Form to assist compliance with Regulation 77 of the Aboriginal Heritage Regulations 2018

Application for Certification of a Preliminary Aboriginal Heritage Test for the purposes of the *Aboriginal Heritage Act 2006*

This form specifies the format in which an application should be prepared when a person is seeking certification of a preliminary Aboriginal heritage test under the *Aboriginal Heritage Act 2006* ('Act'). Attach additional sheets where further space is required. This form may be used with a TAX INVOICE (if applicable) when fully completed and payment is made. Refer to the Australian Taxation Office website for information on the requirements of tax invoices. The prescribed fee* for this evaluation is:

PAHT Name: _139-149 Boundary Road, North Melbourne_____ **Prescribed Fee $_355.44____**

SECTION 1 – Applicant information

Name of applicant: Greg Field

Business name: BEG Developments Pty. Ltd.

Postal address: Level 1, 109 Drummond Street, Carlton VIC 3053

Telephone number: 0431 757 086 Fax number: n/a

Email address: greg@fusionpm.com.au ABN (if any): 14 113 423 680

I certify that, to the best of my knowledge and belief, the information supplied in this application is correct and complete. I agree to indemnify the Secretary, the Minister and the Crown against all claims, damages, costs, liabilities or loss including in relation to all actions, claims or demands which may be made in connection with the certification of any preliminary Aboriginal heritage test as a result of this application.

Signed: _____ Date: 2 December 2019

[APPLICANT NAME]

OUTCOMES

TO BE COMPLETED BY THE APPLICANT

	Yes	No
Is a cultural heritage management plan required by the Aboriginal Heritage Regulations 2018?	☐	☑
Is any Aboriginal cultural heritage present in the activity area?	☐	☑
Is it likely the activity will impact any Aboriginal cultural heritage?	☐	☑
Is an authorisation to harm Aboriginal cultural heritage needed to allow the activity to proceed in its current form?	☐	☑

CERTIFICATION

TO BE COMPLETED BY THE SECRETARY (OR DELEGATE)

	Yes	No
I have considered the preliminary Aboriginal heritage test, and I am satisfied that the preliminary Aboriginal heritage test has been prepared in accordance with the prescribed form for the purposes of section 49B of the *Aboriginal Heritage Act 2006* and Schedule 6 of the Aboriginal Heritage Regulations 2018.	☑	☐

Acting under authority delegated to me by the Secretary, Department of Premier and Cabinet, and pursuant to section 49C(2) of the *Aboriginal Heritage Act 2006*, I hereby certify / refuse to certify this preliminary Aboriginal heritage test:

Signed: _____ PAHT Number: 157

Name: HARRY WEBBER

Title: DIRECTOR HERITAGE SERVICES

Dated: 9 / 12 / 2019

Compliance with this certified Preliminary Aboriginal Heritage Test is mandatory should the proposed activity occur. Officers from the Department of Premier and Cabinet may attend the subject land to monitor compliance with the *Aboriginal Heritage Act 2006*.
It is an offence under section 27 and 28 of the *Aboriginal Heritage Act 2006* to do an act that harms Aboriginal cultural heritage.

refer to regulation 83 of the Aboriginal Heritage Regulations for details relating to preliminary Aboriginal heritage test prescribed fees.

SECTION 2: Person(s) involved in preparing the test

If the preliminary Aboriginal heritage test was prepared by another person / organisation on behalf of the applicant:

Name of representative(s): Ashley Matic

Business name: Pragmatic Cultural Heritage Services

Postal address: PO Box 2004, Belgrave VIC 3160

Telephone number: (03) 8782 6090 Fax number: n/a

Email address: ashley@pragmaticheritage.com ABN (if any): 11 636 922 374

SECTION 3: Land owner or occupant of the activity area

Name of land owner / occupant: No Assets Pty. Ltd.

Business name: No Assets Pty. Ltd.

Postal address: Level 1, 109 Drummond Street, Carlton VIC 3053

Telephone number: 0431 757 086 Fax number: n/a

Email address: greg@fusionpm.com.au ABN (if any): n/a

SECTION 4: Description of the activity area

Provide a detailed description of the proposed activity area, including a statement detailing the previous land use and a description of the location and nature of any areas of cultural heritage sensitivity located within the proposed activity area (include additional information in attachments if required). Include as part of the application a:

- map (to scale, and including a north arrow) of the proposed activity area and any associated areas of cultural heritage sensitivity or locations of Aboriginal cultural heritage; and
- shp. file (projected to GDA94) accurately showing the location of the proposed activity area.

The proposed Activity Area consists of an irregularly shaped property located on the western side of side of Boundary Road, with a second, smaller frontage on Alfred Street, and measures 4,520 m^2 in area. It is bounded on the north, west and south-east by commercial properties, on the south by Alfred Street and the east by Boundary Road. The entire property is currently utilised for an existing warehouse building, with the only exception being two small concrete driveways accessing the property in the north-east and north-west.

It is located within 200m of Moonee Ponds Creek, and is thus located within a defined area of Aboriginal cultural heritage sensitivity under the *Aboriginal Heritage Regulations* 2018 (Regulation 26(1), land within 200m of a named waterway)

Size of the proposed activity area (small, medium or large)*: Small

Address: 139-149 Boundary Road, North Melbourne VIC 3051

Volume and folio details: CP 155107 & 1/TP529098, Parish of Doutta Galla

Registered Aboriginal parties for the proposed activity area: None

Local Government Council for the proposed activity area: Melbourne City Council

Refer to the definitions of large activity, medium-sized activity and small activity in regulation 81 of the Aboriginal Heritage Regulations 2018.

SECTION 5: Description of the activity

Provide a detailed description of the proposed activity, including:

- a description of whether the proposed activity is a listed high impact activity under Division 5 of the Aboriginal Heritage Regulations 2018; and
- a description of how the proposed activity will or will not cause significant ground disturbance.

The proposed activity calls for the demolition of the existing warehouse structure on site and the construction of three new mixed-use tower buildings, featuring residential apartments and townhouses with ground floor retail and communal facilities and deep basement parking (see forwarded plans, Attachment 3). This will cause significant ground disturbance through the demolition and removal of the existing structures, the subsequent cleaning up of the site to facilitate construction, and the construction of the new structures including footings/foundations and service trenches.

This constitutes a high impact activity under Regulations 46(1)(b)(xxiii) (construction of a retail premises), 48(1) (construction of 3 or more dwellings on a lot or allotment), 49(1) (a) (subdivision of land into 3 or more lots with at least 3 of the lots to be used for dwellings), and 58(1) as an application for change of use of the land is required.

	Yes	*No*
Will the proposed activity cause significant ground disturbance?	☑	☐
Is the proposed activity a high impact activity listed under Division 5 of Part 2 of the Aboriginal Heritage Regulations 2018?	☑	☐
Is a statutory authorisation required to use the land for a purpose specified under regulation 46(1) (refer to regulation 58)?	☑	☐

SECTION 6: Background assessment

Provide a description of the geographic region, landforms, and geomorphology of which the proposed activity area forms a part and how they relate to the Aboriginal cultural heritage of this region area (include additional information in attachments if required):

The geographic region selected for this PAHT is a component of the catchment around Moonee Ponds Creek, which for the purposes of this assessment has been defined as a circular area with a radius of 2km with the centre focussed on the Activity Area.

The Activity Area is located within the Coode Island Silt geological unit (Qyc), which features Estuarine (sedimentary) deposits of black silts and clays. The formation dates from the Pleistocene Epoch of the Quaternary Period (from 2.8 million years ago to 11,700 years ago). In terms of geomorphology, the Activity Area is located on the boundary of the Western Plains Land System, which is associated with the volcanic soils that make up much of the southwestern component of the state of Victoria, and the Eastern Uplands Land System, and is also featured within two Geomorphological Units - GMU 6.1.5, which is characterised by shallow to moderately deep friable gradational soils (red, black or brown) associated with terraces, floodplains and lakes, swamps and lunettes, and GMU 1.4.6 which features red and brown acid texture soils tending to red and brown gradational soils associated with low hills and ridges.

The Activity Area is located 190m east of Moonee Ponds Creek, which is a major waterway in the western metropolitan district.

Provide a description of the results of the search of the Victorian Aboriginal Heritage Register, including the access number, a list of reports and cultural heritage management plans relevant to the proposed activity area (include additional information as attachments if required):

A review of the VAHR was undertaken by Ashley Matic on 26 September 2019, with the relevant information in regards to previously registered Aboriginal places and completed Aboriginal cultural heritage assessments gathered for the Geographic Region outlined above. The search was undertaken under Access Number 7448, granted on 24 September 2019.

The search revealed that no Aboriginal heritage places have been recorded in the Activity Area in the past, and that very few have been identified within the Geographic Region; several places are registered as currently being located within it, however, but the majority of these are Object Collections currently being held by consultants prior to repatriation. The closest *in situ* Aboriginal cultural heritage places to the Activity Area are Low Density Artefact Distribution (LDAD) VAHR7822-3625 (Royal Park IA) which is located 840m to the north-east, a second LDAD VAHR7822-3884 (Veterinary Research Institute 1) which is located 1.5km to the south-east, and an artefact scatter VAHR7822-1775 (Flemington Racecourse 1) located 1.8km to the north-west.

Likewise, no Aboriginal cultural heritage assessments have been prepared for the Activity Area in the past, and very few localised assessments have been undertaken in the Geographic Region; those that have been completed are predominantly associated with large scale infrastructure projects and have not conducted detailed assessments of the land in close proximity to the Activity Area.

SECTION 7: Ground inspection

Provide a statement of the method and conduct of the ground inspection (if any) of the proposed activity area and the names and roles of the persons who participated in the inspection:

No ground inspection was undertaken in the course of preparing this PAHT.

If a survey for Aboriginal cultural heritage is undertaken, the results of that survey, and any details required under section 34A of the Aboriginal Heritage Act 2006, *must be submitted as part of this application.*

SECTION 8: Aboriginal cultural heritage

Provide a detailed description of any Aboriginal cultural heritage in the activity area, including the registration number of the Aboriginal cultural heritage on the Victorian Aboriginal Heritage Register (Register):

No Aboriginal cultural heritage has been registered within the proposed Activity Area.

SECTION 9: Consultation

Provide details of any consultation undertaken (if any) with any relevant Registered Aboriginal Parties (RAP) or Traditional Owner groups, including:

- A summary of the information provided by a relevant RAP or other person about the Aboriginal cultural heritage in the proposed activity area; and
- Any oral information provided by a relevant RAP or other person about the Aboriginal cultural heritage in the proposed activity area, if the person who provided the information consents.

No consultation with any relevant RAP or TO Groups has been conducted in the course of preparing this PAHT application.

SECTION 10: Significant ground disturbance

Provide a detailed description (including of the nature and extent) of the evidence of significant ground disturbance (if any) that has occurred within the activity area. Attach any figures, maps, (to scale, and including a north arrow) or aerial photographs as required:

Historic plans of the site show that the study area has been subject to significant disturbance in the past, with a MMBW plan from 1895 (Attachment 2) showing the site at that time being broken into several allotments, with several structures having been constructed in the east of the site and a likely dwelling in the south, with the remainder of the space broken into several yard areas. Construction of these features and associated occupation of the sites would have significantly impacted the ground surface in these locations, however the specific details of the nature of construction are not known and thus the exact level of these impacts is unknown. Subsequently, further development has occurred on the site, with a 1945 aerial photograph showing the entire northern half of the site having been built up, with new structures and alterations to the configuration of previously present structures in the south having occurred by that time. A review of the image showing the current conditions of the site shows all of this prior development has been removed for the construction of the current warehouse buildings, car parking and paved areas.

It is unknown when the current warehouse structures on site were completed, however this involved the removal of the existing structures on the site prior to its preparation for the new building. The warehouse buildings are constructed utilising a concrete slab footings across the site, and while the exact nature of the depth of this impact is unknown at this time, given the size and nature of the structure would have required impacts to between minimum of 800 to 1500mm for the establishment of these footings. Common sense, however, dictates this would have had significant impacts on the topsoil (to the point where it is believed it would have been complete disturbance or removal) and the upper levels of the subsoil present on the site at the time of construction.

Results of the geotechnical investigations taken on site (Attachment 3) would seem to support this conclusion, with between 550mm and 1100mm of material identified as fill identified directly overlying clay deposits; while the nature of the fill material varies in each location it is all considered to be imported fill as it contains high amounts of gravel in the upper levels (likely used as bedding for the concrete) and introduced rubbish material (brick fragments and ash) in the lower levels.

SECTION 11: Conclusions

Provide details of:

- whether a cultural heritage management plan is required in relation to the proposed activity;
- whether there has been significant ground disturbance in the proposed activity area and, if so, the nature and extent of the disturbance;
- any other action recommended to protect or preserve any Aboriginal cultural heritage in the proposed activity area, including;
    - whether it is likely there is Aboriginal cultural heritage located in the activity area (other than that included on the Register)
    - what precautions should be undertaken to avoid harming Aboriginal cultural heritage
    - whether it would appear a cultural heritage permit or cultural heritage management plan must be sought to allow harm to Aboriginal cultural heritage before the activity can proceed; and
- any obstacles encountered in preparing the test.

It is not believed a CHMP is required for this project based on the fact the entire surface area of the Activity Area has been subject to significant disturbance in the past through the construction of the existing structures and surface treatments on site, as well as historical development of the site extending back into the 19th century; in the absence of specific construction information, however, it is not possible to ascertain the exact depth to which this disturbance has occurred, however given the area of the structures on site and the nature of the footings used and the surface treatments outside of the building footprints it is considered to have been at least a depth where any *in situ* topsoil deposits had been destroyed.

It is considered unlikely that any Aboriginal cultural heritage material is located within the Activity Area.

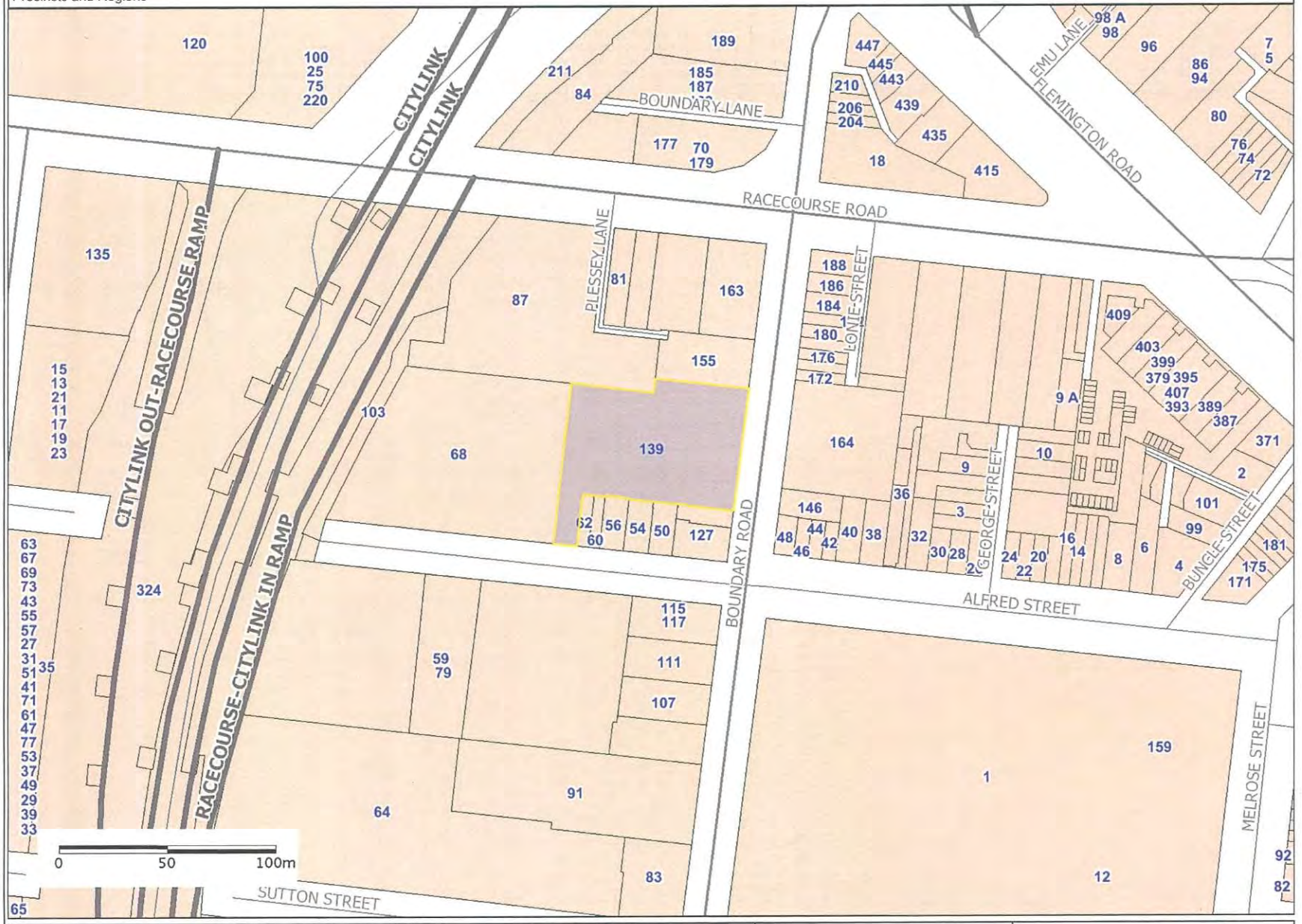
If Aboriginal cultural heritage is identified during works, all works must immediately cease in the vicinity of the find(s) and Aboriginal Victoria must be contacted to determine how to proceed.

No obstacles were encountered in the course of preparing this PAHT.

Attachment 1 Maps Location of Activity Area, Relevant Area(s) of Aboriginal Cultural Heritage Sensitivity (AoS), and the current site configuration (Produced in GeoVic)

Department of Jobs, Precincts and Regions

139-149 Boundary Road, North Melbourne - Activity Area



Legend

Towns (25K)

Roads (vmtrans)
- Freeway
- Highway
- Main Road
- Other

Victoria Boundary (25K)
- Boundary
- Coastline

Property - Address

Disclaimer: This map is a snapshot generated from Victoria Government data. This material may be of assistance to you but the State of Victoria does not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for error, loss or damage which may arise from reliance upon it. All persons accessing this information should make appropriate enquiries to assess the currency of the data.

Map Scale: 1:2,500
Projection: MGA 55

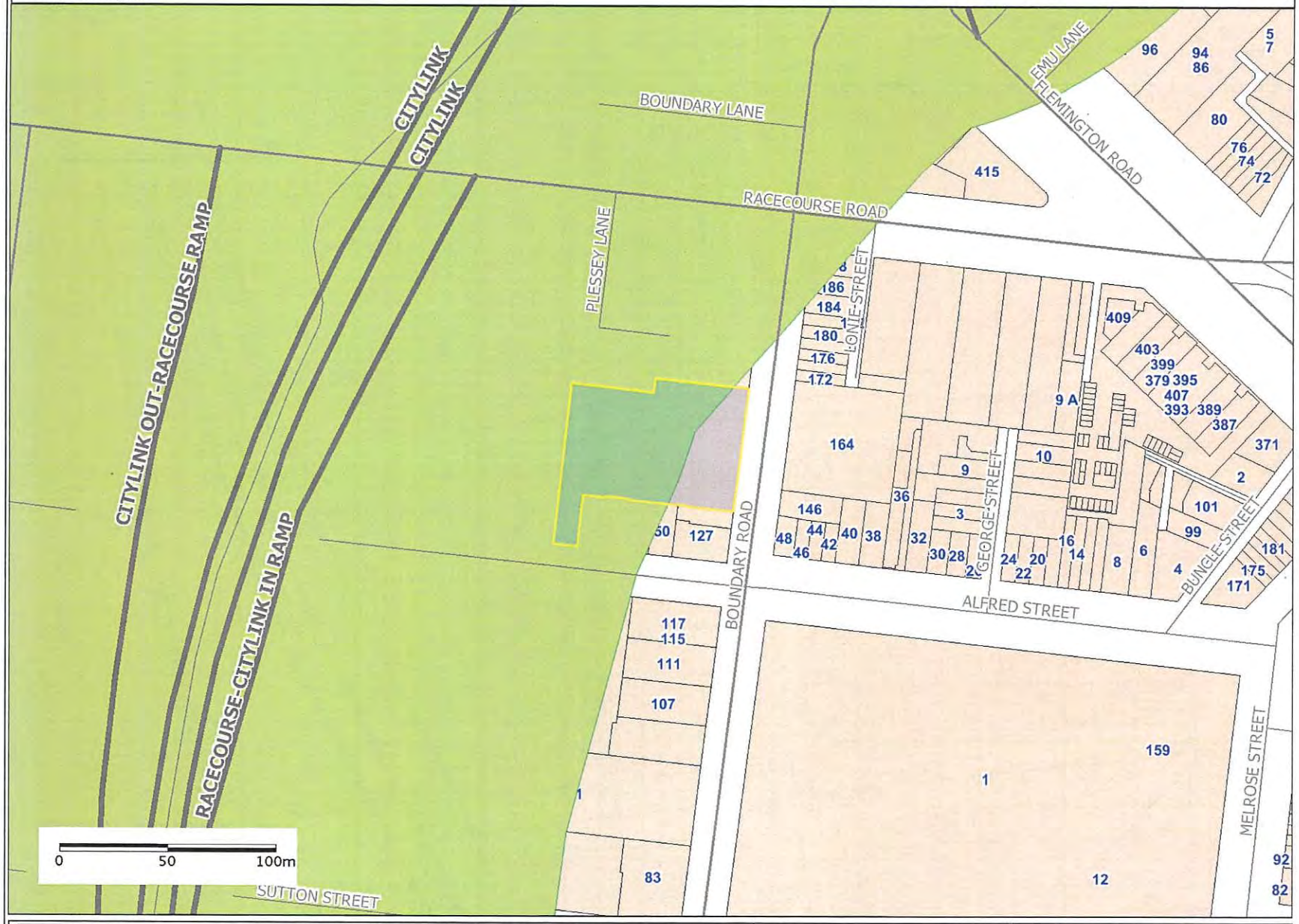
GDA

Generated from GeoVic 3

Map Created Tue Sep 24 2019 10:06:14 GMT+1000 (AEST)

Department of Jobs, Precincts and Regions

139-149 Boundary Road, North Melbourne - Area of Sensitivity



Legend

Town (25K)

Roads (vmtrans)
- Freeway
- Highway
- Main Road
- Other

Victoria Boundary (25K)
- Boundary
- Coastline

Cultural Heritage Sensitivity

Property - Address

Disclaimer: This map is a snapshot generated from Victoria Government data. This material may be of assistance to you but the State of Victoria does not guarantee that the publication is without flaw of any kind or is wholly appropriate for your particular purposes and therefore disclaims all liability for error, loss or damage which may arise from reliance upon it. All persons accessing this information should make appropriate enquiries to assess the currency of the data.

Map Scale: 1:2,500
Projection: MGA 55

GDA

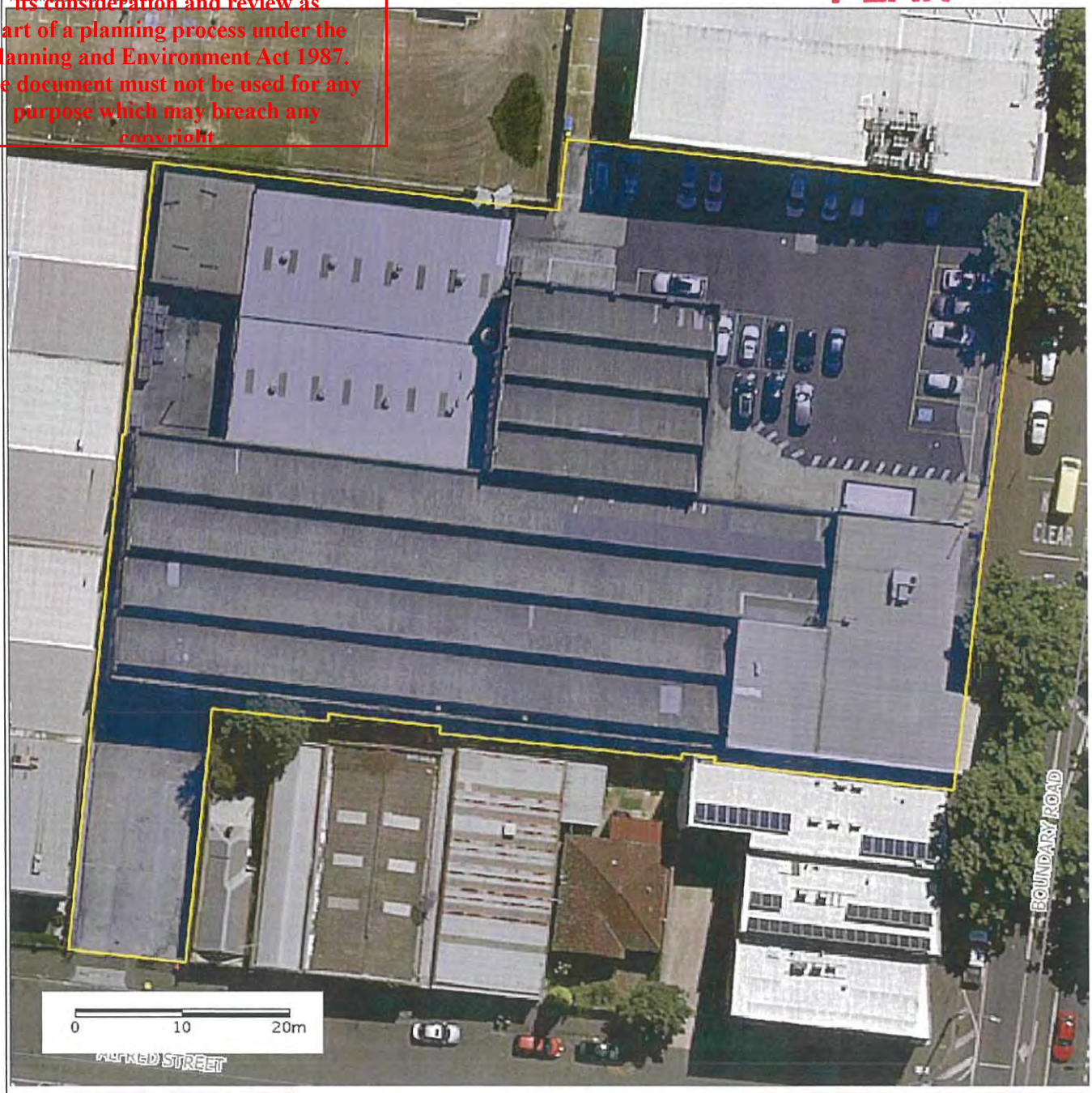
VICTORIA State Government

Generated from GeoVic 3

Map Created Tue Sep 24 2019 10:07:50 GMT+1000 (AEST)

Department of Jobs, Precincts and Regions

139-149 Boundary Road, North Melbourne - Current Conditions



Legend

Towns (25K)

Roads (vmtrans)

- Freeway
- Highway
- Main Road
- Other

Victoria (25K)

- Boundary
- Coastline

Map Scale: 1:550
Projection: MGA 55

GDA

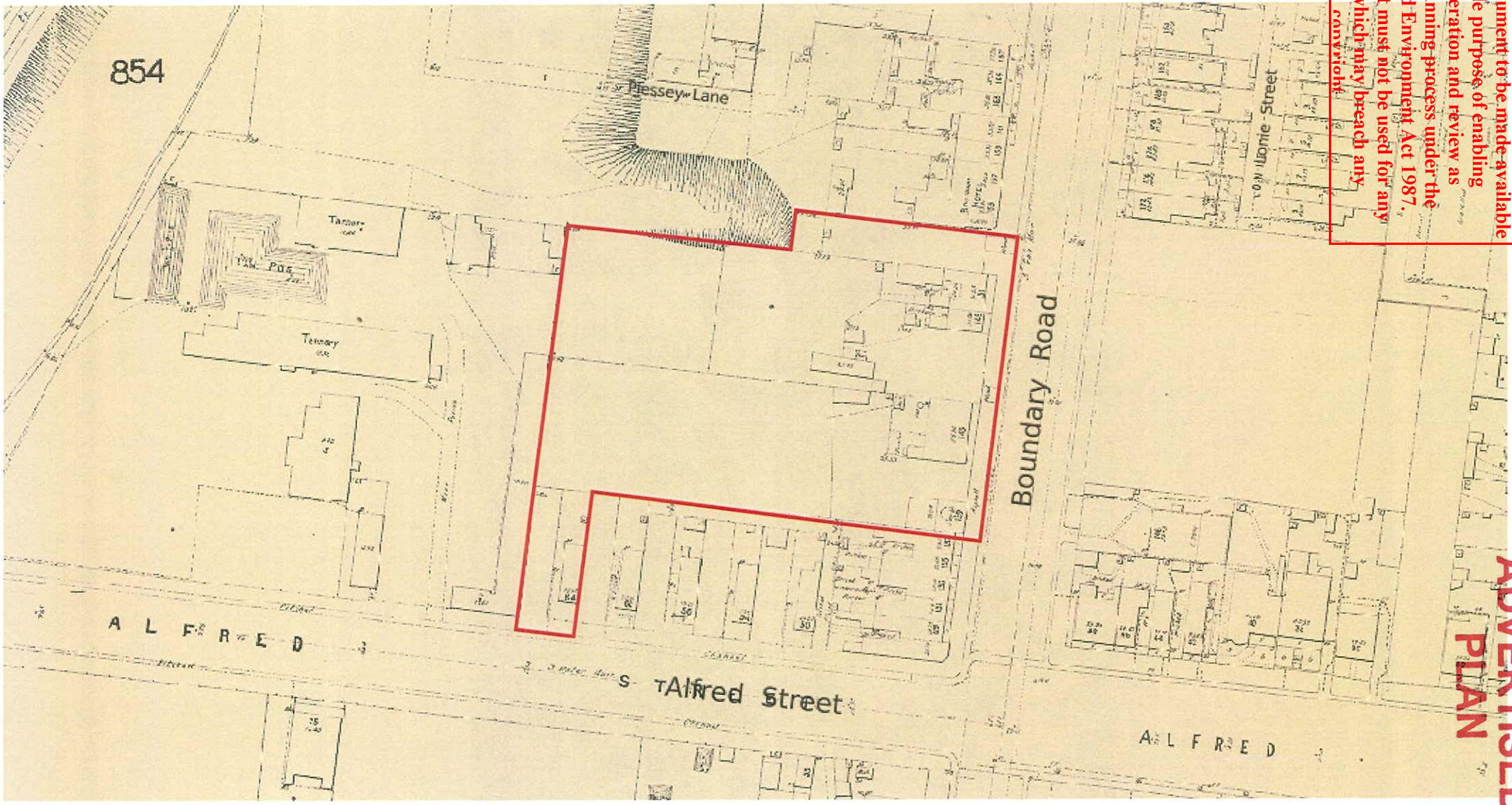
VICTORIA State Government

Generated from GeoVic 3

Map Created Tue Sep 24 2019 10:14:03 GMT+1000 (AEST)

Attachment 2 – Excerpt from 1895 MMBW Plan showing 14-26 Bruce street at that time (City of Melbourne Interactive Maps Website, maps.melbourne.vic.gov.au) and an excerpt of an 945 aerial photograph of the site (DEWLP Historical Photomaps online https://services.land.vic.gov.au/DELWPmaps/historical-photomaps/)

139-149 Boundary Road, North Melbourne - 1895 MMBW



Approx. Scale 1:1000

GeoAust Geotechnical Engineers Pty Ltd

GEOTECHNICAL INVESTIGATION REPORT

STAGE 1 GEOTECHNICAL INVESTIGATION

PROPOSED RESIDENTIAL APARTMENT DEVELOPMENT

139-149 BOUNDARY ROAD

NORTH MELBOURNE VIC

PREPARED FOR

BEG DEVELOPMENTS PTY LTD

JOB NO: 6209-3-R

11 SEPTEMBER 2019

DISTRIBUTION:

BEG DEVELOPMENTS PTY LTD

C/- FUSION PROJECT MANAGEMENT

GeoAust Geotechnical Engineers Pty Ltd ACN: 114 447 371 ABN: 14 030 388 760
7 Micro Circuit Dandenong South Victoria 3175 Ph: (03) 8787 5663 Fax: (03) 8782 0276 E: enquiries@geoaust.com.au

TABLE OF CONTENTS

1 INTRODUCTION

1.1 COMMISSION

The geotechnical investigation was commissioned by Mr Greg Field of Fusion Project Management on behalf of BEG Developments Pty Ltd by signed Authorisation of Engagement dated 11 February 2019. The scope of works for the geotechnical investigation was in accordance with our fee proposal with reference 6209-1-Q, dated 6 December 2018.

1.2 PROPOSED DEVELOPMENT

Based on the town planning drawings provided to GeoAust, which were prepared by CHT Architects Pty Ltd with reference 18113 Revision P5, dated 22 July 2019, the following was understood in relation to the proposed development at 139-149 Boundary Road, North Melbourne:

- Demolition of existing low-rise buildings.
- Construction of three separate residential apartment buildings with heights of ten (10) to eleven (11) levels over a suspended ground floor level.
- Construction of a common lower ground floor level and three basement levels, which will require bulk excavation to depths ranging between a minimum of approximately 10.0 metres below the existing ground surface at the west end of the site and a maximum of approximately 14.0 metres below the existing ground surface at the east end of the site (finished floor level of lower basement level: RL -4.820 metres AHD).

In the absence of any detailed architectural and structural information regarding the proposed development, the following has been assumed about the proposed development:

- Localised excavations for three lift core bases are likely to extend approximately 2.5 – 3.0 metres below the bulk excavation level for the proposed basement levels.
- Construction will be typical of reinforced concrete framed structures.
- No unusual performance criteria apply to the proposed structure.

1.3 INVESTIGATION OBJECTIVES

Based on our experience of geotechnical conditions in the general area of the subject site, in conjunction with our understanding of the proposed development, the objectives of the geotechnical investigation were as follows:

- Investigate the subsurface soil and rock conditions at the subject site, relevant to the proposed development.
- Investigate the ground water conditions at the subject site, relevant to the proposed development.
- Provide a sub-soil class and a hazard factor applicable to the site for earthquake design of the proposed structure in accordance with Australian Standard AS 1170.4 – 2007, 'Structural Design Actions, Part 4: Earthquake Actions in Australia'.
- Provide recommendations for alternative footing systems relevant to the proposed development, including design parameters and estimates of settlements for each of the footing systems.
- Provide recommendations for the design and construction of alternative retention systems for the proposed basement excavation, including lateral earth distributions and estimates of lateral and horizontal settlements.
- Provide recommendations for the design and construction of floor slabs and pavements relevant to the proposed development.
- Provide advice on construction issues relevant to the footings, retention structures and pavements for the proposed development.

1.4 GEOLOGY

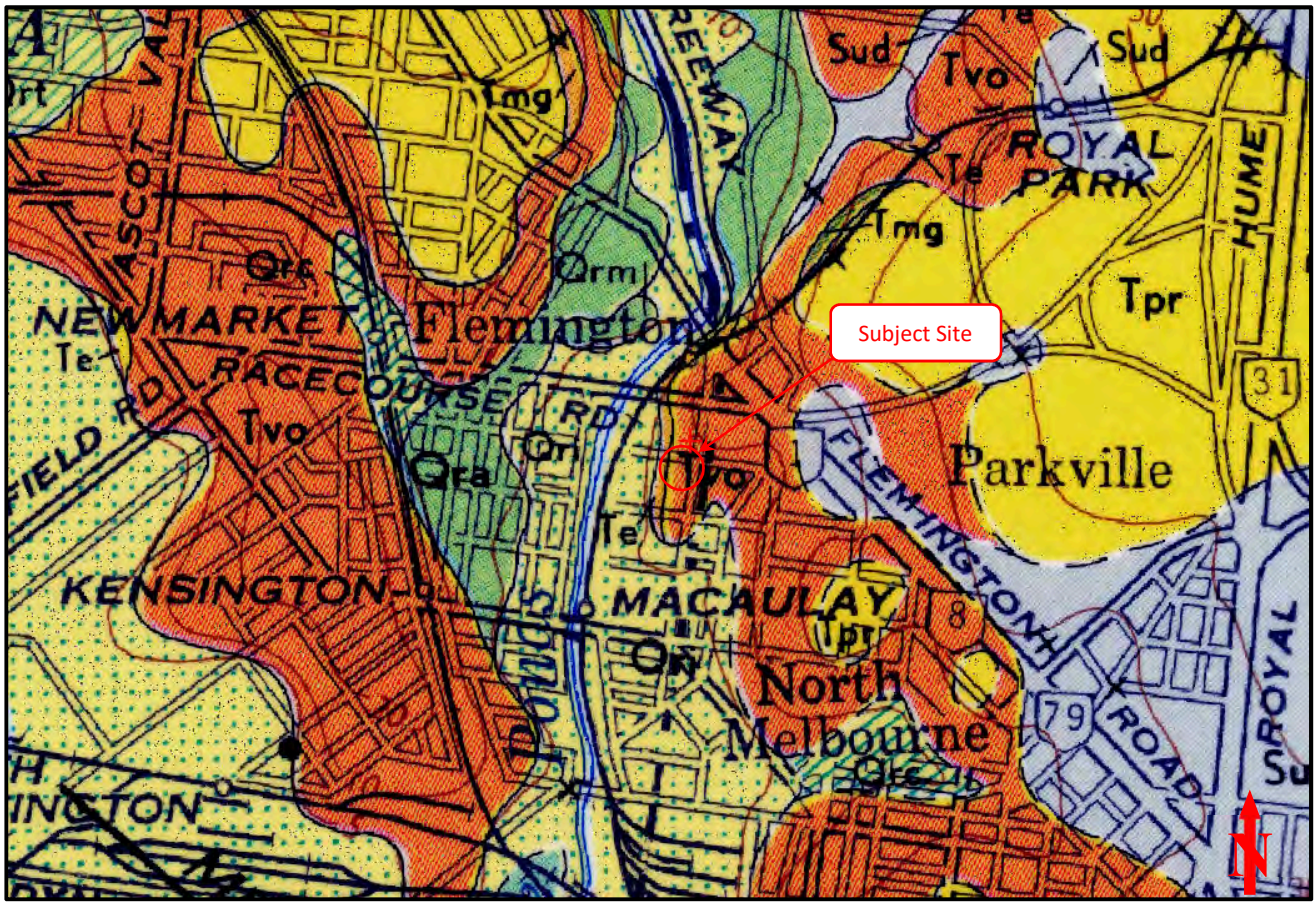
Reference to the Geological Survey of Victoria, 1:63,360 series, Melbourne sheet indicates the site to be located at the contact between the following geological units:

- Quaternary age sedimentation, which forms part of the Yarra Delta. The sediments, which are locally referred to as 'Coode Island Silt' comprise compressible silty clay and clayey silt with some sandy lenses. The Coode Island Silt is of soft to firm consistency and has extremely limited bearing capacity as a founding stratum.
- Tertiary age olivine basalt, referred locally to as 'Older Volcanics'. The degree of weathering of the basalt varies widely, ranging from high plasticity clay in its completely weathered state to very high strength rock in its slightly weathered state. The residual clays associated with weathering of the basalt are typically highly reactive, that is they exhibit appreciable changes in volume when subjected to changes in moisture content. The depth to basalt can vary significantly over short lateral.
- Tertiary age sedimentary deposits, which are referred locally to as 'Sub-Older Volcanics' and typically comprises silt and silty clay.
- Tertiary age sedimentary deposits, which are referred locally to as 'Werribee Formation' and typically comprises clays of stiff to very stiff consistency, and sands, which vary between medium dense and dense.

