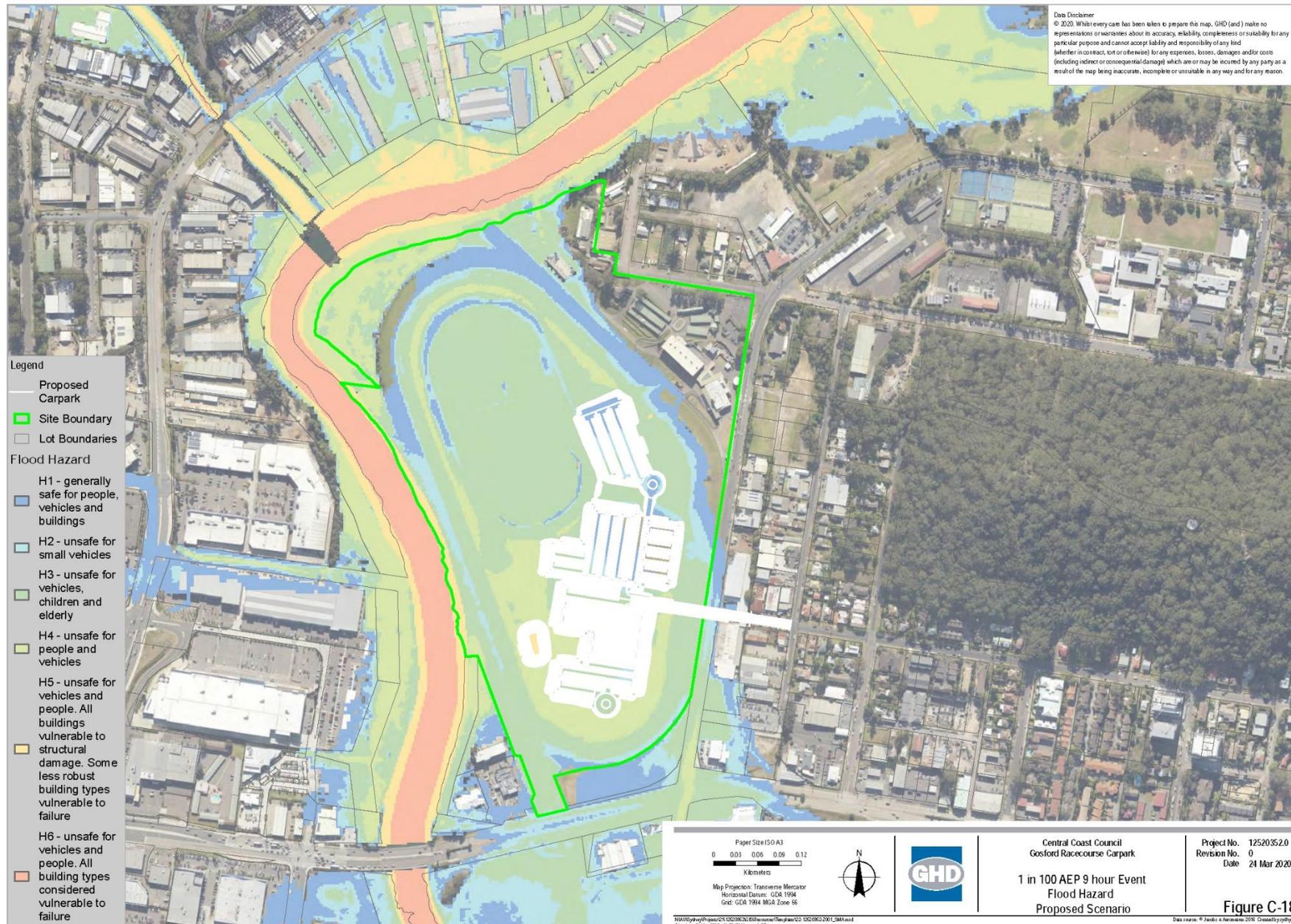


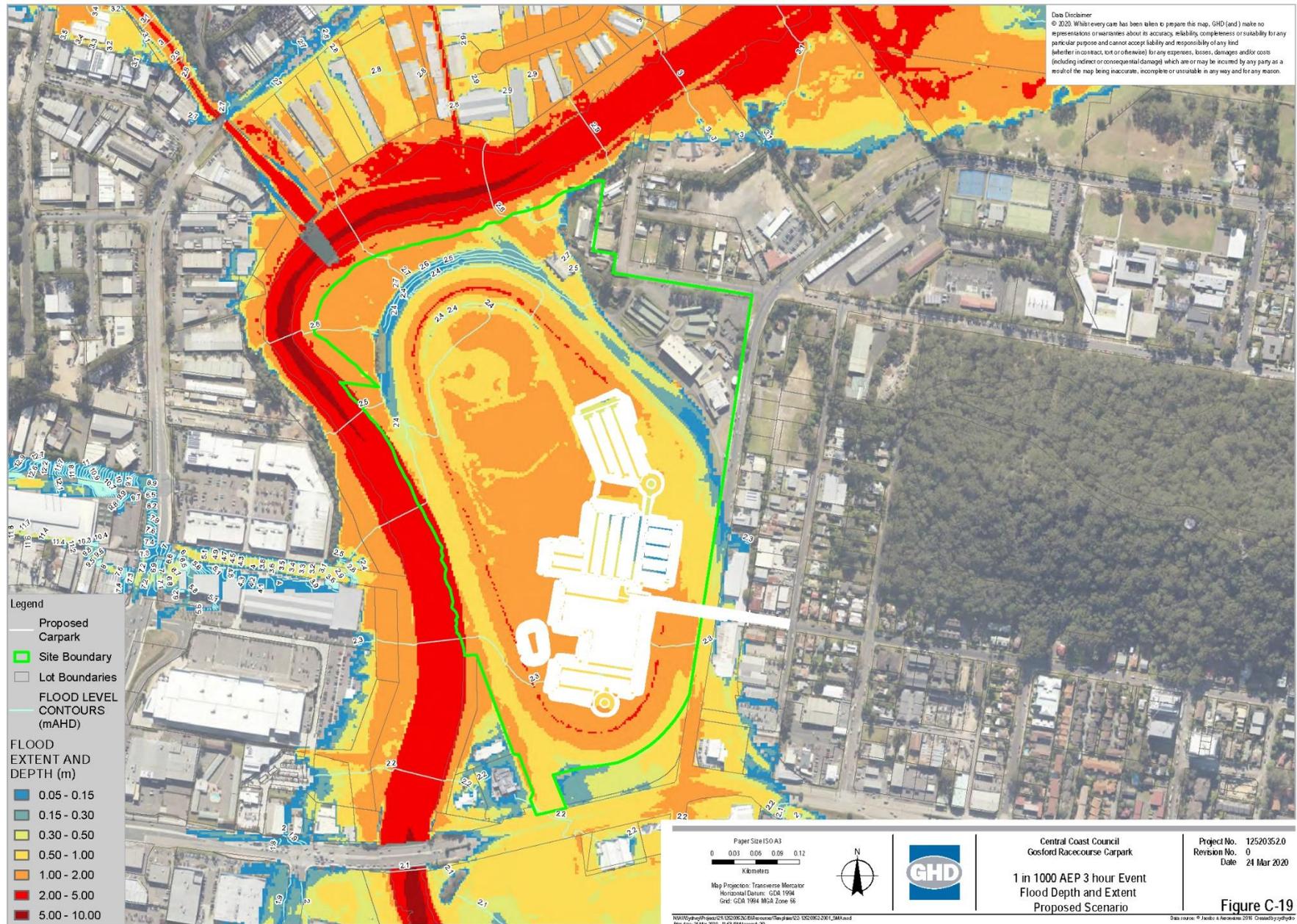




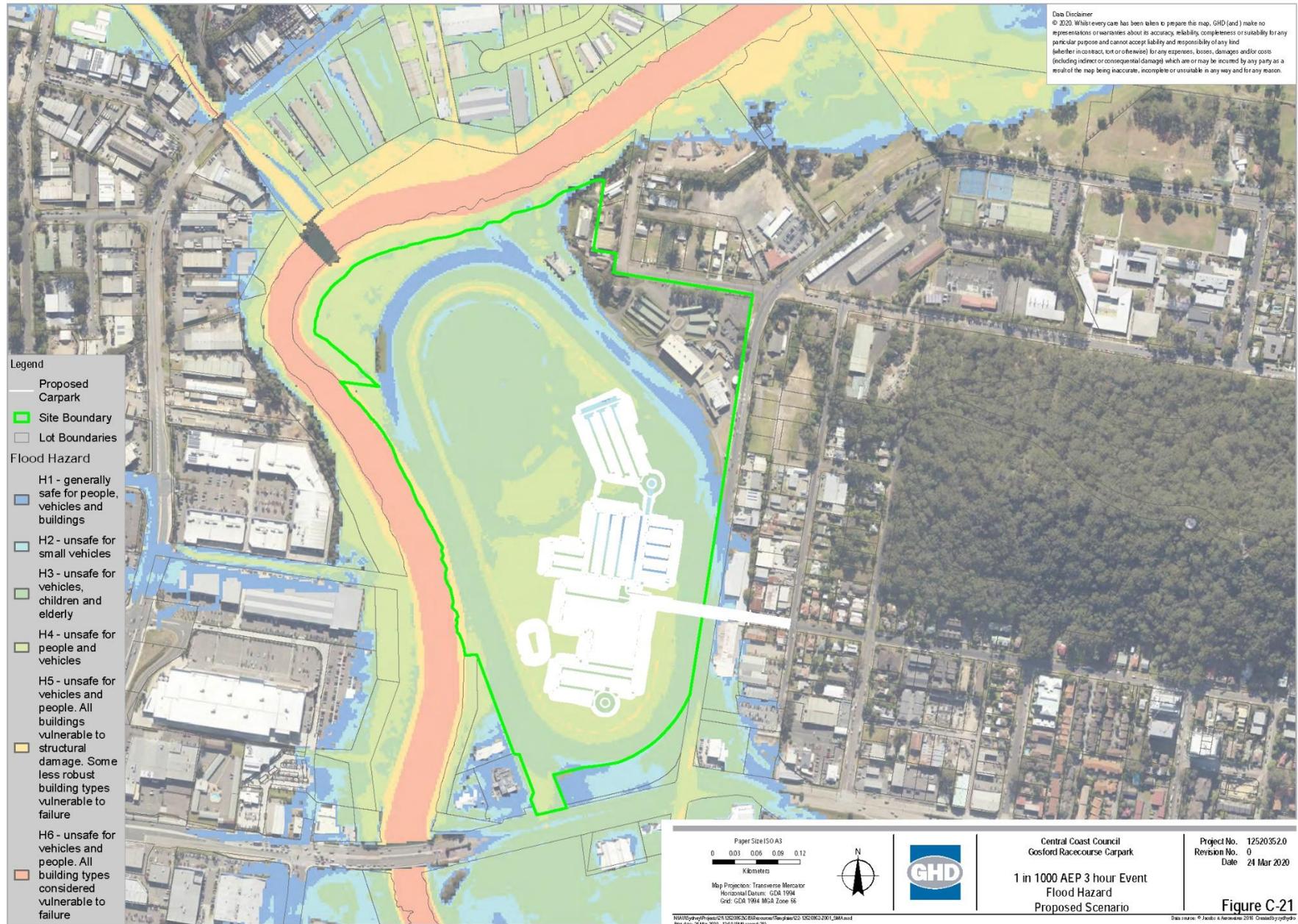


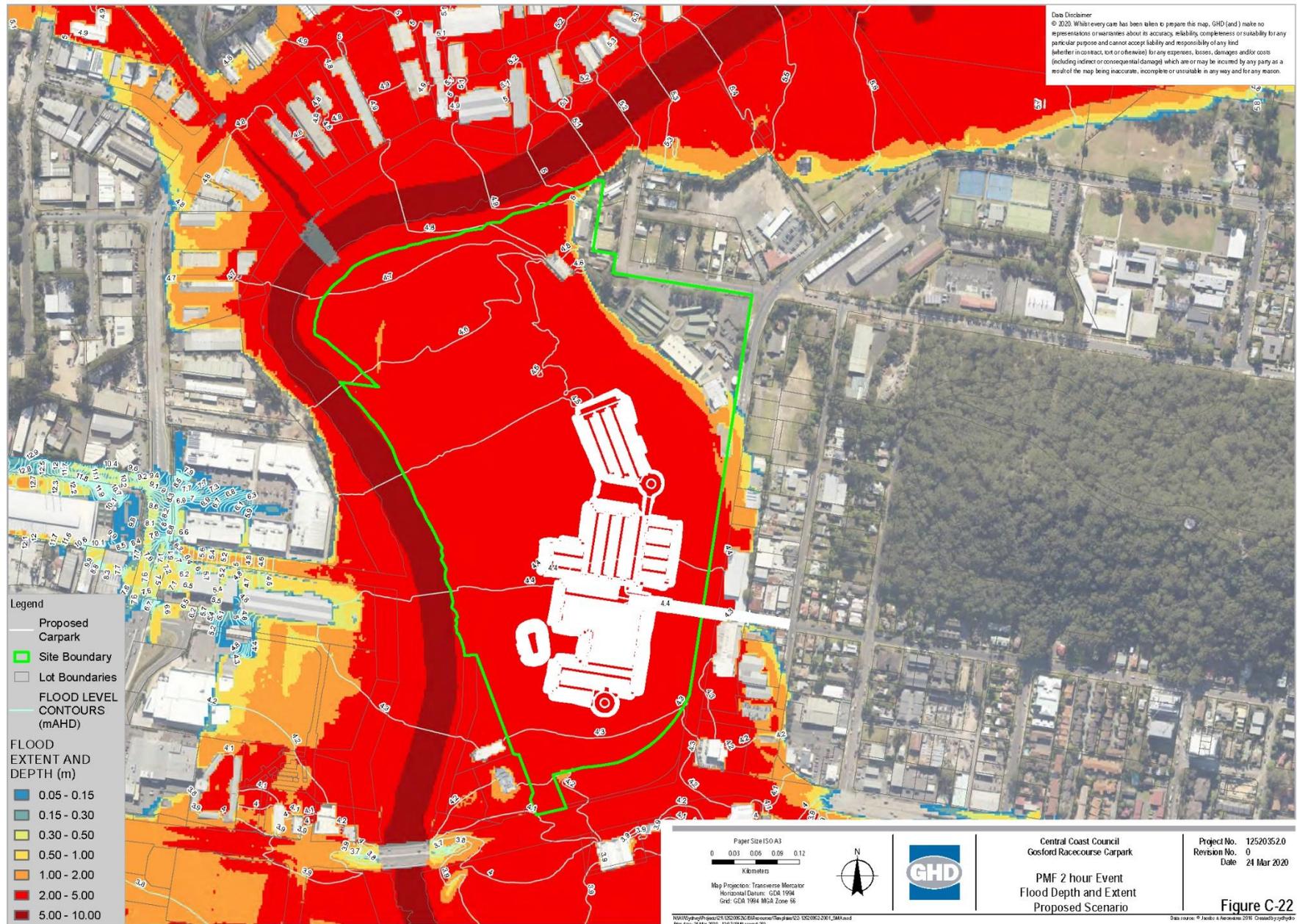


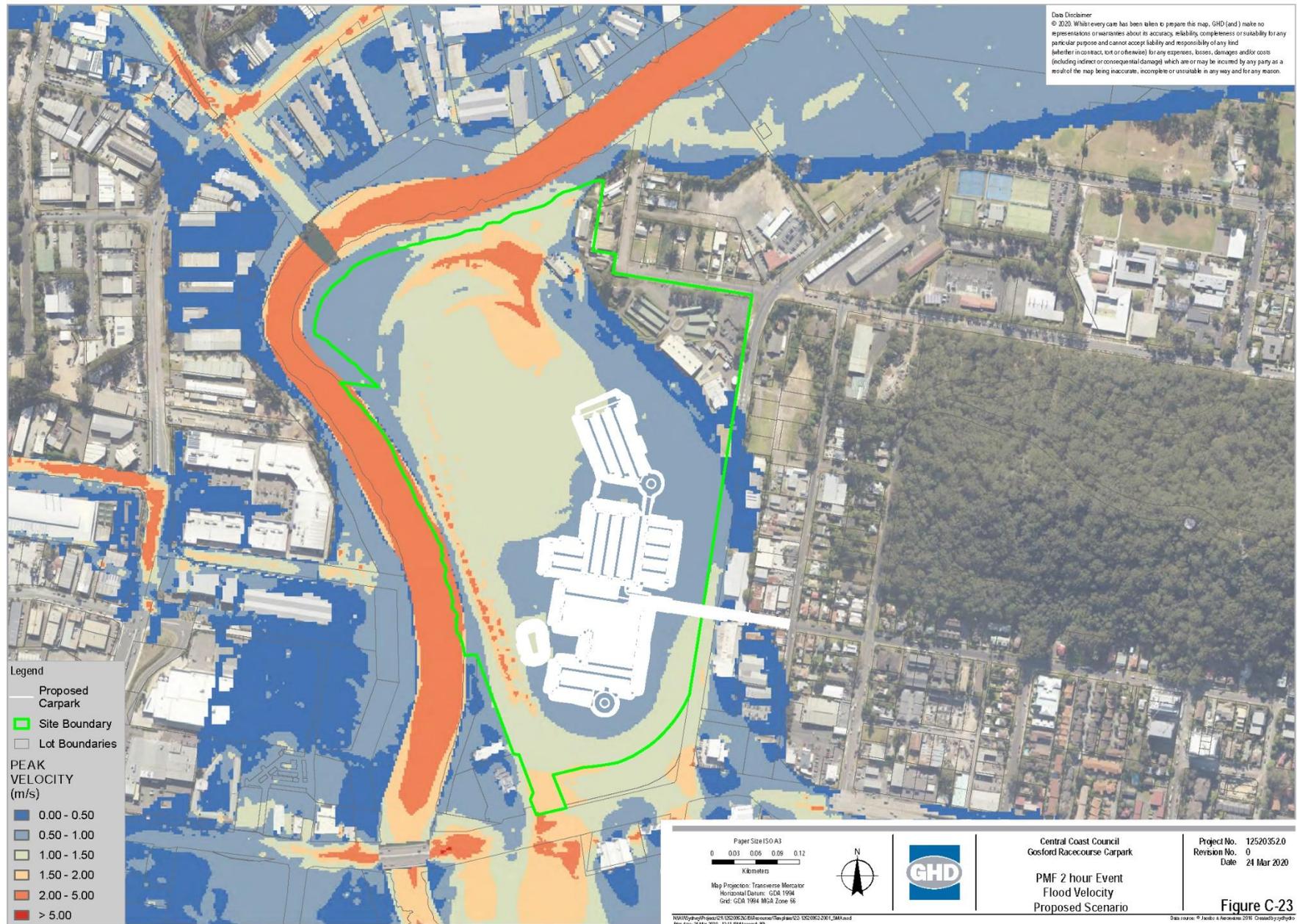


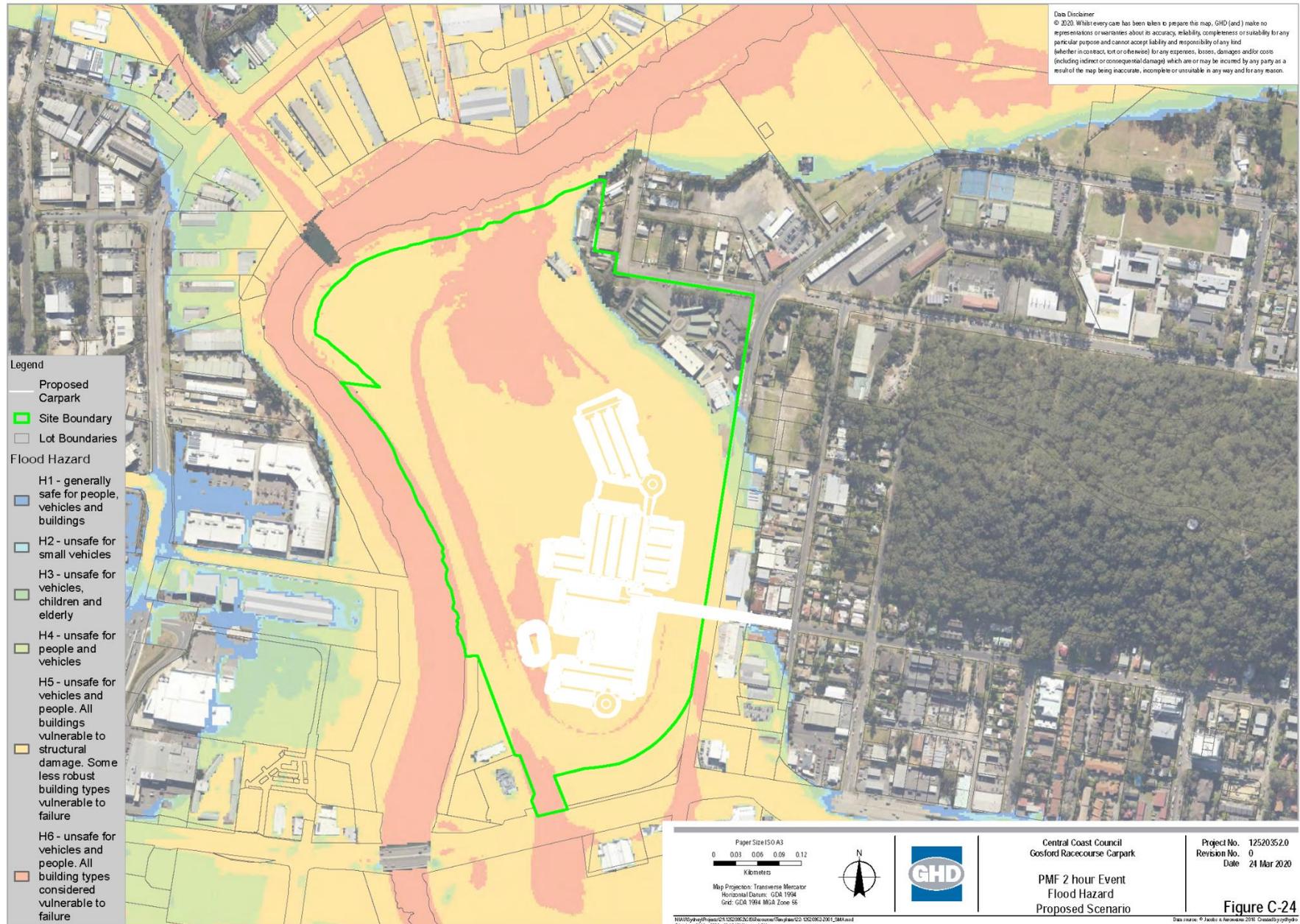


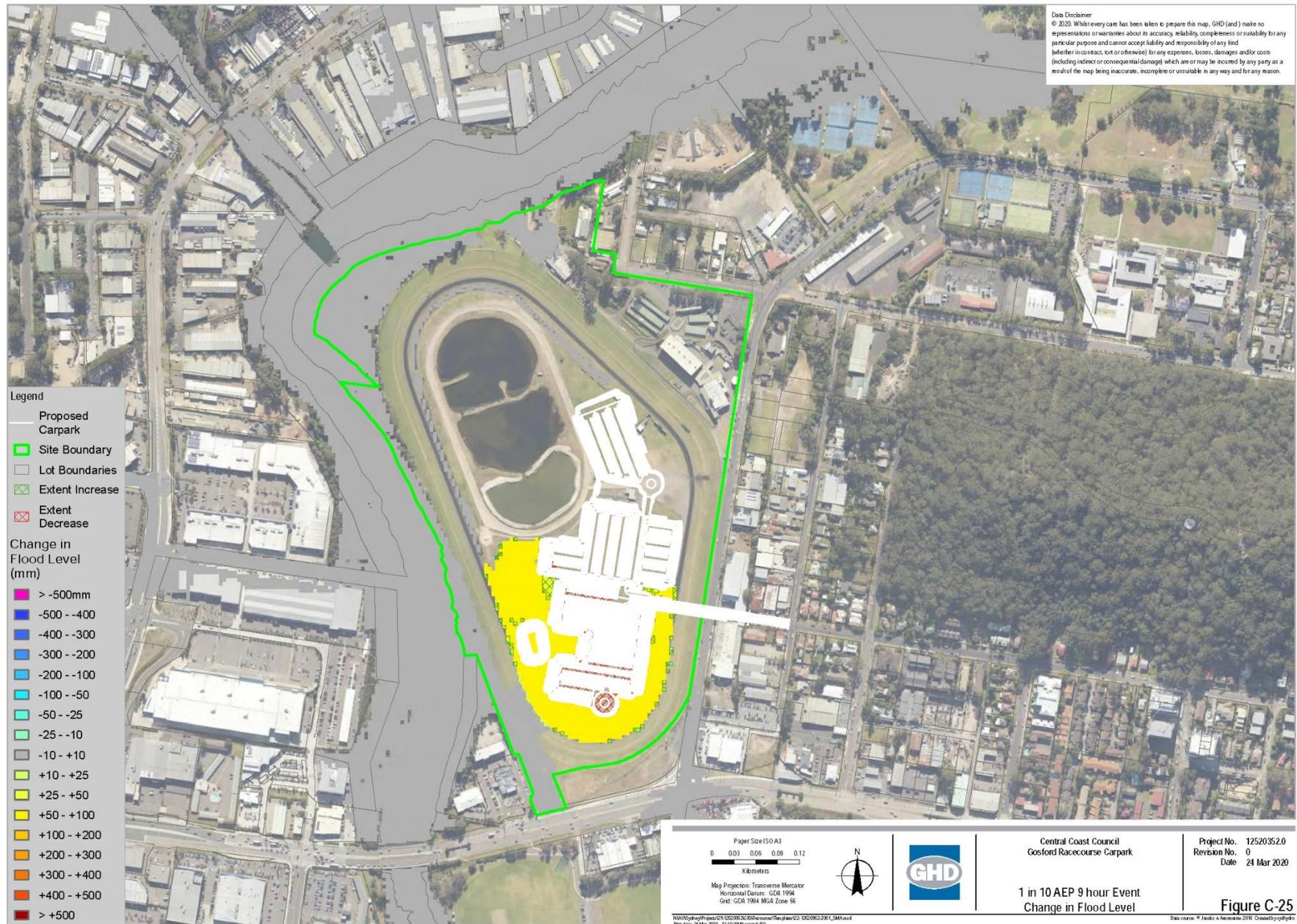






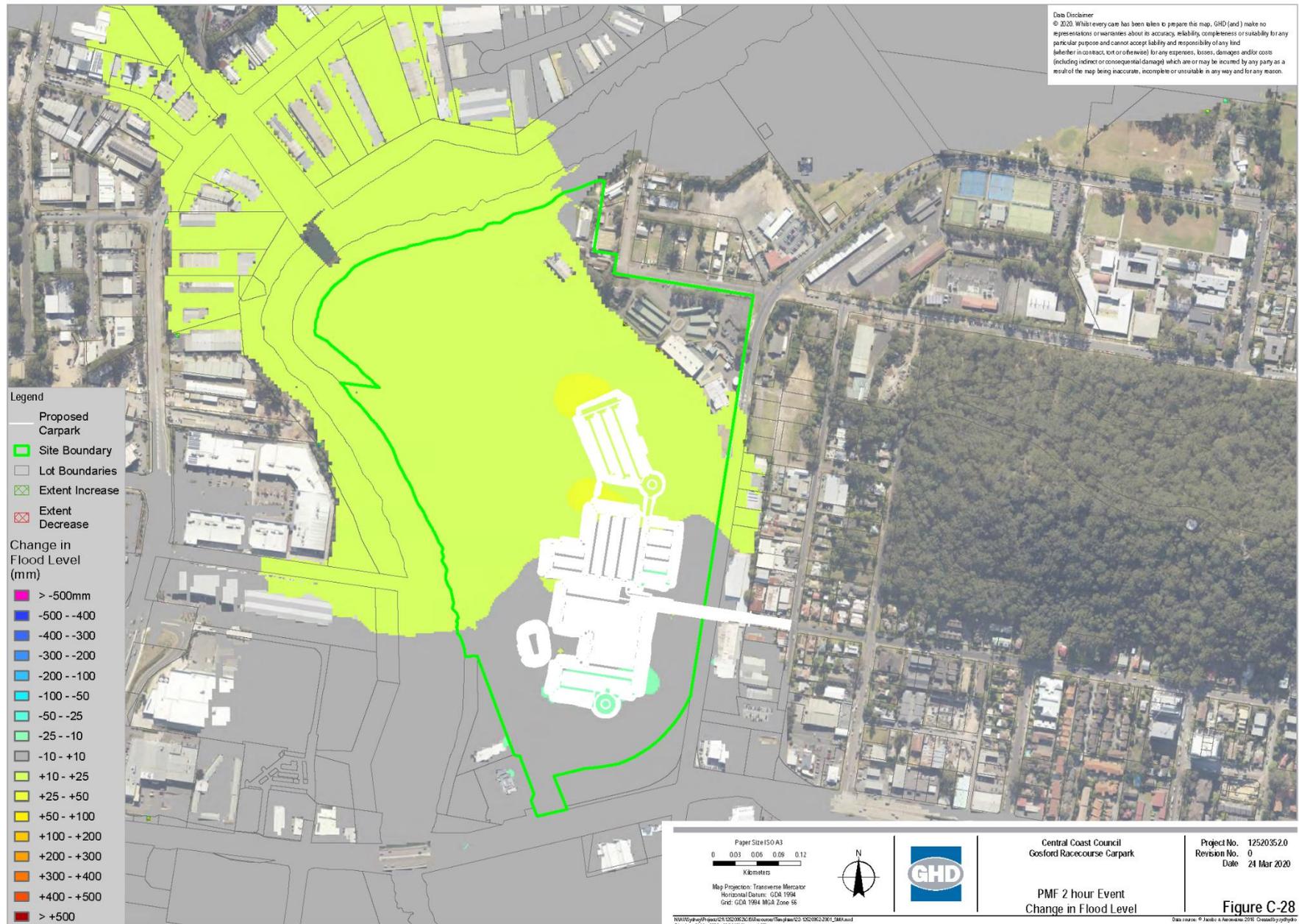












GHD  
 Suite 10, Zenith Building  
 6 Reliance Drive  
 Tuggerah NSW 2259  
 T: 61 2 4350 4100 F: 61 2 4350 4101 E: centralcoastmail@ghd.com

