

1% AEP FLOOD STUDY

Client: Northern Beaches Essential
Services Accommodation

Property: Residential Boarding House Development
16 Wyatt Avenue, Belrose

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For and on behalf of ACOR Consultants Pty Ltd

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ANNEXURES

Annexure A	Bee & Lethbridge Survey Plan, 'Plan showing boundaries, relative heights & physical features over lots 2566 in D.P. 752038 known as No. 16 Wyatt Avenue, Belrose', Reference No. 11971, Revision 00, dated 12 th February 2021.
Annexure B	Platform Architects Architectural Plans, Reference WAB2, Sheets A0.02, A1.01 - A1.09, A2.01 - A2.05 & A3.01 - A3.06, Revision DA04, dated 17 th November 2021.
Annexure C	ACOR Flood Plans, Reference NSW210450, Sheets F1 to F4 (Revision 1, Dated 18 th May 2021), F10, F11, F13, F15, F16, F17, F20 and F21 (Revision 3, dated 2 nd December 2021).

1.0 Introduction

ACOR Consultants Pty Ltd (ACOR) has been commissioned to prepare a 1% AEP Flood Study in accordance with the requirements of the Warringah Development Control Plan 2011 Part C4 Stormwater and Part E11 Flood Prone Land, Northern Beaches Council Water Management for Development Policy and Warringah Local Environmental Plan 2000. The Flood Study investigates flood behaviour throughout the overland flooding catchment impacting the subject site. This includes the analysis of:

- Surface runoff across the catchment.
- Flooding towards the lower part of the catchment.
- Backwater flooding impact on the subject site.

A two-dimensional computer model of the catchment was established to analyse overland flood behaviour under existing and proposed catchment conditions. The model provides information on the extent of flood inundation, flood depths and flood velocities throughout the catchment for the 1% AEP overland flood event.

1.1 Objective

The objective of the study is to define local overland flooding in accordance with the Floodplain Development Manual (NSW DIPNR 2005) and Section 11 of the Northern Beaches Council Water Management for Development Policy. It involved the following steps:

- Attend the site to assess the anticipated extent and nature of flooding and identify hydraulic controls likely to impact on flooding behaviour.
- Develop a hydraulic model to determine 1% AEP flood levels, velocities, and provisional hazard categories.
- Review the hydraulic model to ascertain flood impacts on the proposed development at 16 Wyatt Avenue Belrose, and neighbouring properties.
- Provide recommendations to ensure that flood waters do not adversely impact the proposed boarding house development on 16 Wyatt Avenue, Belrose and neighbouring properties. This will be achieved with the inclusion of increased threshold levels provided by the proposed driveway and the design of flood management and diversion infrastructure.

In addition to this, the report and flood study has been undertaken with the approved flood study applicable to 14 Wyatt Avenue, Belrose in mind. Synergy between the two reports in both the pre - development and post - development scenarios has been taken into account.

1.2 Site Description

The subject site consists of the proposed development at 16 Wyatt Avenue, Belrose, and its neighbouring sites. In the pre-development condition, the site and neighbouring developments are primarily occupied for residential use, located along Wyatt Avenue and surrounding the intersection between Wyatt Avenue and Cotentin Road. A school and recreational parkland is also situated nearby. Dense bushland exists at the rear of the property, the majority of which drains into Fireclay Gully.

In the post-development condition, water is conveyed from the southeast to the northwest, over the intersection between Wyatt Avenue and Cotentin Road and through the rear boundary of 14 Wyatt Avenue into 16 Wyatt Avenue. Additionally, some flows are conveyed through the drainage swale located within 12 Wyatt Avenue, later combining with the roadway flows along the eastern boundary of 14 Wyatt Avenue.

A Childcare Facility has been approved on 12 Wyatt Avenue and 14 Wyatt Avenue has been approved for boarding houses. The proposed post development flood works accommodate for the pre and post development scenarios for both developments.

1.3 Flood Characteristics

In the post-development condition, the subject site is impacted by overland flows draining towards the bushland at the rear of the property and into Fireclay Gulley. The catchment upstream of the site is dominated by residential land use. Elevations within the upstream catchment are generally within the range of 155 m AHD to 197 m AHD.

The site is impacted by flooding during the 1% AEP flood event. The 1% AEP floodwater levels on the site are within the range of 155.10 m AHD to 175.60 m AHD, resulting in partial inundation of the site. Inundation depths vary between designated storage areas and overland areas, with flood depths in designated flood storage areas generally less than 0.80 m, and flood depths in overland areas located away from habitable and egress areas generally less than 0.50 m.

The 1% AEP floodwaters generally pose Low Hazard to occupants of the proposed development and its surrounding areas, with isolated pockets of Intermediate to High Hazard floodwaters located within the flood storage area and at the exit of the flood drainage culvert. Results of the flood modelling assuming a 50% blocked culvert are presented in sheets F10, F11, F13 and F20 (copy enclosed under Annexure C).

Flood characteristics assuming a 'worst case scenario' wherein the flood drainage culvert becomes 100% blocked are also presented in sheets F15, F16, F17 and F21 (copy enclosed under Annexure C). Inundation depths vary between designated storage areas and overland areas, with flood depths in designated flood storage areas generally at or above 1.64 m, and flood depths in overland areas located away from habitable and egress areas not negatively impacted when compared to the 50% blockage scenario, that is generally less than 0.50 m. The 1% AEP floodwaters generally pose Low Hazard to occupants of the proposed development and its surrounding areas, with isolated pockets of Intermediate to High Hazard floodwaters located within the flood storage area.

Discharge from neighbouring sites as well as upstream sites and roads have been taken into account in the modelling and reporting of the works. The proposed approved works on 14 Wyatt Avenue have not been modelled in the post development scenario, however, flood storage capacity on 16 Wyatt Avenue and discharge has been accommodated for using the 14 Wyatt discharge locations.

2.0 Available Data

Northern Beaches Council has informed ACOR that no existing flood study or information is available for this area. ACOR have been tasked to undertake this flood study and have used topographic, flooding and rainfall data obtained from a number of sources. The origin and types of information underpinning the assumptions used in this study are presented below.

2.1 Published Flood Data

There is currently no published flood data for the site. The acknowledgement of flooding of the site is pursuant to the absence of a formalised stormwater drainage system in the surrounding area.

2.2 Survey Data

Survey information adopted for this study has been collated from the following sources:

- ALS survey provided by the NSW Land and Property Information Department (NSW LPI).
- GIS layers of cadastre and satellite imagery provided by the NSW LPI.

2.3 Design Storm Event Data

This study uses design rainfall intensity-frequency-duration (IFD) data, derived for the latitude and longitude of the Northern Beaches LGA. This IFD data was issued by the Hydrometeorological Advisory Service of the Australian Bureau of Meteorology. The IFD data provides average rainfall intensities of design storm events for recurrence intervals up to and including the 1% AEP storm event.

Uniform areal distribution of design storms has been assumed for the catchment due to its small area. Rainfall depths and temporal patterns were developed for the 1% AEP design storm events using the Australian Rainfall and Runoff 2016 (ARR2016).

Estimated average design storm rainfall intensities for the full range of 1% AEP storm events considered are presented in Table 1.

Table 1: Average design rainfall intensities.

Duration	Intensity (mm/hr)	Duration	Intensity (mm/hr)
5 min	279	2 hour	52.0
10 min	224	3 hour	40.5
20 min	160	6 hour	27.3
30 min	127	12 hour	19.1
1 hour	81.4		

3.0 Hydrologic Modelling

Hydrologic modelling was undertaken within TUFLOW using the Direct Rainfall ('rainfall on the grid') methodology. In the hydraulic model, rainfall is applied directly to the 2D terrain, and the hydraulic model automatically routes the flow as determined by the elevation and roughness grids and any included 1D pipeline network.

Direct rainfall modelling is a relatively new feature of hydraulic modelling and it is still being tested on a number of catchments to ensure it is reliably representing the flood behaviour of a given catchment. Runoff is generated over the entire catchment, rather than the more traditional approach of calculating an inflow hydrograph and lumping this in at an assumed location(s). This 'direct rainfall' approach means the whole catchment will be 'wet' and the hydraulic modelling results need to be filtered to show only those cells that genuinely represent areas of catchment flooding. This was achieved by only mapping inundation at cells with a flood depth greater than 0.05 metres.

The design storm events applied to the catchment during the direct rainfall simulation are the design storm events described in Section 2.3. Direct rainfall was applied to the area indicated as 'Catchment' in Figure 1 (refer NSW210450/F1/1, copy enclosed under Annexure C).

4.0 Hydraulic Modelling

A TUFLOW 1D/2D model was used to hydraulically route flows through the catchment and to derive flow depths, velocities and hazards for the pre-development and post-development scenarios. This section describes the hydraulic modelling approach and hydraulic model development.

4.1 Choice of Hydraulic Model

Different hydraulic modelling approaches can be applied according to the floodplain's hydraulic characteristics and the objectives of the study. The simpler methods lump the left and right overbank floodplain areas and the main channel into a one-dimensional (1D) representation. This approach is relatively simple and computationally fast and is generally appropriate for modelling flows through pipe networks and straight sections of formed open channels. The main limitation of such 1D modelling approaches is that flow is assumed to occur in a linear direction, and the water levels across the floodplain are assumed to be at the same level as the main channel.

A more detailed two-dimensional (2D) approach is recommended in areas where significant differences can occur between the channel flood level and the floodplain flood levels. This approach is also preferable where separate flow paths and flow around catchment obstructions occur, as is the case in this study. This is a more complex analysis, which requires greater data requirements and computational resources.

The TUFLOW 1D/2D model was chosen to model the catchment hydraulics. This modelling system dynamically couples the one-dimensional and two-dimensional flow paths in the floodplain.

4.2 TUFLOW 1D Model Domain

The piped drainage network within the catchment was not represented in the TUFLOW model, as it was determined that the worst-case scenario involved the stormwater inlet structures becoming 100% blocked during the 1% AEP flood event. In the post-development scenario, culverts were added to the site to alleviate flooding and modelled with Council required blockage factors.

By not including piped flows external to the site, and letting the floodwaters flow via overland flow, we obtain an exacerbated flood level which given the appropriate analysis, will provide residents with a safer outcome.

4.3 TUFLOW 2D Model Domain

The 2D hydraulic model domain covers the area indicated as 'Catchment' in Figure 1 (refer NSW210450/F1/1, copy enclosed under Annexure C). A 1 metre square grid was utilised for this study. Each grid element contains information on ground topography (see Section 4.3.1), surface resistance to flow (see Section 4.3.4) and initial water level.

The grid cell size of 1 metre is considered to be sufficiently fine to appropriately represent the variations in floodplain topography and land use within the study area. It should be noted that TUFLOW samples elevation points at the cell centres, mid-sides and corners, as a consequence a 1 metre square cell size results in surface elevations being sampled every 0.5 m.

Linear features that potentially influence flow behaviour, such as gullies and levees were incorporated into the topography using 3D 'breaklines' to ensure that these were accurately represented in the model. It is noted that fences have not been explicitly incorporated into the model in urban areas unless deemed critical to the study and were instead considered in the setting of appropriate Manning's 'n' values for these areas.

4.3.1 Topography

A 1 m grid Digital Elevation Model (DEM) was generated for the catchment using ALS survey data. This DEM was used to represent ground elevations throughout the catchment.

Land use categories were assigned to areas of the catchment based on examination of aerial photography and satellite imagery. These land use categories were used to assign roughness and infiltration parameters during modelling. Further detail on the modelling of infiltration and catchments roughness is contained in Section 4.3.3 and Section 4.3.4 respectively.

4.3.2 Building Footprint

The footprints of buildings surrounding critical flow paths are modelled as blocked elements within the 2D domain. Building outlines were determined from aerial photographs and site survey, and the building footprint was removed from the 2D active domain.

In general, buildings far away from the subject site or far from critical flow paths were modelled as full obstructions.

4.3.3 Infiltration

Infiltration losses were modelled using an Initial Loss/Continuing Loss (IL/CL) infiltration model. Initial losses and continuing loss rates were defined for each land use category. The adopted loss parameters are presented in Table 2 in Section 4.3.4, alongside the roughness parameters, for each land use category.

4.3.4 Roughness

The hydraulic roughness of a material is an estimate of the resistance to flow and energy loss due to friction between a surface and the flowing water. A higher hydraulic roughness indicates more flow resistance; for example, a concrete path has a lower hydraulic roughness than a rough vegetated channel as water flows more freely over concrete than through a vegetated channel. Roughness in TUFLOW is modelled using the Manning's 'n' roughness co-efficient. Table 2 lists the adopted Manning's roughness for each land use.

Table 2: Adopted roughness and infiltration parameters.

Land use category	Initial loss (mm)	Continuing loss (mm/hr)	Manning's n
Road	0	0	0.020
Residential lots	5	6	0.150

4.4 Boundary Conditions

This section describes the boundary conditions imposed upon the model. Typical model boundary conditions include flows entering the model domain from upstream, backwater effects from hydraulic controls such as chokes and streams downstream, and the flow predicted through the model domain by a separate hydrologic model.

4.4.1 Direct Rainfall

A direct rainfall boundary condition was applied to the area indicated as 'Catchment' in Figure 1 (refer NSW210450/F1/1, copy enclosed under Annexure C). The direct rainfall method is described in Section 3.

4.4.2 Upstream Boundary

The use of direct rainfall and selected 2D model domain means hydrologic and hydraulic modelling commenced at the top of the catchment. As such, no upstream boundary conditions were applied. Upstream flows are included via the direct rainfall method instead.

4.4.3 Downstream Boundary

A stage-discharge (water level vs. flow) hydrograph was used as the downstream boundary condition of the TUFLOW model. The stage-discharge relationship is generated by TUFLOW by specifying a downstream boundary slope.

5.0 Flood Model Results

This section summarises the results of the hydrologic and hydraulic modelling of overland flows within the catchment. The 1% AEP flood event critical duration and peak flowrate through the catchment are presented. The behaviour of the 1% AEP floodwaters within the vicinity of the subject site are described in general terms, and the impact of flooding on the subject site is discussed.

5.1 Flood Model Validation

No Council modelling is currently obtainable at the date of this report.

5.2 Critical Duration

The design storm from Table 1 which produced the highest peak discharge through the site was selected as the critical duration storm event. The critical duration for the 1% AEP storm event is 10 minutes.

5.3 Design Peak Flood Flow

In the pre-development scenario, the 1% AEP peak flowrate passing through the site area where the proposed buildings are to be located is approximately 1.2 m³/s. Note the 1% AEP floodwaters enter the site via 14 Wyatt Avenue causing the discharge through the site and into the rear of the development as well as over the site boundary with 18 Wyatt Avenue before discharging into bushland at the rear of the properties.

5.4 Design Flood Characteristics

The flood velocity, flood depth, and provisional flood hazard of the 1% AEP flood event were mapped for the existing and proposed site conditions. The following flood maps are enclosed under Annexure C:

- Figure 1. Catchment Map & Model Boundary Condition (refer NSW210450/F1/1);
- Figure 2. 1% AEP Maximum Flood Depth – Pre-Development (refer NSW210450/F2/1);
- Figure 3. 1% AEP Maximum Flood Velocity – Pre-Development (refer NSW210450/F3/1);
- Figure 4. 1% AEP Maximum Flood Hazard – Pre-Development (refer NSW210450/F4/1);
- Figure 5. 1% AEP Maximum Flood Depth with 50% Blocked Culvert – Post-Development (refer NSW210450/F10/3);
- Figure 6. 1% AEP Maximum Flood Velocity with 50% Blocked Culvert – Post-Development (refer NSW210450/F11/3);
- Figure 7. 1% AEP Maximum Flood Hazard with 50% Blocked Culvert – Post-Development (refer NSW210450/F13/3);

- Figure 8. 1% AEP Maximum Flood Depth with 100% Blocked Culvert – Post-Development (refer NSW210450/F15/3);
- Figure 9. 1% AEP Maximum Flood Velocity with 100% Blocked Culvert – Post-Development (refer NSW210450/F16/3);
- Figure 10. 1% AEP Maximum Flood Hazard with 100% Blocked Culvert – Post-Development (refer NSW210450/F17/3);
- Figure 11. 1% AEP Maximum Flood Afflux Map with 50% Blocked Culvert – Post-Development (refer NSW210450/F20/3)
- Figure 12. 1% AEP Maximum Flood Afflux Map with 100% Blocked Culvert – Post-Development (refer NSW210450/F21/3)

The 1% AEP flood level in the vicinity of the site is within the range of 155.10 m AHD to 175.60 m AHD, with depths of less than 0.80 m in the scenario where the flood drainage culvert is 50% blocked.

Flood waters enter the site from 14 Wyatt Avenue and the frontage of 16 Wyatt Avenue, flows are then guided to a proposed flood storage area located between the pedestrian pathway and the eastern site boundary. A culvert to relieve the flood storage area is then provided to cater for the 1% AEP flood event. A proposed floodwall is introduced to the inside edge of the driveway along the eastern boundary (refer to ACOR Consultants Stormwater Plans - NSW210450 C1.01 – C7.01) to provide protection and guidance to the neighbouring and proposed buildings.

Inundation is largely confined to the drainage depression and driveway servicing the lower building, with floodwaters also flowing between the two proposed building blocks in a drainage depression after leaving the flood storage area through the culvert.

The 1% AEP floodwater velocities are generally between 0.5 – 2.0 m/s, which, whilst high, are in accordance with pre-development conditions and are largely attributed to the steepness of the natural site topography.

The proposed development results in a minimal increase in flood levels external to the site. A change in flood level of less than 0.02 m occurs external to the site which is considered within the acceptable model tolerance.

5.5 Provisional Flood Hazard

The degree of Provisional Hazard attributed to flooding at the subject site is a function of Hydraulic Hazard (relating to the depth and velocity of floodwaters) and is adjusted to account for the following factors:

- Size of flood;
- Effective warning time;
- Flood awareness;

- Rate of rise of floodwater;
- Duration of flooding;
- Evacuation problems;
- Effective flood access; and
- Type of development.

Hazard categories are defined as either high, intermediate or low and are based on the guidelines outlined in the Floodplain Development Manual (NSW DIPNR 2005), in particular Figure L.2.

Hazard categories on site include Low to High flood hazards. Generally, locations of intermediate to high hazard are sparingly situated outside of habitable and trafficable areas. 1% AEP floodwaters generally pose Low Hazard to occupants of 16 Wyatt Avenue, Belrose.

5.6 Flood Affection of the Site

The site is impacted by flooding during the 1% AEP flood event, with 1% AEP floodwater levels within the range of 155.10 m AHD to 175.60 m AHD, resulting in partial inundation of the site. Inundation depths vary greatly by location. Building 1 (southern building / upper building) is not affected by flood waters during the 1% AEP flood event. The building is protected by driveway levels that exceed the closest overland flow on site. The driveway entrance to Building 2 (northern building / lower building) will be protected by an extended floodwall running along the inner edge of the driveway servicing Building 2, which is proposed to be at a height of 0.5 m above the 1% AEP flood level.

The PMF flood event was not modelled. PMF floodwater velocities and hazards are not presented in this flood study.

A flood planning level (FPL) for the eastern edge of Building 2 is governed by a decreasing flood wall that is always providing 0.5 m freeboard and appropriate protection to inhabitants. The flood planning level for the ground floor of Building 2 is to be set at 170.90 m AHD plus 0.50 m freeboard (that is 171.40 m AHD). The ground floor FFL is required to be set at or above the FPL.

The proposed Building 2 (northern building / lower building) will receive protection to the internal habitable floor levels via the inclusion of proposed flood walls. These flood walls are to be constructed at 0.5 m above the 1% AEP running adjacent to the lower edge of the proposed driveway.

6.0 Flood Risk Management

Based on the foregoing, we offer the following response having due regard for the requirements of the Warringah Development Control Plan 2011 Part C4 Stormwater and Part E11 Flood Prone Land, Northern Beaches Council Water Management for Development Policy, Warringah Local Environmental Plan 2000 Part 6.3 and the Floodplain Development Manual (NSW DIPNR 2005).

6.1 Flood Levels

The proposed Building 2 (northern building / lower building) will receive protection to the internal habitable floor levels via the inclusion of proposed flood walls. These flood walls are to be constructed at 0.5 m above the 1% AEP running adjacent to the lower edge of the proposed driveway. The ground floor FFL is required to be set at or above the FPL.

6.2 Building Components and Method

All building components below the 1% AEP flood level are to be constructed from flood compatible building materials. However, due to the mitigation nature of this development, it is proposed that flood walls constructed to the 1% AEP flood level plus 0.5 m freeboard will provide adequate protection to the proposed development. Suitable wall structure materials include solid brickwork, blockwork, concrete, timber stud walls constructed from Class 1 (highly durable), Class 2 (durable) or H3 treated timber.

Extensive guidance on flood compatible building materials and methods is provided in 'Reducing Vulnerability of Buildings to Flood Damage: Guidance on Building in Flood Prone Areas' (HNFMSC 2006).

The existing location of the 50 kL rainwater tank is positioned within the proposed flood storage area. The tank is proposed to be relocated to the opposite side of the pedestrian pathway to ensure it is kept clear from floodwaters and for easier rainwater connection into the downpipes of Building 2 (Refer to ACOR Consultants Stormwater Plans - NSW210450 C1.01 – C7.01).

6.3 Structural Soundness

Proposed flood walls and culvert works should be capable of withstanding the forces of the 1% AEP floodwaters, including hydrostatic, hydrodynamic, debris impact and buoyancy forces.

Due to the nature of the proposed works including concreting, it is unlikely that structural soundness will be required. Any slabs should be designed to be capable of withstanding the forces imposed by the 1% AEP floodwaters, including hydrostatic, hydrodynamic, debris impact and buoyancy forces. The concrete design should be certified by a practicing Structural Engineer.

6.4 Fencing

Due to the flooded nature of the site, a mixture of light / open style fences and solid flood walls must be provided around all boundaries as noted on Civil and Architectural drawings to provide a safe passage for floodwaters.

6.5 Evacuation

The proposed boarding house provides multiple levels above the ground level where evacuation can be facilitated. Floor levels of 173.49 m AHD are available on the first floor of the dwelling which would provide adequate shelter in place scenarios for Building 2 (northern building / lower building).

We also note that low hazard access is available from the proposed driveway exiting the site during the 1% AEP flood events.

In the event that the 1% AEP flood event is expected to be exceeded, strategies should be adopted in accordance with NSW Government operational guidelines and NSW SES Emergency Evacuation operational guidelines.

7.0 Conclusion

The selection and development of the 1% AEP flood model has been described in Sections 2 to 4 of this report. Flood modelling results were presented and discussed in Section 5. Flood risk management measures are described in Section 6.

The subject site (16 Wyatt Avenue, Belrose) is subject to overland flooding. It has been confirmed through the flood study undertaken, that flood waters enter 16 Wyatt Avenue through the boundary of 14 Wyatt Avenue and drain towards the bushland at the rear of the property and into Fireclay Gulley.

The site is impacted by flooding during the 1% AEP flood event, with 1% AEP floodwater levels within the range 155.10 m AHD to 175.60 m AHD, resulting in partial inundation of the site. Inundation depths are generally less than 0.80 m and located clear of habitable areas and egress pathways.

Floodwaters which enter the site are guided to a proposed flood storage area behind the rear boundary of 14 Wyatt Avenue where they reach depths generally between 0.50 m and 0.80 m. A culvert is then provided to relieve the flood storage area and cater for the 1% AEP flood event.

The 1% AEP floodwaters promote varied hazard categories on site, including Low to High flood hazards. Generally, locations of intermediate and high hazard are situated outside of habitable and trafficable areas. 1% AEP floodwaters generally pose Low Hazard to occupants of 16 Wyatt Avenue, Belrose. The 1% AEP peak flowrate passing through the part of the site where the proposed buildings are to be located is approximately 1.2 m³/s.

ACOR proposes flood management and diversion infrastructures in order to provide residents of 16 Wyatt Avenue with appropriate protection from flood waters. These have been documented in ACOR Consultants Stormwater Plans (NSW210450 C1.01 – C7.01).

It has been demonstrated through site specific flood study that the proposed development results in minimal increase of flood levels external to the site. A change in flood level of less than 0.02 m occurs external to the site which is considered within acceptable model tolerance.

Based on the forgoing, we are of the view the proposed works generally meets the intent of the provisions for sites affected by flooding outlined within Warringah Development Control Plan 2011 Part C4 Stormwater and Part E11 Flood Prone Land and Northern Beaches Council Water Management for Development Policy.

8.0 References

Northern Beaches Council. (2011). *Warringah Development Control Plan 2011*.

Northern Beaches Council. (2000). *Warringah Local Environmental Plan 2000*.

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New South Wales Department of Infrastructure, Planning and Natural Resources (NSW DIPNR). (2005). *Floodplain Development Manual: the management of flood liable land*.

Pilgrim D H (Ed.). (1998). *Australian Rainfall and Runoff*. Institution of Engineers Australia. Barton ACT.

9.0 Glossary

Terminology in this Glossary has been derived or adapted from the Floodplain Development Manual (NSW DIPNR 2005), where appropriate.

Annual Exceedance Probability (AEP)	The chance of a flood of a given or larger size occurring in any one year, expressed as a percentage.
Australian Height Datum (AHD)	A common national surface level datum approximately corresponding to mean sea level.
Average recurrence interval (ARI)	The long-term average number of years between the occurrence of a flood as big as or larger than the selected event.
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.
Design flood	A flood event to be considered in the design process.

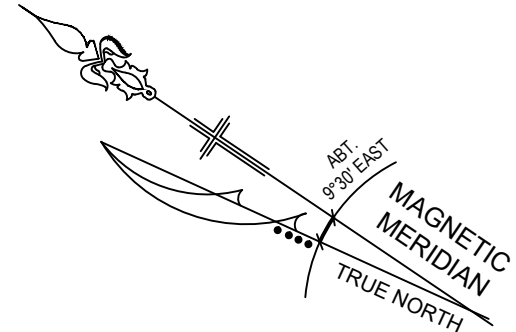
Flood	Relatively high stream flow which overtops the natural or artificial banks in any part of a stream, river, estuary, lake or dam, and/or local overland flooding associated with major drainage before entering a watercourse, and/or coastal inundation resulting from super-elevated sea levels and/or waves overtopping coastline defences excluding tsunami.
Flood hazard	A measure of the floodwaters potential to cause harm or loss. Full definitions of hazard categories are provided in Appendix L of the Floodplain Development Manual (NSW Government, 2005). In summary: • High: conditions that pose a possible danger to personal safety; evacuation by trucks difficult; able-bodied adults would have difficulty wading to safety; potential for significant structural damage to buildings. • Low: conditions such that people and their possessions could be evacuated by trucks; able-bodied adults would have little difficulty wading to safety.
Flood planning area	The area of land below the FPL and thus subject to flood related development controls.
Flood planning levels (FPLs)	Combinations of flood levels (derived from significant historical flood events or floods of specific ARIs) and freeboards selected for floodplain risk management purposes, as determined in management studies and incorporated in management plans.
Floodplain, flood-prone land	Land susceptible to inundation by the probable maximum flood (PMF) event, i.e. the maximum extent of flood liable land.
Floodplain risk management options	The measures that might be feasible for the management of a particular area of the floodplain.

