



CIVIL

Flood Risk Assessment

for

25-27 Boyd Street, Tweed Heads 2291

for Homes NSW

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Acronyms

AEP	Annual Exceedance Probability
AHD	Australian Height Datum
ALS	Airborne Laser Survey (LiDAR)
ARI	Average Recurrence Interval
ARR	Australian Rainfall and Runoff 2019
BoM	Bureau of Meteorology
DCP	Development Control Plan
DTM	Digital Elevation Model
FPL	Flood Planning Level
LGA	Local Government Area
LiDAR	Light Detection and Ranging (also see ALS)
m	Measure of length / height / distance (metres)
m AHD	Meters above Australian High Datum
m/s	Measure of velocity (metres per second)
m ³ /s	Measure of flow rate (cubic metres per second)
PMF	Probable Maximum Flood
PMP	Probable Maximum Precipitation
TSC	Tweed Shire Council
TUFLOW	Two-dimensional hydraulic modelling software

Introduction

Northrop Consulting Engineers have been engaged by Homes NSW to prepare a Flood Risk Assessment for the proposed development at 25-27 Boyd Street, Tweed Heads, herein referred to as the subject site or the site.

This flood risk assessment aims to consider the existing flood risk, and likely changes to that risk due to the proposed development.

This assessment has been prepared with the consideration of the following guidelines and documents:

- Tweed Shire Council Property Flood Report contained within Appendix A.
- Tweed Valley Flood Study Update 2009 and Tweed Byron Coastal Creeks Flood Study 2010 (BMT WBM).
- Industry Specific SEARs
- NSW Floodplain Development Manual (NSW Government 2005).
- Architectural Drawings prepared by CKDS and dated the 29th November 2024.

This report has been prepared for the purpose of SSDA submission. A summary of compliance with the SEARs and report references are summarised below in Table 1.

Table 1 - SEARs Summary

Item	Requirement	Response
15	Identify any flood risk on-site having regard to adopted flood studies, the potential effects of climate change, and any relevant provisions of the NSW Flood Risk Management Manual. Where the development could alter flood behaviour, affect flood risk to the existing community or expose its users to flood risk, provide a flood impact and risk assessment (FIRA) prepared in accordance with the Flood Impact and Risk Assessment – Flood Risk Management Guide LU01. Detail design solutions and operational procedures to mitigate flood risk where required.	It was concluded that the proposed development will not create any significant adverse impacts to flood behaviour on the subject site and on the properties surrounding the subject site. Furthermore, flood risk in the developed case has been adequately managed through the selection of flood levels, implementation of flood protection measures and provision of offsite evacuation opportunities. We recommend the preparation of FERP prior to site occupation outlining these in further detail.

		Date
Prepared by	TVK	10/12/2024
Checked by	KS	10/12/2024
Admin	ZJ	10/12/2024

NL223052 / 10 December 2024

O:\5 Pre-July 24 Projects\Newcastle\YEAR 2022 Jobs\NL223052 - 25-27 Boyd Street, Tweed Heads\E - Reports\E02 - Flood Impact Assessment\NL223052_E02_Flood Risk Assessment [B].docx

Methodology

This flood risk assessment has been undertaken using the following procedure:

- Review Council Property Flood Report.
- Desktop review of all available information including, design plans and latest survey data.
- Assessment of existing and developed flood risk.

Subject Site and Proposed Development

Subject Site

The proposal encompasses the development of 25-27 Boyd Street, Tweed Heads (Lot 1 DP843470) herein known as the Site.

The site has a total lot area of 2,025m² and is currently cleared.

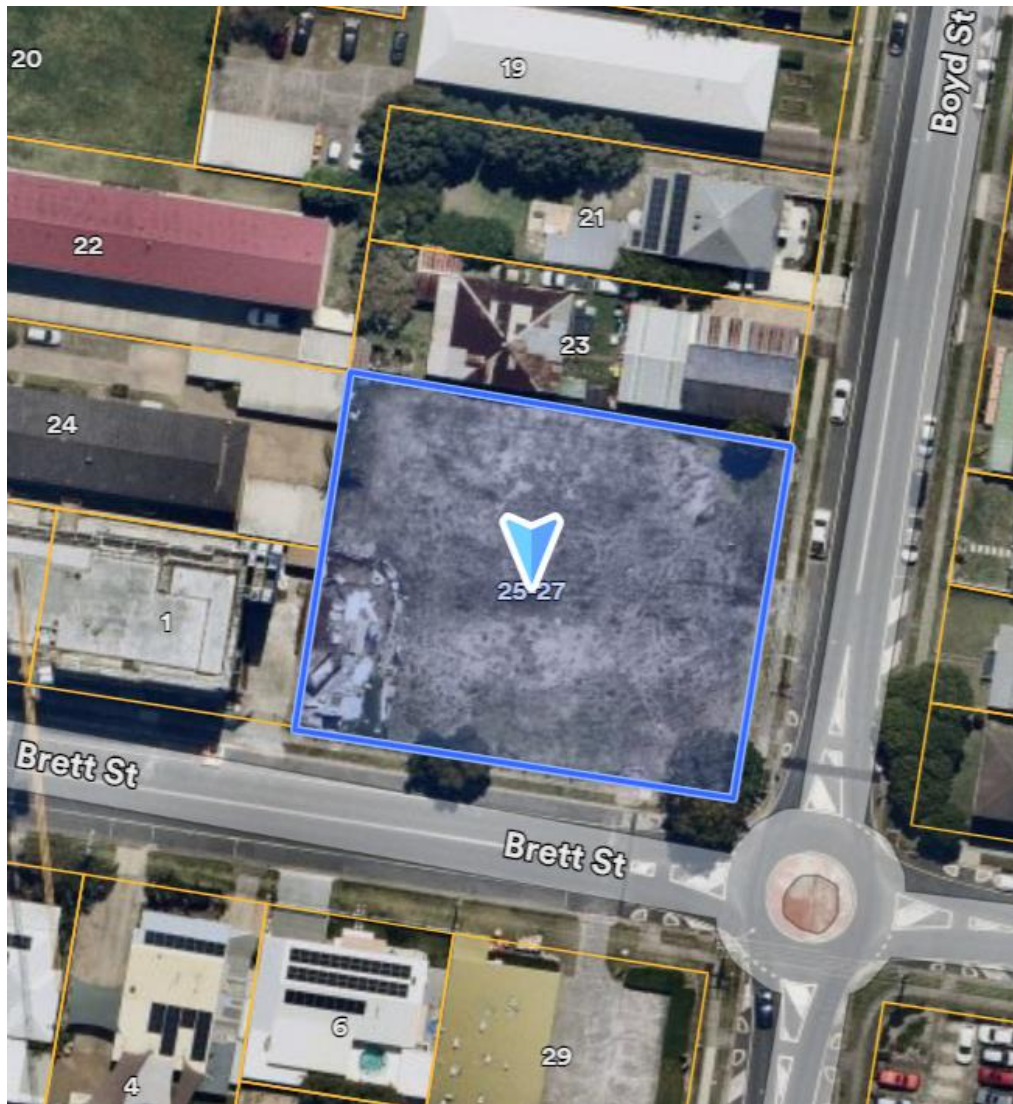


Figure 1 - Subject Site 25-27 Boyd St Tweed Heads (1/DP843470)

Source: Mecone Mosaic

The existing site frontages are presented in

Photo 1 to Photo 4 below.



Photo 1 – Boyd St Street looking south (Google Maps 2022)



Photo 2 – Boyd Street looking north (Google Maps 2022)



Photo 3 – Brett Street looking west (Google Maps 2022)



Photo 4 – Brett Street east (Google Maps 2022)

Proposed Development

The development proposes the construction of a 13-storey residential building accommodating approximately 80 one and two-bedroom apartments and two new basement-level car parks. Proposed vehicle access is via Brett Street, with pedestrian access available from both street frontages.

Architectural plans describing the development are provided in Appendix B.

Flood Behaviour and Characteristics

Flood Behaviour

The site is subject to flood inundation in events rarer than the 1% AEP storm event, caused by regional flooding of the Tweed River. It is not located in Council's flood planning area. Water approaches the site from the east, and is expected to peak slowly after commencement of rain. Land to the west of the site is not flood affected in the PMF.

Flood Levels

Flood levels and flood planning levels for the site is presented below in Table 2.

Table 2 – Existing Flood Level

Design Flood Level (m AHD)	0.2% AEP Level (m AHD)	PMF Level (m AHD)	FPL (m AHD)
2.6	2.9	5.7	3.1

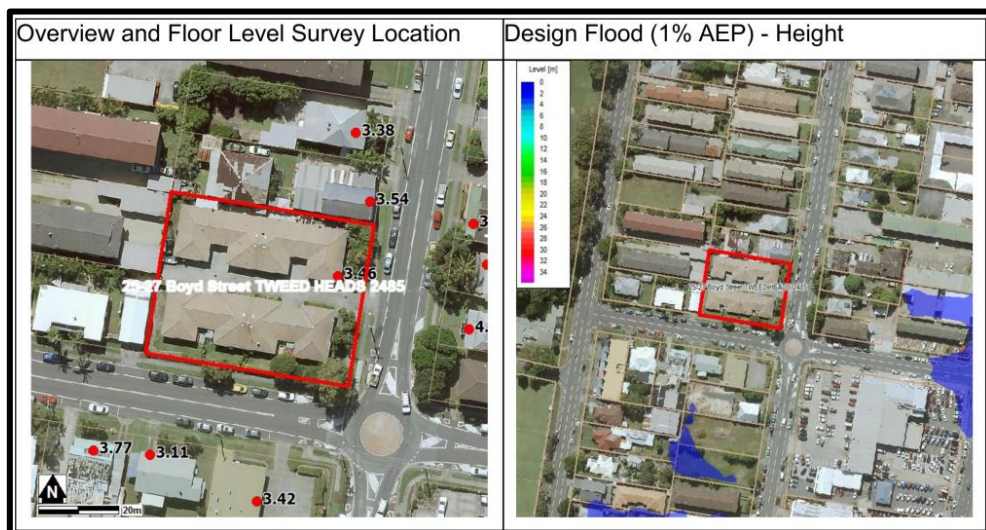


Figure 2- 1% AEP Flood Height and site locality (Tweed Council Property Flood Report, 17.09.20)

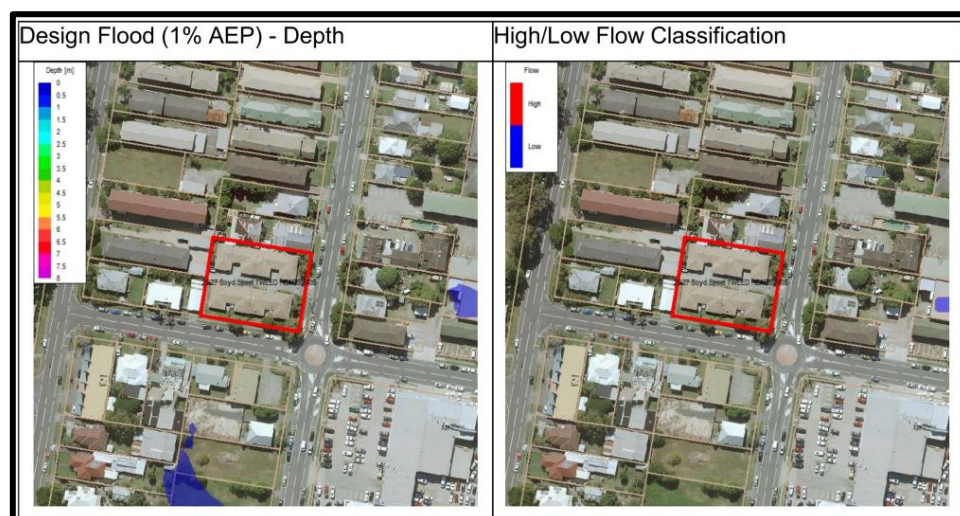


Figure 3 - 1% AEP Depth and Flow classification (Tweed Council Property Flood Report, 17.09.20)

Flood Risk Assessment

Flood Hazard

The flood hazard for the site has not been outlined in the Property Flood Report. However as noted above the site is not impacted in the 1% AEP flooding event, as such flood hazard is only applicable for events rarer than this.

The existing and developed risks are described below.

Existing Risk

The following potential risks from the flood hazard were identified in the existing condition - presented below in Table 3.

Table 3 - Existing flood risk analysis

Item	Likelihood	Consequence	Risk Rating
Structural damage causing economic loss	Rare to very rare	Major	High
Loss of life	Extremely rare	Major	Low
Cancellation of services	Unlikely	Moderate	Moderate

Developed and Residual Risk

Mitigation measures proposed in the design, and potential mitigation measures that could be implemented during operation are presented below in Table 4.

Table 4 - Mitigation Measures

Item	Mitigation Measures
Structural damage causing economic loss	Structures on-site will consider the forces due to floodwater and debris impact using a robust construction typology which will reduce the likelihood and consequence of structural damage in the developed case. The floor level has been set 200mm above the flood planning level to reduce the risk to property.
Loss of life	The likelihood of loss of life has the potential to be reduced through implementation of a Flood Emergency Response Plan. Principles of the emergency response measures are included in the Discussion and Compliance with Council LEP and DCP section of this report.
Cancellation of services	Cancellation of services is unlikely and may occur if rainfall is predicted to exceed the 1% AEP. Potential mitigation measures may include. Redundancy in utilities required to continue operation such as power, telecommunications, potable water, and temporary sewer disposal.

Item	Mitigation Measures
------	---------------------

- Flood barriers to prevent water ingress in very rare to extreme events.

Following implementation of the proposed mitigation measures, the residual developed risk analysis is presented below in Table 5. A risk matrix showing the existing and residual risk comparison is presented in Table 6.

Table 5 – Developed residual risk analysis.

Item	Likelihood	Consequence	Risk Rating
Structural damage causing economic loss	Extremely rare	Moderate	Low
Loss of life	Extremely rare	Major	Low
Cancellation of services	Rare to very Rare	Moderate	Moderate

Table 6 - Risk matrix

Likelihood	AEP Range	Consequence				
		Insignificant	Minor	Moderate	Major	Catastrophic
Likely	>10					
Unlikely	1 to 10					
Rare to very rare	0.01 to 1			Cancellation of services (E + D)	Structural damage (E)	
Extremely rare	<0.01			Structural damage (D) Loss of life (E + D)		

Risk: Very low  Low  Medium  High  Extreme 

Discussion and Compliance with Council LEP and DCP

Potential Flood Impacts

Council's flood mapping presents no flood affectation across the subject site in the 1% AEP event. The proposed development is therefore unlikely to impact flood in this event.

We do not believe the proposed development will result in a significant adverse impact on adjoining properties.

Basement Carpark Entry Protection

The proposed basement entry for the site is located on Brett Street. The proposed crest level is to be set at the Flood planning level of 3.1 AHD.

Emergency Response Measures

The subject site is located within a large catchment area with the site being inundated in storm events larger than the 1% AEP. Given the sites close proximity to flood free land to the west we believe that offsite evacuation is the most appropriate measure for storm events larger than the 1% AEP. Onsite refuge is possible within the proposed development as multiple floors of the building are above the PMF level but should only be undertaken as an absolute last resort.

We expect a Flood Emergency Response Plan can be prepared prior to occupation to outline the following.

- Flood awareness and education.
- Available flood warning products from the BoM and SES.
- Flood preparedness measures including knowing your flood risk, overview of the evacuation route and appropriate point of refuge and list of essential items to have on-hand to facilitate off-site refuge.
- Flood response measures including when to seek refuge off-site once significant rainfall has begun.
- Undertaking appropriate inspections and checks once the event has passed.

An overview of the site's locality to flood free land can be seen in Figure 4 below.