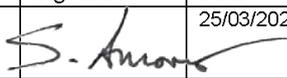
© GHD 2020

This document is and shall remain the property of GHD. The document may only be used for the purpose for which it was commissioned and in accordance with the Terms of Engagement for the commission. Unauthorised use of this document in any form whatsoever is prohibited.

12520352-86870-

32/[https://projectsportal.ghd.com/sites/pp01\\_01/cccgosfordracecourse/ProjectDocs/12520352-REP\\_Concept Design Report.docx](https://projectsportal.ghd.com/sites/pp01_01/cccgosfordracecourse/ProjectDocs/12520352-REP_Concept Design Report.docx)

Document Status

Revision	Author	Reviewer		Approved for Issue		
		Name	Signature	Name	Signature	Date
0	H Fugate M Monroe A Priory	M Carroll A Sneddon R Berg		S Amoroso		25/03/2020
1						

[www.ghd.com](http://www.ghd.com)





Our Ref: JEH:SZH:981249

21 April 2020

**Private & Confidential**

The CEO  
Central Coast Council  
P.O. Box 20  
WYONG NSW 2259

**By Email Only**

**Attention: Ben Brown**

**Email:** [Ben.Brown@centralcoast.nsw.gov.au](mailto:Ben.Brown@centralcoast.nsw.gov.au)

This document, including any attachments, may contain privileged and confidential information intended only for the addressee named above. If you are not the intended recipient please notify us. Any unauthorised use, distribution or reproduction of the content of this document is expressly forbidden.