Freeboard	Provides reasonable certainty that the risk exposure selected in deciding on a particular flood chosen as the basis for the FPL is actually provided. It is a factor of safety typically used in relation to the setting of floor levels, levee crest levels, etc. (See Section K5 of Floodplain Development Manual).
Geographical information systems (GIS)	A system of software and procedures designed to support the management, manipulation, analysis and display of spatially referenced data.
Hydraulics	The term given to the study of water flow in a river, channel or pipe, in particular, the evaluation of flow parameters such as stage and velocity.
Hydraulic category	A classification of floodwater hydraulic behaviour. The categories are: • Floodway: those areas of the floodplain where a significant discharge of water occurs during floods. They are often aligned with naturally defined channels. Floodways are areas that, even if only partially blocked, would cause a significant redistribution of flood flow, or a significant increase in flood levels. • Flood storage: those parts of the floodplain that are important for the temporary storage of floodwaters during the passage of a flood. Loss of flood storage can increase the severity of flood impacts by reducing natural flood attenuation. • Flood fringe: remaining area of flood-prone land after floodway and flood storage areas have been defined
Hydrograph	A graph that shows how the discharge changes with time at any particular location.
Hydrology	The term given to the study of the rainfall and runoff process as it relates to the derivation of hydrographs for given floods.
Local overland flooding	Inundation by local runoff rather than overbank discharge from a stream, river, estuary, lake or dam.

Mainstream flooding	Inundation of normally dry land occurring when water overflows the natural or artificial banks of a stream, river, estuary, lake or dam.
Peak discharge	The maximum discharge occurring during a flood event.
Probable maximum flood (PMF)	The PMF is the largest flood that could conceivably occur at a particular location.
Probable Maximum Precipitation (PMP)	The PMP is the greatest depth of precipitation for a given duration meteorologically possible over a given size storm area at a particular location.
Probability	A statistical measure of the expected frequency or occurrence of flooding.
Risk	Chance of something happening that will have an impact. It is measured in terms of consequences and likelihood. For this study, it is the likelihood of consequences arising from the interaction of floods, communities and the environment.
Runoff	The amount of rainfall that actually ends up as stream or pipe flow, also known as rainfall excess.

ANNEXURE A

Bee & Lethbridge Survey Plan, 'Plan showing boundaries, relative heights & physical features over lots 2566 in D.P. 752038 known as No. 16 Wyatt Avenue, Belrose', Reference No. 11971, Revision 00, dated 12th February 2021.



NOTES:

- 1) CAUTION: SHOULD ANY DEVELOPMENT OR CONSTRUCTION BE PLANNED ON OR NEAR THE BOUNDARIES, THE BOUNDARIES SHOULD BE CLEARLY MARKED ON SITE.
- 2) A BOUNDARY SURVEY HAS BEEN UNDERTAKEN. AREA AND DIMENSIONS HAVE BEEN SURVEYED FROM PLANS MADE AVAILABLE AT LAND REGISTRY SERVICES.
- 3) CONTOUR INTERVAL 0.5 METRE.
- 4) CONTOURS ARE INDICATIVE OF GROUND FORM ONLY. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION.
- 5) TREE SPREADS ARE DIAGRAMMATIC ONLY AND ARE NOT SYMMETRICAL.
- 6) UNDERGROUND (NON VISIBLE) SERVICE LINES HAVE BEEN SHOWN FROM "DIAL BEFORE YOU DIG" SERVICE AUTHORITY RECORDS & ARE DIAGRAMMATIC ONLY IN REGARD TO THEIR POSITION & WIDTH UNLESS STATED OTHERWISE.
- 7) BEARINGS SHOWN ARE ON MAGNETIC MERIDIAN.

INVESTIGATION OF "DIAL BEFORE YOU DIG" UNDERGROUND SERVICES HAS BEEN MADE. DETECTION OF UNDERGROUND SERVICES IS NOT AN INTEGRAL PART OF THIS SURVEY. ALL RELEVANT AUTHORITIES SHOULD BE NOTIFIED PRIOR TO ANY EXCAVATION ON OR NEAR THE SITE.

DEVELOPERS & EXCAVATORS MAY BE HELD FINANCIALLY RESPONSIBLE BY THE ASSET OWNER SHOULD THEY DAMAGE UNDERGROUND NETWORKS.



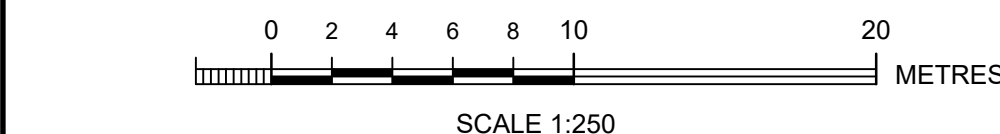
CARELESS DIGGING CAN:

- CAUSE DEATH OR SERIOUS INJURY TO WORKERS AND THE GENERAL PUBLIC
- INCONVENIENCE USERS OF ELECTRICITY, GAS, WATER AND COMMUNICATIONS
- LEAD TO CRIMINAL PROSECUTION AND DAMAGES CLAIMS
- CAUSE EXPENSIVE FINANCIAL LOSSES TO BUSINESS
- CUT OFF EMERGENCY SERVICES
- DELAY PROJECT COMPLETION TIMES WHILE THE DAMAGE IS REPAIRED

MINIMISE YOUR RISK AND DIAL BEFORE YOU DIG.
TEL. 1100

101
D.P. 1244381

1
D.P. 1139826



(A) EASEMENT TO DRAIN WATER 2.05 WIDE
VIDE GOV. GAZETTE 08/06/2007 FOLIO 3670



Bee & Lethbridge Pty Ltd
Suite 2, 14 Starkey Street,
PO Box 330, Forestville, NSW 2087
Phone: 9451 6757
Email: survey@beeleth.com.au
ABN: 13 003 194 447
www.beeleth.com.au

COPLAND C. LETHBRIDGE
REGISTERED SURVEYOR N.S.W.
IDENTIFICATION No. SU001470



TREE
DENOTES APPROX. 0.14m DIAMETER OF TREE
DENOTES APPROX. 5m HEIGHT OF TREE
DENOTES APPROX. 4m SPREAD OF TREE

GUTTER
DENOTES TOP OF GUTTER

UNDERGROUND ELECTRIC LINES
OVERHEAD ELECTRIC LINES
BOARDS SEWER
TELECOMMUNICATION LINES
WATER LINES

TOP OF BANK
BOTTOM OF BANK
ROCK OUTCROP

STOP VALVE
HYDRANT
TAP
WATER METER
TELECOM. PIT

LIGHT POLE
POWER POLE
DRAINAGE PIT
SEWER ACCESS CHAMBER

PLAN SHOWING BOUNDARIES, RELATIVE HEIGHTS &
PHYSICAL FEATURES OVER LOTS 2566 IN D.P. 752038
KNOWN AS No. 16 WYATT AVENUE, BELROSE.

L.G.A.: NORTHERN BEACHES

CLIENT	Mr & Mrs J. & J. HOLMAN	REF No.	11971
PROPERTY	No. 16 WYATT AVENUE, BELROSE	SHEET No.	1 of 1
DATUM	A.H.D.	SCALE	1:250 @ B1
SURVEYED	CL/AS/SB/JG.	DRAWN	TP./JS./HH./RM.
		DWG No.	11971B
		REV No.	00

ANNEXURE B

**Platform Architects Architectural Plans, Reference WAB2, Sheets A0.02, A1.01
- A1.09, A2.01 - A2.05 & A3.01 - A3.06, Revision DA04, dated 17th November
2021.**

SITE STATISTICS

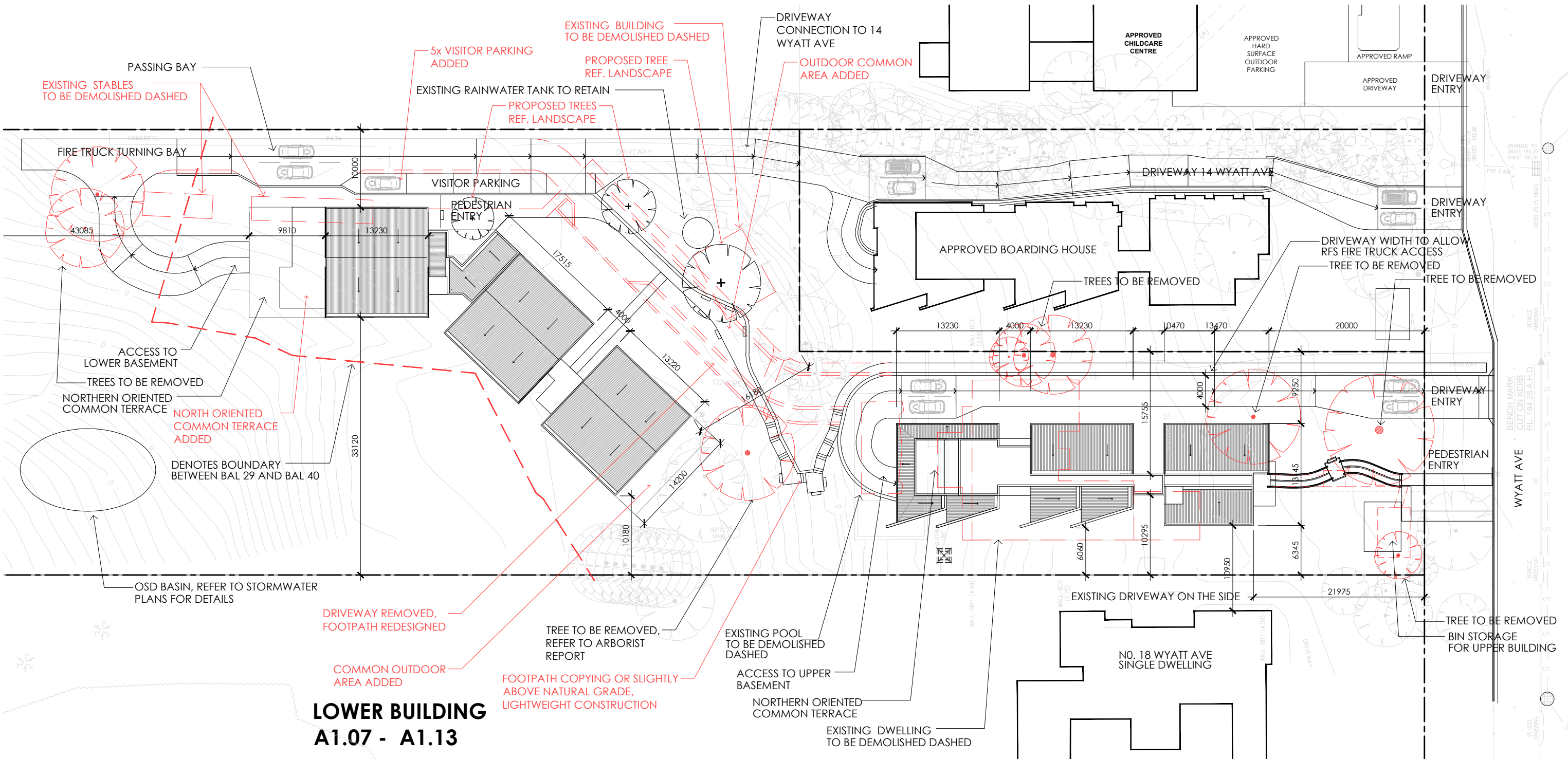
SITE AREA: 9342 SQ.M
GFA: 2046.6 SQ.M (EXCL. LIFTS, STAIRS AND BASEMENT)
SITE COVERAGE: 3072.1 SQ.M (32.9%) (INCL DRIVEWAY, BUILDINGS, BIN ROOM, FOOTPATHS AND ALL HARD SURFACE)
NATURALLY LANDSCAPED AREA: 6269.9 SQ.M (>50%)
LANDSCAPING IN PLANTERS: 47.6 SQ.M

LOWER BUILDING

32x BOARDING ROOMS (EACH ROOM INCL. ENSUITE)
20x CAR PARKING SPACES + 5 EXTERNAL VISITOR SPACES
9x MOTOR BIKES SPACES
WALL RACKS FOR BICYCLES
4x COMMON AREA TOTAL 216.2 SQ.M

UPPER BUILDING

22x BOARDING ROOMS (EACH ROOM INCL. ENSUITE)
1x MANAGERS ROOM (WITH ENSUITE)
11x CAR PARKING SPACES (2 x ACCESSIBLE)
5x MOTOR BIKES SPACES
WALL RACKS FOR BICYCLES
2x COMMON AREA TOTAL 126.9 Q.M



LOWER BUILDING
A1.07 - A1.13

PROPOSED TWO STOREYS
AND BASEMENT CAR PARK

UPPER BUILDING
A1.01 - A1.06

PROPOSED THREE STOREYS
AND BASEMENT CAR PARK

IMPORTANT NOTES:
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• All discrepancies to be brought to the attention of the Architect.
• Larger scale drawings and written dimensions take precedence.
• The Statutory Planning Levels is min 3.1m AHD. All levels to AHD.
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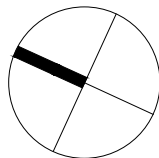
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DA02	Apr '21	DA ISSUE	BG
DA03	09/06/21	DA ISSUE	BG/OH
DA04	17/11/21	DA ISSUE	PH/OH

REVISION NOTES
ISSUED FOR DA LODGMENT
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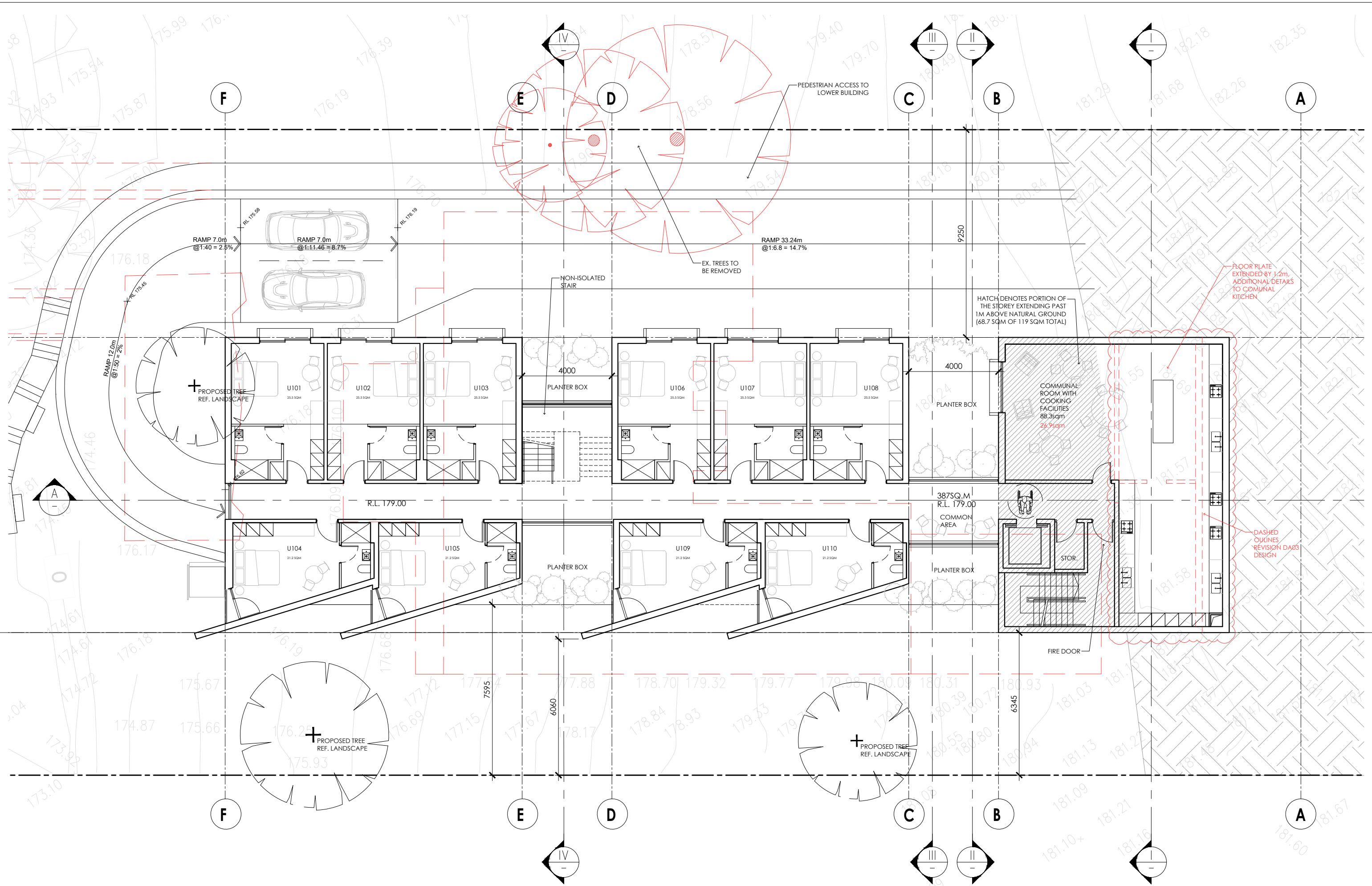
2/40 East Esplanade Manly 2095
p. 02 8385 9759 abn. 74602856157
nominated architect Bldg Gough Reg No. 8280

CLIENT
NORTHERN BEACHES
ESSENTIAL SERVICES
ACCOMMODATION



DRAWING TITLE
SITE PLAN

STATUS
DA
NUMBER
A0.02
SCALE
1:500
@ A3
REVISION
DA04
PRELIMINARY
PROJECT
WAB2



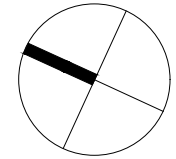
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P1	Apr '21	PRELIMINARY ISSUE	OH
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DA03	09/06/21	DA ISSUE	BG/OH
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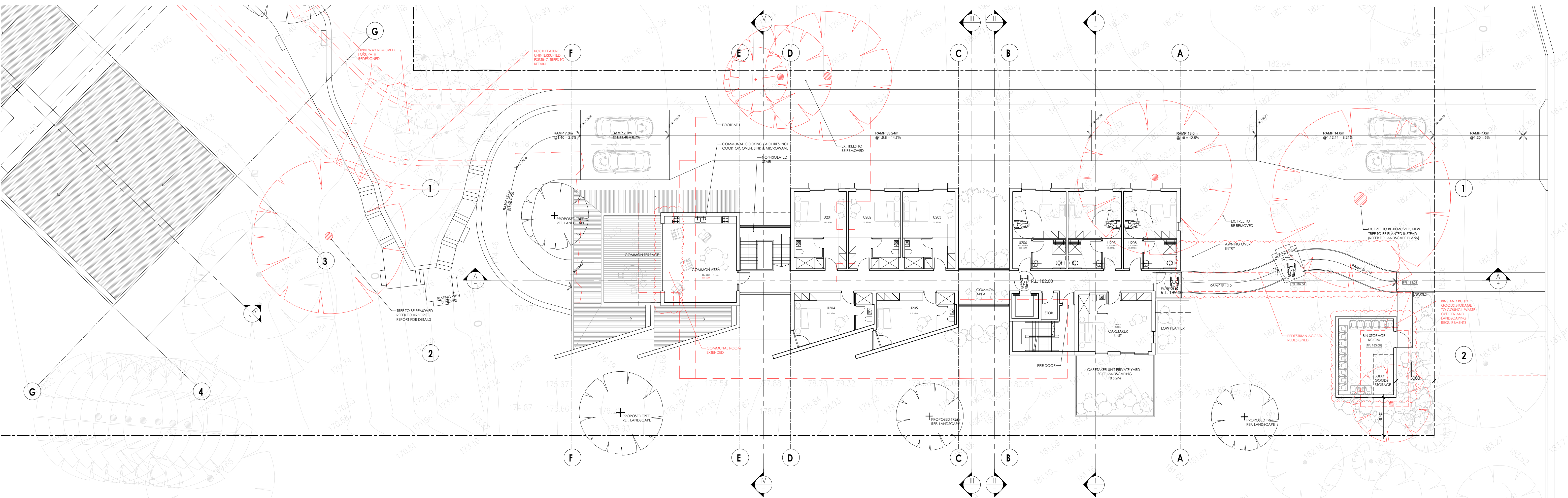
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ACCOMMODATION**



DRAWING TITLE
**UPPER BUILDING
LOWER GROUND FLOOR PLAN**
STATUS
DA
NUMBER
A1.02
SCALE
1:150
@A3
REVISION
DA04
PRELIMINARY
PROJECT
WAB2



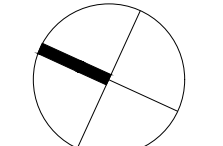
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• The Existing Planning level is 1.1m AHD. All levels to AHD.
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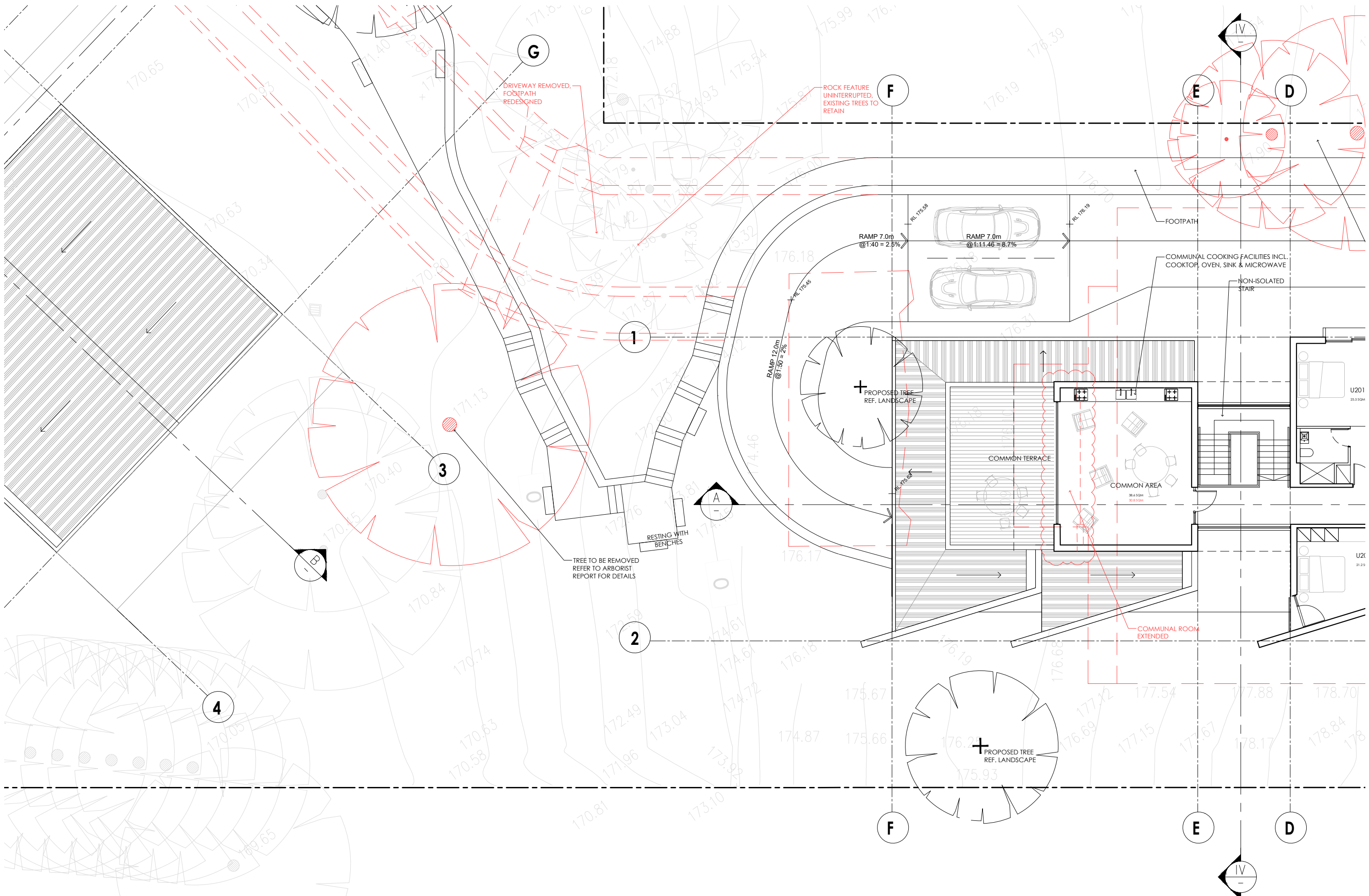
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nominated architectural Suite Google Map No. 8280

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DRAWING TITLE
**UPPER BUILDING
GROUND FLOOR PLAN**
STATUS
DA
NUMBER
A1.03
SCALE
1:500
REVISION
DA04
PROJECT
WAB2
PRELIMINARY



CONTINUATION A1.04

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- The Statutory Planning Levels is min 3.1m AHD. All levels to AHD.