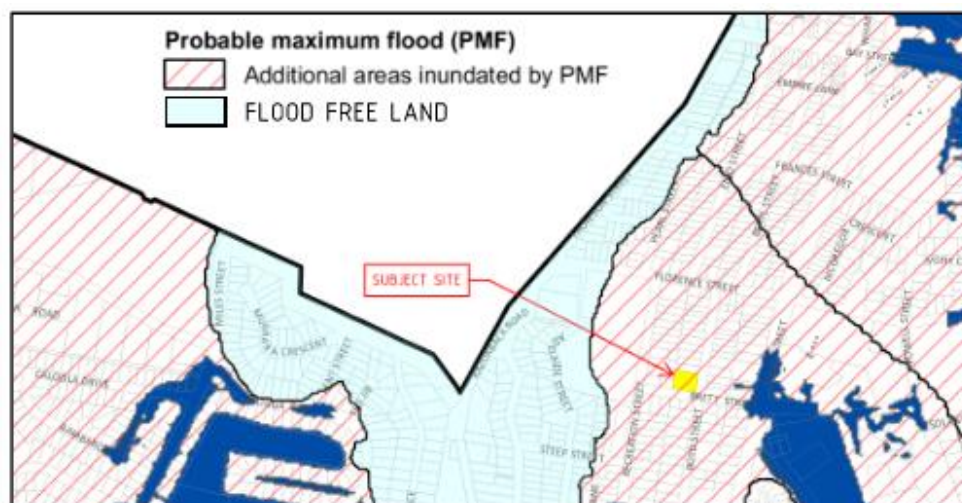


Figure 4. Site Locality to Flood Free land. (TSC's Design Flood Level Map 01.09.10)

Commentary with respect to the Tweed City Centre LEP 2012 are presented below in Table 7.

Table 7 – Tweed City Centre LEP 2012 Compliance

Requirement	Comment
(1) The objectives of this clause are as follows	
(a) to minimise the flood risk to life and property associated with the use of land,	The site is not inundated up to and including the 1% AEP storm. The development incorporates measures to minimise risk to property and life with all floor levels being above the flood planning level.
(b) to allow development on land that is compatible with the flood function and behaviour on the land, taking into account projected changes as a result of climate change,	We believe the development is compatible with the flood function of the land.
(c) to avoid adverse or cumulative impacts on flood behaviour and the environment,	We do not believe the subject site will cause any impact in the 1% AEP event.
(d) to enable the safe occupation and efficient evacuation of people in the event of a flood.	The site is not inundated in a 1% AEP event. For larger events flood free land is located within close proximity to the site therefore off-site refuge is to be sought. This is to be outlined in the FERP.
(2) Development consent must not be granted to development on land the consent authority considers to be within the flood planning area unless the consent authority is satisfied the development	
(a) is compatible with the flood function and behaviour on the land, and	The site is not subject to flood waters in the 1% AEP, as such we believe the development is compatible with the flood function of the site.
(b) will not adversely affect flood behaviour in a way that results in detrimental increases in the potential flood affectation of other development or properties, and	Due to no inundation in 1% event we do not believe the subject site will cause any impact in the 1% AEP event.
(c) will not adversely affect the safe occupation and efficient evacuation of people or exceed the capacity of existing evacuation routes for the surrounding area in the event of a flood, and	The site is not inundated in a 1% event. For larger events flood free land is located within close proximity to the site therefore off-site refuge is to be sought. This is to be outlined in the FERP.
(d) incorporates appropriate measures to manage risk to life in the event of a flood, and	Off-site refuge is to be provided on adjacent flood free land for events larger than the 1% AEP. We recommend preparing a Flood Emergency Response Plan to further minimise the risk to life, prior to occupation.
(e) will not adversely affect the environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of riverbanks or watercourses.	The site is currently developed, and water quality and quantity management devices have been provided. We do not believe this development will contribute to erosion, siltation

Requirement	Comment
	or destabilising of riparian vegetation and riverbanks.
(3) In deciding whether to grant development consent on land to which this clause applies, the consent authority must consider the following matters	
(a) the impact of the development on projected changes to flood behaviour as a result of climate change,	We do not believe the development will have a significant impact on flood behaviour changes due to climate change.
(b) the intended design and scale of buildings resulting from the development,	By others.
(c) whether the development incorporates measures to minimise the risk to life and ensure the safe evacuation of people in the event of a flood,	Off-site refuge is to be provided on adjacent flood free land for events larger than the 1% AEP. We recommend preparing a Flood Emergency Response Plan to further minimise the risk to life, prior to occupation.
(d) the potential to modify, relocate or remove buildings resulting from development if the surrounding area is impacted by flooding or coastal erosion.	This is not applicable to this case.

We believe the proposed development does not trigger any special flood considerations outlined with the Tweed City Centre LEP 2012 section 5.22.

DCP Compliance

The Tweed Development Control Plan (DCP) compliance is considered in Table 8 below.

Table 8 - Tweed DCP compliance

Requirement	Comment
A3.3.2. Development Generally on Flood Liabile Land	
Design Flood Levels Refer to A3.2.4 for design flood levels for this locality.	The proposed development incorporates the design flood levels into the design.
High Flow Areas Refer to A3.2.5 for development controls applicable to land in mapped high flow areas. The development controls in A3.2.5 take precedence over other controls in A3.3.	The site is not noted as being in a High Flow area in council's Property Flood Report.
Emergency Response Provisions Refer to A3.2.6 for development controls applicable to the provision of adequate emergency response for habitable development. The development controls in A3.2.6 take precedence over other controls in A3.3.	Refer to Emergency Response measures above.
Filling All filling is to be graded so that it drains to the street or other approved permanent drainage system.	The site will primarily be occupied by a basement excavation and then surrounding landscaped vegetation and hardstand that is managed by onsite controls. As such we believe this is not applicable.
Building Materials All materials used below Council's adopted design flood level must not be susceptible to water damage.	Basement is protected from inundation via crest set at the flood planning level as such inundation is considered unlikely. The ground floor level has been set 200mm above the FPL.
Electrical Supply Subject to the requirements of Northern Rivers Electricity, all electrical wiring, power outlets, switches, etc., should, to the maximum extent possible, be located above the design flood level. All electrical wiring installed below the design flood level should be suitably treated to withstand continuous submergence in water.	All habitable floor levels are to be above the flood planning level, and the basement is protected from inundation via crest set at the flood planning level, as such flood inundation is unlikely.
Car Parking Car parking in the form of basement parking will not be approved below the design flood level unless it is protected against the inflow of water to a level of 500 mm above the design flood.	Basement crests have been set at the FPL of RL3.10m AHD in accordance with Councils requirement of 500mm above design flood level.
Development	The Ground Level FFL of the development is set at RL3.3m AHD which is 200mm above the Flood planning level.

Requirement	Comment
The habitable areas of all residential buildings are to be at a level of not less than council's adopted minimum floor level for development. Areas for recreational purposes only may be approved below council's minimum floor level in flood fringe areas provided that furnishings therein are readily removable.	

Conclusions

A Flood Impact and Risk Assessment Report has been prepared for the proposed development at 25-27 Boyd Street, Tweed Heads NSW.

It was concluded that the proposed development will not create any significant adverse impacts to flood behaviour on the subject site and on the properties surrounding the subject site.

Furthermore, flood risk in the developed case has been adequately managed through the selection of flood levels, implementation of flood protection measures and provision of offsite evacuation opportunities.

We commend our findings for review.

Limitation Statement

Northrop Consulting Engineers Pty Ltd (Northrop) has been retained to prepare this report based on specific instructions, scope of work and purpose pursuant to a contract with its client. It has been prepared in accordance with the usual care and thoroughness of the consulting profession for the use by Homes NSW. The report is based on generally accepted practices and standards applicable to the scope of work at the time it was prepared. No other warranty, express or implied, is made as to the professional advice included in this report.

Except where expressly permitted in writing or required by law, no third party may use or rely on this report unless otherwise agreed in writing by Northrop.

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Document Register

Rev	Status	Prepared	Approved	Date
A	For Review	TVK	KS	30.10.24
B	For Approval	TVK	KS	10.12.24

Appendix A – Property Flood Report

Property Flood Report

This Property Flood Report tells you what you need to know about this property and its flood risk. It shows house floor and flood levels and provides information on nearby levees and river gauges, if applicable. To understand the terms used, please see the Flood Terms and Definitions section at the end of this report.

Property Address: 25-27 Boyd Street TWEED HEADS 2485

Lot/Section/Deposited Plan: 1//DP843470

Date Prepared: 17/09/2020

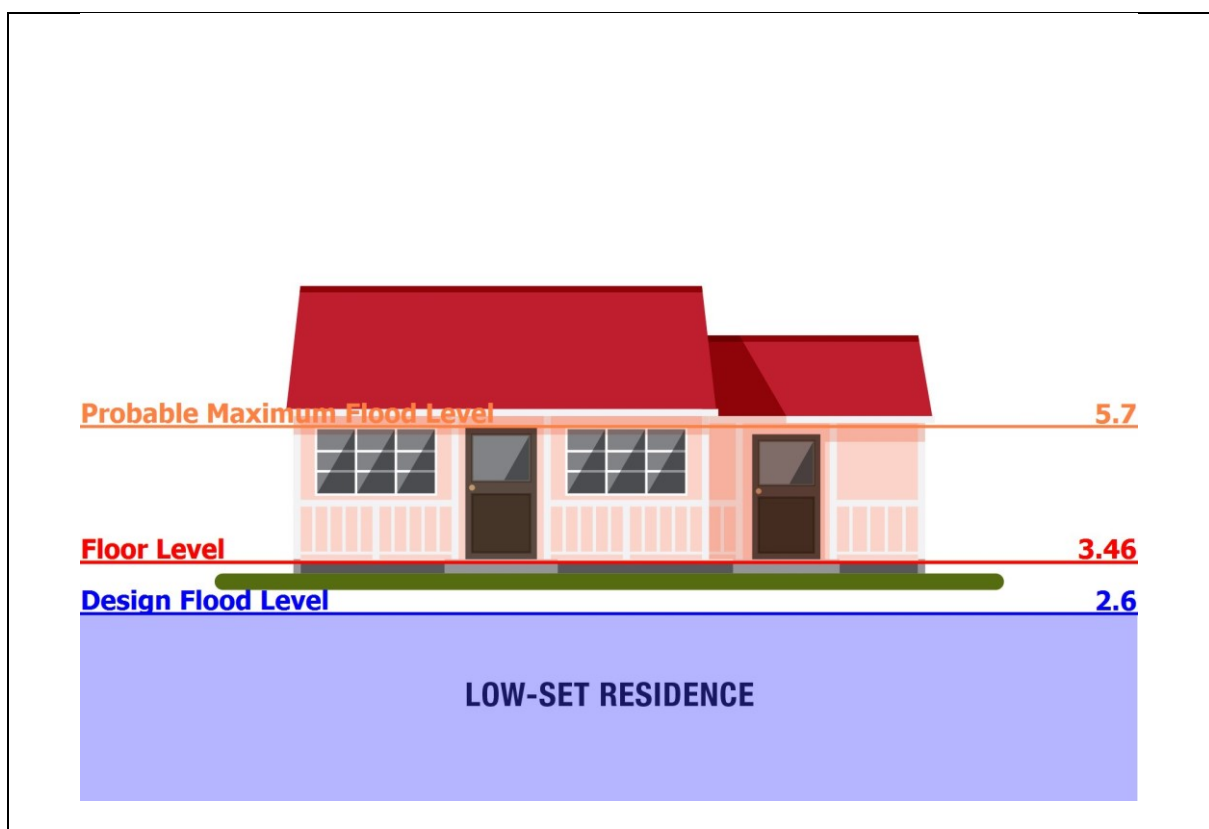


Figure 1: Flood and Floor Levels at 25-27 Boyd Street TWEED HEADS 2485

The house floor level provided above was taken in 2012 and is approximate only. If an accurate floor level is required this should be confirmed by a registered surveyor.

Be Prepared

Flood Warnings are issued by the Bureau of Meteorology (BoM). Warnings and real-time rainfall and river level information can be viewed on the BoM website (www.bom.gov.au).

NSW State Emergency Service (SES) distribute Flood Bulletins which add local consequences and safety information related to Flood Warnings. These products are distributed to community via local media and social media.

Planning now so that you know your risks and what to do if there is a flood can save your life, the lives of your family members, pets and others. It can also minimise damage to your property and possessions. The NSW State Emergency Service has tools available to assist you to prepare. Visit the SES website to start your Home Emergency Plan now.

Website: www.ses.nsw.gov.au

Flood & Storm Emergency: ☎ 132 500

Life Threatening Situations: ☎ 000



Tweed Shire Council have developed the Tweed Emergency Dashboard for all hazard emergency information. The purpose of this Emergency Dashboard is to provide Tweed residents with links, useful information and contacts in an emergency. Go to: <https://emergency.tweed.nsw.gov.au/>

Should you require any further information, please contact Council on (02) 6670 2400 or email us at tsc@tweed.nsw.gov.au

Technical Information

The below information is for those who are flood savvy or have a technical need to know more about Council's building development controls, such as surveyors, builders, certifiers, architects and engineers.

Property Address: 25-27 Boyd Street TWEED HEADS 2485

Lot/Section/Deposited Plan: 1//DP843470

Property Levels

Description	Minimum (m AHD)	Maximum (m AHD)
Approximate Ground Level	2.8	3.6
Approximate Floor Level (2012)	3.460	

Planning Levels

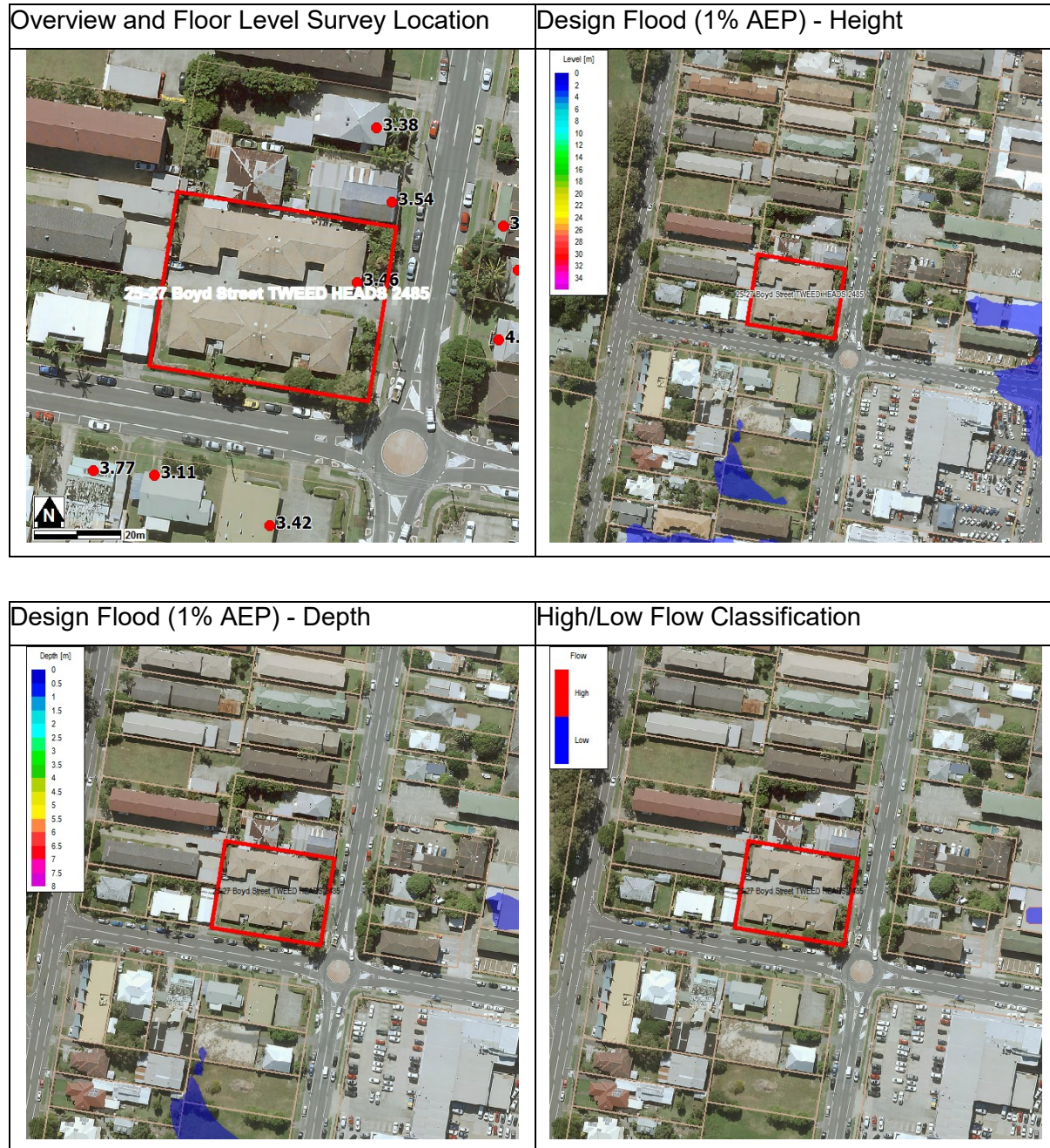
Planning Level	Level (m AHD)
Design Flood Level	2.6
Minimum Habitable Floor Level (Flood Planning Level)	3.1
Climate Change Design Flood Level*	3.0
Climate Change Habitable Floor Level*	3.5
High Flow Area	No
High Hazard Area	NA