The Quaternary age sedimentary deposits are underlain by the Tertiary age deposits. The Tertiary age deposits in turn are underlain by sedimentary deposits of the Silurian age, which are locally referred to as the 'Dargile Formation'. The Dargile Formation comprises current bedded sandstone and massive siltstone and shale. The rock strengths typically range from very low to high within the siltstone and sandstone.

The Dargile Formation extends to depths significantly in excess of those likely to be influenced by the proposed development.

An extract from the Geological Survey of Victoria, 1:63,360 series, Melbourne sheet showing the surface geology in the general area of the subject site is provided in Figure 1.4.1.



Legend (in the order of age)

Qra:	Quaternary age low level alluvial deposits: Silt, sandy silt, minor sand and gravel.
Qrc:	Quaternary age colluvial and minor slump deposits: Poorly sorted gravel, sand and sandy silt.
Qrm:	Quaternary age swamp deposits: Silt and clay.
Qrt:	Quaternary age terrace alluvial deposits: Silt, sandy silt, minor sand and gravel.
Qri:	"Coode Island Silt" Quaternary age sedimentary deposits: Silt, silty and sandy clay, minor peat and shell beds.
Tpr:	**"**Brighton Group" Tertiary age sedimentary deposits: Silty sand, minor gravels, sometimes including clay balls.
Tmg:	"Green Gully Member" Tertiary age sedimentary deposits: Silt, sand and minor gravel.
Tvo:	**"**Older Volcanics" Tertiary age olivine and titanaugide basalt: Dense, deeply weathered.
Te:	"Sub-Older Volcanics" Tertiary age sedimentary deposits: Silt and silty clay.
Sud:	**"**Dargile Formation" Silurian age sedimentary deposits: Sandstone, siltstone and minor shaley siltstone.

FIGURE 1.4.1: Extract from the Geological Survey of Victoria, 1:63,360 Series, Melbourne Sheet

1.5 GROUND WATER TABLE

Reference to Visualising Victoria's Groundwater website (www.vvg.org.au) indicates the depth of the ground water table to be 5 – 10 metres below the ground surface at the subject site. Immediately to the south west of the subject site, the depth of the ground water table is indicated to be less than 5 metres below the ground surface.

A screenshot of the plan extracted from the Visualising Victoria's Groundwater website superimposed over a Google Earth image of the subject site and immediate surrounds, showing the estimated depth of the ground water table, is provided in Figure 1.5.1.

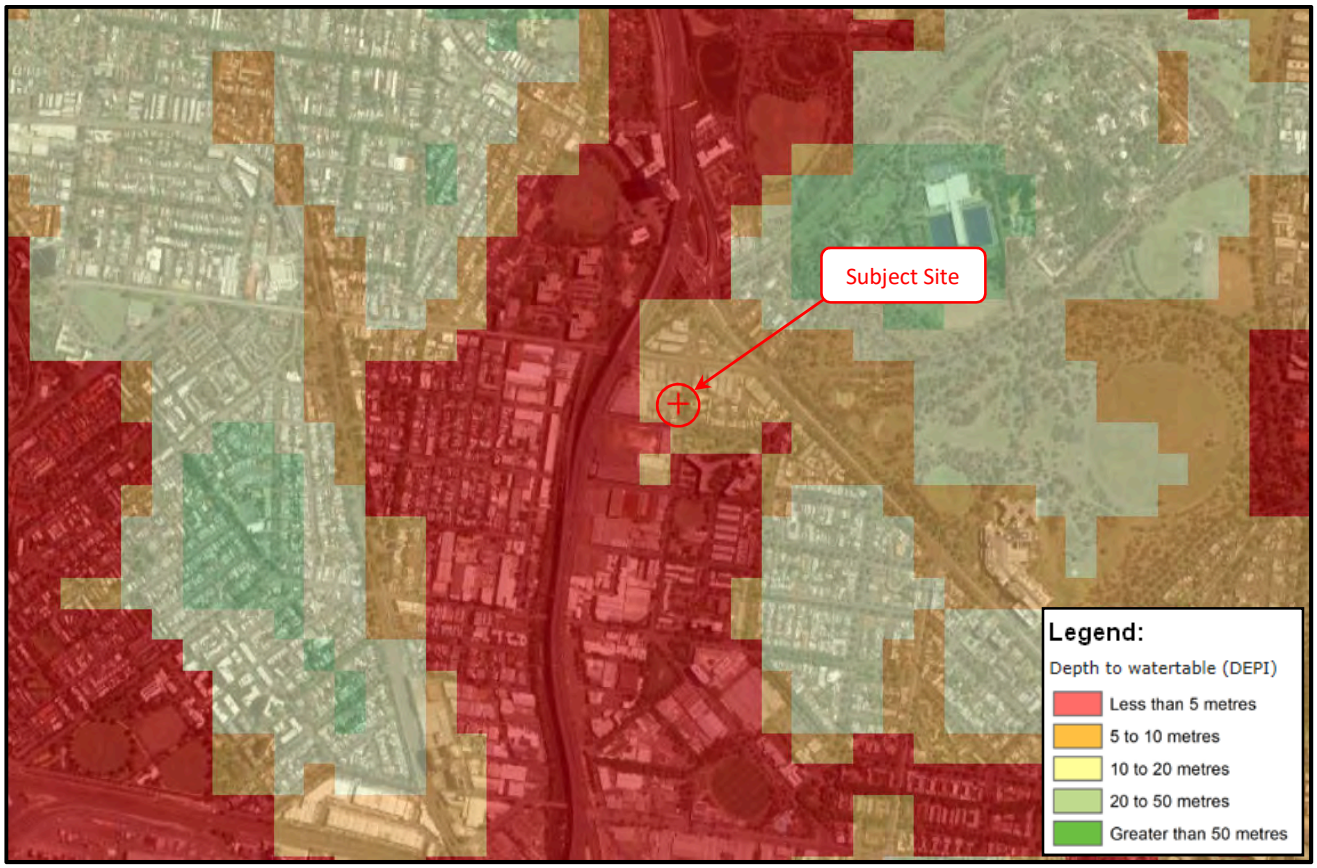


FIGURE 1.5.1: Screenshot from the Visualising Victoria's Groundwater Website

1.6 ACID SULFATE SOILS

Reference to the Coastal Acid Sulfate Soil Hazard, Melbourne T7822 sheet indicates the site is located within an area with probability of occurrence of acid sulfate soils.

An extract from the Coastal Acid Sulfate Soil Hazard, Melbourne T7822 sheet, is provided in Figure 1.6.1.

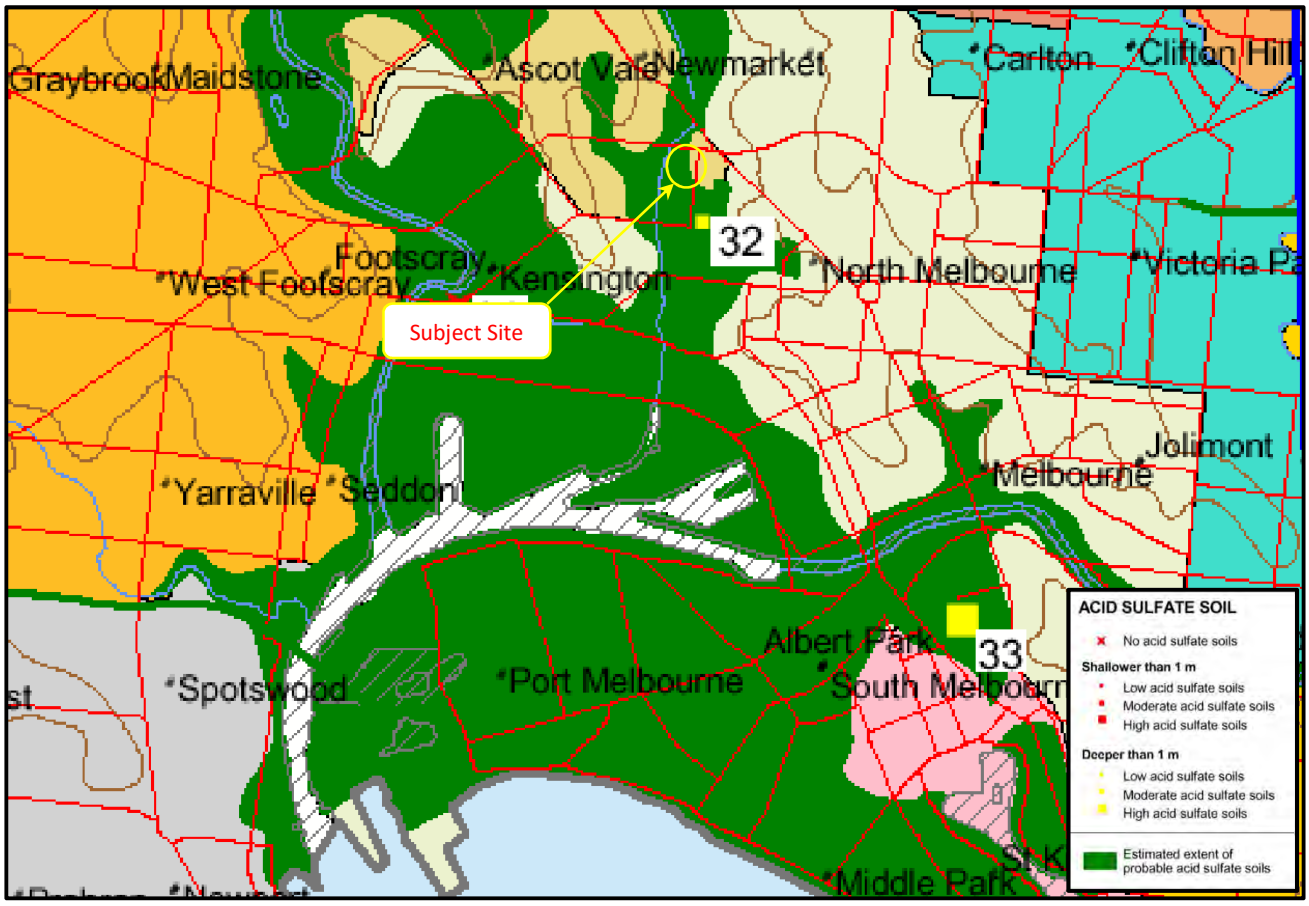


FIGURE 1.6.1: Extract from the Coastal Acid Sulfate Soil Hazard, Melbourne T7822 Sheet

2 INVESTIGATION METHODS

2.1 FIELD INVESTIGATION

Field investigation was completed under the direct supervision of Geotechnical Engineers from GeoAust on 6 and 7 August 2019 and included the following:

2.1.1 Boreholes

The details of the boreholes drilled at the subject site are provided in Table 2.1.1.1. The approximate locations of the boreholes are indicated in the attached Figure 1.

TABLE 2.1.1.1: Details of Boreholes

Borehole	Reduced Level of Borehole Collar (metre AHD)	Total Depth (metre)	Depth Interval of Drilling Methods (metre)		
			Auger Drilling	Wash Boring	N.M.L.C Diamond Core Drilling
1	RL 4.66	20.7	0.0 – 1.5	1.5 – 15.05	15.05 – 20.7
2	RL 8.65	19.3	0.0 – 1.5	1.5 – 10.6	10.6 – 19.3
3	RL 7.75	20.7	0.0 – 1.5	1.5 – 10.5	10.5 – 20.7

The boreholes were drilled using a track mounted Comacchio MC405 rotary drilling rig.

The presence of the various existing buildings at the subject site precluded access with a drilling rig to a significant portion of the site at the time of the site testing. Upon demolition and removal of the existing structures at the site, further site testing, comprising three additional boreholes will need to be conducted to confirm the subsurface soil and rock conditions over the balance of the site.

The logs of the boreholes were prepared in accordance with Australian Standard AS 1726 'Geotechnical Site Investigations'. Definitions of the logging terms and symbols used are provided in Appendix A and the logs of the boreholes are provided in Appendix B.

The reduced levels of the borehole collars were surveyed relative to the temporary bench mark indicated in the 'Neighbourhood & Site Description Plan' prepared by Di Mase Berry & Co Pty Ltd with Ref No. 14230 Version 1 dated 26 November 2018. The reduced levels of the borehole collars are provided on the logs of the boreholes in Appendix B.

Photographs of the rock core recovered from the boreholes are provided in Appendix C.

2.1.2 In-situ Testing

Testing was carried out in accordance with the relevant test procedures in Australian Standard AS 1289, 'Methods of Testing Soils for Engineering Purposes' and included the following:

- Vane shear strength testing of cohesive soils.
- Standard penetration testing.

Test results are included on the logs of the boreholes.

2.1.3 Ground Water Monitoring Standpipes

Two (2) ground water monitoring standpipes with a diameter of 50 millimetres were installed in Boreholes 1 and 2 upon completion of drilling. The details of the standpipe construction are provided in Table 2.1.3.1.

TABLE 2.1.3.1: Details of Ground Water Monitoring Standpipes Installed in Boreholes 1 and 2

Test Location	Depth of Standpipe (metre)	Standpipe Type	Depth Interval of Screen (metre)	Depth Interval of Filter Pack (metre)	Depth Interval of Bentonite Seal (metre)
Borehole 1	20.7	Hand slotted 50mm diameter Class 9 PVC	8.7 – 20.7	3.2 – 20.7	0.0 – 3.2
Borehole 2	19.3	Hand slotted 50mm diameter Class 9 PVC	7.3 – 19.3	2.0 – 19.30	0.0 – 2.0

The standing water levels gauged within the standpipes are provided in Section 3.3.

2.2 LABORATORY TESTING

Point load strength index testing was carried out by GeoAust on the core samples of rock recovered from the boreholes in accordance with the test procedure in Australian Standard AS 4133.4.1 – 2007, 'Methods of Testing Rocks for Engineering Purposes, Rock Strength Test – Determination of Point Load Strength Index'. The results of the point load strength index testing are presented in Section 3.4.

3 RESULTS OF INVESTIGATION

3.1 SITE DESCRIPTION

The following site features were noted at the time of the field investigation:

- The site was located within moderately sloping local topography. The site itself sloped down to the approximate west.
- The site fronted Boundary Road to the east.
- A concrete paved driveway at the west end of the south property boundary facilitated access to the site from Alfred Street to the south.
- The neighbouring properties to the south were occupied by a number of single and double storey commercial and residential buildings, as well as an electrical substation with a masonry building. With the exceptions of the buildings on the most eastern and western neighbouring properties to the south, which abutted the common property boundaries, all other neighbouring buildings were offset from the common property boundaries. The adjacent buildings did not include any basement levels.
- The neighbouring property to the west was occupied by a double storey commercial building which was offset approximately 1.0 metre from the common property boundary. The ground surface at the subject site had been retained above the neighbouring property to the west by a masonry retaining wall up, which was up to approximately 1.5 metres in height.
- The neighbouring property to the north east was occupied by a three storey commercial building, which abutted the common property boundary.
- The neighbouring property to the north west was vacant following the recent demolition of a double storey car park building.
- The subject site was occupied by a number of double storey commercial buildings and a warehouse, which were of brick construction. Based on a cursory external inspection the existing buildings at the subject site were in fair condition.
- There was a car park at the north east corner of the subject site, which was paved with asphaltic concrete. Based on a cursory inspection, the existing pavement generally appeared to be in good to moderate condition.
- The surface drainage across the site was visually assessed to be fair due to the sloping topography of the site.

- There was no vegetation at the subject site. However, there were a number of small to medium sized trees and shrubs on the neighbouring properties to the south. Additionally, there were also a number of medium to large sized trees within the roadside reserve along the west side of Boundary Road, immediately adjacent to the east property boundary of the subject site. The Nearmap aerial image of the site (www.nearmap.com) taken on 7 April 2019, which has been reproduced in the attached Figure 1, shows the locations and canopy sizes of the trees adjacent to the subject site.

3.2 SUBSURFACE CONDITIONS

The logs of the boreholes are provided in Appendix B. The subsurface conditions encountered within the boreholes are summarised in Table 3.2.1.

TABLE 3.2.1: Summary of Soil and Rock Profile Encountered in Boreholes 1 – 3

Inferred Geological Unit	Borehole		1	2	3
	Reduced Level of Borehole Collar (metre AHD)		RL 4.66	RL 8.65	RL 7.75
	Soil and Rock Description	Consistency / Density / Strength	Approximate Depth Intervals (metre)		
Fill	Existing Pavement	-	0.0 – 0.15	0.0 – 0.15	0.0 – 0.3
	Silt and Clay	Firm to Very Stiff Consistency	0.15 – 1.1	0.15 – 0.65	0.3 – 0.55
Older Volcanics	Clay	Firm to Stiff Consistency	1.1 – 2.0	NP	NP
		Very Stiff to Hard Consistency	NP	0.65 – 3.5	0.55 – 2.9
Sub – Older Volcanics	Sandy Clay	Firm to Stiff Consistency	2.0 – 4.5	NP	NP
		Very Stiff to Hard Consistency	4.5 – 5.0	3.5 – 6.0	2.9 – 5.2
Werribee Formation	Silty Sand	Medium Dense	5.0 – 12.0	NP	5.2 – 6.0
	Clay	Stiff Consistency	NP	NP	6.0 – 7.5
	Silty Sand Underlying Clay	Dense to Very Dense	12.0 – 14.0	6.0 – 9.1	7.5 – 9.0
Dargile Formation	Weathered Siltstone and Sandstone	Extremely Low to Very Low Rock Strength	NP	9.1 – 13.71	9.0 – 11.74
		Low to Medium Rock Strength	14.0 – 20.7	13.71 – 19.3	11.74 – 20.7

Legend NP: Nil Present

A brief description of the soil and rock layers encountered within the boreholes is given below:

EXISTING PAVEMENT: The existing pavement encountered at the location of Borehole 1 comprised a 150 millimetre thick layer of concrete.

At the locations of Boreholes 2 and 3, the existing pavement comprised a 40 – 50 millimetre thick layer of asphaltic concrete underlain by fine to coarse grained crushed rock.

FILL: The fill comprised a mixture of medium plasticity clay and gravelly clay and sandy and clayey silt. The consistency of clay and silt fill varied between firm and very stiff.

CLAY (Inferred Older Volcanics): The clay was of high plasticity, meaning that it will be subject to appreciable changes in volume upon changes in moisture content. Upon moisture ingress, the clay will swell and conversely, upon drying out, the clay will shrink.

The residual basaltic clay contained trace quantities of fine to medium grained sand and gravel. The clay was of firm to stiff consistency in Borehole 1, and of very stiff consistency in Boreholes 2 – 3.

SANDY CLAY (Inferred Sub-Older Volcanics): The Older Volcanics clay was underlain by sandy clay of low to medium plasticity, which was inferred to be part of Sub-Older Volcanics deposits. The sandy clay also contained seams and bands of clayey and silty sand.

In Borehole 1 the sandy clay, upon first contact, was of firm to stiff consistency. At depths in excess of approximately 4.5 metres below the existing ground surface, the sandy clay was of very stiff consistency. In Boreholes 2 and 3, the sandy clay was of very stiff to hard consistency.

SILTY SAND (Inferred Werribee Formation): The silty sand was fine to coarse grained and contained seams and bands of fine to medium grained and clay. The silty sand was of medium relative density.

CLAY (Inferred Werribee Formation): The clay encountered in Borehole 3 was of high plasticity and stiff consistency.

SAND UNDERLYING CLAY (Inferred Werribee Formation): The sand underlying the clay was typically fine to coarse grained and of dense to very dense relative density. The silty sand contained varying amounts of fine to medium grained gravel and clayey seams.

SILTSTONE AND SANDSTONE: The depth to the weathered siltstone and sandstone varied between 11.74 and 14.0 metres below the existing ground surface.

The siltstone and sandstone were predominantly distinctly weathered. The rock strength of distinctly weathered and siltstone and sandstone varied significantly between extremely low to high. However, for the most part, the distinctly weathered and siltstone and sandstone were of low to medium rock strength.

The bedding of the weathered siltstone and sandstone was measured to be dipping approximately 0 – 20 degrees below the horizontal.

The siltstone and sandstone were slightly fractured to fractured with some fragmented zones. The fractures within the siltstone and sandstone were generally planar, smooth to rough, clean and/or stained by iron oxide. A number of the fractures were infilled with clay seams up to 150 millimetres in thickness, as noted on the logs of the boreholes. Where intercepted, the sandstone was fine grained.

Defect spacings were variable within the siltstone with rock quality designations (RQD) varying between 0 and 100%. A summary of RQD values for siltstone and sandstone in individual boreholes is provided in Table 3.2.2.

TABLE 3.2.2: Summary of Rock Quality Designation Values for Siltstone and Sandstone in Boreholes 1 – 3

Test Location	Minimum RQD Value (%)	Maximum RQD Value (%)	Average RQD Value (%)
Borehole 1	0	100	67
Borehole 2	0	67	22
Borehole 3	0	75	28

Minor core losses occurred within the siltstone and sandstone during drilling. The losses are likely to have occurred within zones of extremely weathered siltstone and sandstone, which was of extremely low rock strength and/or residual Silurian clay.

3.3 GROUND WATER

Ground water seepage was not intersected during auger drilling of Borehole 1 – 3 or observed a short time after completion of auger drilling. Auger drilling within Boreholes 1 – 3 extended to a depth of 1.5 metres below the existing ground surface. The introduction of water for rotary wash boring and NMLC diamond core drilling negated any further meaningful observation of ground water seepage during drilling below the augered depth.

Two (2) ground water monitoring standpipes with a diameter of 50 millimetres were installed in Boreholes 1 and 2 upon completion of drilling. The construction details of the ground water monitoring standpipes are provided in Section 2.1.3.

The standing ground water levels gauged within the ground water monitoring standpipes installed in Boreholes 1 and 2 are provided in Table 3.3.1.

TABLE 3.3.1: Standing Water Levels Gauged within the Standpipes Installed in Boreholes 1 and 2

Borehole	Reduced Level of Borehole Collar (metre AHD)	Date of Reading	Depth of Standing Water Level Below Existing Ground Surface (metre)	Reduced Level of Standing Water Level (metre AHD)
1	RL 4.66	14 August 2019	2.89	RL 1.77
2	RL 8.65		7.56	RL 1.09

As part of a site contamination assessment conducted by Kleinfelder Pty Ltd, a total of six (6) ground water monitoring wells were installed at the subject site. A site plan showing the locations of the ground water monitoring wells installed by Kleinfelder together with ground water elevation and counter plan, which was prepared on the basis of the standing ground water levels gauged within the ground water monitoring wells at in September 2017 is provided in Appendix D. The standing ground water levels within the ground water monitoring wells installed by Kleinfelder Pty Ltd is summarised in Table 3.3.2.

TABLE 3.3.2: Standing Water Levels Gauged within the Ground Water Monitoring Wells Installed by Kleinfelder

Test Location	Approximate Reduced Level of Existing Ground Surface (metre AHD)	Date of Reading	Depth of Standing Water Level Below Existing Ground Surface (metre)	Approximate Reduced Level of Standing Water Level (metre AHD)
MW1	RL 8.51	September 2017	8.16	RL 0.35
		6 August 2019	8.00	RL 0.51
MW2	RL 8.05	September 2017	7.55	RL 0.51
		6 August 2019	7.30	RL 0.75
MW3	RL 4.23	September 2017	1.94	RL 2.29
		6 August 2019	1.60	RL 2.63
MW4	RL 4.23	September 2017	3.29	RL 0.94
		6 August 2019	2.30	RL 1.93
MW5	RL 7.33	September 2017	6.62	RL 0.71
		6 August 2019	Not Accessible	Not Accessible
MW6	RL 4.48	September 2017	3.90	RL 0.58
		6 August 2019	3.62	RL 0.86

The standing water levels gauged within the ground water monitoring standpipes installed in Boreholes 1 and 2 and also the ground water monitoring wells installed by Kleinfelder varied significantly between approximately RL 0.51 and 2.63 metres AHD across the subject site. The reason for this has not been ascertained as part of the site testing but may be attributable to one or a combination of the following:

- Possible leaking of the existing underground services at, and adjacent to, the subject site.
- The presence of more than one aquifer within the multiple geological units underlying the subject site.

To further assess the ground water conditions at the subject site, such that the design of the floor slabs at the base of the bulk excavation for the proposed basement levels and the basement retention system can potentially be refined, the followings are recommended:

- Monitoring of the standing ground water levels within the existing standpipes and ground monitoring wells over the period leading up to the demolition.
- Installation of additional standpipes within the boreholes at the time of Stage 2 geotechnical investigation to better define the phreatic surface (ground water table) underlying the subject site.
- Conducting a series of in-situ hydraulic conductivity tests within the standpipes to determine the approximate hydraulic conductivity of the saturated soil profile below the ground water table at the subject site.

On the basis of the standing water levels gauged within the ground water monitoring standpipes installed in Boreholes 1 and 2 and also the ground water monitoring wells installed by Kleinfelder, the bulk excavations for the proposed basement levels, which will extend down to an approximate RL -5.0 metres AHD, will intersect the regional ground water table and as such will intercept variable flows of ground water seepage.

In addition to the ground water seepage influx, which will be encountered within the proposed basement excavation, ephemeral flows of perched ground water seepage are likely to develop within the fill immediately overlying the less permeable clay following periods of wet weather, particularly during the winter and spring months when rainfall rates are typically high and evaporation levels are low. The fill and underlying clay at shallow depths are anticipated to be unstable and completely unworkable when saturated.

3.4 LABORATORY TEST RESULTS

The results of the point load strength index tests conducted by GeoAust on the core samples of rock recovered from the borehole are summarised in Table 3.4.1.

TABLE 3.4.1: Summary of Point Load Strength Index Test Results

Borehole	Sample Depth (metre)	Material Type	Is(50)	Rock Strength
1	15.7	Sandstone	0.93	Medium
1	16.25	Siltstone	1.00	Medium
1	17.3	Siltstone	0.17	Low
1	17.3	Siltstone	0.79	Medium
1	17.3	Siltstone	0.04	Very Low
1	18.1	Siltstone	0.08	Very Low
1	18.1	Siltstone	1.28	High
1	19.4	Siltstone	1.05	High
1	19.9	Siltstone	0.99	Medium
2	11.25	Siltstone	0.21	Low
2	14.5	Siltstone	0.07	Very Low
2	15.0	Siltstone	0.29	Low
2	15.3	Siltstone	0.13	Low
2	15.45	Siltstone	0.02	Extremely Low
2	16.6	Sandstone	1.23	High
2	16.6	Sandstone	1.76	High
2	17.65	Sandstone	0.56	Medium
2	17.7	Sandstone	0.65	Medium
2	18.25	Sandstone	0.78	Medium
3	11.44	Siltstone	0.06	Very Low
3	11.82	Siltstone	0.25	Low
3	12.72	Siltstone	0.21	Low
3	13.35	Siltstone	0.29	Low
3	14.47	Sandstone	0.32	Medium
3	14.47	Sandstone	0.76	Medium
3	15.59	Sandstone	0.39	Medium
3	16.07	Siltstone	0.74	Medium
3	19.47	Siltstone	0.45	Medium
3	20.65	Sandstone	0.37	Medium

4 COMMENTS AND RECOMMENDATIONS

4.1 STAGE 1 REPORT

The following comments and recommendations have been based on a limited amount of field testing, which does not provide coverage of the entire site for the proposed development. The comments and recommendations of this report will require revision once additional geotechnical testing has been conducted at the site. The comments and recommendations of this report must not be used for final structural design and construction. Additional testing will be conducted at the site once site access becomes available.

At the time of the investigation only limited details of the proposed development were known to us. It has been assumed that no unusual performance criteria apply. Given this assumption the comments and recommendations of this report may require revision once structural design has progressed.

4.2 EARTHQUAKE SITE CLASSIFICATION

Australian Standard AS 1170.4 – 2007 (R2018), 'Structural Design Actions, Part 4: 'Earthquake Actions in Australia' outlines the methods for assigning the site's sub-soil class.

Based on the subsurface conditions encountered at the subject site, and the requirements of Australian Standard AS 1170.4 – 2007 (R2018), the following Hazard Design Factor and Sub-Soil Class are recommended:

- Sub-Soil Class: Class C_e – Shallow Soil Site
- Hazard Design Factor (Z): 0.09

4.3 DESIGN GROUND WATER LEVEL

The design ground water level for the subject site has been based upon the ground water levels gauged within the ground water monitoring standpipes installed in Boreholes 1 and 2 and also the ground water monitoring wells installed by Kleinfelder, in conjunction with an allowance of 1.0 – 1.5 metres increase for long term fluctuation in the ground water table. The allowance for a future increase in the ground water level from those gauged within the ground water monitoring standpipes is based on the historical records of ground water monitoring wells in Melbourne dating back to the mid-1980s.

It is recommended that the following design ground water level should be adopted for the proposed development at the subject site:

- Design Ground Water Level: RL 2.5 metres AHD

4.4 FOOTINGS AND RETENTION SYSTEMS – GENERAL DISCUSSION

Best performance of the proposed structure will be achieved by adopting a uniform footing arrangement and founding stratum for the proposed structure. Differential settlements are likely to be problematic where more than one footing system or variable founding depths and founding strata are adopted for the proposed structure.

The following footing and retention systems would appear most suitable given the development type and subsurface conditions:

- Based on the subsurface conditions encountered at the locations of Boreholes 1 – 3, it is anticipated that the bulk excavation for the proposed three (3) level basement, which will extend down to depths ranging between approximately 10 and 14 metres below the existing ground surface, will expose a combination of sand of inferred Werribee Formation and underlying weathered siltstone and sandstone of Dargile Formation across the subject site.

  It is anticipated that conventional pad and strip footings founded on weathered siltstone and sandstone may be considered for the support of the proposed structure over the north east portion of the site, where the bulk excavation for the proposed basement levels exposes weathered siltstone and sandstone or the depth to the weathered siltstone and sandstone does not exceed approximately 1.5 metres below the basement bulk excavation level.

  At locations where the depth to the weathered siltstone and sandstone exceeds approximately 1.5 metres below the basement bulk excavation level, it may be more economical and practicable to suspend the proposed structure on a series of piles socketed into the weathered siltstone and sandstone.

  Upon demolition of the existing buildings at the subject site, further site testing will be required in order to delineate the areas of the site where pad and strip footings founded on distinctly weathered siltstone and sandstone may be considered for the support of the proposed structure.

- Piles socketed into the distinctly weathered siltstone and sandstone. Construction of piles will extend below the regional ground water table. Piling contractors will need to take into account the presence of the ground water seepage at depths below approximately RL 1.77 metres AHD. Conventional unsupported bored piles will be unsuitable for use below the water table in saturated sand and the use of continuous flight auger piles (CFA) piles is recommended. Additionally, piling contractors will need to take into account the presence of siltstone and sandstone rock, which vary in strength between extremely low and high.

- As an alternative to continuous flight auger piles (CFA) piles, bored piles constructed under drilling mud (bentonite/polymer) may be considered. Bored piles will be the most difficult to construct but will provide the greatest load carrying capacity in both compression and tension.

- Based on the standing ground water levels gauged within the standpipes installed in Boreholes 1 and 2, and also the ground water monitoring wells installed by Kleinfelder, the bulk excavation for the proposed basement levels will extend up to approximately 7.0 metres below the existing ground water table. The construction of the proposed basement levels will be relatively difficult and expensive due to the shallow ground water table and the potential adverse consequences of uncontrolled lowering of the ground water table within the Coode Island Silt to the west of the site.

- The use of an anchored diaphragm wall or an anchored cased secant pile wall retention system with a facing of shotcrete is recommended for the retention of the proposed basement excavation. The diaphragm wall or cased secant pile wall will need to be embedded at least 3.0 metres below the bulk excavation level for the proposed basement levels and embedded well into weathered siltstone and sandstone in order to reduce (not eliminate) the flows of ground water seepage beneath the toe of the wall into the basement excavation during construction. The greater the depth of embedment of the diaphragm wall into the weathered siltstone and sandstone, the greater the reduction in the flow of ground water seepage into the basement excavation during construction. The retaining wall will able to be utilised as a load bearing element for the proposed structure, subject to adequate embedment into distinctly weathered siltstone and sandstone.

- Continuous dewatering of the basement excavation extending below the regional ground water table will be required during construction. It will be necessary to locally draw the ground water table down to at least 1.0 metre below the maximum proposed depth of excavations throughout the construction period using a formal dewatering arrangement designed and installed by specialist dewatering contractors.

- It will be necessary to lower the ground water table below the underside of the B4 basement floor slab during the construction period until such time that the proposed structure has advanced to a stage in construction where the dead load of the structure exceeds the buoyant forces acting on the B4 basement floor slab.

- Extreme care must be taken not to lower the regional ground water table outside of the proposed basement excavation both during construction and post construction. Lowering of ground water table adjacent to the subject site will result in potentially appreciable settlement of the Coode Island Silt, which will result in unacceptable settlement and distortion of nearby buildings, infrastructure and pavements constructed directly on the fill and near surface Quaternary age sediments. Recharge of the ground water table outside the basement retention system may need to be considered during the construction period in order to prevent lowering of the ground water table within the Coode Island Silt.

- Moonee Valley City Council will not allow any pumped ground water seepage intercepted by the proposed basement excavation to be discharged into the stormwater drainage system during the construction period. The pumped ground water seepage will need to be discharged into the sewerage system after an appropriate trade waste agreement has been obtained from City West Water.

- During construction, temporary lateral restraint of the diaphragm wall or cased secant pile wall retention system will need to be provided with multiple rows of ground anchors. The uppermost row of ground anchors must be positioned as high as possible to limit lateral deflections of the retention system. Anchors must be installed incrementally as excavation proceeds. Ground anchors must be installed immediately once the anchor points have been exposed. Upon completion of construction, lateral restraint of the retention system will need to be provided by the structure and the ground anchors will need to be de-stressed.

- The basement retaining walls and also the floor slabs at the base of the bulk excavation for the proposed basement levels must be designed as a fully tanked structure. A diaphragm wall, if it is properly constructed, is likely to be more watertight than a cased secant pile wall, as there are significantly fewer joints in a diaphragm wall than in a cased secant pile wall.

- A tanked basement structure constructed using cased secant piles will necessitate the provision of an impermeable membrane behind a secondary reinforced shotcrete wall installed in front of the secant pile retention system. Given that it will not be possible to provide any form of drainage behind the basement retaining walls, the membrane should extend up to the ground surface level and the basement retaining walls should be designed for full hydrostatic pressure. The membrane will also need to extend beneath the underside of the floor slab at the base of the bulk excavation for the basement levels.

- A well-constructed fully tanked retention system in conjunction with a properly designed and constructed floor slab at the base of the bulk excavation for the proposed basement, which are able to resist full hydrostatic pressure, should only allow relatively minor amounts of seepage water into the completed structure. Nonetheless, it must be recognised that the completed basement structure will not be watertight and, as such, a suitable drainage system must be installed and maintained within the completed lower ground floor level over the life of the structure.

- If there is a requirement for the completed basement structure below the ground water table to be dry, the following options can be considered in the construction of the retention system:

  - Install false walls (blockwork or equivalent) in front of the basement retaining walls with provision for a suitable drainage system between the two walls.

  - Construct a cast in-situ concrete wall incorporating a suitable waterproofing additive (Xypex or equivalent product) in lieu of a shotcrete wall in front of the water proof membrane. The cast in-situ concrete wall will need to be approximately 250 millimetres thick. The design and construction of the concrete wall will need to ensure that concrete shrinkage cracks are limited to widths able to be sealed by the waterproofing additive.

4.5 FOOTINGS

4.5.1 Pad and Strip Footings Founded on Weathered Siltstone and Sandstone

It is anticipated that conventional pad and strip footings founded on distinctly weathered siltstone and sandstone may be considered for the support of the proposed structure over the north east portion of the site, where the bulk excavation for the proposed basement levels exposes distinctly weathered siltstone and sandstone or the depth to the distinctly weathered siltstone and sandstone does not exceed approximately 1.5 metres below the basement bulk excavation level.