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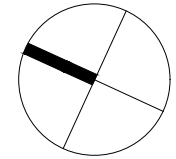
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DA04	17/11/21	DA ISSUE	PH/OH

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nominated architect Bldg Code Reg No. 8280

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ESSENTIAL SERVICES
ACCOMMODATION**



DRAWING TITLE
**UPPER BUILDING
GROUND FLOOR PLAN - SHEET 1**

STATUS
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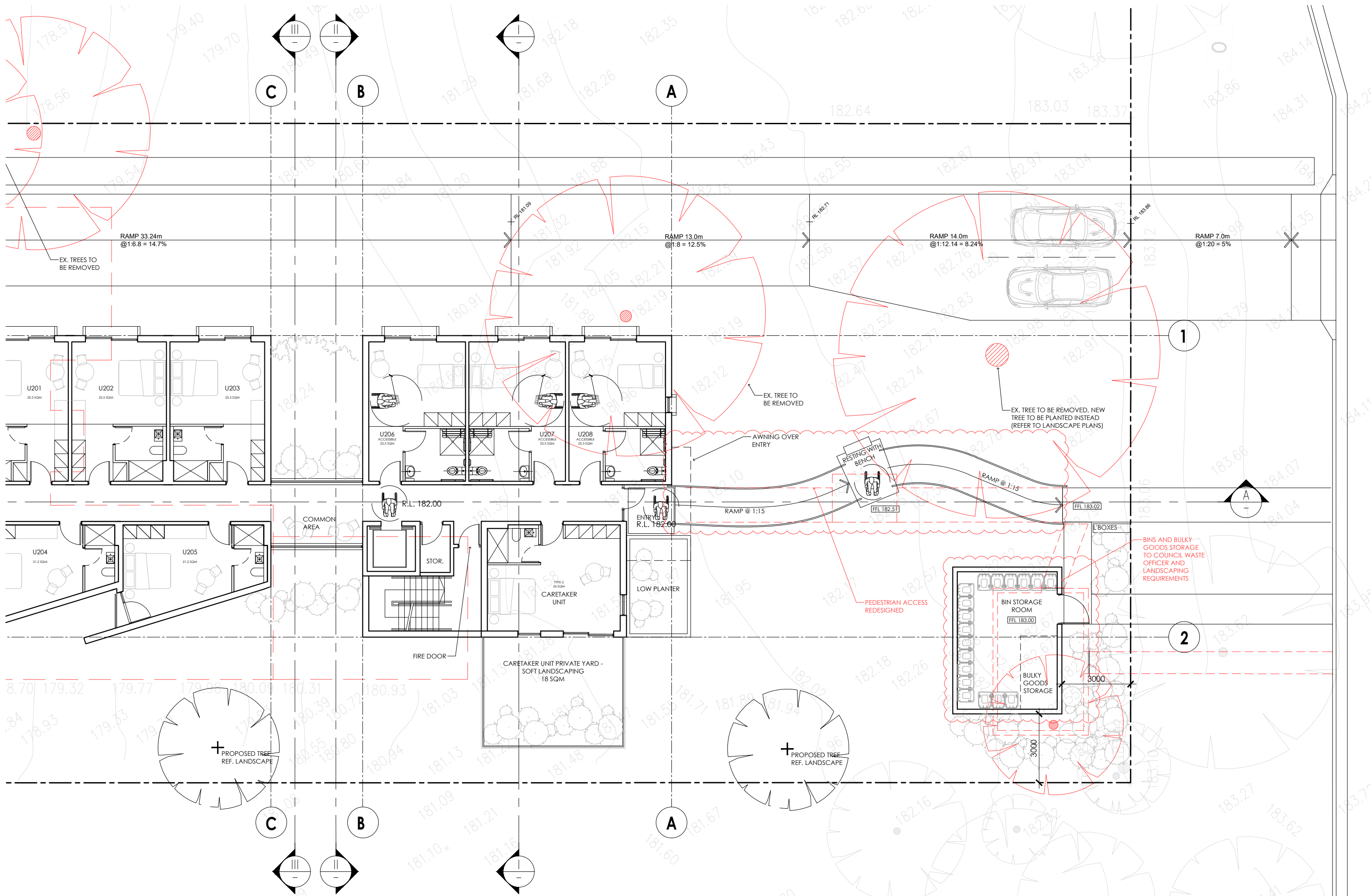
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SCALE
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@ A3

REVISION
DA04
PRELIMINARY

PROJECT
WAB2

CONTINUATION A1.03



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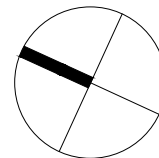
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DA04	17/11/21	DA ISSUE	PH/OH

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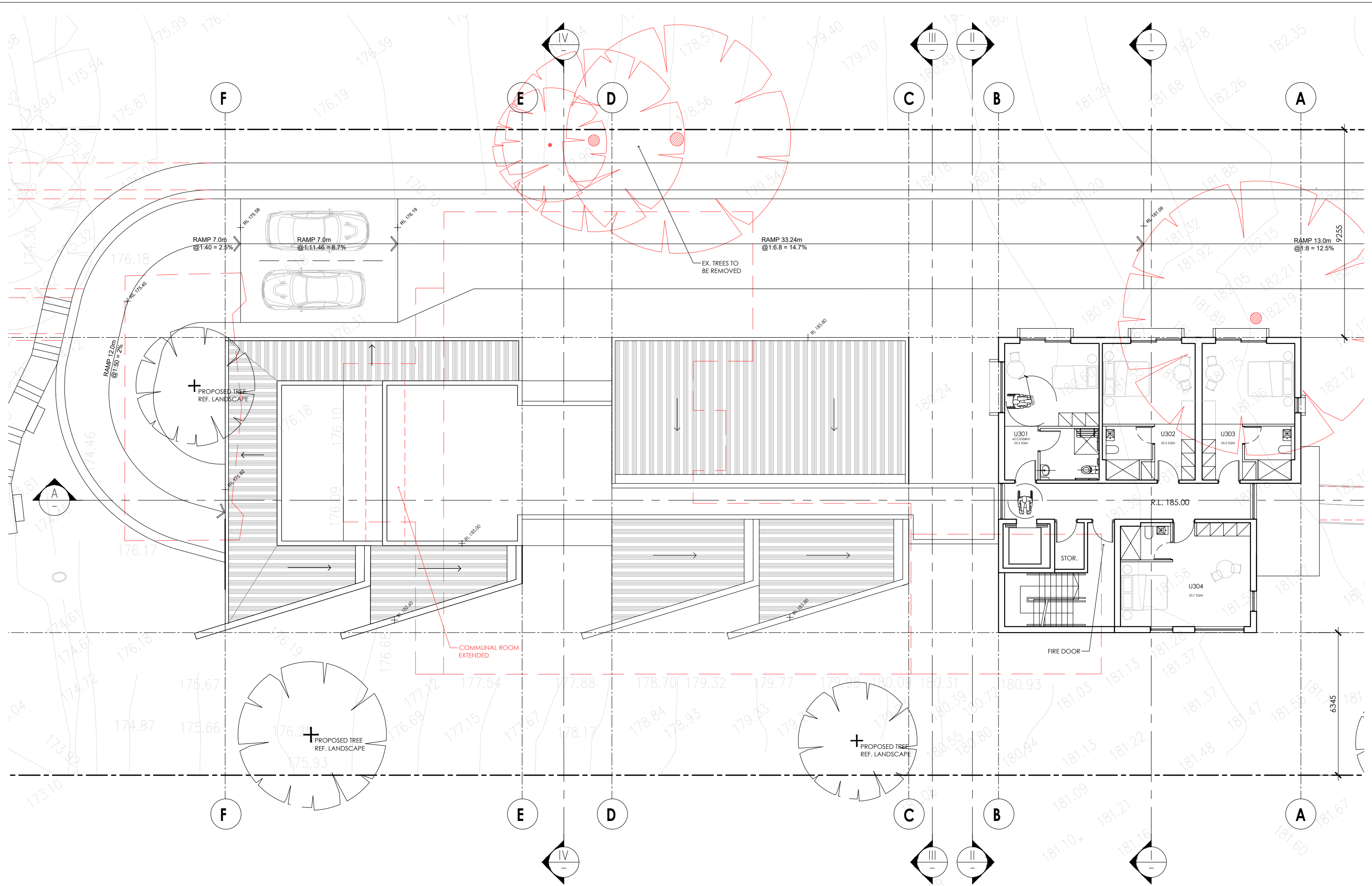
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DRAWING TITLE
UPPER BUILDING
GROUND FLOOR PLAN - SHEET 2
STATUS
DA
NUMBER
A1.03B
SCALE
1:150
@A3
REVISION
DA04
PRELIMINARY
PROJECT
WAB2



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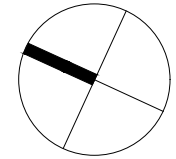
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DA04	17/11/21	DA ISSUE	PH/OH

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DRAWING TITLE
**UPPER BUILDING
FIRST FLOOR PLAN**

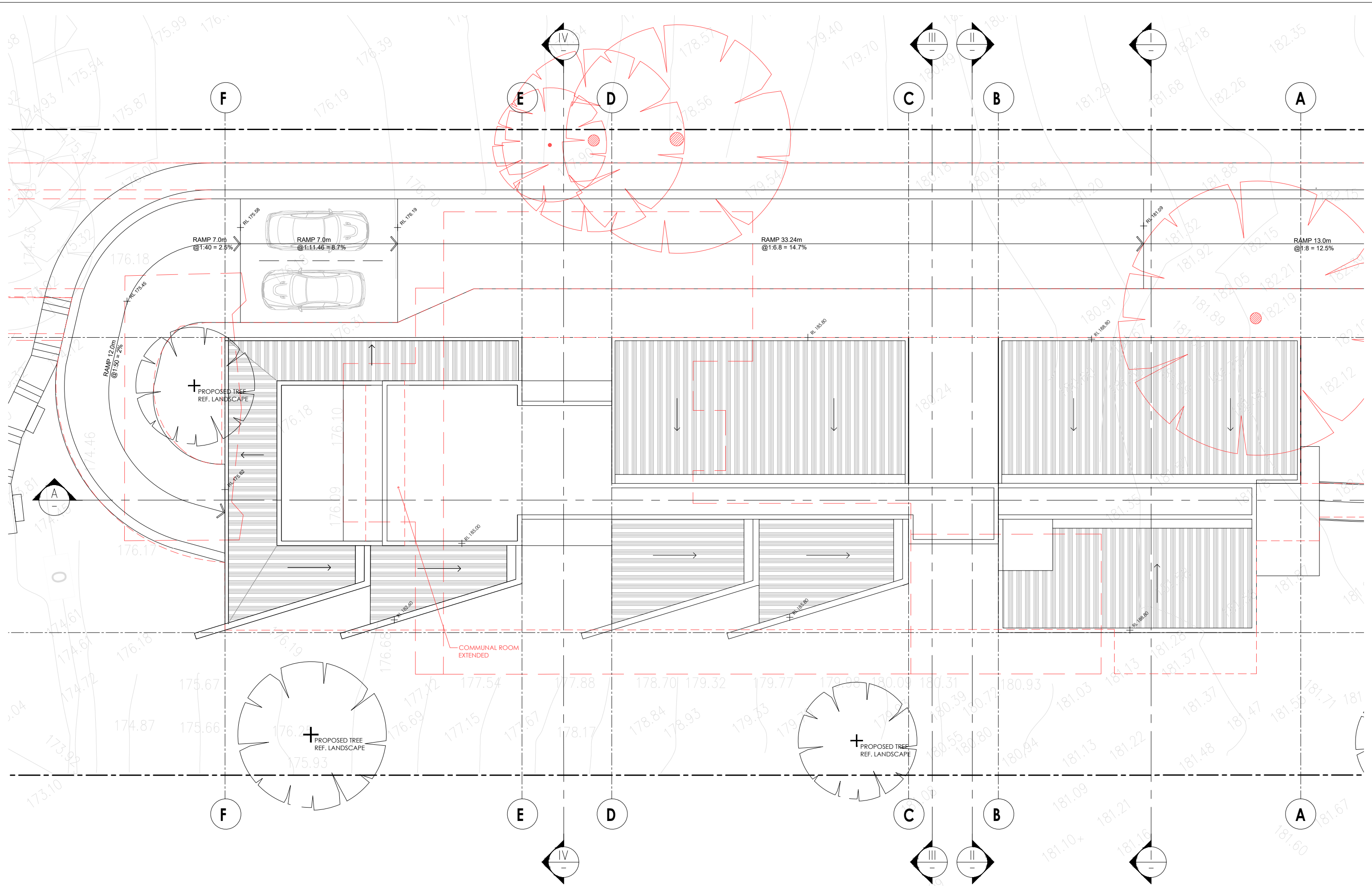
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REVISION
DA04
PRELIMINARY

PROJECT
WAB2



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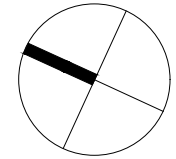
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DRAWING TITLE
**UPPER BUILDING
ROOF PLAN**

STATUS
DA

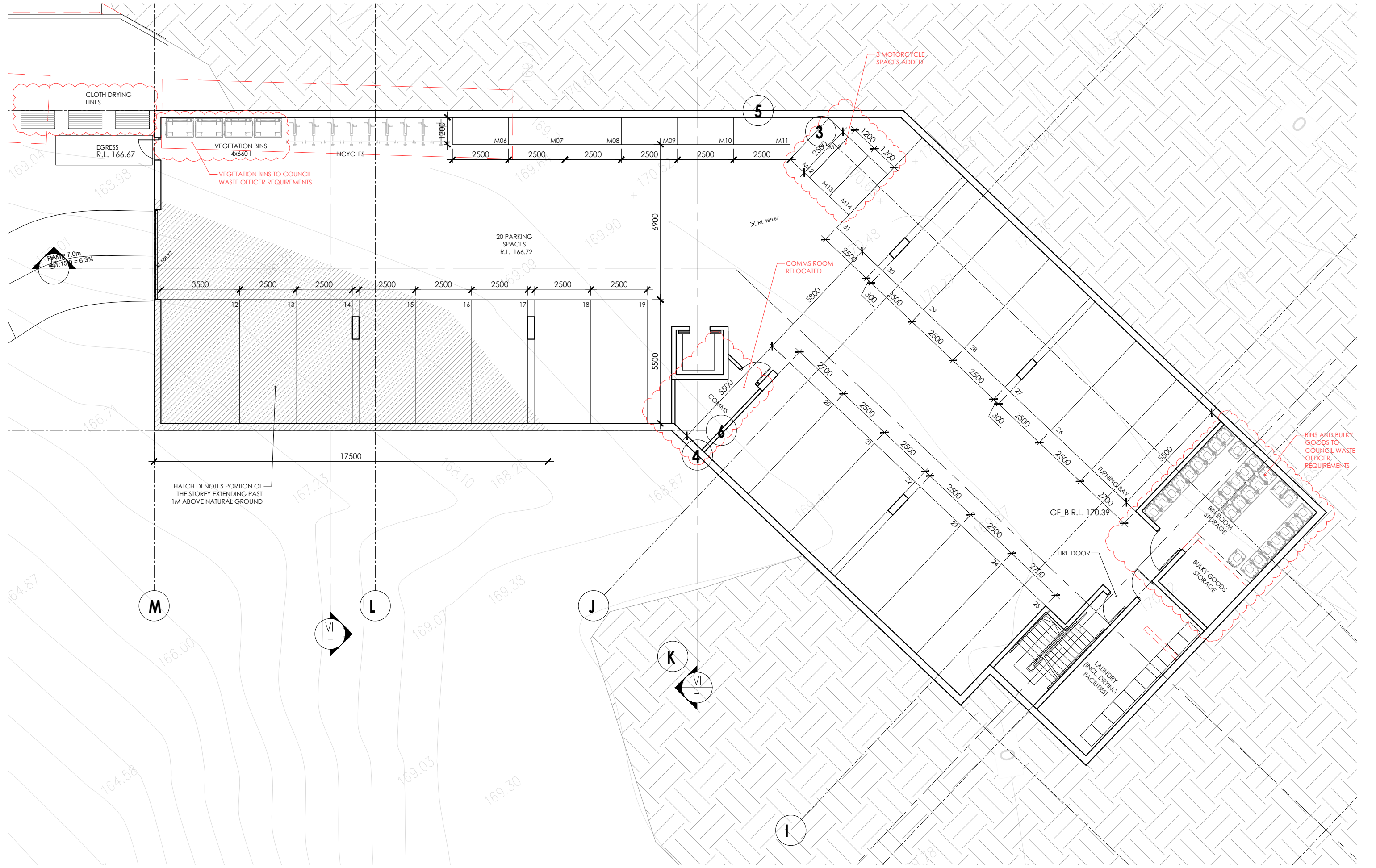
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REVISION
DA04
PRELIMINARY

PROJECT
WAB2

PRELIM



IMPORTANT NOTES:
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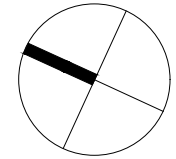
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DA03	09/06/21	DA ISSUE	BG/OH
DA04	17/11/21	DA ISSUE	PH/OH

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ESSENTIAL SERVICES
ACCOMMODATION**



DRAWING TITLE
**LOWER BUILDING
BASEMENT PLAN**

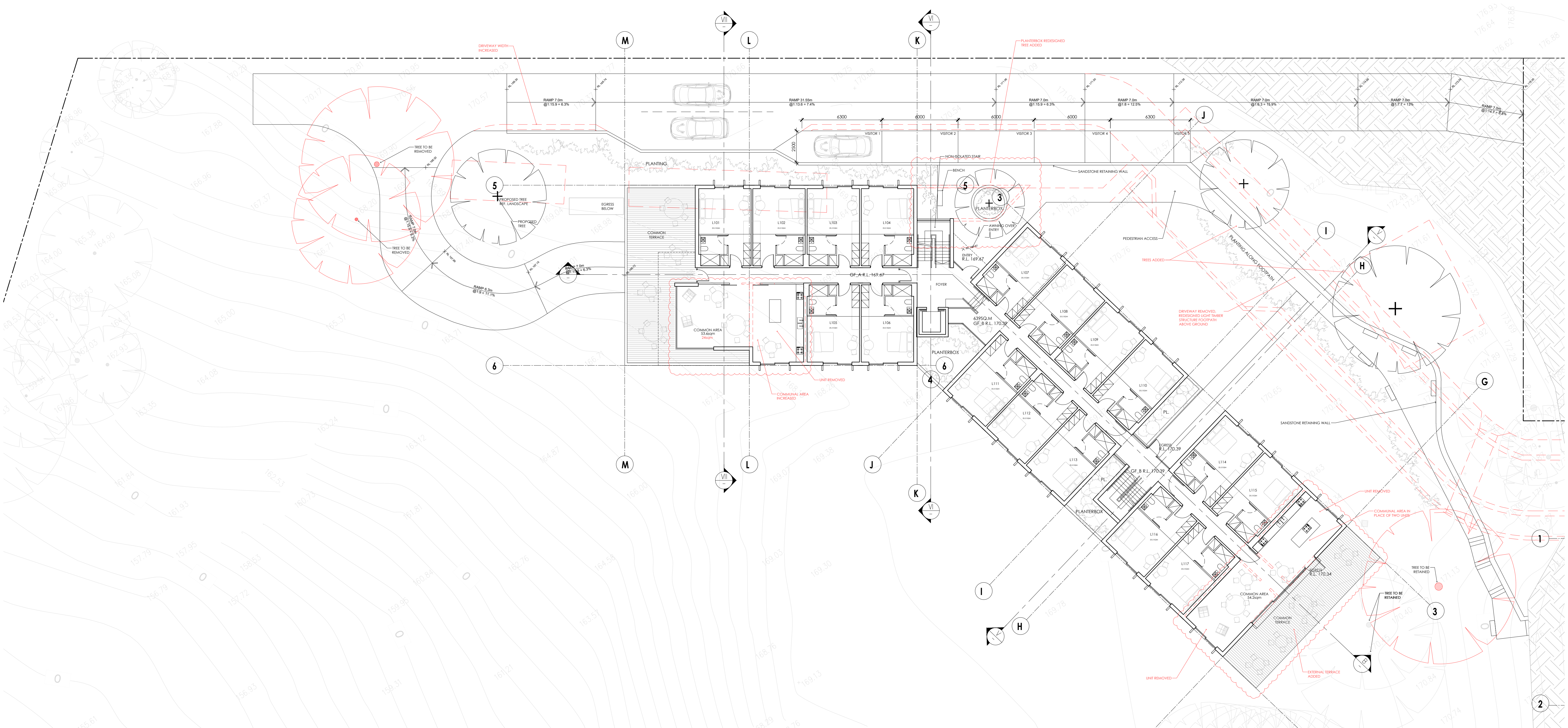
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REVISION
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PRELIMINARY

PROJECT
WAB2



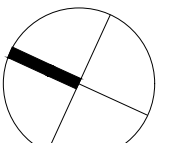
IMPORTANT NOTES:
Do not scale from drawings. Use figured dimensions only. Ensure that the drawings used
copy the sheet revision no. Read in conjunction with consultant engineers drawings - refer
contract drawing list.
• All dimensions to be checked on site before commencement of work.
• All dimensions to be checked to the center of the member.
• All dimensions to be checked to the face of the member.
• The Building Planning Level is 1.1m AHD. All levels to AHD.
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REVISION	DATE	DESCRIPTION	BY
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DA03	May '21	DA ISSUE	WJCH
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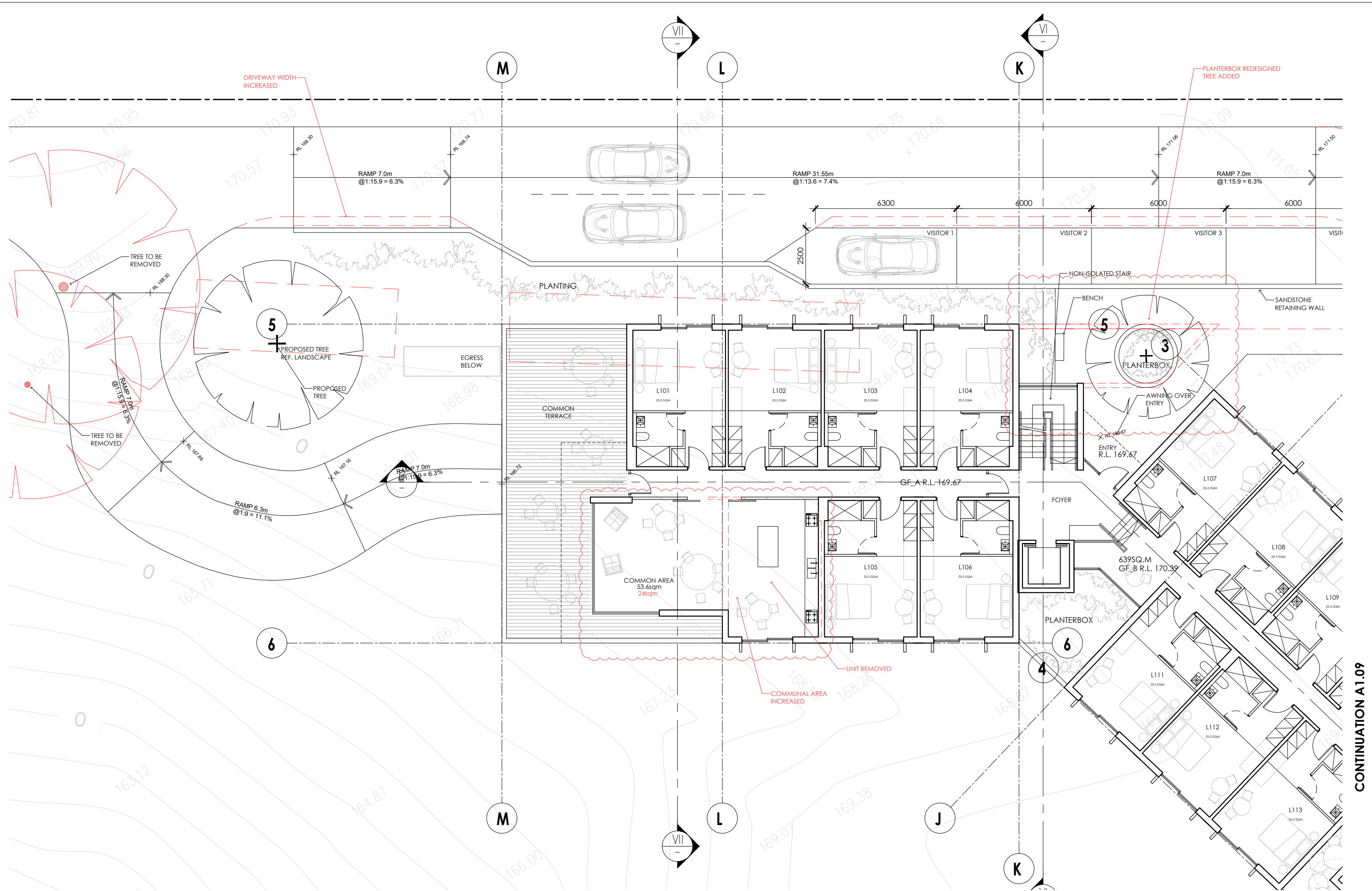
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2/401 East Esplanade North 2915
p. 02 9385 9739 (m) 7460285417
www.platformarchitects.com.au

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ESSENTIAL SERVICES
ACCOMMODATION



DRAWING TITLE
**LOWER BUILDING
GROUND FLOOR PLAN**
STATUS
DA
NUMBER
A1.07
SCALE
1:100
PROJECT
DA04
PRELIMINARY
WAB2

PRELIM



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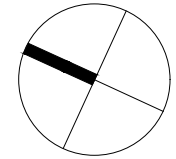
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DA03	09/06/21	DA ISSUE	BG/OH
DA04	17/11/21	DA ISSUE	PH/OH

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DRAWING TITLE
LOWER BUILDING
GROUND FLOOR PLAN - SHEET 1

STATUS
DA

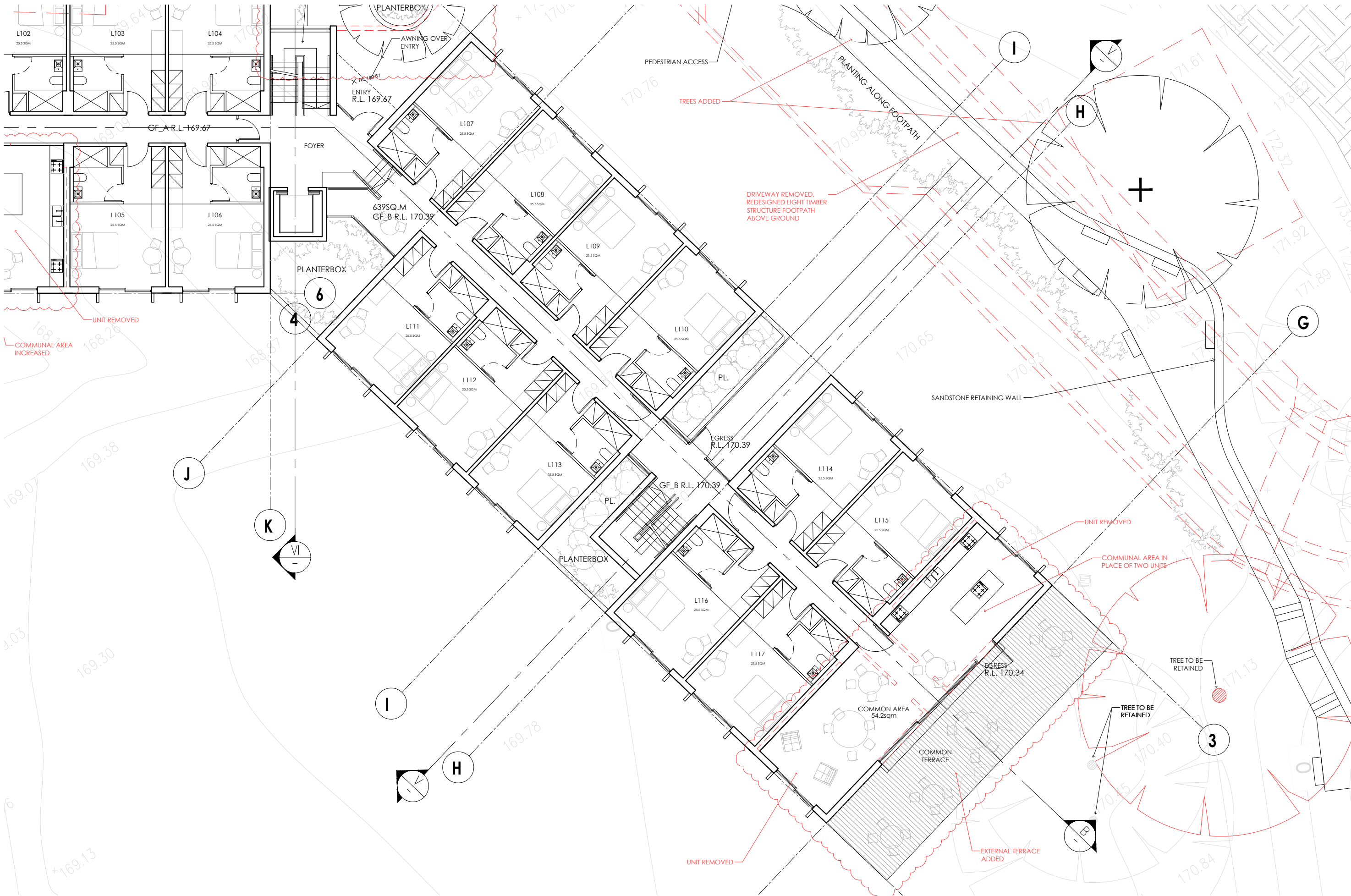
NUMBER
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SCALE
1:150
@ A3

REVISION
DA04
PRELIMINARY

PROJECT
WAB2

CONTINUATION A1.09



IMPORTANT NOTES:
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- Larger scale drawings and written dimensions take precedence.
- The Statutory Planning Level is min 3.1m AHD. All levels to AHD.