* Climate Change Levels are compulsory in new urban land release subdivision areas

Flooding Levels

Flood Event	Minimum Level (m AHD)	Maximum Level (m AHD)
20% AEP	N/A	N/A
5% AEP	N/A	N/A
1% AEP	N/A	N/A
Climate Change 2100 1% AEP	N/A	N/A
0.2% AEP	2.9	2.9
Probable Maximum Flood (PMF)	5.7	5.7

Mapping



Detailed mapping data, including flood mapping, can be sourced at Council's open data hub:
www.tweed.nsw.gov.au/Mapping

For more information on Tweed Shire Flood Planning controls see the Tweed Local Environment Plan and Development Control Plan Section A3 – Development of Flood Liable Land at www.tweed.nsw.gov.au/PlanningPolicies

Information Sources

- **Ground Levels:** 2014 Airborne Laser Survey (LiDAR)
- **Existing Floor Levels:** 2011 and 2012 Floor Level Survey (Tweed Shire Council)
- **Flooding Levels:** Tweed Valley Flood Study Update 2009 and Tweed Byron Coastal Creeks Flood Study 2010 (BMT WBM)

Flood Terms and Definitions

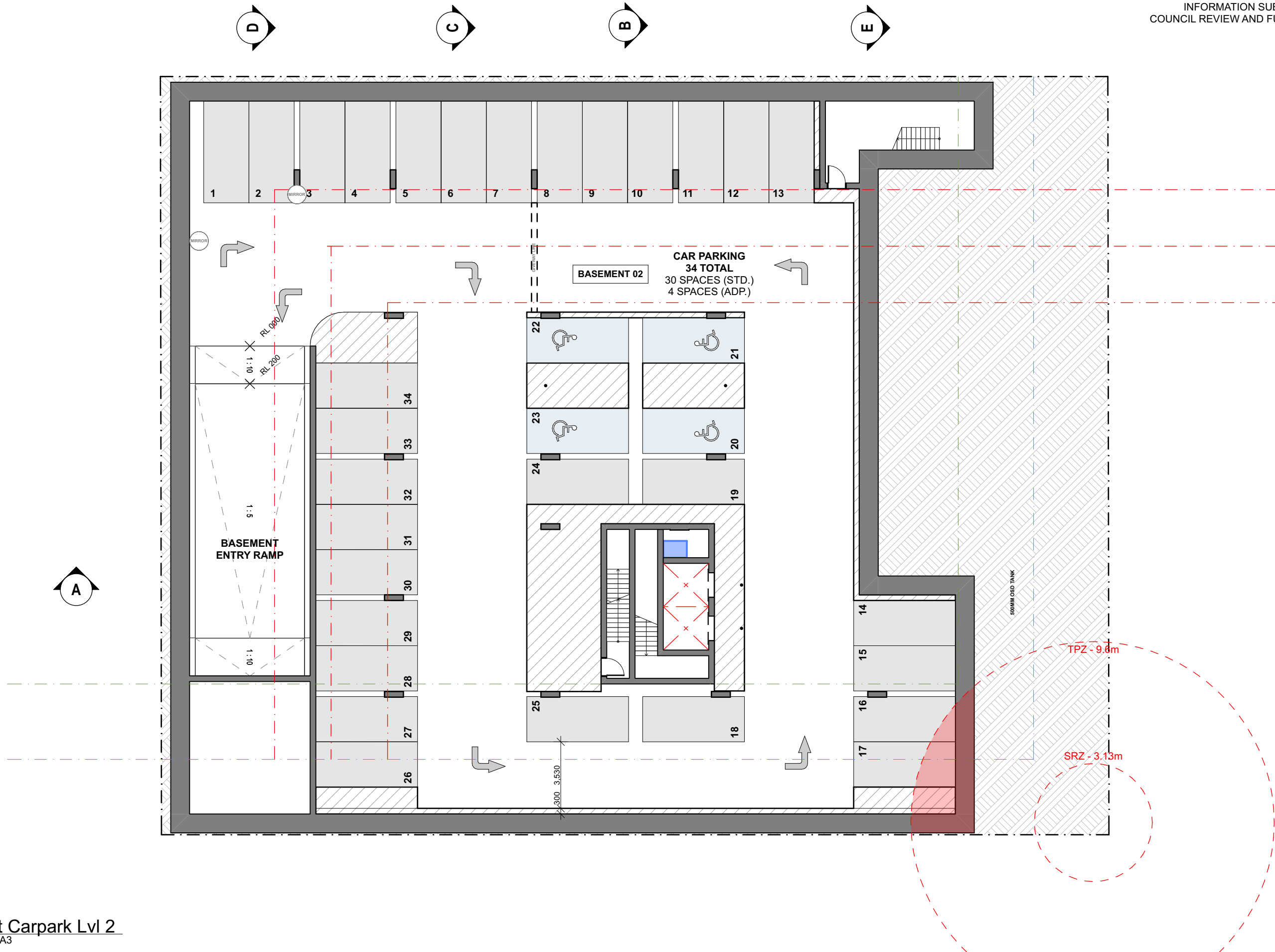
- **Annual Exceedance Probability (AEP):** The probability of a flood event of a given size occurring in any one year, usually expressed as a percentage annual chance.
- **Average Recurrence Interval (ARI):** Similar to AEP. The long-term average number of years between the occurrence of a flood as big as (or larger than) the selected event.
- **metres above Australian Height Datum (m AHD):** The reference level for defining ground levels in Australia. The level of 0.0m AHD is approximately mean sea level.
- **Maximum and Minimum Ground Level** – Highest and lowest ground levels on the property based on available ground level information. A Registered Surveyor can confirm exact ground levels.
- **Surveyed Floor Level** – Approximate floor levels of dwellings, usually taken from the street. These are generally the level of the front step of the habitable level of the building most visible from the street frontage
- **Design Flood Level (DFL)** – A hypothetical flood representing a specific likelihood of occurrence. In Tweed Shire, for residential property, the peak of the modelled 1% AEP (100 Year ARI) flood is the Design Flood Level
- **Minimum Habitable Floor Level** – The minimum level in metres AHD at which habitable areas of development (generally including bedrooms, living rooms, kitchen, study, family and rumpus rooms) must be constructed. In Tweed Shire, this is Design Flood Level plus 0.5m of freeboard. Also known as 'Flood Planning Level'
- **Climate Change Floor Level** – 2100 Climate Change Design Flood Level plus 0.5m of freeboard. Climate Change Design Flood Level is based on reasonable predictions of increased rainfall intensity and sea level rise. See the Tweed Valley Flood Study Update 2009 – Climate Change for more information.
- **Probable Maximum Flood.** An extreme flood deemed to be the largest flood that could conceivably occur at a specific location. It is generally not physically or economically possible to provide complete protection against this flood event, but should be considered for emergency response etc. The PMF defines the extent of flood prone land (i.e. the floodplain).

Disclaimer

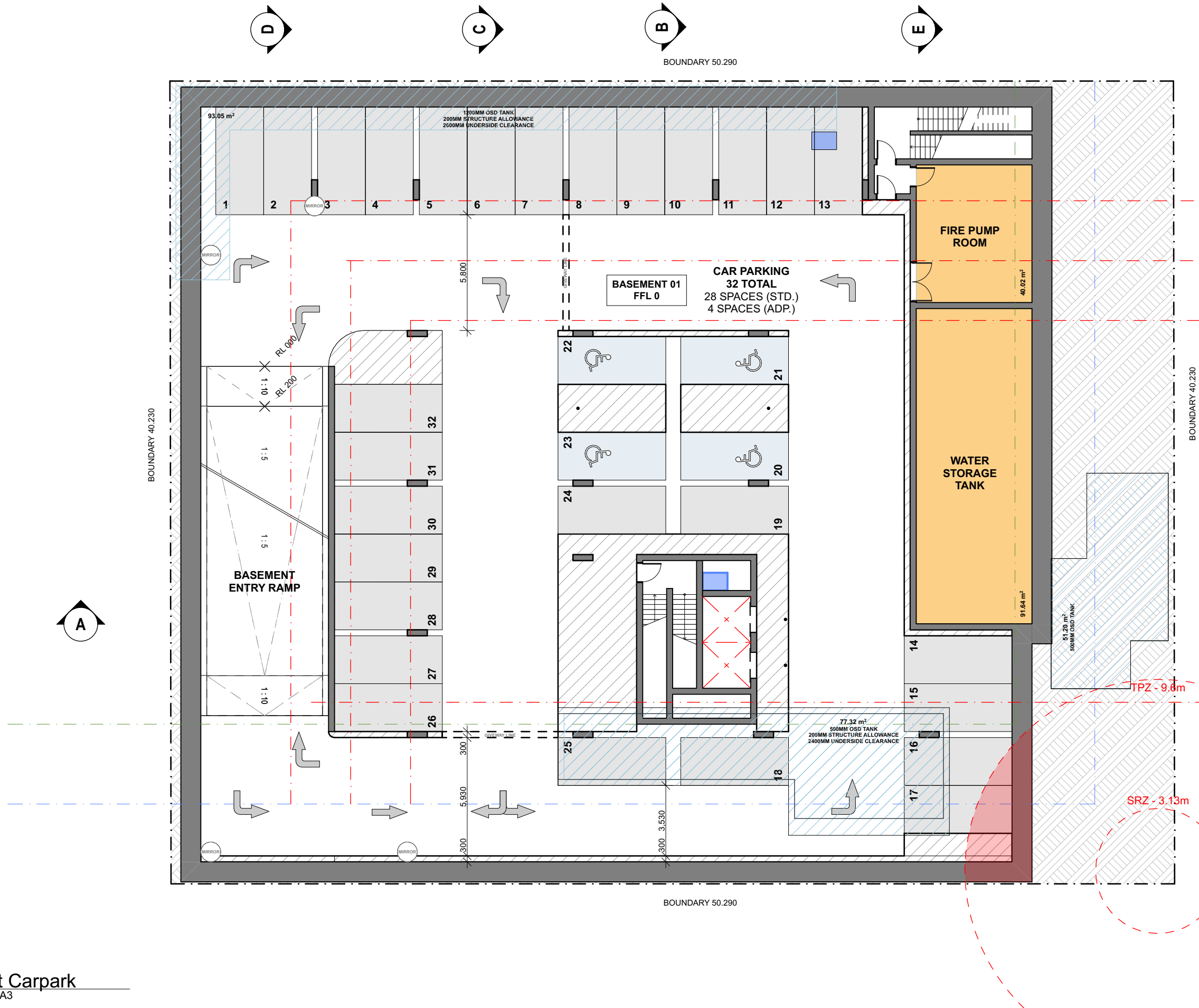
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Any person having regard to the information contained in this document is encouraged to seek, at their discretion, all other sources of information on the subject matter as they consider appropriate, which may include local knowledge and/or professional advice.

Appendix B – Architectural Drawings

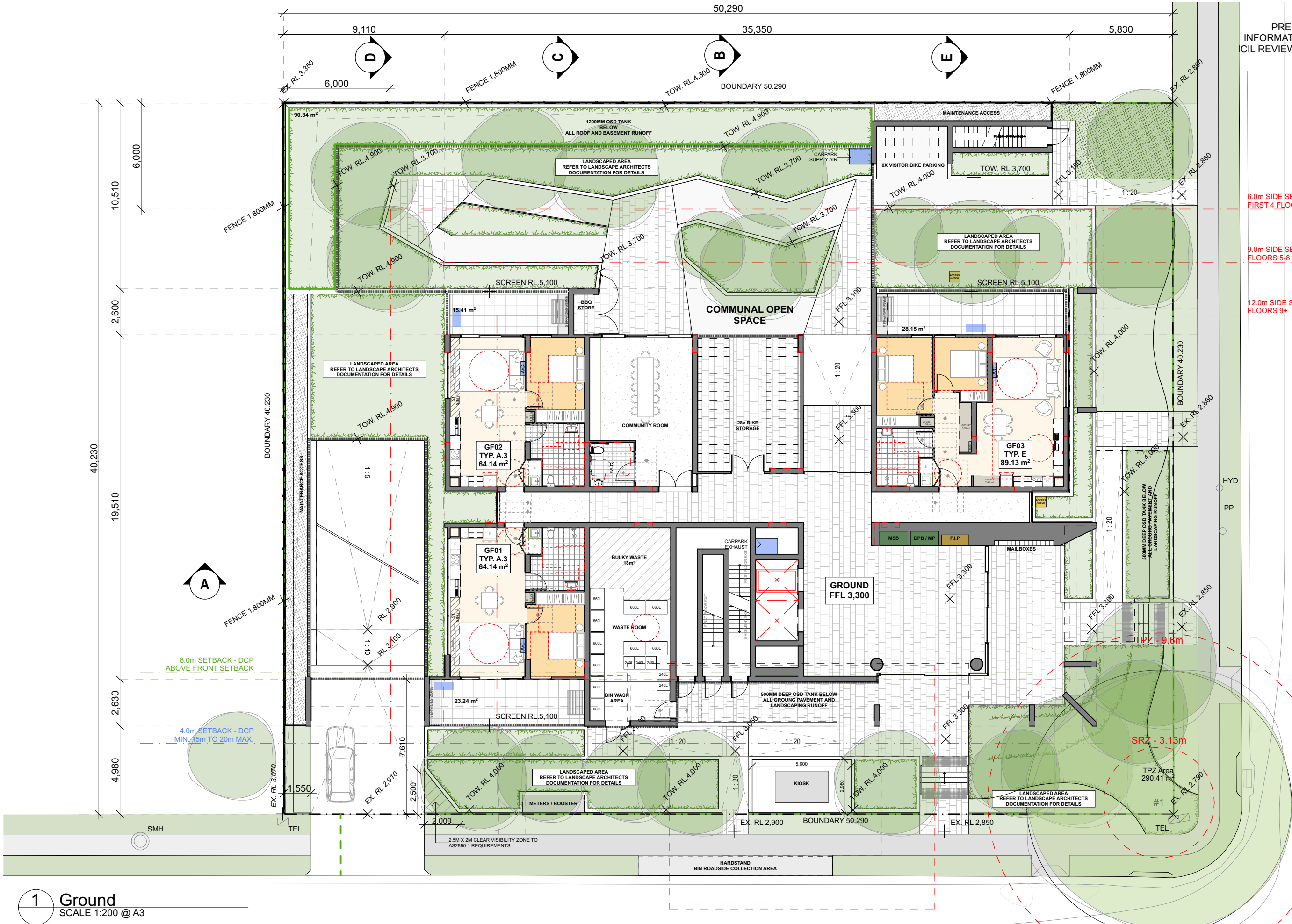


1 Basement Carpark Lvl 2
SCALE 1:200 @ A3



1 Basement Carpark
SCALE 1:200 @ A3

NOTE:
PRELIMINARY AUTHORITY CONTROL
INFORMATION SUBJECT TO PLANNER AND
CIL REVIEW AND FURTHER INVESTIGATION



6.0m SIDE SETBACK (HABITABLE) - ADG
FIRST 4 FLOORS (12m)