Dear Mr Brown

**Advice regarding planning pathways for car park at Gosford Racecourse  
Address: 4 Racecourse Road West Gosford**

- 1.1 We refer to the above matter and your request for advice regarding the planning pathways available to carry out development for the purposes of a carpark on Lot 100 DP 1221111, known as 4 Racecourse Road, West Gosford (**the Land**).
- 1.2 Specifically, the proposal involves:
- (a) construction of an asphalt, at-grade<sup>1</sup> car park with 1,500 car spaces on part of the Land which is presently unoccupied, as shown on Figure 1 below (**the Proposed Car Park**); and
  - (b) construction of an access tunnel for vehicles and pedestrians extending underneath part of the Land, Racecourse Road, and 1A Donnison Street West so as to provide a link between the Proposed Carpark and Donnison Street West (**the Proposed Access Tunnel**)
- (collectively, **the Proposed Development**).
- (c) The Proposed Development will be undertaken by Central Coast Council (**the Council**).

Adelaide  
Brisbane  
Canberra  
Darwin  
Hobart  
Melbourne  
Norwest  
Perth  
Sydney

<sup>1</sup> Query raising of level to deal with flooding issues

Doc ID 726923673/v1

Level 14, Australia Square, 264-278 George Street, Sydney NSW 2000 Australia  
GPO Box 5408, Sydney NSW 2001 Australia  
DX 129 Sydney

Telephone +61 2 9334 8555  
Facsimile 1300 369 656 (Australia) +61 2 8507 6584 (International)  
hwlebsworth.com.au

ABN 37 246 549 189



Figure 1. Plan showing the location of the proposed car park and tunnel

- 1.3 We are instructed that the ownership of the land on which the Proposed Development will be undertaken is as follows:
- (a) the Land is owned by Gosford Race Club Limited (**the Club**);
  - (b) Racecourse Road is a public road and is owned by Roads and Maritime Services (**RMS**); and
  - (c) Dennison Street West is a public road and is owned by the Council.
- 1.4 We understand the portion of the Land on which the Proposed Carpark will be constructed will be leased to Council and the lease will provide that car parking in the Proposed Car Park will be available to patrons of the racecourse on race days.
- 2. Executive Summary**
- 2.1 As a public authority, the Council may carry out the Proposed Development as development for the purposes of road infrastructure facilities, which does not require consent under clause 94(1) of the *State Environmental Planning Policy (Infrastructure) 2007 (ISEPP)*.
- 2.2 This pathway would require the Council to undertake an environmental impact assessment under Part 5 of the *Environmental Planning and Assessment Act 1979 (EPA Act)*. It may also require the Council to consult other authorities under the ISEPP prior to carrying out the work.
- 2.3 Given the zoning of the Land under the *Gosford Local Environmental Plan 2014 (GLEP)* and the *State Environmental Planning Policy (Gosford City Centre) 2018 (Gosford SEPP)*, the Proposed Car Park will be permissible with consent if it is ancillary to the Gosford Racecourse and will be prohibited if it is characterised as an independent use.



infrastructure facilities may be carried out by or on behalf of a public authority on any land without consent.

- 3.8 We note we have been instructed that development will be carried out by Council. As identified above, this avenue under the ISEPP is only available if development is being carried out by or on behalf of a public authority. "Public authority" is defined in the EPA Act and includes a local authority, such as the Council. If circumstances change and development will no longer be carried out by or on behalf of Council, please let us know. Whether development is carried out "by or on behalf of" another entity under the ISEPP is a matter of fact and degree, but extends beyond arrangements or actual delegation and agency.<sup>2</sup>
- 3.9 Clause 93 of the ISEPP defines "road infrastructure facilities" as including, among other things, tunnels, ventilation shafts, emergency access ways, toll plazas, toll booths, security systems, bus lanes, transit lanes, and "road related areas", as defined in the *Road Transport Act 2013 (RT Act)*.
- 3.10 Section 4 of the RT Act defines "road related areas" as, among other things, "an area that is not a road and that is open to or used by the public for driving, riding or parking vehicles".
- 3.11 In our view, on the information available, all aspects of the Proposed Development can be characterised as types of "road infrastructure facilities". Therefore, development can be carried out by or on behalf of a public authority for such a purpose without consent.
- 3.12 If Council wishes to carry out other development in connection with the Proposed Development which does not fall within the scope of "road infrastructure facilities", clause 97 of the ISEPP allows certain other development to be carried out as exempt development "in connection with" a road or road infrastructure facilities. For a full list of these forms of development, see **Annexure A** to this advice. Such development must also comply with clause 20 of the ISEPP, though having regard to the land on which the proposed development is to be carried out, we do not anticipate the Council will have issues complying with these requirements.
- 3.13 The ISEPP requires the Council to consult other authorities prior to carrying out the work as outlined in below.
- 3.14 Council will need to consult the RMS under clause 104 of the ISEPP. Clause 104 applies to certain types of development as identified in the Table to Schedule 3 of the ISEPP. Schedule 3 includes:

<sup>2</sup> See *R v Portus; Ex parte Federated Clerks Union of Australia* [1949] HCA 53; (1949) 79 CLR 428 at 435 (Latham CJ), 438 (Dixon J); *Burwood Area Community Housing Limited v Sutherland Shire Council* [2006] NSWLEC 313 at [28] (Preston CJ).

Purpose of development	Size or capacity—site with access to a road (generally)	Size or capacity—site with access to classified road or to road that connects to classified road (if access within 90m of connection, measured along alignment of connecting road)
Car parks (whether or not ancillary to other development)	200 or more car parking spaces	50 or more car parking spaces

- 3.15 It is unnecessary to consider whether the Land has access to roads or classified roads as the Proposed Car Park exceeds 200 car parking spaces. As a result, clause 104 applies to the Proposed Development.
- 3.16 As this is the case, then under clause 104(2A) of the ISEPP, in order to carry out the Proposed Development, Council must have:
- (a) given written notice of the intention to carry out the development to RMS in relation to the development, and
  - (b) taken into consideration any response to the notice that is received from RMS within 21 days after the notice is given.
- 3.17 The Council may also need to consult with the State Emergency Service (**SES**) under clause 15AA of the ISEPP. Consultation is required where a public authority seeks to carry out development without consent under Part 3 Division 17 and where the land is "flood liable". Flood liable means "and that is susceptible to flooding by the probable maximum flood event, identified in accordance with the principles set out in the manual entitled *Floodplain Development Manual: the management of flood liable land*".
- 3.18 As discussed above, our preliminary review of the Council's online mapping tool appears to show the land is flood liable.
- 3.19 If this is the case, then under clause 15AA(1), in order to carry out the Proposed Development, Council must have:
- (a) given written notice of the intention to carry out the development (together with a scope of works) to the State Emergency Service, and
  - (b) taken into consideration any response to the notice that is received from the State Emergency Service within 21 days after the notice is given.
- 3.20 We note that, although proper regard should be given to the RMS's or SES's comments, the requirement is only for Council to "consider", not necessarily "adopt", these comments.
- 3.21 The carrying out of development without consent under the ISEPP would require the Council to undertake an environmental impact assessment under Part 5 of the

*Environmental Planning and Assessment Act 1979 (EPA Act)* prior to carrying out development.

3.22 Section 5.3(1) of the EPA Act provides:

(1) *For the purpose of attaining the objects of this Act relating to the protection and enhancement of the environment, a **determining authority** in its consideration of **an activity** shall, notwithstanding any other provisions of this Act or the provisions of any other Act or of any instrument made under this or any other Act, examine and take into account to the fullest extent possible all matters affecting or likely to affect the environment by reason of that activity.*

3.23 Section 5.1 provides that "activity" includes "development", and so with respect to development carried out by or on behalf of a public authority, the "determining authority" is the "public authority by or on whose behalf the activity is or is to be carried out". Council is therefore required to carry out an environmental impact assessment prior to carrying out the development.

3.24 We note that in the event that environmental assessment determines that the Proposed Development is likely to significantly affect the environment, additional steps including public exhibition are required by Council as the "determining authority" under section 5.7 of the EPA Act prior to the carrying out development.

3.25 We have not considered in detail what other approvals may be required, however we note that Council may also need an approval under section 138 of the Roads Act 1993 (**the Roads Act**) as part of this planning pathway.

3.26 Based on the information provided, it is unclear whether any of the Proposed Works will interfere with Racecourse Road, which is owned by RMS, or whether it will only affect Donnison Street West, which is owned by Council.

3.27 If approval under the Roads Act is required from the RMS, then the RMS will also be a "determining authority" who is required to follow the procedures in section 5.7 of the EPA Act prior to giving their consent to the works.