Upon demolition of the existing buildings at the subject site, further site testing will be required in order to delineate the areas of the site where pad and strip footings founded on weathered siltstone and sandstone may be considered for the support of the proposed structure.

Conventional pad and strip footings founded below the bulk excavation level for the proposed basement levels on weathered siltstone and sandstone may be proportioned on the basis of the maximum allowable bearing pressures given in Table 4.5.1.1.

TABLE 4.5.1.1: Maximum Allowable Bearing Pressures for Spread Footings

Founding Material		Maximum Allowable Bearing Pressure *(kPa)*	
		Pad Footing	Strip Footing
Weathered Siltstone and Sandstone	Extremely Low to Very Low Rock Strength	750	600
	Low to Medium Rock Strength	1,500	1,200

Total settlements for pad footings are estimated to be approximately 0.5% of the width of pad footings and approximately 1.0% of the width of strip footings. Differential settlements between adjacent isolated footings with similar founding conditions and loadings are anticipated to be approximately half of the total settlement value. For uniformly loaded columns at 8.0 metre centres, an angular distortion of less than 1 in 600 is estimated. It should be noted that where isolated footings are subject to significantly different loadings, differential settlement between these footings may exceed acceptable limits. Settlements should be checked in detail where such instances arise.

Soil reactivity need not be considered with respect to the proportioning of footings founded on weathered siltstone and sandstone. Structural considerations for strip footings founded on weathered siltstone and sandstone are likely to govern. However, a minimum embedment of 1.0 metre below the bulk excavation level is recommended. Footing excavations must be free of any water and loose material prior to pouring concrete.

Pad and strip footing excavations must be inspected by a qualified engineer prior to the placement of concrete to ensure that the founding conditions are consistent with the design recommendations. In the event that the design recommendations are not met, it may be necessary to either increase the founding depth of the footings or alternatively increase the plan area of the footings.

4.5.2 Continuous Flight Auger (CFA) Piles

Continuous flight auger (CFA) piles can be installed through the low strength saturated soils without the need for temporary casing, making the construction of deep piles relatively economical. The CFA piles will need to be founded into the distinctly weathered siltstone and sandstone of medium or higher rock strength at depths in excess of approximately 12 – 14 metres below the existing ground surface.

The ability of the CFA piles to be socketed into weathered siltstone and sandstone is highly dependent on the capacity of the drilling rig, the cutting equipment used to advance the pile excavation and the expertise of the piling contactor. Only specialist piling contractors with experience of constructing CFA piles should be considered for this project.

Piling contractors experienced in the design and installation of continuous flight auger (CFA) piles should make their own assessment of piling conditions and load carrying capacities of their proprietary pile types. However, as a guide, the design geotechnical and working loads provided in Table 4.5.2.1 should be achievable for 600 – 900 millimetre diameter CFA piles socketed into the weathered siltstone and sandstone.

TABLE 4.5.2.1: Design Geotechnical and Working Loads for CFA Piles

CFA Pile Diameter (mm)	Design Geotechnical Load (kN)	Working Load (kN)
600	4,000	3,000
750	6,750	5,000
900	10,000	7,500

The following assumptions have been made for the loads provided in Table 4.5.2.1:

- A structural load factor of 1.35 is applicable to the proposed structure.
- A geotechnical strength reduction factor (ϕ_g) of 0.6 is adopted.
- The piles have spacings of at least 2.5 pile diameters to ensure that the full shaft friction is available.
- These values are subject to dynamic proof load testing and CAPWAP analysis.

Settlement at the top of CFA pile sockets subjected to working loads provided in Table 4.5.2.1 is estimated to be approximately 10 millimetres. Elastic shortening of the pile must be added to this settlement. Differential settlements between adjacent piles are expected to be approximately half of the total settlement value.

Groups of piles providing support to a single column will experience appreciably greater settlements than individual piles. An assessment of the settlement characteristics of pile groups can only be provided once final piling details are known. Differential settlements between adjacent pile groups are expected to be approximately half of the total settlement value of the pile groups.

In considering the use of CFA piles, it must be noted that the length of conventional reinforcement cages in CFA piles is typically limited to approximately 15.0 metres.

4.5.3 Bored Piles Socketed into Weathered Siltstone and Sandstone

Bored piles socketed into the weathered siltstone and sandstone bedrock have the ability to support significantly greater loads than continuous flight auger piles. However, the construction of bored piles through a saturated soil profile will be difficult. Bored piles will need to be constructed using a drilling fluid (bentonite and/or polymer) to support the pile excavations during drilling and concreting. A full head of drilling fluid must be maintained within the bored pile excavations at all stages during the construction of the bored piles.

Bored piles must be socketed into distinctly weathered siltstone and sandstone of low or higher rock strength, subject to the following minimum founding conditions:

- The pile must extend at least 3.0 pile diameters into distinctly weathered siltstone and sandstone of medium or higher rock strength.
- Pile spacings should exceed 2.5 pile diameters to ensure that full side adhesion is available for the pile sockets and also group effects do not lead to excessive settlements of the piles.
- At least 60% of the pile load should be provided by side resistance.

Bored piles socketed into the weathered siltstone and sandstone will derive capacity from a combination of socket shear and base resistance. The minimum required socket length for a given load at a particular pile location will be dependent on the profile of rock quality at each pile location, roughness of the walls of the socket excavation and cleanliness of the base of the socket.

Socket roughness and cleanliness are influenced by pile construction and cleaning methodology. Additional roughening and cleaning of the pile socket may be required after drilling. Once pile loads, sizes and construction methodology are determined, individual sockets may be designed.

It is recommended that the rock profile at each pile location is logged by a suitably experienced engineer at the time of bored pile excavation to ensure that variations in rock strength and the roughness of the socket be carefully monitored to ensure that an adequate socket length is provided.

In accordance with Australian Standard AS 2159 – 2009 'Piling Design and Installation' the geotechnical strength reduction factor is influenced by the scope of geotechnical investigation and means of determining/selecting geotechnical design parameters, the design methodology, construction controls and the method and extent of pile testing.

The ultimate geotechnical strengths provided in Table 4.5.3.1 are recommended for the design of the bored piles socketed into distinctly or less weathered siltstone and sandstone of medium or higher rock strength in accordance with the above minimum requirements.

TABLE 4.5.3.1: Design Ultimate Geotechnical Strengths for Bored Piles

Founding Material	Design Ultimate Geotechnical Strength (kPa)	
	Base Resistance	Socket Shear
Clay (Firm to Stiff Consistency)	N/A	N/A
Clay (Very Stiff to Hard Consistency)	N/A	50
Silty Sand (Medium Relative Density)	N/A	N/A
Silty Sand (Dense to Very Dense Relative Density)	N/A	25
Distinctly Weathered Siltstone and Sandstone (Extremely Low to Very Low Strength)	N/A	250
Distinctly or Less Weathered Siltstone and Sandstone (Low to Medium Rock Strength)	9,000	900

It must be noted that the design geotechnical strength ($R_{d,g}$) and working pressure of a bored pile must be determined in accordance with Section 4 of Australian Standard AS 2159 – 2009, 'Piling – Design and Installation' on the basis of the ultimate geotechnical strengths provided in Table 4.5.3.1.

Based on the geotechnical investigation completed at the subject site, the individual risk ratings for Site and Design risk factors are provided in Table 4.5.3.2 as per Table 4.3.2(A) of Australian Standard AS 2159 – 2009. Other individual risk ratings for Installation risk factors will need to be determined by the piling contractor.

TABLE 4.5.3.2: Weighting Factors and Individual Risk Ratings for Risk Factors

Risk factor	Weighting factor (w_i)	Typical description of risk circumstances for individual risk rating (IRR)			Recommended risk rating (IRR)
		1 (Very Low Risk)	3 (Moderate Risk)	5 (Very High Risk)	
Site					
Geological complexity of site	2	Horizontal strata, well-defined soil and rock characteristics	Some variability over site, but without abrupt changes in stratigraphy	Highly variable profile or presence of karstic features or steeply dipping rock levels or faults present on site, or combinations of these	5
Extent of ground investigation	2	Extensive drilling investigation covering whole site to an adequate depth	Some boreholes extending at least 5 pile diameters below the base of the proposed pile foundation level	Very limited investigation with few shallow boreholes	3
Amount and quality of geotechnical data	2	Detailed information on strength compressibility of the main strata	CPT probes over full depth of proposed piles or boreholes confirming rock as proposed founding level for piles	Limited amount of simple in situ testing (e.g., SPT) or index tests only	3
Design					
Experience with similar foundations in similar geological conditions	1	Extensive	Limited	None	1
Method of assessment of geotechnical parameters for design	2	Based on appropriate laboratory or in situ tests or relevant existing pile load test data	Based on site-specific correlations or on conventional laboratory or in situ testing	Based on non-site-specific correlations with (for example) SPT data	5
Design method adopted	1	Well-established and soundly based method or methods	Simplified methods with well-established basis	Simple empirical methods or sophisticated methods that are not well established	3
Method of utilizing results of in situ test data and installation data	2	Design values based on minimum measures values on piles loaded to failure	Design methods based on average values	Design values based on maximum measured values on test piles loaded up only to working load, or indirect measurements used during installation, and not calibrated to static loading tests	3
Installation					
Level of construction control	2	Detailed with professional geotechnical supervision, construction processes that are well established and relatively straightforward	Limited degree of professional geotechnical involvement in supervision, conventional construction procedures	Very limited or no involvement by designer, construction processes that are not well established or complex	*TO BE DETERMINED BY PILING CONTRACTOR*
Level of performance monitoring of the supported structure during and after construction	0.5	Detailed measurements of movements and pile loads	Correlation of installed parameters with on-site static load tests carried out in accordance with this Standard	No monitoring	*TO BE DETERMINED BY PILING CONTRACTOR*

Piling contractors will need to make an assessment of a suitable geotechnical strength reduction factor for pile design once all the weighting factors and individual risk factors in Table 4.3.2(A) of Australian Standard AS 2159 – 2009 have been taken into consideration, together with any increase in the geotechnical strength reduction factor associated with any testing of the piles that is proposed.

Adopting a geotechnical strength reduction factor of 0.56 for preliminary design of bored piles and a structural load factor of 1.35, the design geotechnical and working pressures provided in Table 4.5.3.3 are recommended for the design of the bored piles socketed into distinctly weathered siltstone and sandstone of low to medium rock strength.

TABLE 4.5.3.3: Base and Socket Shear Resistances for Bored Piles Socketed into Siltstone and Sandstone

Founding Material	Design Geotechnical Pressure (kPa)		Working Pressure (kPa)	
	Base Resistance	Socket Shear	Base Resistance	Socket Shear
Clay (Firm to Stiff Consistency)	N/A	N/A	N/A	N/A
Clay (Very Stiff to Hard Consistency)	N/A	27	N/A	20
Silty Sand (Medium Relative Density)	N/A	N/A	N/A	N/A
Silty Sand (Dense to Very Dense Relative Density)	N/A	13	N/A	10
Distinctly Weathered Siltstone and Sandstone (Extremely Low to Very Low Strength)	N/A	135	N/A	100
Distinctly or Less Weathered Siltstone and Sandstone (Low to Medium Rock Strength)	5000	500	3,700	370

The settlement at the top of the pile socket under the working load is estimated to be approximately 1% of the pile diameter subject to the following conditions:

- A structural load factor of 1.35 is applicable to the proposed structures.
- The pile bases are properly cleaned to remove all loose material prior to pouring concrete.
- The pile sockets are properly roughened (grooves or undulations > 10 millimetres deep, > 10 millimetres wide and spaced 50 – 200 millimetres apart).
- Elastic shortening of the pile above the top of the pile socket must be added to this settlement.

Differential settlements between adjacent piles are expected to be approximately half of the total settlement value. These values will be exceeded where the bases of the pile excavations are not suitably clean. If cleaning of the pile bases proves problematic, it may be necessary to reduce the contribution of the pile base to total pile capacity.

Groups of piles providing support to a single column will experience greater settlements than individual piles. An assessment of the settlement characteristics of pile groups can only be provided once final piling details are known. Differential settlements between adjacent pile groups are expected to be approximately half of the total settlement value of the pile groups.

For piles socketed into weathered siltstone and sandstone, which will be subjected to tensile loads, the allowable capacity in tension shall be the lesser of:

- 75% of the allowable socket shear strengths specified in Table 4.5.3.3.
- The weight of the 45° cone of siltstone and sandstone extending from the toe of the pile to the top of the pile socket plus the weight of the cylinder of soil extending from the top of the 45° failure cone to the ground surface level. Saturated unit weights of 24 kN/m^3 and 18 kN/m^3 should be used for the distinctly weathered siltstone and residual soils, respectively, in calculating the tensile capacity of the piles for transient loads. Buoyant unit weights must be used in calculating the tensile capacity of the piles for sustained loads.

4.5.4 Construction of Bored Piles

The construction of bored piles through a saturated soil profile will be difficult. Bored piles will need to be constructed using a drilling fluid (bentonite and/or polymer) to support the pile excavations during drilling and concreting. A full head of drilling fluid must be maintained within the bored pile excavation at all stages during the construction of the bored piles.

The construction of the piles will require the use of a drilling rig equipped with a rock coring bucket to penetrate any rock of medium or higher strength.

Socket roughness and cleanliness will significantly influence the load carrying capacity and settlement characteristics of the piles. Both socket roughness and cleanliness are influenced by pile construction and cleaning methodology. Additional roughening and cleaning of the pile sockets is likely to be required after drilling to ensure that the following

- The depth of grooves or undulations > 10 millimetres.
- The width of the grooves or undulations > 10 millimetres.
- The grooves or undulations are spaced 50 – 200 millimetres apart.

If the pile sockets cannot be adequately roughened and cleaned it may be necessary to reduce the socket resistance component of the piles in the assessment of the pile capacities. The pile bases must be cleaned of all loose material using a suitable cleaning bucket. The use of a rock coring bucket or toothed auger is completely unacceptable for cleaning pile bases. Given that the bored piles will extend below the ground water table level, cleaning of the pile bases may be difficult. If the bases of the piles cannot be thoroughly cleaned it will be necessary to reduce the base resistance component of the piles in the assessment of the pile capacities.

It will be necessary to use a suitable concrete mix, which can be placed below water after the pile sockets have been roughened and cleaned. The concrete will need to be placed using a tremie and a minimum 2.0 metre depth of concrete maintained above the tremie outlet throughout the pour to maintain plug flow. The finished level of concrete placed should be higher than the design level to allow removal of the anticipated thick layer of laitance, which forms on the rising surface of concrete poured below the ground water table using tremie methods.

Drilling of piles, roughening, base cleaning and placement of concrete should be completed as a continuous operation without delay.

4.5.5 Pile Testing

It is recommended that at least 5% of all load bearing piles installed be subjected to dynamic testing and CAPWAP analysis to confirm that design loads have been achieved. The testing of piles must be carried out by a suitably qualified person in accordance with the requirements of Section 8 of Australian Standard AS 2159 – 2009, 'Piling Design and Installation'.

4.6 BASEMENT RETENTION SYSTEMS

Based on the standing ground water levels gauged within the standpipes installed in Boreholes 1 and 2, and also the ground water monitoring wells installed by Kleinfelder, the bulk excavation for the proposed basement levels will extend up to approximately 7.0 metres below the existing ground water table. The construction of the proposed basement levels will be relatively difficult and expensive due to the shallow ground water table and the potential adverse consequences of uncontrolled lowering of the ground water table within the Coode Island Silt to the west of the site.

Extreme care must be taken not to lower the regional ground water table outside of the proposed basement excavation both during construction and post construction. Lowering of ground water table adjacent to the subject site will result in potentially appreciable settlement of the Coode Island Silt, which will result in unacceptable settlement and distortion of nearby buildings, infrastructure and pavements constructed directly on the fill and near surface Quaternary age sediments. Recharge of the ground water table outside the basement retention system may need to be considered during the construction period in order to prevent lowering of the ground water table within the Coode Island Silt.

4.6.1 Anchored Diaphragm Wall or Cased Secant Pile Wall Retention System

The use of an anchored diaphragm wall or an anchored cased secant pile wall retention system with a facing of shotcrete is recommended for the retention of the proposed basement excavation.

Given the depth of the proposed basement excavation, the use of conventional secant piles is not recommended. It is extremely difficult to ensure sufficient pile overlap for conventional secant piles extending to depths in excess of approximately 6 – 7 metres.

The diaphragm wall or cased secant pile wall will need to be embedded at least 3.0 metres below the bulk excavation level for the proposed basement levels and embedded well into weathered siltstone and sandstone in order to reduce (not eliminate) the flows of ground water seepage beneath the toe of the wall into the basement excavation during construction. The greater the depth of embedment of the diaphragm wall into the weathered siltstone and sandstone, the greater the reduction in the flow of ground water seepage into the basement excavation during construction. The retaining wall will able to be utilised as a load bearing element for the proposed structure, subject to adequate embedment into distinctly weathered siltstone and sandstone.

Lateral restraint of the toe of the retention wall may be achieved by suitably embedding the wall into the distinctly weathered siltstone and sandstone below the base of the bulk excavation for the proposed basement levels. The minimum depth of embedment of the wall will depend on both the lateral loads, which have to be restrained by the wall, and the vertical loads, which will need to be supported by the wall. The minimum embedment depth will need to be designed accordingly.

It is noted that design of a laterally loaded retention wall will be governed by lateral deflection of the wall rather than ultimate lateral resistance provided by the soil and rock profile.

During construction, temporary lateral restraint of the diaphragm wall or cased secant pile wall retention system will need to be provided with multiple rows of ground anchors. The uppermost row of ground anchors must be positioned as high as possible to limit lateral deflections of the retention system. Anchors must be installed incrementally as excavation proceeds. Ground anchors must be installed immediately once the anchor points have been exposed. Upon completion of construction, lateral restraint of the retention system will need to be provided by the structure and the ground anchors will need to be de-stressed.

The retaining wall will able to be utilised as a load bearing element for the proposed structure, subject to adequate embedment into distinctly weathered siltstone and sandstone. Where required, selected piles within a secant pile wall may be deepened and designed as load bearing in accordance with the recommendation provided in Sections 4.5. The design of the retaining wall must accommodate the vertical component of the temporary anchor loads.

The basement retaining walls and also the floor slabs at the base of the bulk excavation for the proposed basement levels must be designed as a fully tanked structure.

A diaphragm wall, if it is properly constructed, is likely to be more watertight than a cased secant pile wall, as there are significantly fewer joints in a diaphragm wall than in a cased secant pile wall.

A tanked basement structure constructed using cased secant piles will necessitate the provision of an impermeable membrane behind a secondary reinforced shotcrete wall installed in front of the secant pile retention system. Given that it will not be possible to provide any form of drainage behind the basement retaining walls, the membrane should extend up to the ground surface level and the basement retaining walls should be designed for full hydrostatic pressure. The membrane will also need to extend beneath the underside of the floor slab at the base of the bulk excavation for the basement levels.

A well-constructed fully tanked retention system in conjunction with a properly designed and constructed floor slab at the base of the bulk excavation for the proposed basement, which are able to resist full hydrostatic pressure, should only allow relatively minor amounts of seepage water into the completed structure. Nonetheless, it must be recognised that the completed basement structure will not be watertight and, as such, a suitable drainage system must be installed and maintained within the completed lower ground floor level over the life of the structure.

If there is a requirement for the completed basement structure below the ground water table to be dry, the following options can be considered in the construction of the retention system:

- Install false walls (blockwork or equivalent) in front of the basement retaining walls with provision for a suitable drainage system between the two walls.
- Construct a cast in-situ concrete wall incorporating a suitable waterproofing additive (Xypex or equivalent product) in lieu of a shotcrete wall in front of the water proof membrane. The cast in-situ concrete wall will need to be approximately 250 millimetres thick. The design and construction of the concrete wall will need to ensure that concrete shrinkage cracks are limited to widths able to be sealed by the waterproofing additive.

Structural adequacy and water tightness of the proposed retention system below the ground water table will be highly dependent on the quality of construction. It is recommended that only experienced contractors are considered for the construction of the retention wall below the ground water table.

Care must be taken in the design and construction of the soldier pile capping beam such that it does not undermine any existing adjacent footings providing support to the neighbouring structures along the common property boundaries. The underside of the soldier pile capping beam should be at least 250 millimetres above the founding level of the existing adjacent footings, provided that the adjacent footings are founded into native clay of very stiff consistency. Where this cannot be achieved, the following will need to be considered:

- Construction of the soldier pile capping beam in a 'hit one, miss two' sequence. The drive width for each section of the capping beam excavation must not exceed 1.5 metres. The maximum drive width may need to be reduced if the Structural Engineer determines that the existing adjacent footing is unable to structurally span 1.5 metres. Care must be taken to ensure that the adjacent boundary wall and footing are not damaged by the excavation for the section of capping beam.
- Underpin the existing adjacent footings in a 'hit one, miss two' sequence. The underpins must be designed by a qualified Structural Engineer.
- A temporary works engineer must be engaged to assess the stability of the boundary wall and the requirement for any propping of the wall during construction.

4.6.2 Lateral Earth Pressures

The design lateral earth pressure distribution for the basement retention structure should be chosen to suitably limit deformation outside of the excavation. The magnitude of deformation is also time dependent and influenced by construction methods and quality. Assuming a maximum bulk excavation depth of approximately 14 metres below the existing ground surface level, horizontal ground surfaces to the front and rear of the proposed retaining walls, a uniform lateral earth pressure distribution may be adopted for progressively anchored retaining walls as a simple approach.

A uniform lateral pressure distribution of 6H kPa may be adopted for the design of the basement level retaining walls, where H is the total retained height in metres. Lateral earth pressures generated by surcharge loads may be calculated using an earth pressure coefficient (K) of 0.58. The zone of influence of the excavation should be taken to extend a horizontal distance of 2.0 times the excavation depth out from the excavation perimeter.

Hydrostatic pressure must be added to the above specified lateral earth pressure distribution.

The earth pressure coefficient (K) of 0.58 may be used in conjunction with elastic theory (e.g. a stress distribution derived using Boussinesq's solutions or equivalent) to determine the lateral earth pressure distributions due to surcharge loads.

Sloping backfill should be incorporated as surcharge loading. Any temporary or permanent surcharge loads such as nearby high-level footings, traffic loading and compaction stresses, should also be included in design.

Relevant unit weights and Poisson's ratios for the soil and rock profile are provided in Section 4.6.3.

If the retaining wall is proposed to be modelled using WALLAP, it is recommended that the design parameters provided in Section 4.6.3 are adopted.

4.6.3 Design Parameters for Retention Structures

Based on the soil and rock profile intercepted in Boreholes 1 – 3, the soil and rock parameters, which are applicable to the design of the basement level retaining walls using proprietary software such as WALLAP are provided in Table 4.6.3.1. It must be noted however, that the parameters given in Table 4.6.3.1 are unfactored. Appropriate strength reduction factors must be applied in accordance with Australian Standard AS 4678 – 2002 'Earth Retaining Structures'.

TABLE 4.6.3.1: Design Parameters for Retention Structures

Soil and Rock Description	Depth Interval in Boreholes (m)			γ (kN/m^3)	Poisson's Ratio	K_a	K_o	K_p	Undrained (Short Term)			Drained (Long Term)		
	1	2	3						C_u (kPa)	$Ø_u$ (Deg)	E_u (MPa)	C' (kPa)	Ø' (Deg)	E' (MPa)
Fill	0.0 – 1.1	0.0 – 0.65	0.0 – 0.55	18	0.5	0.41	0.58	N/A	-	-	-	0	25	10
Clay	1.1 – 2.0	NP	NP	18	0.5	0.41	0.58	2.46	50	0	25	5	25	15
	NP	0.65 – 3.5	0.55 – 2.9	19	0.5	0.41	0.58	2.46	120	0	35	5	25	25
Sandy Clay	2.0 – 4.5	NP	NP	18	0.5	0.41	0.58	2.46	50	0	25	5	25	15
	4.5 – 5.0	3.5 – 6.0	2.9 – 5.2	19	0.5	0.41	0.58	2.46	120	0	35	5	25	25
Silty Sand	5.0 – 12.0	NP	5.2 – 6.0	20	0.3	0.31	0.47	3.25	-	-	-	0	32	50
Clay	NP	NP	6.0 – 7.5	18	0.5	0.41	0.58	2.46	50	0	25	5	25	15
Silty Sand Underlying Clay	12.0 – 14.0	6.0 – 9.1	7.5 – 9.0	20	0.3	0.25	0.40	4.02	-	-	-	0	37	100
Extremely to Distinctly Weathered Siltstone and Sandstone	NP	9.1 – 13.71	9.0 – 11.74	22	0.25	0.31	0.47	3.25	-	-	-	0	32	120
Distinctly Weathered Siltstone and Sandstone	14.0 – 20.7	13.71 – 19.3	11.74 – 20.7	24	0.25	0.27	0.43	3.69	-	-	-	0	35	250

Legend NP: Nil Present; N/A: Not Applicable

4.6.4 Ground Anchors

During construction, temporary lateral restraint of the diaphragm wall or cased secant pile wall retention system will need to be provided with multiple rows of ground anchors. The uppermost row of ground anchors must be positioned as high as possible to limit lateral deflections of the retention system. Anchors must be installed incrementally as excavation proceeds. Ground anchors must be installed immediately once the anchor points have been exposed. Upon completion of construction, lateral restraint of the retention system will need to be provided by the structure and the ground anchors will need to be de-stressed.

Anchor capacities will largely depend upon the method and quality of installation. However, preliminary design of temporary ground anchors may be carried out using the allowable bond strengths provided in Table 4.6.4.1. Ground anchors must not be bonded into clay of stiff consistency.

TABLE 4.6.4.1: Maximum Allowable Soil/Grout Bond Stress for Temporary Ground Anchors

Soil/Rock Type	Maximum Allowable Bond Stress (kPa)
Native Clay of Firm to Stiff Consistency	N/A
Native Clay of Very Stiff to Hard Consistency	50
Medium Dense to Very Dense Silty Sand	50
Extremely to Distinctly Weathered Siltstone and Sandstone	100
Distinctly Weathered Siltstone and Sandstone	250

Legend N/A: Not Applicable

It must be noted that at least some of the ground anchors will extend into saturated soils below the ground water table. It must be ensured that suitable anchor installation methods are used to ensure that the ground anchors are properly bonded. It is recommended that only suitably qualified ground anchor installation contractors should be considered for this project.

The bond length of anchors should not exceed 10 metres. All anchors must be proof tested in accordance with Table B1 in Australian Standard AS 4678 – 2002, 'Earth-Retaining Structures' under the supervision of an experienced engineer. The testing may allow an upgrade of the above allowable bond stresses.

To guard against a sliding wedge failure behind the retaining wall, the free length of anchors should extend at least 1.5 metres beyond the 40° line extending up from the toe of the retaining wall. Local and global stability of the retaining wall should be analysed once retaining wall geometry and anchor locations have been determined.

Local and global stability of the proposed retaining wall should be analysed once retaining wall geometry and anchor locations have been determined. Design of anchors should provide reserve capacity to allow additional tensioning of anchors if monitoring of the ground and wall movements indicates greater than anticipated deflections or settlements.

4.6.5 Ground Movements Related to Excavation

Adjacent to any excavations there will be some movement of the ground within the zone of influence of the excavation. The magnitude of ground and wall movement is highly dependent on the wall design, construction sequence, quality of installation and elapsed time.

It is recommended that a detailed dilapidation survey be conducted on the neighbouring buildings prior to excavation and construction.

As a guide, precedence suggests that for similar conditions to those anticipated at the subject site, lateral deflection of anchored walls designed for a uniform lateral earth pressure distribution of 6H kPa, and constructed with good workmanship, is likely to be in the range of approximately 0.1 - 0.2% of the excavation depth. Consistent with the above horizontal deflection, vertical settlements in the range of 0.1 – 0.2% of the excavation depth could be expected for anchored walls.

The distribution of vertical ground settlement adjacent to the excavation is highly dependent on the deflected shape of the retention system. However, settlement can be expected to diminish to negligible magnitude at the outer extent of the zone of influence of the excavation. The zone of influence of the excavation should be taken to extend a horizontal distance of approximately 2.0 times the excavation depth out from the excavation perimeter.

In addition to the inherent deformations, which will take place within any proposed bulk excavations, there may be some minor delays between excavation and the establishment of a suitable or anchoring arrangement, during which time additional minor lateral deflections may take place.

4.6.6 Monitoring of Ground Movements Related to Excavation

Survey monitoring of the basement retention systems should be undertaken at regular intervals during the construction period. Survey points will need to be installed along the capping beam at approximately 5 to 10 metre intervals. Baseline monitoring should be undertaken prior to commencement of the basement excavations at the subject site and subsequent monitoring should be undertaken at weekly intervals from the time that excavation commences until the time the temporary ground anchors are destressed.

A threshold maximum lateral deflection of 7 millimetres[1] from the baseline survey monitoring should be adopted at locations where structures and movement sensitive underground assets are located adjacent to the proposed basement excavations. The maximum lateral deflection can be relaxed to 25 millimetres at locations where the basement excavation abuts road reserves. The following alarm procedure should be implemented:

- Amber Alarm: Lateral deflections reach 75% of the above maximum lateral deflections. Monitoring of lateral deflections should be increased to weekly.
- Red Alarm: Lateral deflections reach 95% of the above maximum lateral deflections. Construction must be ceased and this office and relevant authorities such as Council and VicRoads must be notified without delay. Monitoring of lateral deflections should be increased to daily.

[1] Structural Engineer shall review the threshold on the basis of conditions and construction of the adjacent structures.

4.7 BASEMENT FLOOR SLAB

Based on the subsurface conditions encountered at the locations of Boreholes 1 – 3, it is anticipated that the bulk excavation for the proposed basement levels will expose a combination of sand of inferred Werribee Formation and underlying weathered siltstone and sandstone of Dargile Formation across the subject site.

Any exposed weathered siltstone and sandstone at the base of the bulk excavation is likely to be significantly disturbed to shallow depths by heavy construction equipment. It is therefore recommended that design parameters for a conventional floor slab at the base of the bulk excavation for the proposed basement levels are restricted to those applicable to clay in order to reflect the anticipated level of disturbance of the weathered siltstone and sandstone.

Subject to adequate preparation of the exposed native subgrade at the time of construction, the following parameters are recommended for the design of the floor slabs at the base of the bulk excavation for the basement levels over the eastern half of the site:

- Soaked CBR Value: 3.0%
- Long Term Modulus: 14 MPa
- Short Term Modulus: 21 MPa

Subgrade preparation at the base of the bulk excavation for the proposed basement level should comprise removing as much as possible of the loose soil and rock to expose a clean subgrade.

4.7.1 Floor Slabs Designed to Resist Hydrostatic Pressure

The floor slabs at the base of the bulk excavation for the proposed basement levels will need to be designed for hydrostatic uplift. It is recommended that the design ground water level specified in Section 4.3 is adopted in the design of the proposed hydrostatic slabs.

It is recommended that an impermeable membrane should be provided beneath the underside of the floor slabs at the base of the bulk excavation for the proposed basement levels.

In the event that the ground water table rises above the design ground water table level due to unforeseen circumstances, it is recommended that a pressure relief system should be provided below the floor slab membrane to prevent damage to the floor slab.

The pressure relief system could comprise the following:

- A series of drains installed at maximum 6.0 metre centres in one direction. The trenches must be lined with a suitable grade of non-woven geotextile fabric to prevent silting of the drains. The backfill to the trenches must comprise free-draining screenings.
- A minimum 100 millimetre thick layer of free-draining screenings beneath the entire floor slab. The layer of screenings must be placed over a layer of non-woven geotextile fabric to prevent silting of the screenings. The layer of screenings must have direct hydraulic conductivity with the drains.
- The drains should be connected to solid riser pipes, which are plumbed into the basement drainage system. The height of the riser pipes will determine the maximum hydrostatic pressure on the B4 basement floor slab.

A well-constructed fully tanked retention system in conjunction with a properly designed and constructed floor slab at the base of the bulk excavation for the proposed basement, which are able to resist full hydrostatic pressure, should only allow relatively minor amounts of seepage water into the completed structure. Nonetheless, it must be recognised that the completed basement structure will not be watertight and, as such, a suitable drainage system must be installed and maintained within the completed basement level over the life of the structure.

4.8 EXCAVATION AND SITE PREPARATION

4.8.1 Excavation Conditions

Based on the conditions encountered in Boreholes 1 – 3, it is anticipated that the surface fill and underlying natural soil profile will be able to be readily excavated using a medium capacity hydraulic excavator equipped with toothed bucket.

Ground vibration during excavation of the soil profile is not anticipated to be problematic with regard to the performance of the existing adjacent buildings. However, it would be prudent to conduct a full dilapidation survey of all adjoining structures prior to the commencement of construction.

Based on the subsurface conditions encountered at the location of Boreholes 1 and 2, it is anticipated that weathered siltstone bedrock will be intercepted by the bulk excavation for the basement levels towards the north east corner of the site. The following general advice is provided in relation to the excavation of the siltstone and sandstone:

- Extremely weathered siltstone and sandstone should be readily excavated using a medium capacity hydraulic excavator fitted with a toothed bucket.

- Low strength siltstone and sandstone will require a medium capacity hydraulic excavator equipped with a ripping tyne to loosen the rock, before it can be bulk excavated. The use of a hydraulic rock breaker is likely to be required for some low strength siltstone and sandstone, particularly where defect spacings are substantial and also within confined excavations.
- Efficient excavation of any medium and higher strength siltstone will require the use of a high capacity excavator equipped with a hydraulic rock breaker to loosen the rock before it can be excavated.

Ground vibration during bulk excavation of the siltstone and sandstone using an excavator fitted with a hydraulic rock breaker will be perceivable by occupants of the adjacent buildings and possibly may be problematic with regard to the performance of the buildings, depending upon the proximity of the excavation to the adjacent buildings and the size of equipment used to excavate the rock. It would be prudent to conduct a full dilapidation survey of all adjoining structures and undertake vibration monitoring during initial stages of rock excavation. As a guide to tolerable vibration limits, reference to the German Standard DIN 4150-Part 3 is suggested.

4.8.2 Lowering of Ground Water During Construction

Based on the standing ground water levels gauged within the standpipes installed in Boreholes 1 and 2, and also the ground water monitoring wells installed by Kleinfelder, the bulk excavation for the proposed basement levels will extend up to approximately 7.0 metres below the existing ground water table. Significant flows of ground water seepage will need to be managed during the construction period within basement excavation extending well below the ground water table.

Prior to attempting any excavations below the ground water table, it is strongly recommended that a perimeter watertight retention wall, as recommended in Section 4.6.1, should be installed around the entire perimeter of the basement excavation.

It is essential that the basement retention wall is embedded well into weathered siltstone and sandstone below the bulk excavation level in order to reduce (not eliminate) the flows of ground water seepage beneath the toe of the wall into the basement excavation during construction.

It will be necessary to temporarily draw the ground water table within the confines of the watertight basement retention system down using an appropriate dewatering arrangement prior to the commencement of basement excavation. The ground water table must be temporarily lowered at least 1.0 metre below the B3 basement floor slab subgrade level at the time of construction. It will be necessary to lower the ground water table during the construction period until such time that the proposed structure has advanced to a stage in construction where the dead weight of the proposed structure exceeds the buoyant forces acting on the B3 basement floor slab.

Extreme care must be taken not to lower the regional ground water table outside of the proposed basement excavation both during construction and post construction. Lowering of ground water table adjacent to the subject site will result in potentially appreciable settlement of the Coode Island Silt, which will result in unacceptable settlement and distortion of nearby buildings, infrastructure and pavements constructed directly on the fill and near surface Quaternary age sediments. Recharge of the ground water table outside the basement retention system may need to be considered during the construction period in order to prevent lowering of the ground water table within the Coode Island Silt.

Moonee Valley City Council will not allow pumped ground water seepage intercepted by the proposed basement excavation to be discharged into the stormwater drainage system during the construction period. The pumped ground water seepage will therefore need to be discharged into the sewerage system after an appropriate trade waste agreement has been obtained from City West Water. Treatment of the pumped ground water may be required before it can be discharged into the sewer.

In addition to the ground water seepage flows below the regional ground water table, the possible presence of perched seepage water within the fill overlying the less permeable clay should be noted. Perched seepage water flows will lead to instability within the near surface soil layers during excavation for the basement levels.

The presence of perched seepage water is likely to be most prevalent during the winter and spring months when rainfall levels are highest and evaporation rates are lowest.

Consideration should also be given to commencing site excavations during summer and early autumn when the presence of perched seepage water is likely to be reduced.

4.8.3 Temporary Batter Slopes

In accordance with the Workcover Victoria, May 2018 Compliance Code – Excavation (Edition 1), no worker shall be permitted to enter an excavation exceeding a depth of 1.0 metre unless the excavation has been suitably battered, benched or shored. This is of particular relevance to the fill and native soils at the subject site, which are prone to collapse without warning.

Temporary batter slopes constructed above the ground water table for a maximum excavation depth of 2.5 metres below the existing ground surface should be no steeper than 1 in 2 unless appropriate support structures are provided. The recommended 1 in 2 temporary excavation batter is subject to the following conditions:

- Adjacent surcharge loads do not exceed 5 kPa. An experienced Geotechnical Engineer should perform a stability analysis on any proposed batters where surcharge loads exceed 5 kPa or where the excavation depth exceeds 2.5 metres.

