PROPOSED RESIDENTIAL DEVELOPMENT

No. 182-186 Gertrude Street, North Gosford

Flood Impact Assessment

PREPARED FOR:

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1 EXECUTIVE SUMMARY

JCO Consultants has been engaged to prepare a flood impact assessment report for the proposed development at **No. 182-186 Gertrude Street, North Gosford** in accordance with the requirements of Central Coast Council's Development Control Plan (DCP) and NSW floodplain Development Manual.

The client is proposing a residential development on this site. The proposed development involves constructing a multi storey apartment building (total 39 units) with basement carpark. The general property surrounding the subject site are low density residential properties (R1).

The local catchment tends to drain through the local drainage depression which locates at the frontage of No.182 Gertrude Street, North Gosford. The existing kerb inlet pit outside of No.182 Gertrude Street captures and diverts the catchment runoff to the easement trunk drainage pipe locating along the northern boundary of No.180 Gertrude Street. Refer to easement location in site specific Survey Plan by 'TSS Total Surveying Solutions'.

Figure 1.1: Site Location Map

The **Overland Flow 'Flood' Study** incorporates the following:

- ***Addressing the 'flood planning controls' per Central Coast Councils LEP & DCP;***
- ***Design considerations pursuant to 'NSW Floodplain Development Manual';***
- ***An assessment of the potential overland flooding from local upstream catchment;***
- ***Modelling of overland flow flood behaviours comparing pre & post flood impact on the subject site utilising 2D 'TUFLOW' Flood Model.***

Proposed Building footprint encroaches into the 1% AEP flood extent, as such the proposed structure must be constructed with flood resistance material. In addition, our assessment will address the potential for flood volume regime exacerbation.

Note the following resulting outcomes and subsequent design mitigation requirements per the 2D TUFLOW modelling results (1% AEP storm event):

- **Habitable Flood Level (Level 2)** - MIN FFL40.30mAHD (*500mm freeboard + 1%AEP Flood Level RL39.80mAHD = FFL40.30AHD*)
- **Habitable Flood Level (Ground Floor)** - MIN FFL33.90mAHD (*500mm freeboard + 1%AEP Flood Level RL33.40mAHD = FFL33.90mAHD*)
- **Non-habitable Floor Level to be 300mm above external ground.**
- **Driveway Crest Level to be above RL40.06mAHD (PMF Flood Level).**

Our 2D TUFLOW, as outlined & detailed in this report, will provide the comparison between the pre-development & post-development scenarios.

Our analysis and subsequent results conclude that there is negligible impact on flood depth, velocity and flood behaviours. Furthermore, there is no exacerbation to the flood regime.

(refer to Table 1 below)

	Freeboard Requirement (mm)	Post Development 1% AEP from Model (m AHD)	PMF Flood Level from Model (m AHD)	1% AEP level from Council Letter (m AHD)	Minimum Floor Level (m AHD)	Adopted Design Levels (m AHD)
Habitable Area (Level 2)	500	RL39.80	RL40.11	RL39.65	FFL40.30	FFL40.30
Habitable Area (Ground)	500	RL33.40	RL33.52	RL33.31	RL33.90	RL33.90
Driveway Crest	Above PMF	RL39.90	RL40.06	RL39.90	RL40.06	RL40.10

Table 1 – Floor Level Requirements

2 INTRODUCTION

This analysis & report documents the procedures and findings of the hydraulic modelling relative to the subject site for both the pre & post development scenario conditions.

In summary, our assessment concluded:

1. ***Proposed flood conditions relative to the proposed development are largely unchanged from the existing conditions;***
2. ***Proposal of new Residential Development (No.182-186 Gertrude Street, North Gosford) does not materially affect local flood characteristics in terms of Flood Depth and Flood Hazard;***
3. ***Proposed Residential Development has negligible offsite flood impacts (less than 10mm);***
4. ***The TUFLOW model was calibrated and regenerated results nearly identical to Councils Flood Information which is deemed satisfactory for the purpose of assessment.***
5. ***Comprehensive Assessment of Council Flood Controls indicates the proposed Residential Development complies with Council requirements.***

3 REFERENCE DOCUMENTS

The following documents + Reports have been referred in this Overland Flow Impact Report:

1. *'Site Survey Plans' prepared by 'TSS Total Surveying Solutions' dated 02.02.2023*
2. *Architectural Plans prepared by 'TEXCO DESIGN'*
3. *NSW Government Floodplain Development Manual – The Management of Flood Liable Land (2005)*
4. *Central Coast Development Control Plan 2022*
5. *Central Coast Council DCP – 3.1 Floodplain Management and Water Cycle Management*
6. *Australian Rainfall and Runoff*
7. *LiDAR DATA – Australian Foundation Spatial Data (ELVIS)*
8. *'Flood Information Letter' by Central Coast Council dated 06.06.2022*

4 LOCAL CATCHMENT

The site is affected by overland flooding from the local upstream catchment. The runoff from the localised main upstream catchment traverses overland through the low-lying areas of the catchment until it reaches Gertrude Street frontage. The upstream catchment runoff is conveyed through the kerb inlet pit and pipe system at the immediate upstream of No.182 Gertrude Street, then merge into the 375mm DIA trunk drainage pipe running parallel to the side boundary of No.180 Gertrude Street. Part of overland flow will overtop the boundary line No No.186 Gertrude Street and traverses along the side boundary setback during major storm events. In our TUFLOW model, the **existing** 375mm DIA drainage system was assumed to be fully block for both pre and post scenarios to simulate the more conservative flood conditions.

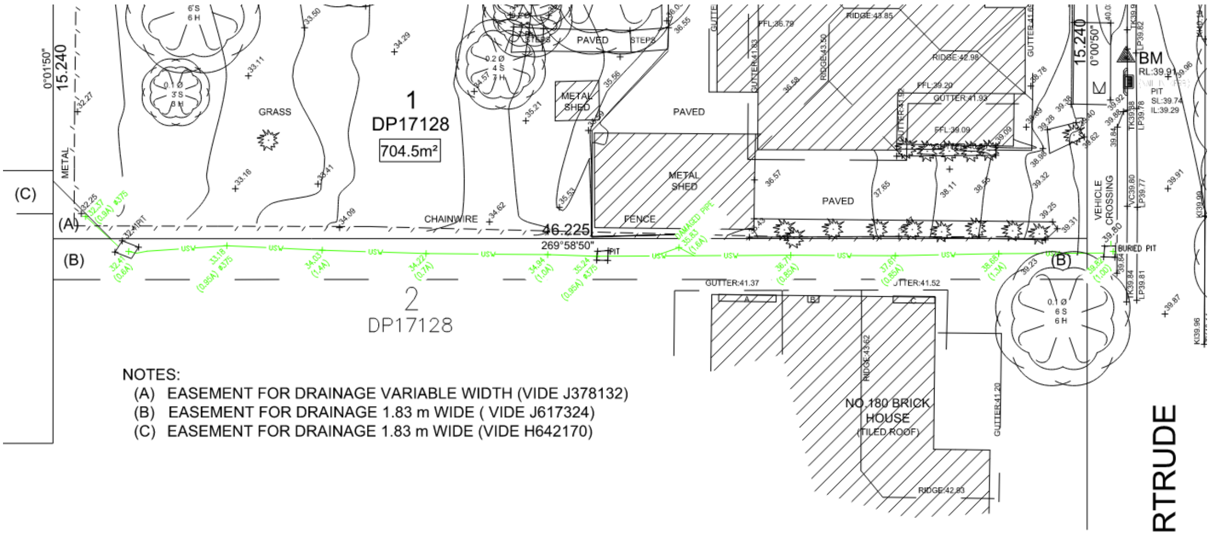


Figure 4.1 Existing Site Drainage System in No.180 Gertrude Street, Noth Gosford

The applicable upstream catchment is predominantly 'vegetated' / 'low density residential area' and is characterised by an average slope of 22% (approximately).

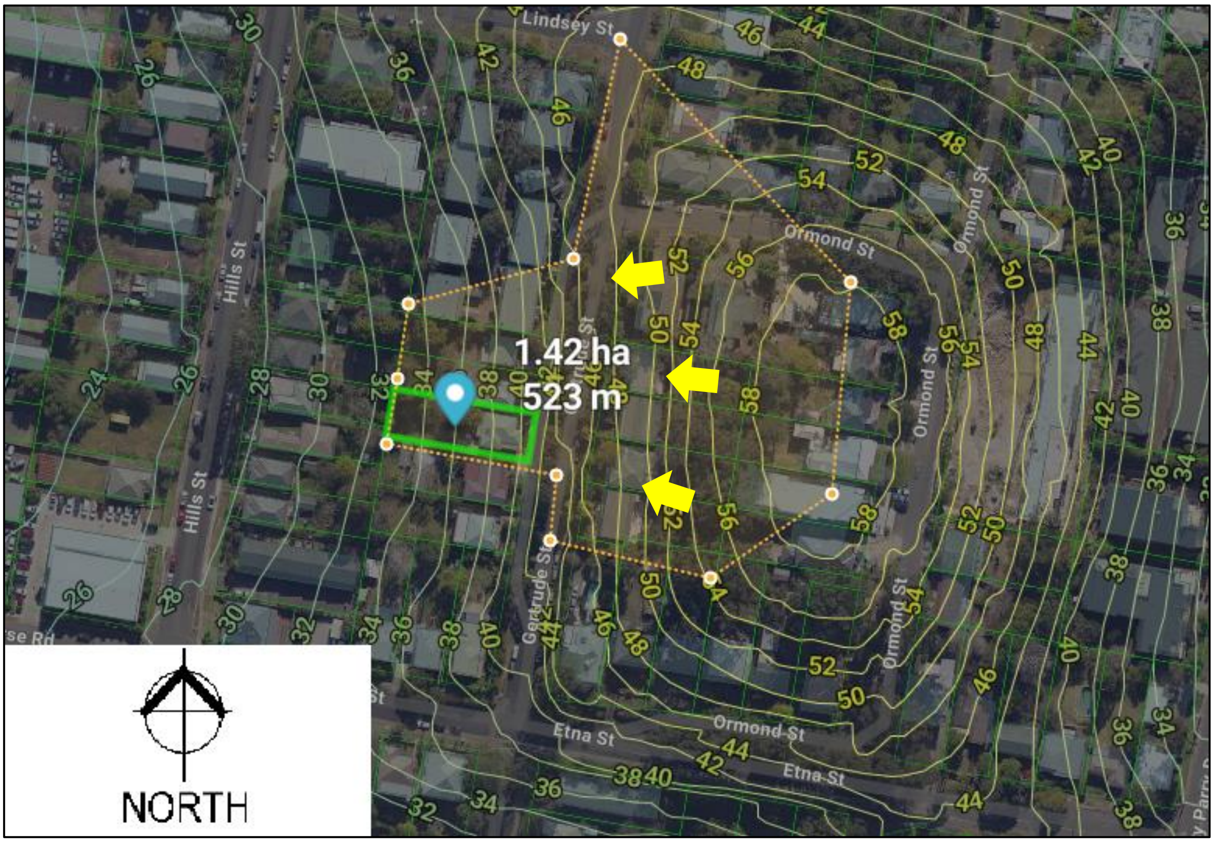


Figure 4.2 Upstream Catchment Plan

4.1 Objective

The purpose of this Flood Impact Assessment is to provide a detailed assessment of the potential Local Overland Flooding and to determine the flood impact on the subject site.
Furthermore, to assess if there will be any potential exacerbation on the surrounding neighbouring properties when assessing the pre to post-development scenario conditions.

In summary, the objectives are as follows:

- ***Define design flood levels, velocities and depths for the catchment existing Terrain;***
- ***Amend the model to include the proposed development footprint and investigate if the proposed development affects the flood characteristics;***
- ***Propose mitigation measures to eliminate any impacts; and***
- ***Address the requirements of Central Coast Council's DCP***

5 GLOSSARY

Annual Exceedance Probability (AEP)
The chance of a flood of a given or a larger size occurring in any one year, usually expressed as a percentage.

Australian Height Datum (AHD)
A common national surface level datum approximately corresponding to mean sea level.

Catchment
The land area draining through the main stream, as well as tributary streams, to a particular site. It always relates to an area above a specific location.

Flood
Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse.

Flood Planning Levels (FPLs)
Are the combinations of flood levels and freeboards selected for floodplain risk management purposes.

Freeboard
Is a factor of safety typically used in relation to the setting of floor levels.

Habitable Room
In industrial or commercial situation: an area used for offices or to store valuable possessions susceptible to damage in the event of a flood.

Peak Discharge
The maximum discharge occurring during a flood event.

Probable Maximum Flood
PMF is the largest flood that could conceivably occur at a location, usually estimated from probable maximum precipitation.

High Flood Risk Precinct
Land below the 1% AEP (100-year) flood that is either subject to a high hydraulic hazard or where there are significant evacuation difficulties.

Medium Flood Risk Precinct
Land below the 1% AEP (100-year) flood that is not subject to a high hydraulic hazard and where there may be some evacuation difficulties.

Low Flood Risk Precinct
All other land within the floodplain (i.e. within the extent of the probable maximum flood) but not identified within either the High Flood Risk or the Medium Flood Risk Precinct.

Hazard
Is a source of potential harm or a situation with a potential to cause loss. In relation to this plan, the hazard is flooding which has the potential to cause harm or loss to the community.

Hydraulic Hazard
Is the hazard as determined by the provisional criteria outlined in the FMM in a 1% Annual Exceedance Probability (AEP) flood event.

Local Overland Flooding
Local overland flooding means inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.

development consent however will be addressed as a condition of consent. It is then warranted this aspect be considered in the design phase

(a) Flood Effects
Due regard is to be given to the location and shape of proposed buildings on the site with respect to the diversion of overland flow and flood depth, not only on the site but also to neighbouring properties

6 AUTHORITIES REQUIREMENTS

6.1 Central Coast Development Control Plan 2022 – Chapter 3 – 3.1 Floodplain Management

Objective

- To reduce private and public losses resulting from floods.
- To enable safe access or evacuation of people to the existing public road network during flooding.
- To maintain the existing flood regime and flow conveyance capacity.
- To avoid significant adverse effects on the floodplain environment that would cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of any river bank or watercourse.

Table 4 Flood Control Target Matrix

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

Planning Consideration	Criteria	Residential development
Floor Level	B	Habitable floor levels are to be above the FPL for all new structures.
	B	Non-habitable floor levels: Garage, laundry, or public toilets/sporting amenities to have floor levels at least 300mm (desirable 500mm) above surrounding finished ground level. Materials, equipment or contents are not to be stored below the FPL unless they are flood compatible, capable of withstanding the forces of floodwater, debris and buoyancy, and not prone to causing pollution or an environment hazard.
Flood Impacts	C	The development must not: ▪ Affect the safe occupation of any flood prone land. ▪ Be sited on the land such that flood risk is increased. ▪ Adversely affect flood behaviour by raising predevelopment flood level by more than 10mm. ▪ Result in an increase in the potential of flooding detrimentally affecting other development or properties. ▪ Significantly alter flow distributions and velocities to the detriment of other properties or the environment of the floodplain.

		▪ Significantly and detrimentally affect the floodplain environment or cause avoidable erosion, siltation, destruction of riparian vegetation or a reduction in the stability of any riverbank or watercourse. ▪ Be likely to result in unsustainable social and economic costs to the flood affected community or general community as a consequence of flooding (including: damage to public property and infrastructure, such as roads, stormwater, water supply, sewerage, and utilities). ▪ Be incompatible with the flow of floodwaters on flood prone land (considering any structures, filling, excavation, landscaping, clearing, fences, or any other works). ▪ Cause or increase any potential flood hazard (considering the number of people, their frailty, as well as emergency service and welfare personnel).
Fencing	G	Fencing within a floodway will not be permissible except for security/ permeable/ open type/ safety fences of a type approved by Council. Fencing in certain areas may also be restricted by current Floodplain Risk Management Plans. Council will require a Development Application for all new solid (nonporous) and continuous fences above 0.6m high, within the 1% AEP storm event extents unless otherwise stated by exempt and complying development provisions which may be incorporated into in State Environmental Planning Policies or Councils Environmental Planning Instruments from time to time. An applicant will need to demonstrate that the fence would create no impediment to the flow of floodwaters. Appropriate fences must satisfy the following:-

Table 6 – Flood Risk Control Matrix of the subject

7 HYDROLOGY

A hydrologic model combines rainfall information with local catchment characteristics to estimate a runoff hydrograph. For this study, 'TUFLOW' model direct rainfall was used for the upstream catchment to convert rainfall hyetograph to runoff hydrographs.