3.28 For completeness, we note the carrying out of development without consent under the ISEPP is not restricted or prohibited by the provisions of the GLEP or the Gosford SEPP. The ISEPP prevails to the extent of any inconsistency over other EPIs. Further Clause 5.12(1) of both the GLEP and the Gosford SEPP provide that each relevant plan/policy:

*does not restrict or prohibit, or enable the restriction or prohibition of, the carrying out of any development, **by or on behalf of a public authority**, that is permitted to be carried out with or **without development consent**, or that is exempt development, **under State Environmental Planning Policy (Infrastructure) 2007.***

- 3.29 As a consequence of this provision, the ISEPP pathway is, in effect, the only pathway that can be used if development is to be carried out by or on behalf of Council as the GLEP and the Gosford SEPP do not control such development.<sup>3</sup>

*Clause 20A - Exempt Development*

- 3.30 For completeness, we note that clause 20A of the ISEPP enables the carrying out of development for certain purposes listed in Schedule 1 of the ISEPP provided they meet certain development standards. One of these purposes is "car parks".
- 3.31 However, one of the relevant development standards sets the following limit on parking spaces:

*Must not exceed 200 spaces for a site with access to any road or 50 spaces for a site with access to a classified road or to a road that connects to a classified road (if the access is within 90m of that connection, measured along the alignment of the connecting road)*

- 3.32 Given the size of the Proposed Car Park greatly exceeds this figure this development pathway is not available.

Development under the GLEP/Gosford SEPP

- 3.33 The Land Use Table for the RE2 - Private Recreation zone in the GLEP specifies the development which may be carried out without consent, or with consent, or the development that is prohibited, and provides:

**2 Permitted without consent**

*Nil*

**3 Permitted with consent**

*Aquaculture; Community facilities; Environmental facilities; Environmental protection works; Kiosks; Recreation areas; Recreation facilities (indoor); Recreation facilities (outdoor); Registered clubs; Restaurants or cafes; Roads*

**4 Prohibited**

*Any development not specified in item 2 or 3*

- 3.34 The Proposed Car Park would either be characterised as a "car park" or as development ancillary to the existing racecourse. Whether it is one or the other will depend upon the dominant purpose of the Proposed Car Park.
- 3.35 We have considered the 2019-2020 Gosford Racecourse calendar and found that the racecourse generally only has race days two to three times a month, although we do not know what other functions the Racecourse is used for.

<sup>3</sup> See *Butler Street Community Network Incorporated v Northern Region Joint Regional Planning Panel* [2017] NSWLEC 51

21 April 2020

- 3.36 In our view, if the car park were used by the public for a range of purposes several days a week, and only be used by the race course on race days, the Proposed Development would be characterised as a car park. Car parks are a use of land not specified in item 2 or 3 and therefore such development is prohibited under the GLEP.
- 3.37 In the alternative, if the car park were only used occasionally by the public for specific events, and use by the race course on race days, an argument could be made that the car park is development ancillary to the existing racecourse. The existing racecourse could be characterised as a recreation facility (major), which is defined as:
- a building or place used for large-scale sporting or recreation activities that are attended by large numbers of people whether regularly or periodically, and includes theme parks, sports stadiums, showgrounds, racecourses and motor racing tracks*
- 3.38 As identified at paragraph 3.4 above, development for the purposes of a recreation facility (major) is an additional permitted use under the GLEP and is permitted with consent notwithstanding the zoning of RE2 zoning (which would otherwise prohibit such a use).
- 3.39 We note that regardless of how the proposed Car Park is characterised, roads, are permitted with consent.
- 3.40 The Land Use Table for the B6 - Business Corridor zone in the Gosford SEPP is identical to that in the GLEP. Due to the length of the Land Use Table, a full copy of the provisions are set out in full in Annexure A, however in summary:
- (a) roads, road related facilities, car parks and are all innominate uses and are therefore permissible with consent (as the table provides any use not otherwise listed is permissible with consent); and
  - (b) recreation facilities (major) are listed as prohibited.
- 3.41 The area of the land zoned B6 is the area on which the Proposed Development will involve the construction or alteration of roads and road related facilities and so this aspect of the Proposed Development could be carried out with consent.
- 3.42 In light of the above, if Proposed Car Park can be properly characterised as being ancillary to the Gosford Racecourse, then the Proposed Development can be carried out under the GLEP or Gosford SEPP. However, if the Proposed Car Park is properly characterised as an independent use (i.e. a car park) it is prohibited under the Gosford LEP.
- 3.43 This pathway, if available, would require merits assessment under Part 4 of the EPA Act. Having regard to the characteristics of the site, key issued under the GLEP and Gosford SEPP which will need to be addressed will include acid sulphate soils (see clause 7.1 of the GLEP) and flooding issues (see clauses 7.2 and 7.3 of the GLEP).

3.44 As identified at paragraphs 3.25 and 3.27 above, approval from the RMS under the Roads Act may be required. If so, the development will be integrated development Division 4.8 of the EPA Act.

**4. Conclusion**

4.1 The Proposed Development may be carried out by or on behalf of the Council as development for the purposes of road infrastructure facilities under clause 94(1) of the ISEPP. This requires Council to undertake environmental assessment under Part 5 of the EPA Act and consultation with the RMS and possibly the SES.

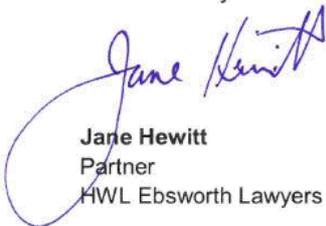
4.2 This development pathway is the only pathway available if the Proposed Development is to be carried out by or on behalf of Council, by virtue of clause 5.12(1) of the GLEP and clause 5.12(1) of the Gosford SEPP.

4.3 For completeness, we note that development for the purposes of a car park may be carried out by a person other than Council, provided it is ancillary to the Gosford Racecourse, with consent under the GLEP and the Gosford SEPP, requiring merits assessment under Part 4 of the EPA Act.

4.4 The advice is of its nature a high level advice as many of the details of the development design and the parts of the land on which it is proposed to be carried out are unknown. However, on the information provided, we have identified the potential need for the approval of RMS under section 138 of the Roads Act, as well as flooding and acid sulphate soils issues which may be of relevance to the GLEP/Gosford SEPP pathway, if available that development pathway is available.

4.5 Please do not hesitate to contact us should you require any clarification or further advice in relation to this matter.

Yours faithfully



**Jane Hewitt**  
Partner  
HWL Ebsworth Lawyers

+61 2 9334 8639  
jhewitt@hwle.com.au

**Simon Hill**  
Associate  
HWL Ebsworth Lawyers

+61 2 9334 8558  
shill@hwle.com.au

**97 Exempt development**

- (1) Development for any of the following purposes is exempt development if it is carried out by or on behalf of a public authority or the Minister responsible for Crown roads (within the meaning of the *Roads Act 1993*) in connection with a road or road infrastructure facilities and complies with clause 20—
- (a), (b) (Repealed)
- (c) erection, installation, maintenance, reconstruction or replacement of any of the following, and any associated landscaping works—
- (i) security fencing with a height above ground level (existing) of not more than 3.2m,
  - (ii) safety barriers or systems, including Jersey barriers,
  - (iii) directional, safety or other advisory signs relating to road works or the use of existing road infrastructure facilities,
  - (iv) pedestrian and cyclist facilities (such as footpaths, street lighting, kerb adjustments and ramps, pedestrian fences, refuges, holding rails, and bollards),
  - (v) slope stability works that are required for safety reasons and minor road safety improvements,
  - (vi) minor road pavement or shoulder work (such as patching, grading, re-sheeting, sealing and re-sealing),
  - (vii) street furniture (such as seats, bins and directional signs) and any associated kerb construction, access paths and ramps, lighting and signage that complies with AS:1428.2 and the Disability Standards,
  - (viii) removal from or addition to existing traffic lights of items such as signal displays, loops or buttons,
  - (ix) roadside facilities and rest areas, if the development does not involve the installation of toilets and involves no greater disturbance to the ground or vegetation than necessary,
  - (x) street lighting, if any replacement involves the replacement of existing materials with similar materials only and if the lighting minimises light spill and artificial sky glow in accordance with the Lighting for Roads and Public Spaces Standard,
  - (xi) pavement and road surface markings (such as bus lane markings), lane delineators, electric pavement lights, detection loops and traffic counters,
  - (xii) kerb and guttering,
  - (xiii) culverts, drains and other works to improve the quality or control of stormwater runoff,
  - (xiv) public transport information display and ticketing systems,
- (d) repair or replacement of lighting, mechanical systems, electrical equipment or air monitoring equipment, replacement of screening of overhead bridges and removal of graffiti or debris,
- (e) emergency works to protect a road or road infrastructure facilities, the environment or the public, but only if they involve no greater disturbance to soil or vegetation than necessary,
- (f) upgrading or maintenance of landscaping, or vegetation management (such as weed spraying, slashing and pruning), that—
- (i) does not involve construction works, and
  - (ii) involves the replacement (if any) of existing materials with similar materials only,
- (g) installation, replacement or maintenance of temporary structures (such as temporary bus stops, bus shelters or signs) that are associated with alternative transport arrangements necessitated by road works or road maintenance and that are removed as soon as practicable.
- (h) (Repealed)