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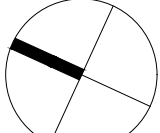
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P1	Apr '21	PRELIMINARY ISSUE	OH
DA02	Apr '21	DA ISSUE	BG
DA03	09/06/21	DA ISSUE	BG/OH
DA04	17/11/21	DA ISSUE	PH/OH

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DRAWING TITLE
LOWER BUILDING
GROUND FLOOR PLAN - SHEET 2

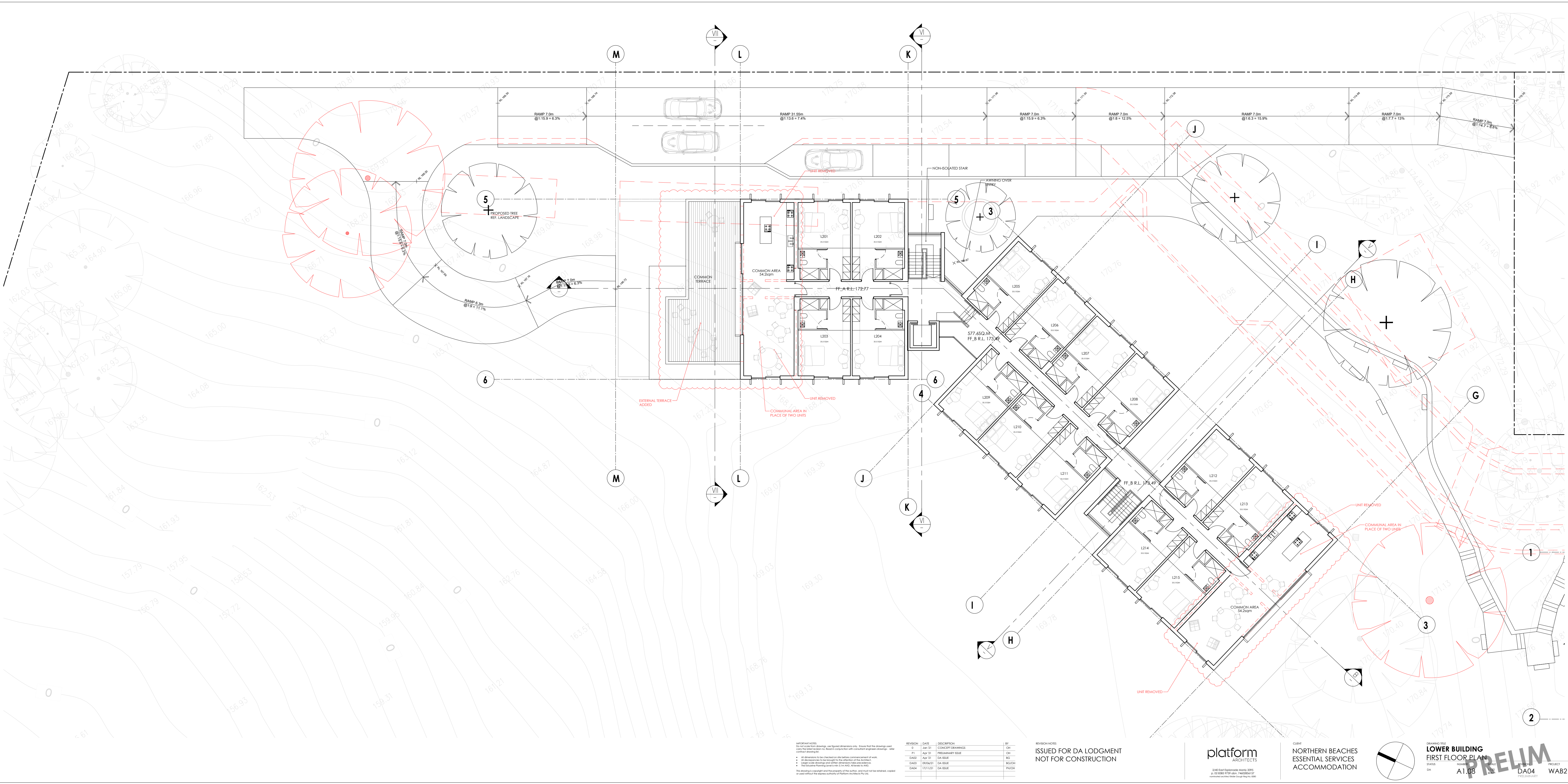
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NUMBER
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SCALE
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REVISION
DA04
PRELIMINARY

PROJECT
WAB2



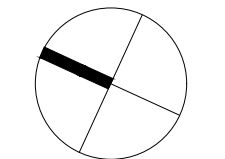
IMPORTANT NOTES:
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copy the client's version. No need in conjunction with consultant's drawings - refer
contract drawing list.
• All dimensions to be checked on site before commencement of work.
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• The Elevation Piping Level is 1.1m AHD. All levels to AHD.
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REVISION	DATE	DESCRIPTION	BY
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P1	Apr '21	PRELIMINARY ISSUE	CH
DA02	Apr '21	DA ISSUE	BO
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REVISION NOTES
ISSUED FOR DA LODGMENT
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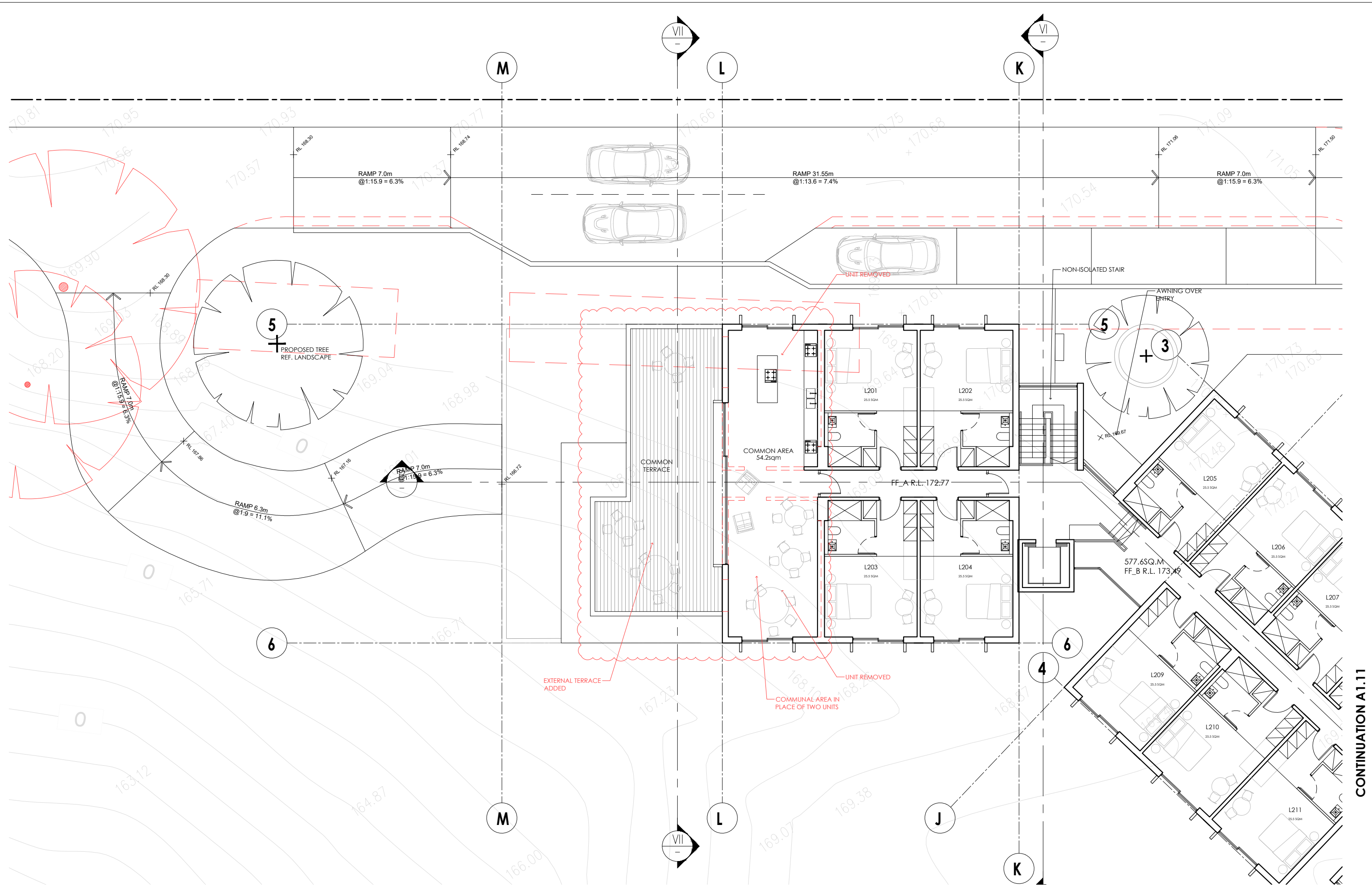
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DRAWING TITLE
LOWER BUILDING
FIRST FLOOR PLAN
STATUS: DA
NUMBER: A1.08
DATE: 17/11/21
PROJECT: DA04
PRELIMINARY: WAB2

PRELIM



IMPORTANT NOTES:
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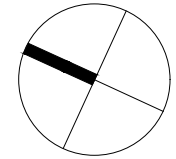
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DA03	09/06/21	DA ISSUE	BG/OH
DA04	17/11/21	DA ISSUE	PH/OH

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DRAWING TITLE
LOWER BUILDING
FIRST FLOOR PLAN - SHEET 1

STATUS
DA

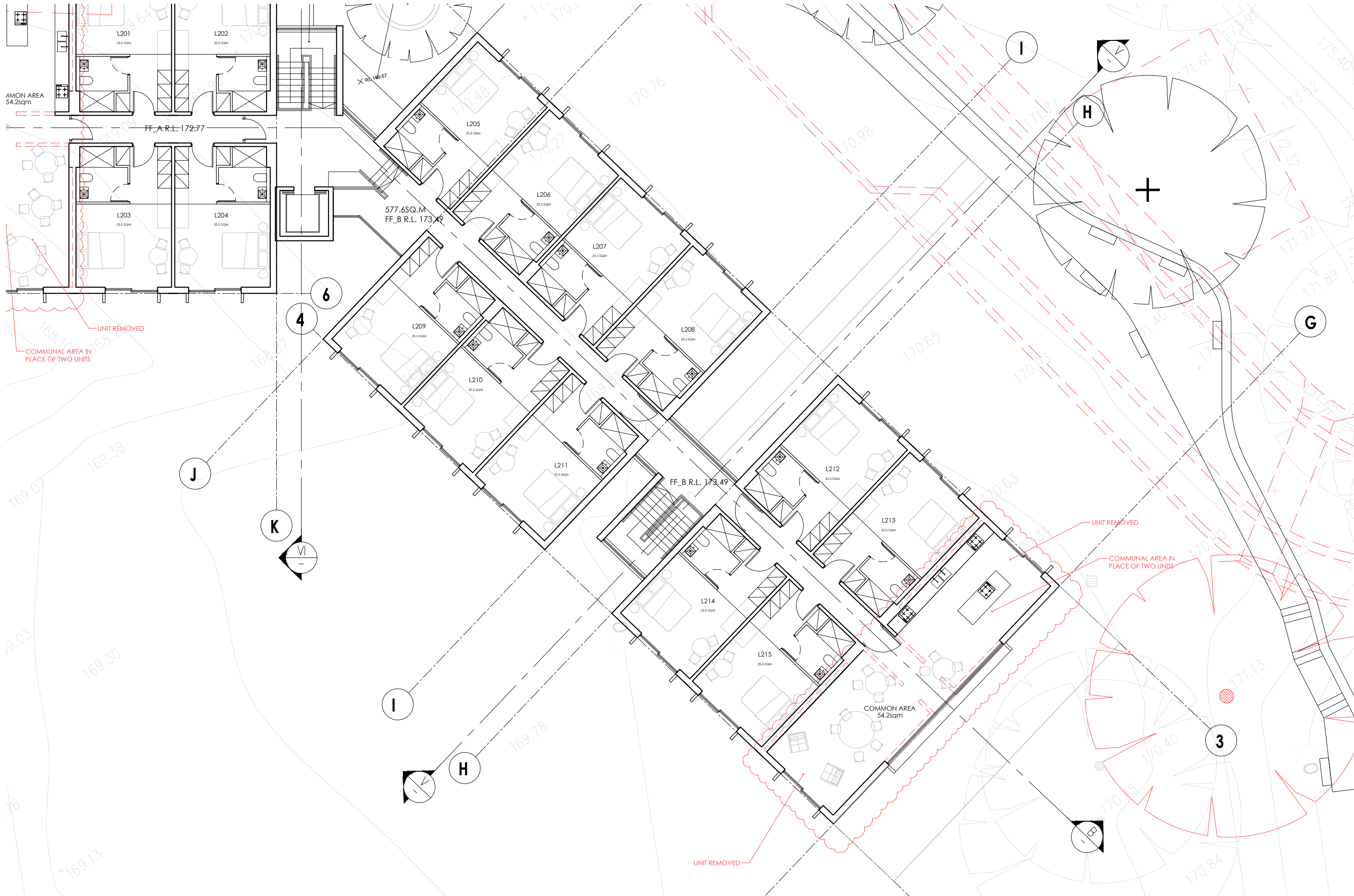
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SCALE
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@A3

REVISION
DA04
PRELIMINARY

PROJECT
WAB2

CONTINUATION A1.11



IMPORTANT NOTES:
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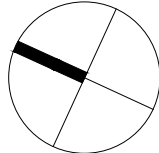
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DA02	Apr '21	DA ISSUE	BG
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DA04	17/11/21	DA ISSUE	PH/OH

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DRAWING TITLE
**LOWER BUILDING
FIRST FLOOR PLAN - SHEET 2**

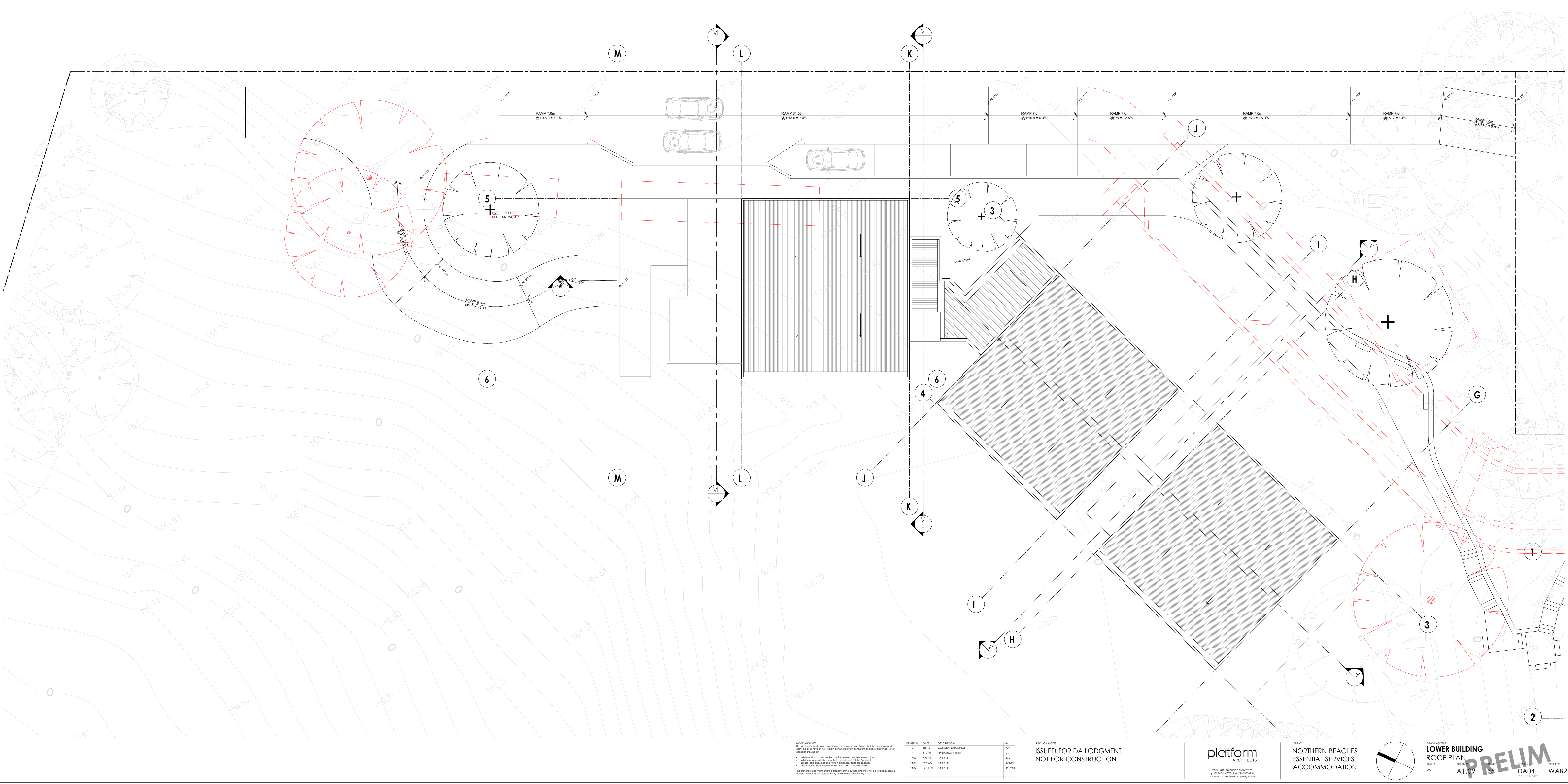
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NUMBER
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SCALE
1:150
@A3

REVISION
DA04
PRELIMINARY

PROJECT
WAB2



IMPORTANT NOTES:
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copy the client's version. No field in conjunction with consultant engineers drawings - refer
contract drawing list.
• All dimensions to be checked on the before commencement of work.
• All dimensions to be checked on the before commencement of work.
• All dimensions to be checked on the before commencement of work.
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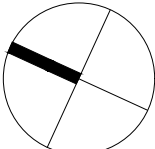
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DA02	Apr '21	DA ISSUE	BO
DA03	May '21	DA ISSUE	BO/CH
DA04	17/11/21	DA ISSUE	PH/CH

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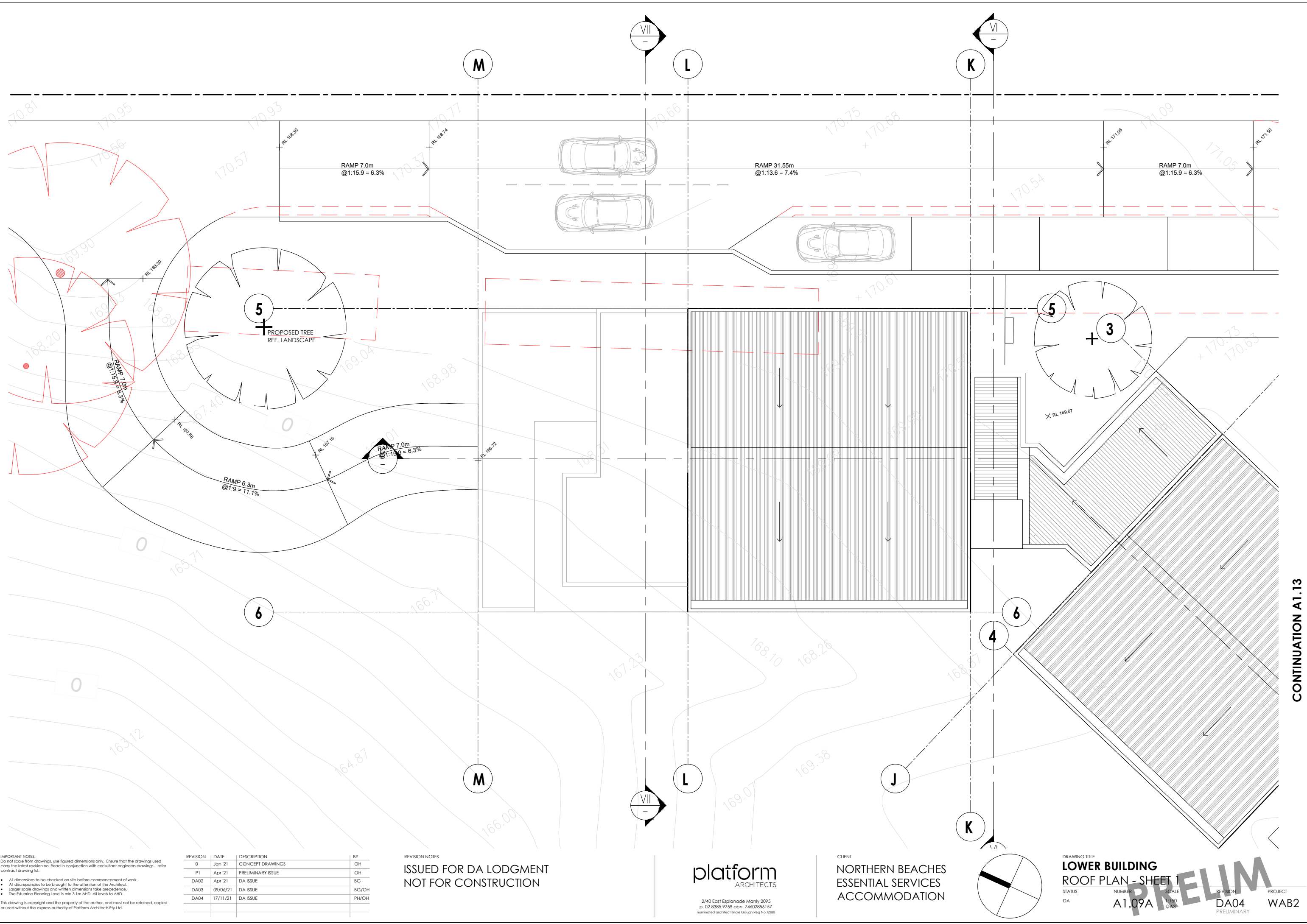


DRAWING TITLE
**LOWER BUILDING
ROOF PLAN**
STATUS
DA

NUMBER
A1.09

PROJECT
DA04

WAB2



IMPORTANT NOTES:
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- Larger scale drawings and written dimensions take precedence.
- The Estuarine Planning Level is min 3.1m AHD. All levels to AHD.

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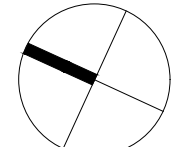
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DA04	17/11/21	DA ISSUE	PH/OH

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DRAWING TITLE
**LOWER BUILDING
ROOF PLAN - SHEET 1**

STATUS
DA

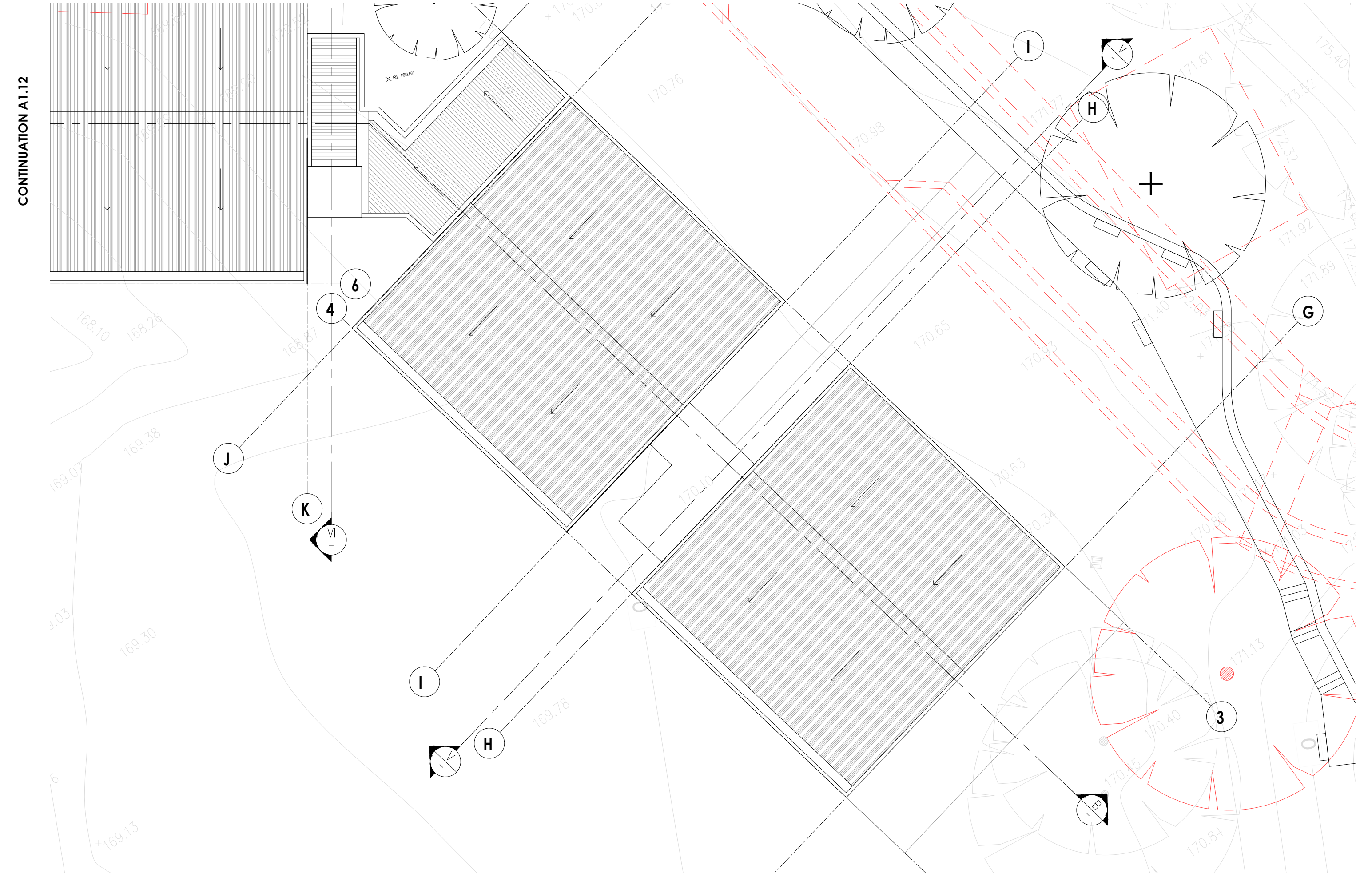
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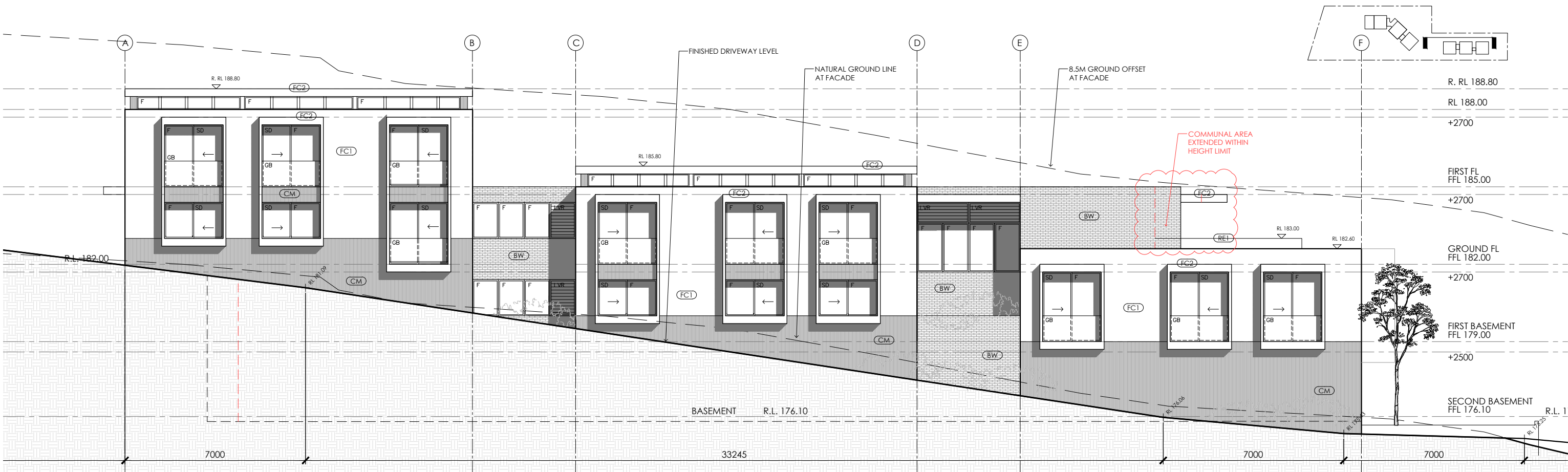
REVISION
DA04
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PROJECT
WAB2