The rainfall data downloaded from BOM was applied in the TUFLOW model using 2d_rf file. The flood results generated by the 1% AEP 10min storm duration were consistent with Councils 1% AEP Flood extent (Appendix B). Hence, for the purposes of our flood modelling, it is seemed satisfactory.

The direct rainfall catchment is indicated in Figure 7.1.1

Figure 7.1.1: Direct Rainfall Catchment

The estimated design rainfalls from BOM were applied to the hydrological model in order to predict design runoff hydrograph. Design 1% AEP peak flood discharges were included for the 10min, 15min, 20min, 30min, 45min and 1hr duration storm events. Based on the 'TUFLOW' model simulation results, a critical storm duration of 10min was determined and hence adopted for our assessment. The Figure below indicates the Flow Runoff Hydrograph for the 1% AEP storm event at the front boundary of the site.

The peak runoff flow rate at the site location is 0.34cu.m/s which occurred at 10min. Our TUFLOW modelling 1%AEP flood water level and flood depth are equal or higher than Councils Flood

Information, dated 06.06.2022, during 1% AEP storm (refer to comparison in Table 1). Therefore, it is considered acceptable for the assessment.

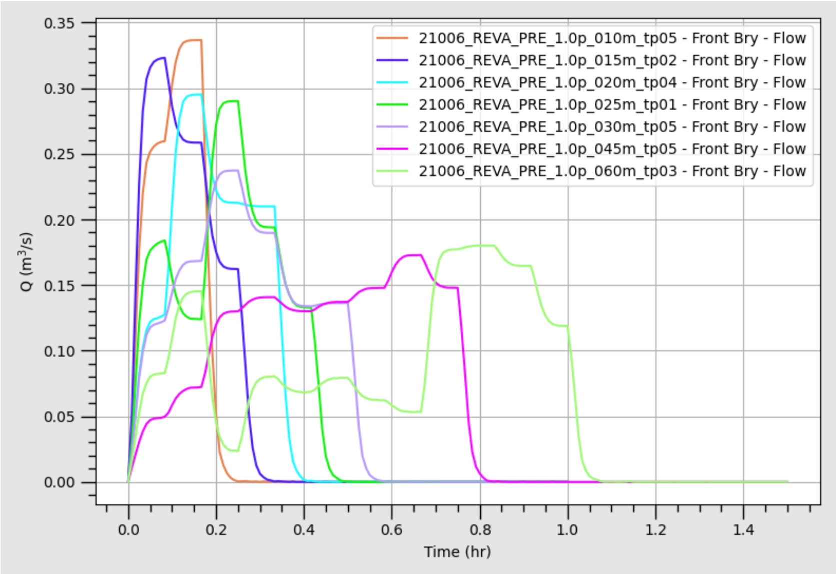


Figure 7.1.2: Overland Flow Hydrograph traversing through subject site during 1% AEP (total flow at property frontage)

7.2 Rainfall Data

The design rainfall intensity-frequency-duration (IFD) data for the catchment site were obtained from the Bureau of Meteorology (BOM).

A summary of the rainfall intensities adopted in this study is provided in the Table below.

IFD Design Rainfall Intensity (mm/h)								
Location Label:								
Requeste	Latitude	-33.415	Longitude	151.347				
Nearest gı	Latitude	33.4125 (S	Longitude	151.3375 (E)				
		Annual Exceedance Probability (AEP)						
Duration	Duration i	63.20%	50%	20%	10%	5%	2%	1%
1 min	1	131	150	216	265	317	393	456
2 min	2	109	126	183	227	272	335	388
3 min	3	101	116	169	208	249	307	355
4 min	4	95.1	109	157	194	232	286	331
5 min	5	89.9	103	148	182	218	269	312
10 min	10	70.9	81.3	117	143	171	212	246
15 min	15	59	67.7	97.3	119	143	178	206
20 min	20	50.9	58.5	84.2	104	124	154	179
25 min	25	45	51.7	74.6	91.9	110	137	159
30 min	30	40.5	46.6	67.3	82.9	99.5	123	144
45 min	45	31.6	36.4	52.8	65.1	78.2	97	113
1 hour	60	26.4	30.4	44.1	54.4	65.3	81	94.2
1.5 hour	90	20.5	23.5	34.1	42	50.3	62.4	72.4
2 hour	120	17.1	19.6	28.3	34.8	41.7	51.6	59.9

Table 7.2 'Rainfall Intensities'

8 HYDRAULIC

8.1 Definition

A hydraulic model converts runoff (traditionally from a hydrological model) into water levels and velocities throughout the major drainage/creek systems in the study area (known as the model 'domain', which includes the definition of both terrain and roughness). The model simulates the hydraulic behaviour of the water within the study area as potential overland flow paths, which develop when the capacity of the channels is exceeded. The model is established in conjunction with boundary conditions, which include runoff hydrographs generated by 'TUFLOW' model and appropriate downstream boundary.

A 2D fully dynamic hydraulic model was established for the study area. TUFLOW, a dynamic hydraulic modelling system developed by BMT was used in this study. TUFLOW is used world-wide and has been shown to provide reliable, robust simulation of flood behaviour in urban and rural areas through a vast number of applications.

8.2 Model Topography

The survey data included in the model was extrapolated from Digital Terrain Model (DTM) created from the ALS (Airborne Laser Scanning) received from ELVIS (Foundation Spatial Data). The 2019 Lidar data below was adopted in the TUFLOW model.

Gosford201105-LID1-AHD_3466300_56_0002_0002_1m

The Survey Plan prepared by 'TSS Total Surveying Solutions' was also used to calibrate the terrain to achieve higher contour accuracy. The site-specific survey data is generally consistent with the Lidar data, hence it is deemed acceptable for the existing surface in the pre-development model.

8.3 2D Model Set-up

TUFLOW hydraulic modelling was carried out to determine the flood behaviour within the catchment area. Grid size of 0.5m x 0.5m was adopted for entire TUFLOW model and deemed satisfactory to define the flood extent through the developed areas in the vicinity of the subject property.

In the post development scenario, the part of the proposed building footprint is model as full blockage (refer to Figure 8.3.1 and Figure 8.3.2), the driveway ramp was modelled based on the gradient in the architectural plans prepared by 'TEXCO DESIGN'. The driveway crest level is set to RL40.10mAHD above PMF Flood Level to protect the basement from inundation. The proposed regrading/cutdown was modelled with 2d-zsh file in TUFLOW. Proposed levels and blockage locations are indicated in Figure 8.3.1. The side landscape area (Yellow hatched in Figure 8.3.1) along the northern boundary is to be lowered to offset the potential flood impact to the neighbouring property.

New pits and pipes system was included in the TUFLOW model to divert the flood water potentially trap in the sag point north to the driveway ramp. A 375mm dia pipe (associated with 900SQ pits) were proposed under the driveway ramp connecting the front setback area to the side setback. Assumption of 50% blockage factor was applied to the model. The inflow rate at the immediate upstream of the pipe inlet is estimated to be 0.07m3/s based on the TUFLOW model. Thus the 375mm dia pipe size at 1% fall will provide sufficient capacity to cater for the inflow in the sag point.

Figure 8.3.1: Site Regrading in TUFLOW model

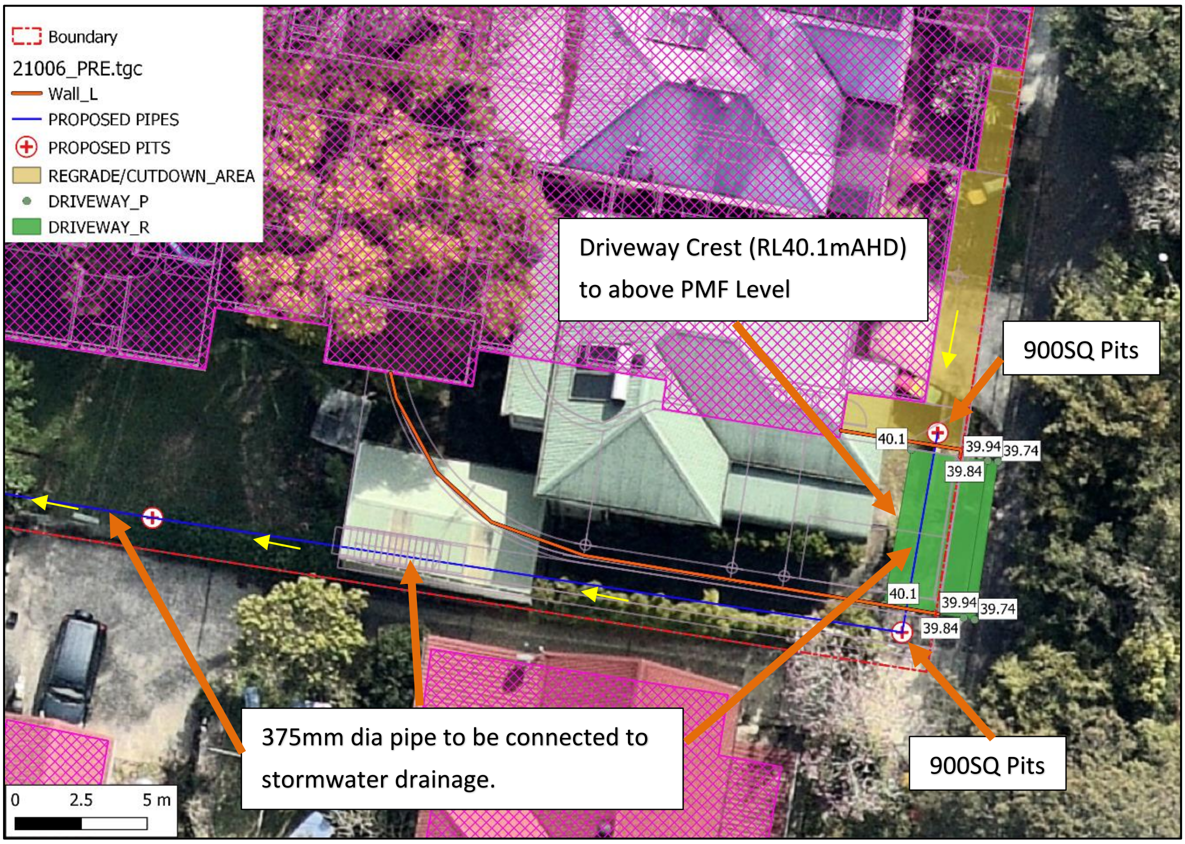


Figure 8.3.2: Site Setup in TUFLOW model

8.4 Model 2D roughness

The following Mannings n values were assigned to TUFLOW model to simulate the runoff conditions from the upstream catchment. The manning n for building area with water depth less than 0.02m will have n value as 0.05.

Material ID	Manning's n	Initial Loss, Continious Loss	Description
1	0.03	2,1.5	Residential area & Open Space
2	0.05,0.02,0.2,3	0,0	Building
3	0.025	0,0	Road& Carpark

Table 8.4: Manning's Roughness Coefficient & Rainfall Losses

Figure 8.4: Material ID Map in TUFLOW model

8.5 TUFLOW Obstruction

In the post development state, future building footprint in 1%AEP flood extent was modelled into 'TUFLOW' as inactive cells/obstructions.

8.6 Upstream & Downstream Boundary Condition

The upstream flow was modelled using TUFLOW Direct Rainfall method. Downstream Boundary is significantly away (100m) from the subject site and was assigned as freely discharge. The downstream tailwater level will have negligible affect on the site flooding.

8.7 Adopted Drainage Network

For this study, all in-ground stormwater drainage pits & pipes located within the study area were assumed to be fully blocked, except for the proposed pits and pipe under the driveway ramp and along the southern boundary. In post-development, the 3 off 900SQ Pit and 375mm dia pipes were modelled as 50% block to divert inflow from the sag area to the southern boundary. The proposed pit and pipe system is also acting as additional flood storage which improves the overall flood conditions on site in post-development scenario.

In the pre-development scenario, the modelling results with 100% pipe blockage achieved the same or more conservative flood levels compared to Councils Flood Information. Therefore, the flood model is deemed satisfactory for the assessment.

9 RESULTS & COMPLIANCE WITH COUNCILS REQUIREMENTS

9.1 Design Flood Modelling Results

'2D TUFLOW' hydraulic models were undertaken for the 1% AEP design flood event. The peak water level, depth, and velocity for each 0.5m x 0.5m grid cell in the study area were determined. The pre & post flood extent, flood level contours, hazard precincts and flood impact generated by the TUFLOW model is presented in ***Appendix A (Figure A.1 – A.10).***

The flood depth generated by out TUFLOW model is matching the flood depth with Councils flood information (if not higher). The ponding depth within the proposed overland flowpath along the northern and south boundaries are less than 150mm which is extremely minor. Once the local drainage system is installed, such shallow overland flow will be captured into the inground drainage lines before turning into surface runoff.

9.2 Flood Planning Level

In accordance with **Central Coast Council DCP 2022 Part 3.1: Table 4 Flood Control Target Matrix**

- Habitable floor levels to be equal to or greater than the 1% AEP (100YR ARI) flood level plus 500mm freeboard
- Non-habitable floor level : Garage, laundry, or public toilets/sporting amenities to have floor levels at least 300mm (desirable 500mm) above surrounding finished ground level. Materials, equipment or contents are not to be stored below the FPL unless they are flood compatible, capable of withstanding the forces of floodwater, debris and buoyancy, and not prone to causing pollution or an environment hazard.

	Freeboard Requirement (mm)	Max Post Development 1% AEP from Model (m AHD)	PMF Flood Level from Model (m AHD)	Flood Planning Level (m AHD)	Adopted Design Levels (m AHD)
Habitable Area (Level 2)	**500**	**RL39.80**	**RL40.11**	**FFL40.30**	**FFL40.30**
Habitable Area (Ground Floor)	**500**	**RL33.40**	**RL33.52**	**RL33.90**	**RL33.90**
Driveway Crest	**Above PMF**	**RL39.90**	**RL40.06**	**RL40.06**	**RL40.10**

Table 9.2 Flood Planning Level

No external entry is proposed for Level 1. Therefore, freeboard requirement is not applicable to Level 1 floor level.

All non-habitable floor area is at least 300mm above the external ground.

9.3 Building Component & Structure Soundness

To reduce the risk to human life and damage to property caused by flooding, new building structures subject to flooding must be designed and constructed to withstand the anticipated hydrostatic forces.

For all parts of the development potentially exposed to floodwater (below Flood Planning Level), the development structure **must**:

i. be constructed of flood compatible building components in accordance with the Stormwater and Floodplain Management Technical Manual

ii. Structural Engineer must design & Certify that the structure is designed and capable of withstanding forces subject to forces of floodwater, debris, buoyancy forces anticipated up to Flood Planning Level. Refer to Table 9.2 for Flood Planning Level.

9.4 Hazard Assessment

Safety of people/residence in floods is of major concern. As such, an assessment of the provisional flood hazard (Velocity & Depth product at 0.1 m^2/s interval) is presented in ***Appendix A - Figure A.3 & A.4.*** The VxD product within the subject site is largely **less than 0.1**, as such, the Provisional Flood Hazard is generally **Low Hazard** according to NSW Floodplain Management Manual.

Based on the Hazard criteria ***Table 9.4.1-9.4.2 & Figure 9.4.3***, Hazard Classification Map ***(Refer to Appendix A - Figure A.5 & A.6)*** is generated for both the pre-development and post-development scenario's to investigate any relevant flood hazard. It is noted that the 'Hazard Classification Map' for post development are within H1 class as shown in ***Appendix A - Figure A.5 & A.6***. The Flood Hazard Classification are generally within H1 which is considered "Generally safe for people and vehicle". The localised H5 area indicated in the Flood Hazard Map was caused by the sudden velocity increase (jump) in a steep topography, which is considered a minor anomaly. Most importantly, the flood depth in vast majority of the site is less than 150mm. As such, it is our opinion that the hazard category is safe for future occupants.

Hazard Vulnerability Classification	Description
H1	Generally safe for vehicles, people and buildings.
H2	Unsafe for small vehicles.
H3	Unsafe for vehicles. children and the elderly.
H4	Unsafe for vehicles and people.
H5	Unsafe for vehicles and people. All buildings vulnerable to structural damage. Some less robust buildings subject to failure.
H6	Unsafe for vehicles and people. All building types considered vulnerable to failure.