- (1A) The construction of bus stops or bus shelters (including the construction or installation of any associated kerbs, access paths or ramps, lighting or signage) carried out by or on behalf of a public authority, or an accredited bus service operator providing regular bus services at those stops or shelters, is exempt development if—
- (a) the development complies with clause 20, and
  - (b) the stops or shelters—
    - (i) have a height above the footpath of not more than 3.2 metres, and
    - (ii) have only non-reflective finishes, and
    - (iii) do not obstruct the line of sight of vehicular traffic or pedestrian traffic, and
  - (c) the design of any associated kerbs, access paths and ramps, lighting and signage is in accordance with AS 1428 and the Disability Standards.
- (1B) The display of commercial advertisements on bus stops or bus shelters is not exempt development under this clause.
- (1C) Development for the purposes of maintaining bus stops or bus shelters (including maintaining any associated kerbs, access paths or ramps, lighting or signage) by or on behalf of a public authority, or an accredited bus service operator providing regular bus services at those stops or shelters, is exempt development if the development—
- (a) complies with clause 20, and
  - (b) does not involve giving the shelter or stop a reflective finish, and
  - (c) does not cause the design of any associated kerbs, access paths or ramps, lighting or signage to be inconsistent with AS 1428 or the Disability Standards.
- (1D) Without limiting clause 20A, development for a purpose specified in Schedule 1 is exempt development if the development—
- (a) is carried out by or on behalf of an accredited bus service operator providing a regular bus service, and
  - (b) is carried out on land within the boundaries of an existing bus depot, and
  - (c) meets the development standards for the development specified in Schedule 1, and
  - (d) complies with clause 20.
- (2) In this clause—  
**relevant development control plan** means, in relation to a bus stop or bus shelter, a development control plan (as in force on the commencement of this Policy) that has been adopted by the council for the local government area in which the stop or shelter is located.

**Annexure B**

*Excerpt from Land Use Tables for the B6 - Business Corridor zone in the GLEP and Gosford SEPP*

**2 Permitted without consent**

*Nil.*

**3 Permitted with consent**

*Business premises; Community facilities; Garden centres; Hardware and building supplies; Hotel or motel accommodation; Landscaping material supplies; Light industries; Multi dwelling housing; Oyster aquaculture; Passenger transport facilities; Plant nurseries; Recreation facilities (indoor); Residential flat buildings; Roads; Shop top housing; Tank-based aquaculture; Warehouse or distribution centres; Any other development not specified in item 2 or 4*

**4 Prohibited**

*Agriculture; Air transport facilities; Amusement centres; Animal boarding or training establishments; Biosolids treatment facilities; Boat building and repair facilities; Boat sheds; Camping grounds; Caravan parks; Cemeteries; Centre-based child care facilities; Charter and tourism boating facilities; Correctional centres; Crematoria; Depots; Eco-tourist facilities; Electricity generating works; Environmental facilities; Environmental protection works; Exhibition homes; Exhibition villages; Extractive industries; Farm buildings; Flood mitigation works; Forestry; Freight transport facilities; Function centres; Heavy industrial storage establishments; Highway service centres; Home-based child care; Home businesses; Home occupations (sex services); Industries; Information and education facilities; Marinas; Mooring pens; Moorings; Mortuaries; Open cut mining; Pond-based aquaculture Recreation areas; Recreation facilities (major); Recreation facilities (outdoor); Registered clubs; Research stations; Residential accommodation; Resource recovery facilities; Restricted premises; Rural industries; Rural supplies; Service stations; Sewage treatment plants; Storage premises; Tourist and visitor accommodation; Transport depots; Vehicle body repair workshops; Vehicle repair stations; Veterinary hospitals; Waste disposal facilities; Water recreation structures; Water recycling facilities; Water supply systems*

Finance Summary

Total Construction Cost 'Per Space'

When analysed on a construction cost per car space, the Racecourse project is by far the least expensive project out of the three shortlisted car park sites that were considered.

Racecourse Road	Albany Street	Central Coast Stadium
\$20,500	\$70,000	\$50,000

The relatively low-cost base 'Per Space' is due to the 1,500 car spaces (incl. Tunnel) predominately being constructed on grade in an open environment, whilst the other two projects are multideck car parks with associated superstructure, essential building services with various site constraints.

The total finance required to bring this project up to Tender Award is estimated to be \$1.5M. This will allow Council to engage consultants to mitigate the flood issues via a comprehensive flood model, further develop the design enabling lodgement of both a Planning Proposal and DA. This would equate to about 4.2% of the perceived Total Development Cost.

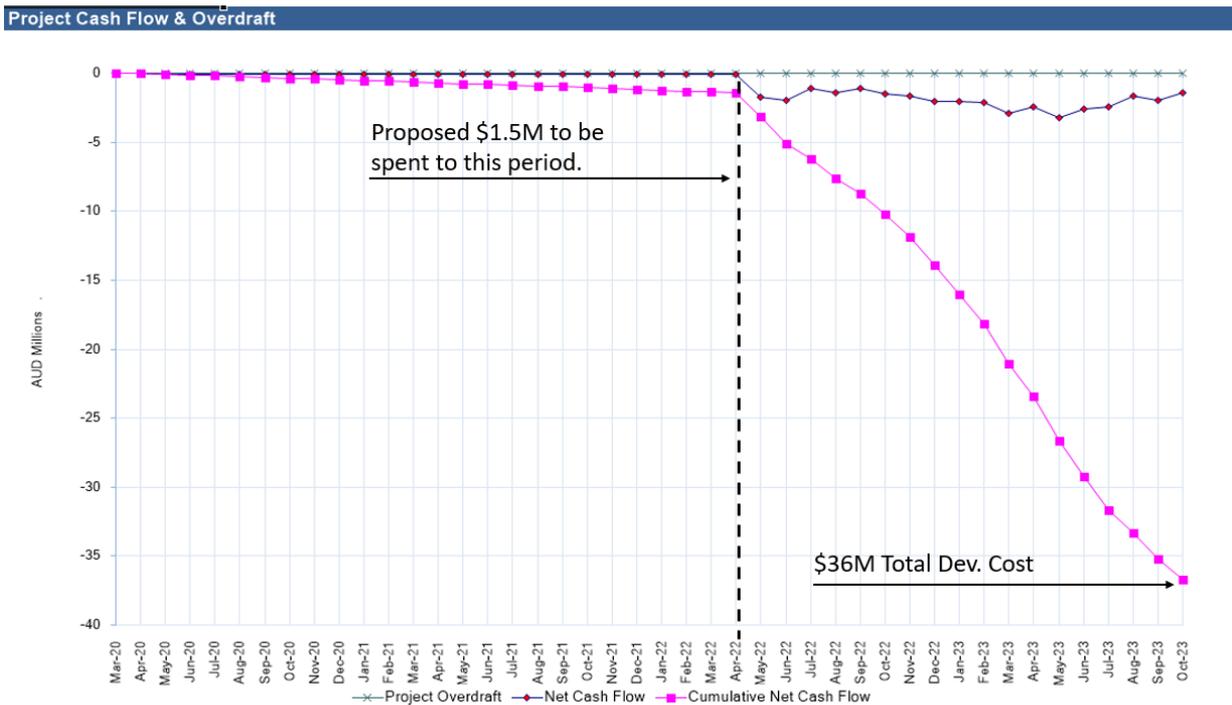


Figure 1- Project Cash Flow

The above Project Cash Flow graph demonstrates the overall capital outlay of the project at the end of the project duration. Whilst the Total Development Cost forecast is currently circa \$36m, the sum required to reduce the risk exposure to April 22 (end of the Planning Proposal/ DA Period/ Design Development) is \$1.5m.