- The crest of the excavation batter is offset at least 1.0 metre from the property boundaries.
- Any perched seepage water is intercepted well behind the excavation batter, prior to the commencement of excavation. Battered excavations will not be possible in saturated soils.
- The toe of the excavation batter is located at least 1.0 metre above the ground water level.
- Permanent retention structures should be completed within approximately 1 month of the temporary batters being excavated.

4.8.4 Site Trafficability During Construction

During summer and early autumn when evaporation rates are typically high and rainfall levels low, it should be possible for trucks to traffic the stripped ground surface. Other than dust suppression no significant difficulties are anticipated. During winter and spring, and even following heavy or prolonged rain periods during summer and autumn, only tracked machinery will be able to access the site upon the completion of demolition and removal of the existing buildings and pavements at the site.

If site access is to be provided for trucks once the ground surface has been exposed to rain it will be necessary to strip all poor quality fill and saturated soil from the areas to be accessed, and construct access tracks using non-descript crushed rock (100 millimetre minus), recycled brick and concrete rubble or equivalent placed over a suitable grade of geogrid and/or geotextile fabric. The depth of crushed rock required will depend upon the site conditions at the time of construction, the weight of the vehicles and the traffic frequency. Specialist suppliers of geotextiles should be consulted at the time of construction regarding the selection of an appropriate grade of geogrid and/or geotextile fabric.

4.8.5 Working Platform for Piling Rig

The extent of site preparation works needed to enable a piling rig to setup and safely operate at the site, will depend on the following factors:

- The mass of the piling rig, in particular the ground pressures beneath the tracks and mast base of the piling rig.
- The depth, composition and density/consistency of the surface layers of fill material overlying the near surface native sediments.
- The amount of any possible contaminated fill that will be required to be removed from the site prior to the commencement of construction.
- The extent of disturbance to the fill and near surface native sediments during site demolition works.

Based on experience of similar conditions, it is anticipated that it will be necessary to construct a good quality granular working platform before a piling rig can be setup at the site. A detailed assessment of the minimum required thickness of the working platform can only be provided once the details of the piling rig become available and the site has been cleared such that the ground conditions at shallow depth can be assessed in more detail. However, as a guide, a working platform, which is constructed from imported granular fill that is compacted in layers over a suitable layer of geogrid, is likely to be in the order of 0.5 – 0.75 metres thick.

This office should be consulted for detailed design of the working platform for the rig prior to the commencement of construction as soon as the load details for the rig become available.

4.9 EXTERNAL PAVEMENTS

4.9.1 Performance of Pavements

The performance of pavements constructed on high plasticity clay subgrades is notoriously problematic. The successful performance of pavements at the subject site is subject to the following:

- Adequate preparation of subgrades.
- Adequate surface and subsurface drainage, ensuring that pavement layers and subgrades do not become saturated.

Performance of the proposed external pavement at the south end of the subject site will be commensurate with the level of subgrade preparation and the amount of care taken to prevent extremes in moisture content both during and post construction. In order of increasing performance and cost, the following forms of subgrade preparation can be considered for the proposed development at the subject site:

1) **Untreated Compacted Clay Fill or Native Clay Subgrade:** *This option can only be considered where the pavement subgrade can be prepared under favourable conditions.*

2) **Bridging Layer of Structural Fill:** *This option will provide significantly improved performance of pavements compared with pavements constructed on an untreated subgrade. Additionally, this option will be beneficial if the finished subgrade level is to be raised above the native clay layer.*

4.9.2 Pavements Constructed on an Untreated Clay Fill and Native Clay Subgrade

Construction of a new pavement directly on an untreated clay fill or native clay subgrade can only be considered under favourable conditions. If the subgrade is softened by moisture ingress at the time of construction, it will not be possible to construct the pavements on an untreated subgrade.

Similarly, the successful future performance of the new pavements on an untreated clay fill or native clay subgrade will be dependent upon adequate drainage being provided and maintained, such that there is no chance of the pavement layers and subgrade becoming saturated during the life of the pavement. Saturation of the untreated subgrade will result in very rapid failure of the new pavement.

Any poor-quality fill comprising predominantly of silt and/or poorly compacted fill, as well as any silt topsoil must be stripped to expose a stable clay fill or native clay subgrade throughout. The stripped ground surface must be moisture conditioned to within 85 – 115% of the Standard optimum moisture content value as determined in accordance with Australian Standard AS 1289 5.1.1. Scarification of the fill to a depth of 0.25 metres below the stripped ground surface may assist with moisture conditioning of the fill.

The stripped ground surface must be compacted using an appropriate vibrating roller to at least 98% of the Standard maximum dry density value as determined in accordance with Australian Standard AS 1289 5.1.1.

Proof rolling of the prepared subgrade should be closely inspected by an experienced engineer. Any unstable areas of subgrade must be stripped and re-instated using compacted structural fill. The presence of any unusual features or conditions should be brought to the attention of this office before construction proceeds.

Pavements constructed directly on an adequately prepared clay fill and native clay subgrade may be designed using the following parameters:

- Compacted Clay Fill/Native Clay Subgrade: - CBR = 1.5%
  - Long Term Modulus = 8 MPa.
  - Short Term Modulus = 11 MPa.

4.9.3 Pavements Constructed on a Bridging Layer of Structural Fill

All poor-quality fill, silt topsoil and moisture softened clay must be stripped to expose a stable native clay surface throughout. Further clay should be stripped as required to provide a minimum depth of 0.6 metres below the proposed pavement subgrade level.

The stripped clay surface must be moisture conditioned to within 85 – 115% of the Standard optimum moisture content value as determined in accordance with Australian Standard AS 1289 5.1.1. Scarification of the exposed clay to a depth of 0.25 metres below the stripped ground surface may assist with moisture conditioning of the clay. The stripped clay surface must be compacted using an appropriate vibrating roller to at least 98% of the Standard maximum dry density value as determined in accordance with Australian Standard AS 1289 5.1.1.

Proof rolling of the stripped clay surface must be closely inspected by an experienced engineer. Any localised soft or heaving areas must be stripped and re-instated using structural fill.

If extensive areas of instability are identified during proof rolling, or the subgrade has been exposed to significant rainfall and is unworkable at the time of construction, it will be necessary to place a layer of geogrid (Tensar TX160 geogrid or an equivalent product) over the surface of the clay prior to the placement of any structural fill. The geogrid must be installed in accordance with the manufacturer's specifications. A minimum lap width of 0.6 metres must be provided at all locations.

Structural fill meeting the material and placement specifications of Section 4.10.2 should be placed on the prepared ground surface to construct a bridging layer of compacted fill on which to construct pavements. A minimum depth of 0.6 metres of imported structural fill below the proposed pavement subgrade level is recommended.

Assuming a CBR value of 8% for any structural fill, a design CBR value of 4.5% may be adopted on top of the 0.6 metre thick bridging layer of structural fill.

If required, a composite design CBR value may be determined for other layered profiles using the following Japan Roads Formula:

$$CBR_c = [\Sigma (t_n \times CBR_n^{1/3})]^3$$

Where CBR_c = the composite CBR of the layered system
n = layer number
t_n = thickness of layer n
Σt_n = 1.0 metre
CBR_n = CBR value of layer n

Rigid pavements and floor slabs may be designed using the following long and short term Young's Moduli:

- Structural Fill: - Long Term Modulus = 25 MPa
  - Short Term Modulus = 32 MPa.
- Underlying Native Clay: - Long Term Modulus = 8 MPa
  - Short Term Modulus = 11 MPa.

A single equivalent modulus value can be calculated for the layered soil profile using the method given in Section 3.3.7.1 of Publication T48 by Cement, Concrete and Aggregates Australia, 2009, titled 'Guide to Industrial Floors and Pavements'.

4.9.4 Subgrade Drainage and Moisture Control

Effective surface and perimeter cut-off drainage must be provided and maintained to ensure that the pavement layers and subgrade cannot become saturated. Premature pavement failure will occur where drainage is poor.

4.9.5 Inspection of Subgrade

Proof rolling of the exposed subgrade prior to placement of the subbase course should be closely inspected by a qualified engineer to ensure that a suitable level of subgrade preparation has been achieved. Any soft or heaving areas should be stripped and re-instated using structural fill. The presence of any unusual features or conditions should be brought to the attention of this office before construction proceeds.

4.10 EARTHWORKS

4.10.1 Suitability of In-situ Soils for Use as Structural Fill

The following comments are made with regard to the use of site derived soils for use as structural fill:

Fill and Native Soil Profile: These soils are considered unsuitable for use as structural fill.

Completely to Extremely Weathered Siltstone and Sandstone: The extremely weathered siltstone and sandstone are not recommended for use as structural fill, as they tend to break down to silt and silty sand during compaction.

Distinctly Weathered Siltstone and Sandstone: The distinctly weathered siltstone and sandstone of low or higher rock strength will be suitable for use as structural fill, subject to adequate moisture conditioning.

4.10.2 Structural Fill

All imported structural fill should satisfy the following criteria:

- Maximum % of material retained on 40mm sieve after compaction: - 20%
- Percentage passing 4.75mm after compaction: - 40 – 80%
- Percentage passing 0.075mm after compaction: - 5 – 30%
- Maximum Liquid Limit after compaction: - 50%
- Maximum Plasticity Index after compaction: - 25%
- Plasticity Index x % passing 0.425mm sieve after compaction: - ≤650
- Minimum 4-day soaked CBR value: - 8%
- Maximum coefficient of permeability: - $1x10^{-7}$ m/sec

Imported structural fill may comprise one of the following imported materials:

- Ripped weathered siltstone or sandstone (low to medium strength sedimentary rock)
- Type A fill as defined by VicRoads
- Class 4 crushed rock as defined by VicRoads

Structural fill should be placed on a stable base. Structural fill should be placed in uniform layers not exceeding a loose thickness of 200 millimetres and compacted to at least 98% of the Standard maximum dry density value as determined in accordance with Australian Standard AS 1289 5.1.1. The structural fill should be placed at 85 – 115% of the Standard optimum moisture content value as determined in accordance with Australian Standard AS 1289 5.1.1.

The placement of any structural fill at the site together with material selection and density testing should be conducted under the supervision of a suitably experienced geotechnical practitioner. All field and laboratory testing associated with the selection of a suitable imported fill material and monitoring of relative compaction should be performed in accordance with the test methods specified in Australian Standard AS 1289, 'Methods of Testing Soils for Engineering Purposes.' Australian Standard AS 3798, 'Guidelines on Earthworks for Commercial and Residential Developments' provides guidance on the specification, execution and control of earthworks relevant to the subject site.

4.11 ADDITIONAL SITE TESTING

The comments and recommendations contained within this report have been based on a limited amount of field testing, which does not provide adequate coverage of the entire site for the proposed development.

The presence of the existing buildings at the subject site precluded access with a drilling rig to a significant portion of the site at the time of the site testing. The following additional geotechnical investigation is recommended once site access becomes available:

- Drilling of three (3) additional boreholes to confirm the subsurface soil and rock conditions over the balance of the site.
- Monitoring of the standing ground water levels within the existing standpipes and ground monitoring wells over the period leading up to the demolition.
- Installation of additional standpipes within the boreholes at the time of Stage 2 geotechnical investigation to better define the phreatic surface (ground water table) underlying the subject site.
- Conducting in-situ hydraulic conductivity tests within the additional standpipes to determine the approximate hydraulic conductivity of the saturated soil profile below the ground water table at the subject site.

4.12 REPORT LIMITATIONS

The comments and recommendations of this report will require revision once additional geotechnical testing has been conducted at the site. The comments and recommendations of this report must not be used for final structural design and construction.

This report is for the use of the party to whom it is addressed only and has been produced for the proposed development as described in Section 1.2 of this report and for no other purpose.

It has been assumed that the conditions encountered by the limited number of boreholes are representative of the site in general. Some variation from the conditions encountered by the boreholes is expected over the site.

It is beyond the scope of this report to comment on any possible contamination of soil and ground water at the subject site.

Contractors should be provided access to this report. This report should only be reproduced in full.

If you require any further information please do not hesitate to contact the undersigned.

For and on behalf of
GEOAUST GEOTECHNICAL ENGINEERS PTY LTD

Reza Nobakht
MEng MIEAust

Stephen Mayer
BEng MIEAust CPEng EC-2262

TEST LOCATION PLAN

Geotechnical Engineers Pty Ltd

JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
LOCATION: 139-149 Boundary Road NORTH MELBOURNE

NOT TO SCALE

LEGEND

Denotes approximate borehole location

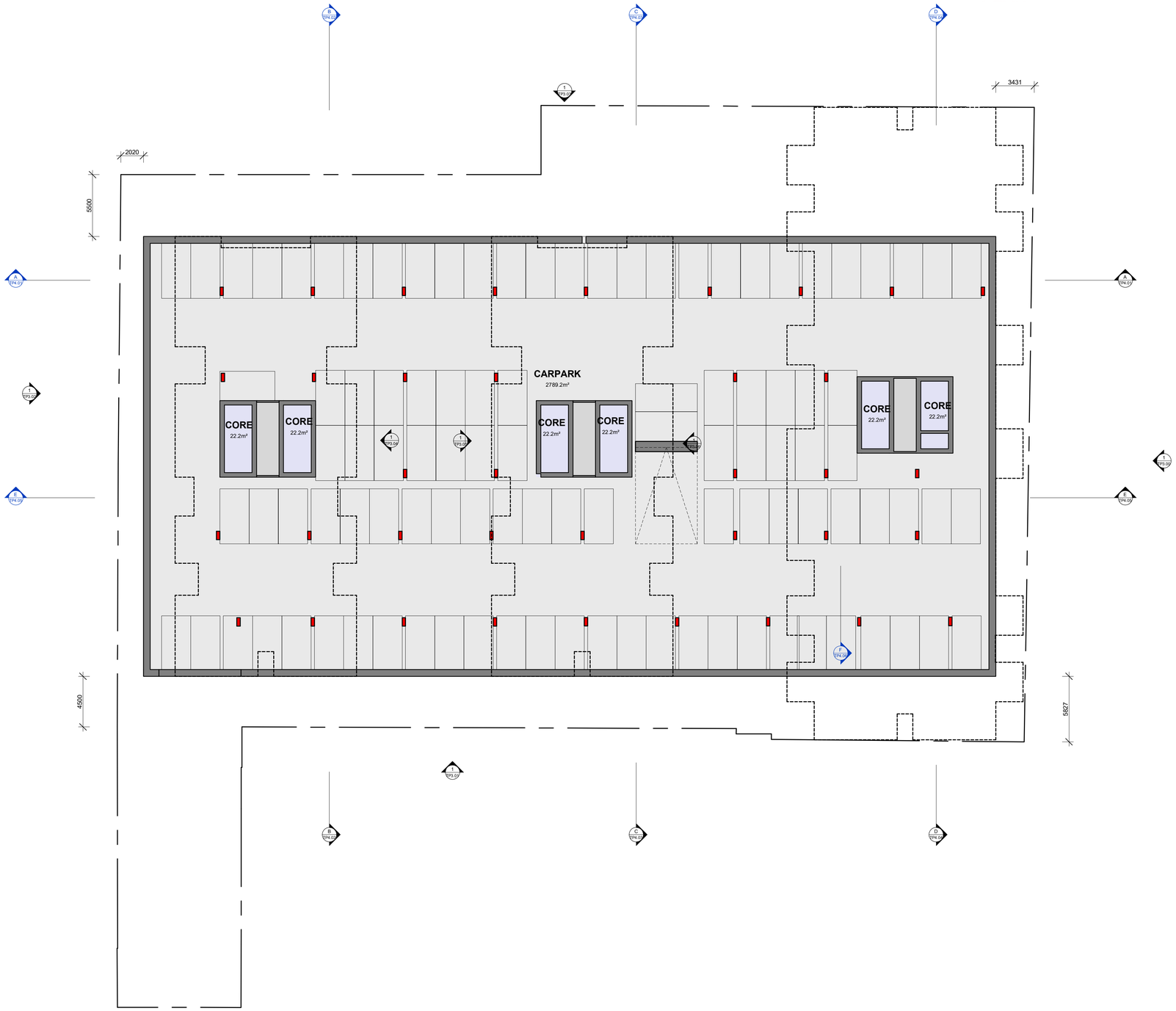
N

Figure 1

GeoAust Geotechnical Engineers Pty Ltd

APPENDIX A

Architectural Plans & Site Survey Plan Extracts



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Amendments

No.	Date	Notes
P5	22/07/2019	Revision 7 - Additional Basement Level Option

Title
BASEMENT 03

Sheet
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TP2.00

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P5

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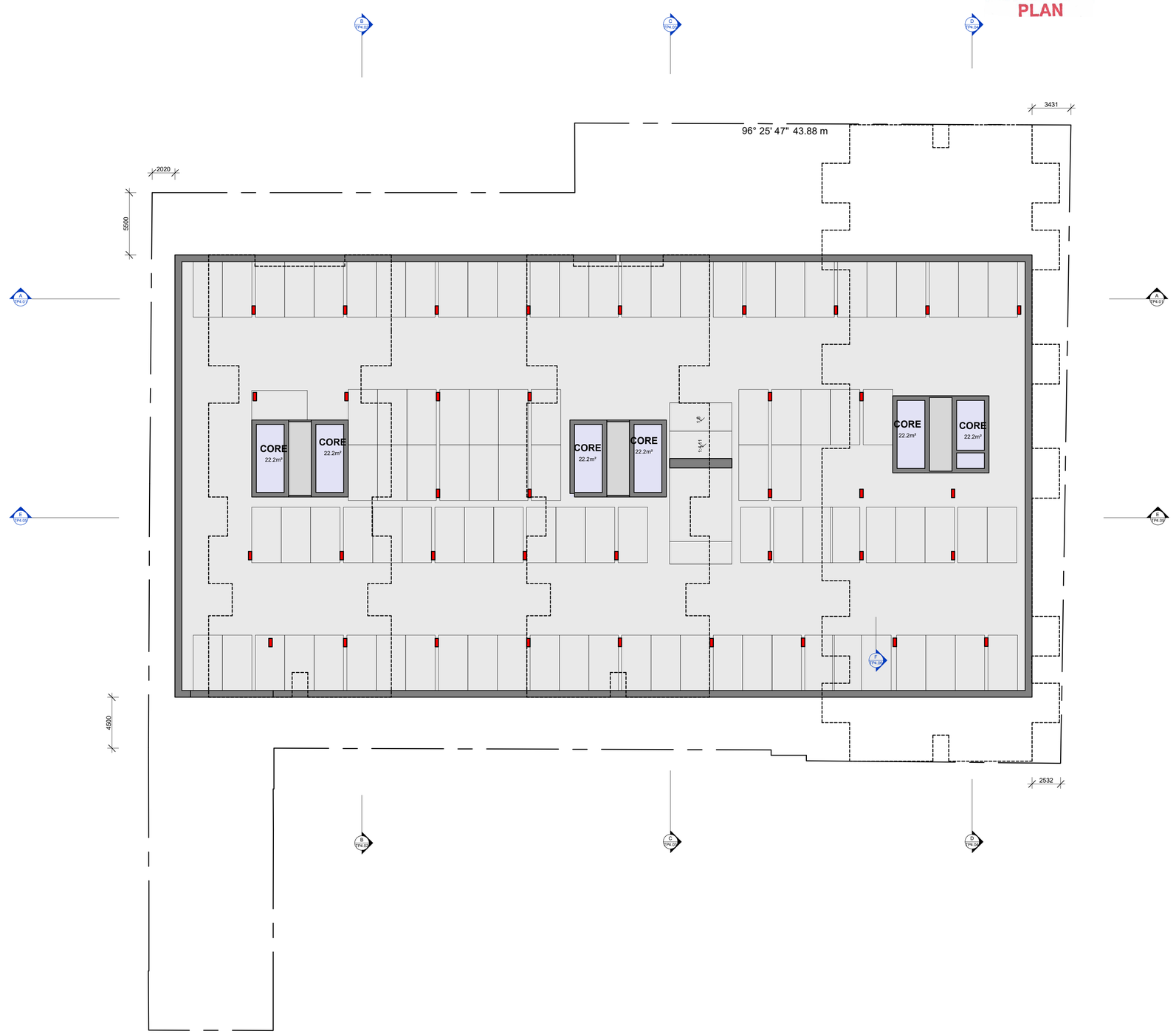

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Title
BASEMENT 02

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Title

BASEMENT 01

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Title
LOWER GROUND FLOOR PLAN

Sheet
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TP2.03

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ADVERTISED PLAN

Double Storey Carpark

SITE BOUNDARY

6000

5500

4500

3431

2532

COMMON GARDEN

TH 3B2B 50.3m²

BAL 9.6m²

TH 3B2B 50.2m²

CORE 21.4m²

VOID

BIOCIRCUIT AREA

GYM 143.7m²

COURTYARD 445.9m²

CORE 22.2m²

WELLNESS 291.9m²

RETAIL 181.5m²

GAS 8.7m²

LOBBY 40.5m²

UP

PRIVATE DINING 119.8m²

COURTYARD 233.7m²

GAMES ARCADE 199.3m²

RETAIL 80.4m²

Switch Room 33.7m²

SUBSTATION 48m²

BOUNDARY ROAD

Iron Fence

Mixed Wire Fence

ALFRED STREET

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Title
UPPER GROUND FLOOR PLAN

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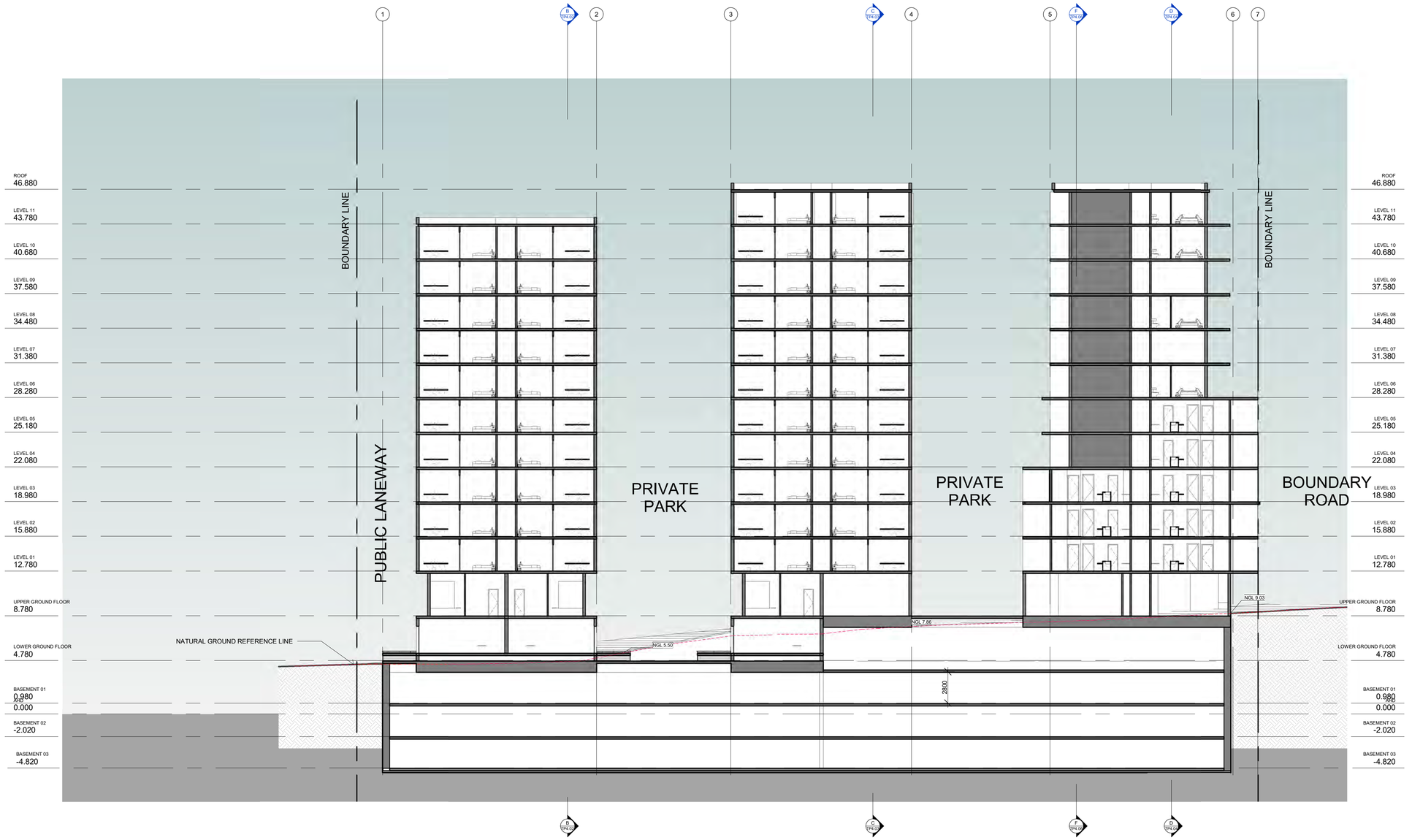

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SECTION A-A

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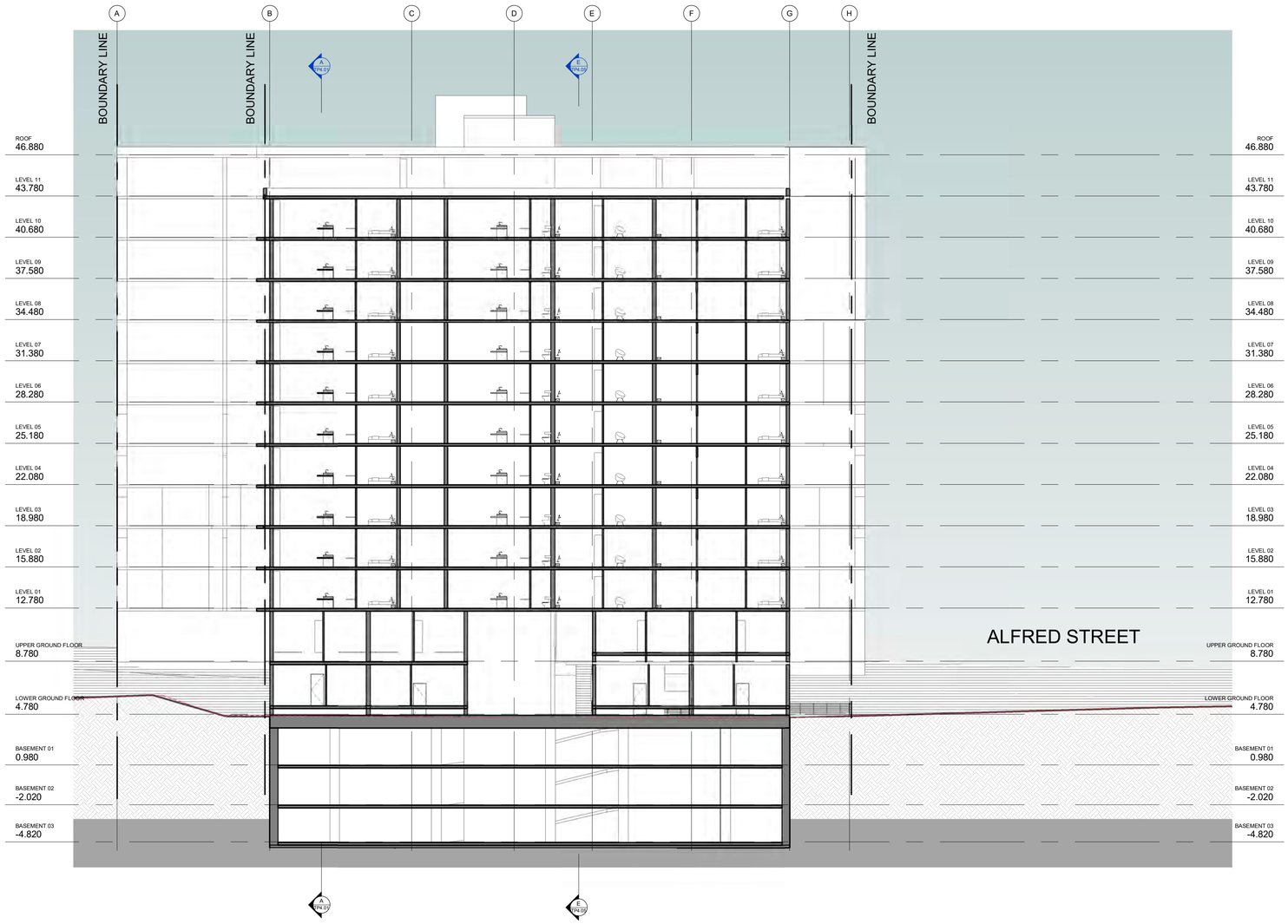

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SECTION B-B

Sheet

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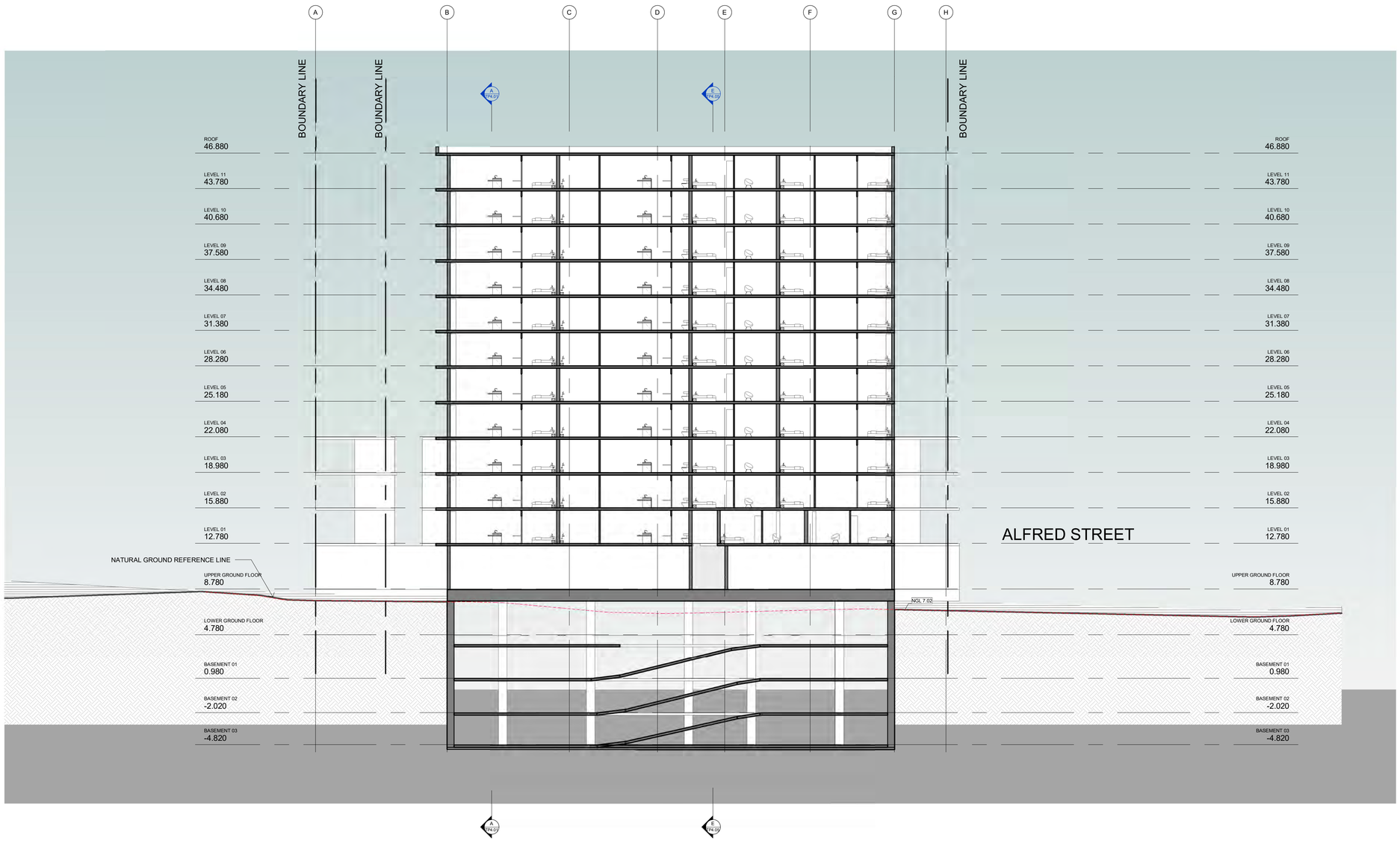

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SECTION C-C

Sheet

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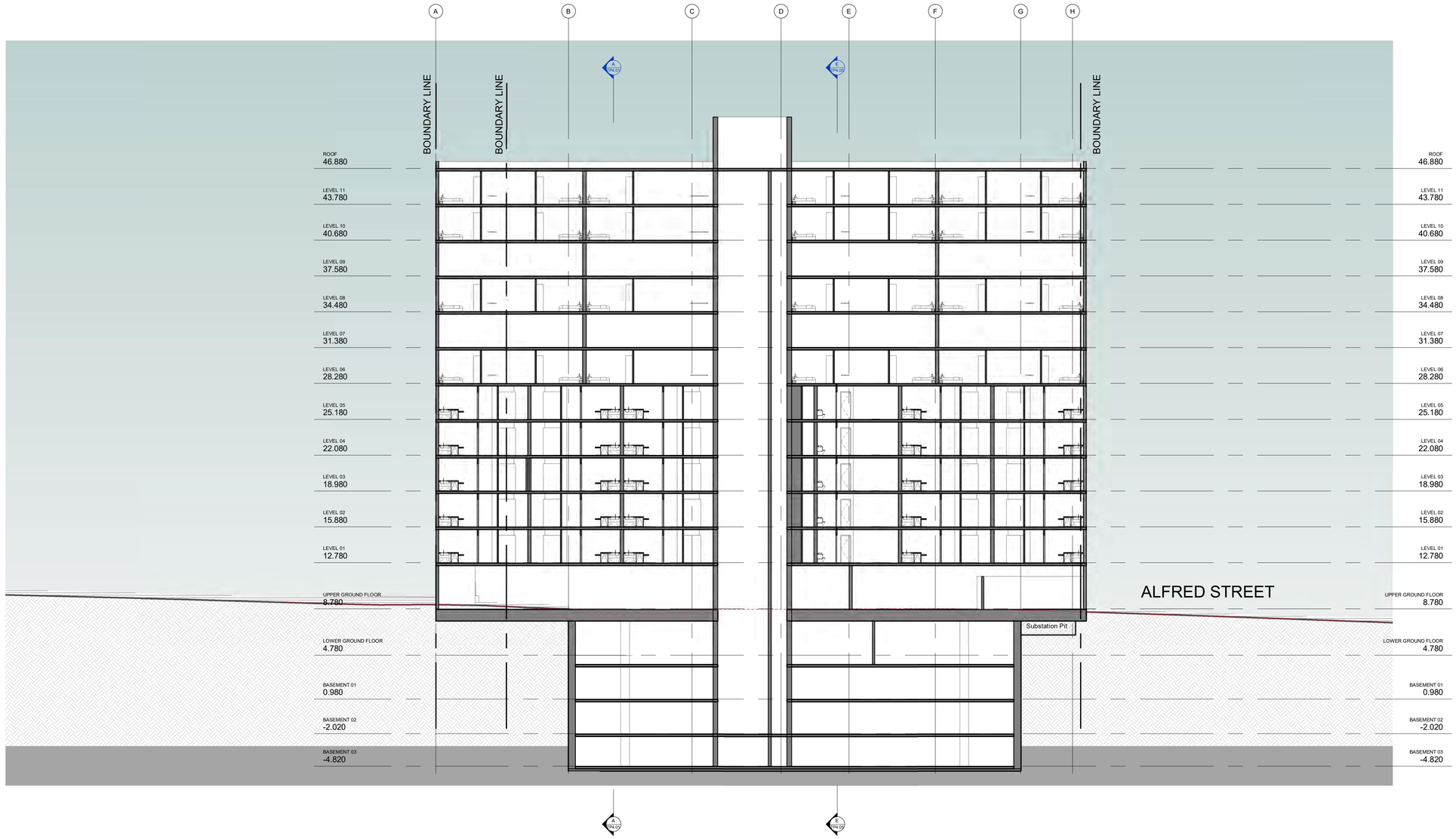

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Title

SECTION D-D

Sheet

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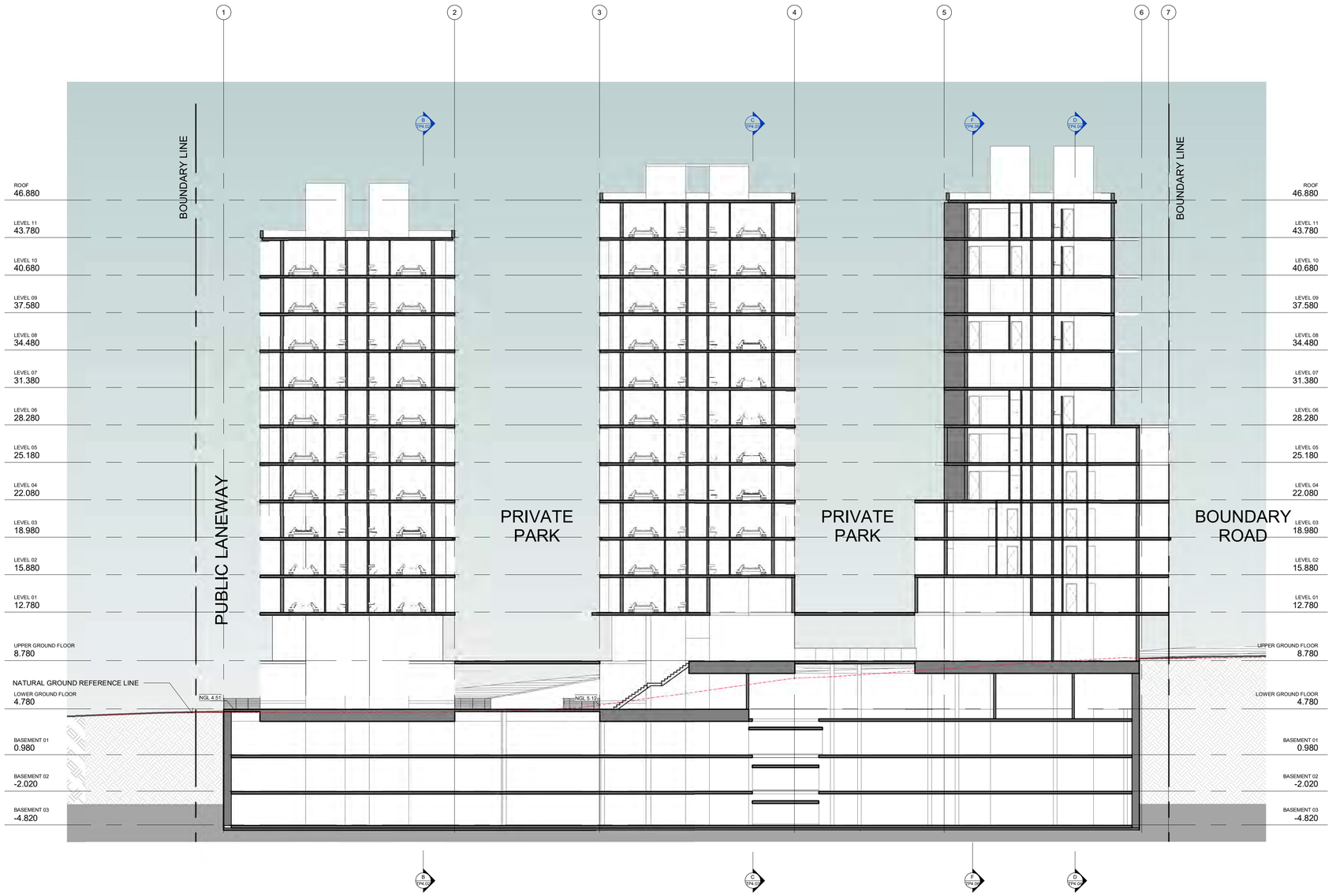

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No.	Date	Notes
PA	04/06/2019	Revision 2
P1	17/06/2019	Revision 3
P2	20/06/2019	Revision 4
P3	28/06*2019	Revision 5
P5	22/07/2019	Revision 7 - Additional Basement Level Option

Title

SECTION E-E

Sheet

PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.