Table 9.4.1 – Combined Hazard Curves – Vulnerability Thresholds (Smith et al.2014)

Hazard Vulnerability Classification	Classification Limit (D and V in combination)	Limiting Still Water Depth (D)	Limiting Velocity (V)
H1	D*V ≤ 0.3	0.3	2.0
H2	D*V ≤ 0.6	0.5	2.0
H3	D*V ≤ 0.6	1.2	2.0
H4	D*V ≤ 1.0	2.0	2.0
H5	D*V ≤ 4.0	4.0	4.0
H6	D*V > 4.0	-	-

Table 9.4.2 – Combined Hazard Curves – Vulnerability Thresholds Classification Limits (Smith et al.2014)

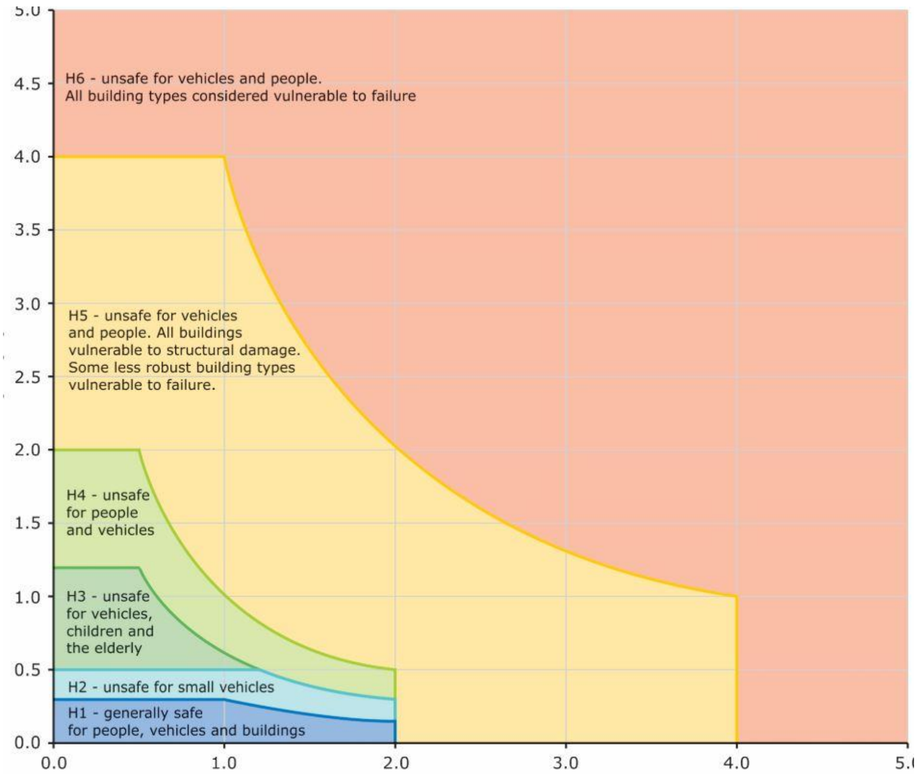


Figure 9.4.3 – Combined Hazard Curves (Smith et al.2014)

9.5 Evacuation

The PMF Flood Level according to Council Flood Information Letter dated 06.06.2022 is at RL28.2mAHD, refer to Appendix B. As such, offsite evacuation plan is not required since the proposed building finished floor level is above RL28.2mAHD (habitable floor FFL28.56mAHD) and will be constructed by flood compatible material up to Flood Planning Level RL 28.56mAHD. Our model indicates the PMF flood level the Gertrude Street can reach RL40.07mAHD. Thus flood hazard is Low and is considered safe for residents to exit the building by walking or driving.

During Major storm events when offsite evacuation is not possible, residents shall go up the stairs to Ground Level which is above PMF Flood Level. During major storm events, it is considered safe to stay within any floor area above Ground Level until the storm passes or wait for rescue.

9.6 Flood Affectation

The modelling results undertaken for this Flood Impact Assessment indicates that the proposed development will not alter the overall flood behaviours to the vicinity during the 1% AEP flood event.

The ***Flood Impact Map (Refer to Appendix A Figure A.11)*** demonstrates that there is no cumulative impact in the vicinity as the offsite water change in flood depth is generally less 10mm. The impact is negligible and within the tolerance of modelling accuracy. Hence, the characteristic of the flooding is not altered by the proposed development.

10 CONCLUSION & RECOMMENDATIONS

A detailed flood impact investigation was carried out on the subject site **(No.182-186 Gertrude Street, North Gosford)**. A two-dimensional hydraulic model was constructed for this study. A TUFLOW model was undertaken using Direct Rainfall method to simulate the overland flood contributing towards the subject site. The flood depth generated from the TUFLOW model are consistent if not more conservative than Councils Flood Information.

Utilising the 2D hydraulic model, the flood behaviour during 1% AEP was determined. The flood water depth, flood levels, flood hazard, VxD product and velocities, generated by the TUFLOW model, were assessed in this study. Our assessment has revealed 'negligible' increase (less than 10mm) in off-site floodwater depth from pre to post development scenarios. Furthermore and more importantly, this increase does not create a hazard to the future residents nor exacerbate flooding in the surrounding catchment. The proposed regrade/cutdown within the landscaping area created additional flood storage or flowpath to safely divert the upstream runoff. 375mm DIA pipe proposed under the driveway ramp will allow water to discharge freely and avoid permanent pounding.

In conclusion, to avoid any impact whatsoever on the flood behaviour of the catchment, the following mitigation measures will be implemented as part of the DA submission:

- ***The Habitable Floor Levels on Ground Floor Level and Level 2 to be above the minimum floor levels detailed in Table 1 (500mm freeboard + 1%AEP Flood Level);***
- ***Non-habitable floor levels, fire egress impacted by 1%AEP flood extent are to be minimum 300mm above external ground;***
- ***Driveway Crest level to be minimum above PMF flood level (RL40.06mAHD);***
- ***The external area to be regraded/cutdown as per Mitigation Measures shown in Figure 10.1 and Figure 10.2;***
- ***Install 3x900SQ Pits and 375mm diameter pipes to divert potential runoff to side setback (refer to figure 10.1)***
- ***Retaining walls on both sides of the Driveway to be minimum 400mm above finished ground area to prevent water from backflowing into basement;***
- ***All structures including retaining walls of the proposed building below the Flood Planning Level (1%AEP flood level + 500mm Freeboard) to be of flood compatible building components, refer to Figure A.2 in Appendix A for Flood Depth and Flood Levels.***
- ***All proposed fencing within the 1%AEP floodplain to be permeable fencing (louvres or pool fencing) up to the 1%AEP Flood level to allow flood water flow through, minimum base opening to be 200mm from natural ground levels;***
- ***No external infill above existing ground is permitted in the flood affected area unless approved by Council.***

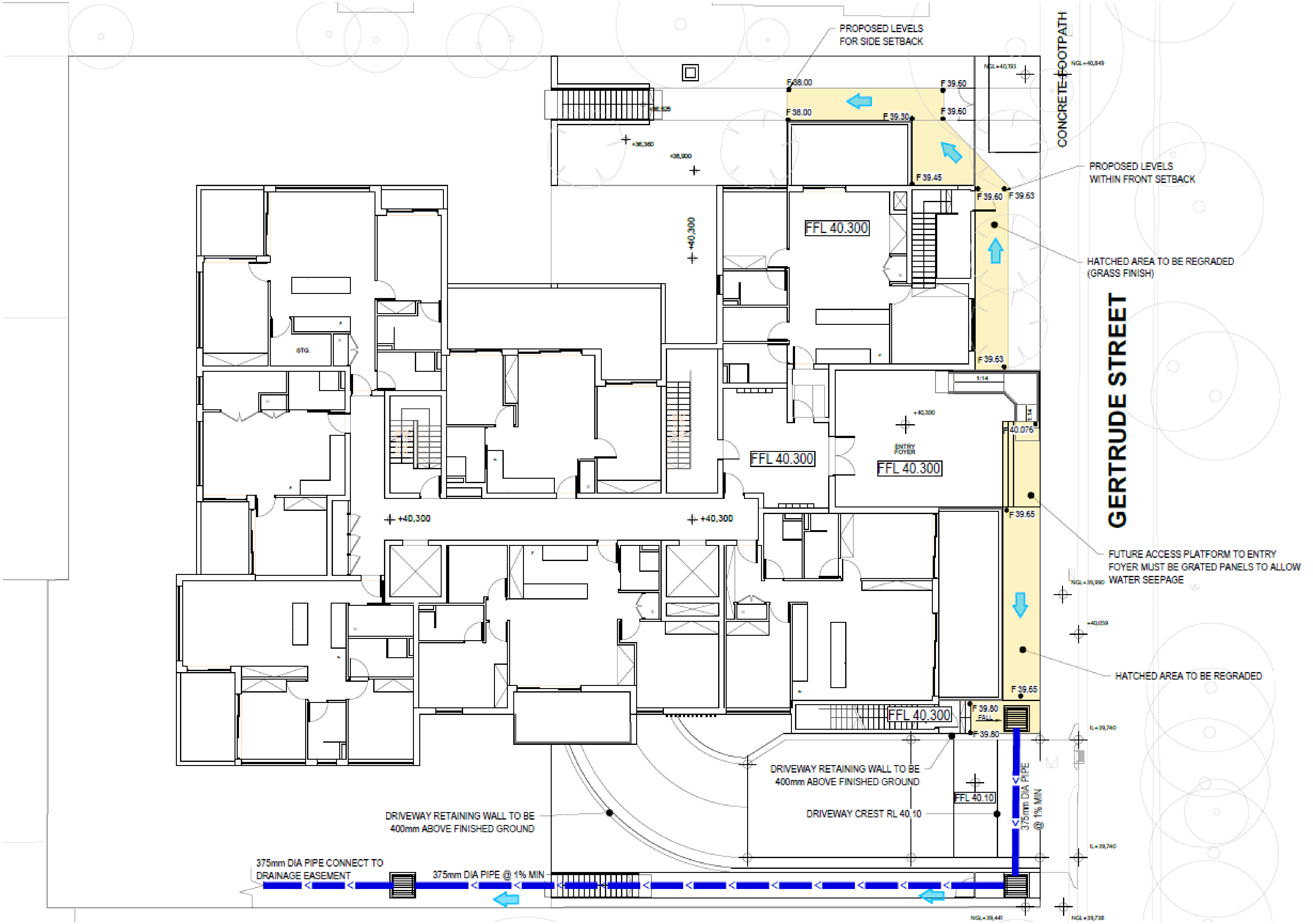
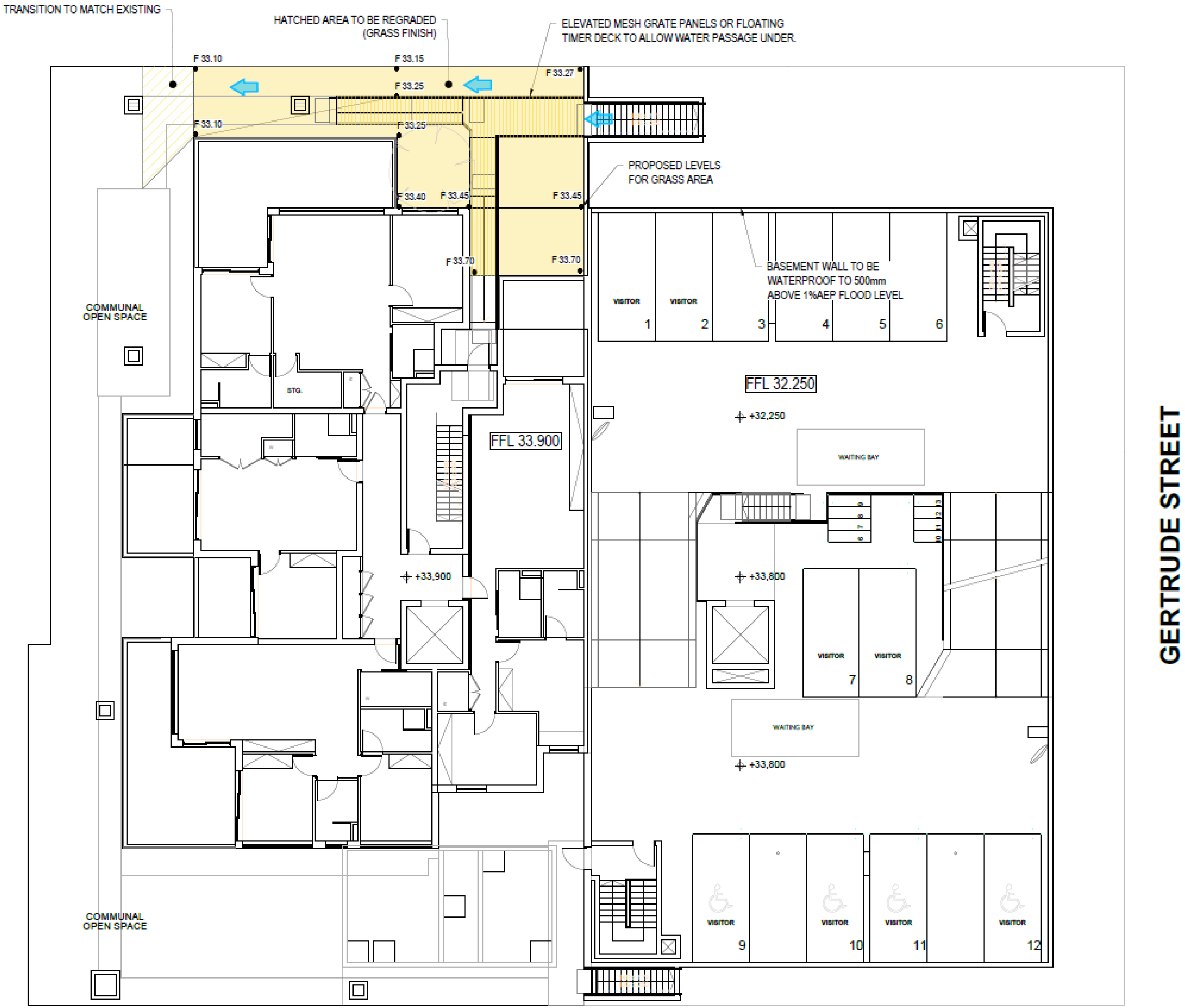


Figure 10.1 Mitigation Measures - 1



-

Figure 10.2 Mitigation Measures - 2

APPENDIX A

TUFLOW Flood Modelling Flood Result Mapping for Pre & Post Development

Flood Mapping

JCO CONSULTANTS

JCO Consultants endeavours to ensure that the information provided in this map is correct at the time of publication. JCO Consultants does not warrant, guarantee or make representations regarding the currency and accuracy of information contained within this map.