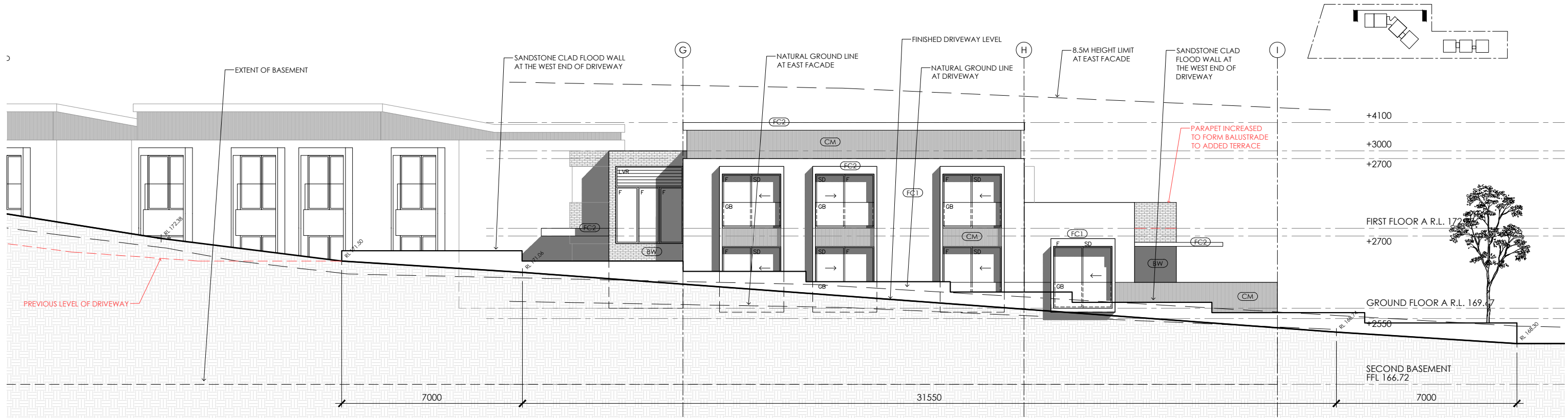
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NORTH EAST ELEVATION
UPPER BUILDING



NORTH EAST ELEVATION
LOWER BUILDING



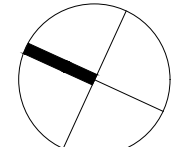
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P1	Apr '21	PRELIMINARY ISSUE	OH
DA02	Apr '21	DA ISSUE	BG
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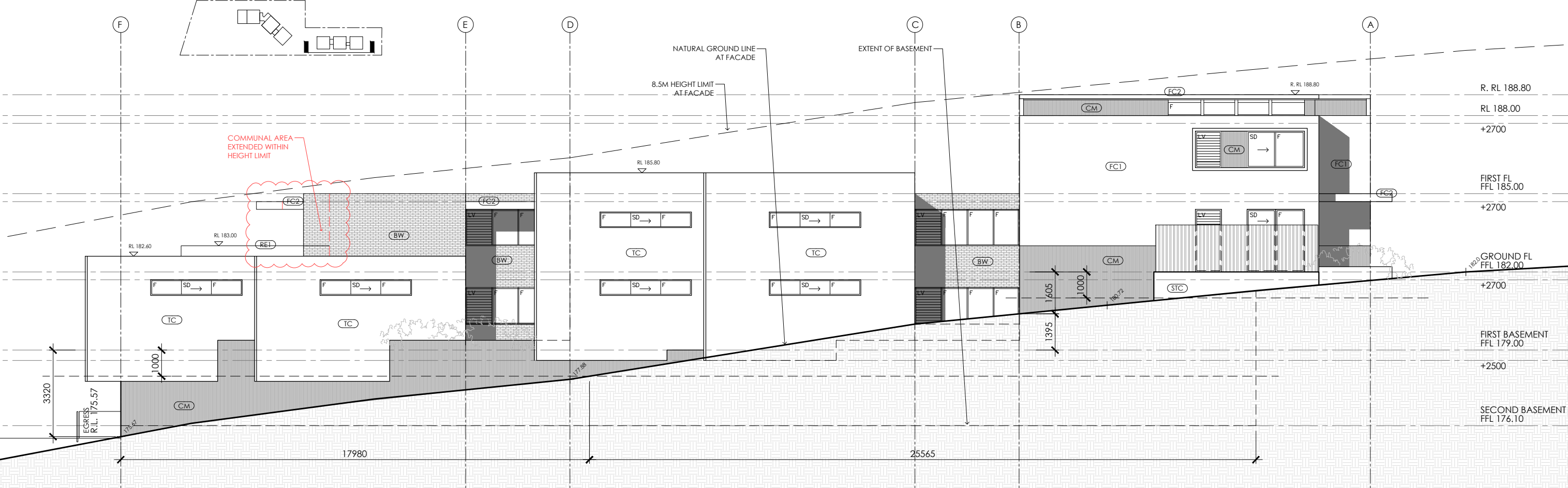
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ESSENTIAL SERVICES
ACCOMMODATION

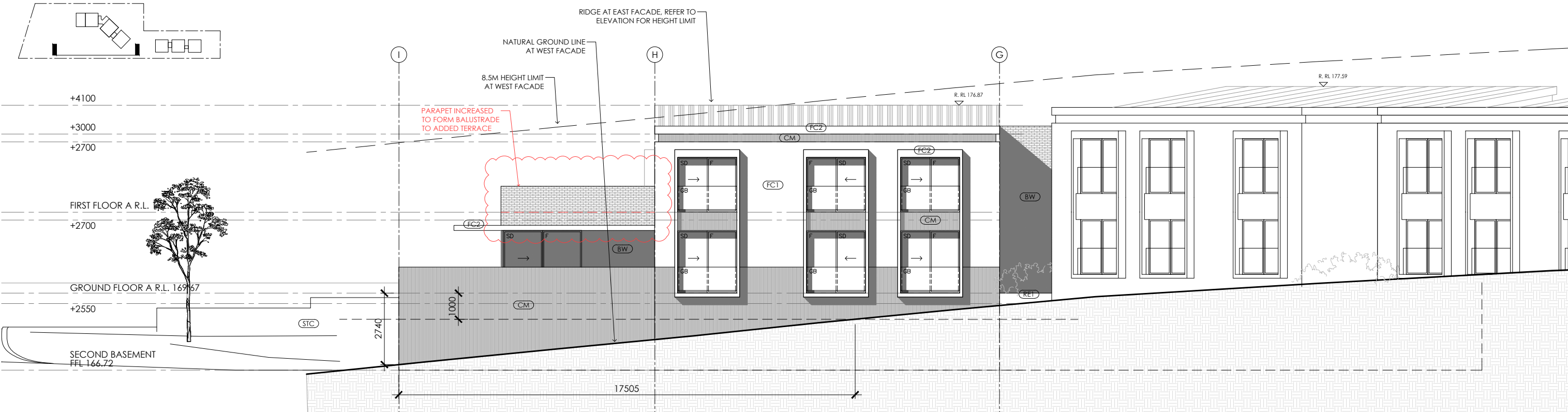


DRAWING TITLE
NORTH EAST ELEVATIONS
UPPER AND LOWER BUILDING
STATUS
DA
NUMBER
A2.01
SCALE
1:150 @ A3
REVISION
DA04
PRELIMINARY
PROJECT
WAB2

SOUTH WEST ELEVATION
UPPER BUILDING



SOUTH WEST ELEVATION
LOWER BUILDING



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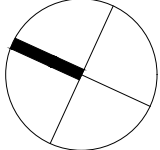
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DA02	Apr '21	DA ISSUE	BG
DA03	09/06/21	DA ISSUE	BG/OH
DA04	17/11/21	DA ISSUE	PH/OH

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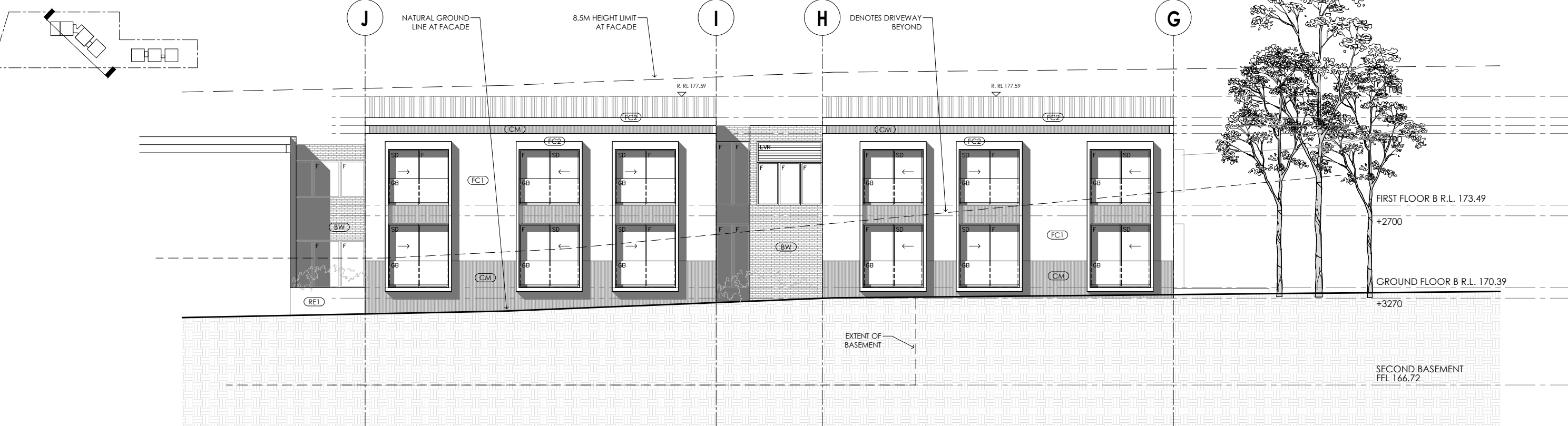


DRAWING TITLE
**SOUTH WEST ELEVATIONS
UPPER AND LOWER BUILDING**
STATUS
DA
NUMBER
A2.02
SCALE
1:150 @ A3
REVISION
DA04
PRELIMINARY
PROJECT
WAB2

EAST ELEVATION
LOWER BUILDING



WEST ELEVATION
LOWER BUILDING



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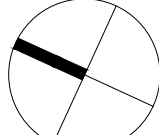
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DA02	Apr '21	DA ISSUE	BG
DA03	09/06/21	DA ISSUE	BG/OH
DA04	17/11/21	DA ISSUE	PH/OH

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DRAWING TITLE
**EAST WEST ELEVATIONS
LOWER BUILDING**

STATUS
DA

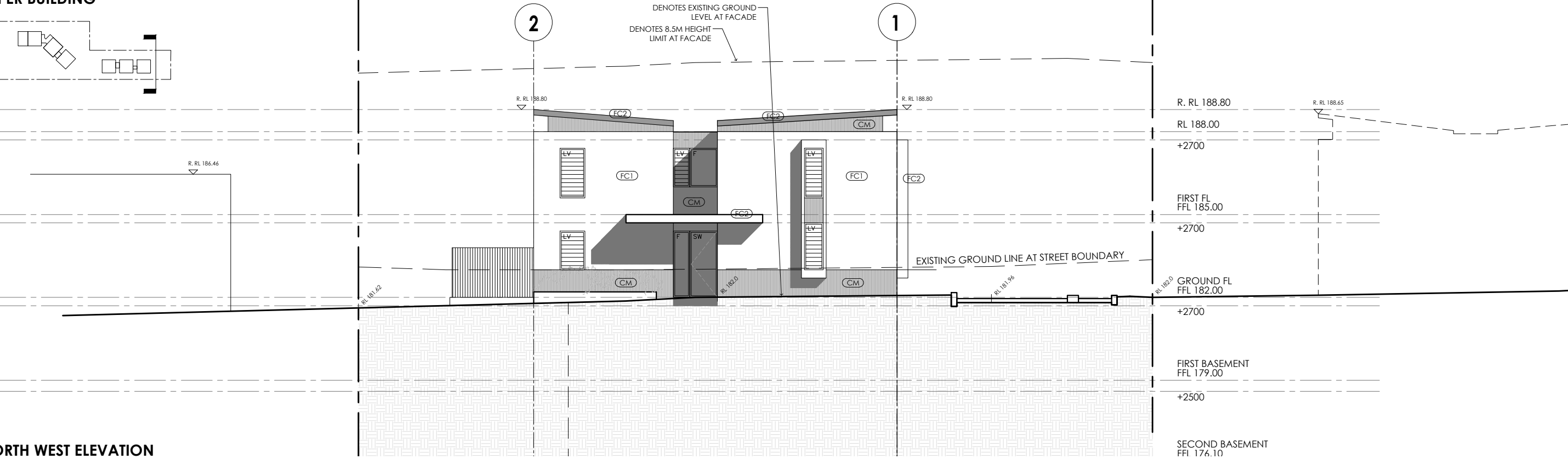
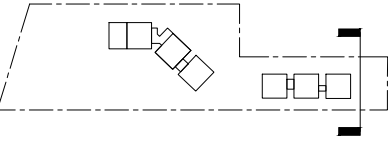
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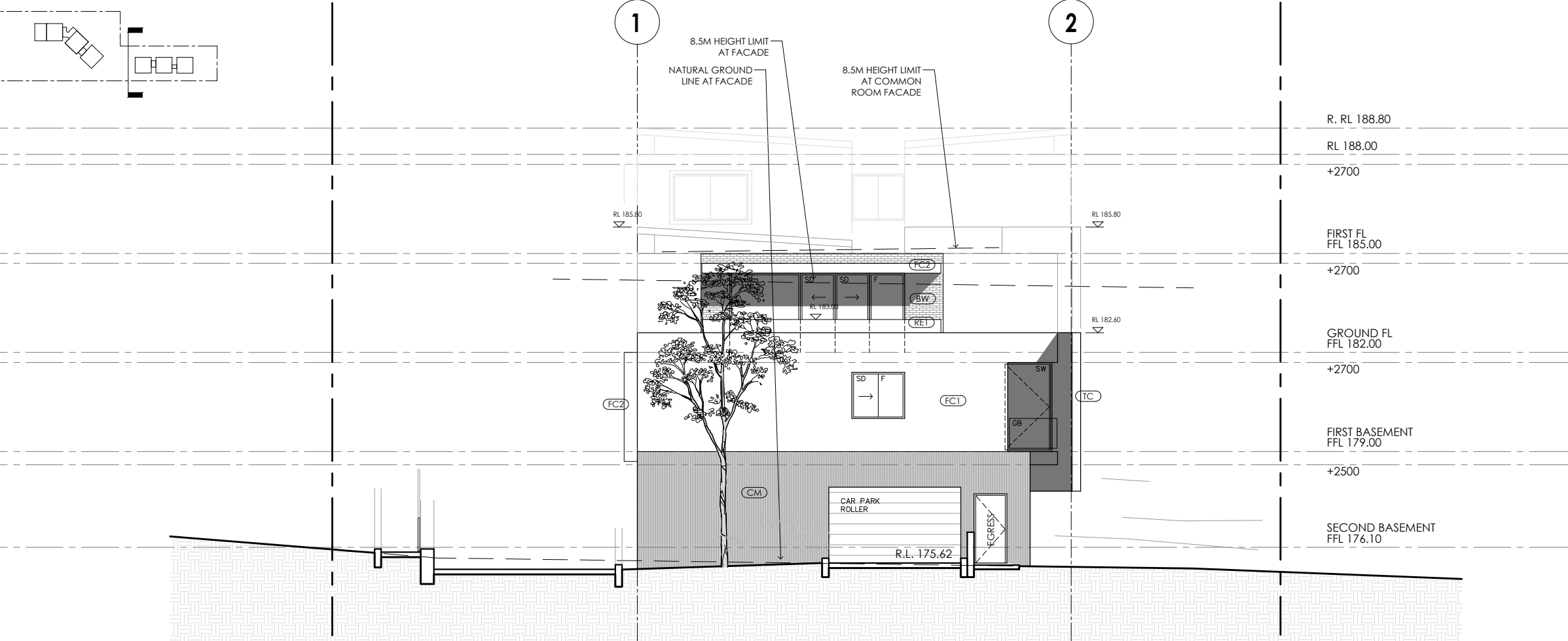
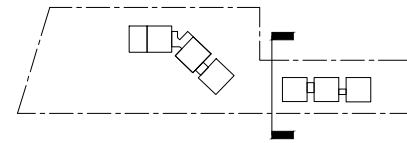
REVISION
DA04
PRELIMINARY

PROJECT
WAB2

SOUTH EAST ELEVATION
UPPER BUILDING



NORTH WEST ELEVATION
UPPER BUILDING



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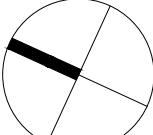
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DA02	Apr '21	DA ISSUE	BG
DA03	09/06/21	DA ISSUE	BG/OH
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DRAWING TITLE
**SOUTH EAST ELEVATION
NORTH WEST ELEVATION**

STATUS
DA

NUMBER
A2.04

SCALE
1:150 @ A3

REVISION
DA04
PRELIMINARY

PROJECT
WAB2

A diagram of a multi-room environment. The environment is bounded by dashed lines. It contains several rooms and corridors. A robot, represented by a small black rectangle, is located in a central corridor. A goal, represented by a small black circle, is located in a room on the right. The environment is designed for a robot to navigate from its starting position to the goal.



A diagram of a robot in a hallway. The robot is represented by a rectangle with a smaller rectangle inside, tilted at an angle. It is positioned in a hallway with a dashed line representing a wall on the left and a solid line representing a wall on the right. A door is located on the left wall, and the robot is facing towards it.



REVISION	DATE	DESCRIPTION	BY
0	Jan '21	CONCEPT DRAWINGS	OH
P1	Apr '21	PRELIMINARY ISSUE	OH
DA02	Apr '21	DA ISSUE	BG
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DA04	17/11/21	DA ISSUE	PH/OH

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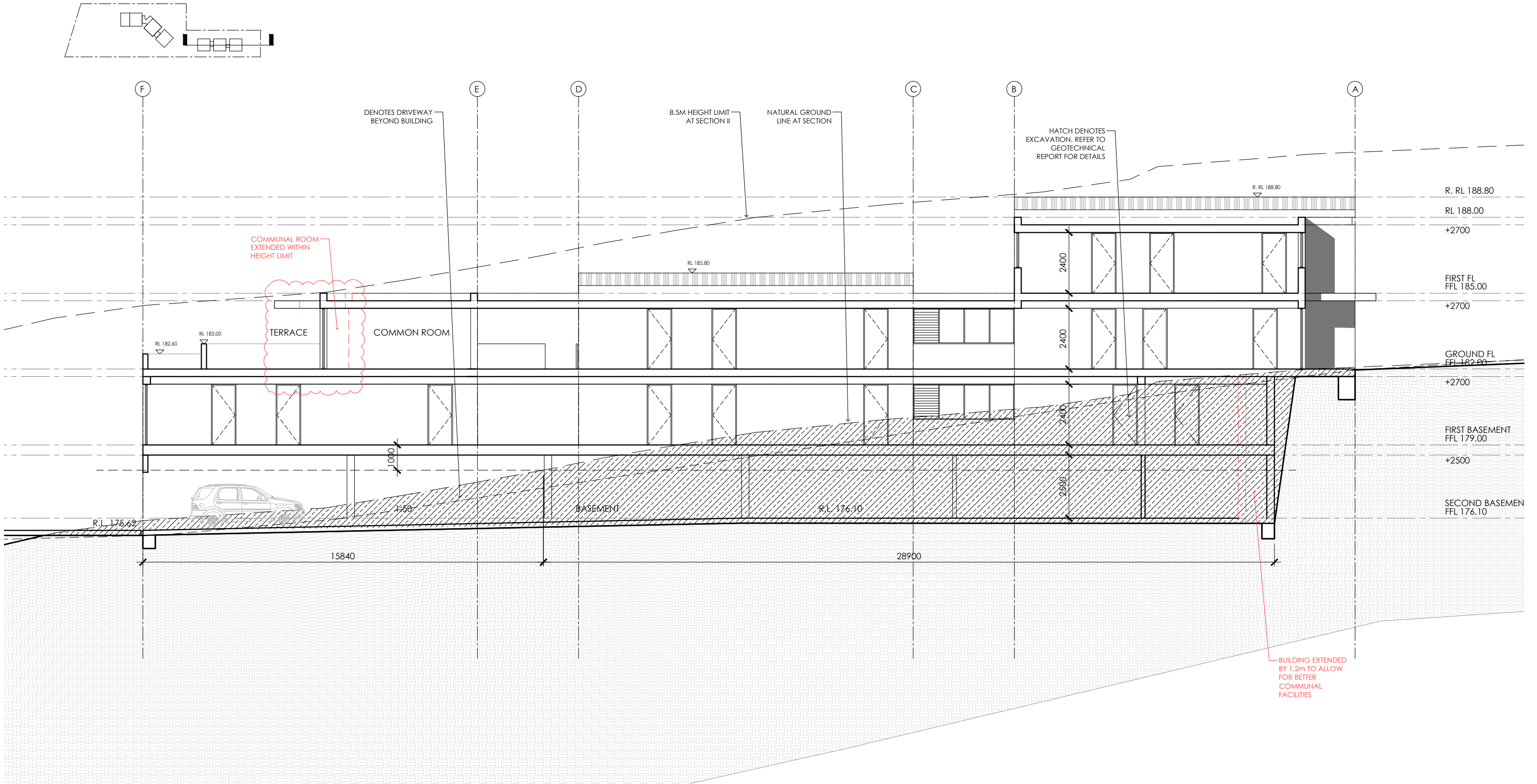
SOUTH EAST ELEVATION
NORTH WEST ELEVATION

STATUS NUMBER SCALE

DA A2.05 1:150@A3

REVISION PROJECT
DA04 WAB2
PRELIMINARY

SECTION A
UPPER BUILDING



IMPORTANT NOTES:
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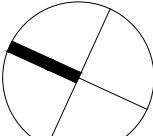
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DA02	Apr '21	DA ISSUE	BG
DA03	09/06/21	DA ISSUE	BG/OH
DA04	17/11/21	DA ISSUE	PH/OH

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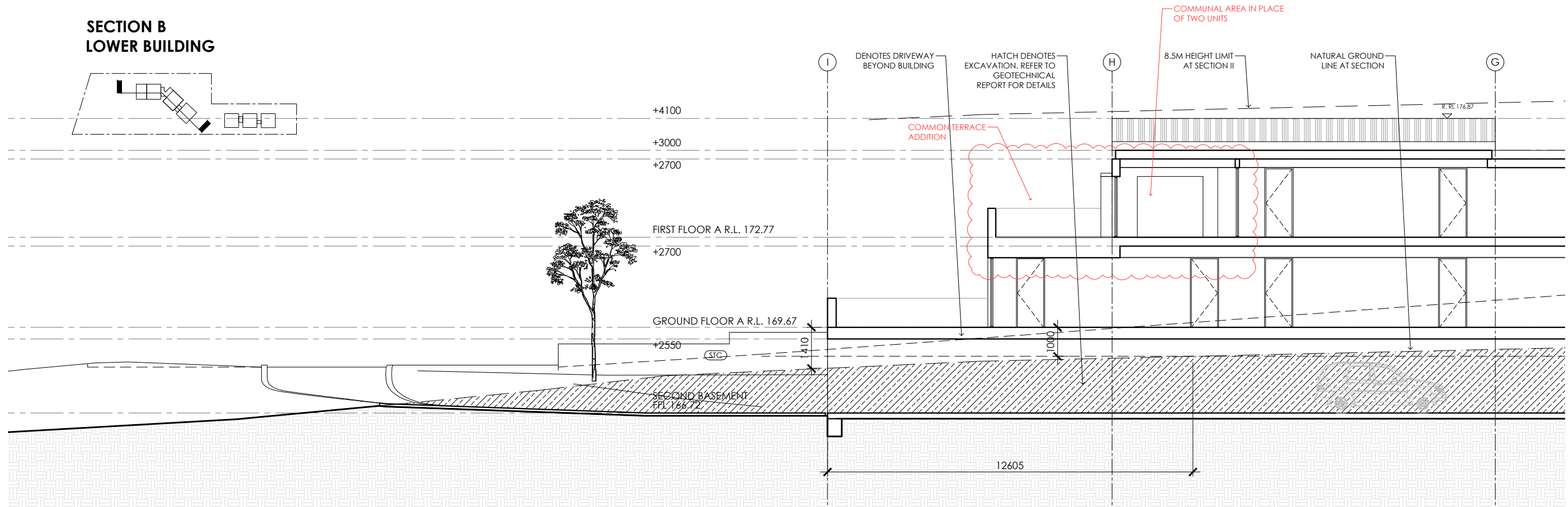
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DRAWING TITLE
**SECTION A
UPPER BUILDING**