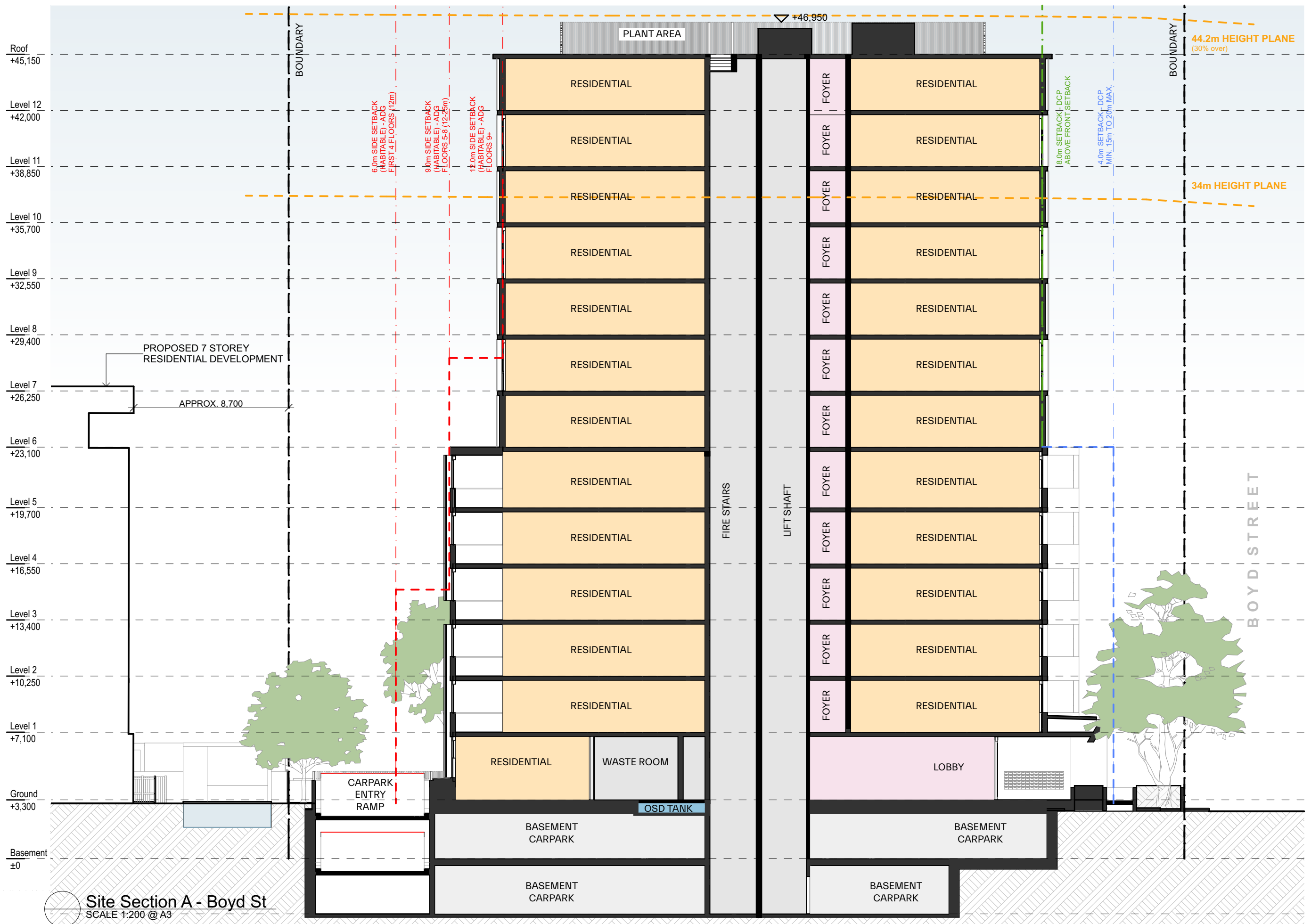
9.0m SIDE SETBACK (HABITABLE) - ADG
FLOORS 5-8 (12-25m)

12.0m SIDE SETBACK (HABITABLE) - ADG
FLOORS 9+

BOYD STREET

1 Ground
SCALE 1:200 @ A3

DA Package



Site Section A - Boyd St
SCALE 1:200 @ A3

DA Package



Architecture | Planning | Interiors

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Newcastle NSW 2300
P 02 4929 1843

CENTRAL COAST
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East Gosford NSW 2250
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ABN 12 129 231 269
Nominated Architects: Caine King NSW ARB 7974 / Stuart Campbell NSW ARB 7545

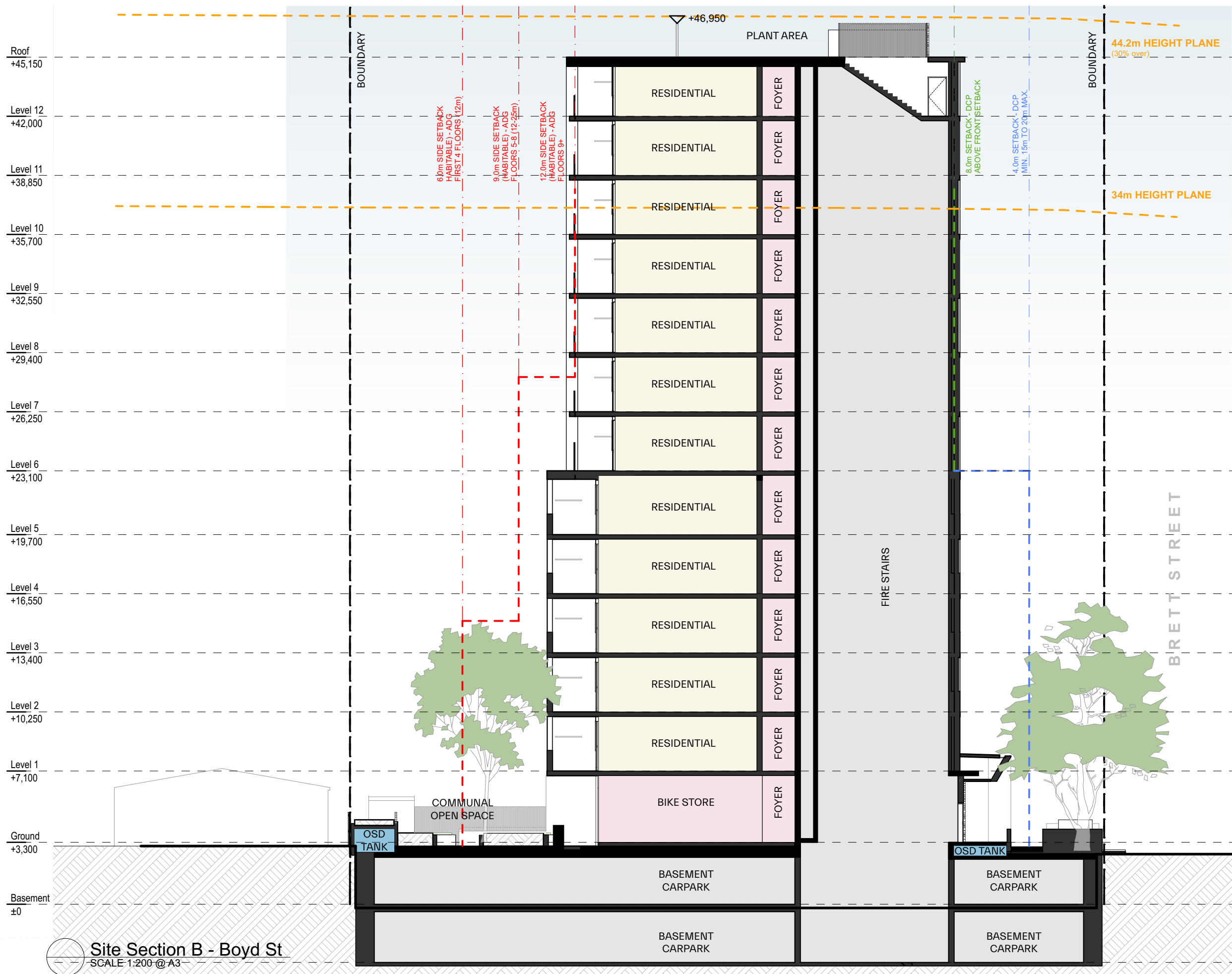


Homes NSW - Tweed Heads
project #
22134
25-27 Boyd St,
Tweed Heads, NSW 2485

Section A
drawing #
A-3001
AS SHOWN

issue
R
29/11/2024

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Site Section B - Boyd St
SCALE 1:200 @ A3

DA Package



Architecture | Planning | Interiors

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ABN 12 129 231 269
Nominated Architects: Caine King NSW ARB 7974 / Stuart Campbell NSW ARB 7545

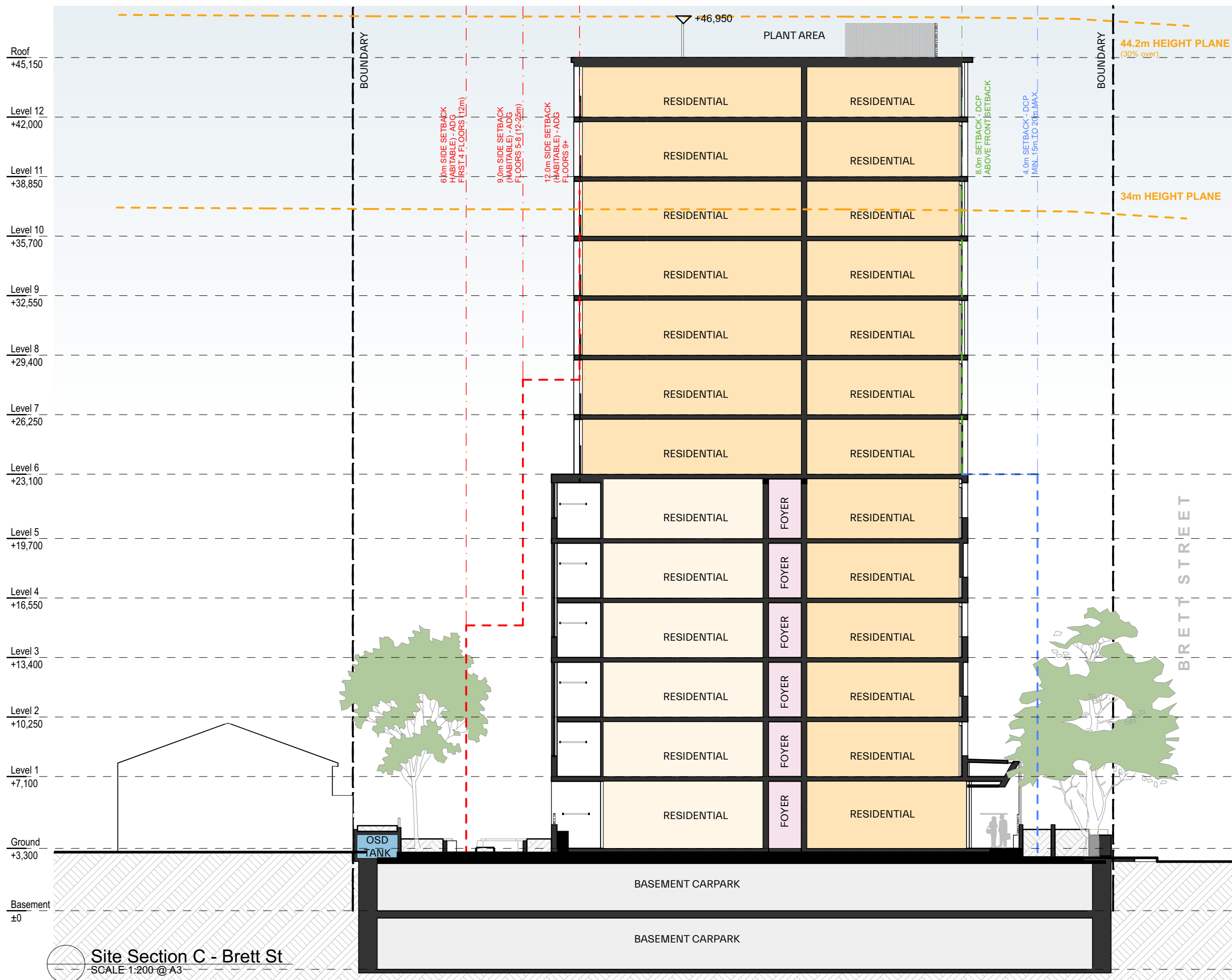


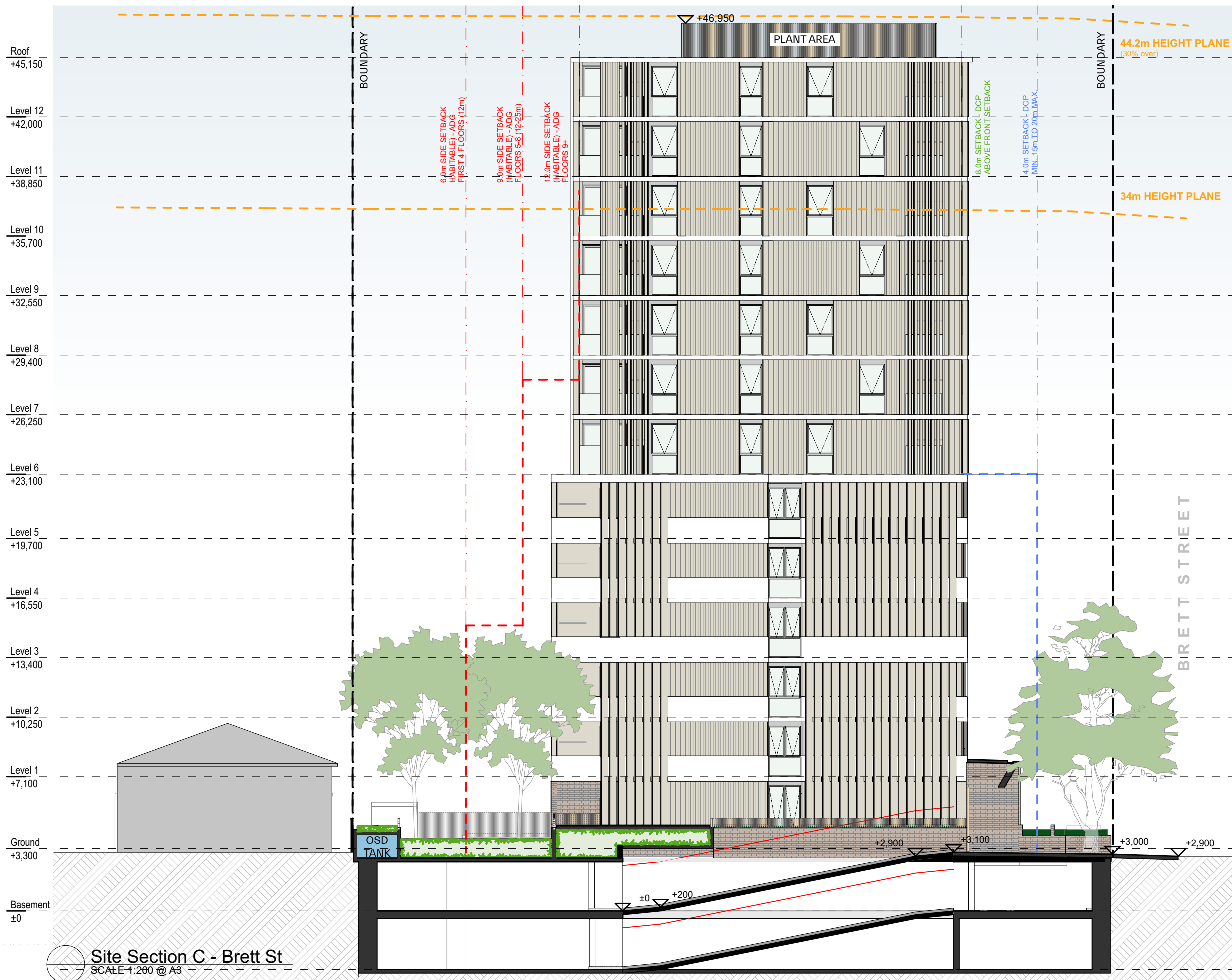
Homes NSW - Tweed Heads
project #
22134
25-27 Boyd St,
Tweed Heads, NSW 2485