Scale:
0 5 10 m

North:

Revision: A
Coordinate: MGA 56

Title:
Figure A.1 - 1% AEP Flood Depth & Contours – Pre Development

JCO CONSULTANTS

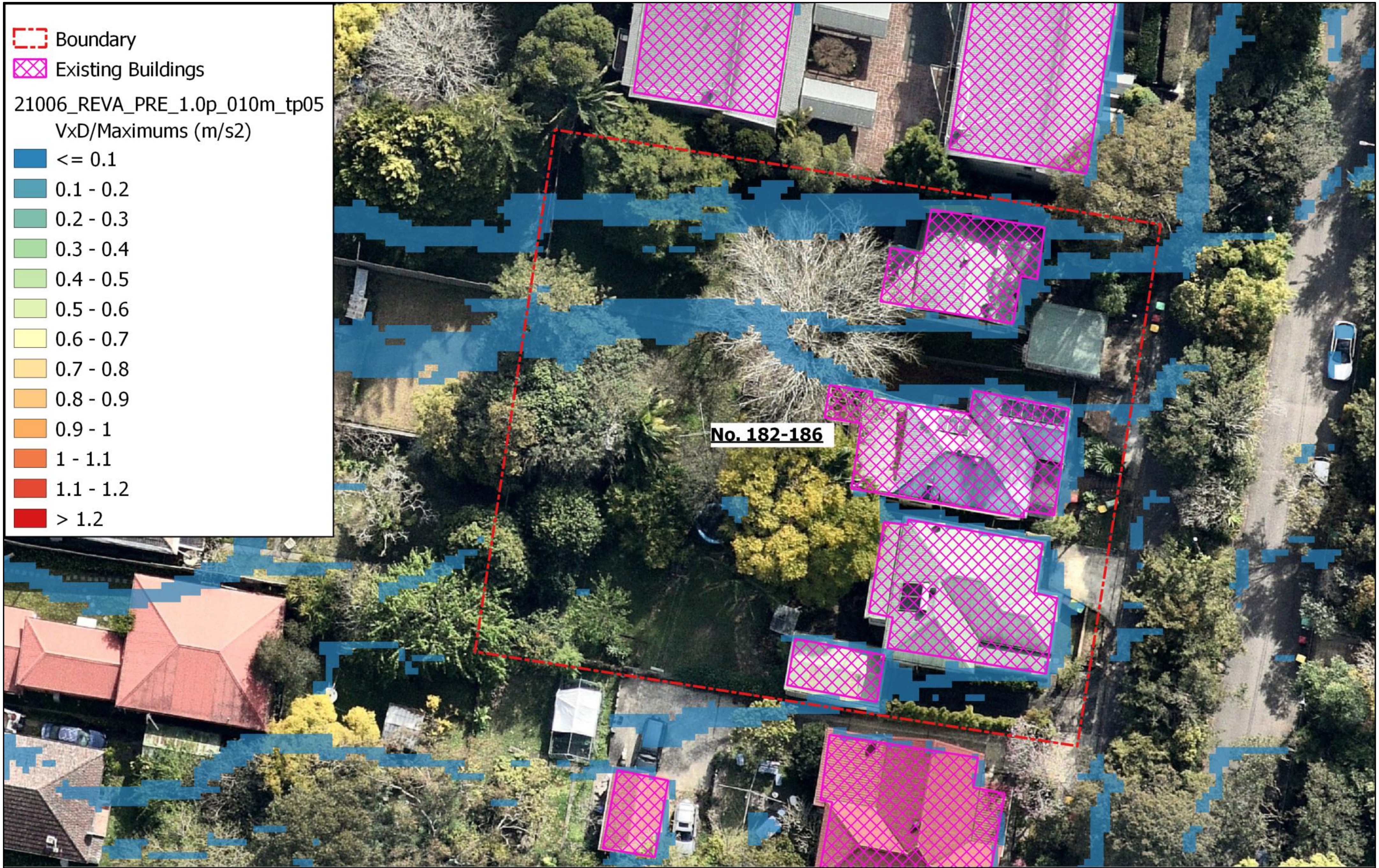
Scale: 0 5 10 m

North:

Revision: A

Coordinate: MGA 56

Title:
Figure A.2 - 1% AEP Flood Depth & Contours – Post Development



JCO CONSULTANTS

Scale: 0 5 10 m

North:

Revision: A

Coordinate: MGA 56

Title:

Figure A.3 - 1% AEP VxD Product – Pre Development

JCO CONSULTANTS

Scale: 0 5 10 m

North:

Revision: A

Coordinate: MGA 56

Title:

Figure A.4 - 1% AEP VxD Product – Post Development

JCO CONSULTANTS

Scale: 0 5 10 m

North:

Revision: A

Coordinate: MGA 56

Title:

Figure A.5 - 1% AEP ARR Hazard Class – Pre Development

JCO CONSULTANTS

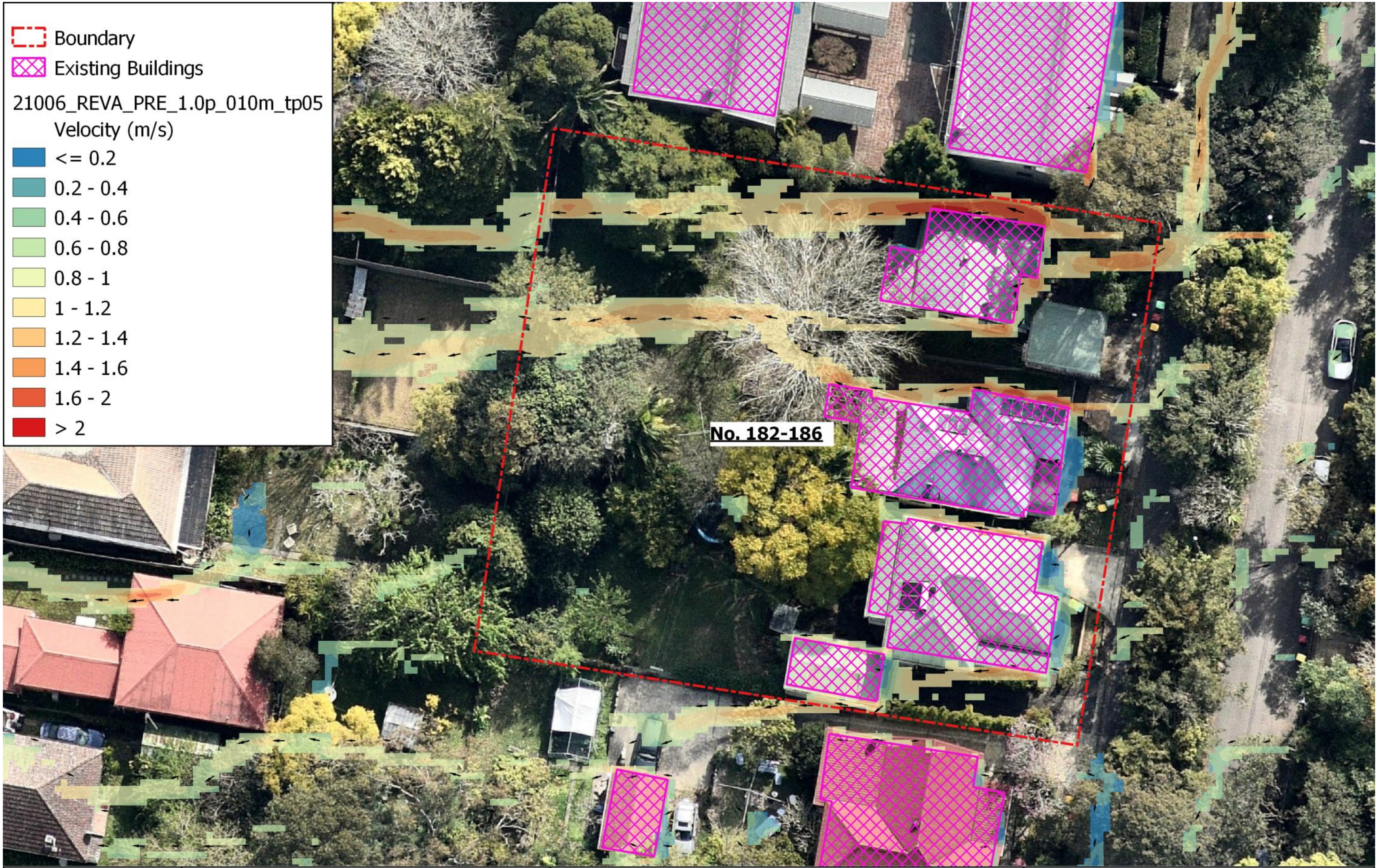
Scale: 0 5 10 m

North:

Revision: A

Coordinate: MGA 56

Title:
Figure A.6 - 1% AEP ARR Hazard Class – Post Development



JCO CONSULTANTS

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Scale: 0 5 10 m

North:

Revision: A

Coordinate: MGA 56

Title: Figure A.7 - 1% AEP Velocity – Pre Development

JCO CONSULTANTS

Scale: 0 5 10 m

North:

Revision: A

Coordinate: MGA 56

Title:

Figure A.8 - 1% AEP Velocity – Post Development

JCO CONSULTANTS

Scale: 0 5 10 m

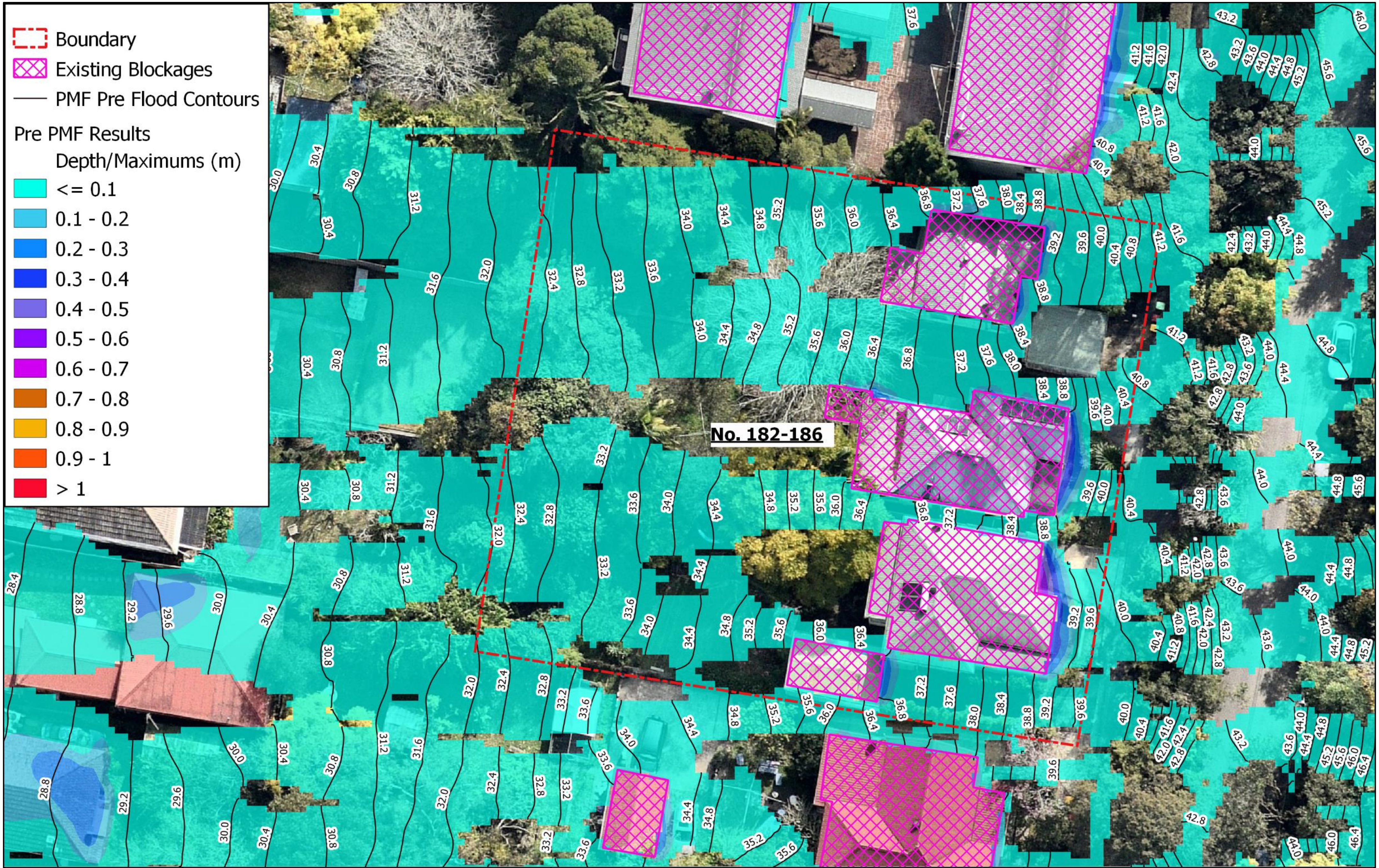
North:

Revision: A

Coordinate: MGA 56

Title:
Figure A.9 - 1% AEP Flood Water Level Impact Map

JCO CONSULTANTS	JCO Consultants endeavours to ensure that the information provided in this map is correct at the time of publication. JCO Consultants does not warrant, guarantee or make representations regarding the currency and accuracy of information contained within this map.	Scale: 0 5 10 m North: Revision: A Coordinate: MGA 56	Title: Figure A.10 - 1% AEP VxD Impact Map



JCO CONSULTANTS

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Scale: 0 5 10 m

North:

Revision: A

Coordinate: MGA 56

Title:
Figure A.11 - PMF Flood Depth & Contours – Pre Development

JCO CONSULTANTS

Scale: 0 5 10 m

North:

Revision: A

Coordinate: MGA 56

Title:
Figure A.12 - PMF Flood Depth & Contours – Post Development

APPENDIX B

Council Flood Information 1%AEP & PMF
Dated 06.06.2022

Flood Information Certificate

Central Coast Council

Property Address:	**182 Gertrude St, NORTH GOSFORD**
Lot /DP:	1/DP17128
Date Prepared:	6 June 2022
Source of information:	Gosford CBD Local Overland Flow Flood Study, 2013

This Flood Certificate provides advice furnished in good faith by the council relating to the likelihood of the land identified above being flooded and to the nature or extent of any such flooding ("flood risk") .

Flood level and flood planning advice is provided in the tables below and as maps in the Appendix. This advice regarding flood risk has been derived from the flood study listed above. Should you have any enquiries concerning this certificate, please do not hesitate to contact Andrew Dewar on 1300 463 954 during the hours of 8.00am to 4.15pm Monday to Friday

Flood Level Information Table

Flood Event	Minimum Level (m AHD)	Maximum Level (m AHD)
PMF	36.84	42.37
1% AEP	36.66	39.65
5% AEP	36.65	36.65

This site falls outside the Flood Planning Area. Floodplain Development Controls do not apply for single occupancy or dual occupancy developments.

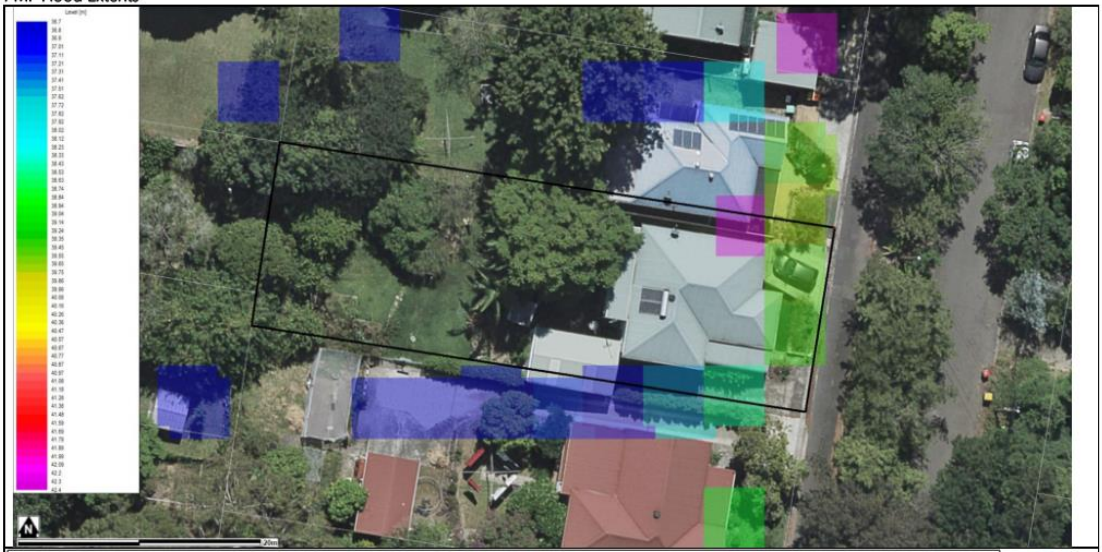
Planning Information Table

Flood Control Lot	☐
Minimum Habitable Floor Level	N/Am AHD
Complying Development: Flood Exclusionary Categories	
(a) Flood Storage Area	☐
(b) Floodway Area	☐
(c) Flow Path	☐
(d) High Hazard Area (H3, H4, H5, H6 Hazard Categorisation)	☐
(e) High Risk Area	☐

Central Coast Council
P 1300 463 954 I **E** ask@centralcoast.nsw.gov.au

Flood Information Certificate

PMF Flood Extents



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Flood Information Certificate

PMF Flood Depth

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Flood Information Certificate

1% AEP Flood Extents

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Flood Information Certificate

1% AEP Flood Depth

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Flood Information Certificate

1% AEP Hazard Categorisation

Flood Information Certificate

Hydraulic Categorisation

Flood Information Certificate

Property Address: **184 Gertrude St, NORTH GOSFORD**

Lot /DP: 25/DP1591

Date Prepared: 6 June 2022

Source of information: Gosford CBD Local Overland Flow Flood Study, 2013

This Flood Certificate provides advice furnished in good faith by the council relating to the likelihood of the land identified above being flooded and to the nature or extent of any such flooding ("flood risk") .

Flood level and flood planning advice is provided in the tables below and as maps in the Appendix. This advice regarding flood risk has been derived from the flood study listed above. Should you have any enquiries concerning this certificate, please do not hesitate to contact Andrew Dewar on 1300 463 954 during the hours of 8.00am to 4.15pm Monday to Friday

Flood Level Information Table

Flood Event	Minimum Level (m AHD)	Maximum Level (m AHD)
PMF	32.43	42.37
1% AEP	39.43	39.65
5% AEP	39.55	39.55

This site falls outside the Flood Planning Area. Floodplain Development Controls do not apply for single occupancy or dual occupancy developments.