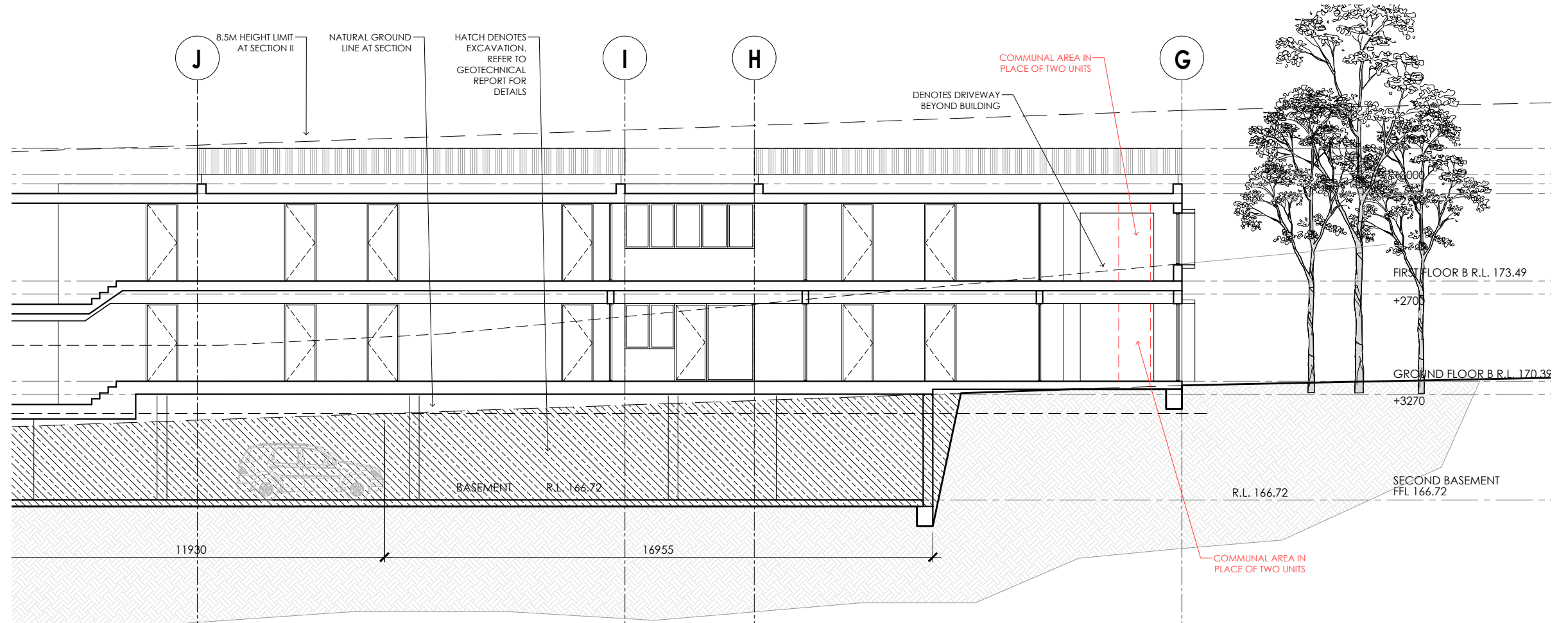
STATUS DA	NUMBER A3.01	SCALE 1:150 @ A3	REVISION DA04 PRELIMINARY	PROJECT WAB2
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SECTION B
LOWER BUILDING



CONTINUATION BELOW

CONTINUATION ABOVE



IMPORTANT NOTES:
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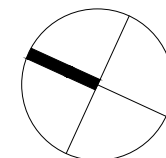
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DA04	17/11/21	DA ISSUE	PH/OH

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nominated architect Bridie Gough Reg No. 8280

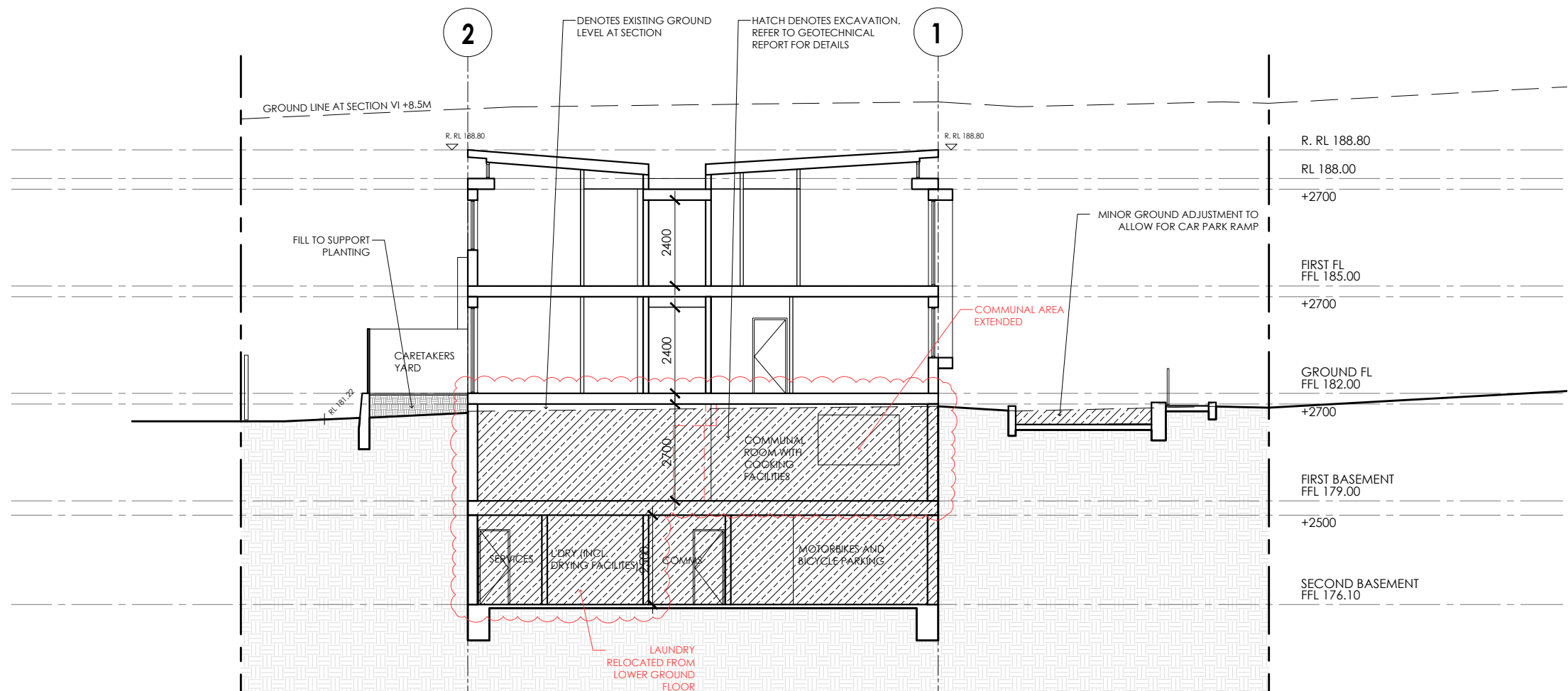
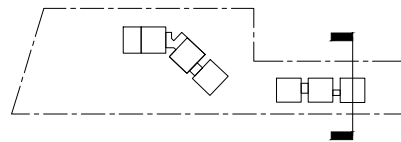
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ESSENTIAL SERVICES
ACCOMMODATION



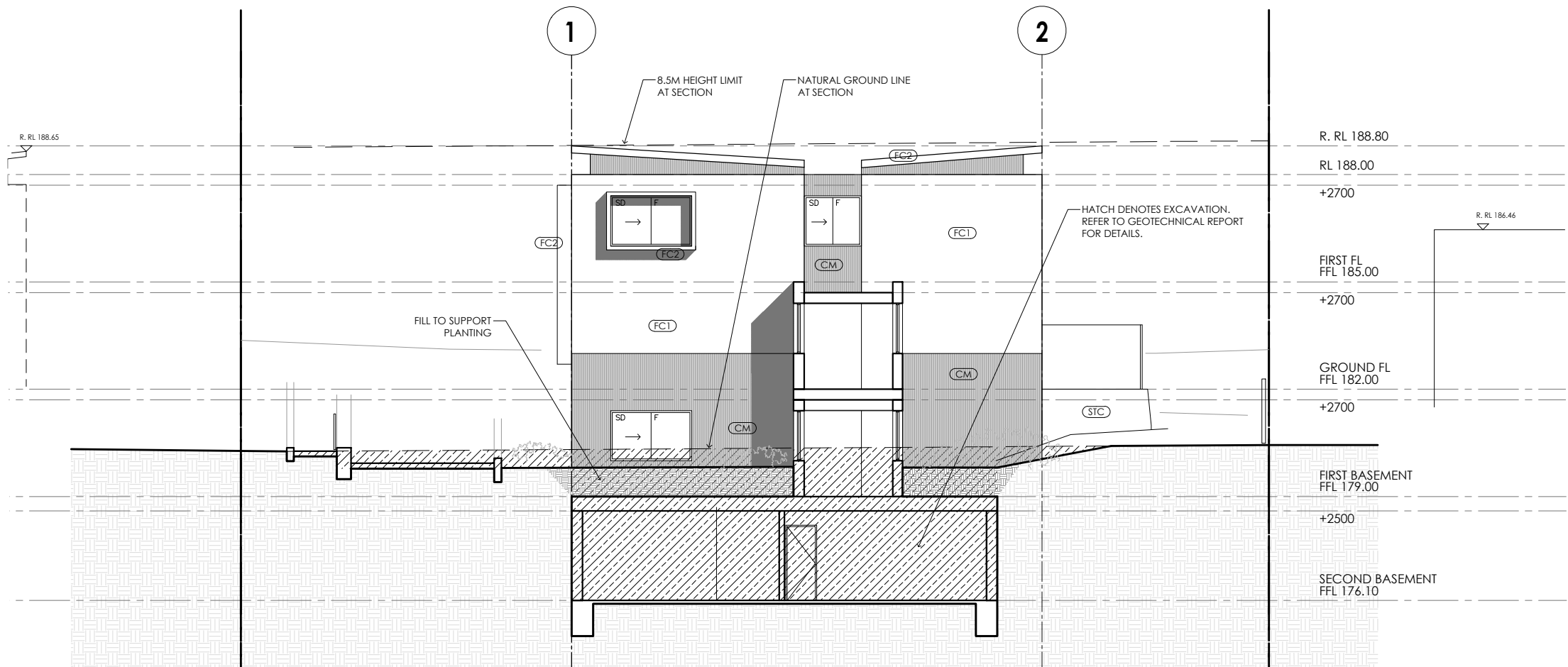
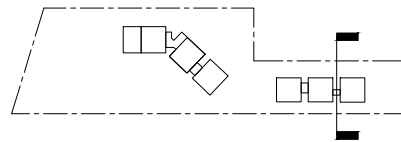
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**SECTION B
LOWER BUILDING**

STATUS DA	NUMBER A3.02	SCALE 1:150 @ A3	REVISION DA04 PRELIMINARY	PROJECT WAB2
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SECTION I
UPPER BUILDING



SECTION II
UPPER BUILDING



IMPORTANT NOTES:
Do not scale from drawings, use figured dimensions only. Ensure that the drawings used carry the latest revision no. Read in conjunction with consultant engineers drawings - refer contract drawing list.

- All dimensions to be checked on site before commencement of work.
- All discrepancies to be brought to the attention of the Architect.
- Larger scale drawings and written dimensions take precedence.
- The Statutory Planning Level is min 3.1m AHD. All levels to AHD.

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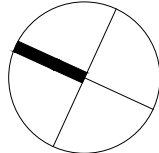
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P1	Apr '21	PRELIMINARY ISSUE	OH
DA02	Apr '21	DA ISSUE	BG
DA03	09/06/21	DA ISSUE	BG/OH
DA04	17/11/21	DA ISSUE	PH/OH

REVISION NOTES
ISSUED FOR DA LODGMENT
NOT FOR CONSTRUCTION

platform
ARCHITECTS

2/40 East Esplanade Manly 2095
p. 02 8385 9759 abn. 74602856157
nominated architect Bldg Gough Reg No. 8280

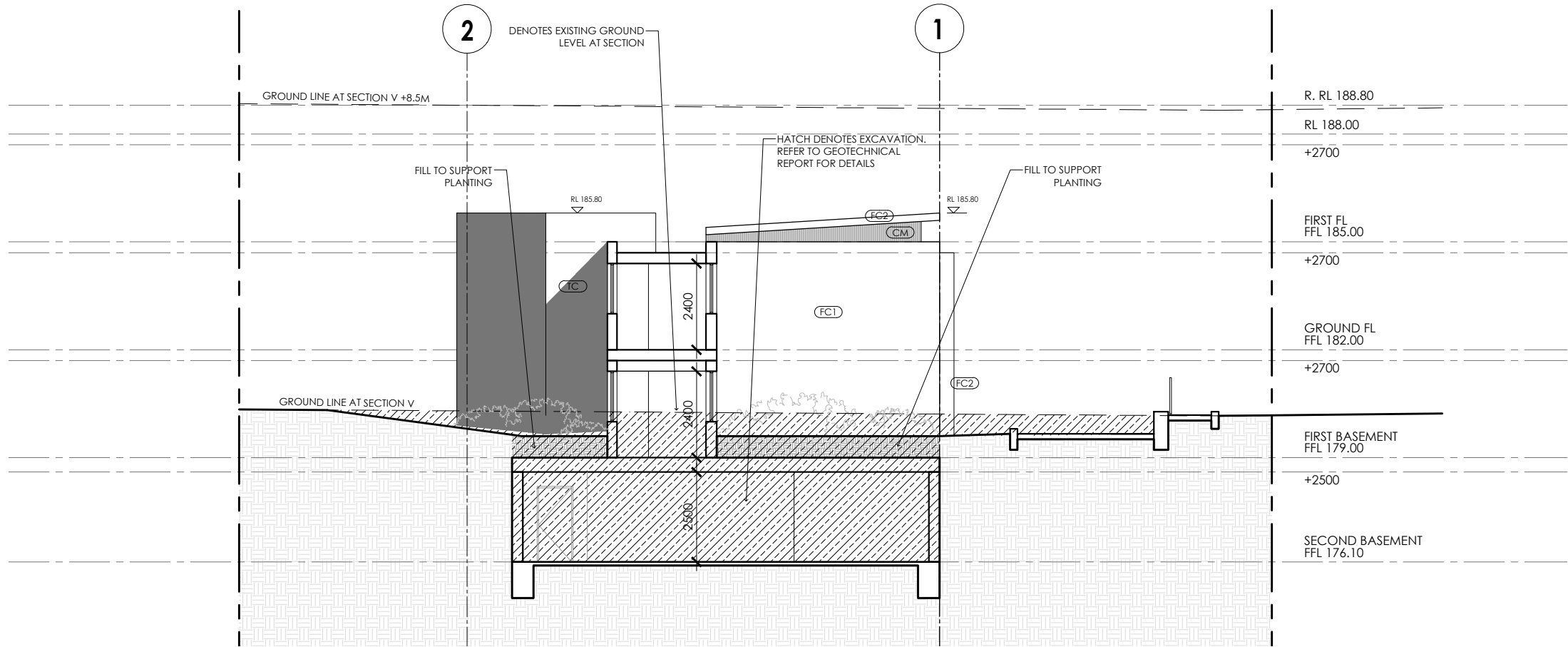
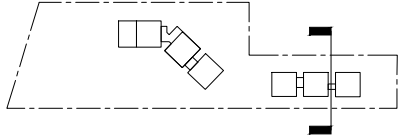
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ESSENTIAL SERVICES
ACCOMMODATION



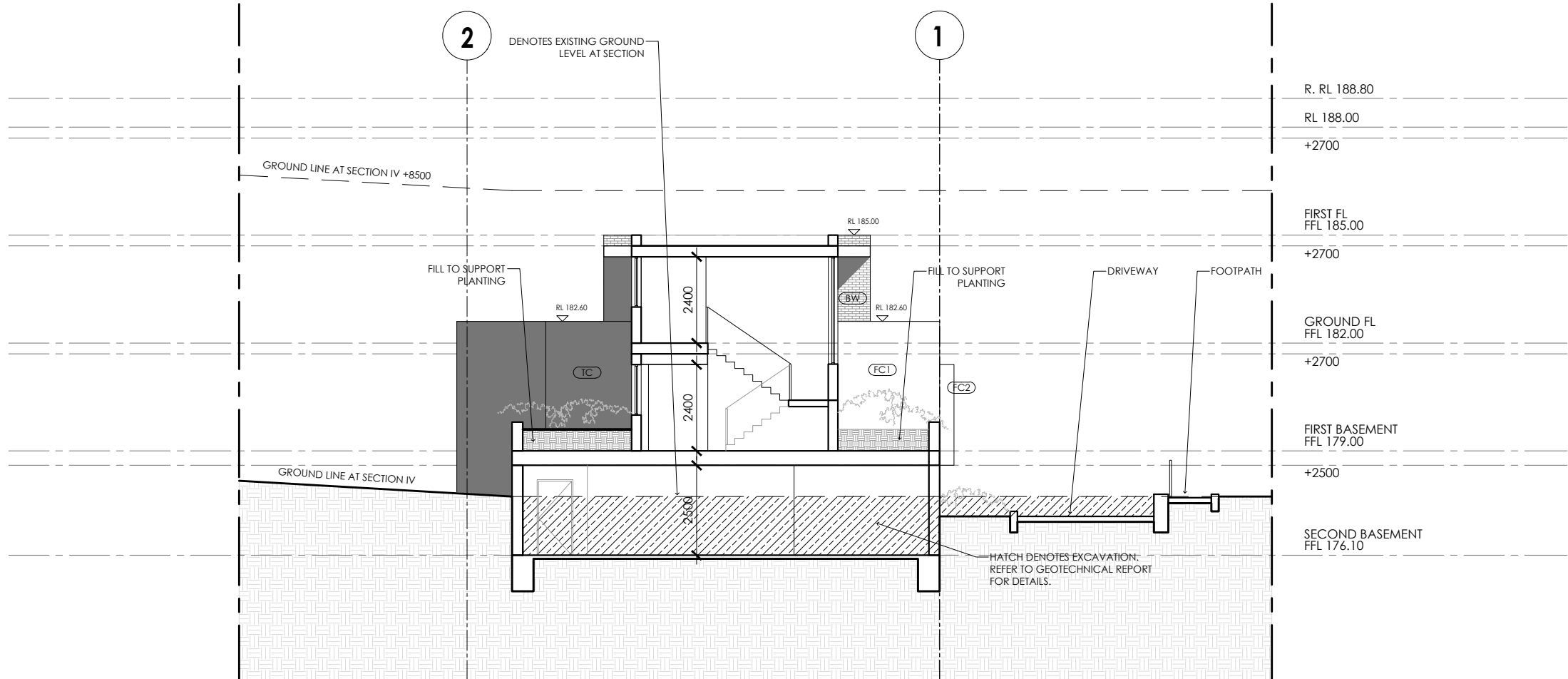
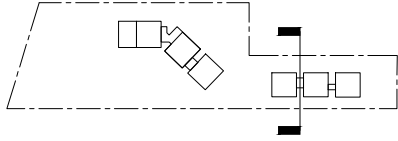
DRAWING TITLE
SECTIONS I & II
UPPER BUILDING

STATUS DA	NUMBER A3.03	SCALE 1:150 @ A3	REVISION DA04 PRELIMINARY	PROJECT WAB2
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SECTION III
UPPER BUILDING



SECTION IV
UPPER BUILDING



IMPORTANT NOTES:
Do not scale from drawings. Use figured dimensions only. Ensure that the drawings used carry the latest revision no. Read in conjunction with consultant engineers drawings - refer contract drawing list.

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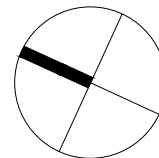
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DA03	09/06/21	DA ISSUE	BG/OH
DA04	17/11/21	DA ISSUE	PH/OH

REVISION NOTES
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platform
ARCHITECTS

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p. 02 8385 9759 abn. 74602856157
nominated architect Bldg Reg No. 8280

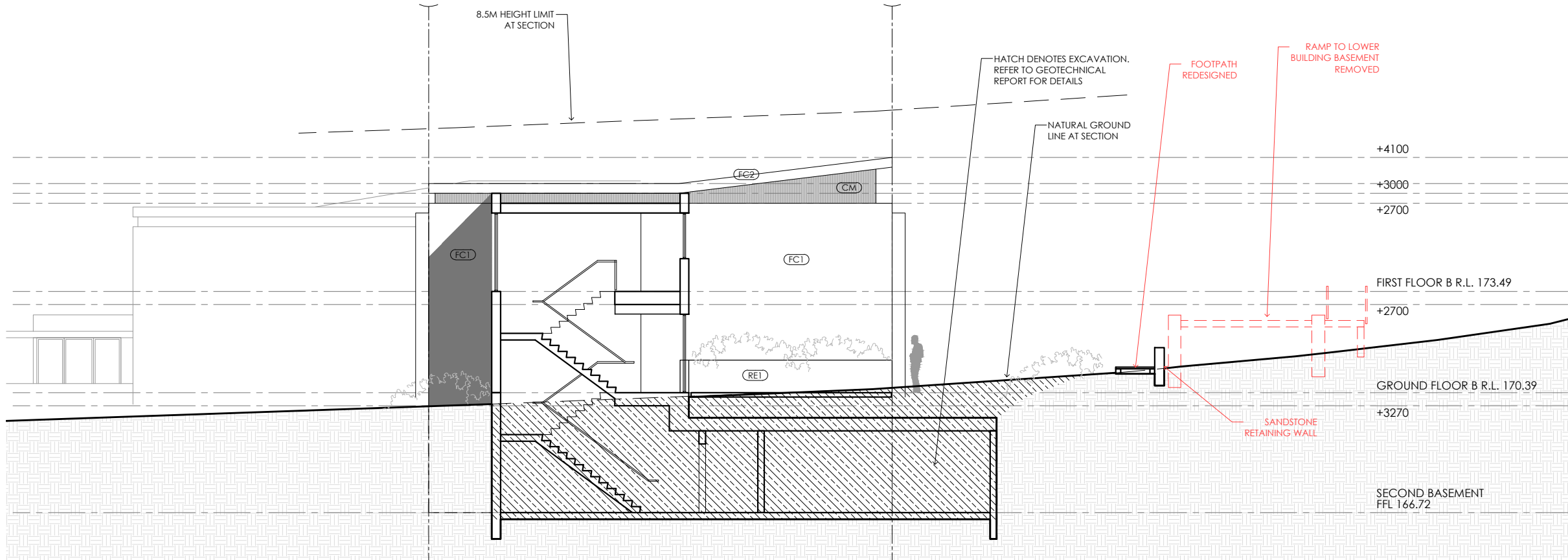
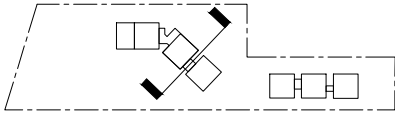
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ESSENTIAL SERVICES
ACCOMMODATION



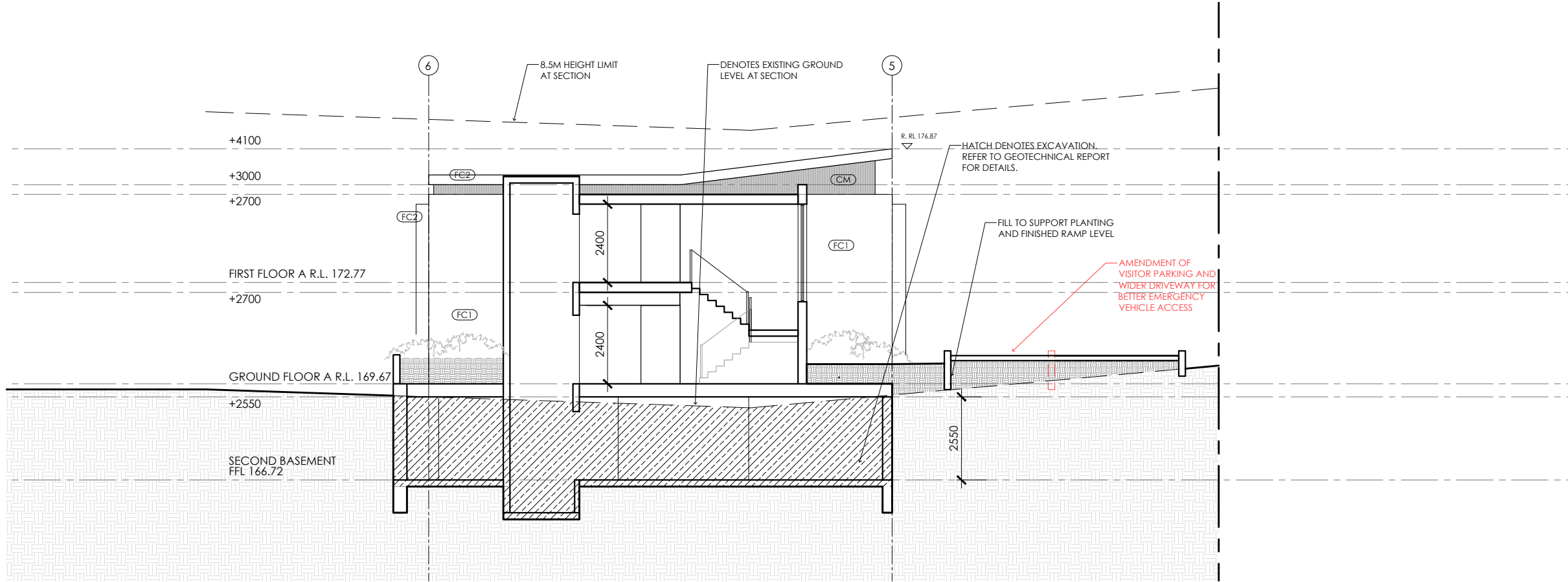
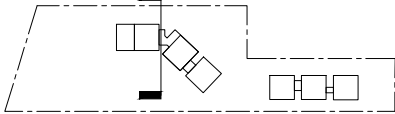
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SECTIONS III & IV
UPPER BUILDING

STATUS DA	NUMBER A3.04	SCALE 1:150 @ A3	REVISION DA04 PRELIMINARY	PROJECT WAB2
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SECTION V
LOWER BUILDING



SECTION VI
LOWER BUILDING



IMPORTANT NOTES:
Do not scale from drawings, use figured dimensions only. Ensure that the drawings used carry the latest revision no. Read in conjunction with consultant engineers drawings - refer contract drawing list.

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- All discrepancies to be brought to the attention of the Architect.
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- The Statutory Planning Level is min 3.1m AHD. All levels to AHD.