Section B
drawing #
A-3002
AS SHOWN

issue
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Site Section C - Brett St
SCALE 1:200 @ A3

BRETT STREET

DA Package

CKDS

Architecture | Planning | Interiors

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Nominated Architects: Caine King NSW ARB 7974 / Stuart Campbell NSW ARB 7545

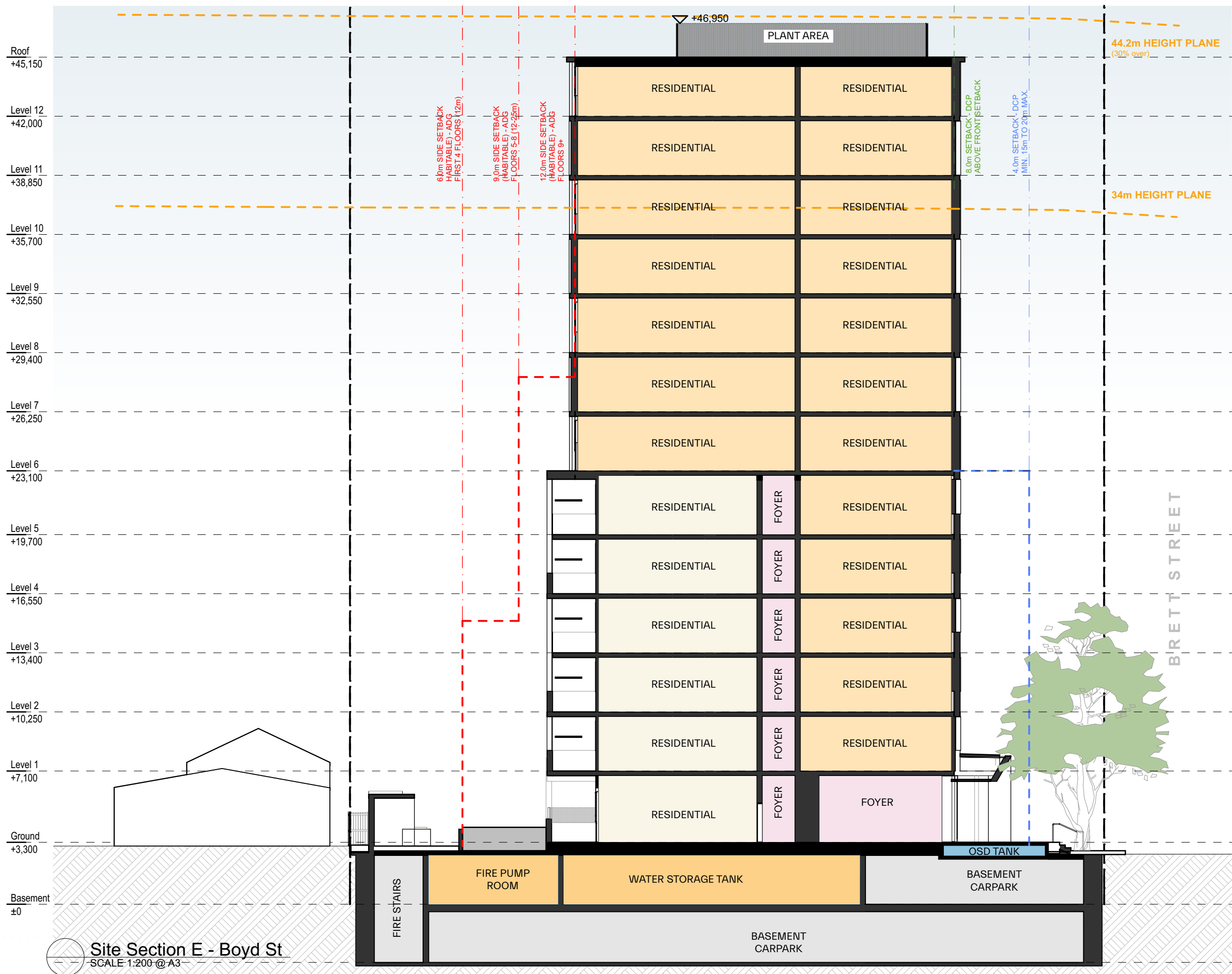


Homes NSW - Tweed Heads
project #
22134
25-27 Boyd St,
Tweed Heads, NSW 2485

Section D
drawing #
A-3004
AS SHOWN

issue
O
29/11/2024

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Site Section E - Boyd St
SCALE 1:200 @ A3

DA Package



Architecture | Planning | Interiors

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East Gosford NSW 2250
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ABN 12 129 231 269
Nominated Architects: Caine King NSW ARB 7974 / Stuart Campbell NSW ARB 7545



Homes NSW - Tweed Heads
project #
22134
25-27 Boyd St,
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Section E
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A-3005
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Appendix C – Civil Drawings

HOMES NSW - TWEED HEADS

25-27 BOYD STREET, TWEED HEADS
CIVIL ENGINEERING PACKAGE



LOCALITY PLAN

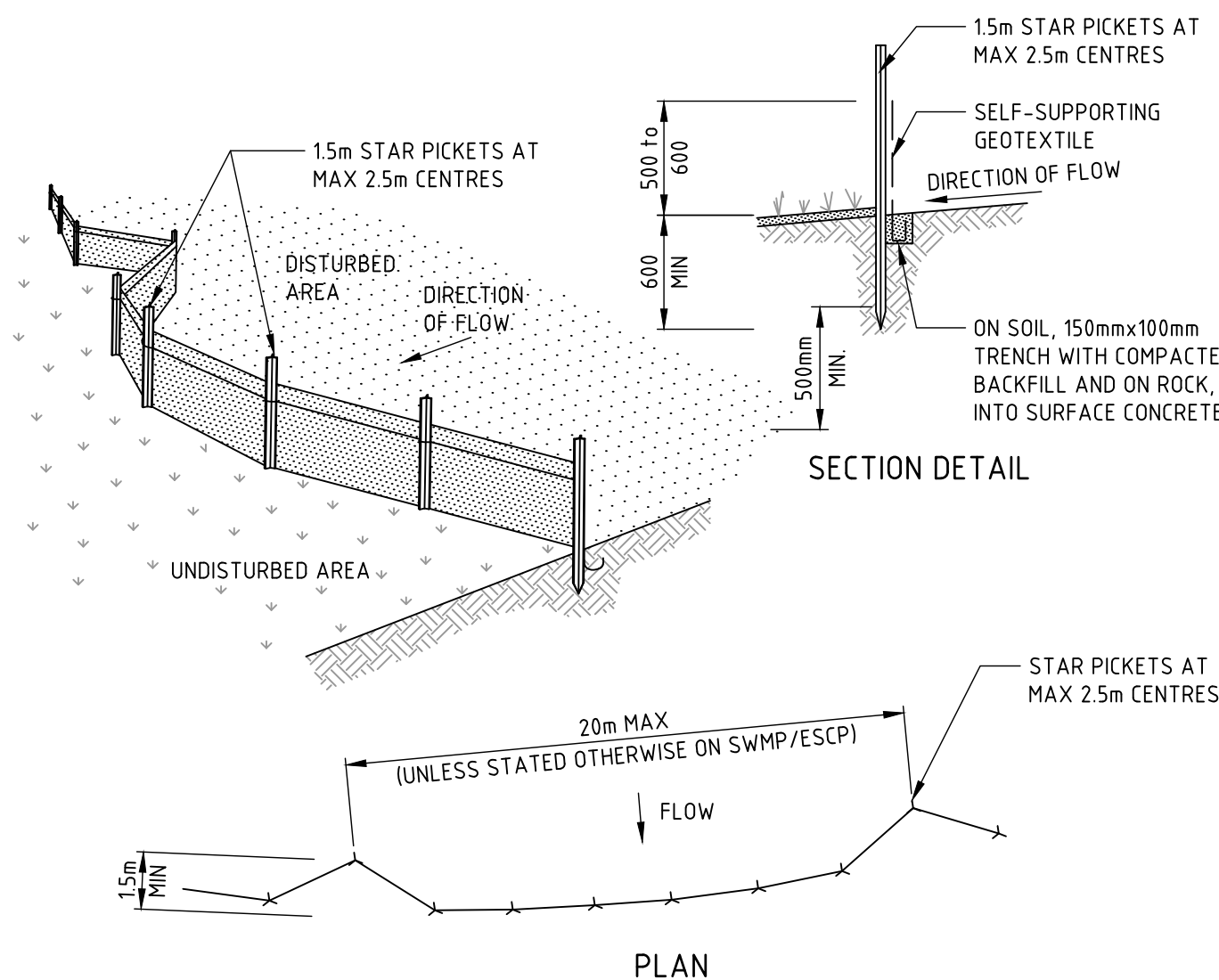
IMAGE SOURCE : NEARMAPS

DRAWING LIST	
DWG No.	DRAWING TITLE
DA-C01.01	COVER SHEET, DRAWING LIST AND LOCALITY PLAN
DA-C02.01	EROSION AND SEDIMENT CONTROL PLAN
DA-C02.11	EROSION AND SEDIMENT CONTROL DETAILS
DA-C03.01	CUT AND FILL PLAN
DA-C04.01	CIVIL WORKS PLAN - GROUND FLOOR
DA-C04.11	CIVIL WORKS PLAN - BASEMENT LEVEL 1
DA-C04.12	CIVIL WORKS PLAN - BASEMENT LEVEL 2
DA-C09.01	CIVIL DETAILS

DRAWN: J. KNIGHT
DESIGNED: E. CEARING
JOB MANAGER: K. SINCLAIR
VERIFIER: K. SINCLAIR

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REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE	CLIENT	ARCHITECT	NOT TO SCALE	PROJECT	DRAWING TITLE	JOB NUMBER
A	ISSUED FOR DEVELOPMENT APPLICATION	JK	KS	EG	06.12.24			 Newcastle Level 1, 215 Pacific Hwy, Charlestown NSW 2290 Ph (02) 4943 1777 Email newcastle@northrop.com.au ABN 81 094 433 100	HOMES NSW - TWEED HEADS 25-27 BOYD STREET, TWEED HEADS	CIVIL ENGINEERING PACKAGE COVER SHEET, DRAWING LIST AND LOCALITY PLAN	NL223052
						DRAWING NOT TO BE USED FOR CONSTRUCTION UNLESS VERIFICATION SIGNATURE HAS BEEN ADDED	THE COPYRIGHT OF THIS DRAWING REMAINS WITH NORTHROP CONSULTING ENGINEERS PTY LTD				DRAWING NUMBER DA-C01.01
											REVISION A
DRAWING SHEET SIZE ± A1											



1. ALL EROSION AND SEDIMENTATION CONTROL MEASURES MUST BE APPROPRIATE FOR THE SEDIMENT TYPE(S) OF THE SOILS ON-SITE, IN ACCORDANCE WITH THE 'BLUE BOOK' (MANAGING URBAN STORMWATER – SOILS AND CONSTRUCTION LANDCOM, 2004), OR OTHER CURRENT RECOGNISED INDUSTRY STANDARDS FOR EROSION AND SEDIMENT CONTROL FOR AUSTRALIAN CONDITIONS. THIS INCLUDES SEDIMENT TRAPS AND LINING OF CHANNELS.
2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR KEEPING A DETAILED WRITTEN RECORD OF ALL EROSION AND SEDIMENT CONTROLS ON-SITE DURING THE CONSTRUCTION PERIOD. THIS RECORD SHALL BE UPDATED ON A DAILY BASIS AND SHALL CONTAIN DETAILS ON THE CONDITION OF CONTROLS AND ANY MAINTENANCE, CLEANING AND BREACHES. THIS RECORD SHALL BE KEPT ON-SITE AT ALL TIMES AND SHALL BE MADE AVAILABLE FOR INSPECTION BY THE PRINCIPAL CERTIFYING AUTHORITY AND THE SUPERINTENDENT DURING NORMAL WORKING HOURS.
3. INSTALL SEDIMENT PROTECTION FILTERS ON ALL NEW AND EXISTING STORMWATER INLET PITS IN ACCORDANCE WITH EITHER A MESH OR GEOTEXTILE. REFER DETAIL SD6-11 OR THE GEOTEXTILE INLET FILTER DETAIL SD6-12 OF THE 'BLUE BOOK'.
4. ESTABLISH ALL REQUIRED SEDIMENT FENCES IN ACCORDANCE WITH DETAIL SD6-8 OF THE 'BLUE BOOK'.
5. INSTALL SEDIMENT FENCING, OR OTHER SEDIMENT CONTROL DEVICES, AROUND INDIVIDUAL BUILDING ZONES/AREAS AS REQUIRED AND AS DIRECTED BY THE SUPERINTENDENT OR APPROPRIATE COUNCIL OFFICER.
6. ALL TRENCHES INCLUDING SERVICE TRENCHES AND SWALE EXCAVATION SHALL BE RE-GRASS TO THE HIGH SIDE AND CLOSED AT THE END OF EACH DAY'S WORK.
7. THE CONTRACTOR SHALL ENSURE THAT ALL VEGETATION (TREE, SHRUB AND GROUND COVER) WHICH IS TO BE RETAINED SHALL BE PROTECTED DURING THE DURATION OF CONSTRUCTION.
8. ALL VEGETATION TO BE REMOVED SHALL BE MULCHED ON-SITE AND SPREAD/STOCKPILED AS DIRECTED BY THE SUPERINTENDENT.
9. STRIP TOPSOIL IN AREAS DESIGNATED FOR STRIPPING AND STOCKPILE FOR RE-USE AS REQUIRED: ANY SURPLUS MATERIAL SHALL BE SPREAD ON-SITE AS DIRECTED BY THE SUPERINTENDENT OR REMOVED FROM SITE AND DISPOSED OF IN ACCORDANCE WITH EPA GUIDELINES.
10. CONSTRUCT AND MAINTAIN ALL MATERIAL STOCKPILES IN ACCORDANCE WITH DETAIL SD4-1 OF THE 'BLUE BOOK' (INCLUDING CUT-OFF SWALES TO THE HIGH SIDE AND SEDIMENT FENCES TO THE LOW SIDE).
11. ENSURE STOCKPILES DO NOT EXCEED 2.0m HIGH PROVIDE WIND AND RAIN EROSION PROTECTION AS REQUIRED IN ACCORDANCE WITH THE 'BLUE BOOK'.
12. PROVIDE WATER TRUCKS OR SPRINKLER DEVICES DURING CONSTRUCTION AS REQUIRED TO SUPPRESS DUST.
13. ONCE CUT/FILL OPERATIONS HAVE BEEN FINALISED ALL DISTURBED AREAS THAT ARE NOT BEING WORKED ON SHALL BE RE-VEGETATED AS SOON AS IS PRACTICAL.