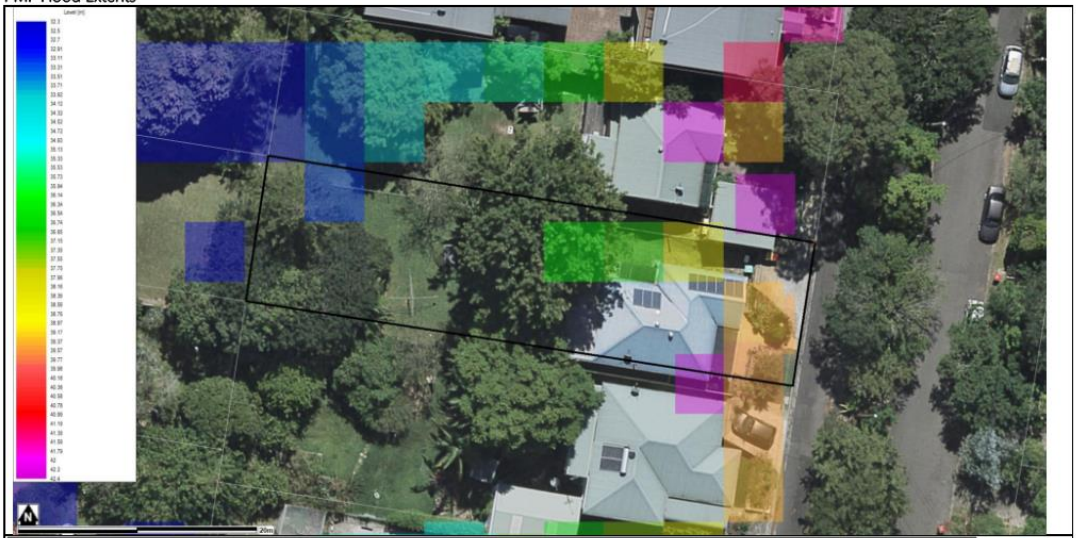
Planning Information Table

Flood Control Lot	☐
Minimum Habitable Floor Level	N/Am AHD
Complying Development: Flood Exclusionary Categories	
(a) Flood Storage Area	☐
(b) Floodway Area	☐
(c) Flow Path	☐
(d) High Hazard Area (H3, H4, H5, H6 Hazard Categorisation)	☐
(e) High Risk Area	☐

Central Coast Council
P 1300 463 954 I **E** ask@centralcoast.nsw.gov.au

Flood Information Certificate

PMF Flood Extents



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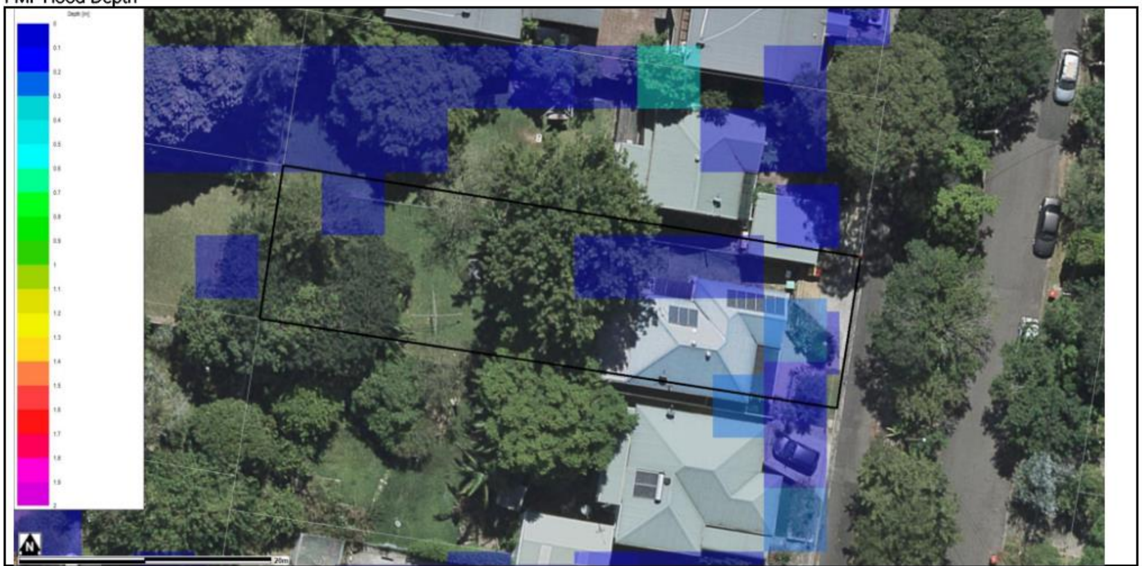
Flood Information Certificate

PMF Flood Depth



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Flood Information Certificate

1% AEP Flood Extents

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Flood Information Certificate

1% AEP Flood Depth

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Flood Information Certificate

1% AEP Hazard Categorisation

Flood Information Certificate

Hydraulic Categorisation

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Flood Information Certificate

Central Coast Council

Property Address:	**186 Gertrude St, NORTH GOSFORD**
Lot /DP:	24/DP1591
Date Prepared:	6 June 2022
Source of information:	Gosford CBD Local Overland Flow Flood Study, 2013

This Flood Certificate provides advice furnished in good faith by the council relating to the likelihood of the land identified above being flooded and to the nature or extent of any such flooding ("flood risk") .

Flood level and flood planning advice is provided in the tables below and as maps in the Appendix. This advice regarding flood risk has been derived from the flood study listed above. Should you have any enquiries concerning this certificate, please do not hesitate to contact Andrew Dewar on 1300 463 954 during the hours of 8.00am to 4.15pm Monday to Friday

Flood Level Information Table

Flood Event	Minimum Level (m AHD)	Maximum Level (m AHD)
PMF	32.43	43.11
1% AEP	32.43	38.05
5% AEP	34.04	34.04

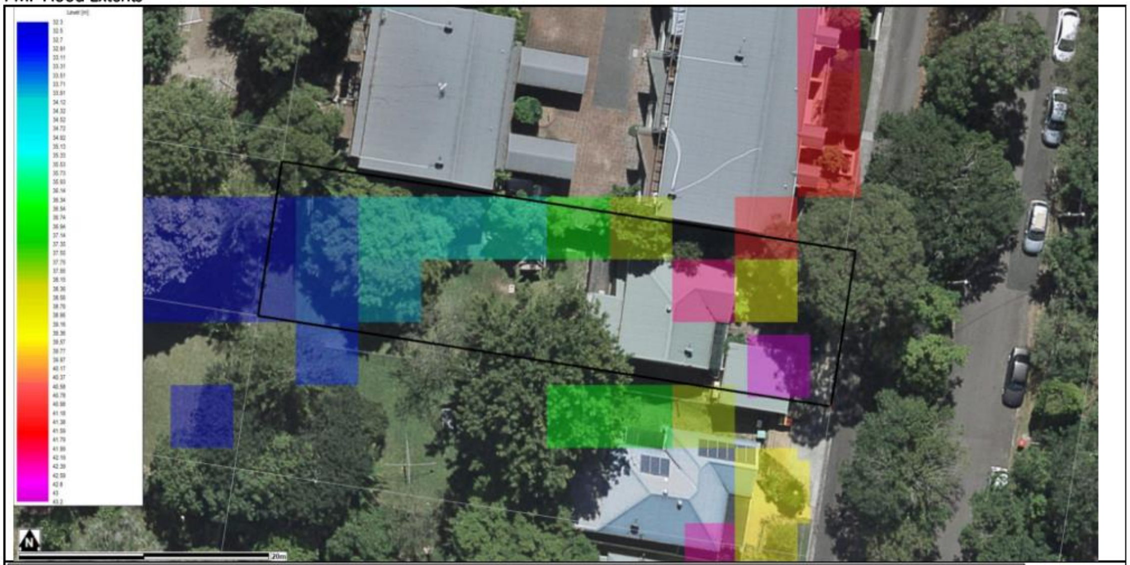
This site falls outside the Flood Planning Area. Floodplain Development Controls do not apply for single occupancy or dual occupancy developments.

Planning Information Table

Flood Control Lot	☐
Minimum Habitable Floor Level	N/Am AHD
Complying Development: Flood Exclusionary Categories	
(a) Flood Storage Area	☐
(b) Floodway Area	☐
(c) Flow Path	☐
(d) High Hazard Area (H3, H4, H5, H6 Hazard Categorisation)	☐
(e) High Risk Area	☐

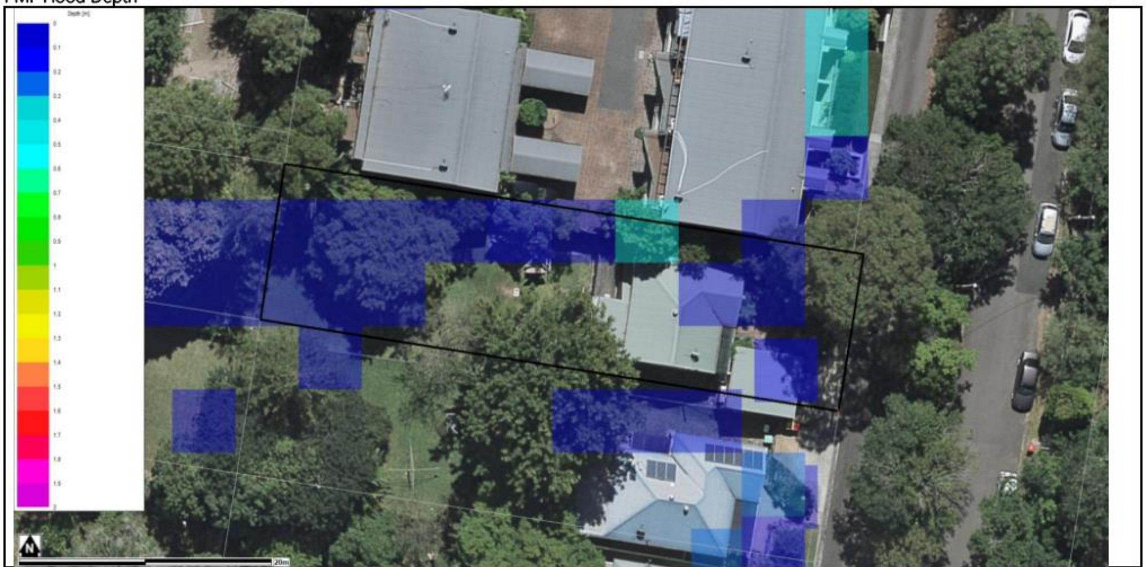
Flood Information Certificate

PMF Flood Extents



Flood Information Certificate

PMF Flood Depth



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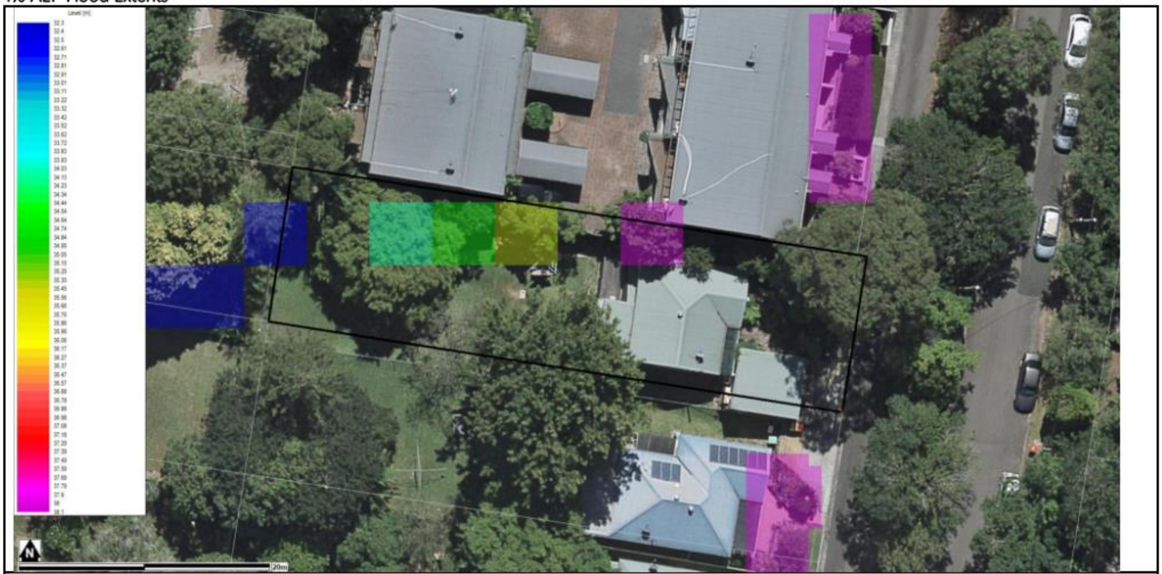
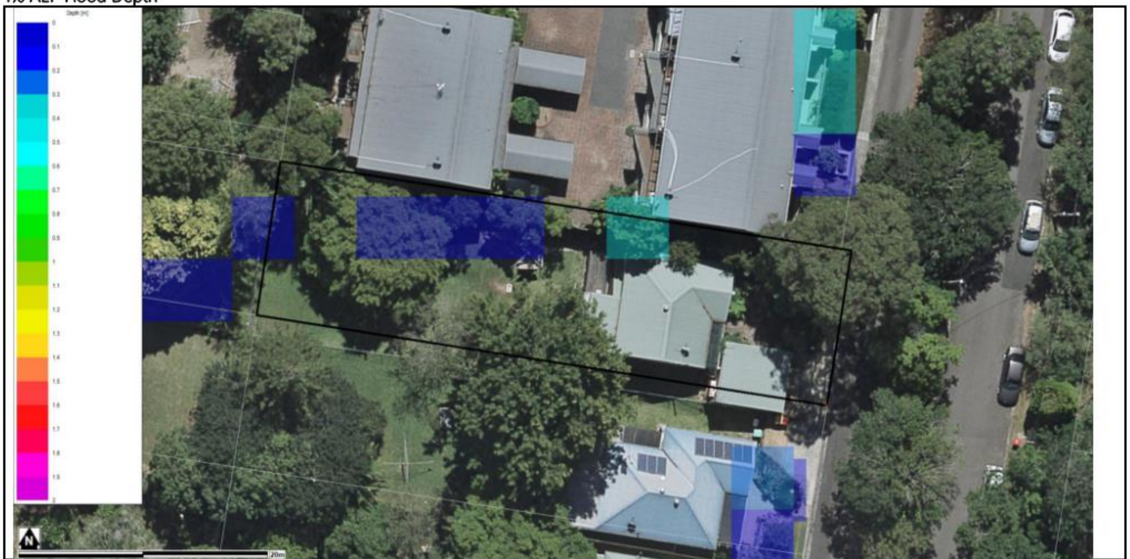
Flood Information Certificate

1% AEP Flood Extents



Flood Information Certificate

1% AEP Flood Depth



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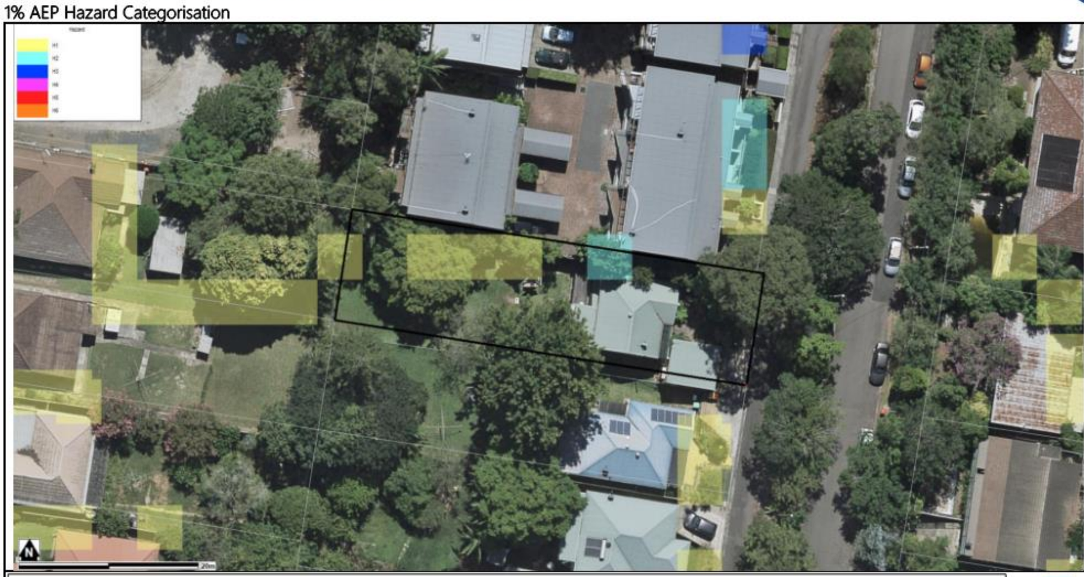
Flood Information Certificate