TP4.05

Revision

P5

Scale
1 : 200@A1

Date
22/07/2019

18113

Drawn by:AuthoChecked by:Checker

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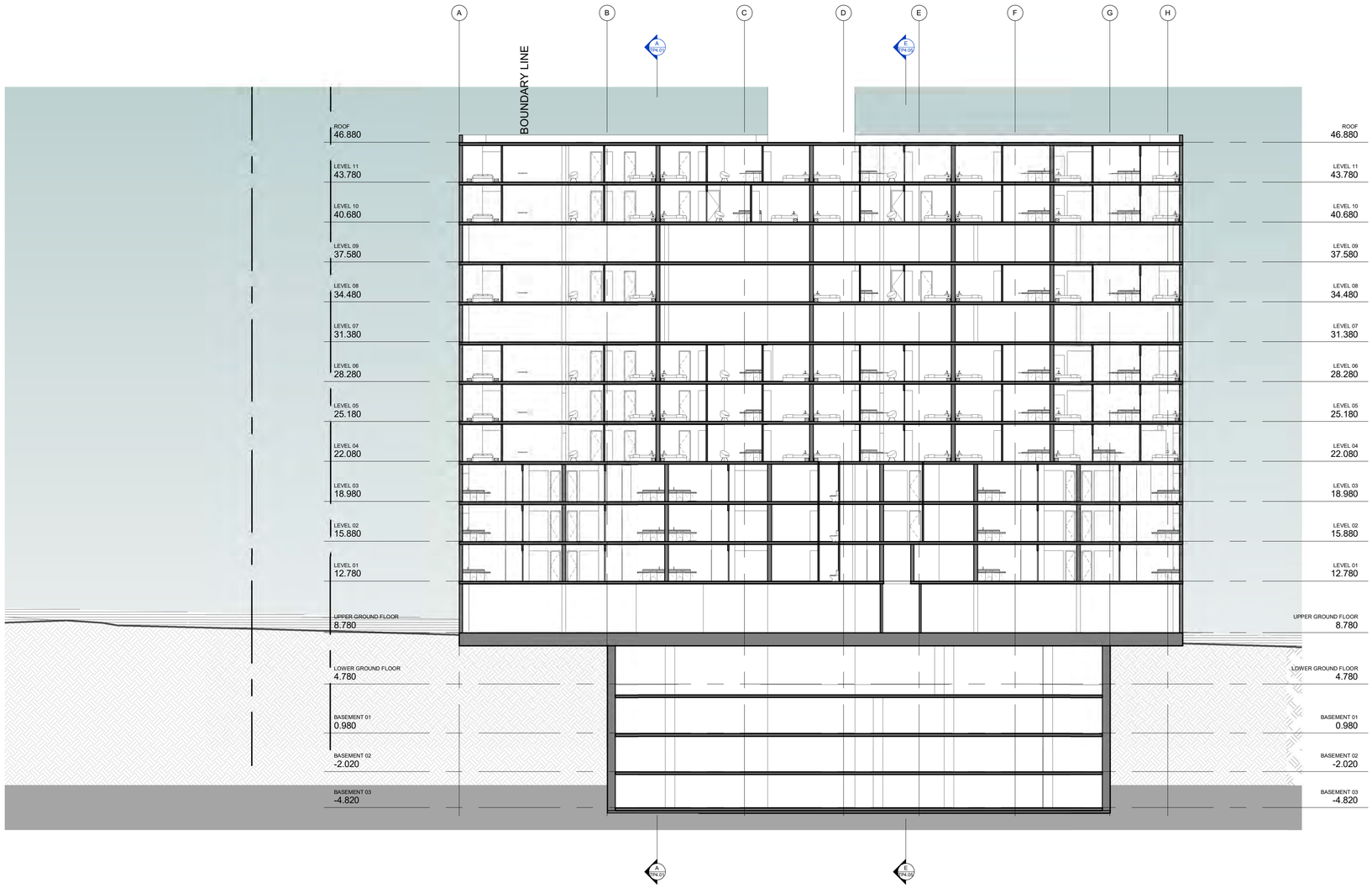

CHT ARCHITECTS

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Project

MIXED USE DEVELOPMENT

139 - 149 Boundary Road, North Melbourne

Client

BLUE EARTH GROUP

Amendments

No.	Date	Notes
P2	20/06/2019	Revision 4
P3	28/06/2019	Revision 5
P5	22/07/2019	Revision 7 - Additional Basement Level Option

Title

SECTION F-F

Sheet

PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No. TP4.06

Revision P5

Scale 1 : 200@A1

Date 22/07/2019

18113

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GeoAust Geotechnical Engineers Pty Ltd

APPENDIX B

Definitions of Logging Terms and Symbols

GeoAust Geotechnical Engineers Pty Ltd

EXPLANATION NOTES FOR BOREHOLE AND TEST PIT LOGS

SOIL CLASSIFICATION AND LOG SYMBOLS

SOIL CLASSIFICATION CHART

	MAJOR DIVISIONS		SYMBOLS GRAPH	SYMBOLS LETTER	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES
				GP	POORLY-GRADED GRAVELS, GRAVEL - SAND MIXTURES
	MORE THAN 50% OF COARSE FRACTION IS LARGER THAN 2.0MM	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
				GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
MORE THAN 50% OF MATERIAL SMALLER THAN 63MM IS LARGER THAN 0.075MM	SAND AND SANDY SOILS	CLEAN SANDS (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
				SP	POORLY-GRADED SANDS, GRAVELLY SAND, LITTLE OR NO FINES
	MORE THAN 50% OF COARSE FRACTION IS SMALLER THAN 2.0MM	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SM	SILTY SANDS, SAND - SILT MIXTURES
				SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR
				CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY
				OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
MORE THAN 50% OF MATERIAL SMALLER THAN 63MM IS SMALLER THAN 0.075MM	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS
				CH	INORGANIC CLAYS OF HIGH PLASTICITY
				OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS				PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS

GROUND WATER

	Inflow
	Outflow
	Standing level on completion
1/2	Standing level 1/2 hour after completion
	Collapse of borehole annulus
VS	Very slight seepage
S	Slight seepage rate
M	Moderate seepage rate
H	High seepage rate
NOT OBSERVED	Ground water observation not possible. Ground water may or may not be present
NOT ENCOUNTERED	Ground water was not evident during excavation or a short time after completion

SAMPLING AND TESTING

DS	Disturbed sample
U60	Thin walled tube sample. Number indicates nominal sample diameter in mm
ES	Environmental sample
SPT	Standard penetration test
3/6/9 N=15	3,6 and 9 refer to blows per 150mm penetration. N=15 is the sum of blows after the initial 150mm penetration
3/6/9 blows for 20mm penetration: N>15.	3 and 6 refer to blows per 150mm penetration. 9 blows resulted in 20mm penetration at which point practical refusal of penetration occurred
S=47kPa	In-situ vane shear test. Result expressed as peak undrained shear strength in kPa
PP=145kPa	Pocket penetrometer test. Result expressed as dial reading in kPa
DCP	Dynamic Cone Penetrometer Test
EX	Excavation. Test starts at base of excavation
S	DCP sank under own weight or last blow of previous 100mm increment
E	End of DCP test
R	End of DCP test due to effective refusal of penetration

Figure 1

GeoAust Geotechnical Engineers Pty Ltd

EXPLANATION NOTES FOR BOREHOLE AND TEST PIT LOGS

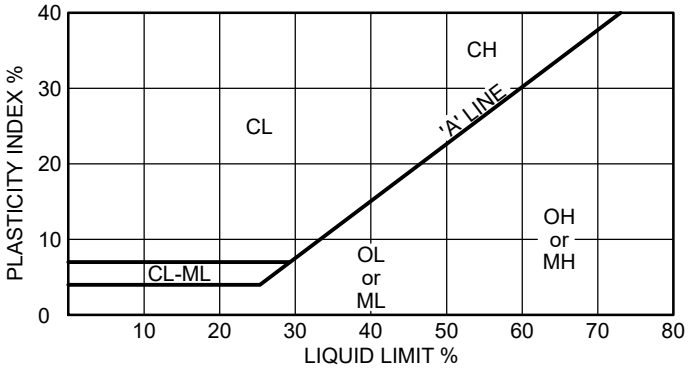
SOIL DESCRIPTION

PARTICLE SIZE

MAJOR DIVISION	SUB-DIVISION	SIZE (mm)
Boulders		>200mm
Cobbles		63 to 200mm
Gravel	Coarse	20 to 63mm
	Medium	6 to 20mm
	Fine	2.36 to 6mm
Sand	Coarse	0.6 to 2.36mm
	Medium	0.2 to 0.6mm
	Fine	0.075 to 0.2mm

0.075mm is the approximate minimum particle size discernible by eye

PLASTICITY CHART



MATERIAL PROPORTIONS

COARSE GRAINED SOILS		FINE GRAINED SOILS		IDENTIFICATION
% Fines	Modifier	% Coarse	Modifier	Field Assessment
⩽ 5	Omit or use 'trace'	⩽ 15	Omit or use 'trace'	Presence just detectable by feel or eye. Properties little or no different to those of primary soil
> 5 ⩽ 12	Describe as 'with clay/silt' as applicable	> 15 ⩽ 30	Describe as 'with sand/gravel' as applicable	Presence easily detected by feel or eye. Properties little or no different to those of primary soil
> 12	Prefix soil as 'silty/clayey' as applicable	> 30	Prefix soil as 'sandy/gravelly'	Presence obvious by feel or eye. Properties of soil are altered from those of the primary soil

COHESIVE SOILS - CONSISTENCY TERMS

LOG SYMBOL	TERM	UNDRAINED STRENGTH	FIELD ASSESSMENT
VS	Very Soft	<12kPa	Exudes between fingers when squeezed
S	Soft	12 - 25kPa	Can be moulded by light finger pressure
F	Firm	25 - 50kPa	Can be moulded by strong finger pressure
St	Stiff	50 -100kPa	Cannot be moulded by fingers. Can be indented by thumb
VSt	Very Stiff	100 - 200kPa	Can be indented by thumb nail
H	Hard	> 200kPa	Can be indented by thumb nail with difficulty

GRANULAR SOILS - DENSITY

LOG SYMBOL	TERM	DENSITY INDEX (%)
VL	Very Loose	< 15
L	Loose	15 - 35
MD	Medium Dense	35 - 65
D	Dense	65 - 85
VD	Very Dense	> 85

MOISTURE CONDITION

LOG SYMBOL	TERM	FIELD ASSESSMENT
D	Dry	Clay and silt are hard, friable, powdery, well dry of plastic limit. Sands and gravels are cohesionless, free running
M	Moist	Feels cool, darkened colour. Cohesive soils can be moulded. Granular soils tend to cohere
W	Wet	Feels cool, darkened in colour. Cohesive soils weakened, free water forms on hands when handling. Granular soils cohere

FIELD ASSESSMENT OF FILL COMPACTION

LOG SYMBOL	TERM
APC	Appears poorly compacted
AMC	Appears moderately compacted
AWC	Appears well compacted

Figure 2

GeoAust Geotechnical Engineers Pty Ltd

EXPLANATION NOTES FOR BOREHOLE AND TEST PIT LOGS

ROCK DESCRIPTION

STRENGTH OF INTACT ROCK MATERIAL

LOG SYMBOL	TERM	POINT LOAD INDEX (MPa) Is50	FIELD ASSESSMENT
EL	Extremely Low	Is50 <0.03	Easily remoulded by hand to a material with soil properties
VL	Very Low	0.03 ⩽ Is50 < 0.1	Material crumbles under firm blows with sharp end of pick; can be peeled with knife; pieces up to 30mm thick can be broken by finger pressure
L	Low	0.1 ⩽ Is50 < 0.3	Easily scored with knife; indentations 1mm to 3mm after firm blows with pick point; core 150mm long and 50mm diameter can be broken by hand; sharp edges of core friable
M	Medium	0.3 ⩽ Is50 < 1.0	Readily scored with knife; core 150mm long and 50mm diameter can be broken by hand with difficulty
H	High	1 ⩽ Is50 < 3	Core 150mm long and 50mm diameter cannot be broken by hand but can be broken by single firm blow of pick; rock rings under hammer
VH	Very High	3 ⩽ Is50 < 10	Hand held specimen breaks with pick after more than one blow; rock rings under hammer
EH	Extremely High	10 ⩽ Is50	Specimen requires many pick blows to break intact rock, rock rings under hammer

ROCK WEATHERING CLASSIFICATION

LOG SYMBOL	TERM	DEFINITION
EW	Extremely Weathered	Rock is weathered to such an extent that it has soil properties , i.e. it iether disintegrates or can be remoulded in water
DW	Distinctly Weathered	Rock strength usually changed by weathering. May be discoloured. Porosity may be increased by leaching, or may be decreased by deposition of weathering products in pores
SW	Slightly Weathered	Rock is slightly discoloured but shows little or no change of strength from fresh rock
FR	Fresh	Rock shows no sign of decomposition or staining

ROCK MASS PROPERTIES

TERM	SEPARATION OF STRATIFICATION PLANES	TERM	DESCRIPTION
Thinly laminated	< 6mm	Fragmented	Primarily fragments < 20mm length and mostly of width < core diameter
Laminated	6mm to 20mm	Highly fractured	Core lengths generally less than 20mm to 40mm with occasional fragments
Very thinly bedded	20mm to 60mm	Fractured	Core lengths mainly 30mm to 100mm with occasional shorter and longer pieces
Thinly bedded	60mm to 200mm	Slightly fractured	Core lengths generally 0.3m to 1.0m with occasional longer and shorter sections
Medium bedded	0.2m to 0.6m		
Thickly beddded	0.6m to 2.0m		
Massive	> 2m	Unbroken	Core has no fractures

ROCK QUALITY DESIGNATION (RQD). RQD is calculated for each core run. The RQD is the sum of the length of all pieces of rock core longer than 100mm expressed as a percentage of the total core run length.

CORE RECOVERY. Core recovery is calculated for each core run. Core recovery is the total length of core, rock or soil, recovered expressed as a percentage of the total length of the core run.

ROCK DEFECT DESCRIPTION - Description order: type, orientation in degrees, infill, infill thickness, surface shape, roughness

DEFECT TYPE		INFILL		INFILL THICKNESS		SURFACE SHAPE		ROUGHNESS	
LOG SYMBOL	TERM	LOG SYMBOL	TERM	LOG SYMBOL	TERM	LOG SYMBOL	TERM	LOG SYMBOL	TERM
BP	Bedding parting	KL	Clean	V	Veneer <1mm thick	PL	Planar	SL	Slickensided
JT	Joint	CL	Clay			CV	Curved	PO	Polished
FT	Fault	CA	Carbonate	SN	Stain <1mm thick	IR	Irregular	SO	Smooth
SM	Seam	RF	Rock fragments			UN	Undular	RO	Rough
SH	Sheared zone	RC	Rock fragments and clay	5	5mm thick	ST	Stepped	VR	Very Rough
CR	Crushed seam								
IF	Infilled zone								
FR	Fractured zone								

Figure 3

APPENDIX C

Bore Logs

BOREHOLE LOG

TEST LOCATION 1
SHEET 1 of 6

GeoAust Geotechnical Engineers Pty Ltd
7 Micro Circuit, DANDENONG SOUTH VIC 3175
T: (03) 8787 5663 F: (03) 8782 0276
E-mail: enquiries@geoaust.com.au

JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 4.66m
DATUM: AHD
DRILLED BY: G.H
LOGGED BY: P.D
DATE: 6/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
127mm Diameter Auger		0.15		-	**FILL: Concrete**	-	-							Class 9 PVC standpipe installed to 20.7m depth. Screened from 8.7m to 20.7m.
				-	**FILL: Gravelly Clay,** medium plasticity, brown to dark brown; Gravel, fine to coarse grained, with fine to coarse grained Sand and cobbles	Moist (MC>PL)	F							
		0.5		-	0.25m - mottled brown and grey trace red, trace Gravel, fine to medium grained						0.5			S = 80kPa
				-	**FILL: Clay,** medium plasticity, brown mottled yellow and grey, trace fine grained Gravel and fine to coarse grained Sand		St							
		1.1		CH	**CLAY:** high plasticity, brown, trace fine to medium grained Sand	Moist (MC>PL)	St				1.0			S = 60kPa
Wash Boring											1.5			S = 70kPa 0/2/3 N = 5. PP = 190,150,170kPa
				-	1.6m - mottled brown, red-brown and grey-brown						2.0			
	14/8/19										2.5			
				-	3.0m - with fine to medium grained Sand, Sand content increasing with depth		F to St				3.0			1/2/3 N = 5. PP = 140,90,90,110kPa
		3.5									3.5			

Refer Appendix A for definition of logging terms and symbols

Figure B-1

BOREHOLE LOG

TEST LOCATION 1

SHEET 2 of 6

GeoAust Geotechnical Engineers Pty Ltd
7 Micro Circuit, DANDENONG SOUTH VIC 3175
T: (03) 8787 5663 F: (03) 8782 0276
E-mail: enquiries@geoaust.com.au

JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 4.66m
DATUM: AHD
DRILLED BY: G.H
LOGGED BY: P.D
DATE: 6/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
Wash Boring				CH	**CLAY:** high plasticity, mottled brown, red-brown and grey-brown, with fine to medium grained Sand, Sand content increasing with depth	Moist (MC>PL)	F to St							
				-	4.0m - with seams and bands of Sandy Clay and Sandy Silt						4.0			
							VSt				4.5			3/4/6 N = 10. PP = 320,340,280kPa
		5		SM	**Silty SAND:** fine to coarse grained, mottled brown and grey, with Clay fines and Clayey seams, trace fine grained Gravel	Moist	MD				5.0			
											5.5			
											6.0			5/7/7 N = 14.
											6.5			
											7.0			

Refer Appendix A for definition of logging terms and symbols

Figure B-2

BOREHOLE LOG

TEST LOCATION 1
SHEET 3 of 6

GeoAust Geotechnical Engineers Pty Ltd
7 Micro Circuit, DANDENONG SOUTH VIC 3175
T: (03) 8787 5663 F: (03) 8782 0276
E-mail: enquiries@geoaust.com.au

JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 4.66m
DATUM: AHD
DRILLED BY: G.H
LOGGED BY: P.D
DATE: 6/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
Wash Boring					**Silty SAND:** fine to coarse grained, mottled brown and grey, with Clay fines and Clayey seams, trace fine grained Gravel	Moist	MD							
				-	7.5m - grey, with fine grained Gravel, seams and bands of Sandy Clay and Clayey Sand						7.5			8/12/11 N = 23.
											8.0			
											8.5			
											9.0			9/13/8 N = 21.
				-	9.3m - fine to coarse grained, with seams and bands of fine to medium grained, Silt content decreasing with depth						9.5			
											10.0			
		10.5									10.5			

Refer Appendix A for definition of logging terms and symbols

Figure B-3

BOREHOLE LOG

TEST LOCATION 1
SHEET 4 of 6

GeoAust Geotechnical Engineers Pty Ltd
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JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 4.66m
DATUM: AHD
DRILLED BY: G.H
LOGGED BY: P.D
DATE: 6/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
Wash Boring				SM	**Silty SAND:** fine to coarse grained, grey, with seams and bands of fine to medium grained, Silt content decreasing with depth	Moist	MD				11.0			4/4/19 N = 23.
											11.5			
							VD				12.0			19/21/29 N = 50. Hammer double bouncing
											12.5			
											13.0			
											13.5			8/20/30 N = 50. Hammer double bouncing
		14		-	13.8m - mottled brown and yellow-brown						14.0			

Refer Appendix A for definition of logging terms and symbols

Figure B-4

BOREHOLE LOG

TEST LOCATION 1
SHEET 5 of 6

GeoAust Geotechnical Engineers Pty Ltd
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E-mail: enquiries@geoaust.com.au

JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 4.66m
DATUM: AHD
DRILLED BY: G.H
LOGGED BY: P.D
DATE: 6/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
Wash Boring				-	**SANDSTONE:** fine grained **and SILTSTONE:** brown and grey	DW	L to M				14.5			
		15.05									15.0		☒	10 blows for 50mm penetration: SPT. Hammer double bouncing. Refusal on Siltstone START CORING AT 15.05m RUN 1 (15.05m - 15.6m) 100% CORE RECOVERY RQD = 0%
N.M.L.C Diamond Coring				-	**SANDSTONE:** fine grained **and SILTSTONE:** brown and grey, Bedding 15°, fractured, Joints and Bedding Partings mostly 0° to 60°, lesser 60° to 80°, planar lesser irregular, smooth to rough, iron		M							
				-	stained or Clay infill 1mm to 5mm thick, common healed 15.3m - Clay seam, 60mm thick		L L to M				15.5			RUN 2 (15.6m - 16.5m) 100% CORE RECOVERY RQD = 50%
							M							
		16.2					L				16.0			
				-	**SILTSTONE:** grey and grey-brown, Bedding 10° to 20°, slightly fractured, most defects are Bedding Partings 10° to 20°, planar lesser undular, smooth, clean or Clay veneer, lesser Joints 20° to 70°, undular, clean, smooth		M				16.5			RUN 3 (16.5m - 18.0m) 100% CORE RECOVERY RQD = 100%
				-	16.92m - grey						17.0			
		17.5									17.5			

Refer Appendix A for definition of logging terms and symbols

Figure B-5

BOREHOLE LOG

TEST LOCATION 1
SHEET 6 of 6

GeoAust Geotechnical Engineers Pty Ltd
7 Micro Circuit, DANDENONG SOUTH VIC 3175
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E-mail: enquiries@geoaust.com.au

JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 4.66m
DATUM: AHD
DRILLED BY: G.H
LOGGED BY: P.D
DATE: 6/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
N.M.L.C Diamond Coring				-	**SILTSTONE:** grey, Bedding 10° to 20°, slightly fractured, most defects are Bedding Partings 10° to 20°, planar lesser undular, smooth, clean or Clay veneer, lesser Joints 20° to 70°, undular, clean, smooth	DW	M				18.0			RUN 4 (18.0m - 19.5m) 100% CORE RECOVERY RQD = 77%
											18.5			
											19.0			
											19.5			RUN 5 (19.5m - 20.7m) 100% CORE RECOVERY RQD = 56%
											20.0			
											20.5			
		20.7		-	20.52m - highly fractured band, 180mm thick, with Clay infill <1mm to 20mm thick		L							
					END OF BOREHOLE LOG AT 20.7M									

Refer Appendix A for definition of logging terms and symbols

Figure B-6

BOREHOLE LOG

TEST LOCATION 2
SHEET 1 of 6

GeoAust Geotechnical Engineers Pty Ltd
7 Micro Circuit, DANDENONG SOUTH VIC 3175
T: (03) 8787 5663 F: (03) 8782 0276
E-mail: enquiries@geoaust.com.au

JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 8.65m
DATUM: AHD
DRILLED BY: B.S
LOGGED BY: P.D
DATE: 7/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
127mm Diameter Auger		0.04		-	**FILL: Asphaltic Concrete**	-	-							
		0.15		-	**FILL: Silty Sandy Gravel (Crushed Rock, 40mm minus),** fine to coarse grained, angular, igneous, mottled brown and grey; Sand, fine to coarse grained; Silt, low plasticity	Dry	D							Class 9 PVC standpipe installed to 19.3m depth. Screened from 7.3m to 19.3m.
				-			VSt							
					FILL: Mixture of Sandy Silt, low plasticity, brown; Sand, fine to coarse grained, **and Clay,** medium plasticity, mottled brown and red with white flecks, trace fine grained Gravel						0.5			S > 120kPa
		0.65		CH	**CLAY:** high plasticity, dark brown tending to red-brown with depth	Moist (MC~PL)	H							
											1.0			S > 120kPa
											1.5			S > 120kPa 5/7/11 N = 18.
Wash Boring						Moist (MC>PL)								PP = 540,>600,>600kPa
				-	2.0m - trace fine grained Gravel						2.0			
											2.5			
											3.0			4/8/11 N = 19. PP = >600,>600kPa
				-	3.0m - mottled brown and red-brown									
		3.5									3.5			

Refer Appendix A for definition of logging terms and symbols

Figure B-7

BOREHOLE LOG

TEST LOCATION 2
SHEET 2 of 6

GeoAust Geotechnical Engineers Pty Ltd
7 Micro Circuit, DANDENONG SOUTH VIC 3175
T: (03) 8787 5663 F: (03) 8782 0276
E-mail: enquiries@geoaust.com.au

JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 8.65m
DATUM: AHD
DRILLED BY: B.S
LOGGED BY: P.D
DATE: 7/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
Wash Boring				CH	**CLAY:** high plasticity, mottled brown and red-brown, with seams and bands of Sandy Clay and Clayey Sand	Moist (MC>PL)	H				4.0			
				-	4.5m - trace fine grained Gravel						4.5			3/4/5 N = 9. PP = 460,420kPa
											5.0			
											5.5			
		6		SM	**Silty SAND:** fine to coarse grained, red-brown, trace Clayey seams and fine to medium grained Gravel	Moist	MD to D				6.0			9/13/16 N = 29.
											6.5			
											7.0			

Refer Appendix A for definition of logging terms and symbols

Figure B-8

BOREHOLE LOG

TEST LOCATION 2
SHEET 3 of 6

GeoAust Geotechnical Engineers Pty Ltd
7 Micro Circuit, DANDENONG SOUTH VIC 3175
T: (03) 8787 5663 F: (03) 8782 0276
E-mail: enquiries@geoaust.com.au

JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 8.65m
DATUM: AHD
DRILLED BY: B.S
LOGGED BY: P.D
DATE: 7/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
Wash Boring	14/8/19 ▼				**Silty SAND:** fine to coarse grained, red-brown, trace Clayey seams and fine to medium grained Gravel	Moist	MD to D							
				-	7.5m - mottled brown and grey		D				7.5			15/22/21 N = 43.
		9.1									8.0			
				-	**SILTSTONE:** yellow-brown, with Clay seams	DW	L				8.5			
											9.0			21/10 blows for 10mm penetration: N > 10. Hammer double bouncing. Refusal on Siltstone
											9.5			
											10.0			
		10.5									10.5			

Refer Appendix A for definition of logging terms and symbols

Figure B-9

BOREHOLE LOG

TEST LOCATION 2
SHEET 4 of 6

GeoAust Geotechnical Engineers Pty Ltd
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JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 8.65m
DATUM: AHD
DRILLED BY: B.S
LOGGED BY: P.D
DATE: 7/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
				-	**SILTSTONE:** grey, with Clay seams	DW	L							36 blows for 100mm penetration: SPT. Hammer double bouncing. Refusal on Siltstone
		10.64		-	10.6m - Clay seam, 40mm thick									
N.M.L.C Diamond Coring				-	**SILTSTONE:** grey, Bedding 10° to 20°, fractured, Joints and Bedding Partings mostly 0° to 30° lesser 30° to 90°, planar or undular lesser irregular, smooth, clean or Clay veneer, trace Clay infill <1mm to 10mm thick						11.0			START CORING AT 10.6m RUN 1 (10.6m - 11.3m) 100% CORE RECOVERY RQD = 16%
														RUN 2 (11.3m - 12.5m) 100% CORE RECOVERY RQD = 13%
											11.5			
											12.0			
											12.5			RUN 3 (12.5m - 13.5m) 100% CORE RECOVERY RQD = 59%
							VL							
							L							
							VL							
							M				13.0			
							L							
							VL							
				-	13.46m - Clay seam, 40mm thick						13.5			RUN 4 (13.5m - 14.9m) 100% CORE RECOVERY RQD = 0%
		13.71		-	Continued next page		L							
											14.0			

Refer Appendix A for definition of logging terms and symbols

Figure B-10

BOREHOLE LOG

TEST LOCATION 2
SHEET 5 of 6

GeoAust Geotechnical Engineers Pty Ltd
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JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 8.65m
DATUM: AHD
DRILLED BY: B.S
LOGGED BY: P.D
DATE: 7/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
N.M.L.C Diamond Coring					**SILTSTONE and SANDSTONE:** fine grained, brown, Bedding 0° to 10°, fractured, Joints and Bedding Partings mostly 0° to 60°, lesser 60° to 80°, planar lesser irregular, smooth to rough, Clay veneer, iron stained or clean	DW	L							
							M							
				-	14.28m - highly fractured band, 140mm thick, with Clay infill <1mm to 5mm thick									
				-	14.42m - Clay seam, 50mm thick						14.5			
				-	14.58m - Clay seam, 30mm thick									
				-	14.68m - Clay seam, 10mm thick									
														RUN 5 (14.9m - 15.8m) 100% CORE RECOVERY RQD = 0%
											15.0			
				-	15.15m - grey									
											15.5			
				-	15.8m - fractured to slightly fractured									RUN 6 (15.8m - 16.5m) 100% CORE RECOVERY RQD = 67%
											16.0			
							H							
				-	16.35m - brown-grey									
				-	16.38m - Clay seam, 20mm thick									
											16.5			RUN 7 (16.5m - 18.0m) 100% CORE RECOVERY RQD = 37%
											17.0			
				-	17.02m - highly fractured band, 280mm thick		M							
				-	17.15m - grey									
		17.5									17.5			

Refer Appendix A for definition of logging terms and symbols

Figure B-11

BOREHOLE LOG

TEST LOCATION 2
SHEET 6 of 6

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JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 8.65m
DATUM: AHD
DRILLED BY: B.S
LOGGED BY: P.D
DATE: 7/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
N.M.L.C Diamond Coring				-	**SILTSTONE and SANDSTONE:** fine grained, grey, Bedding 0° to 10°, fractured to slightly fractured, Joints and Bedding Partings mostly 0° to 60°, lesser 60° to 80°, planar lesser irregular, smooth to rough, Clay veneer, iron stained or clean	DW	M				18.0			RUN 8 (18.0m - 18.6m) 100% CORE RECOVERY RQD = 0%
		18.6		-	**CORE LOSS**	-	-				18.5			RUN 9 (18.6m - 19.3m) 64% CORE RECOVERY RQD = 0%
		18.85		-	**SILTSTONE and SANDSTONE:** fine grained, grey, Bedding 0° to 10°, fractured to slightly fractured, Joints and Bedding Partings mostly 0° to 60°, lesser 60° to 80°, planar lesser irregular, smooth to rough, Clay veneer, iron stained or clean 18.85m - highly fractured zone, 230mm thick 19.05m - Clay seam, 120mm thick 19.25m - Clay seam 50mm thick	DW	M				19.0			
		19.3			END OF BOREHOLE LOG AT 19.3M									

Refer Appendix A for definition of logging terms and symbols

Figure B-12

BOREHOLE LOG

TEST LOCATION 3
SHEET 1 of 6

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JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 7.75m
DATUM: AHD
DRILLED BY: D.W
LOGGED BY: A.G
DATE: 7/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
127mm Diameter Auger	NOT OBSERVED	0.05		-	**FILL: Asphaltic Concrete**	-	-							
				-	**FILL: Sandy Gravel,** fine to coarse grained, brown, igneous, slag and concrete; Sand, fine to coarse grained, trace Clay fines	Moist	MD							
		0.3		-	**FILL: Clayey Silt,** medium plasticity, brown, with Sand, fine to coarse grained, and Gravel, fine to coarse grained, sub-angular to angular, brick, ash and igneous	Moist (MC>PL)	St to VSt							
		0.55		CH	**CLAY:** high plasticity, dark brown, with Silt fines, Silt content increasing with depth	Moist (MC>PL)	VSt with St seams				0.5			S > 120kPa
				-	1.0m - brown tending yellow/orange-brown						1.0			S > 120kPa
				-	1.4m - trace pockets of pale yellow-brown, fine to coarse grained Silty Sand						1.5			S = 84kPa 2/4/6 N = 10. PP = 210,220,240,230kPa
Wash Boring							VSt				2.0			
											2.5			
		2.9		CL	**Sandy CLAY:** low plasticity, brown; Sand, fine to coarse grained, with pockets of Clayey Sand						3.0			3/5/6 N = 11. PP = 230,340,260,350kPa
		3.5									3.5			

Refer Appendix A for definition of logging terms and symbols

Figure B-13

BOREHOLE LOG

TEST LOCATION 3
SHEET 2 of 6

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JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 7.75m
DATUM: AHD
DRILLED BY: D.W
LOGGED BY: A.G
DATE: 7/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
Wash Boring	NOT OBSERVED			CL	**Sandy CLAY:** low plasticity, brown; Sand, fine to coarse grained, with pockets of Clayey Sand	Moist (MC>PL)	VSt							
				-	4.0m - with seams of Silty Sand, fine grained						4.0			
											4.5			6/6/8 N = 14. PP = 160,170,165,150kPa
											5.0			
		5.2		SM	**Silty SAND:** fine to coarse grained, red-brown and brown, trace Clay fines	Moist	MD							
											5.5			
		6		CH	**CLAY:** high plasticity, brown mottled grey, with pockets of fine to coarse grained Sand	Moist (MC>PL)	St				6.0			3/5/5 N = 10. PP = 160,170,140,145kPa
											6.5			
											7.0			

Refer Appendix A for definition of logging terms and symbols

Figure B-14

BOREHOLE LOG

TEST LOCATION 3
SHEET 3 of 6

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PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 7.75m
DATUM: AHD
DRILLED BY: D.W
LOGGED BY: A.G
DATE: 7/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
Wash Boring	NOT OBSERVED				**CLAY:** high plasticity, brown mottled grey, with pockets of fine to coarse grained Sand	Moist (MC>PL)	St							
		7.5		SM	**Silty SAND:** fine to coarse grained, brown to red-brown and grey	Moist	D				7.5			11/19/15 N = 34.
		9		-	**SILTSTONE:** pale grey and yellow-brown	DW	VL				8.0			30 blows for 70mm penetration: SPT. Hammer double bouncing
		10.5									8.5			
											9.0			
											9.5			
											10.0			
											10.5			

Refer Appendix A for definition of logging terms and symbols

Figure B-15

BOREHOLE LOG

TEST LOCATION 3
SHEET 4 of 6

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JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 7.75m
DATUM: AHD
DRILLED BY: D.W
LOGGED BY: A.G
DATE: 7/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
N.M.L.C Diamond Coring	NOT OBSERVED			-	**SILTSTONE:** mottled pale brown and grey, Bedding plane dipping at 10° to 20°, defect spacing mostly 40mm to 90mm, defects are Joints 25° to 60°, 80° to 90°, planar, smooth, clean or iron stained or Bedding Partings 10° to 20°, planar or undular, clean, lesser Clay veneer or iron stain	EW to DW	EL to VL						X	42 blows for 100mm penetration: SPT. Hammer double bouncing START CORING AT 10.5m RUN 1 (10.5m - 12.0m) 100% CORE RECOVERY RQD = 75%
				-	10.93m - defect spacing mostly 430mm to 590mm						11.0			
				-	11.03m - dark grey to dark blue-grey									
				-	11.5m - drilling break						11.5			
							L							
				-	11.93m - irregularly interbedded with thin bands of fine grained Sandstone						12.0			RUN 2 (12.0m - 13.3m) 100% CORE RECOVERY RQD = 27%
				-	12.15m - Joints ~0°, ~60° and ~90°, defect spacing mostly 70mm to 150mm									
											12.5			
				-	12.84m - fragmented seam, 22mm thick									
											13.0			RUN 3 (13.3m - 14.9m) 100% CORE RECOVERY RQD = 43%
				-	13.47m - drilling break						13.5			
				-	13.67m - Clay seam, 150mm thick		M							
		14									14.0			