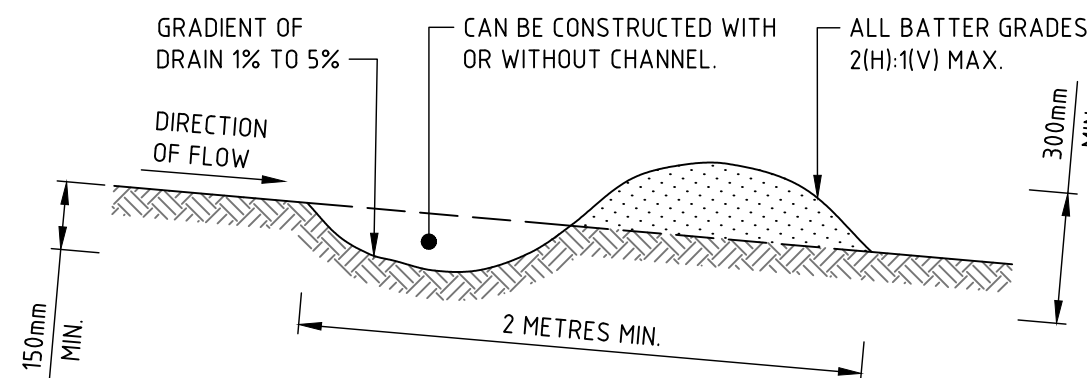
SITE PARAMETERS	
CONSTRAINT	VALUE
SEDIMENT TYPE	C
SOIL HYDROLOGY GROUP	A
K = SOIL ERODIBILITY (K-FACTOR)	0.009
R = RAINFALL EROSIVITY (R-FACTOR)	\$2520
S ≥ 2 YEAR, 6 HOUR STORM INTENSITY	15.3
LS = SLOPE LENGTH / GRADIENT	0.18 (60m SLOPE @ 1% GRADE)
P = EROSION CONTROL PRACTICE (P-FACTOR)	1.3 (TYPICAL)
C = GROUND COVER (C-FACTOR)	1.0 (TYPICAL FOR STRIPPED SITE)
SOIL LOSS (RUSLE METHOD) (tonnes/ha/yr)	11
EROSION HAZARD (TABLE 4.2 BLUE BOOK)	VERY LOW

NOTE: THE AVERAGE SOIL LOSS FROM THE AREA OF DISTURBANCE IS LESS THAN 150M3 PER YEAR. BUILDING A SEDIMENT BASIN IS THEREFORE UNNECESSARY IN ACCORDANCE WITH THE BLUE BOOK SECTION 6.3.2 (D).

1. STRIP THE TOPSOIL, LEVEL THE SITE AND COMPACT THE SUBGRADE.
2. COVER THE AREA WITH NEEDLE-PUNCHED GEOTEXTILE.
3. CONSTRUCT A 200mm THICK PAD OVER THE GEOTEXTILE USING ROAD BASE OR 30mm AGGREGATE.
4. ENSURE THE STRUCTURE IS AT LEAST 15 METRES LONG OR TO BUILDING ALIGNMENT AND AT LEAST 3 METRES WIDE.
5. WHERE A SEDIMENT FENCE JOINS ONTO THE STABILISED ACCESS, CONSTRUCT A HUMP IN THE STABILISED ACCESS TO DIVERT WATER TO THE SEDIMENT FENCE.

1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.
2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.
3. DRIVE 15 METRE LONG STAR PICKETS INTO GROUND AT 2.5 METRE INTERVALS (MAX) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.
4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.
5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP.
6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.

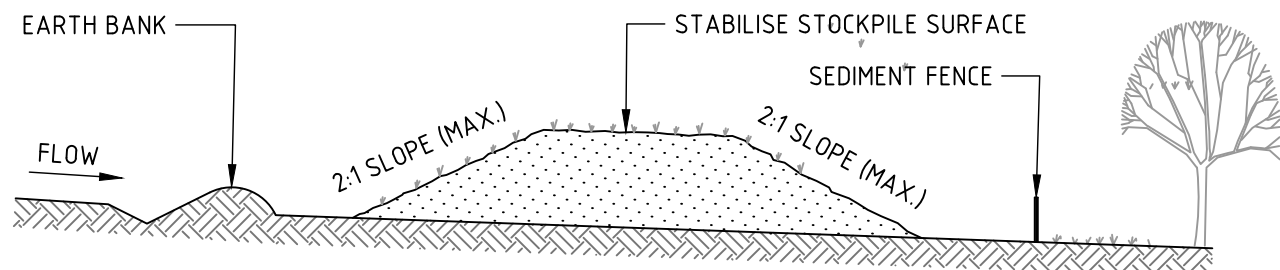
SEDIMENT FENCE (SD 6-8)



1. BUILD WITH GRADIENTS BETWEEN 1 AND 5 PERCENT.
2. AVOID REMOVING TREES AND SHRUBS IF POSSIBLE - WORK AROUND THEM.
3. ENSURE THE STRUCTURES ARE FREE OF PROJECTIONS OR OTHER IRREGULARITIES THAT COULD IMPEDE WATER FLOW.
4. BUILD THE DRAINS WITH CIRCULAR, PARABOLIC OR TRAPEZOIDAL CROSS SECTIONS, NOT V SHAPED.
5. ENSURE THE BANKS ARE PROPERLY COMPACTED TO PREVENT FAILURE.
6. COMPLETE PERMANENT OR TEMPORARY STABILISATION WITHIN 10 DAYS OF CONSTRUCTION.

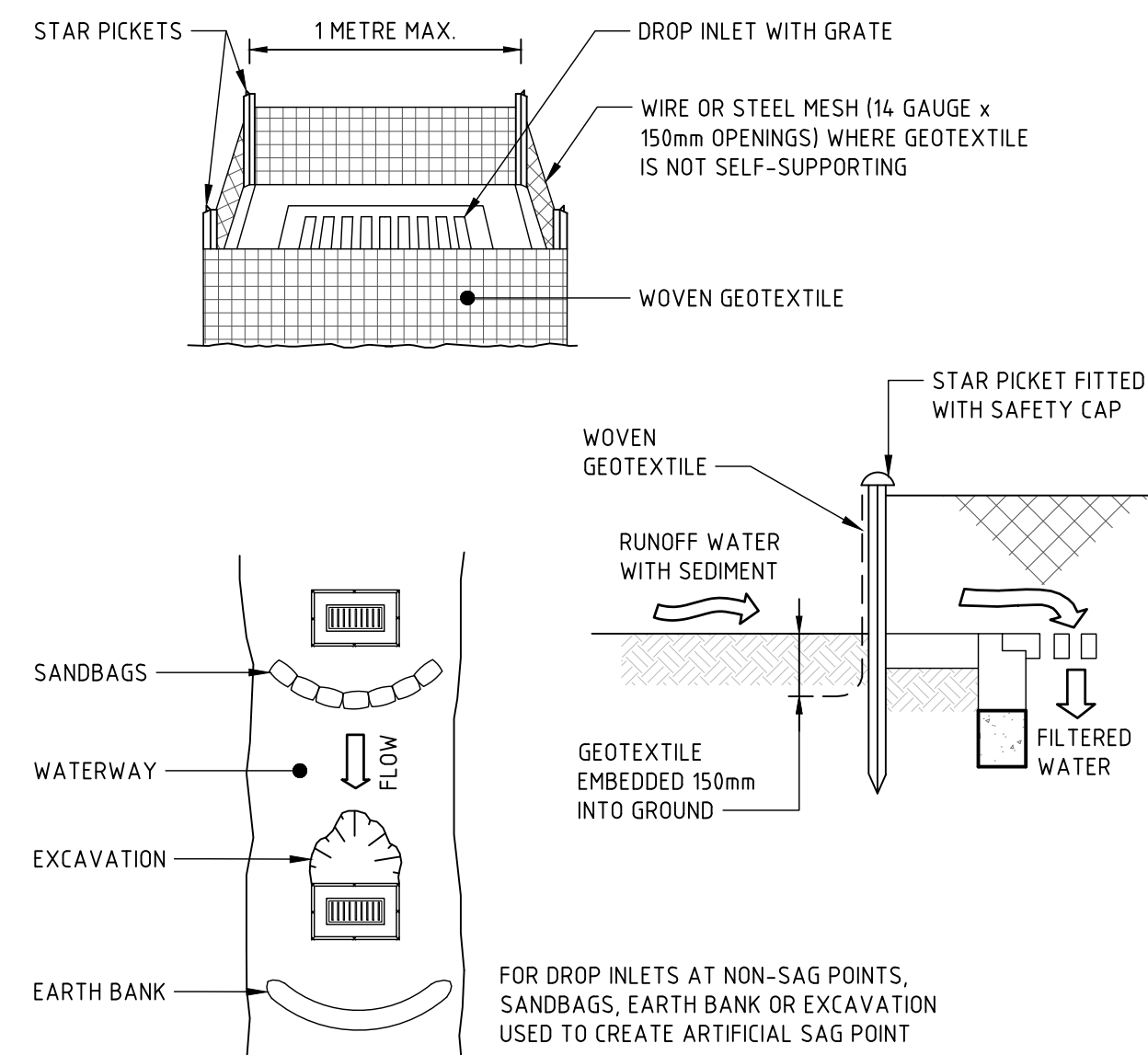
NOTE: ONLY TO BE USED AS TEMPORARY BANK
WHERE MAXIMUM UPSLOPE LENGTH IS 80 METRES.

EARTH BANK - LOW FLOW (SD 5-5)



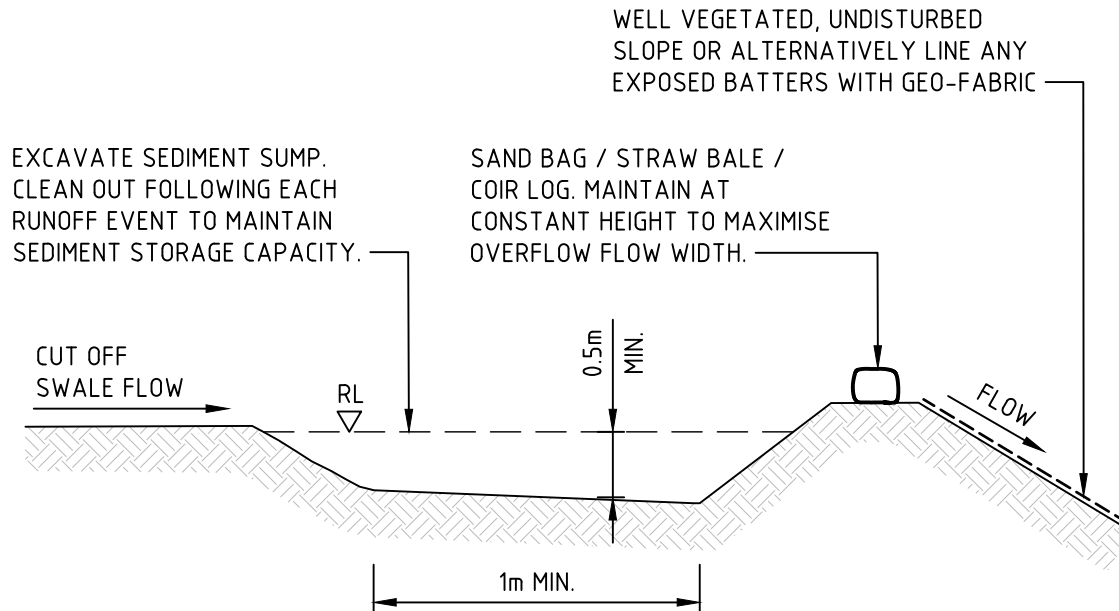
1. PLACE STOCKPILES MORE THAN 2m (PREFERABLY 5m) FROM EXISTING VEGETATION, CONCENTRATED WATER FLOW, ROADS AND HAZARD AREAS.
2. CONSTRUCT ON THE CONTOUR AS LOW, FLAT, ELONGATED MOUNDS.
3. WHERE THERE IS SUFFICIENT AREA, TOPSOIL STOCKPILES SHALL BE LESS THAN 2m IN HEIGHT.
4. WHERE THEY ARE TO BE IN PLACE FOR MORE THAN 10 DAYS, STABILISE FOLLOWING THE APPROVED ESCP OR SWMP TO REDUCE THE C-FACTOR TO LESS THAN 0.10.
5. CONSTRUCT EARTH BANKS (STANDARD DRAWING 5-5) ON THE UPSLOPE SIDE TO DIVERT WATER AROUND STOCKPILES AND SEDIMENT FENCES (STANDARD DRAWING 6-8) 1 TO 2m DOWNSLOPE.

STOCKPILES (SD 4-1)

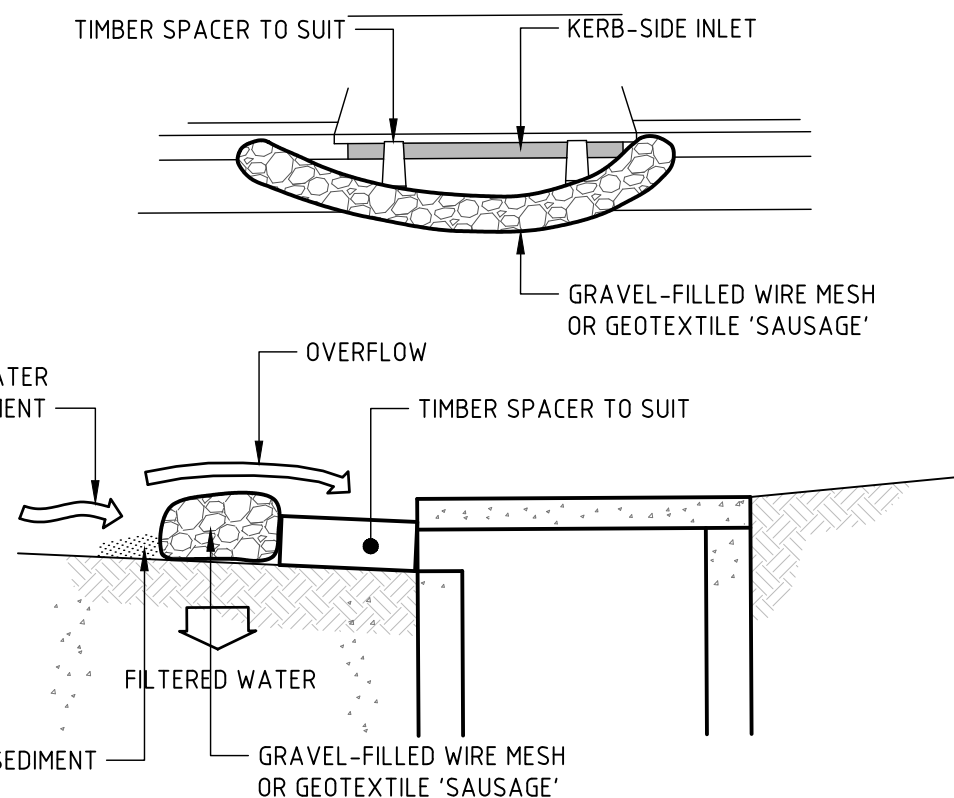


1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE OR STRAW BALES.
2. FOLLOW STANDARD DRAWING 6-7 AND STANDARD DRAWING 6-8 FOR INSTALLATION PROCEDURES FOR THE STRAW BALES OR GEOFABRIC. REDUCE THE PICKET SPACING TO 1 METRE CENTRES.
3. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING.
4. DO NOT COVER THE INLET WITH GEOTEXTILE UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

GEOTEXTILE INLET FILTER (SD 6-12)



SEDIMENT TRAP DETAIL



NOTE: THIS PRACTICE ONLY TO BE USED
WHERE SPECIFIED IN APPROVED SWMP/ESCP

1. INSTALL FILTERS TO KERB INLETS ONLY AT SAG POINTS.
2. FABRICATE A SLEEVE MADE FROM GEOTEXTILE OR WIRE MESH LONGER THAN THE LENGTH OF THE INLET PIT AND FILL IT WITH 25mm TO 50mm GRAVEL.
3. FORM AN ELLIPTICAL CROSS-SECTION ABOUT 150mm HIGH X 400mm WIDE.
4. PLACE THE FILTER AT THE OPENING LEAVING AT LEAST A 100mm SPACE BETWEEN IT AND THE KERB INLET. MAINTAIN THE OPENING WITH SPACER BLOCKS.
5. FORM A SEAL WITH THE KERB TO PREVENT SEDIMENT BYPASSING THE FILTER.
6. SANDBAGS FILLED WITH GRAVEL CAN SUBSTITUTE FOR THE MESH OR GEOTEXTILE PROVIDING THEY ARE PLACED SO THAT THEY FIRMLY ABUT EACH OTHER AND SEDIMENT-LADEN WATERS CANNOT PASS BETWEEN.