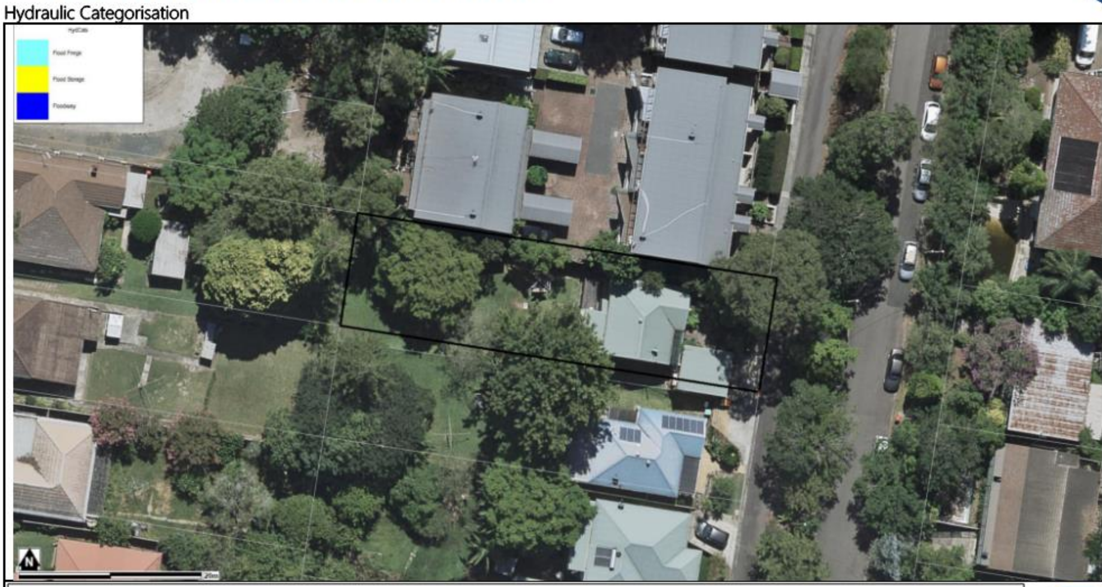
1% AEP Hazard Categorisation



DISCLAIMER

Flood Information Certificate

Hydraulic Categorisation



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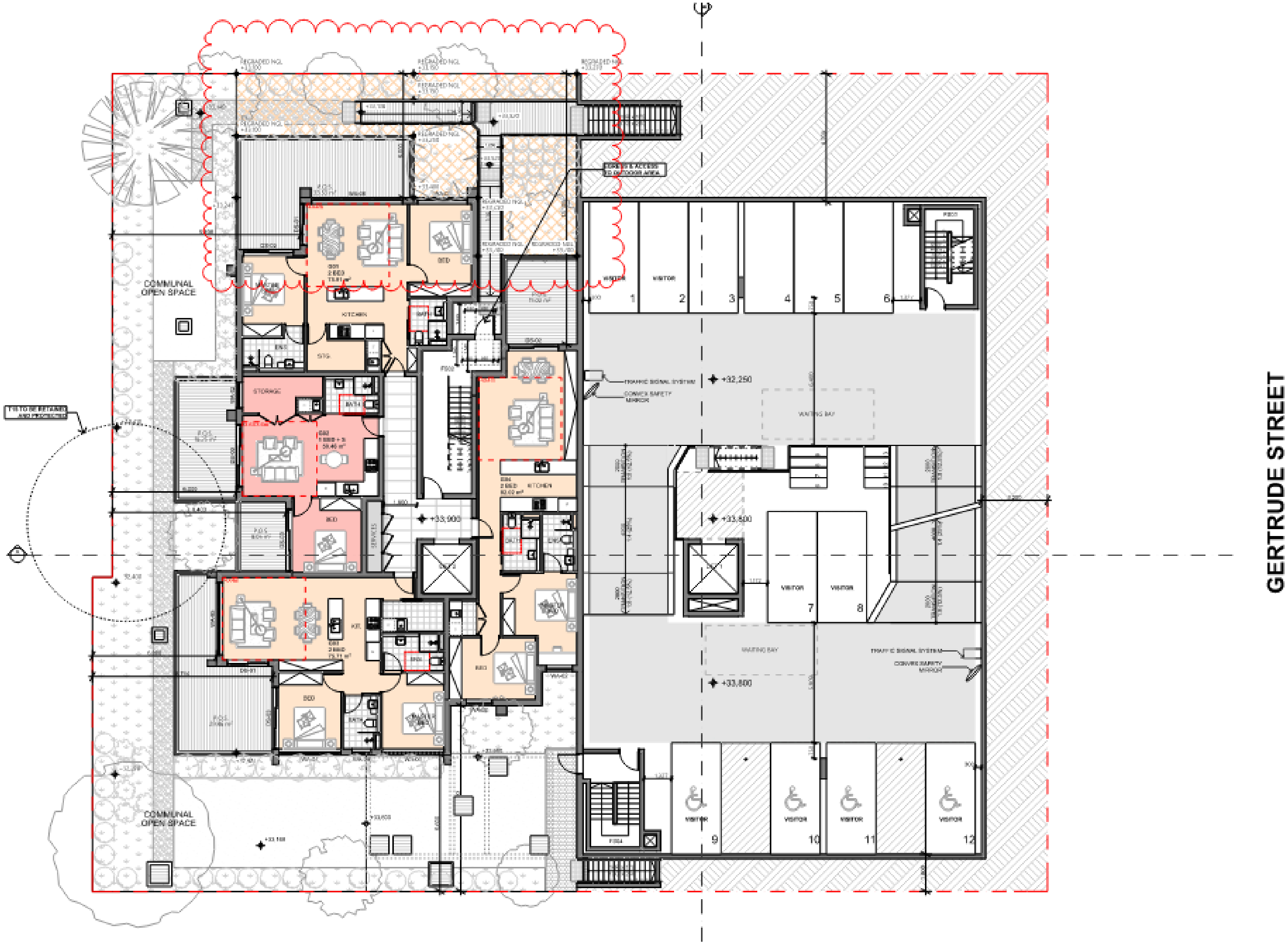
APPENDIX C

- ***Survey Plan* by *TSS Total Surveying Solutions' dated 02.02.2023***
- ***Architectural Plans by 'TEXCO DESIGN'***



SITE REGRADING AS PER FLOOD REPORT

NOTE
The Builder shall check all dimensions and levels on site prior to construction. Notify any errors, discrepancies or omissions to the architect. Refer to written dimensions only. Do not scale drawings. Drawings shall not be used for construction purposes until issued for construction. This drawing reflects a design by Texco Design Pty Ltd and is to be used only for work when authorised in writing by Texco Design Pty Ltd.

All boundaries and contours are subject to survey drawing. All levels to Australian Height Datum. It is the contractors responsibility to confirm all measurements on site and locations of any services prior to work on site.

Project Partners
Refer to consultant documentation when directed

- Builder	- #Builder
- Planning Consultant	- #Planning Consultant
- Structural Engineer	- #Structural Engineer
- Mechanical Engineer	- #Mechanical Engineer
- Hydraulic Engineer	- #Hydraulic Engineer
- Fire Engineer	- #Fire Engineer
- Fire Service	- #Fire Service
- Electrical Engineer	- #Electrical Engineer
- Landscape Designer	- #Landscape Consultant
- Traffic Engineer	- #Traffic Engineer
- Surveyor Consultant	- #Surveyor

Rev ID	Issue Date	Approved by	Rev. Note
A	[illegible]	TZ	ISSUE FOR SUBMISSION
B	[illegible]	TZ	ISSUE FOR SUBMISSION

Project Designer
TEXCO DESIGN
Nom Arch: NSW ARB 11348
P: +61 440 984 880
E: office@texcodesign.com.au

TRUE NORTH

Drawn | Checked	MC | TZ |
Revision Date:	20/02/2023
Project NO:	2201
Project Status	DA
Client	LINDFIELD GROUP
Site:	182-186 GERTRUDE ST NORTH GOSFORD
Climate Zone	5
Wind Region	A

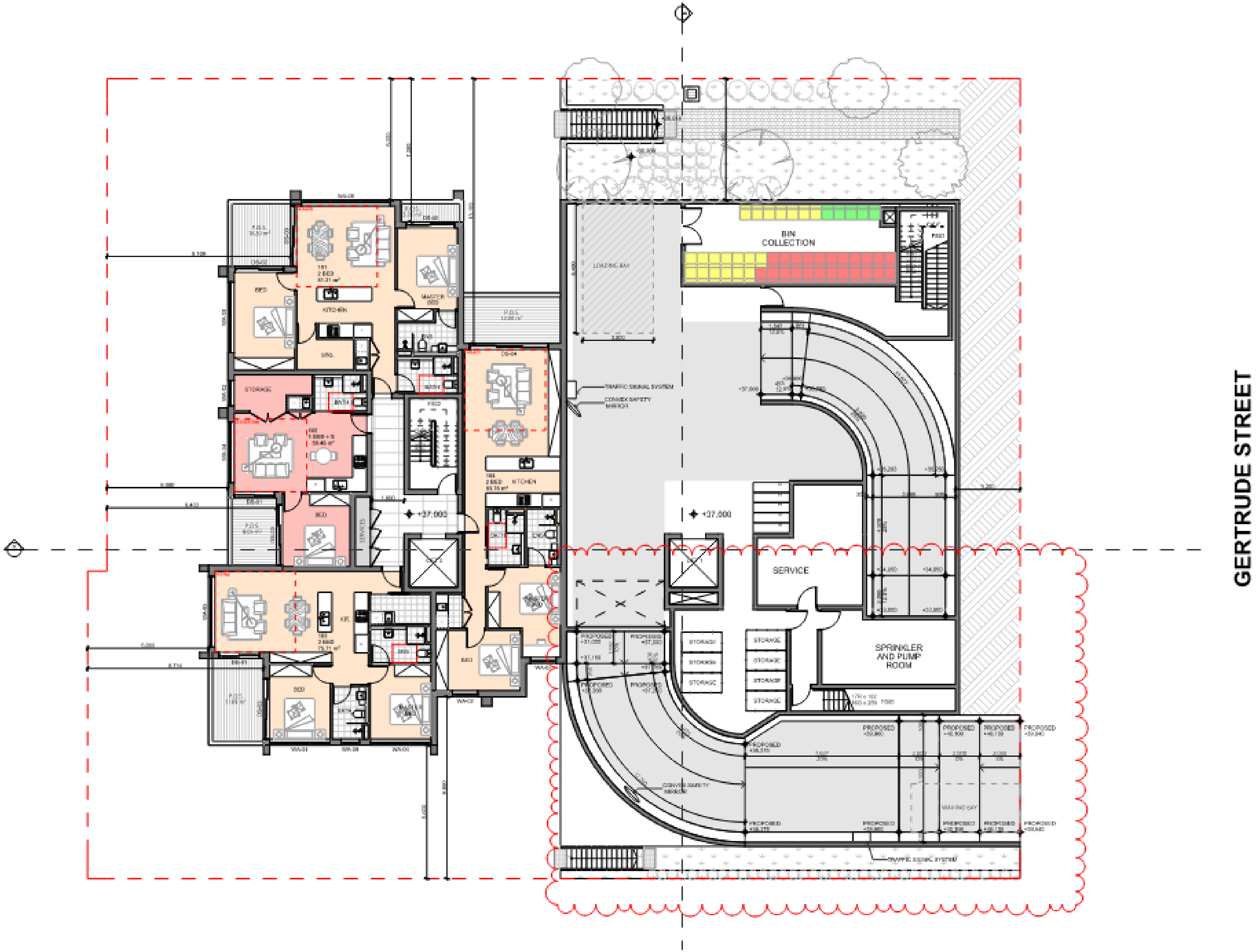
PAPER A3 1:200

DRAWING TITLE :
PLANS
GROUND FLOOR PLAN

PROJECT NAME :
182-186 GERTRUDE ST NORTH GOSFORD

REVISION NO. B

DRAWING NO. 103



NOTE
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Project Partners
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Rev.ID	Issue Date	Approved by	Rev. Note
A	[illegible]	TZ	ISSUE FOR SUBMISSION
B	[illegible]	TZ	ISSUE FOR SUBMISSION

Project Designer
TEXCO DESIGN
Nom.Arch: NSW ARB 11346
P: +61 440 084 880
E: office@texcodesign.com.au

N
TRUE NORTH

Drawn | Checked: MC | TZ |
Revision Date: 20/02/2023
Project NO: 2201
Project Status: DA

Client: LINDFIELD GROUP
Site: 182-186 GERTRUDE ST NORTH GOSFORD
Climate Zone: 5
Wind Region: A

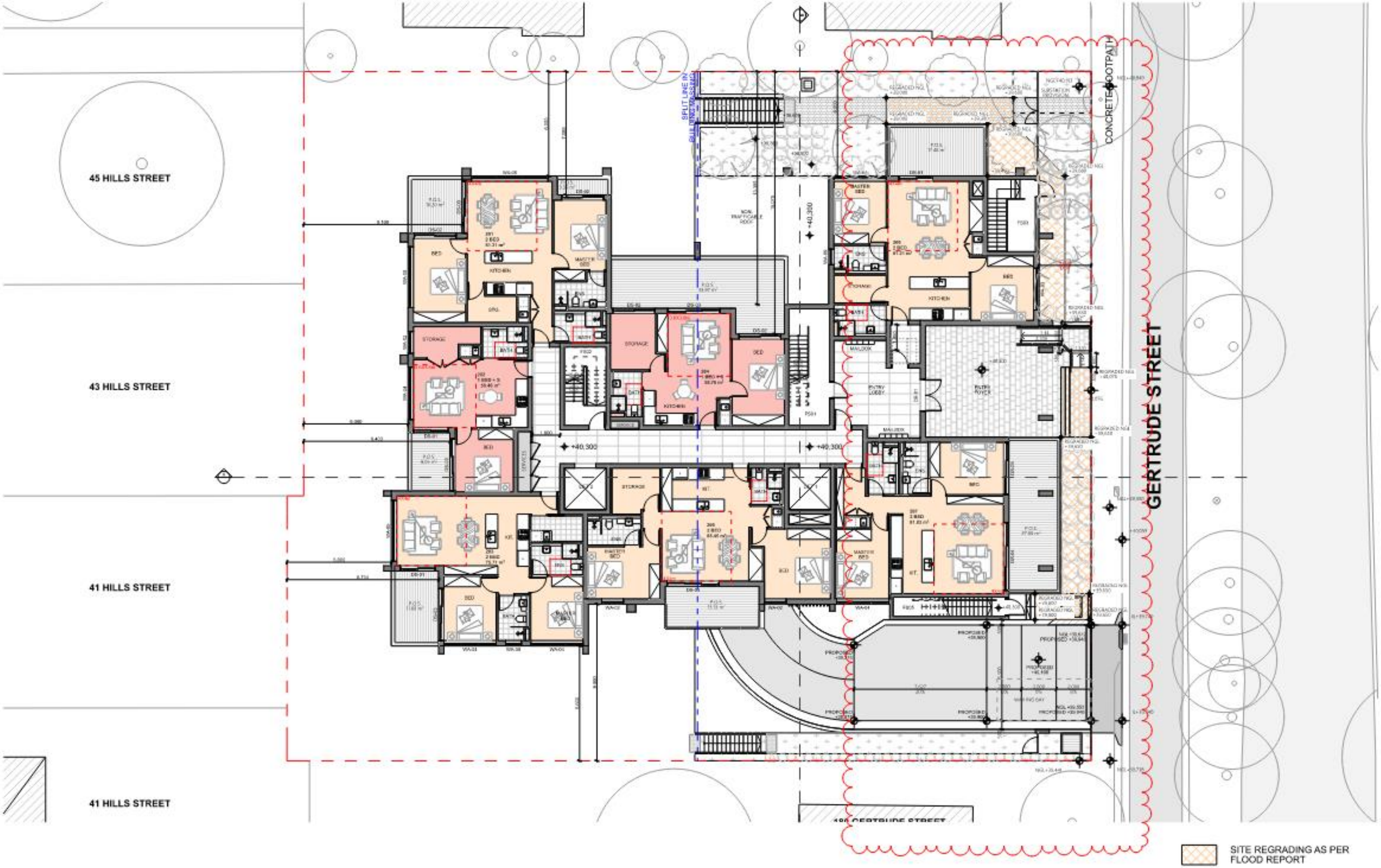
PAPER
A3
1:200

DRAWING TITLE :
PLANS
LEVEL 01 FLOOR PLAN

PROJECT NAME :
182-186 GERTRUDE ST NORTH GOSFORD

REVISION NO.
B

DRAWING NO.
104



NOTE

Project Partners

Project Designer

TEXCO DESIGN

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P: +61 440 084 880

TRUE NORTH

Drawn / Checked	MC | TZ |
Revision Date:	20/02/2023
Project NO.	2201
Project Status	DA
Client	LINDFIELD GROUP
Site:	182-186 GERTRUDE ST NORTH GOSFORD
Climate Zone	5
Wind Region	A