Refer Appendix A for definition of logging terms and symbols

Figure B-16

BOREHOLE LOG

TEST LOCATION 3
SHEET 5 of 6

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JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 7.75m
DATUM: AHD
DRILLED BY: D.W
LOGGED BY: A.G
DATE: 7/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
N.M.L.C Diamond Coring	NOT OBSERVED			-	**SILTSTONE:** dark grey to dark blue-grey, Bedding plane dipping at 10° to 20°, defect spacing mostly 70mm to 150mm, defects are Joints ~0°, ~60° and ~90°, planar, smooth, clean or iron stained or Bedding Partings 10° to 20°, planar or undular, clean, lesser Clay veneer or iron stain	EW to DW	M							
				-	14.5m - defect spacing mostly 30mm to 150mm						14.5			
		14.9		-	**CORE LOSS**	-	-				15.0			RUN 4 (14.9m - 16.4m) 85% CORE RECOVERY RQD = 17%
		15.03		-	**SILTSTONE:** dark grey to dark blue-grey, Bedding plane dipping at 10° to 20°, defect spacing mostly 30mm to 150mm, defects are Joints ~0°, ~60° and ~90°, planar, smooth, clean or iron stained or Bedding Partings 10° to 20°, planar or undular, clean, lesser Clay veneer or iron stain	DW	M							
				-	15.05m - thin beds becoming thin laminations with depth						15.5			
				-	15.92m - Clay seam, 50mm thick						16.0			
				-	16.22m - Clay seam, 11mm thick									RUN 5 (16.4m - 17.7m) 100% CORE RECOVERY RQD = 0%
				-	16.5m - cross bedding present, minor flame and load structures						16.5			
											17.0			
											17.5			

Refer Appendix A for definition of logging terms and symbols

Figure B-17

BOREHOLE LOG

TEST LOCATION 3
SHEET 6 of 6

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JOB No: 6209
CLIENT: BEG Developments Pty Ltd
PROJECT: Proposed Residential Apartment Development
139-149 Boundary Road NORTH MELBOURNE
LOCATION: Refer to Test Location Plan (Figure 1)
RL: 7.75m
DATUM: AHD
DRILLED BY: D.W
LOGGED BY: A.G
DATE: 7/08/2019

Method	Ground Water	Depth	Graphic Log	Classification Symbol	Material description	Moisture / Weathering	Density / Consistency	Sample DS	Sample U60	Sample ES	Depth	DCP Test	Test	Comments and Test Results
N.M.L.C Diamond Coring	NOT OBSERVED			-	**SILTSTONE:** dark grey to dark blue-grey, Bedding plane dipping at 10° to 20°, defect spacing mostly 30mm to 150mm, defects are Joints ~0°, ~60° and ~90°, planar, smooth, clean or iron stained or Bedding Partings 10° to 20°, planar or undular, clean, lesser Clay veneer or iron stain 17.5m - Clay seam, 23mm thick	DW	M				18.0			RUN 6 (17.7m - 18.9m) 83% CORE RECOVERY RQD = 12%
				-	18.43m - Clay seam, 6mm thick						18.5			
				-	18.6m - Clay seam, 104mm thick									
		18.9		-	**CORE LOSS**	-	-				19.0			RUN 7 (18.9m - 20.7m) 89% CORE RECOVERY RQD = 17%
		19.1		-	**SILTSTONE:** dark grey to dark blue-grey, Bedding plane dipping at 10° to 20°, defect spacing mostly 30mm to 150mm, defects are Joints ~0°, ~60° and ~90°, planar, smooth, clean or iron stained or Bedding Partings 10° to 20°, planar or undular, clean, lesser Clay veneer or iron stain	DW	M				19.5			
				-	20.18m - Clay seam, 21mm thick						20.0			
				-	20.57m - Clay seam, 9mm thick						20.5			
		20.7			END OF BOREHOLE LOG AT 20.7M									

Refer Appendix A for definition of logging terms and symbols

Figure B-18

GeoAust Geotechnical Engineers Pty Ltd

APPENDIX D

Core Photographs

Photograph of NMLC Core Recovered from Borehole 1

Geotechnical Engineers Pty Ltd

JOB No:	6209
CLIENT:	BEG Developments Pty Ltd
PROJECT:	Proposed Residential Apartment Development
LOCATION:	139-149 Boundary Road NORTH MELBOURNE

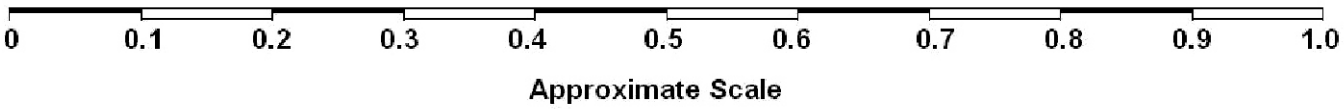


Figure 1

GeoAust Geotechnical Engineers Pty Ltd

Photograph of NMLC Core Recovered from Borehole 2

JOB No:	6209
CLIENT:	BEG Developments Pty Ltd
PROJECT:	Proposed Residential Apartment Development
LOCATION:	139-149 Boundary Road NORTH MELBOURNE

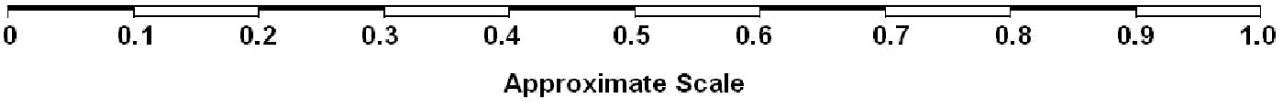
0 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0

Approximate Scale

Figure 2

Photograph of NMLC Core Recovered from Borehole 3

JOB No:	6209
CLIENT:	BEG Developments Pty Ltd
PROJECT:	Proposed Residential Apartment Development
LOCATION:	139-149 Boundary Road NORTH MELBOURNE



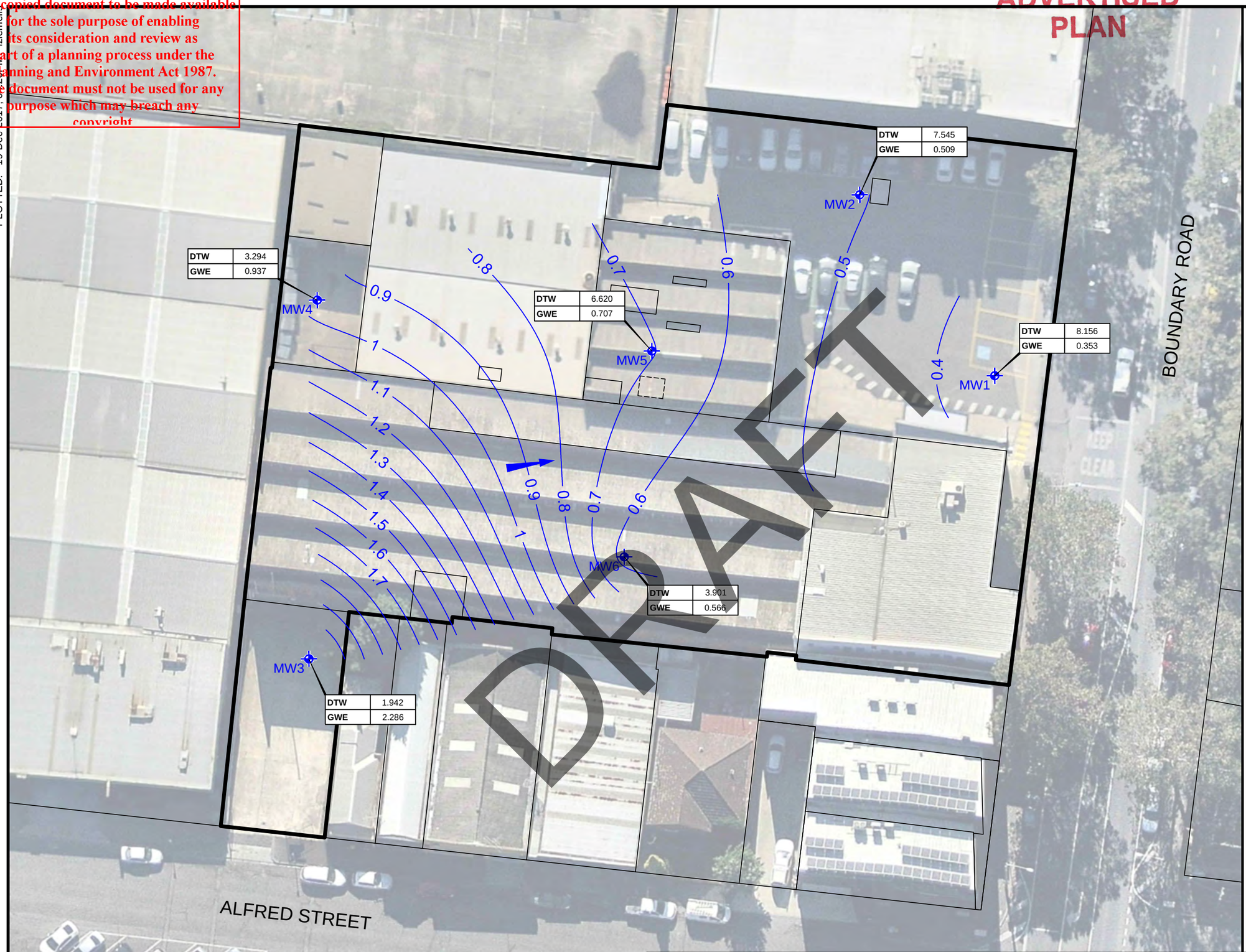
Approximate Scale

Figure 3

GeoAust Geotechnical Engineers Pty Ltd

APPENDIX D

Ground Water Elevation and Contour Plan
Prepared by Kleinfelder Pty Ltd



LEGEND

- MONITORING WELL
- DTW — DEPTH TO WATER (mBTOC)
- GWE — GROUNDWATER ELEVATION (mAHD)
- mAHD — METRES ABOVE AUSTRALIAN HEIGHT DATUM
- INFERRED GROUNDWATER FLOW DIRECTION
- 187.30 — INFERRED GROUNDWATER ELEVATION CONTOUR

NOTE: ALL LOCATIONS ARE APPROXIMATE. DIMENSIONS IN METRES (m).

N

SCALE 1:400 (A3)

0 4 8 12 16 20 METRES

KLEINFELDER
Bright People. Right Solutions.
www.kleinfelder.com

PROJECT:	20181514.001A
DATE DRAWN:	19.12.17
DRAWN BY:	LZ
CHECKED BY:	PR
FILE NAME:	20181514.001A-5.dwg

GROUNDWATER ELEVATION AND CONTOUR PLAN (SEPTEMBER 2017)

139-149 BOUNDARY ROAD
NORTH MELBOURNE, VICTORIA

FIGURE 3

PLOTTED: 19-Dec-2017, 08:29AM by lziemelis
LAYOUT: 3
ATTACHED IMAGES: "region.jpg" "site.jpg" "VVG-N.png" "VVG-S.png"
CAD FILE: O:\09_Projects\DELTEK Projects\Regular\2018\20181514.001A_Grange Developments_Boundary Road\Figures
MELBOURNE, AU

GeoAust Geotechnical Engineers Pty Ltd

Project Reference No: 6209 6 September 2019

GEOTECHNICAL INVESTIGATION – DOCUMENT DISTRIBUTION

Proposed Residential Apartment Development: 139-149 Boundary Road, NORTH MELBOURNE VIC

Please find attached the geotechnical report for the above project. Report distribution details are listed below.

Mr Greg Field e-mail:1
Fusion Project Management
greg@fusionpm.com.au

Should you require further information or clarification of any part of the report please contact the undersigned.

For and on behalf of
GEOAUST GEOTECHNICAL ENGINEERS PTY LTD

Stephen Mayer
BEng MIEAust CPEng EC-2262

139 - 149 Boundary Road | North Melbourne

NO.	SHEET NAME	REV.
TP0.00	COVER SHEET	B
TP0.01	DEVELOPMENT SUMMARY 01	B
TP0.02	DEVELOPMENT SUMMARY 02	B
TP1.01	SITE PLAN	B
TP1.501	APARTMENT DESIGN GUIDLINES 01 - TOWNHOUSES	B
TP1.502	APARTMENT DESIGN GUIDLINES 02 - APARTMENTS	B
TP1.503	APARTMENT DESIGN GUIDLINES 03 - APARTMENTS	B
TP1.504	APARTMENT DESIGN GUIDLINES 04 - APARTMENTS	B
TP1.505	APARTMENT DESIGN GUIDLINES 05 - APARTMENTS	B
TP1.506	APARTMENT DESIGN GUIDLINES 06 - APARTMENTS	B
TP1.507	APARTMENT DESIGN GUIDLINES 07 - APARTMENTS	B
TP1.508	APARTMENT DESIGN ASSESSMENT	B
TP2.00	BASEMENT 03	B
TP2.01	BASEMENT 02	B

NO.	SHEET NAME	REV.
TP2.02	BASEMENT 01	B
TP2.03	LOWER GROUND FLOOR PLAN	B
TP2.04	UPPER GROUND FLOOR PLAN	B
TP2.05	LEVEL 01	B
TP2.06	LEVEL 02	B
TP2.07	LEVEL 03	B
TP2.08	LEVEL 04	B
TP2.09	LEVEL 05	B
TP2.10	LEVEL 06	B
TP2.11	LEVEL 07	B
TP2.12	LEVEL 08	B
TP2.13	LEVEL 09	B
TP2.14	LEVEL 10	B
TP2.15	LEVEL 11	B
TP2.16	ROOF	B
TP3.00	ELEVATIONS	B
TP3.01	ELEVATIONS	B
TP3.02	ELEVATIONS	B
TP3.03	ELEVATIONS	B
TP3.04	ELEVATIONS	B
TP3.05	ELEVATIONS	B
TP3.06	ELEVATIONS	B
TP3.07	ELEVATIONS	B
TP4.01	SECTION A-A	B
TP4.02	SECTION B-B	B
TP4.03	SECTION C-C	B
TP4.04	SECTION D-D	B
TP4.05	SECTION E-E	B
TP4.06	SECTION F-F	B
TP4.07	SECTION G-G	B
TP4.08	SECTION H-H	B
TP4.09	SECTION I-I	B

TOWN PLANNING

CHT ARCHITECTS

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Project
MIXED USE DEVELOPMENT
139 - 149 Boundary Road, North Melbourne

Client
BLUE EARTH GROUP

Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
COVER SHEET

Sheet
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Sheet No.
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Revision
B

Scale
@A1

Date
02/12/2019

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ADVERTISED PLAN

TP - TOWNHOUSES COUNT

UNIT TYPE	NUMBER
TOWNHOUSE	12
TOTAL UNITS	12

TP - APARTMENT MIX

UNIT TYPE	NUMBER	MIX %
1 BED & 1 BATH	110	39.4%
2 BED & 1 BATH	63	22.6%
2 BED & 2 BATH	98	35.1%
3 BED & 2 BATH	8	2.9%
TOTAL UNITS	279	100.0%

GFA (EXCLUDING BALCONIES AND LANDSCAPE AREAS) OVERALL

BASEMENT 03	
CARPARK	3072.01 m²
COMMON	51.16 m²
CORE	118.11 m²
SERVICES	17.97 m²
	3259.25 m²
BASEMENT 02	
CARPARK	3072.01 m²
COMMON	51.16 m²
CORE	118.11 m²
SERVICES	17.97 m²
	3259.25 m²
BASEMENT 01	
CARPARK	3165.43 m²
COMMON	42.08 m²
CORE	118.11 m²
SERVICES	148.09 m²
	3473.72 m²
LOWER GROUND FLOOR	
CARPARK	1514.15 m²
COMMON	136.61 m²
CORE	118.76 m²
SERVICES	145.68 m²
TOWNHOUSE	718.38 m²
	2633.59 m²
UPPER GROUND FLOOR	
COMMERCIAL	251.20 m²
COMMON	201.13 m²
COMMUNAL	758.23 m²
CORE	118.78 m²
SERVICES	142.50 m²
TOWNHOUSE	629.52 m²
	2101.36 m²
LEVEL 01	
APARTMENT	1736.89 m²
COMMON	202.42 m²
COMMUNAL	38.00 m²
CORE	119.70 m²
SERVICES	54.48 m²
	2151.50 m²
LEVEL 02	
APARTMENT	1788.41 m²
COMMON	202.45 m²
CORE	118.25 m²
SERVICES	55.55 m²
	2164.67 m²
LEVEL 03	
APARTMENT	1788.64 m²
COMMON	201.90 m²
CORE	118.91 m²
SERVICES	55.27 m²
	2164.71 m²
LEVEL 04	

GFA (EXCLUDING BALCONIES AND LANDSCAPE AREAS) OVERALL

APARTMENT	1729.40 m²
COMMON	201.85 m²
CORE	96.61 m²
SERVICES	53.40 m²
	2081.26 m²
LEVEL 05	
APARTMENT	1726.73 m²
COMMON	201.90 m²
CORE	97.48 m²
SERVICES	54.41 m²
	2080.52 m²
LEVEL 06	
APARTMENT	1528.03 m²
COMMON	202.18 m²
CORE	118.78 m²
SERVICES	55.14 m²
	1904.13 m²
LEVEL 07	
APARTMENT	1528.67 m²
COMMON	202.13 m²
CORE	118.81 m²
SERVICES	53.89 m²
	1903.50 m²
LEVEL 08	
APARTMENT	1528.08 m²
COMMON	202.18 m²
CORE	118.78 m²
SERVICES	55.17 m²
	1904.21 m²
LEVEL 09	
APARTMENT	1528.12 m²
COMMON	202.18 m²
CORE	118.78 m²
SERVICES	55.14 m²
	1904.23 m²
LEVEL 10	
APARTMENT	1528.70 m²
COMMON	202.13 m²
CORE	117.88 m²
SERVICES	52.43 m²
	1901.14 m²
LEVEL 11	
APARTMENT	605.58 m²
COMMON	86.10 m²
COMMUNAL	253.69 m²
CORE	38.26 m²
SERVICES	197.41 m²
	1181.04 m²
ROOF	
SERVICES	410.84 m²
	410.84 m²
TOTAL GFA	36478.92 m²

TP - GFA (EXCLUDING BASEMENT AND UNDERGROUND AREAS)

LEVEL	AREA
LOWER GROUND FLOOR	1010 m²
UPPER GROUND FLOOR	2101 m²
LEVEL 01	2151 m²
LEVEL 02	2165 m²
LEVEL 03	2165 m²
LEVEL 04	2081 m²
LEVEL 05	2081 m²
LEVEL 06	1904 m²
LEVEL 07	1903 m²
LEVEL 08	1904 m²
LEVEL 09	1904 m²
LEVEL 10	1901 m²
LEVEL 11	1181 m²
ROOF	411 m²
TOTAL GFA	24863 m²

TP - NSA TOWNHOUSES

LEVEL	AREA
LOWER GROUND FLOOR	718 m²
UPPER GROUND FLOOR	630 m²
TOTAL NSA	1348 m²

TP - NSA APARTMENTS (EXCLUDING BALCONIES)

LEVEL	AREA
LEVEL 01	1737 m²
LEVEL 02	1788 m²
LEVEL 03	1789 m²
LEVEL 04	1729 m²
LEVEL 05	1727 m²
LEVEL 06	1528 m²
LEVEL 07	1529 m²
LEVEL 08	1528 m²
LEVEL 09	1528 m²
LEVEL 10	1529 m²
LEVEL 11	606 m²
TOTAL NSA	17017 m²

TP - BALCONY AREAS

LEVEL	AREA
LOWER GROUND FLOOR	1193 m²
UPPER GROUND FLOOR	825 m²
LEVEL 01	298 m²
LEVEL 02	327 m²
LEVEL 03	330 m²
LEVEL 04	357 m²
LEVEL 05	315 m²
LEVEL 06	343 m²
LEVEL 07	324 m²
LEVEL 08	346 m²
LEVEL 09	343 m²
LEVEL 10	329 m²
LEVEL 11	163 m²
TOTAL BALCONY	5494 m²

TP - CAR PARKING SCHEDULE

LEVEL	USE	NUMBER
BASEMENT 01		
BASEMENT 01	RESIDENTS	124
		124
BASEMENT 02		
BASEMENT 02	RESIDENTS	104
		104
BASEMENT 03		
BASEMENT 03	RESIDENTS	106
		106
TOTAL PARKING		334

TP - COMMUNAL LANDSCAPE AREAS (INCLUDING ROOF GARDEN)

LOWER GROUND FLOOR	830.1 m²
UPPER GROUND FLOOR	702.4 m²
LEVEL 11	253.7 m²
TOTAL COMMUNAL LANDSCAPE	1786.2 m²

TP - COMMUNAL AREA (INCLUDING ROOF GARDEN)

UPPER GROUND FLOOR	758.2 m²
LEVEL 01	38.0 m²
LEVEL 11	253.7 m²
TOTAL COMMUNAL	1049.9 m²

TP - BIKE VISITORS SCHEDULE - HORIZONTAL

LEVEL	BIKE COUNT
UPPER GROUND FLOOR	20
LOWER GROUND FLOOR	54
TOTAL	74

TP - BIKE RESIDENTS SCHEDULE

LEVEL	NUMBERS
LOWER GROUND FLOOR	220
BASEMENT 01	19
BASEMENT 02	31
BASEMENT 03	32
TOTAL	302

TP - APARTMENT AND TOWNHOUSES BREAKDOWN

UNIT TYPE	NUMBER
LOWER GROUND FLOOR	
3 BED & 2 BATH	12
	12
LEVEL 01	
1 BED & 1 BATH	12
2 BED & 1 BATH	5
2 BED & 2 BATH	12
	29
LEVEL 02	
1 BED & 1 BATH	12
2 BED & 1 BATH	6
2 BED & 2 BATH	12
	30
LEVEL 03	
1 BED & 1 BATH	12
2 BED & 1 BATH	6
2 BED & 2 BATH	12
	30
LEVEL 04	
1 BED & 1 BATH	11
2 BED & 1 BATH	7
2 BED & 2 BATH	9
3 BED & 2 BATH	1
	28
LEVEL 05	
1 BED & 1 BATH	11
2 BED & 1 BATH	7
2 BED & 2 BATH	9
3 BED & 2 BATH	1
	28
LEVEL 06	
1 BED & 1 BATH	10
2 BED & 1 BATH	6
2 BED & 2 BATH	8
3 BED & 2 BATH	1
	25
LEVEL 07	
1 BED & 1 BATH	10
2 BED & 1 BATH	6
2 BED & 2 BATH	8
3 BED & 2 BATH	1
	25
LEVEL 08	
1 BED & 1 BATH	10
2 BED & 1 BATH	6
2 BED & 2 BATH	8
3 BED & 2 BATH	1
	25
LEVEL 09	
1 BED & 1 BATH	10
2 BED & 1 BATH	6
2 BED & 2 BATH	8
3 BED & 2 BATH	1
	25
LEVEL 10	
1 BED & 1 BATH	10
2 BED & 1 BATH	6
2 BED & 2 BATH	8
3 BED & 2 BATH	1
	25
LEVEL 11	
1 BED & 1 BATH	2
2 BED & 1 BATH	2
2 BED & 2 BATH	4
3 BED & 2 BATH	1
	9
TOTAL UNITS	291

STORAGE CAGES - 4M3 FULL HEIGHT

Level	Count
BASEMENT 03	51
BASEMENT 02	51
BASEMENT 01	42
LOWER GROUND FLOOR	21
	165

STORAGE CAGES - 4M3 OVER BONNET

Level	Count
BASEMENT 03	58
BASEMENT 02	66
BASEMENT 01	52
LOWER GROUND FLOOR	17
	193

TOWN PLANNING

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DEVELOPMENT SUMMARY 01

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Revision
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02/12/2019

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TP - TOWNHOUSES SCHEDULE BUILDING B

UNIT NO.	UNIT TYPE	AREA
LOWER GROUND FLOOR		
B-TH09	3 BED & 2 BATH	60 m²
B-TH10	3 BED & 2 BATH	59 m²
B-TH11	3 BED & 2 BATH	61 m²
B-TH12	3 BED & 2 BATH	61 m²
		241 m²
UPPER GROUND FLOOR		
B-TH09	TOWNHOUSE	53 m²
B-TH10	TOWNHOUSE	52 m²
B-TH11	TOWNHOUSE	53 m²
B-TH12	TOWNHOUSE	53 m²
		210 m²
		451 m²

TP - TOWNHOUSES SCHEDULE BUILDING C

UNIT NO.	UNIT TYPE	AREA
LOWER GROUND FLOOR		
C-TH01	3 BED & 2 BATH	60 m²
C-TH02	3 BED & 2 BATH	60 m²
C-TH03	3 BED & 2 BATH	59 m²
C-TH04	3 BED & 2 BATH	59 m²
C-TH05	3 BED & 2 BATH	60 m²
C-TH06	3 BED & 2 BATH	60 m²
C-TH07	3 BED & 2 BATH	60 m²
C-TH08	3 BED & 2 BATH	60 m²
		477 m²
UPPER GROUND FLOOR		
C-TH01	TOWNHOUSE	53 m²
C-TH02	TOWNHOUSE	53 m²
C-TH03	TOWNHOUSE	52 m²
C-TH04	TOWNHOUSE	52 m²
C-TH05	TOWNHOUSE	53 m²
C-TH06	TOWNHOUSE	53 m²
C-TH07	TOWNHOUSE	53 m²
C-TH08	TOWNHOUSE	53 m²
		420 m²
		897 m²

TP - APARTMENT SCHEDULE BUILDING A

UNIT NO.	UNIT TYPE	AREA
LEVEL 01		
A-101	2 BED & 2 BATH	67 m²
A-102	2 BED & 2 BATH	67 m²
A-103	2 BED & 2 BATH	66 m²
A-104	2 BED & 2 BATH	66 m²
A-105	2 BED & 1 BATH	64 m²
A-106	2 BED & 1 BATH	64 m²
A-107	1 BED & 1 BATH	53 m²
A-108	1 BED & 1 BATH	51 m²
A-109	1 BED & 1 BATH	51 m²
A-110	2 BED & 2 BATH	66 m²
A-111	2 BED & 2 BATH	66 m²
A-112	2 BED & 2 BATH	67 m²
A-113	2 BED & 2 BATH	67 m²
		817 m²
LEVEL 02		
A-201	2 BED & 2 BATH	67 m²
A-202	2 BED & 2 BATH	67 m²
A-203	2 BED & 2 BATH	66 m²
A-204	2 BED & 2 BATH	66 m²
A-205	2 BED & 1 BATH	64 m²
A-206	2 BED & 1 BATH	64 m²
A-207	1 BED & 1 BATH	51 m²
A-208	1 BED & 1 BATH	51 m²
A-209	1 BED & 1 BATH	51 m²
A-210	1 BED & 1 BATH	51 m²
A-211	2 BED & 2 BATH	66 m²
A-212	2 BED & 2 BATH	66 m²
A-213	2 BED & 2 BATH	67 m²
A-214	2 BED & 2 BATH	67 m²
		866 m²
LEVEL 03		
A-301	2 BED & 2 BATH	67 m²
A-302	2 BED & 2 BATH	67 m²
A-303	2 BED & 2 BATH	66 m²
A-304	2 BED & 2 BATH	66 m²
A-305	2 BED & 1 BATH	64 m²
A-306	2 BED & 1 BATH	64 m²
A-307	1 BED & 1 BATH	51 m²
A-308	1 BED & 1 BATH	51 m²
A-309	1 BED & 1 BATH	51 m²
A-310	1 BED & 1 BATH	51 m²
A-311	2 BED & 2 BATH	66 m²
A-312	2 BED & 2 BATH	66 m²
A-313	2 BED & 2 BATH	67 m²
A-314	2 BED & 2 BATH	67 m²
		866 m²
LEVEL 04		
A-401	3 BED & 2 BATH	106 m²
A-402	2 BED & 2 BATH	67 m²
A-403	2 BED & 1 BATH	66 m²
A-404	2 BED & 2 BATH	66 m²
A-405	2 BED & 1 BATH	64 m²
A-406	2 BED & 1 BATH	61 m²
A-407	1 BED & 1 BATH	51 m²
A-408	1 BED & 1 BATH	52 m²
A-409	2 BED & 2 BATH	66 m²
A-410	2 BED & 2 BATH	66 m²
A-411	1 BED & 1 BATH	51 m²
A-412	2 BED & 2 BATH	67 m²
		784 m²
LEVEL 05		
A-501	3 BED & 2 BATH	106 m²
A-502	2 BED & 2 BATH	67 m²
A-503	2 BED & 2 BATH	66 m²
A-504	2 BED & 1 BATH	66 m²
A-505	2 BED & 1 BATH	63 m²
A-506	1 BED & 1 BATH	50 m²
A-507	2 BED & 1 BATH	61 m²
A-508	1 BED & 1 BATH	52 m²
A-509	2 BED & 2 BATH	66 m²
A-510	2 BED & 2 BATH	66 m²
A-511	1 BED & 1 BATH	51 m²

TP - APARTMENT SCHEDULE BUILDING A

UNIT NO.	UNIT TYPE	AREA
A-512	2 BED & 2 BATH	67 m²
		782 m²
LEVEL 06		
A-601	3 BED & 2 BATH	105 m²
A-602	2 BED & 2 BATH	68 m²
A-603	2 BED & 1 BATH	66 m²
A-604	1 BED & 1 BATH	56 m²
A-605	2 BED & 1 BATH	61 m²
A-606	2 BED & 2 BATH	64 m²
A-607	2 BED & 2 BATH	67 m²
A-608	2 BED & 2 BATH	68 m²
A-609	1 BED & 1 BATH	51 m²
		606 m²
LEVEL 07		
A-701	3 BED & 2 BATH	106 m²
A-702	2 BED & 2 BATH	68 m²
A-703	2 BED & 1 BATH	66 m²
A-704	1 BED & 1 BATH	56 m²
A-705	2 BED & 1 BATH	61 m²
A-706	2 BED & 2 BATH	64 m²
A-707	2 BED & 2 BATH	67 m²
A-708	2 BED & 2 BATH	68 m²
A-709	1 BED & 1 BATH	51 m²
		606 m²
LEVEL 08		
A-801	3 BED & 2 BATH	106 m²
A-802	2 BED & 2 BATH	68 m²
A-803	2 BED & 1 BATH	66 m²
A-804	1 BED & 1 BATH	56 m²
A-805	2 BED & 1 BATH	61 m²
A-806	2 BED & 2 BATH	64 m²
A-807	2 BED & 2 BATH	67 m²
A-808	2 BED & 2 BATH	68 m²
A-809	1 BED & 1 BATH	51 m²
		606 m²
LEVEL 09		
A-901	3 BED & 2 BATH	106 m²
A-902	2 BED & 2 BATH	68 m²
A-903	2 BED & 1 BATH	66 m²
A-904	1 BED & 1 BATH	56 m²
A-905	2 BED & 1 BATH	61 m²
A-906	2 BED & 2 BATH	64 m²
A-907	2 BED & 2 BATH	67 m²
A-908	2 BED & 2 BATH	68 m²
A-909	1 BED & 1 BATH	51 m²
		606 m²
LEVEL 10		
A-1001	3 BED & 2 BATH	106 m²
A-1002	2 BED & 2 BATH	68 m²
A-1003	2 BED & 1 BATH	66 m²
A-1004	1 BED & 1 BATH	56 m²
A-1005	2 BED & 1 BATH	61 m²
A-1006	2 BED & 2 BATH	64 m²
A-1007	2 BED & 2 BATH	67 m²
A-1008	2 BED & 2 BATH	68 m²
A-1009	1 BED & 1 BATH	51 m²
		606 m²
LEVEL 11		
A-1101	3 BED & 2 BATH	106 m²
A-1102	2 BED & 2 BATH	68 m²
A-1103	2 BED & 1 BATH	66 m²
A-1104	1 BED & 1 BATH	56 m²
A-1105	2 BED & 1 BATH	61 m²
A-1106	2 BED & 2 BATH	64 m²
A-1107	2 BED & 2 BATH	67 m²
A-1108	2 BED & 2 BATH	68 m²
A-1109	1 BED & 1 BATH	51 m²
		606 m²
		7748 m²

TP - APARTMENT SCHEDULE BUILDING B

UNIT NO.	UNIT TYPE	AREA
LEVEL 01		
B-101	2 BED & 2 BATH	69 m²
B-102	2 BED & 2 BATH	69 m²
B-103	1 BED & 1 BATH	50 m²
B-104	1 BED & 1 BATH	50 m²
B-105	2 BED & 1 BATH	61 m²
B-106	1 BED & 1 BATH	49 m²
B-107	1 BED & 1 BATH	51 m²
B-108	1 BED & 1 BATH	51 m²
		450 m²
LEVEL 02		
B-201	2 BED & 2 BATH	69 m²
B-202	2 BED & 2 BATH	69 m²
B-203	1 BED & 1 BATH	50 m²
B-204	1 BED & 1 BATH	50 m²
B-205	2 BED & 1 BATH	61 m²
B-206	2 BED & 1 BATH	60 m²
B-207	1 BED & 1 BATH	50 m²
B-208	1 BED & 1 BATH	51 m²
		461 m²
LEVEL 03		
B-301	2 BED & 2 BATH	69 m²
B-302	2 BED & 2 BATH	69 m²
B-303	1 BED & 1 BATH	50 m²
B-304	1 BED & 1 BATH	50 m²
B-305	2 BED & 1 BATH	60 m²
B-306	2 BED & 1 BATH	60 m²
B-307	1 BED & 1 BATH	51 m²
B-308	1 BED & 1 BATH	51 m²
		462 m²
LEVEL 04		
B-401	2 BED & 2 BATH	69 m²
B-402	2 BED & 2 BATH	69 m²
B-403	1 BED & 1 BATH	50 m²
B-404	1 BED & 1 BATH	50 m²
B-405	2 BED & 1 BATH	60 m²
B-406	2 BED & 1 BATH	60 m²
B-407	1 BED & 1 BATH	51 m²
B-408	1 BED & 1 BATH	51 m²
		462 m²
LEVEL 05		
B-501	2 BED & 2 BATH	69 m²
B-502	2 BED & 2 BATH	69 m²
B-503	1 BED & 1 BATH	50 m²
B-504	1 BED & 1 BATH	50 m²
B-505	2 BED & 1 BATH	60 m²
B-506	2 BED & 1 BATH	60 m²
B-507	1 BED & 1 BATH	51 m²
B-508	1 BED & 1 BATH	51 m²
		461 m²
LEVEL 06		
B-601	2 BED & 2 BATH	69 m²
B-602	2 BED & 2 BATH	69 m²
B-603	1 BED & 1 BATH	50 m²
B-604	1 BED & 1 BATH	50 m²
B-605	2 BED & 1 BATH	61 m²
B-606	2 BED & 1 BATH	60 m²
B-607	1 BED & 1 BATH	51 m²
B-608	1 BED & 1 BATH	51 m²
		462 m²
LEVEL 07		
B-701	2 BED & 2 BATH	69 m²
B-702	2 BED & 2 BATH	69 m²
B-703	1 BED & 1 BATH	50 m²
B-704	1 BED & 1 BATH	50 m²
B-705	2 BED & 1 BATH	60 m²
B-706	2 BED & 1 BATH	60 m²
B-707	1 BED & 1 BATH	51 m²
B-708	1 BED & 1 BATH	51 m²
		462 m²

TP - APARTMENT SCHEDULE BUILDING B

UNIT NO.	UNIT TYPE	AREA
LEVEL 08		
B-801	2 BED & 2 BATH	69 m²
B-802	2 BED & 2 BATH	69 m²
B-803	1 BED & 1 BATH	50 m²
B-804	1 BED & 1 BATH	50 m²
B-805	2 BED & 1 BATH	60 m²
B-806	2 BED & 1 BATH	60 m²
B-807	1 BED & 1 BATH	51 m²
B-808	1 BED & 1 BATH	51 m²
		461 m²
LEVEL 09		
B-901	2 BED & 2 BATH	69 m²
B-902	2 BED & 2 BATH	69 m²
B-903	1 BED & 1 BATH	50 m²
B-904	1 BED & 1 BATH	50 m²
B-905	2 BED & 1 BATH	61 m²
B-906	2 BED & 1 BATH	60 m²
B-907	1 BED & 1 BATH	51 m²
B-908	1 BED & 1 BATH	51 m²
		462 m²
LEVEL 10		
B-1001	2 BED & 2 BATH	69 m²
B-1002	2 BED & 2 BATH	69 m²
B-1003	1 BED & 1 BATH	50 m²
B-1004	1 BED & 1 BATH	50 m²
B-1005	2 BED & 1 BATH	60 m²
B-1006	2 BED & 1 BATH	60 m²
B-1007	1 BED & 1 BATH	51 m²
B-1008	1 BED & 1 BATH	51 m²
		462 m²
		4604 m²