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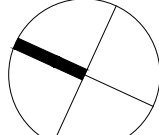
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DA03	09/06/21	DA ISSUE	BG/OH
DA04	17/11/21	DA ISSUE	PH/OH

REVISION NOTES
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ARCHITECTS

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nominated architect Bridie Gough Reg No. 8280

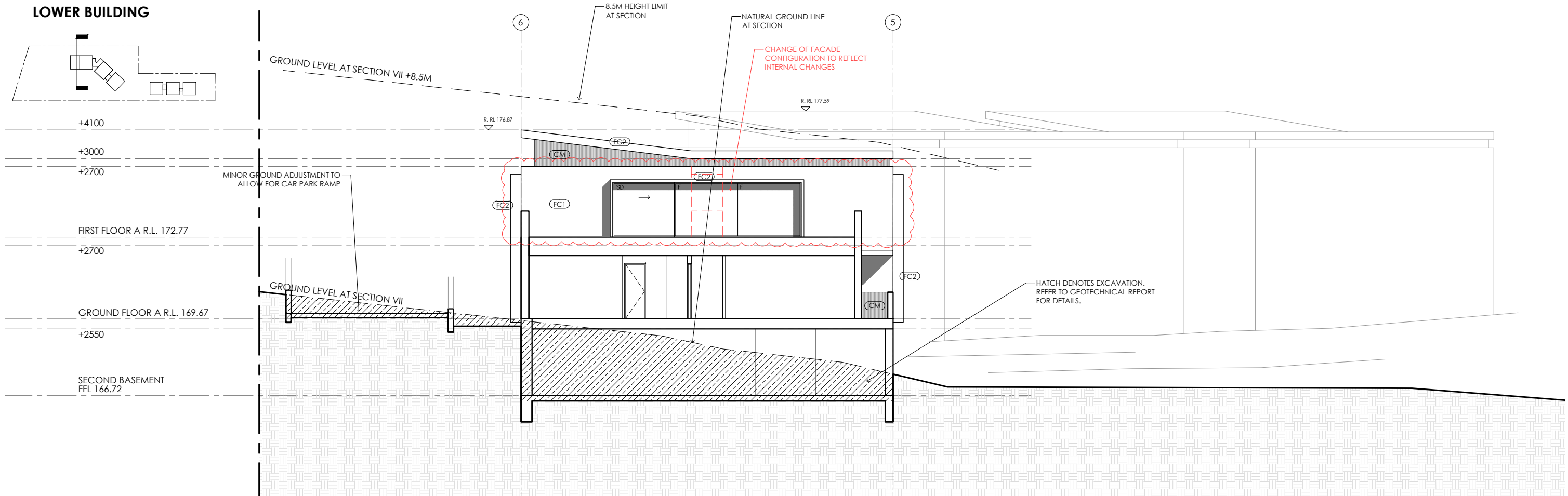
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ESSENTIAL SERVICES
ACCOMMODATION



DRAWING TITLE
**SECTIONS V & VI
LOWER BUILDING**

STATUS DA	NUMBER A3.05	SCALE 1:150 @ A3	REVISION DA04 PRELIMINARY	PROJECT WAB2
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SECTION VII
LOWER BUILDING



IMPORTANT NOTES:
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- All discrepancies to be brought to the attention of the Architect.
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- The Estimating Planning Level is min 3.1m AHD. All levels to AHD.

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P1	Apr '21	PRELIMINARY ISSUE	OH
DA02	Apr '21	DA ISSUE	BG
DA03	09/06/21	DA ISSUE	BG/OH
DA04	17/11/21	DA ISSUE	PH/OH

REVISION NOTES

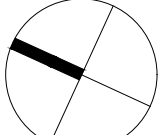
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platform
ARCHITECTS

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p. 02 8385 9759 abn. 74602856157
nominated architect Bridie Gough Reg No. 8280

CLIENT

NORTHERN BEACHES
ESSENTIAL SERVICES
ACCOMMODATION



DRAWING TITLE

SECTION VII
LOWER BUILDING

STATUS

DA

NUMBER

A3.06

SCALE

1:150 @ A3

REVISION

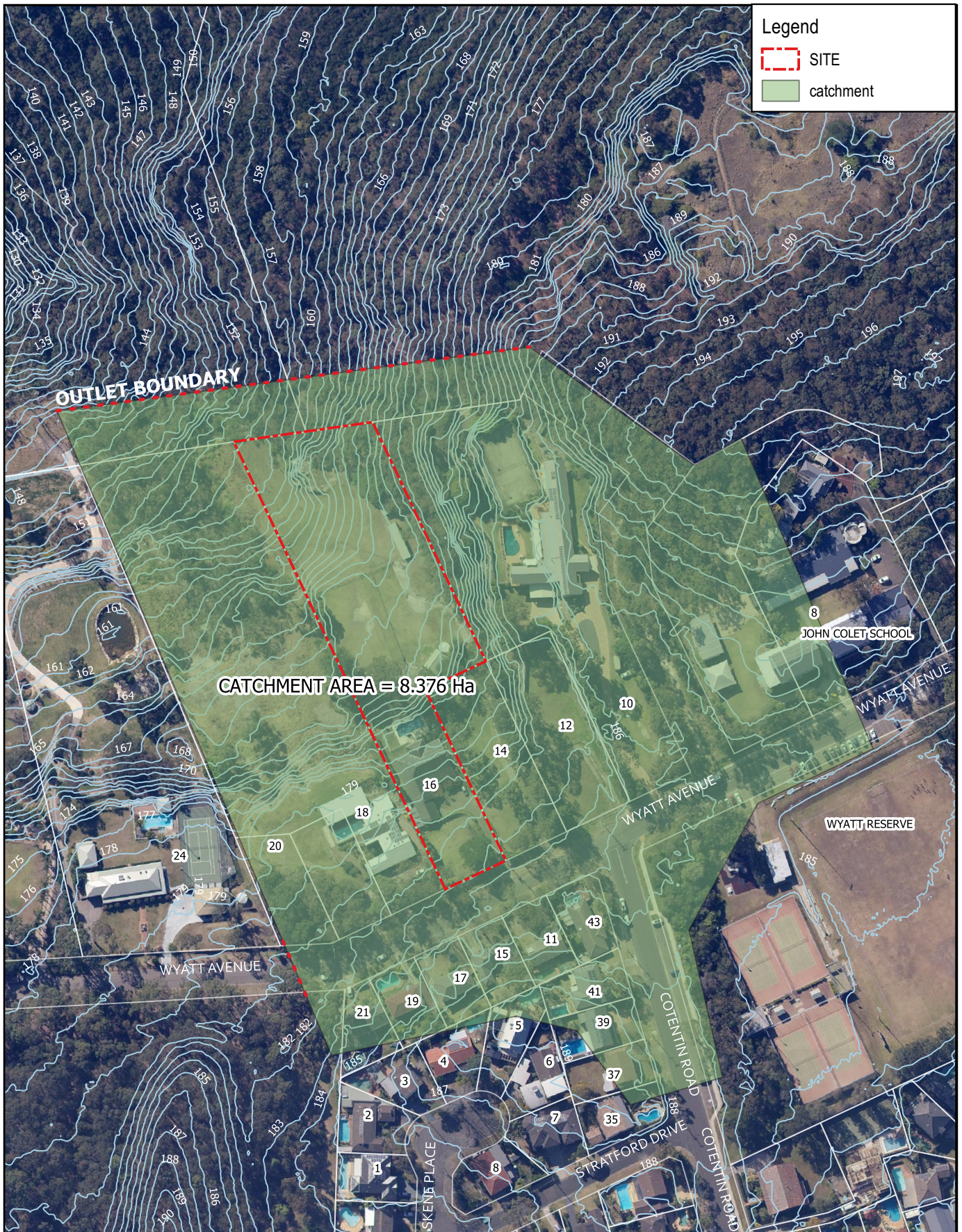
DA04
PRELIMINARY

PROJECT

WAB2

ANNEXURE C

ACOR Flood Plans, Reference NSW210450, Sheets F1 to F4 (Revision 1, Dated 18th May 2021), F10, F11, F13, F15, F16, F17, F20 and F21 (Revision 3, dated 2nd December 2021).



Title: CATHMENT MAP & MODEL BOUNDARY CONDITION



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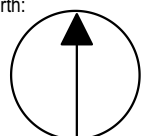
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Project: PROPOSED BOARDING HOUSE
DEVELOPMENT

16 WYATT AVENUE
BELROSE

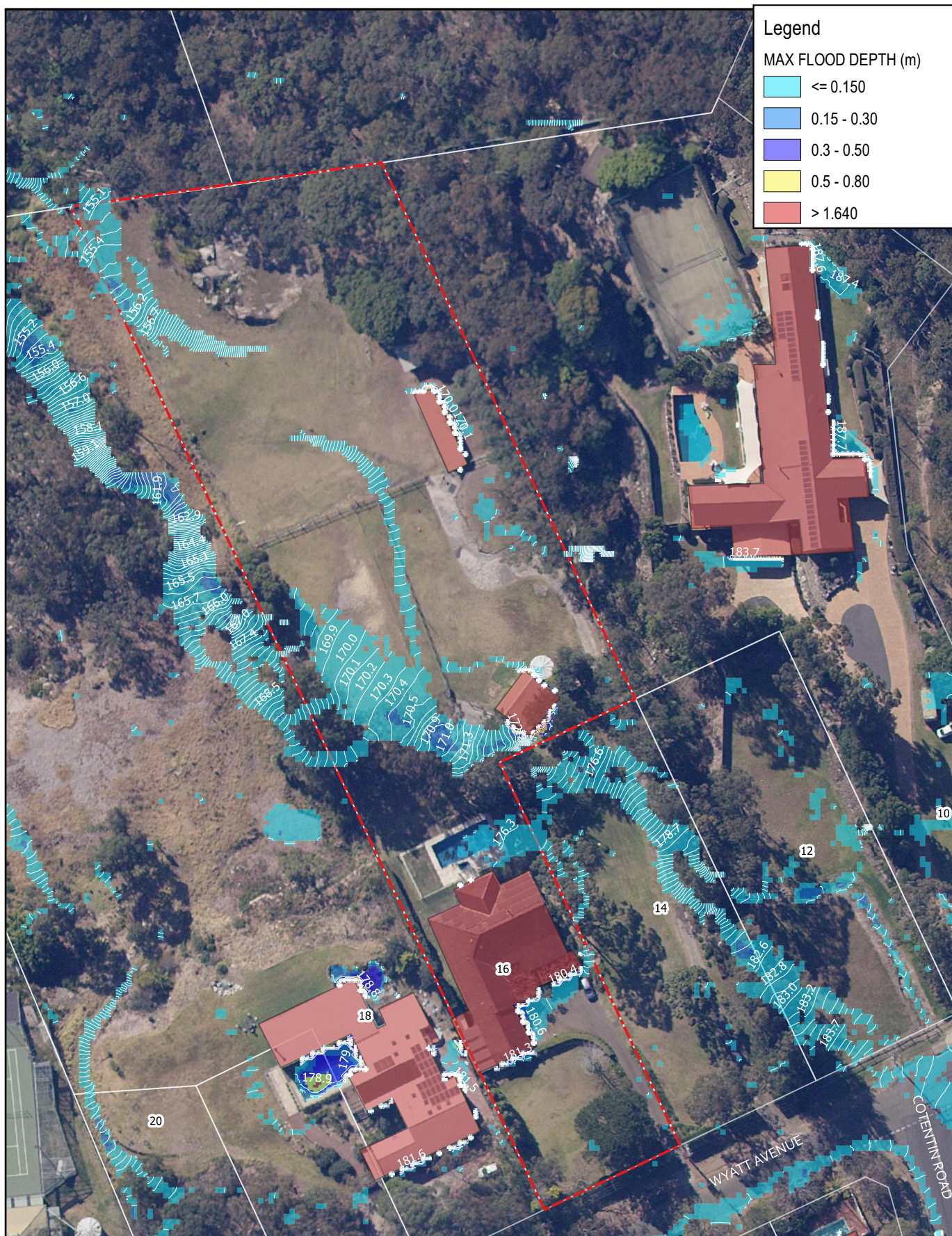
Client: JOHN HOLMAN

North:



Job Number: NSW210450	Sheet: F1	Revision: 1	Date: 18.05.2021	Designed: KP	Reviewd: RE	Scale: 1:1000
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Title: 1% AEP MAXIMUM FLOOD DEPTH - PRE DEVELOPMENT



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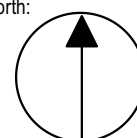
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Project: PROPOSED BOARDING HOUSE
DEVELOPMENT

16 WYATT AVENUE
BELROSE

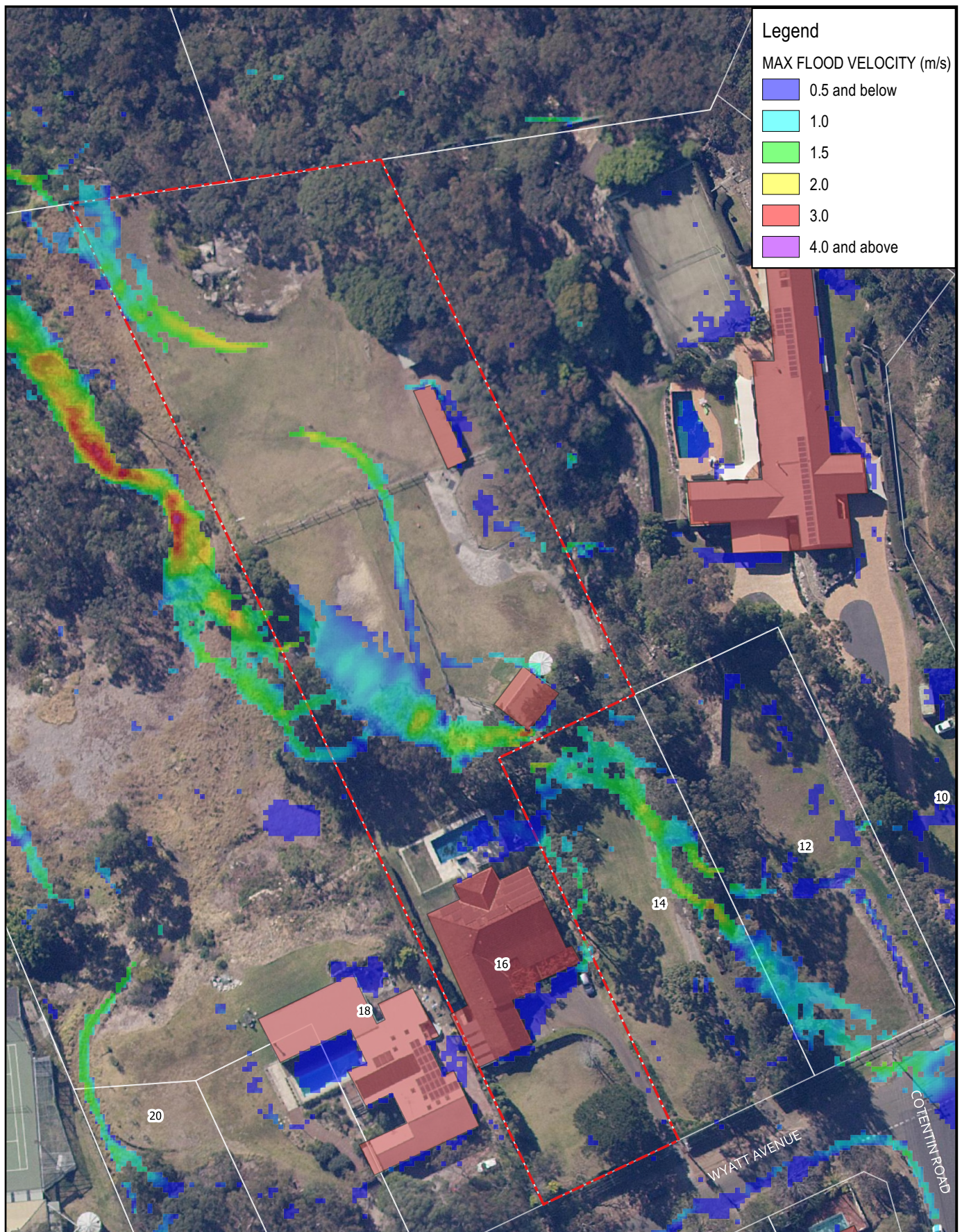
Client: JOHN HOLMAN

North:



Job Number: NSW210450	Sheet: F2	Revision: 1	Date: 18.05.2021	Designed: KP	Reviewd: RE	Scale: 1:1000
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Title: 1% AEP MAXIMUM FLOOD VELOCITY - PRE DEVELOPMENT



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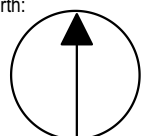
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Project: PROPOSED BOARDING HOUSE
DEVELOPMENT

16 WYATT AVENUE
BELROSE

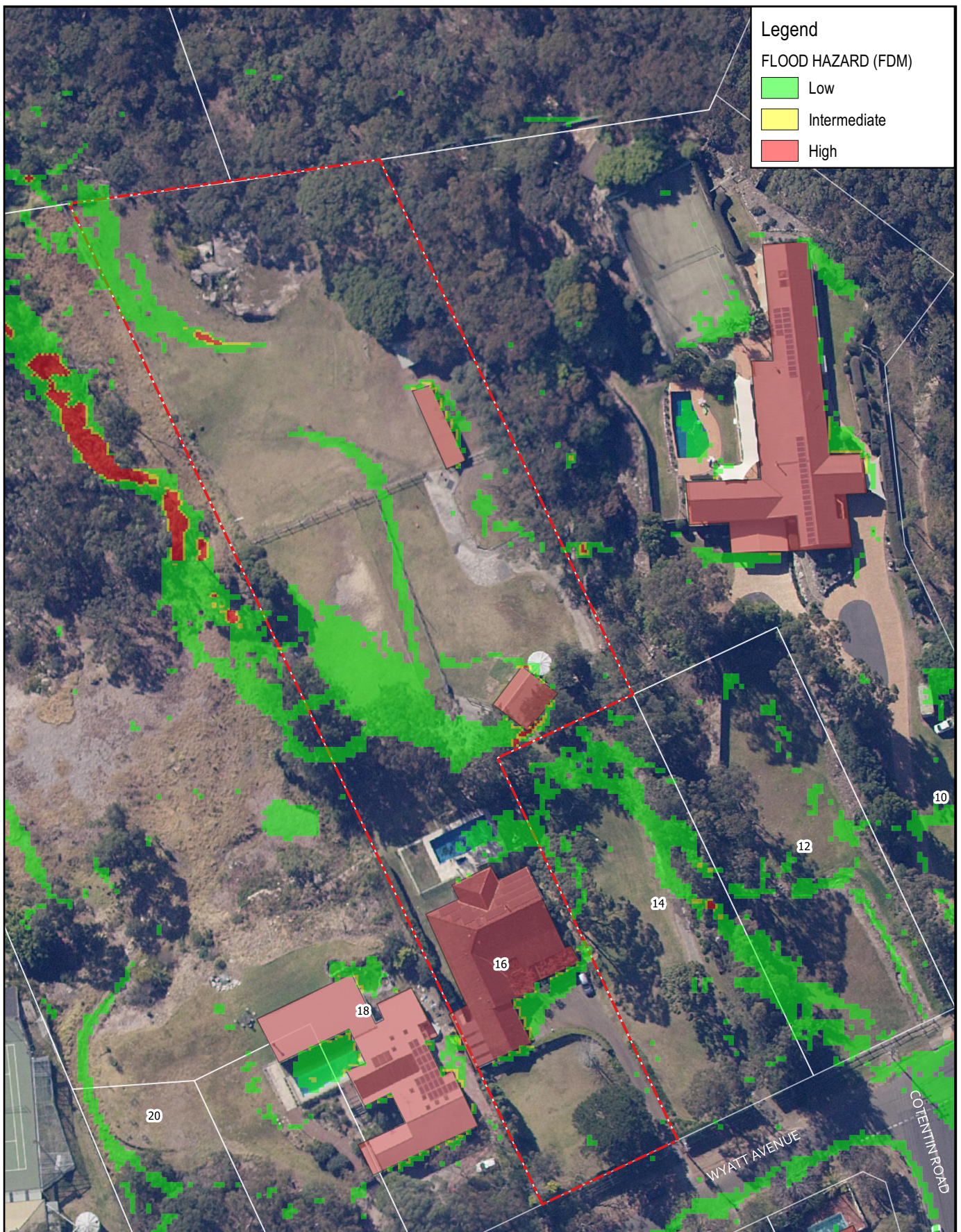
Client: JOHN HOLMAN

North:



Job Number: NSW210450	Sheet: F3	Revision: 1	Date: 18.05.2021	Designed: KP	Reviewd: RE	Scale: 1:1000
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Title: 1% AEP MAXIMUM FLOOD HAZARD - PRE DEVELOPMENT



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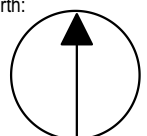
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Project: PROPOSED BOARDING HOUSE
DEVELOPMENT

16 WYATT AVENUE
BELROSE

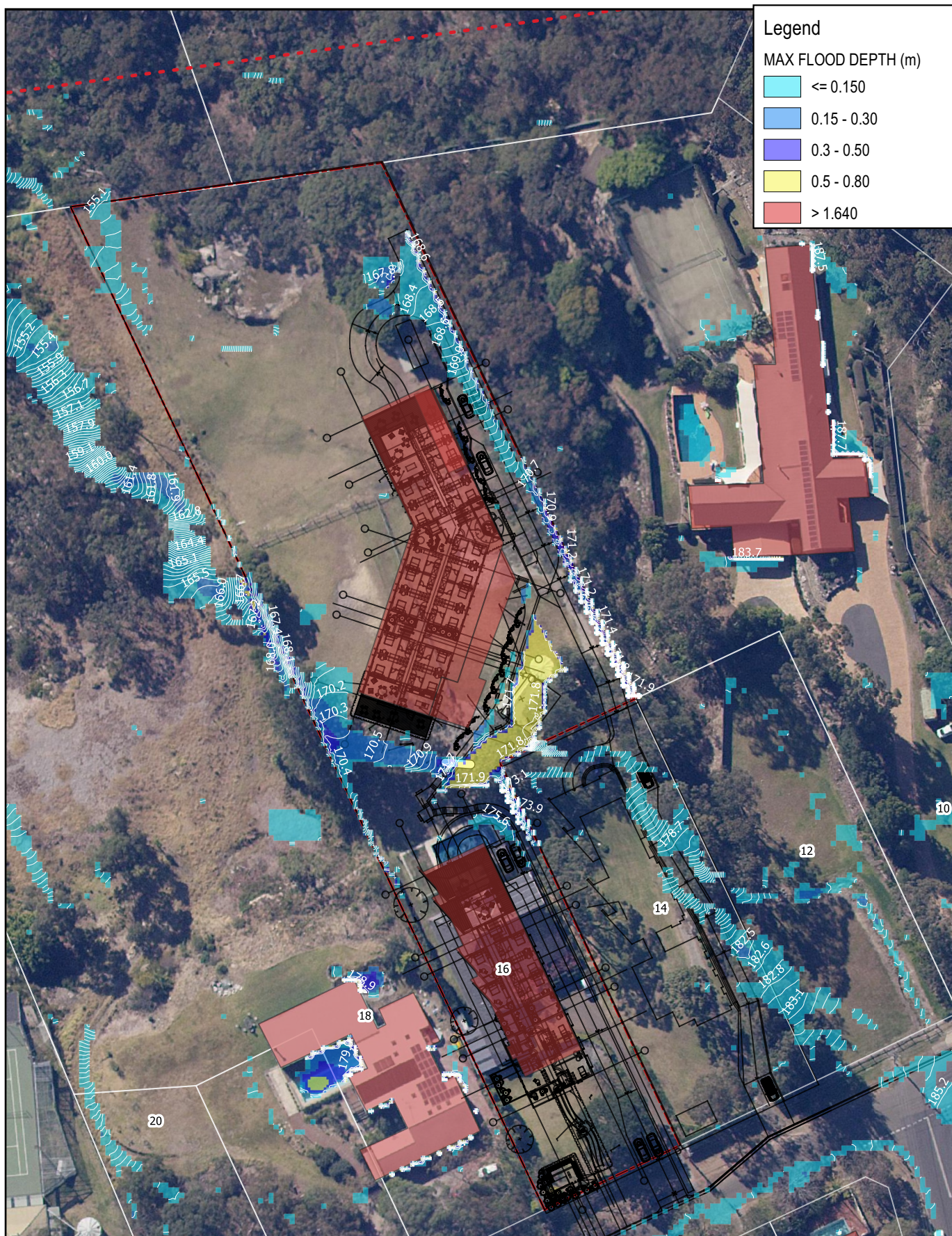
Client: JOHN HOLMAN

North:



Job Number: NSW210450	Sheet: F4	Revision: 1	Date: 18.05.2021	Designed: KP	Reviewd: RE	Scale: 1:1000
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Title: 1% AEP MAXIMUM FLOOD DEPTH WITH 50% BLOCKED CULVERT- POST DEVELOPMENT



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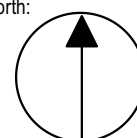
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Project: PROPOSED BOARDING HOUSE
DEVELOPMENT

16 WYATT AVENUE
BELROSE

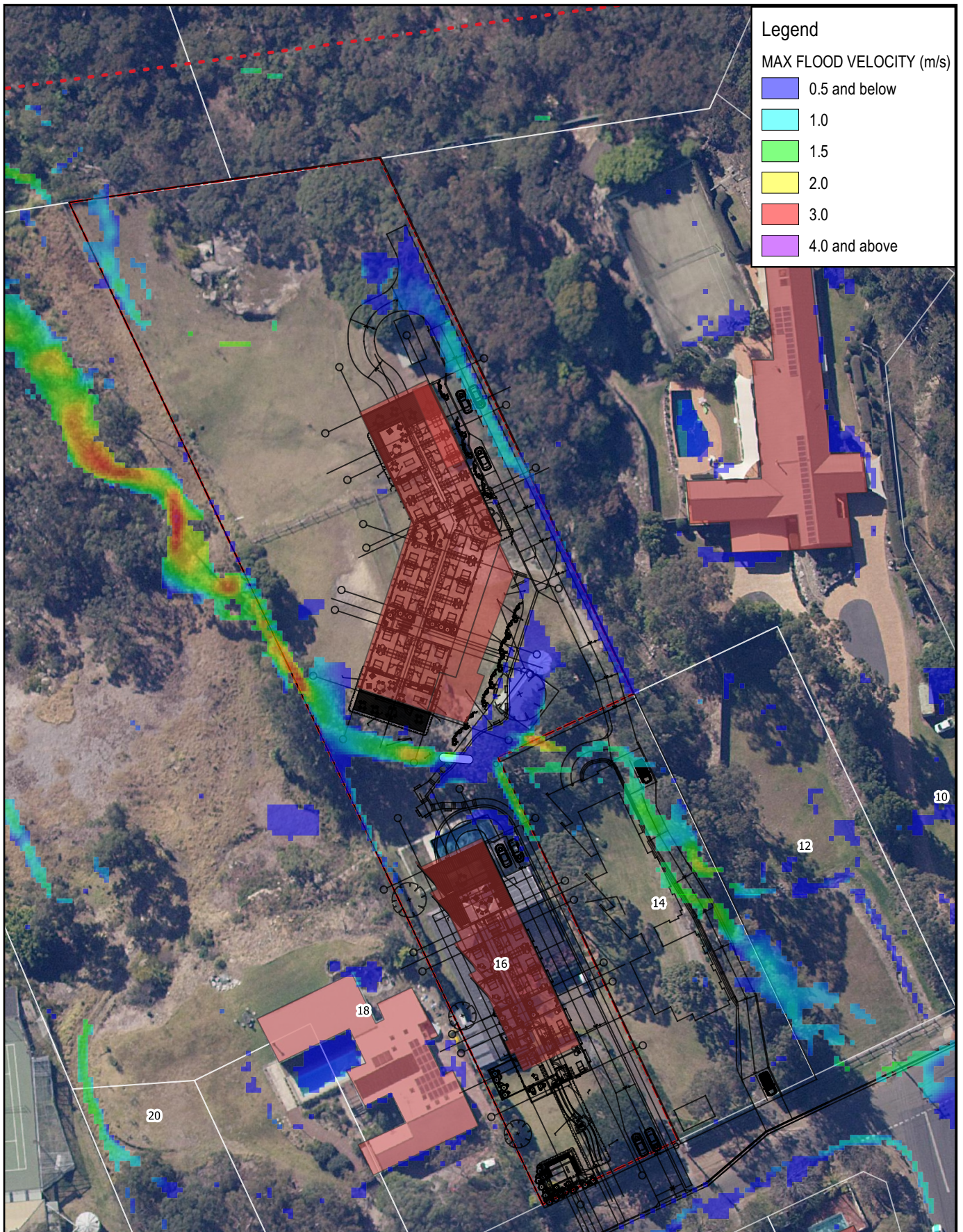
Client: NORTHERN BEACHES ESSENTIAL
SERVICES ACCOMODATION

North:



Job Number: NSW210450	Sheet: F10	Revision: 3	Date: 02.12.2021	Designed: KP	Reviewd: RE	Scale: 1:1000
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Title: 1% AEP MAXIMUM FLOOD VELOCITY WITH 50% BLOCKED CULVERT- POST DEVELOPMENT



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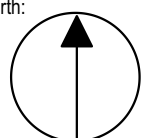
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Project: PROPOSED BOARDING HOUSE
DEVELOPMENT

16 WYATT AVENUE
BELROSE

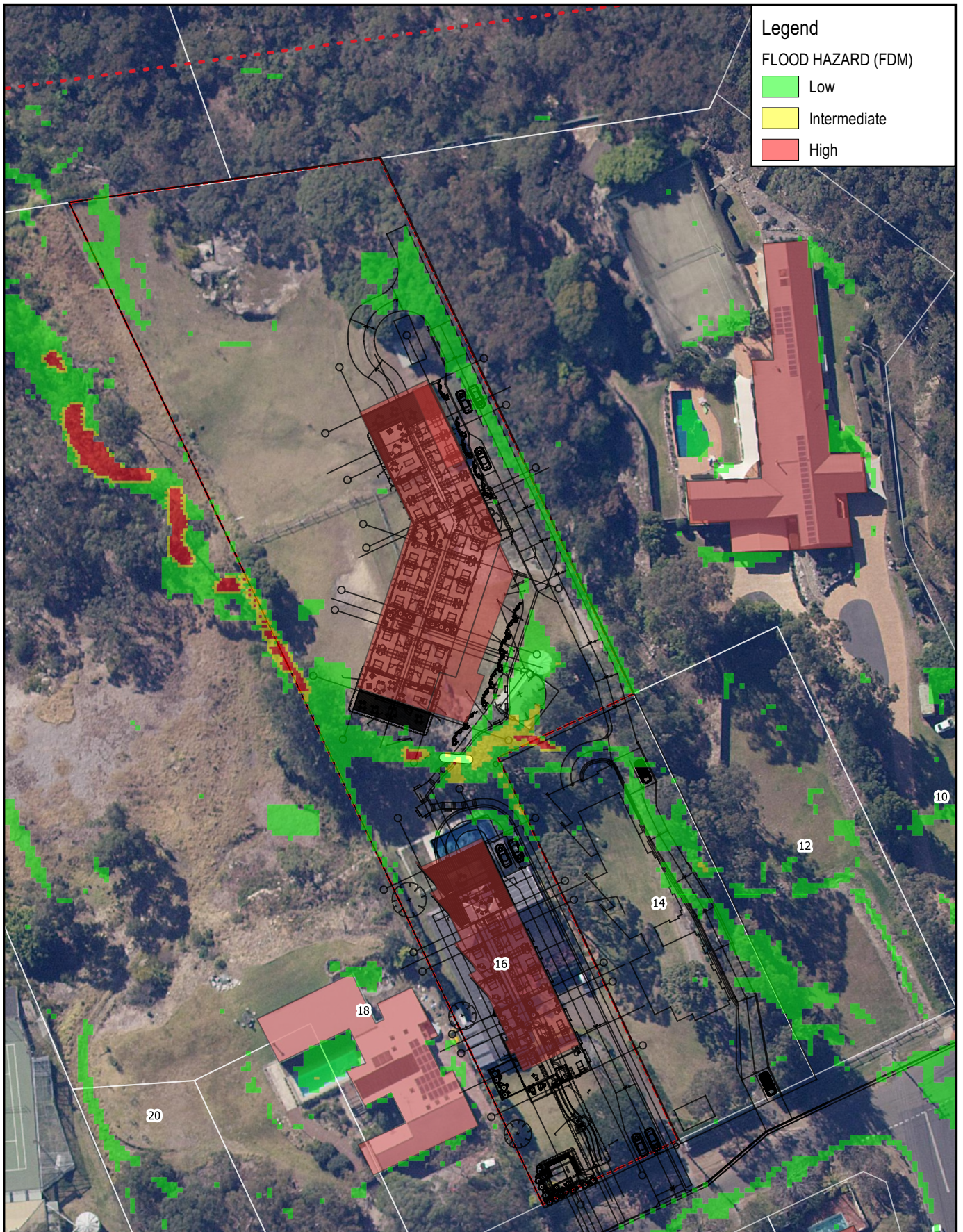
Client: NORTHERN BEACHES ESSENTIAL
SERVICES ACCOMODATION

North:



Job Number: NSW210450	Sheet: F11	Revision: 3	Date: 02.12.2021	Designed: KP	Reviewd: RE	Scale: 1:1000
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Title: 1% AEP MAXIMUM FLOOD HAZARD WITH 50% BLOCKED CULVERT - POST DEVELOPMENT



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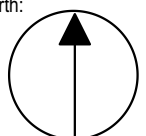
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Project: PROPOSED BOARDING HOUSE
DEVELOPMENT

16 WYATT AVENUE
BELROSE

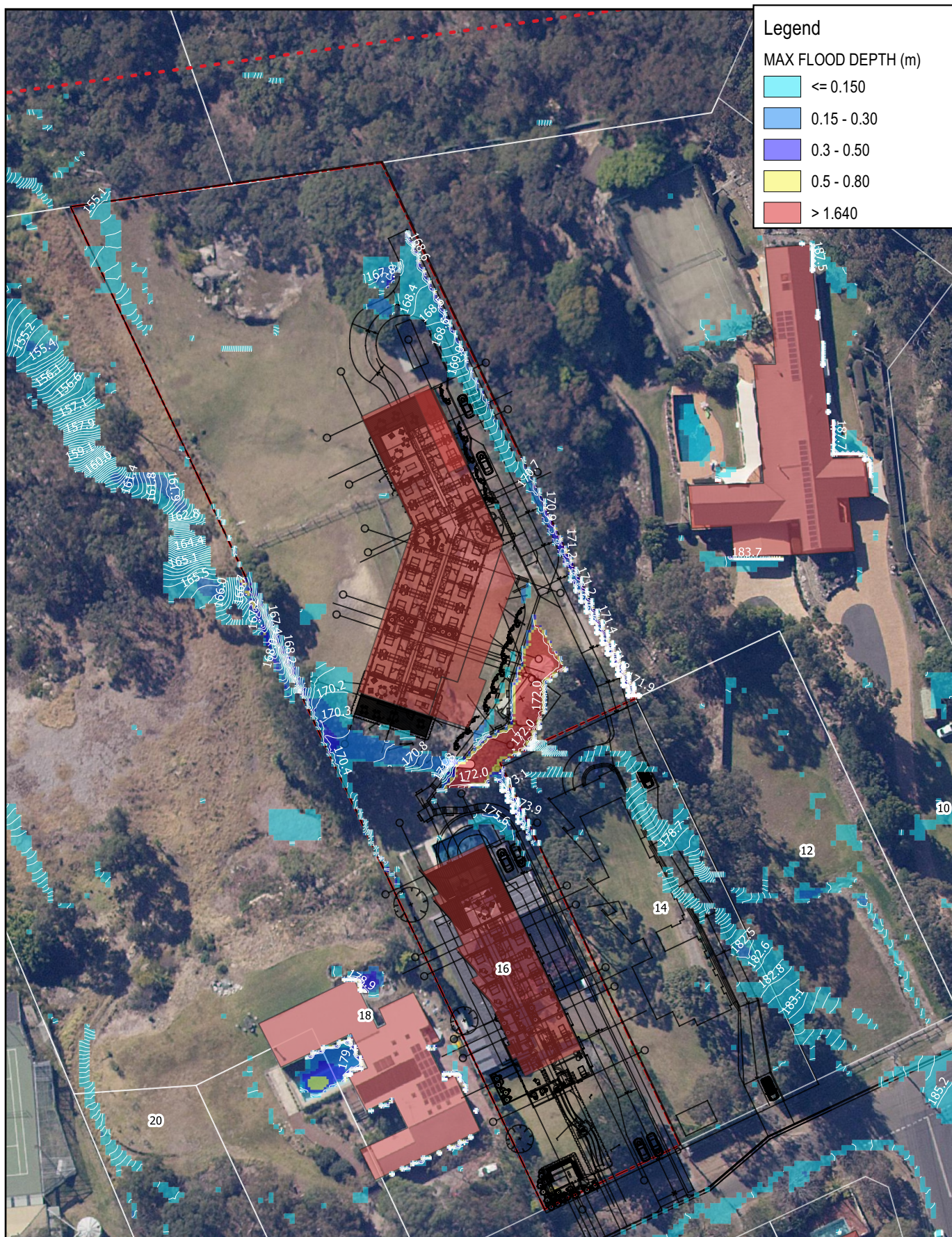
Client: NORTHERN BEACHES ESSENTIAL SERVICES
ACCOMODATION

North:



Job Number: NSW210450	Sheet: F13	Revision: 3	Date: 02.12.2021	Designed: KP	Reviewd: RE	Scale: 1:1000
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Title: 1% AEP MAXIMUM FLOOD DEPTH WITH 100% BLOCKED CULVERT- POST DEVELOPMENT



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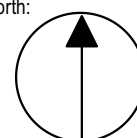
ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

Project: PROPOSED BOARDING HOUSE
DEVELOPMENT

16 WYATT AVENUE
BELROSE

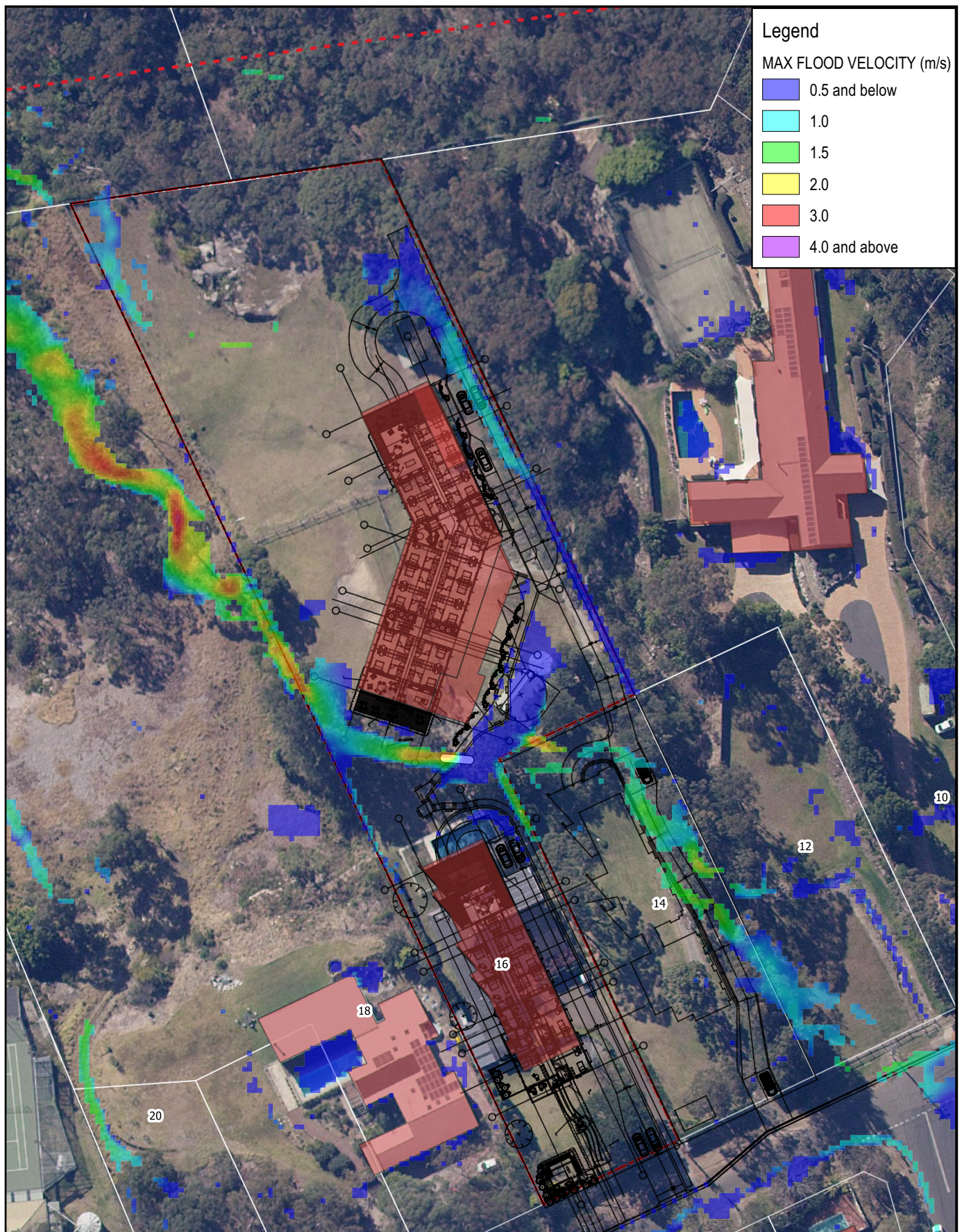
Client: NORTHERN BEACHES ESSENTIAL
SERVICES ACCOMODATION

North:



Job Number: NSW210450	Sheet: F15	Revision: 3	Date: 02.12.2021	Designed: KP	Reviewd: RE	Scale: 1:1000
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Title: 1% AEP MAXIMUM FLOOD VELOCITY WITH 100% BLOCKED CULVERT- POST DEVELOPMENT



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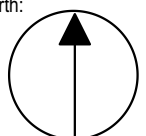
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Project: PROPOSED BOARDING HOUSE
DEVELOPMENT

16 WYATT AVENUE
BELROSE

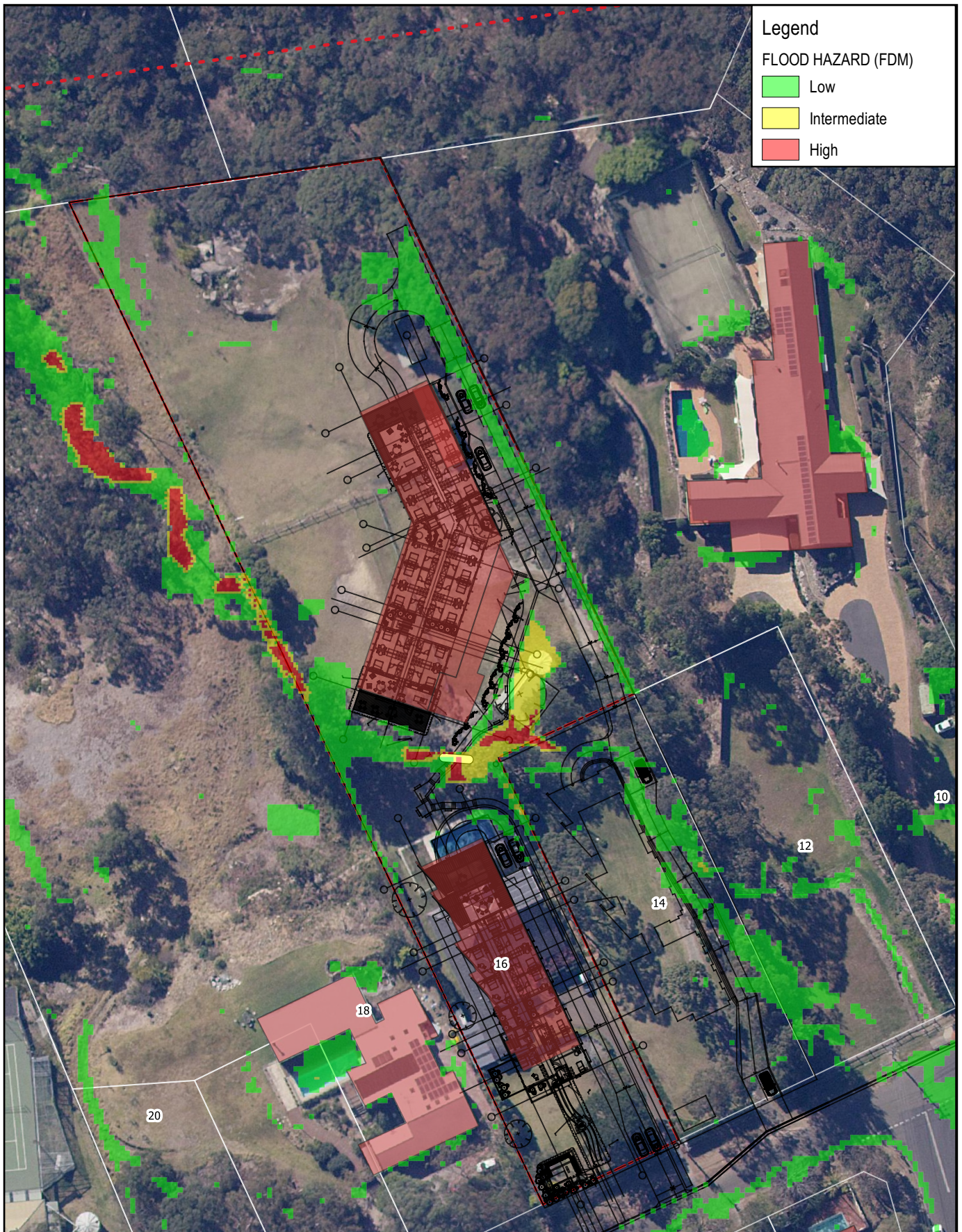
Client: NORTHERN BEACHES ESSENTIAL
SERVICES ACCOMODATION

North:



Job Number: NSW210450	Sheet: F16	Revision: 3	Date: 02.12.2021	Designed: KP	Reviewd: RE	Scale: 1:1000
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Title: 1% AEP MAXIMUM FLOOD HAZARD WITH 100% BLOCKED CULVERT - POST DEVELOPMENT



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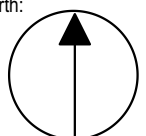
ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

Project: PROPOSED BOARDING HOUSE
DEVELOPMENT

16 WYATT AVENUE
BELROSE

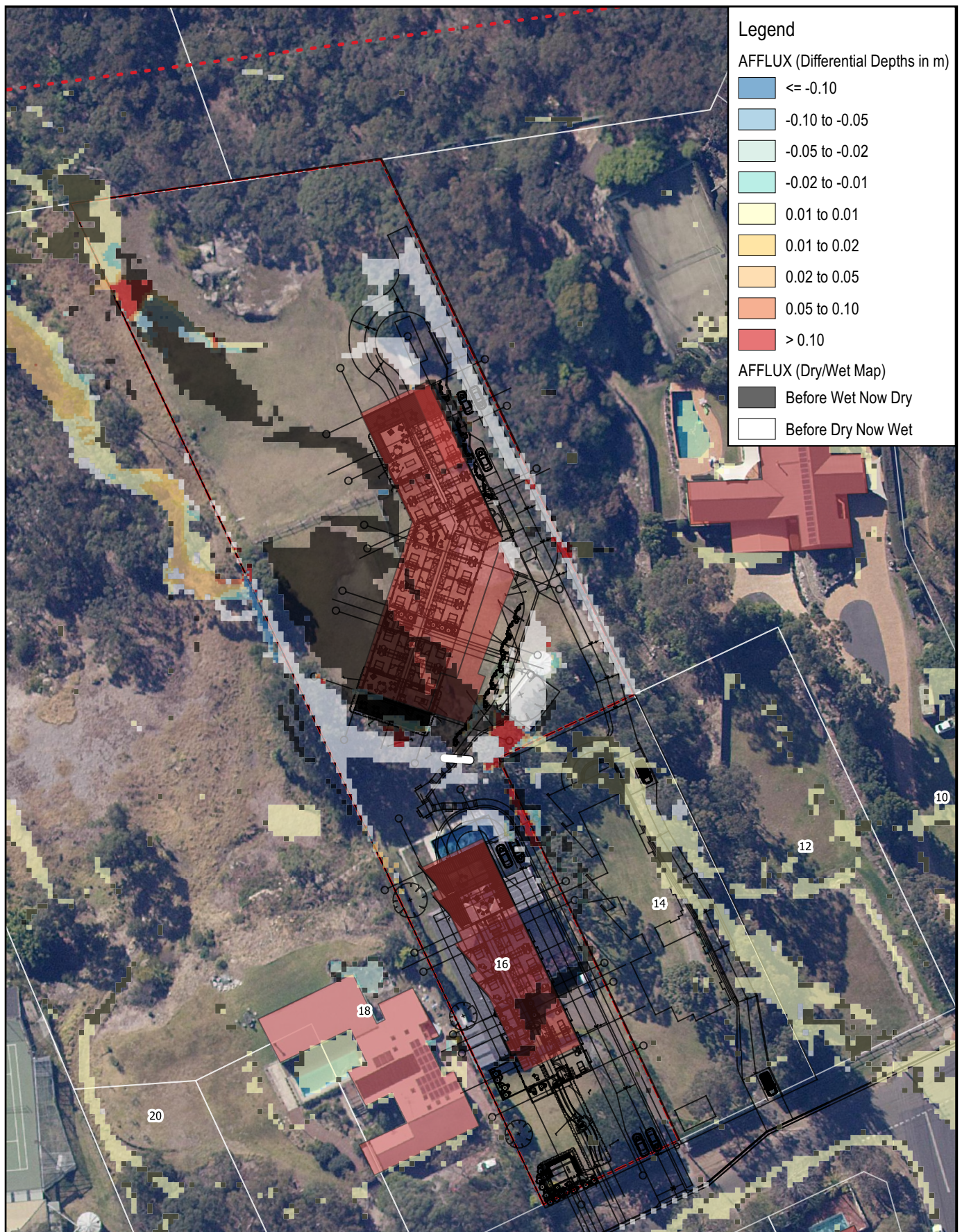
Client: NORTHERN BEACHES ESSENTIAL SERVICES
ACCOMODATION

North:



Job Number: NSW210450	Sheet: F17	Revision: 3	Date: 02.12.2021	Designed: KP	Reviewd: RE	Scale: 1:1000
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Title: 1% AEP MAXIMUM FLOOD AFFLUX MAP WITH 50% BLOCKED CULVERTS - POST DEVELOPMENT



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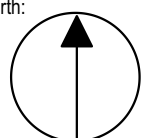
ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

Project: PROPOSED BOARDING HOUSE
DEVELOPMENT

16 WYATT AVENUE
BELROSE

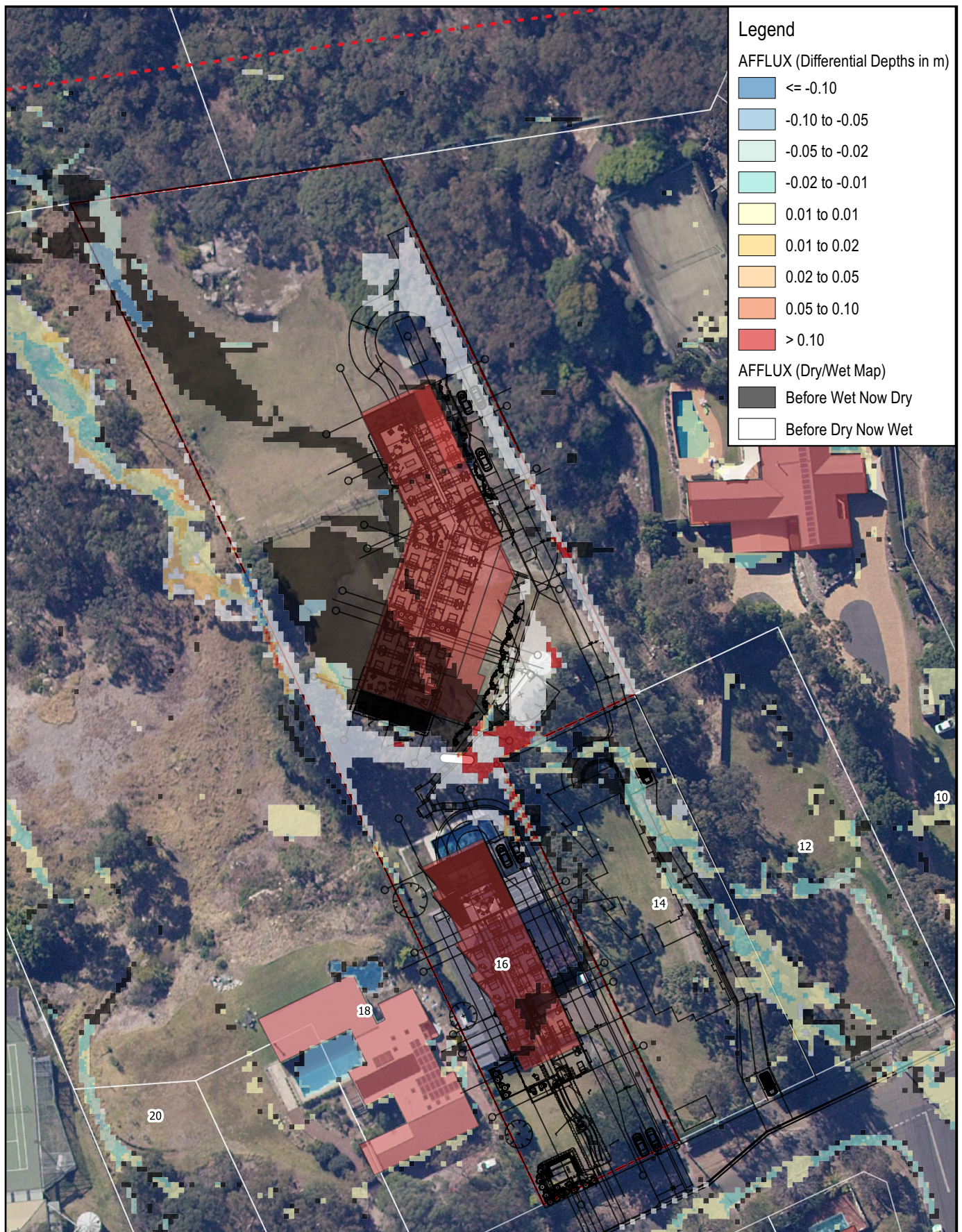
Client: NORTHERN BEACHES ESSENTIAL
SERVICES ACCOMODATION

North:



Job Number: NSW210450	Sheet: F20	Revision: 3	Date: 02.12.2021	Designed: KP	Reviewd: RE	Scale: 1:1000
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Title: 1% AEP MAXIMUM FLOOD AFFLUX MAP WITH 100% BLOCKED CULVERTS - POST DEVELOPMENT



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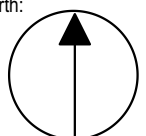
ENGINEERS | MANAGERS | INFRASTRUCTURE PLANNERS | DEVELOPMENT CONSULTANTS

Project: PROPOSED BOARDING HOUSE
DEVELOPMENT

16 WYATT AVENUE
BELROSE

Client: NORTHERN BEACHES ESSENTIAL
SERVICES ACCOMODATION

North:



Job Number: NSW210450	Sheet: F21	Revision: 3	Date: 02.12.2021	Designed: KP	Reviewd: RE	Scale: 1:1000
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