We note, at this conceptual stage, we have not included any analysis of anticipated car parking revenue.



20 April 2020

Central Coast Council (NSW)

Our ref: 12520352-76991-47  
Your ref:

Dear Sir/Madam

### **CCC - Gosford Racecourse Multidisciplinary Services Concept Design Report – Addendum**

This letter report presents the results of a supplementary flooding assessment undertaken for the proposed Gosford Racecourse Carpark and as such should be considered as an addendum to the GHD's earlier report entitled 'Gosford Racecourse Multidisciplinary Services - Concept Design Report', Rev 0 dated 25 March 2020 (GHD, 2020). The flooding assessment presented in Section 6.3 of the earlier report was developed to assess the proposed Racecourse Carpark providing a 1 in 10 AEP flood immunity. This requirement has subsequently been reviewed, and a further assessment was requested that targets the proposed Racecourse Carpark providing a 1 in 100 AEP flood immunity.

The assessment was completed using the TUFLOW flood model for the Narara Creek catchment as discussed in the Gosford Racecourse Multidisciplinary Services - Concept Design Report (GHD, 2020). A revised car park concept design providing 1 in 100 AEP flood immunity was configured in the model and the critical events for the 1 in 10 AEP, 1 in 100 AEP, 1 in 1000 AEP and PMF events were simulated as before.

#### **Existing Flood Environment**

The existing flooding scenario presented in the Concept Design Report remains unchanged with results presented in Appendix C of the Gosford Racecourse Multidisciplinary Services - Concept Design Report (GHD, 2020).

#### **Carpark Proposal**

The revised car park concept design providing 1 in 100 AEP flood immunity was configured in the TUFLOW model by modifying the model terrain. To achieve a 1 in 100 AEP flood immunity the car park finished level was set to approximately 2.2 m AHD minimum, with approximately 1 in 4 batters around the car park circumference, generally 2% cross-fall and 0.5% longitudinal slope. The terrain model did not include any retaining walls to provide flood immunity at the approaches from the tunnel portal to the car park. These will likely be required as part of the design to provide flood immunity, however would not materially alter the flood results presented in this assessment.

Flood maps showing flood level and depth, peak velocity and flood hazard for this revised car park concept design are provided below in Figure 1 to Figure 12. The results show:

- In flood events up to the 1 in 100 AEP flood, the car park is not inundated. This includes the tunnel approach and entry on the racecourse side.

- It is noted, that in the 1 in 1000 AEP event, due to the proposed car park grading, much of the car park would be expected to be flood immune to this event too. Only lower parts of the carpark would experience shallow inundation. Flood velocity across the wider racecourse site would be approximately 0.5 m/s and flood hazard is generally classified as H4-H5. In accordance with the Australian Disaster Resilience Guideline 7-3 Flood Hazard (AIDR, 2017) the classification would make the car park itself safe for vehicles and pedestrians, although the tunnel itself would likely not function during this event for evacuation purposes.
- In the PMF event the car park is inundated by around 1.5 m of flood water, and flood velocity across the carpark are predicted as approximately 0.9-1 m/s. The flood hazard for the carpark is H5. In accordance with the Australian Disaster Resilience Guideline 7-3 Flood Hazard (AIDR, 2017) the H5 classification would make the carpark unsafe for all people and all vehicles in this event.
- Figure 13 to Figure 16 show that flood level impacts in the order of 100 mm to 200 mm within the Gosford Racecourse property boundary in the 1 in 10 AEP flood event. No increase greater than 10 mm exists beyond the Racecourse property (less than 10 mm generally accepted as being within the tolerance limits of the software as noted by the TUFLOW software proprietors).
- In the 1 in 100 AEP event modelled increases between 10 mm and 25 mm are predicted beyond the site boundary upstream to the south-western portion of the golf course and downstream to where Narara Creek meets Brisbane Water (see Figure 14). It is noted that significant decreases in flood level are predicted south-east of the proposed car park.
- In the 1 in 1000 AEP event modelled the extent of the flood level impacts between 10 mm and 25 mm (see Figure 15) are spread further across the floodplain (compared to the 1 in 100 AEP flood level impacts noted on Figure 14). These impacts increase in magnitude beyond 25 mm (less than 50 mm) immediately adjacent to the Gosford Racecourse property.
- In the PMF event, flood level impacts are more widespread in magnitude and extent are predicted than those previously noted (see Figure 16). The largest increase in flood level beyond the Gosford Racecourse property is between 50 mm and 100 mm in the PMF event.
- With respect to flood velocity impacts, during the 1 in 10 AEP, there are only negligible change to velocities as noted on Figure 17. Figure 18 shows the 1 in 100 AEP velocity impacts. In this event, there are minimal changes to velocities, generally confined to the fringes of the proposed car park and within the racecourse property boundary. The magnitude of these impacts are generally less than 0.3 m/s in area with existing velocities generally less than 0.5 m/s. In the 1 in 1000 AEP event modelled, the changes noted above in the 1 in 100 AEP events extend further during the 1 in 1000 AEP event but largely remain within the racecourse property boundary (see Figure 19). The magnitude of the change is still generally less than 0.3 m/s although some localised impacts greater than this are noted. These changes are generally confined to areas where existing velocities are around 0.5 m/s. In the PMF event modelled, the above noted changes to velocity are further widespread, with some impacts propagating beyond the racecourse property boundary (see Figure 20). Also, the magnitude of the impact is around 0.6 m/s. In this area the existing velocities in the PMF event are around 1 m/s.

**Summary**

The TUFLOW modelling for Narara Creek completed for the Gosford Racecourse Multidisciplinary Services - Concept Design Report (GHD, 2020) has been updated for a new carpark layout targeting 1 in 100 AEP flooding immunity. The TUFLOW modelling was undertaken for the 1 in 10, 1 in 100, 1 in 1000 AEP and PMF events for the proposed carpark scenario. The results from these simulations have been compared to the existing scenario results presented in the Concept Design Report (GHD, 2020). The flood level impacts are more widespread when compared with those presented in the Concept Design Report (GHD, 2020), with a calculated afflux larger than 10 mm.

**Limitations**

This Report has been prepared by GHD for Central Coast Council and may only be used and relied on by Central Coast Council for the purpose agreed between GHD and Central Coast Council as set out in this Report.

GHD otherwise disclaims responsibility to any person other than Central Coast Council arising in connection with this Report. GHD also excludes implied warranties and conditions, to the extent legally permissible.

The services undertaken by GHD in connection with preparing this Report were limited to those specifically detailed in the Report and are subject to the scope limitations set out in the Report.

The opinions, conclusions and any recommendations in this Report are based on conditions encountered and information reviewed at the date of preparation of the Report. GHD has no responsibility or obligation to update this Report to account for events or changes occurring subsequent to the date that the Report was prepared. Specifically, this Report does not take into account the effects, implications and consequences of or responses to COVID-19, which is a highly dynamic situation and rapidly changing. These effects, implications, consequences of and responses to COVID-19 may have a material effect on the opinions, conclusions, recommendations, assumptions, qualifications and limitations in this Report, and the entire Report must be re-examined and revisited in light of COVID-19. Where this Report is relied on or used without obtaining this further advice from GHD, to the maximum extent permitted by law, GHD disclaims all liability and responsibility to any person in connection with, arising from or in respect of this Report whether such liability arises in contract, tort (including negligence) or under statute.

The opinions, conclusions and any recommendations in this Report are based on assumptions made by GHD described in this Report. GHD disclaims liability arising from any of the assumptions being incorrect.

Sincerely  
GHD

**Andrew Priory**

Water Resources Engineer  
+61 2 92397419

Attachments: Flooding Maps