TP - APARTMENT SCHEDULE BUILDING C

UNIT NO.	UNIT TYPE	AREA
LOWER GROUND FLOOR		
C-TH01	3 BED & 2 BATH	60 m²
C-TH02	3 BED & 2 BATH	60 m²
C-TH03	3 BED & 2 BATH	59 m²
C-TH04	3 BED & 2 BATH	59 m²
C-TH05	3 BED & 2 BATH	60 m²
C-TH06	3 BED & 2 BATH	60 m²
C-TH07	3 BED & 2 BATH	60 m²
C-TH08	3 BED & 2 BATH	60 m²
LEVEL 01		
C-101	2 BED & 2 BATH	69 m²
C-102	2 BED & 2 BATH	69 m²
C-103	1 BED & 1 BATH	50 m²
C-104	1 BED & 1 BATH	50 m²
C-105	2 BED & 1 BATH	60 m²
C-106	2 BED & 1 BATH	61 m²
C-107	1 BED & 1 BATH	51 m²
C-108	1 BED & 1 BATH	51 m²
LEVEL 02		
C-201	2 BED & 2 BATH	69 m²
C-202	2 BED & 2 BATH	69 m²
C-203	1 BED & 1 BATH	50 m²
C-204	1 BED & 1 BATH	50 m²
C-205	2 BED & 1 BATH	60 m²
C-206	2 BED & 1 BATH	60 m²
C-207	1 BED & 1 BATH	51 m²
C-208	1 BED & 1 BATH	51 m²
LEVEL 03		
C-301	2 BED & 2 BATH	69 m²
C-302	2 BED & 2 BATH	69 m²
C-303	1 BED & 1 BATH	50 m²
C-304	1 BED & 1 BATH	50 m²
C-305	2 BED & 1 BATH	60 m²
C-306	2 BED & 1 BATH	60 m²
C-307	1 BED & 1 BATH	51 m²
C-308	1 BED & 1 BATH	51 m²
LEVEL 04		
C-401	2 BED & 2 BATH	69 m²
C-402	2 BED & 2 BATH	69 m²
C-403	1 BED & 1 BATH	50 m²
C-404	1 BED & 1 BATH	50 m²
C-405	2 BED & 1 BATH	60 m²
C-406	2 BED & 1 BATH	60 m²
C-407	1 BED & 1 BATH	51 m²
C-408	1 BED & 1 BATH	51 m²
LEVEL 05		
C-501	2 BED & 2 BATH	69 m²
C-502	2 BED & 2 BATH	69 m²
C-503	1 BED & 1 BATH	50 m²
C-504	1 BED & 1 BATH	50 m²
C-505	2 BED & 1 BATH	60 m²
C-506	2 BED & 1 BATH	60 m²
C-507	1 BED & 1 BATH	51 m²
C-508	1 BED & 1 BATH	51 m²
LEVEL 06		
C-601	2 BED & 2 BATH	69 m²
C-602	2 BED & 2 BATH	69 m²
C-603	1 BED & 1 BATH	50 m²
C-604	1 BED & 1 BATH	50 m²
C-605	2 BED & 1 BATH	60 m²
C-606	2 BED & 1 BATH	60 m²
C-607	1 BED & 1 BATH	51 m²
C-608	1 BED & 1 BATH	51 m²
LEVEL 07		
C-701	2 BED & 2 BATH	69 m²
C-702	2 BED & 2 BATH	69 m²
C-703	1 BED & 1 BATH	50 m²
C-704	1 BED & 1 BATH	50 m²
C-705	2 BED & 1 BATH	60 m²
C-706	2 BED & 1 BATH	60 m²

TP - APARTMENT SCHEDULE BUILDING C

UNIT NO.	UNIT TYPE	AREA
C-707	1 BED & 1 BATH	51 m²
C-708	1 BED & 1 BATH	51 m²
LEVEL 08		
C-801	2 BED & 2 BATH	69 m²
C-802	2 BED & 2 BATH	69 m²
C-803	1 BED & 1 BATH	50 m²
C-804	1 BED & 1 BATH	50 m²
C-805	2 BED & 1 BATH	60 m²
C-806	2 BED & 1 BATH	60 m²
C-807	1 BED & 1 BATH	51 m²
C-808	1 BED & 1 BATH	51 m²
LEVEL 09		
C-901	2 BED & 2 BATH	69 m²
C-902	2 BED & 2 BATH	69 m²
C-903	1 BED & 1 BATH	50 m²
C-904	1 BED & 1 BATH	50 m²
C-905	2 BED & 1 BATH	60 m²
C-906	2 BED & 1 BATH	60 m²
C-907	1 BED & 1 BATH	51 m²
C-908	1 BED & 1 BATH	51 m²
LEVEL 10		
C-1001	2 BED & 2 BATH	69 m²
C-1002	2 BED & 2 BATH	69 m²
C-1003	1 BED & 1 BATH	50 m²
C-1004	1 BED & 1 BATH	50 m²
C-1005	2 BED & 1 BATH	60 m²
C-1006	2 BED & 1 BATH	60 m²
C-1007	1 BED & 1 BATH	51 m²
C-1008	1 BED & 1 BATH	51 m²
		5089 m²

TOWN PLANNING

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Project
MIXED USE DEVELOPMENT
139 - 149 Boundary Road, North Melbourne

Client
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Amendments

No.	Date	Notes
B	02/12/2019	TP Submission

Title
DEVELOPMENT SUMMARY 02

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP0.02

Revision
B

Scale
@A1

Date
02/12/2019

18113

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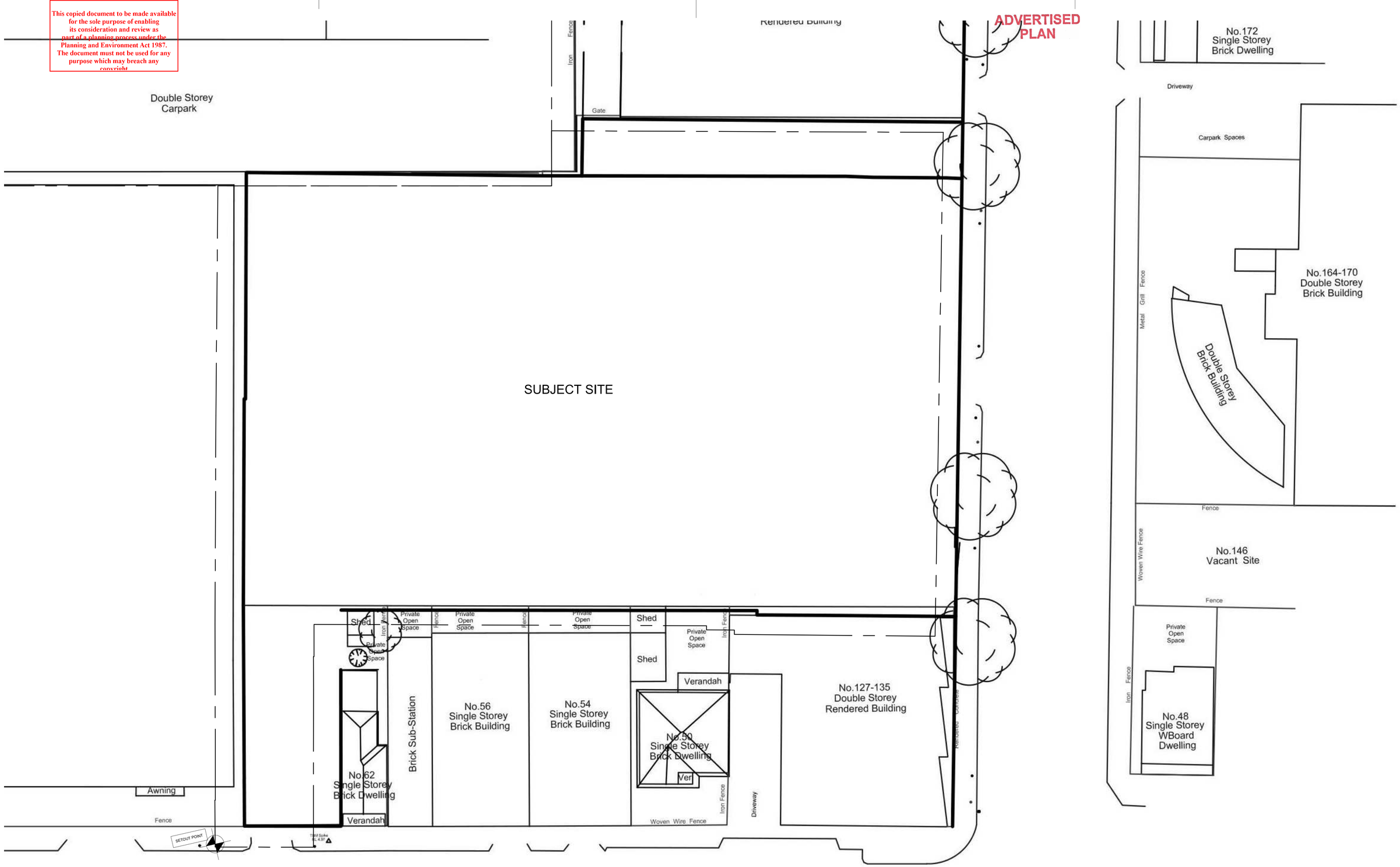

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
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Title
SITE PLAN

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP1.01

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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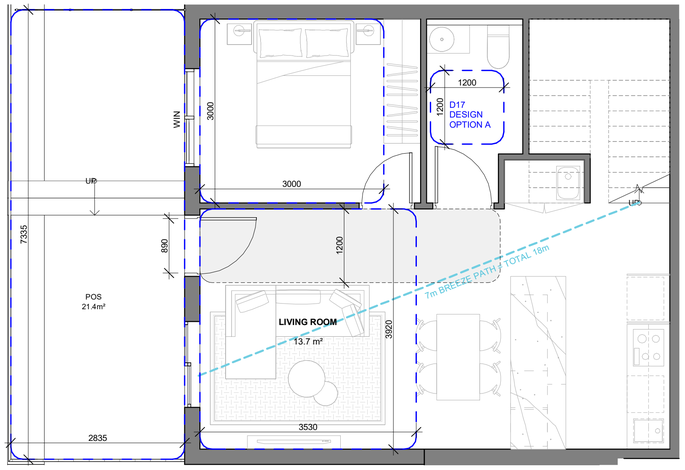
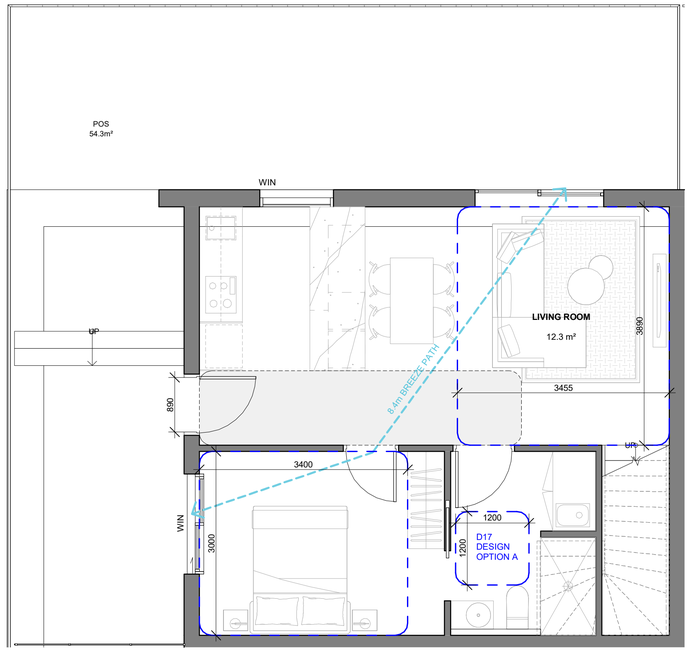
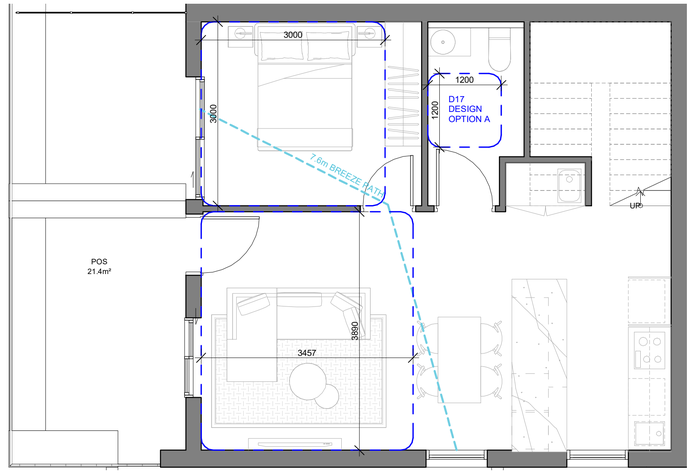
ADVERTISED PLAN



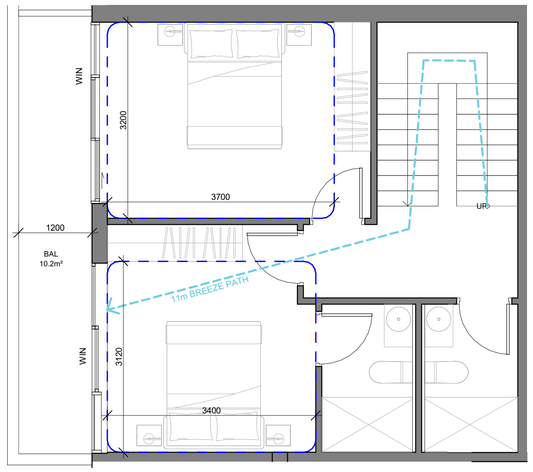
3 TOWNHOUSE TYPE A_LOWER GROUND
SCALE 1 : 50



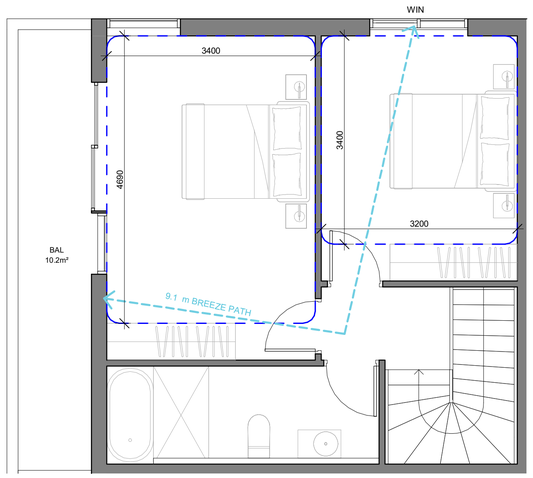
1 TOWNHOUSE TYPE B_LOWER GROUND
SCALE 1 : 50



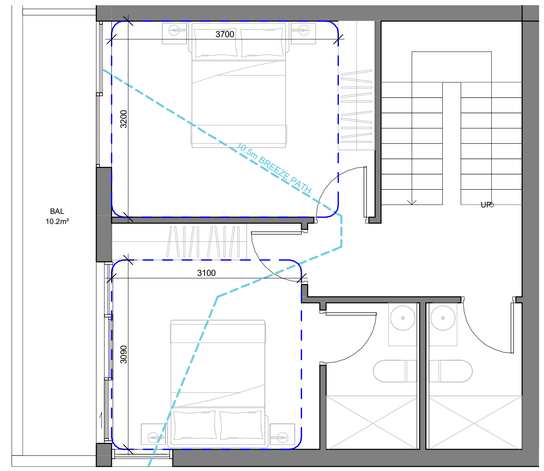
5 TOWNHOUSE TYPE C_LOWER GROUND
SCALE 1 : 50



4 TOWNHOUSE TYPE A_UPPER GROUND
SCALE 1 : 50



2 TOWNHOUSE TYPE B_UPPER GROUND
SCALE 1 : 50



6 TOWNHOUSE TYPE C_UPPER GROUND
SCALE 1 : 50

D17 D19 D20 D24 D25 D26 D27

UNIT TYPE: TOWN HOUSE 3 BED & 2 BATH AREA: 113m² + 31.6m² (POS)
TH03, TH04, TH05, TH06, TH07, TH08, TH10, TH11 & TH12.

TOWNHOUSE TYPE A INTERNAL STORAGE SCHEDULE	
ISLAND BENCH	2 m³
KITCHEN BENCH	2 m³
LAUNDRY	2 m³
WARDROBE	4 m³
WARDROBE	3 m³
WARDROBE	3 m³
TOTAL INTERNAL STORAGE	15 m³

UNIT TYPE: TOWN HOUSE 3 BED & 2 BATH AREA: 113m² + 64.5m² (POS)
TH01, TH02 & TH.09.

TOWNHOUSE TYPE B INTERNAL STORAGE SCHEDULE	
ISLAND BENCH	2 m³
KITCHEN BENCH	1 m³
LAUNDRY	2 m³
WARDROBE	3 m³
WARDROBE	3 m³
WARDROBE	3 m³
TOTAL INTERNAL STORAGE	14 m³

UNIT TYPE: TOWN HOUSE 3 BED & 2 BATH AREA: 113m² + 64.5m² (POS)
TH01, TH02 & TH.09.

TOWNHOUSE TYPE C INTERNAL STORAGE SCHEDULE	
ISLAND BENCH	2 m³
KITCHEN BENCH	1 m³
LAUNDRY	2 m³
WARDROBE	3 m³
WARDROBE	3 m³
WARDROBE	3 m³
TOTAL INTERNAL STORAGE	14 m³

LEGEND

D17	STANDARD 'D17' COMPLIANT
D19	STANDARD 'D19' COMPLIANT
D20	STANDARD 'D20' COMPLIANT
D24	STANDARD 'D24' COMPLIANT
D25	STANDARD 'D25' COMPLIANT
D26	STANDARD 'D26' COMPLIANT
D27	STANDARD 'D27' COMPLIANT
D25	'DUAL ASPECT' APARTMENT STANDARD 'D25' NOT APPLICABLE
	NON COMPLIANT STANDARD

NOTES:

CEILING HEIGHTS:
LOWER GROUND FLOOR - MININUM 2.9M CEILING HEIGHT
UPPER GROUND FLOOR - MINIMUM 3.6M CEILING HEIGHT

DOORS:
ALL APARTMENT ENTRANCE DOORS, ACCESSIBLE BATHROOMS DOORS & MASTER BEDROOM DOORS SHALL PROVIDE A CLEAR OPENING WIDTH OF AT LEAST 850mm & IN THE CASE OF DESIGN OPTION B, SHALL BE FITTED WITH READILY REMOVABLE HINGES.

SHOWERS:
ALL APARTMENT SHOWERS TO BE HOBLESS STEP FREE SHOWERS & IN THE CASE OF DESIGN OPTION B, SHALL HAVE A REMOVABLE SCREEN.

TOWN PLANNING

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
APARTMENT DESIGN GUIDLINES 01 - TOWNHOUSES

Sheet
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Sheet No. TP1.501
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Date 02/12/2019

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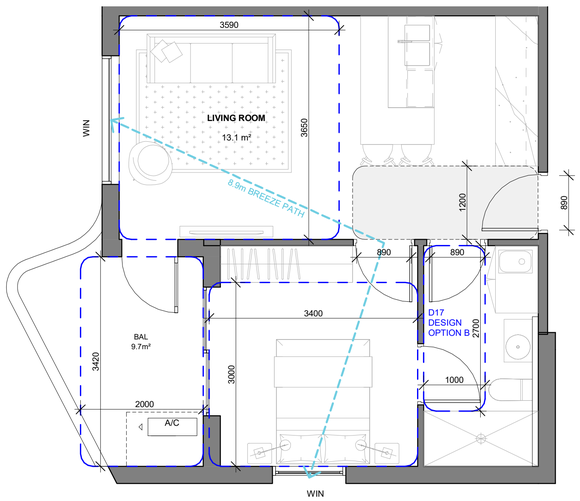
ADVERTISED PLAN

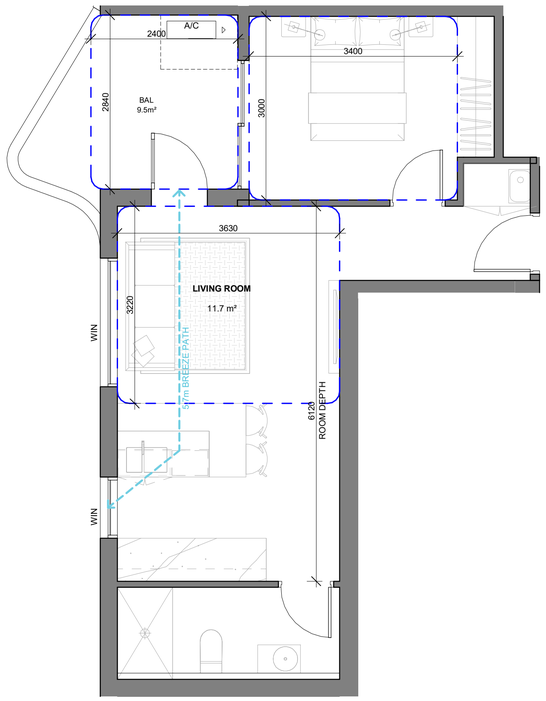


D17 D19 D20 D24 D25 D26 D27

1 APARTMENT TYPE 1
SCALE 1 : 50

UNIT TYPE: 1 BED & 1 BATH
AREA: 51m² + 9.7m² (balcony)
APT: A107, A108, A207, A208, A307, A308, A407, A408, A507, A508,A607, A608, A707, A708, A807, A907, A908, A1007, A1008, B107, B108, B207, B208, B307, B308, B407, B408, B507, B508, B607, B608, B707, B708, B807, B808, B907, B908, B1007, B1008, B1107, B1108, C411, C511, C609, C709, C809,C909, C1009, C1109

TYPE 01 INTERNAL STORAGE SCHEDULE	
ISLAND BENCH	2 m³
KITCHEN BENCH	1 m³
LAUNDRY	1 m³
WARDROBE	3 m³
TOTAL INTERNAL STORAGE	8 m³

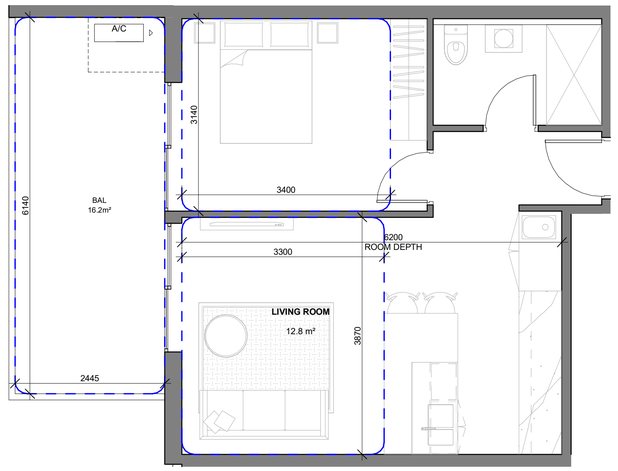


D17 D19 D20 D24 D25 D26 D27

2 APARTMENT TYPE 2
SCALE 1 : 50

UNIT TYPE: 1 BED & 1 BATH
AREA: 50m² + 9.5m² (balcony)
APT: A103, A104, A203, A204, A303, A304, A403, A404, A503, A504, A603, A604, A703, A704, A803, A804, A903,A904, A1003, A1004, B103, B104, B203, B303, B304, B403, B404, B503, B504, B603, B604, B703, B704, B803, B804, B903, B904, B1003, B1004

TYPE 02 INTERNAL STORAGE SCHEDULE	
ISLAND BENCH	3 m³
KITCHEN BENCH	1 m³
LAUNDRY	1 m³
WARDROBE	4 m³
TOTAL INTERNAL STORAGE	9 m³



D17 D19 D20 D24 D25 D26 D27

3 APARTMENT TYPE 3
SCALE 1 : 50

UNIT TYPE: 1 BED & 1 BATH
AREA: 51m² + 16m² (balcony)
APT: C109, C209, C210, C309, C310, C408, C508

TYPE 03 INTERNAL STORAGE SCHEDULE	
ISLAND BENCH	2 m³
KITCHEN BENCH	1 m³
LAUNDRY	2 m³
WARDROBE	3 m³
TOTAL INTERNAL STORAGE	9 m³

LEGEND

D17	STANDARD 'D17' COMPLIANT
D19	STANDARD 'D19' COMPLIANT
D20	STANDARD 'D20' COMPLIANT
D24	STANDARD 'D24' COMPLIANT
D25	STANDARD 'D25' COMPLIANT
D26	STANDARD 'D26' COMPLIANT
D27	STANDARD 'D27' COMPLIANT
D25	'DUAL ASPECT' APARTMENT STANDARD 'D25' NOT APPLICABLE
	NON COMPLIANT STANDARD

NOTES:

CEILING HEIGHTS:
LOWER GROUND FLOOR - MININUM 2.9M CEILING HEIGHT
UPPER GROUND FLOOR - MINIMUM 3.6M CEILING HEIGHT

DOORS:
ALL APARTMENT ENTRANCE DOORS, ACCESSIBLE BATHROOMS DOORS & MASTER BEDROOM DOORS SHALL PROVIDE A CLEAR OPENING WIDTH OF AT LEAST 850mm & IN THE CASE OF DESIGN OPTION B, SHALL BE FITTED WITH READILY REMOVABLE HINGES.

SHOWERS:
ALL APARTMENT SHOWERS TO BE HOBLESS STEP FREE SHOWERS & IN THE CASE OF DESIGN OPTION B, SHALL HAVE A REMOVABLE SCREEN.

TOWN PLANNING

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Project
MIXED USE DEVELOPMENT
139 - 149 Boundary Road, North Melbourne

Client
BLUE EARTH GROUP

Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
APARTMENT DESIGN GUIDLINES 02 - APARTMENTS

Sheet
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Date 02/12/2019

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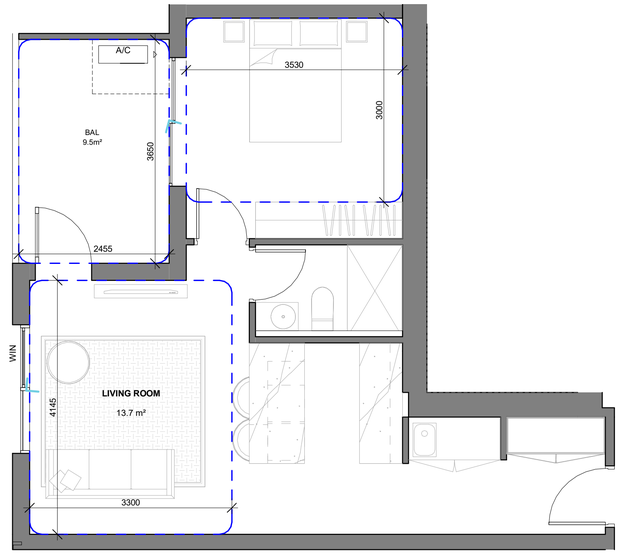
ADVERTISED PLAN

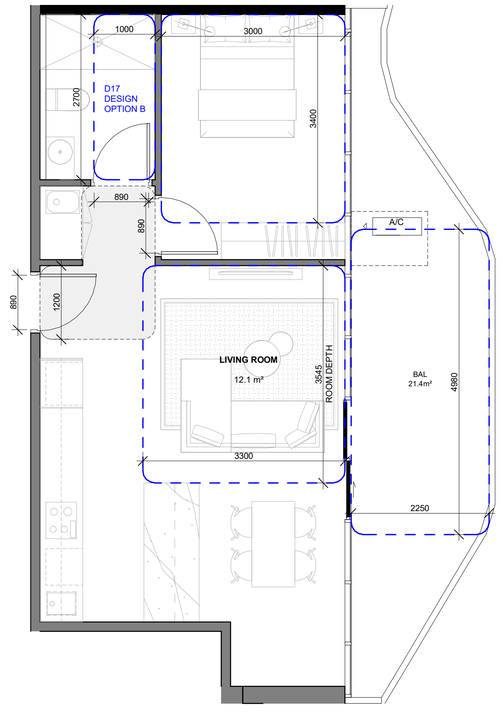


D17 D19 D20 D24 D25 D26 D27

1 APARTMENT TYPE 4
SCALE 1 : 50

UNIT TYPE: 1 BED & 1 BATH
AREA: 53m² + 9m² (balcony)
APT: C107, C108, C207, C208, C307, C308, C407, C506

TYPE 04 INTERNAL STORAGE SCHEDULE	
ISLAND BENCH	1 m³
KITCHEN BENCH	1 m³
LAUNDRY	2 m³
WARDROBE	4 m³
TOTAL INTERNAL STORAGE	8 m³



D17 D19 D20 D24 D25 D26 D27

2 APARTMENT TYPE 5
SCALE 1 : 50

UNIT TYPE: 1 BED & 1 BATH
AREA: 55m² + 21m² (balcony)
APT: C604, C704, C804, C904, C1004, C1104

TYPE 05 INTERNAL STORAGE SCHEDULE	
KITCHEN BENCH	2 m³
KITCHEN BENCH	2 m³
LAUNDRY	2 m³
WARDROBE	3 m³
TOTAL INTERNAL STORAGE	9 m³

D17 D19 D20 D24 D25 D26 D27

3 APARTMENT TYPE 6
SCALE 1 : 50

UNIT TYPE: 2 BED & 1 BATH
AREA: 63.5m² + 9.5m² (balcony)
APT: C105, C106, C205, C206, C305, C306, C405, C505

TYPE 06 INTERNAL STORAGE SCHEDULE	
ISLAND BENCH	2 m³
KITCHEN BENCH	1 m³
WARDROBE	3 m³
WARDROBE	5 m³
TOTAL INTERNAL STORAGE	11 m³

LEGEND

D17	STANDARD 'D17' COMPLIANT
D19	STANDARD 'D19' COMPLIANT
D20	STANDARD 'D20' COMPLIANT
D24	STANDARD 'D24' COMPLIANT
D25	STANDARD 'D25' COMPLIANT
D26	STANDARD 'D26' COMPLIANT
D27	STANDARD 'D27' COMPLIANT
D25	'DUAL ASPECT' APARTMENT STANDARD 'D25' NOT APPLICABLE
	NON COMPLIANT STANDARD

NOTES:

CEILING HEIGHTS:
LOWER GROUND FLOOR - MININUM 2.9M CEILING HEIGHT
UPPER GROUND FLOOR - MINIMUM 3.6M CEILING HEIGHT

DOORS:
ALL APARTMENT ENTRANCE DOORS, ACCESSIBLE BATHROOMS DOORS & MASTER BEDROOM DOORS SHALL PROVIDE A CLEAR OPENING WIDTH OF AT LEAST 850mm & IN THE CASE OF DESIGN OPTION B, SHALL BE FITTED WITH READILY REMOVABLE HINGES.

SHOWERS:
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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
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Title
APARTMENT DESIGN GUIDLINES 03 - APARTMENTS

Sheet
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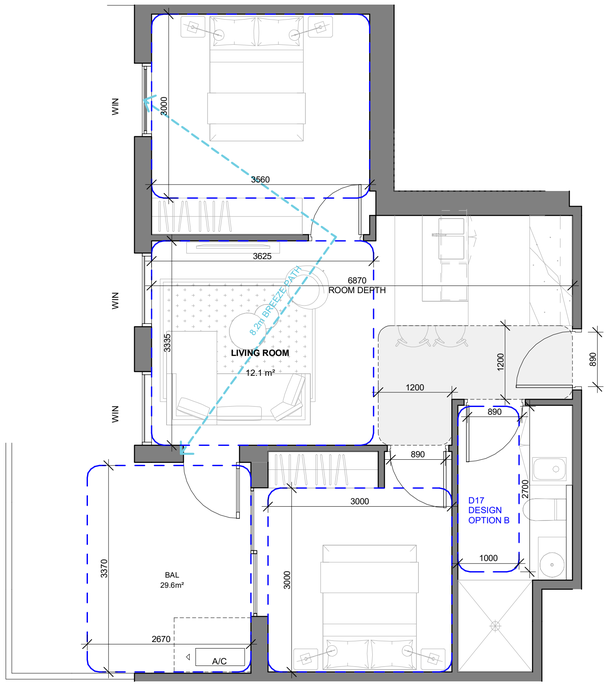
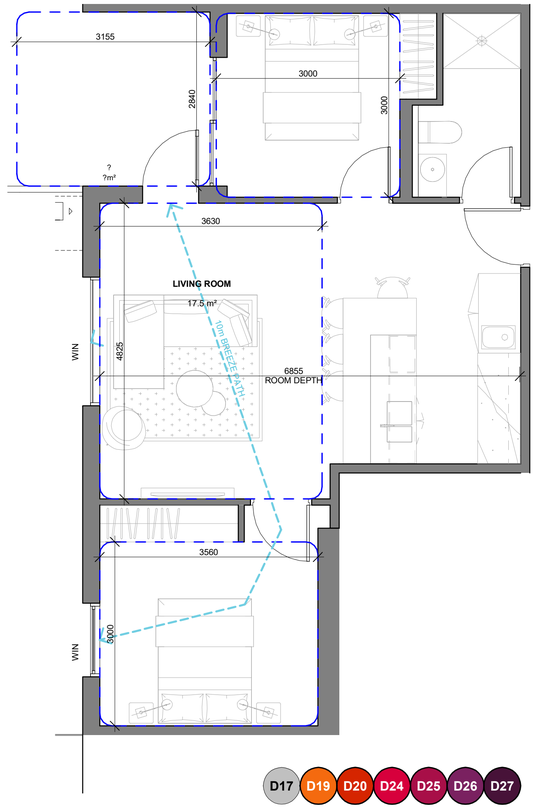


D17 D19 D20 D24 D25 D26 D27

1 APARTMENT TYPE 7
SCALE 1 : 50

UNIT TYPE: 2 BED & 1 BATH
AREA: 61m² + 9.7m² (balcony)
APT: C406, C507, C605, C705, C805, C905, C1005, C1105

TYPE 07 INTERNAL STORAGE SCHEDULE	
ISLAND BENCH	3 m³
KITCHEN BENCH	1 m³
LAUNDRY	2 m³
WARDROBE	4 m³
WARDROBE	3 m³
TOTAL INTERNAL STORAGE	12 m³

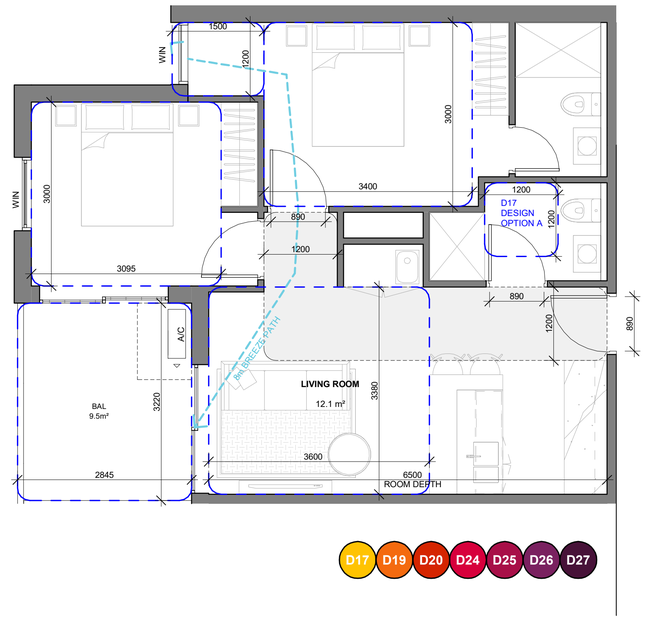


D17 D19 D20 D24 D25 D26 D27

2 APARTMENT TYPE 8
SCALE 1 : 50

UNIT TYPE: 2 BED & 1 BATH
AREA: 69m² + 9.5m² (balcony)
APT: C403, C504, C603, C703, C803, C903, 1003, C1103

TYPE 08 INTERNAL STORAGE SCHEDULE	
ISLAND BENCH	2 m³
KITCHEN BENCH	1 m³
LAUNDRY	2 m³
WARDROBE	2 m³
WARDROBE	4 m³
TOTAL INTERNAL STORAGE	11 m³



D17 D19 D20 D24 D25 D26 D27

3 APARTMENT TYPE 9
SCALE 1 : 50

UNIT TYPE: 2 BED & 2 BATH
AREA: 68.0m² + 9.5m² (balcony)
APT: C101, C102, C103, C104, C110, C111, C112, C113,
C201, C202, C203, C204, C211, C212, C213, C214,
C301, C302, C303, C304, C311, C312, C313, C314,
C402, C404, C410, C412, C502, C503, C505, C510, C512

TYPE 09 INTERNAL STORAGE SCHEDULE	
ISLAND BENCH	2 m³
KITCHEN BENCH	1 m³
LAUNDRY	2 m³
WARDROBE	3 m³
WARDROBE	2 m³
TOTAL INTERNAL STORAGE	10 m³

LEGEND

D17	STANDARD 'D17' COMPLIANT
D19	STANDARD 'D19' COMPLIANT
D20	STANDARD 'D20' COMPLIANT
D24	STANDARD 'D24' COMPLIANT
D25	STANDARD 'D25' COMPLIANT
D26	STANDARD 'D26' COMPLIANT
D27	STANDARD 'D27' COMPLIANT
D25	'DUAL ASPECT' APARTMENT STANDARD 'D25' NOT APPLICABLE
	NON COMPLIANT STANDARD

NOTES:

CEILING HEIGHTS:
LOWER GROUND FLOOR - MININUM 2.9M CEILING HEIGHT
UPPER GROUND FLOOR - MINIMUM 3.6M CEILING HEIGHT

DOORS:
ALL APARTMENT ENTRANCE DOORS, ACCESSIBLE BATHROOMS DOORS & MASTER BEDROOM DOORS SHALL PROVIDE A CLEAR OPENING WIDTH OF AT LEAST 850mm & IN THE CASE OF DESIGN OPTION B, SHALL BE FITTED WITH READILY REMOVABLE HINGES.

SHOWERS:
ALL APARTMENT SHOWERS TO BE HOBLESS STEP FREE SHOWERS & IN THE CASE OF DESIGN OPTION B, SHALL HAVE A REMOVABLE SCREEN.