SANDBAG SEDIMENT FILTER (SD 6-11)

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A	ISSUED FOR INFORMATION	JK	KS	KS	10.10.24	DR UNLE
B	ISSUED FOR DEVELOPMENT APPLICATION	JK	KS	EG	06.12.24	

	ARCHITECT 
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ABN 81 094 433 100

PROJECT
HOMES NSW - TWEED HEADS
25-27 BOYD STREET, TWEED HEADS

DRAWING TITLE CIVIL ENGINEERING PACKAGE EROSION AND SEDIMENT CONTROL DETAILS	JOB NUMBER NL223052	
	DRAWING NUMBER DA-C02.11	REVISION B
	DRAWING SHEET SIZE = A1	
	DATE = 11/11/2011	

LEGEND

— SITE BOUNDARY LINE

- - - EXTENT OF LEVEL 1

- - - EXTENT OF LEVEL 2

-X.XX BULK EARTHWORKS DEPTH (CUT)

X.XX BULK EARTHWORKS DEPTH (FILL)

--- EXISTING CONTOURS (X.Xm INTERVAL)

DEPTH OF CUT		
- 9.99m	TO	- 7.0m
- 7.0m	TO	- 5.0m
- 5.0m	TO	- 3.0m
- 3.0m	TO	- 2.0m
- 2.0m	TO	- 1.55m
- 1.0m	TO	- 0.5m
- 0.5m	TO	- 0.25m
- 0.25m	TO	- 0.0m

DEPTH OF FILL		
0.0m	TO	0.25m
0.25m	TO	0.5m
0.5m	TO	0.75m
0.75m	TO	1.0m
1.0m	TO	1.25m
1.25m	TO	1.5m
1.5m	TO	2.0m
2.0m	TO	9.99m

NOTES

1. BULK EARTHWORKS LEVELS AND VOLUMES ARE BASED ON A COMPARISON OF THE DESIGN BULK EARTHWORKS SURFACE AND THE EXISTING SURFACE LEVEL AS SURVEYED WITH NO ALLOWANCE FOR TOPSOIL STRIPPING. THE FOLLOWING ALLOWANCES HAVE BEEN MADE TO GENERATE DESIGN BULK EARTHWORKS SURFACE;

FINISHED DESIGN SURFACE MINUS 200mm:
2. NO ALLOWANCE HAS BEEN MADE FOR SELECT LAYERS OR UNSUITABLE MATERIAL.
3. NO ALLOWANCE HAS BEEN MADE FOR TEMPORARY SEDIMENT DAMS
4. NO ALLOWANCE HAS BEEN MADE FOR SERVICE TRENCHES, DRAINAGE TRENCHES, DRAINAGE INFRASTRUCTURE (PITS, CULVERTS, ETC) IN THE LEVELS OR VOLUMES PRESENTED ON THIS PLAN.
5. NO ALLOWANCE FOR ANY TEMPORARY BATTERS DURING WORKS.
6. NO BULKING FACTORS HAVE BEEN CONSIDERED/ALLOWED FOR.
7. APPROXIMATE BULK EARTHWORKS VOLUMES BASED ON THE NOTES ABOVE ARE AS FOLLOWS;
 - BULK CUT = 10,746m³
 - BULK FILL = 11,233m³
 - BULK CUT/FILL BALANCE = 10,734 m³ (CUT)
9. ALL BULK EARTHWORKS TO BE UNDERTAKEN IN ACCORDANCE WITH SITE SPECIFIC GEOTECHNICAL REPORT AND BULK EARTHWORKS NOTES.



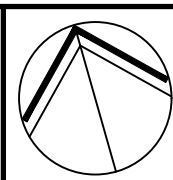
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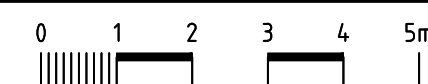
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PROJECT
HOMES NSW - TWEED HEADS
25-27 BOYD STREET, TWEED HEADS

DRAWING TITLE
CIVIL ENGINEERING PACKAGE

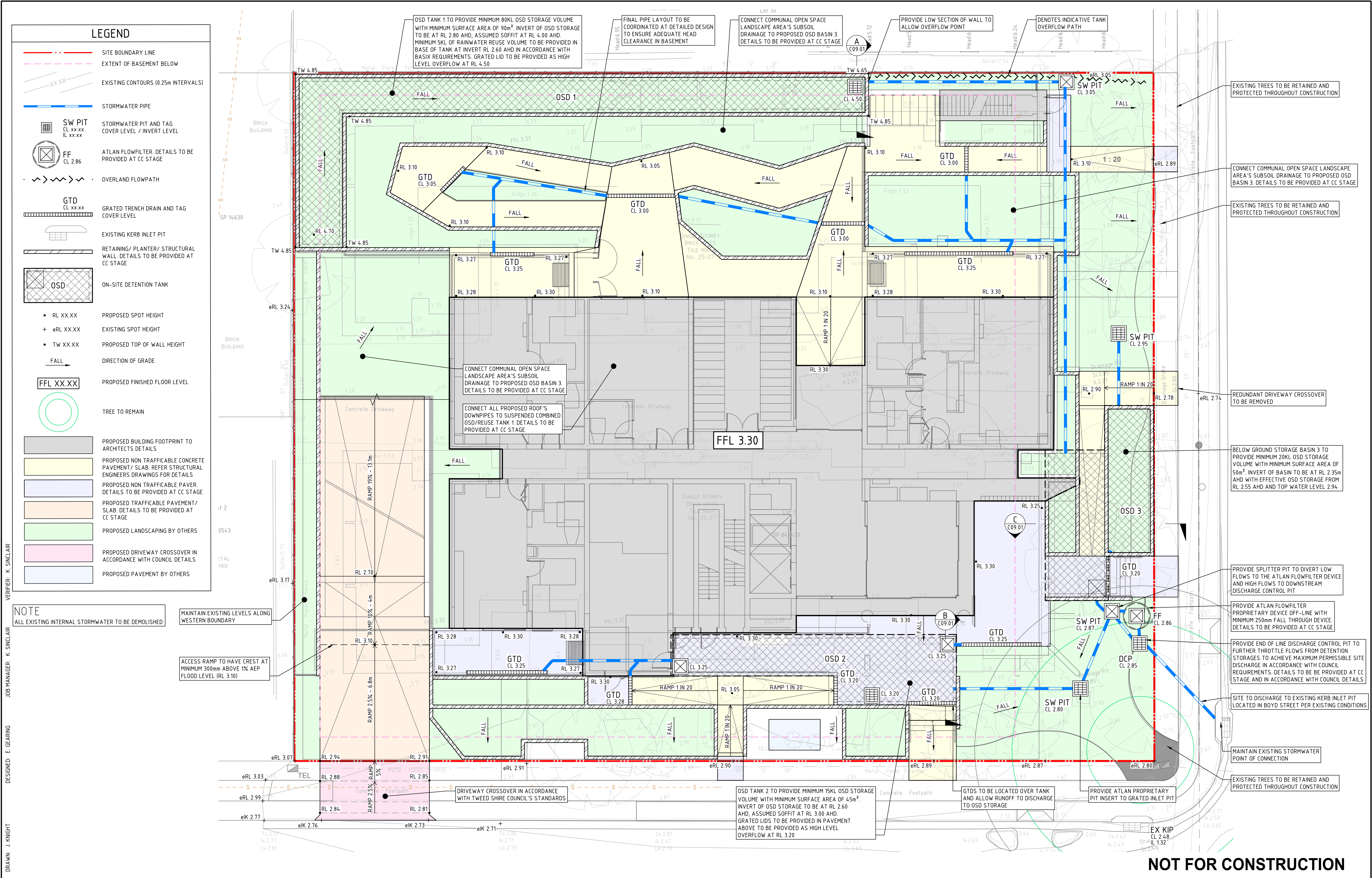
CUT AND FILL PLAN

JOB NUMBER
NI 223052

DRAWING NUMBER	REVISION
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DA-C03.01	B
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RAWING SHEET SIZE = A1

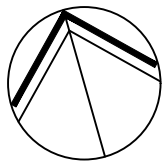
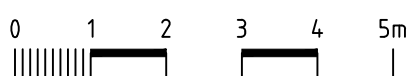


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B	ISSUED FOR INFORMATION	RG	KS	KS	30.10.24	
C	ISSUED FOR DEVELOPMENT APPLICATION	JK	KS	EG	06.12.24	

 NSW GOVERNMENT	 Homes NSW
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ARCHITECT	CLIENT
 CKDS	
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SCALE 1:100 @ A1	

PROJECT	DRAWING TITLE
HOMES NSW - TWEED HEADS 25-27 BOYD STREET, TWEED HEADS	CIVIL ENGINEERING PACKAGE CIVIL WORKS PLAN - GROUND FLOOR

JOB NUMBER	DRAWING NUMBER	REVISION
NL223052	DA-C04.01	C
DRAWING SHEET SIZE = A1		

LEGEND

RL XX.XX

PROPOSED SPOT HEIGHT

FFL XX.XX

PROPOSED FINISHED FLOOR LEVEL

STORMWATER PIPE

GRADED TRENCH DRAIN

GTD - CL 0.00

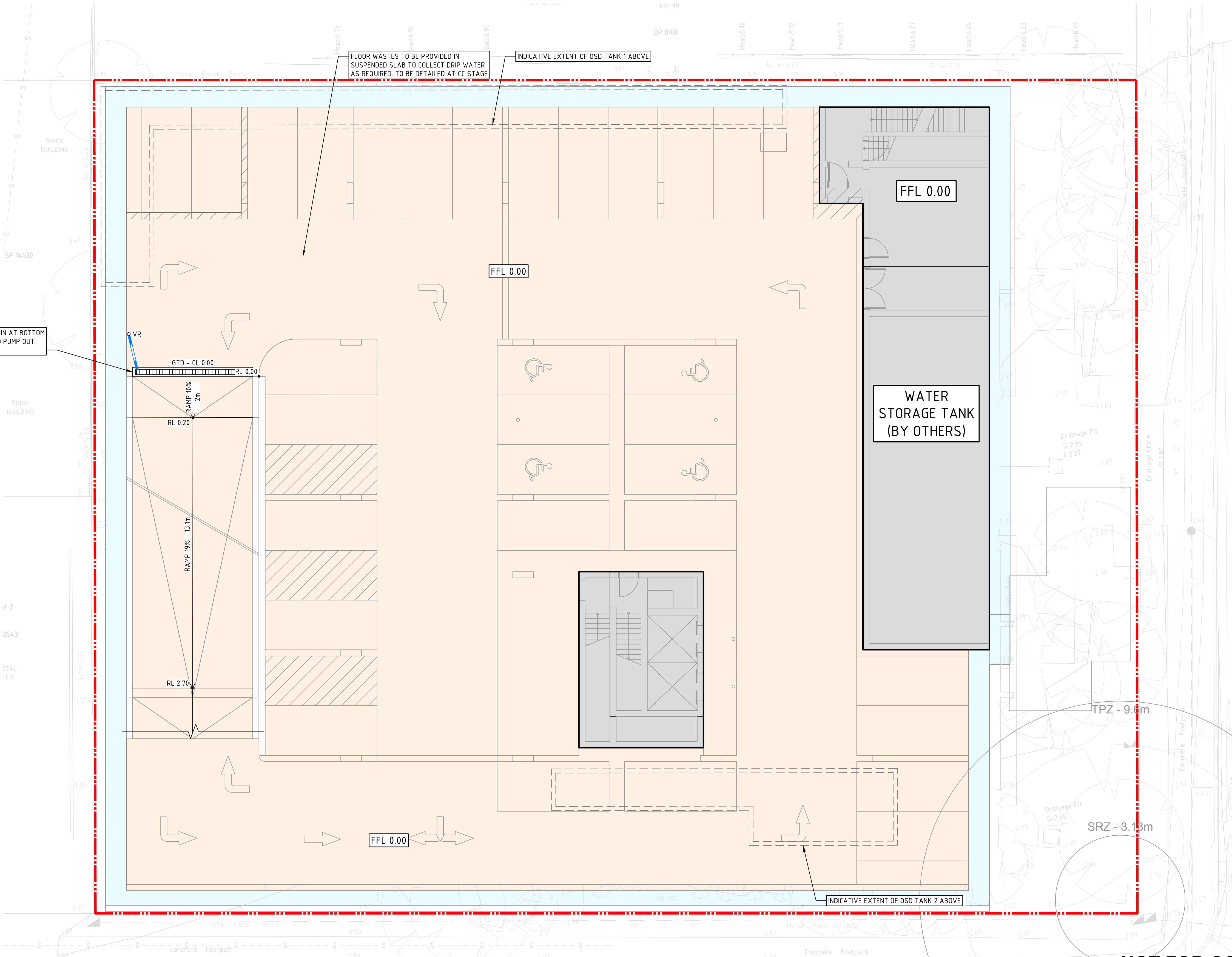
o VR

VERTICAL RISER

PROPOSED BUILDING FOOTPRINT TO ARCHITECTS DETAILS

PROPOSED TRAFFICABLE PAVEMENT/SLAB. DETAILS TO BE PROVIDED AT CC STAGE

PERIMETER WALL TO ARCHITECTS DETAILS



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SCALE 1:100 @ A1

0

1

2

3

4

5m

Newcastle

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ABN 81 094 433 100

PROJECT

HOMES NSW - TWEED HEADS

25-27 BOYD STREET, TWEED HEADS

DRAWING TITLE

CIVIL ENGINEERING PACKAGE

CIVIL WORKS PLAN - BASEMENT
LEVEL 1

JOB NUMBER

NL223052

DRAWING NUMBER

DA-C04.11

REVISION

B

DRAWING SHEET SIZE = A1

LEGEND

SITE BOUNDARY LINE

STORMWATER PIPE

RM

RM

PROPOSED RISING MAIN

SW PIT

CL xx.xx

IL xx.xx

STORMWATER PIT AND TAG COVER LEVEL / INVERT LEVEL

PUMP OUT PIT

DETAILS TO BE PROVIDED AT CC STAGE

PUMP OUT PIT. DETAILS TO BE PROVIDED AT CC STAGE

• RL XX.XX

PROPOSED SPOT HEIGHT

FALL

DIRECTION OF GRADE

R

RIDGE IN FINISHED PAVEMENT LEVEL

FFL XX.XX

PROPOSED FINISHED FLOOR LEVEL

PROPOSED BUILDING FOOTPRINT TO ARCHITECTS DETAILS

PROPOSED TRAFFICABLE PAVEMENT/ SLAB. DETAILS TO BE PROVIDED AT CC STAGE

PERIMETER WALL TO ARCHITECTS DETAILS

The diagram illustrates the basement level civil works plan for a building. It shows the proposed stormwater drainage system, including a rising main (RM) and a pump out pit (PUMP OUT PIT) to collect runoff from the basement and driveway. The plan also shows the proposed finished floor level (FFL) and the proposed building footprint. The drawing includes various annotations such as 'FALL' indicating the direction of grade, 'R' indicating the ridge in finished pavement level, and 'FFL XX.XX' indicating the proposed finished floor level. The plan also shows the proposed building footprint to architects details, the proposed trafficable pavement/slab details to be provided at CC stage, and the perimeter wall to architects details. The drawing includes various annotations such as 'FALL' indicating the direction of grade, 'R' indicating the ridge in finished pavement level, and 'FFL XX.XX' indicating the proposed finished floor level. The plan also shows the proposed building footprint to architects details, the proposed trafficable pavement/slab details to be provided at CC stage, and the perimeter wall to architects details.