PAPER: A3 1:200

DRAWING TITLE:

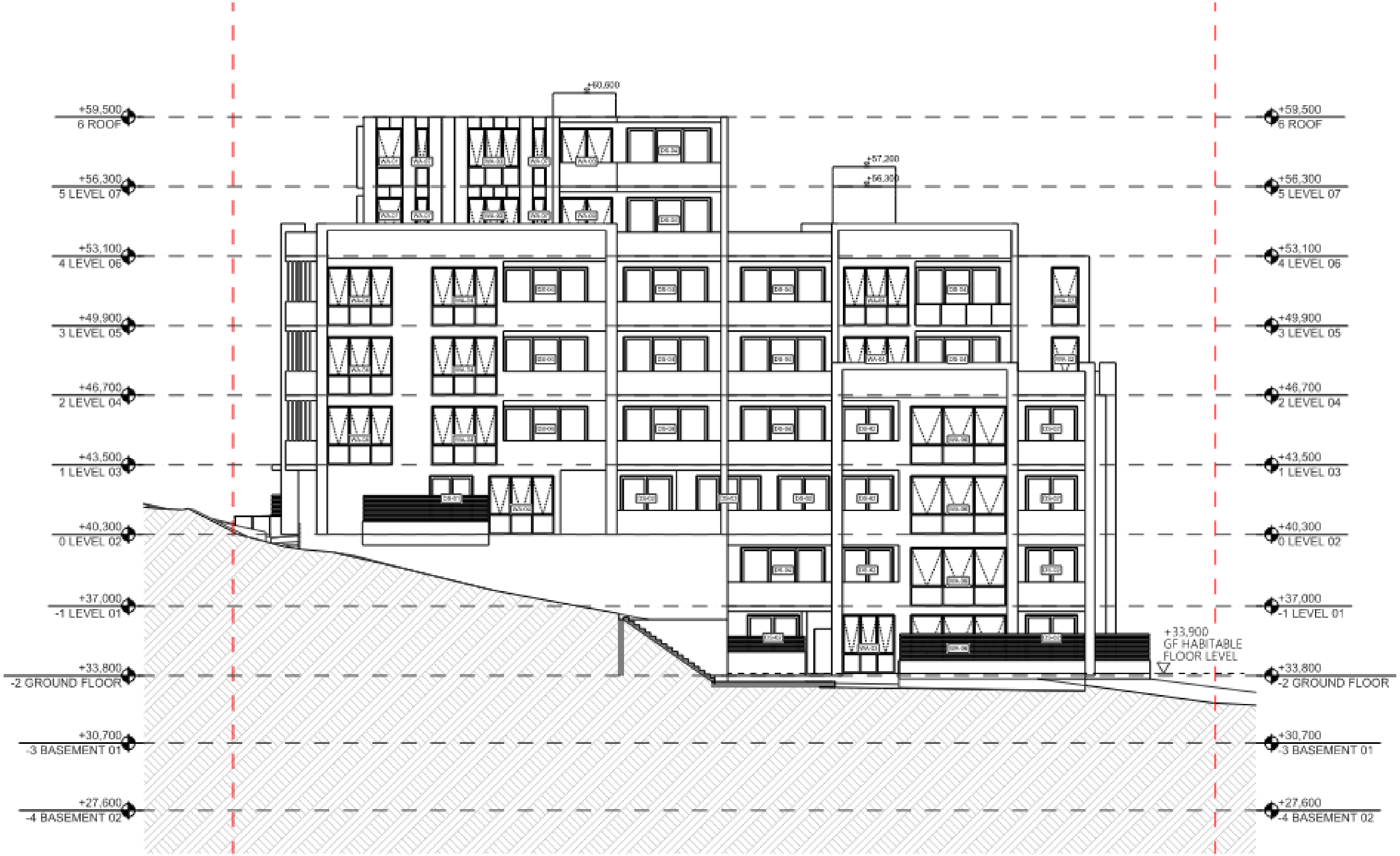
PLANS
LEVEL 02 FLOOR PLAN

PROJECT NAME:

182-186 GERTRUDE ST NORTH GOSFORD

REVISION NO: B

DRAWING NO: 105



NOTE
The Builder shall check all dimensions and levels on site prior to construction. Notify any errors, discrepancies or omissions to the architect. Refer to written dimensions only. Do not scale drawings. Drawings shall not be used for construction purposes until issued for construction. This drawing reflects a design by Texco Design Pty Ltd and is to be used only for work when authorised in writing by Texco Design Pty Ltd.

All boundaries and contours are subject to survey drawing. All levels to Australian Height Datum. It is the contractors responsibility to confirm all measurements on site and locations of any services prior to work on site.

All documents here within are subject to Australian Copyright Laws.

Project Partners
Refer to consultant documentation when directed

- Builder - #Builder
- Planning Consultant - #Planning Consultant
- Structural Engineer - #Structural Engineer
- Mechanical Engineer - #Mechanical Engineer
- Hydraulic Engineer - #Hydraulic Engineer
- Fire Engineer - #Fire Engineer
- Fire Service - #Fire Service
- Electrical Engineer - #Electrical Engineer
- Landscape Designer - #Landscape Consultant
- Traffic Engineer - #Traffic Engineer
- Surveyor Consultant - #Surveyor

Rev.ID	Issue Date	Approved by	Rev. Note
A	18/11/2022	TZ	ISSUE FOR SUBMISSION
B	27/02/2023	TZ	ISSUE FOR SUBMISSION

Project Designer

TEXCO DESIGN
Nom.Arch: NSW ARB 11349
E: office@texcodesign.com.au
P: +61 449 364 889

N
TRUE NORTH

Drawn | Checked	MC | TZ |
Revision Date:	27/02/2023
Project NO:	2201
Project Status	DA
Client	LINDFIELD GROUP
Site:	182-186 GERTRUDE ST NORTH GOSFORD
Climate Zone	5
Wind Region	A

PAPER
A3
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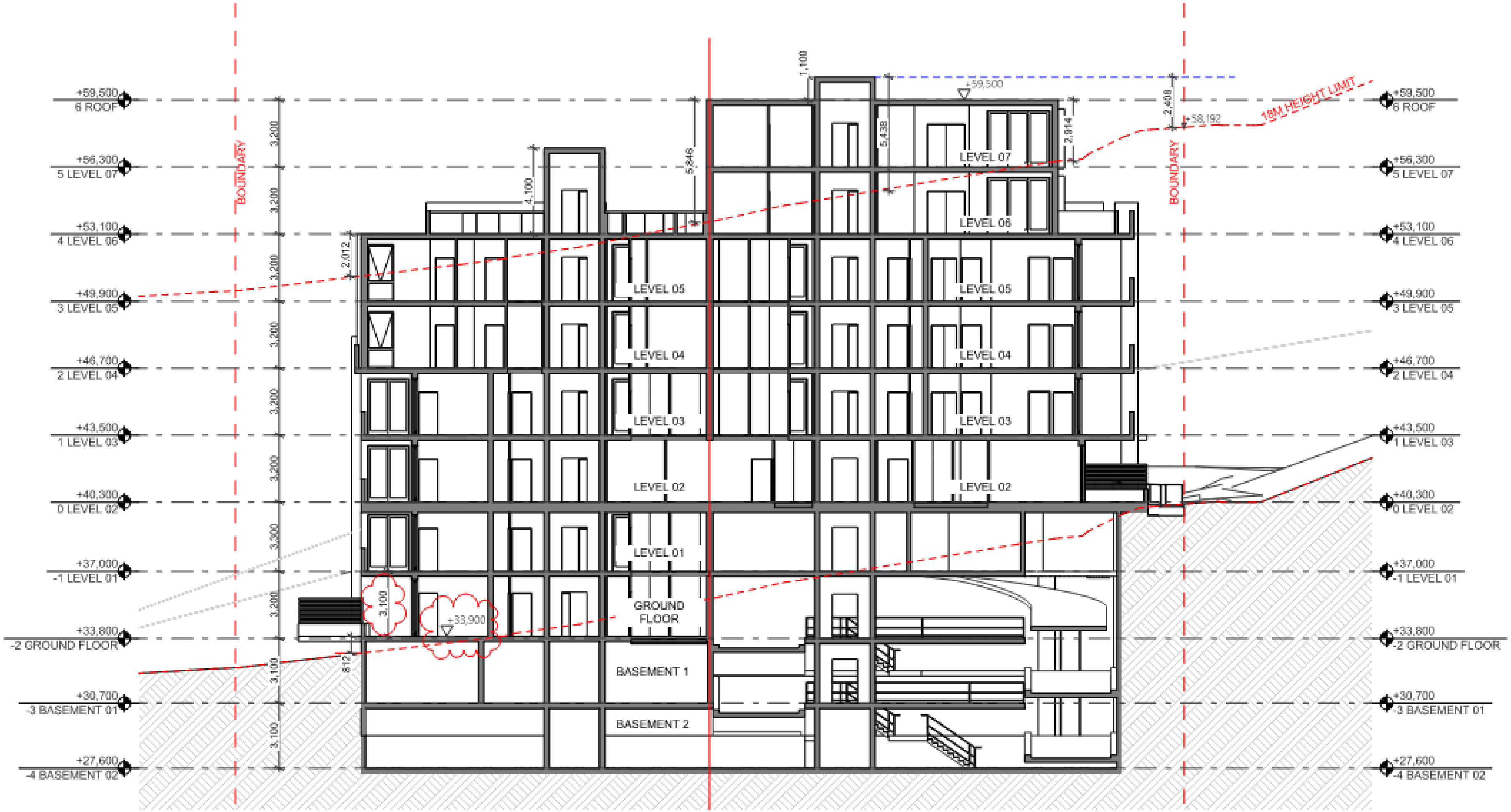
DRAWING TITLE :
ELEVATION
NORTH ELEVATION

PROJECT NAME :
182-186 GERTRUDE ST NORTH GOSFORD

REVISION NO.
B

DRAWING NO.
202



NOTE

Project Partners

Project Designer

TEXCO DESIGN

TRUE NORTH

Drawn | Checked	MC | TZ |
Revision Date:	20/02/2023
Project NO.	2201
Project Status	DA
Client	LINDFIELD GROUP
Site:	182-186 GERTRUDE ST NORTH GOSFORD
Climate Zone	6
Wind Region	A

PAPER
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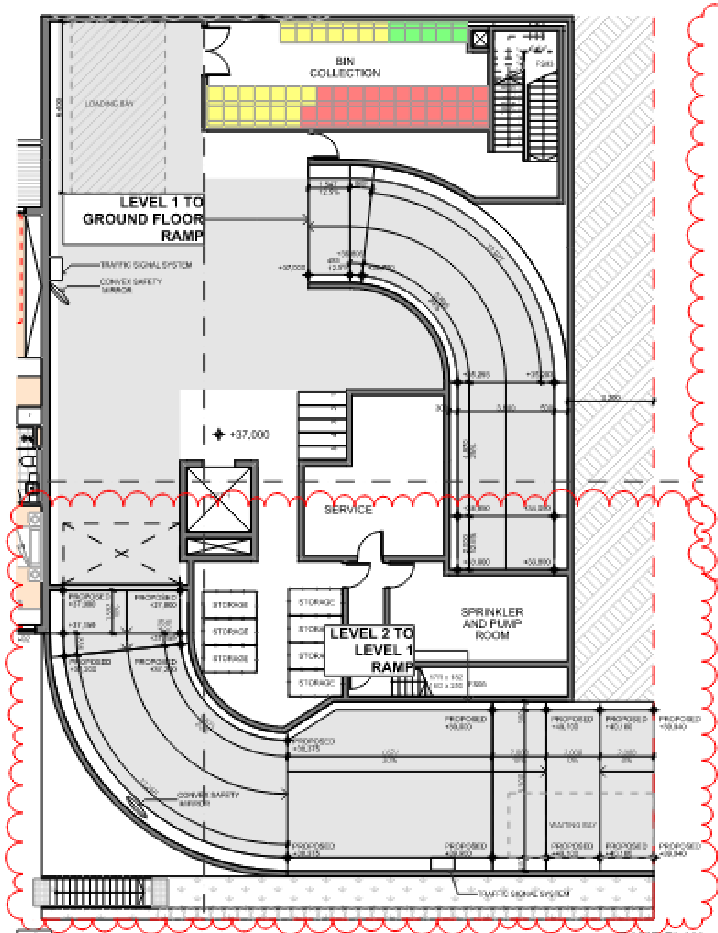
DRAWING TITLE :
SECTION
SECTION AA

PROJECT NAME :
182-186 GERTRUDE ST NORTH GOSFORD

REVISION NO.
B

DRAWING NO.
301



-1.
RAMP PLAN
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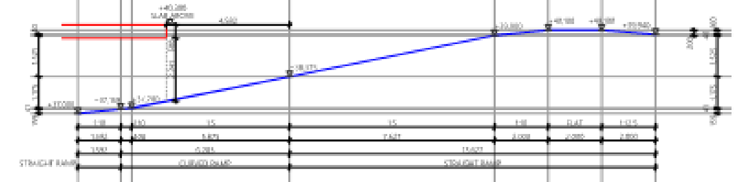
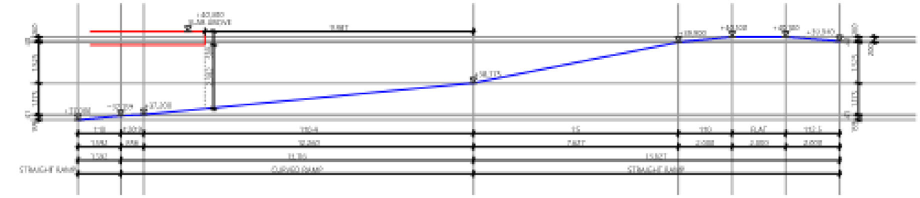
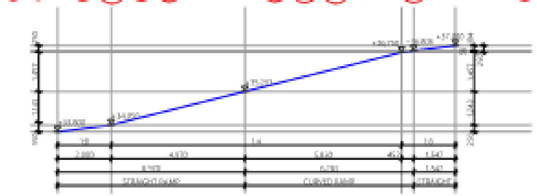


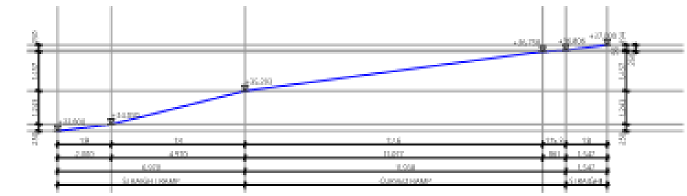
LEVEL 2 TO LEVEL 1 RAMP INNER CURVE
1:200



LEVEL 2 TO LEVEL 1 RAMP OUTER CURVE
1:200



LV1 TO GF RAMP INNER CURVE
1:200



LEVEL 1 TO GROUND FLOOR RAMP OUTERCURVE
1:200

NOTE

The Builder shall check all dimensions and levels on site prior to construction. Notify any errors, discrepancies or omissions to the architect. Refer to written dimensions only. Do not scale drawings. Drawings shall not be used for construction purposes until issued for construction. This drawing reflects a design by Texco Design Pty Ltd and is to be used only for work when authorised in writing by Texco Design Pty Ltd.

All boundaries and contours are subject to survey drawing. All levels to Australian Height Datum. It is the contractor's responsibility to confirm all measurements on site and locations of any services prior to work on site.

Project Partners

Refer to consultant documentation when directed

- Builder - #Builder
- Planning Consultant - #Planning Consultant
- Structural Engineer - #Structural Engineer
- Mechanical Engineer - #Mechanical Engineer
- Hydraulic Engineer - #Hydraulic Engineer
- Fire Engineer - #Fire Engineer
- Fire Service - #Fire Service
- Electrical Engineer - #Electrical Engineer
- Landscape Designer - #Landscape Consultant
- Traffic Engineer - #Traffic Engineer
- Surveyor Consultant - #Surveyor

Rev.ID	Issue Date	Approved by	Rev. Note
A	[illegible]	TZ	ISSUE FOR SUBMISSION
B	[illegible]	TZ	ISSUE FOR SUBMISSION

Project Designer

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TRUE NORTH

Drawn | Checked	MC | TZ |
Revision Date:	20/02/2023
Project NO.	2201
Project Status	DA
Client	LINDFIELD GROUP
Site:	182-186 GERTRUDE ST NORTH GOSFORD
Climate Zone	5
Wind Region	A

PAPER

A3

1:200

DRAWING TITLE :

DETAILS

ROLLOUT-RAMP SECTION

PROJECT NAME :

182-186 GERTRUDE ST NORTH GOSFORD

REVISION NO.