DRAWN: J. KNIGHT
DESIGNED: E. CEARING
JOB MANAGER: K. SINCLAIR
VERIFIER: K. SINCLAIR

REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE
A	ISSUED FOR DEVELOPMENT APPLICATION	JK	KS	EG	06.12.24

NSW GOVERNMENT

Homes NSW

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ABN 81 094 433 100

PROJECT

HOMES NSW - TWEED HEADS
25-27 BOYD STREET, TWEED HEADS

DRAWING TITLE

CIVIL ENGINEERING PACKAGE

CIVIL WORKS PLAN - BASEMENT
LEVEL 2

JOB NUMBER

NL223052

DRAWING NUMBER

DA-C04.12

REVISION

A

DRAWING SHEET SIZE = A1

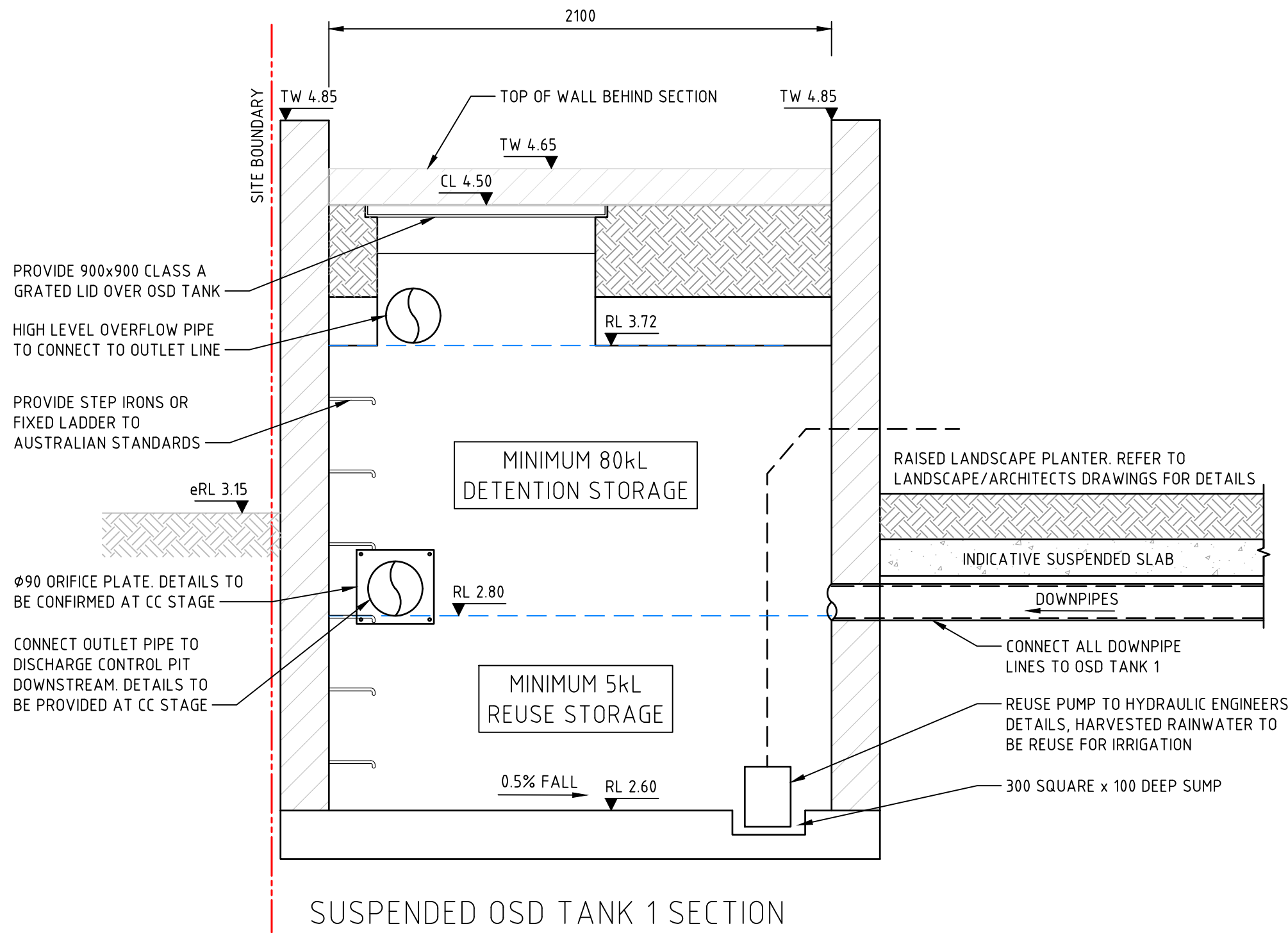
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VERIFIER: K. SINCLAIR

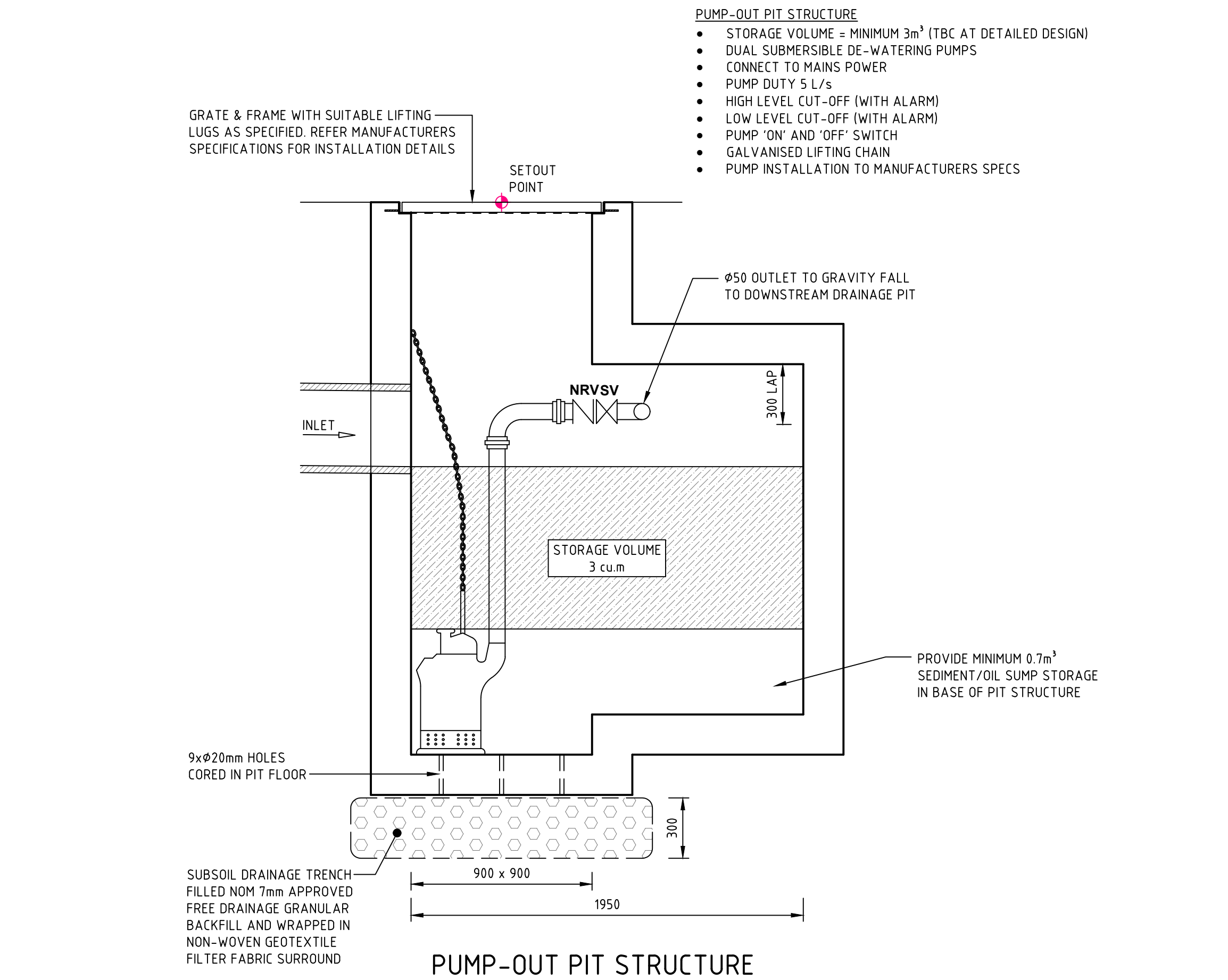
JOB MANAGER: K. SINCLAIR

DESIGNED: E. CEARING

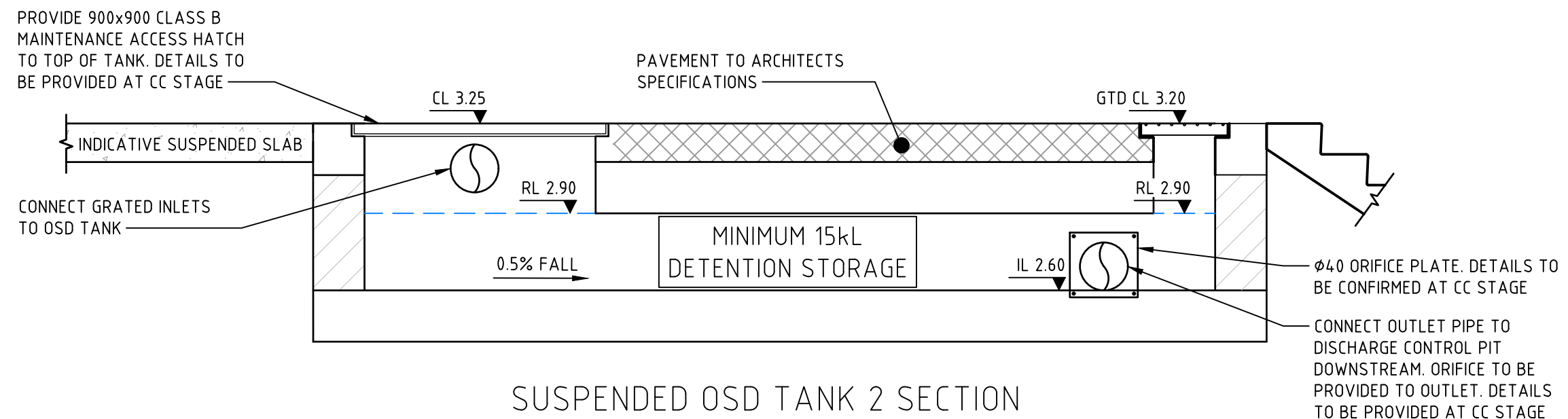
DRAWN: J. KNIGHT



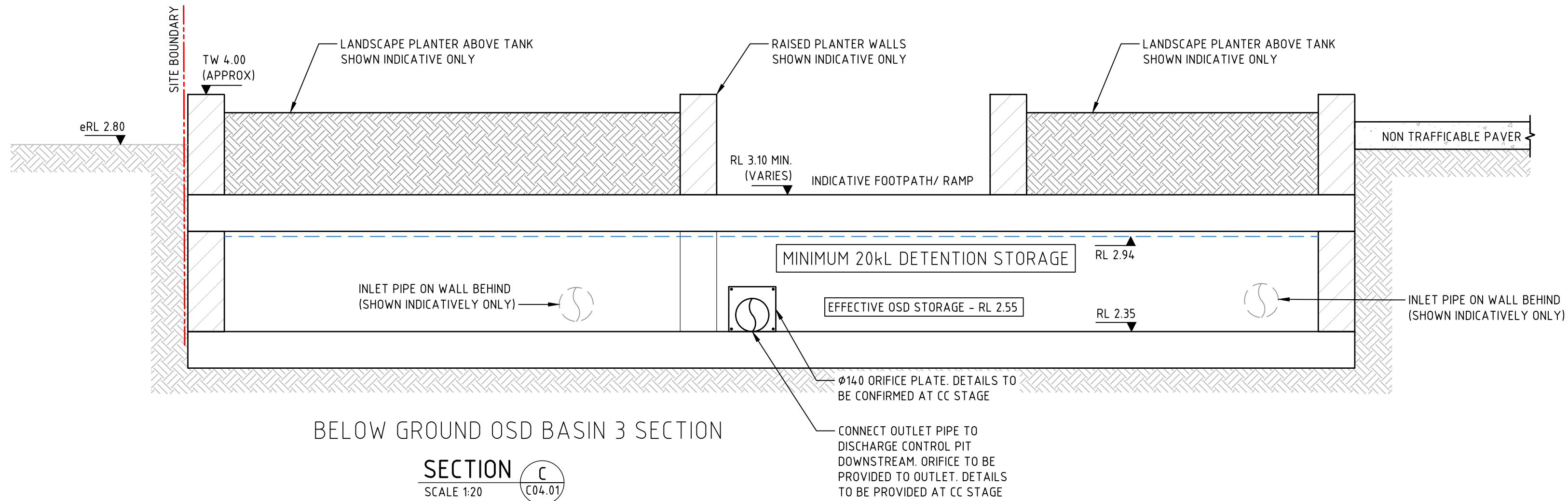
SECTION A
SCALE 1:20
C04.01



PUMP-OUT PIT STRUCTURE



SECTION B
SCALE 1:20
C04.01



SECTION C
SCALE 1:20
C04.01

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REVISION	DESCRIPTION	ISSUED	VER'D	APP'D	DATE	CLIENT	ARCHITECT		PROJECT	DRAWING TITLE	JOB NUMBER		
A	ISSUED FOR INFORMATION	JK	KS	KS	10.10.24	 		 Newcastle Level 1, 215 Pacific Hwy, Charlestown NSW 2290 Ph (02) 4943 1777 Email newcastle@northrop.com.au ABN 81 094 433 100	HOMES NSW - TWEED HEADS 25-27 BOYD STREET, TWEED HEADS	CIVIL ENGINEERING PACKAGE	NL223052		
B	ISSUED FOR INFORMATION	RG	KS	KS	30.10.24							DRAWING NUMBER	REVISION
C	ISSUED FOR DEVELOPMENT APPLICATION	JK	KS	EG	06.12.24								
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