B

DRAWING NO.

511

NOTE

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- Mechanical Engineer - #Mechanical Engineer
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- Fire Service - #Fire Service
- Electrical Engineer - #Electrical Engineer
- Landscape Designer - #Landscape Consultant
- Traffic Engineer - #Traffic Engineer
- Surveyor Consultant - #Surveyor

Rev.O.	Issue Date	Approved by	Rev. Note
A	[illegible]	TZ	ISSUE FOR SUBMISSION
B	27/02/2023	TZ	ISSUE FOR SUBMISSION

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Drawn | Checked	MC | TZ |
Revision Date:	27/02/2023
Project NO.	2201
Project Status	DA
Client	LINDFIELD GROUP
Site:	182-186 GERTRUDE ST NORTH GOSFORD
Climate Zone	6
Wind Region	A

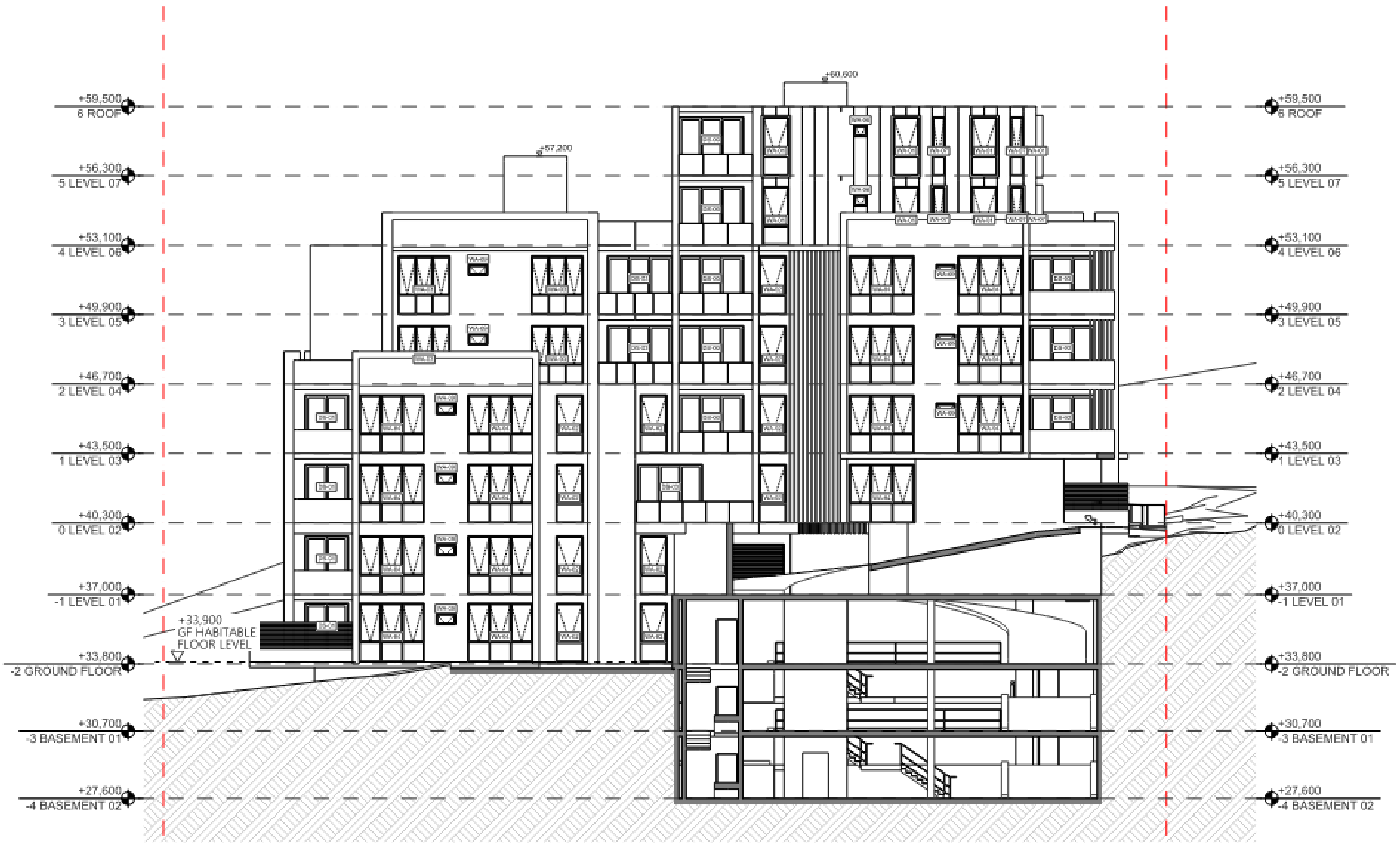
PAPER
A3
1:200

DRAWING TITLE :
ELEVATION
WEST ELEVATION

PROJECT NAME :
182-186 GERTRUDE ST NORTH GOSFORD

REVISION NO.
B

DRAWING NO.
203



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- Fire Engineer	- #Fire Engineer
- Fire Service	- #Fire Service
- Electrical Engineer	- #Electrical Engineer
- Landscape Designer	- #Landscape Consultant
- Traffic Engineer	- #Traffic Engineer
- Surveyor Consultant	- #Surveyor

Rev.ID	Issue Date	Approved by	Rev. Note
A	[illegible]	TZ	ISSUE FOR SUBMISSION
B	27/02/2023	TZ	ISSUE FOR SUBMISSION

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TRUE NORTH

Drawn | Checked	MG | TZ |
Revision Date:	27/02/2023
Project NO.	2201
Project Status	DA
Client	LINDFIELD GROUP
Site:	182-186 GERTRUDE ST NORTH GOSFORD
Climate Zone	5
Wind Region	A

PAPER
A3
1:200

DRAWING TITLE :
ELEVATION
SOUTH ELEVATION

PROJECT NAME :
182-186 GERTRUDE ST NORTH GOSFORD

REVISION NO.
B

DRAWING NO.
204

NOTE
The Builder shall check all dimensions and levels on site prior to construction. Notify any errors, discrepancies or omissions to the architect. Refer to written dimensions only. Do not scale drawings. Drawings shall not be used for construction purposes until issued for construction. This drawing reflects a design by Texco Design Pty Ltd and is to be used only for work when authorised in writing by Texco Design Pty Ltd.

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All documents here within are subject to Australian Copyright Laws.

Project Partners
Refer to consultant documentation when directed

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- Planning Consultant	#Planning Consultant
- Structural Engineer	#Structural Engineer
- Mechanical Engineer	#Mechanical Engineer
- Hydraulic Engineer	#Hydraulic Engineer
- Fire Engineer	#Fire Engineer
- Fire Service	#Fire Service
- Electrical Engineer	#Electrical Engineer
- Landscape Designer	#Landscape Consultant
- Traffic Engineer	#Traffic Engineer
- Surveyor Consultant	#Surveyor

Rev ID	Issue Date	Approved by	Rev. Note
A	[illegible]	TZ	ISSUE FOR SUBMISSION
B	27/02/2023	TZ	ISSUE FOR SUBMISSION

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Drawn | Checked	MC | TZ |
Revision Date:	27/02/2023
Project NO.	2201
Project Status	DA
Client	LINDFIELD GROUP
Site:	182-186 GERTRUDE ST NORTH GOSFORD
Climate Zone	5
Wind Region	A

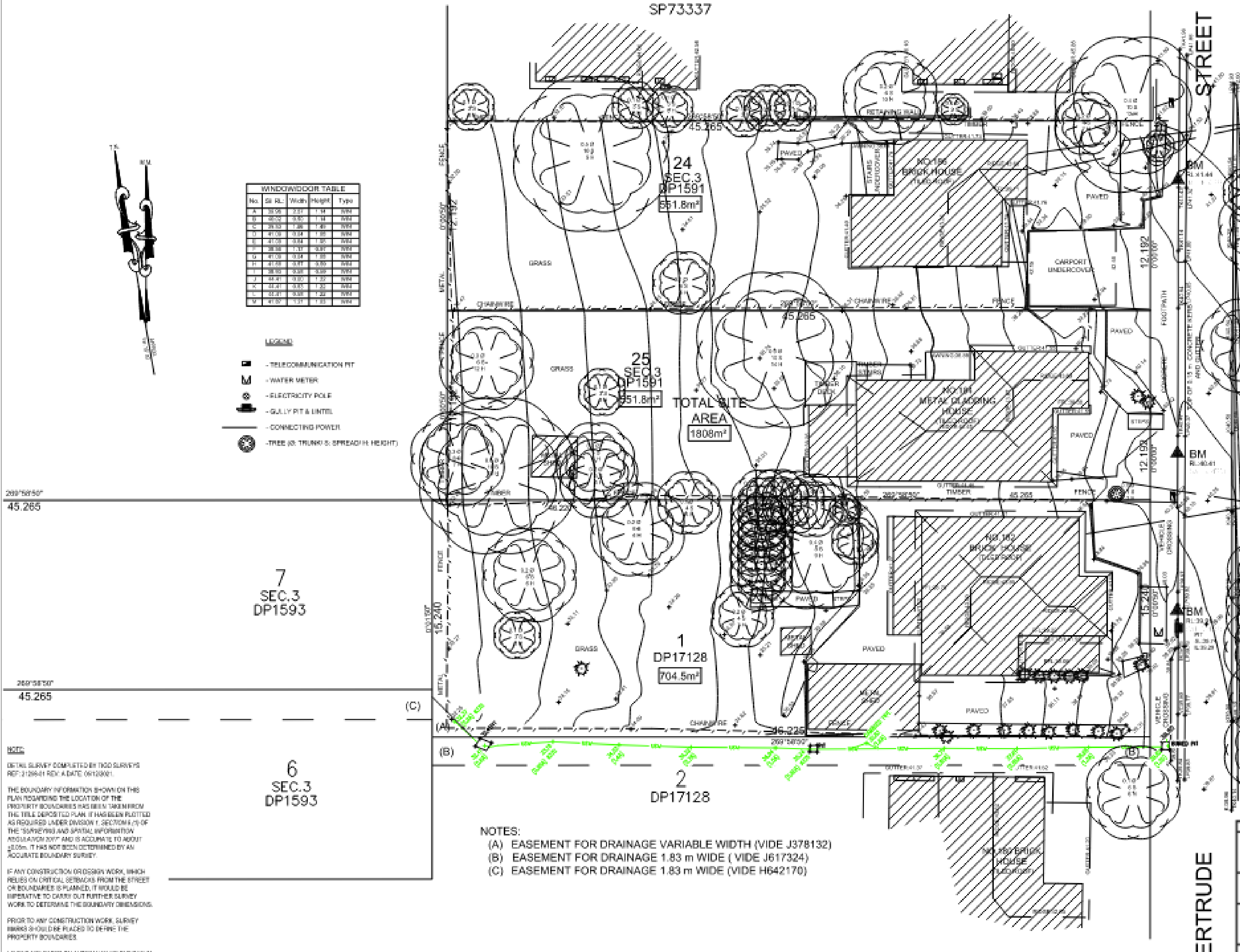
PAPER
A3
1:200

DRAWING TITLE :
ELEVATION
WEST ELEVATION

PROJECT NAME :
182-186 GERTRUDE ST NORTH GOSFORD

REVISION NO.
B

DRAWING NO.
203



BOUNDARIES HAVE NOT BEEN LOCATED BY SURVEY. THE BOUNDARIES SHOWN ON THIS PLAN HAVE BEEN TAKEN FROM THE TITLE DEPOSITED PLAN AND ARE APPROXIMATE RELATIVE TO THE DETAIL SURVEY.

DIAL BEFORE YOU DIG
www.1100.com.au

WINDOW/DOOR TABLE				
No.	Sill RL:	Width	Height	Type
A	39.56	2.57	1.14	WM
B	40.02	0.60	1.14	WM
C	39.53	1.96	1.40	WM
D	41.09	0.84	1.05	WM
E	41.09	0.84	1.05	WM
F	38.88	1.37	0.81	WM
G	41.09	0.84	1.05	WM
H	41.48	0.87	0.69	WM
I	38.93	0.88	0.89	WM
J	44.41	0.60	1.22	WM
K	44.41	0.83	1.22	WM
L	44.41	0.88	1.22	WM
M	41.57	1.37	1.03	WM

LEGEND

- TELECOMMUNICATION PIT
- WATER METER
- ELECTRICITY POLE
- GULLY PIT & LINTEL
- CONNECTING POWER
- TREE (Ø: TRUNK/ S: SPREAD/ H: HEIGHT)

NOTES:

(A) EASEMENT FOR DRAINAGE VARIABLE WIDTH (VIDE J378132)
(B) EASEMENT FOR DRAINAGE 1.83 m WIDE (VIDE J617324)
(C) EASEMENT FOR DRAINAGE 1.83 m WIDE (VIDE H642170)

NOTE:

DETAIL SURVEY COMPLETED BY TIGO SURVEYS REF: 21268-01 REV: A DATE: 06/12/2021.

THE BOUNDARY INFORMATION SHOWN ON THIS PLAN REGARDING THE LOCATION OF THE PROPERTY BOUNDARIES HAS BEEN TAKEN FROM THE TITLE DEPOSITED PLAN. IT HAS BEEN PLOTTED AS REQUIRED UNDER DIVISION 1, SECTION 6 (1) OF THE "SURVEYING AND SPATIAL INFORMATION REGULATION 2017" AND IS ACCURATE TO ABOUT ±0.05m. IT HAS NOT BEEN DETERMINED BY AN ACCURATE BOUNDARY SURVEY.

IF ANY CONSTRUCTION OR DESIGN WORK, WHICH RELIES ON CRITICAL SETBACKS FROM THE STREET OR BOUNDARIES IS PLANNED, IT WOULD BE IMPERATIVE TO CARRY OUT FURTHER SURVEY WORK TO DETERMINE THE BOUNDARY DIMENSIONS.

PRIOR TO ANY CONSTRUCTION WORK, SURVEY MARKS SHOULD BE PLACED TO DEFINE THE PROPERTY BOUNDARIES.

LEVELS ARE BASED ON AUSTRALIAN HEIGHT DATUM (AHD) ADOPTING BM ON SITE (NAIL IN KERB). SURVEY COMPLETED BY TIGO SURVEYS REF: 21268-01 REV: A DATE: 06/12/2021.

LEGEND
UNDERGROUND SERVICES

STORMWATER LINE	SW

Locating Quality Level Description	
Quality Level A	Visualisation/Confirmation of a service, position and depth, by non- destructive digging methods or points of entry to pits or manholes. Recommended Quality Level prior to construction or excavation.
Quality Level B	Locating of services using radio detection methods or ground penetrating radar. Acceptable range of accuracy for Quality Level B is 300mm for position and 500mm for depth.
Quality Level C	Services marked out using only surface features in the field. Surface features include hydrants, gas markers, pits etc. No indication of service location or depth can be attained from Quality Level C.
Quality Level D	Services marked out using DBYD plans only. Offsets on plans can be used to obtain such indication of services in field but no indication of service confirmation can be given from Quality Level D.

TSS TOTAL SURVEYING SOLUTIONS
LANE COVE | CAMDEN | MANLY VALE | CENTRAL COAST

REVISION No.	REVISION DATE:	COMMENT:

LEGEND:

EB - EDGE OF BITUMEN	TG - TOP OF GUTTER
EC - EDGE OF CONCRETE	RR - ROOF RIDGE
TB - TOP OF BANK	FL - FLOOR LEVEL
BB - BOTTOM OF BANK	INV - INVERT LEVEL
TW - TOP OF WINDOW	ELEC - ELECTRICAL PIT
BW - BOTTOM OF WINDOW	Ø/S/H - DIAMETER/SPREAD/HEIGHT

PLAN SHOWING UNDERGROUND SERVICES
OVER LOT 1 & 2 IN DP17128

CLIENT:	CIVIL SCAN	JOB No.: 230068	LGA: CENTRAL COAST
PROJECT:	NORTH GOSFORD	PLAN No.: 230068-1	DATUM: AHD
ADDRESS:	182/186 GERTRUDE STREET, NORTH GOSFORD	DATE: 02/02/2023	SCALE: 1:125@A1
		DRAWN: SC	
		CHK: RB	SHEET 1 OF 1