TOWN PLANNING

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Project
MIXED USE DEVELOPMENT
139 - 149 Boundary Road, North Melbourne

Client
BLUE EARTH GROUP

Amendments

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Title
APARTMENT DESIGN GUIDLINES 04 - APARTMENTS

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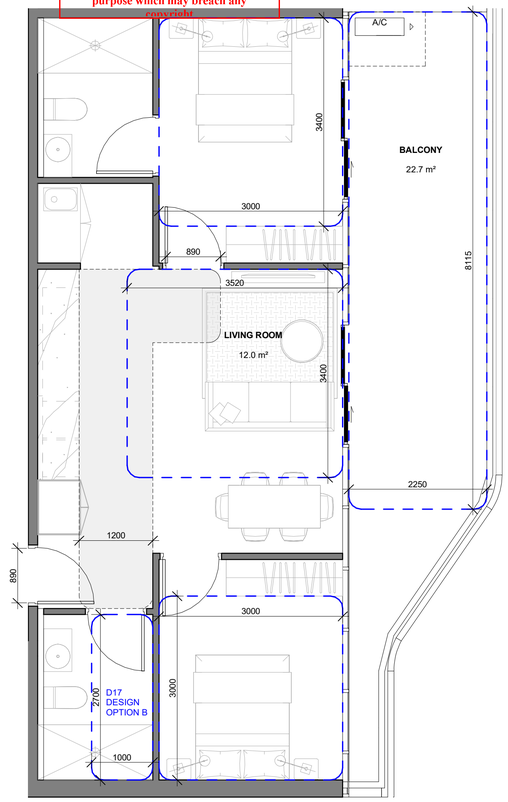
ADVERTISED PLAN

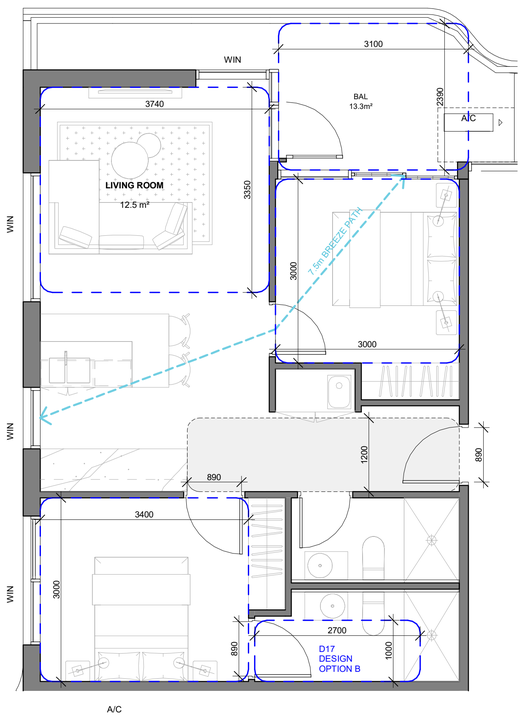


D17 D19 D20 D24 D25 D26 D27

1 APARTMENT TYPE 10
SCALE 1 : 50

UNIT TYPE: 2 BED & 2 BATH
AREA: 67.5m² + 23m² (balcony)
APT: C602, C608, C702, C708, C802, C808, C902, C908, C1002, C1008, C1102, C1108

TYPE 10 INTERNAL STORAGE SCHEDULE	
CUPBOARD	2 m³
ISLAND BENCH	2 m³
LAUNDRY	2 m³
WARDROBE	3 m³
WARDROBE	3 m³
TOTAL INTERNAL STORAGE	11 m³

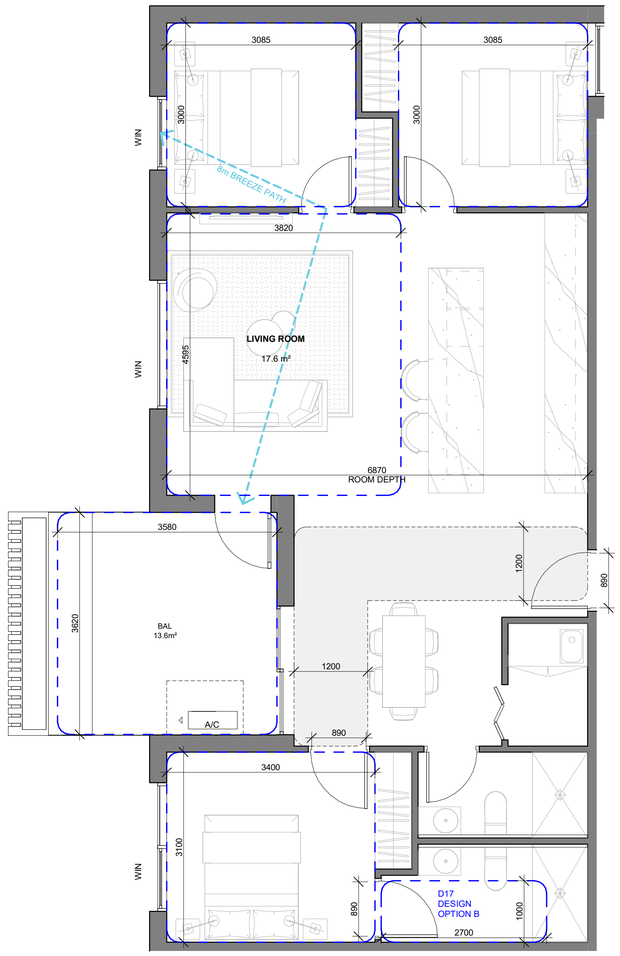


D17 D19 D20 D24 D25 D26 D27

2 APARTMENT TYPE 11
SCALE 1 : 50

UNIT TYPE: 2 BED & 2 BATH
AREA: 69.5m² + 13m² (balcony)
APT: A101, A102, A201, A202, A301, A302, A401, A402, A501, A502, A601, A602, A701, A702, A801, A802, A901, A902, A1001, A1002, B101, B102, B201, B202, B301, B302, B401, B402, B501, B502, B601, B602, B701, B702, B801, B802, B901, B902, B1001, B1002

TYPE 11 INTERNAL STORAGE SCHEDULE	
ISLAND BENCH	2 m³
KITCHEN BENCH	1 m³
LAUNDRY	2 m³
WARDROBE	3 m³
WARDROBE	3 m³
TOTAL INTERNAL STORAGE	11 m³



D17 D19 D20 D24 D25 D26 D27

3 APARTMENT TYPE 12
SCALE 1 : 50

UNIT TYPE: 3 BED & 2 BATH
AREA: 105.5m² + 10.0m² (balcony)
APT: C401, C501, C601, C701, C801, C901, C1001, C1101

TYPE 12 INTERNAL STORAGE SCHEDULE	
ISLAND BENCH	2 m³
KITCHEN BENCH	3 m³
LAUNDRY	2 m³
WARDROBE	3 m³
WARDROBE	2 m³
WARDROBE	2 m³
TOTAL INTERNAL STORAGE	14 m³

LEGEND

D17	STANDARD 'D17' COMPLIANT
D19	STANDARD 'D19' COMPLIANT
D20	STANDARD 'D20' COMPLIANT
D24	STANDARD 'D24' COMPLIANT
D25	STANDARD 'D25' COMPLIANT
D26	STANDARD 'D26' COMPLIANT
D27	STANDARD 'D27' COMPLIANT
D25	'DUAL ASPECT' APARTMENT STANDARD 'D25' NOT APPLICABLE
	NON COMPLIANT STANDARD

NOTES:

CEILING HEIGHTS:
LOWER GROUND FLOOR - MININUM 2.9M CEILING HEIGHT
UPPER GROUND FLOOR - MINIMUM 3.6M CEILING HEIGHT

DOORS:
ALL APARTMENT ENTRANCE DOORS, ACCESSIBLE BATHROOMS DOORS & MASTER BEDROOM DOORS SHALL PROVIDE A CLEAR OPENING WIDTH OF AT LEAST 850mm & IN THE CASE OF DESIGN OPTION B, SHALL BE FITTED WITH READILY REMOVABLE HINGES.

SHOWERS:
ALL APARTMENT SHOWERS TO BE HOBLESS STEP FREE SHOWERS & IN THE CASE OF DESIGN OPTION B, SHALL HAVE A REMOVABLE SCREEN.

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Amendments

No.	Date	Notes
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Title
APARTMENT DESIGN GUIDLINES 05 - APARTMENTS

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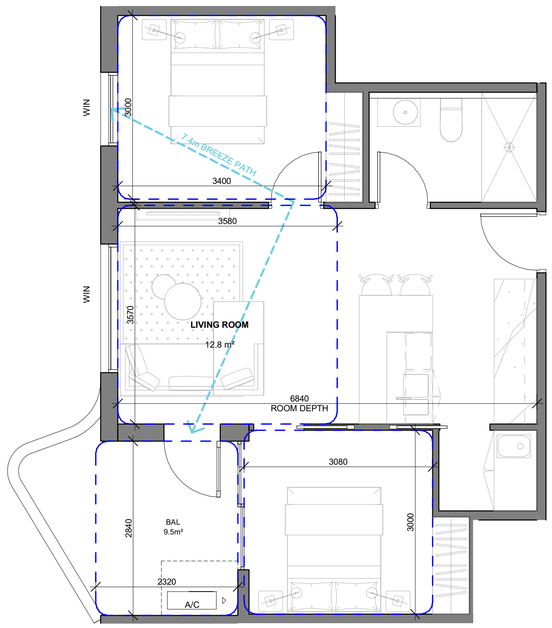
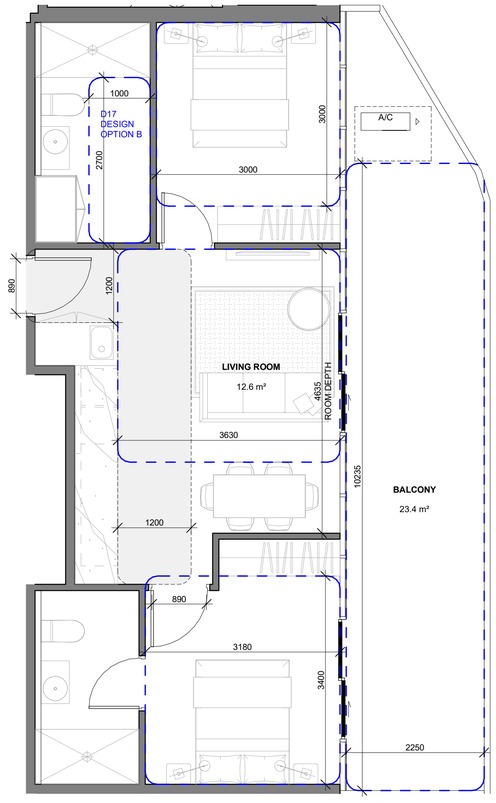
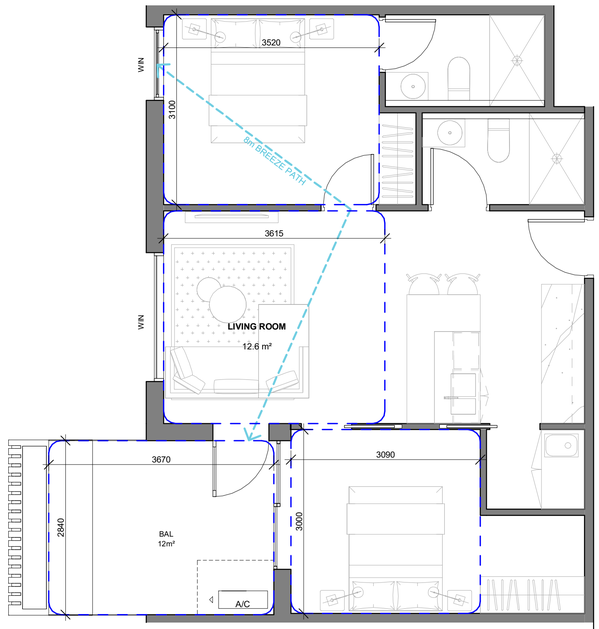


D17 D19 D20 D24 D25 D26 D27



D17 D19 D20 D24 D25 D26 D27



D17 D19 D20 D24 D25 D26 D27

LEGEND

D17	STANDARD 'D17' COMPLIANT
D19	STANDARD 'D19' COMPLIANT
D20	STANDARD 'D20' COMPLIANT
D24	STANDARD 'D24' COMPLIANT
D25	STANDARD 'D25' COMPLIANT
D26	STANDARD 'D26' COMPLIANT
D27	STANDARD 'D27' COMPLIANT
D25	'DUAL ASPECT' APARTMENT STANDARD 'D25' NOT APPLICABLE
	NON COMPLIANT STANDARD

1 APARTMENT TYPE 13
SCALE 1 : 50

UNIT TYPE: 2 BED & 1 BATH
AREA: 61.5m² + 9.5m² (balcony)
APT: A105, A106, A205, A206, A305, A306, A405, A406, A505, A506, A605 A606, A705, A706, A805, A806, A905, A906, A1005, A1006, B105, B205 B206, B305, B306, B405, B406, B505, B506, B605, B606, B705, B706 B805, B806, B905, B906, B1005, B1006

TYPE 13 INTERNAL STORAGE SCHEDULE	
ISLAND BENCH	2 m³
KITCHEN BENCH	1 m³
LAUNDRY	2 m³
WARDROBE	3 m³
WARDROBE	3 m³
TOTAL INTERNAL STORAGE	11 m³

2 APARTMENT TYPE 14
SCALE 1 : 50

UNIT TYPE: 2 BED & 2 BATH
AREA: 64.0m² + 23.0m² (balcony)
APT: C606, C706, C806, C906, C1006, C1106

TYPE 14 INTERNAL STORAGE SCHEDULE	
CUPBOARD	2 m³
ISLAND BENCH	2 m³
LAUNDRY	2 m³
WARDROBE	3 m³
WARDROBE	3 m³
TOTAL INTERNAL STORAGE	12 m³

3 APARTMENT TYPE 15
SCALE 1 : 50

UNIT TYPE: 2 BED & 2 BATH
AREA: 66.5m² + 12.0m² (balcony)
APT: C409, C509, C607, C707, C807, C907, C1007, C1107

TYPE 15 INTERNAL STORAGE SCHEDULE	
ISLAND BENCH	2 m³
KITCHEN BENCH	1 m³
LAUNDRY	2 m³
WARDROBE	2 m³
WARDROBE	3 m³
TOTAL INTERNAL STORAGE	10 m³

NOTES:

CEILING HEIGHTS:
LOWER GROUND FLOOR - MININUM 2.9M CEILING HEIGHT
UPPER GROUND FLOOR - MINIMUM 3.6M CEILING HEIGHT

DOORS:
ALL APARTMENT ENTRANCE DOORS, ACCESSIBLE BATHROOMS DOORS & MASTER BEDROOM DOORS SHALL PROVIDE A CLEAR OPENING WIDTH OF AT LEAST 850mm & IN THE CASE OF DESIGN OPTION B, SHALL BE FITTED WITH READILY REMOVABLE HINGES.

SHOWERS:
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Amendments

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APARTMENT DESIGN GUIDLINES 06 - APARTMENTS

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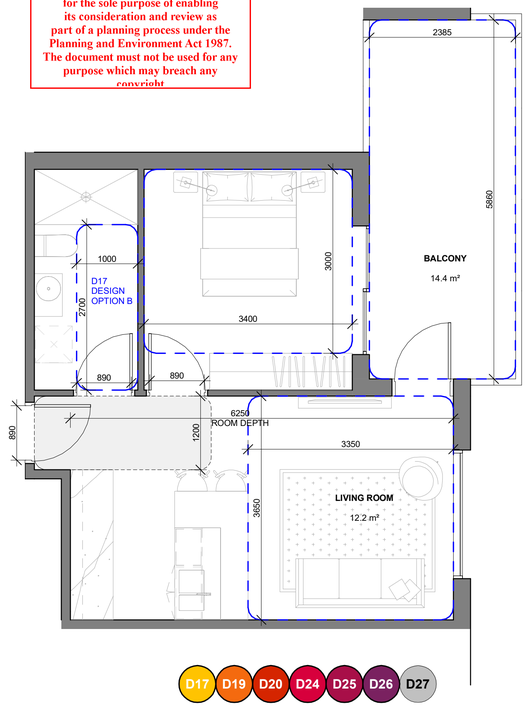

1 APARTMENT TYPE 16
SCALE 1 : 50

UNIT TYPE: 1 BED & 1 BATH
AREA: 49m² + 14m² (balcony)
APT: B106

TYPE 16 INTERNAL STORAGE SCHEDULE	
ISLAND BENCH	2 m³
WARDROBE	4 m³
TOTAL INTERNAL STORAGE	6 m³

LEGEND

D17	STANDARD 'D17' COMPLIANT
D19	STANDARD 'D19' COMPLIANT
D20	STANDARD 'D20' COMPLIANT
D24	STANDARD 'D24' COMPLIANT
D25	STANDARD 'D25' COMPLIANT
D26	STANDARD 'D26' COMPLIANT
D27	STANDARD 'D27' COMPLIANT
D25	'DUAL ASPECT' APARTMENT STANDARD 'D25' NOT APPLICABLE
	NON COMPLIANT STANDARD

NOTES:

CEILING HEIGHTS:
LOWER GROUND FLOOR - MININUM 2.9M CEILING HEIGHT
UPPER GROUND FLOOR - MINIMUM 3.6M CEILING HEIGHT

DOORS:
ALL APARTMENT ENTRANCE DOORS, ACCESSIBLE BATHROOMS DOORS & MASTER BEDROOM DOORS SHALL PROVIDE A CLEAR OPENING WIDTH OF AT LEAST 850mm & IN THE CASE OF DESIGN OPTION B, SHALL BE FITTED WITH READILY REMOVABLE HINGES.

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APARTMENT DESIGN GUIDLINES 07
- APARTMENTS

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ADVERTISED PLAN

STANDARD 'D17' ACCESSIBILITY ASSESSMENT

TYPE	DESCRIPTION	QTY	STANDARD 'D17' COMPLIANT?
TYPE 1	1 BED & 1 BATH	48	YES
TYPE 2	1 BED & 1 BATH	40	NO
TYPE 3	1 BED & 1 BATH	7	NO
TYPE 4	1 BED & 1 BATH	8	NO
TYPE 5	1 BED & 1 BATH	6	YES
TYPE 6	2 BED & 1 BATH	8	YES
TYPE 7	2 BED & 1 BATH	8	YES
TYPE 8	2 BED & 1 BATH	8	NO
TYPE 9	2 BED & 2 BATH	32	YES
TYPE 10	2 BED & 2 BATH	12	YES
TYPE 11	2 BED & 2 BATH	40	YES
TYPE 12	3 BED & 2 BATH	8	YES
TYPE 13	2 BED & 1 BATH	39	NO
TYPE 14	2 BED & 2 BATH	6	YES
TYPE 15	2 BED & 2 BATH	8	NO
TYPE 16	1 BED & 1 BATH	1	YES
TYPE A - LOWER GF	3 BED & 2 BATH	8	YES
TYPE B - LOWER GF	3 BED & 2 BATH	3	YES
TYPE C - LOWER GF	3 BED & 2 BATH	1	YES

TOTAL NO. OF APARTMENTS + TOWNHOUSES	291
TOTAL NO. OF COMPLIANT UNITS	181
% COMPLIANCE REQUIRED	50%
% COMPLIANCE ACHIEVED	62%

STANDARD 'D20'STORAGE ASSESSMENT

TYPE	DESCRIPTION	QTY	STANDARD 'D20' COMPLIANT?
TYPE 1	1 BED & 1 BATH	48	YES
TYPE 2	1 BED & 1 BATH	40	YES
TYPE 3	1 BED & 1 BATH	7	YES
TYPE 4	1 BED & 1 BATH	8	YES
TYPE 5	1 BED & 1 BATH	6	YES
TYPE 6	2 BED & 1 BATH	8	YES
TYPE 7	2 BED & 1 BATH	8	YES
TYPE 8	2 BED & 1 BATH	8	YES
TYPE 9	2 BED & 2 BATH	32	YES
TYPE 10	2 BED & 2 BATH	12	YES
TYPE 11	2 BED & 2 BATH	40	YES
TYPE 12	3 BED & 2 BATH	8	YES
TYPE 13	2 BED & 1 BATH	39	YES
TYPE 14	2 BED & 2 BATH	6	YES
TYPE 15	2 BED & 2 BATH	8	YES
TYPE 16	1 BED & 1 BATH	1	YES
TYPE A - LOWER GF	3 BED & 2 BATH	8	YES
TYPE B - LOWER GF	3 BED & 2 BATH	3	YES
TYPE C - LOWER GF	3 BED & 2 BATH	1	YES

TOTAL NO. OF APARTMENTS + TOWNHOUSES	291
TOTAL NO. OF COMPLIANT UNITS	291
% COMPLIANCE REQUIRED	100%
% COMPLIANCE ACHIEVED	100%

STANDARD 'D25' INTERNAL AMENITY ASSESSMENT

TYPE	DESCRIPTION	QTY	STANDARD 'D25' COMPLIANT?
TYPE 1	1 BED & 1 BATH	48	YES
TYPE 2	1 BED & 1 BATH	40	YES
TYPE 3	1 BED & 1 BATH	7	YES
TYPE 4	1 BED & 1 BATH	8	YES
TYPE 5	1 BED & 1 BATH	6	YES
TYPE 6	2 BED & 1 BATH	8	YES
TYPE 7	2 BED & 1 BATH	8	YES
TYPE 8	2 BED & 1 BATH	8	YES
TYPE 9	2 BED & 2 BATH	32	YES
TYPE 10	2 BED & 2 BATH	12	YES
TYPE 11	2 BED & 2 BATH	40	YES
TYPE 12	3 BED & 2 BATH	8	YES
TYPE 13	2 BED & 1 BATH	39	YES
TYPE 14	2 BED & 2 BATH	6	YES
TYPE 15	2 BED & 2 BATH	8	YES
TYPE 16	1 BED & 1 BATH	1	YES
TYPE A - LOWER GF	3 BED & 2 BATH	8	YES
TYPE B - LOWER GF	3 BED & 2 BATH	3	YES
TYPE C - LOWER GF	3 BED & 2 BATH	1	YES

TOTAL NO. OF APARTMENTS + TOWNHOUSES	291
TOTAL NO. OF COMPLIANT UNITS	291
% COMPLIANCE REQUIRED	100%
% COMPLIANCE ACHIEVED	100%

STANDARD 'D27' NATURAL VENTILATION ASSESSMENT

TYPE	DESCRIPTION	QTY	STANDARD 'D27' COMPLIANT?
TYPE 1	1 BED & 1 BATH	48	YES
TYPE 2	1 BED & 1 BATH	40	YES
TYPE 3	1 BED & 1 BATH	7	NO
TYPE 4	1 BED & 1 BATH	8	NO
TYPE 5	1 BED & 1 BATH	6	NO
TYPE 6	2 BED & 1 BATH	8	NO
TYPE 7	2 BED & 1 BATH	8	YES
TYPE 8	2 BED & 1 BATH	8	YES
TYPE 9	2 BED & 2 BATH	32	YES
TYPE 10	2 BED & 2 BATH	12	NO
TYPE 11	2 BED & 2 BATH	40	YES
TYPE 12	3 BED & 2 BATH	8	YES
TYPE 13	2 BED & 1 BATH	39	YES
TYPE 14	2 BED & 2 BATH	6	NO
TYPE 15	2 BED & 2 BATH	8	YES
TYPE 16	1 BED & 1 BATH	1	NO
TYPE A - LOWER GF	3 BED & 2 BATH	8	YES
TYPE B - LOWER GF	3 BED & 2 BATH	3	YES
TYPE C - LOWER GF	3 BED & 2 BATH	1	YES

TOTAL NO. OF APARTMENTS + TOWNHOUSES	291
TOTAL NO. OF COMPLIANT UNITS	243
% COMPLIANCE REQUIRED	40%
% COMPLIANCE ACHIEVED	84%

STANDARD 'D19' PRIVATE OPEN SPACE ASSESSMENT

TYPE	DESCRIPTION	QTY	STANDARD 'D19' COMPLIANT?
TYPE 1	1 BED & 1 BATH	48	YES
TYPE 2	1 BED & 1 BATH	40	YES
TYPE 3	1 BED & 1 BATH	7	YES
TYPE 4	1 BED & 1 BATH	8	YES
TYPE 5	1 BED & 1 BATH	6	YES
TYPE 6	2 BED & 1 BATH	8	YES
TYPE 7	2 BED & 1 BATH	8	YES
TYPE 8	2 BED & 1 BATH	8	YES
TYPE 9	2 BED & 2 BATH	32	YES
TYPE 10	2 BED & 2 BATH	12	YES
TYPE 11	2 BED & 2 BATH	40	YES
TYPE 12	3 BED & 2 BATH	8	YES
TYPE 13	2 BED & 1 BATH	39	YES
TYPE 14	2 BED & 2 BATH	6	YES
TYPE 15	2 BED & 2 BATH	8	YES
TYPE 16	1 BED & 1 BATH	1	YES
TYPE A - LOWER GF	3 BED & 2 BATH	8	YES
TYPE B - LOWER GF	3 BED & 2 BATH	3	YES
TYPE C - LOWER GF	3 BED & 2 BATH	1	YES

STANDARD 'D19' - NON COMPLIANT

NUMBER	TYPE	DESCRIPTION	QTY
B-108	TYPE 1	1 BED & 1 BATH	1
B-204	TYPE 2	1 BED & 1 BATH	1
B-206	TYPE 13	2 BED & 1 BATH	1
B-208	TYPE 1	1 BED & 1 BATH	1
B-304	TYPE 2	1 BED & 1 BATH	1
B-306	TYPE 13	2 BED & 1 BATH	1
B-308	TYPE 1	1 BED & 1 BATH	1
			7

PLEASE NOTE: ABOVE SEVEN APARTMENTS HAVE DIFFERENT BALCONY SHAPES ONLY, NO DIFFERENCE ON THE INTERNAL LAYOUTS

TOTAL NO. OF APARTMENTS + TOWNHOUSES	291
TOTAL NO. OF COMPLIANT UNITS	284
% COMPLIANCE REQUIRED	100%
% COMPLIANCE ACHIEVED	98%

STANDARD 'D24' FUNCTIONAL LAYOUT ASSESSMENT

TYPE	DESCRIPTION	QTY	STANDARD 'D24' COMPLIANT?
TYPE 1	1 BED & 1 BATH	48	YES
TYPE 2	1 BED & 1 BATH	40	YES
TYPE 3	1 BED & 1 BATH	7	YES
TYPE 4	1 BED & 1 BATH	8	YES
TYPE 5	1 BED & 1 BATH	6	YES
TYPE 6	2 BED & 1 BATH	8	YES
TYPE 7	2 BED & 1 BATH	8	YES
TYPE 8	2 BED & 1 BATH	8	YES
TYPE 9	2 BED & 2 BATH	32	YES
TYPE 10	2 BED & 2 BATH	12	YES
TYPE 11	2 BED & 2 BATH	40	YES
TYPE 12	3 BED & 2 BATH	8	YES
TYPE 13	2 BED & 1 BATH	39	YES
TYPE 14	2 BED & 2 BATH	6	YES
TYPE 15	2 BED & 2 BATH	8	YES
TYPE 16	1 BED & 1 BATH	1	YES
TYPE A - LOWER GF	3 BED & 2 BATH	8	YES
TYPE B - LOWER GF	3 BED & 2 BATH	3	YES
TYPE C - LOWER GF	3 BED & 2 BATH	1	YES

TOTAL NO. OF APARTMENTS + TOWNHOUSES	291
TOTAL NO. OF COMPLIANT UNITS	291
% COMPLIANCE REQUIRED	100%
% COMPLIANCE ACHIEVED	100%

STANDARD 'D26' WINDOWS ASSESSMENT

TYPE	DESCRIPTION	QTY	STANDARD 'D26' COMPLIANT?
TYPE 1	1 BED & 1 BATH	48	YES
TYPE 2	1 BED & 1 BATH	40	YES
TYPE 3	1 BED & 1 BATH	7	YES
TYPE 4	1 BED & 1 BATH	8	YES
TYPE 5	1 BED & 1 BATH	6	YES
TYPE 6	2 BED & 1 BATH	8	YES
TYPE 7	2 BED & 1 BATH	8	YES
TYPE 8	2 BED & 1 BATH	8	YES
TYPE 9	2 BED & 2 BATH	32	YES
TYPE 10	2 BED & 2 BATH	12	YES
TYPE 11	2 BED & 2 BATH	40	YES
TYPE 12	3 BED & 2 BATH	8	YES
TYPE 13	2 BED & 1 BATH	39	YES
TYPE 14	2 BED & 2 BATH	6	YES
TYPE 15	2 BED & 2 BATH	8	YES
TYPE 16	1 BED & 1 BATH	1	YES
TYPE A - LOWER GF	3 BED & 2 BATH	8	YES
TYPE B - LOWER GF	3 BED & 2 BATH	3	YES
TYPE C - LOWER GF	3 BED & 2 BATH	1	YES

TOTAL NO. OF APARTMENTS + TOWNHOUSES	291
TOTAL NO. OF COMPLIANT UNITS	291
% COMPLIANCE REQUIRED	100%
% COMPLIANCE ACHIEVED	100%

STANDARD 'D7' COMMUNAL OPEN SPACE ASSESSMENT

TOTAL NO. OF APARTMENTS	291
REQUIRED MINIMUM AREA OF COMMUNAL OPEN SPACE	250m²
AREA OF COMMUNAL OPEN SPACE ACHIEVED	2232m²

OVERALL DEVELOPMENT BADS COMPLIANCE ASSESSMENT

STANDARD 'D7' COMPLIANT	STANDARD 'D17' COMPLIANT	STANDARD 'D19' COMPLIANT	STANDARD 'D20' COMPLIANT
YES	YES	YES	YES

D7 D17 D19 D20

STANDARD 'D24' COMPLIANT	STANDARD 'D25' COMPLIANT	STANDARD 'D26' COMPLIANT	STANDARD 'D27' COMPLIANT
YES	YES	YES	YES

D24 D25 D26 D27

TOWN PLANNING

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18113

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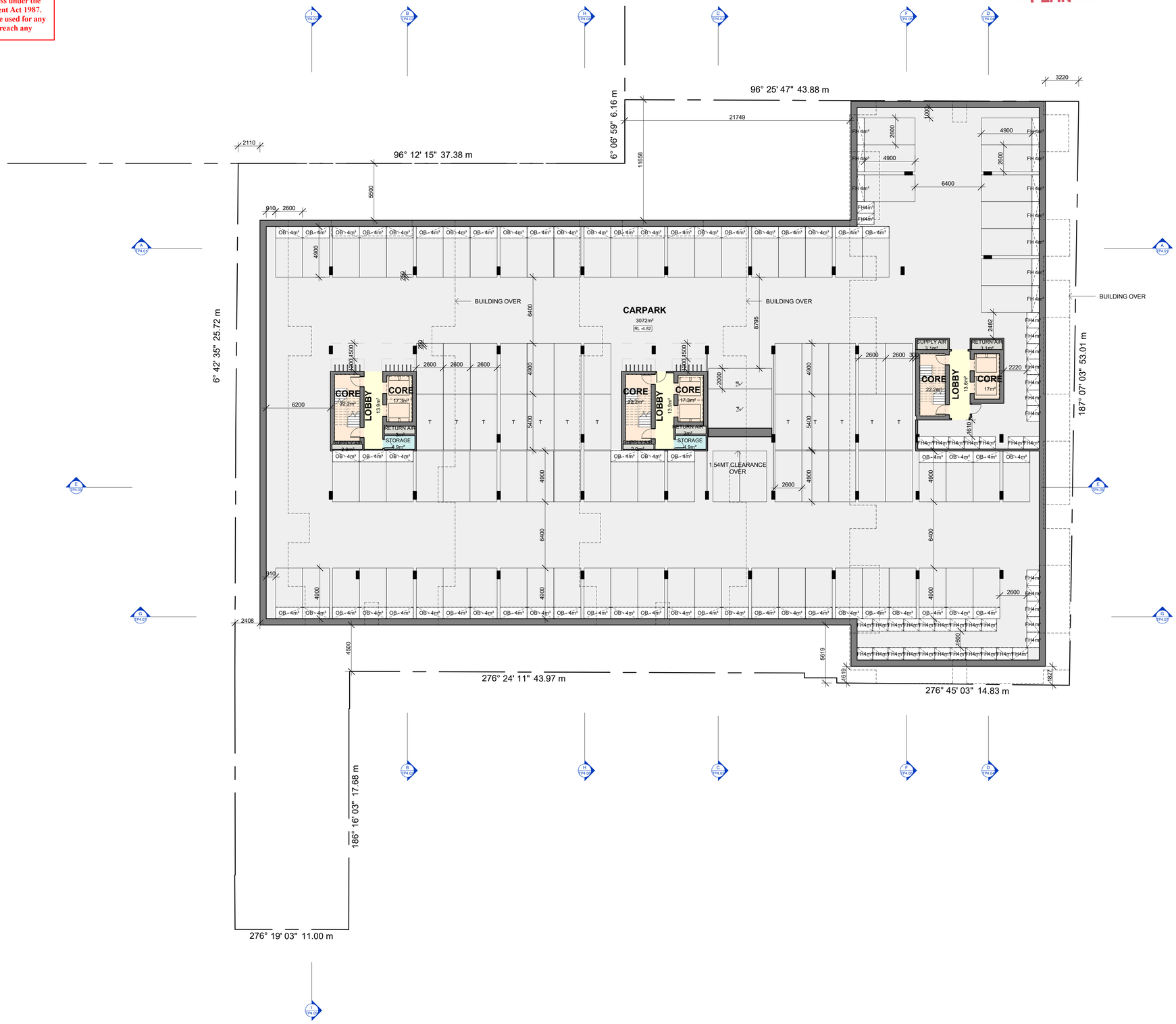
18113 - 2/12/2019 11:04:04 AM

ADVERTISED PLAN



TOWN PLANNING

CHT ARCHITECTS

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Urban Design

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Project
MIXED USE DEVELOPMENT
139 - 149 Boundary Road, North Melbourne

Client
BLUE EARTH GROUP

Amendments

No.	Date	Notes
A	29/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
BASEMENT 03

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.00

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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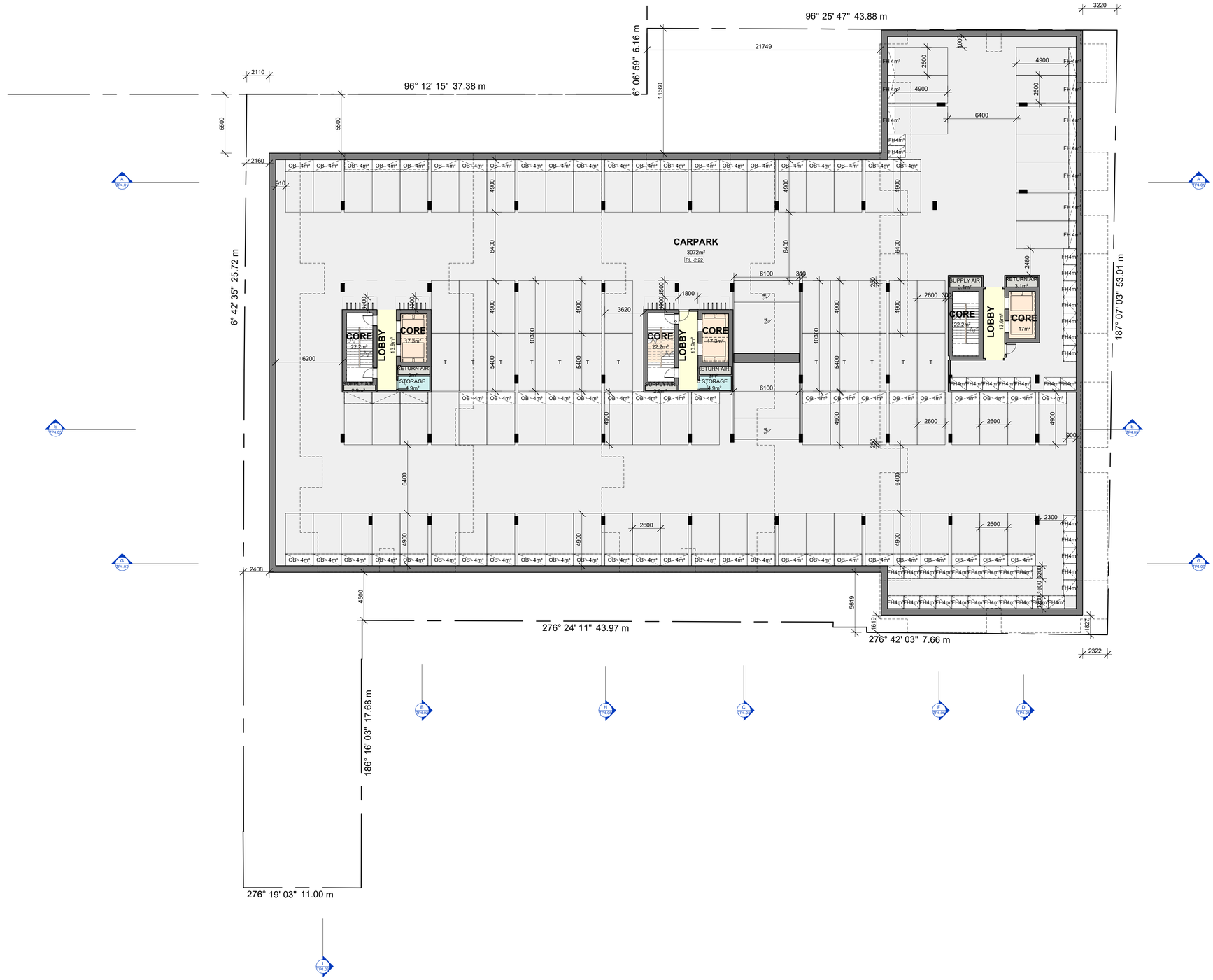
ADVERTISED PLAN



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Client
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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
BASEMENT 02

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.01

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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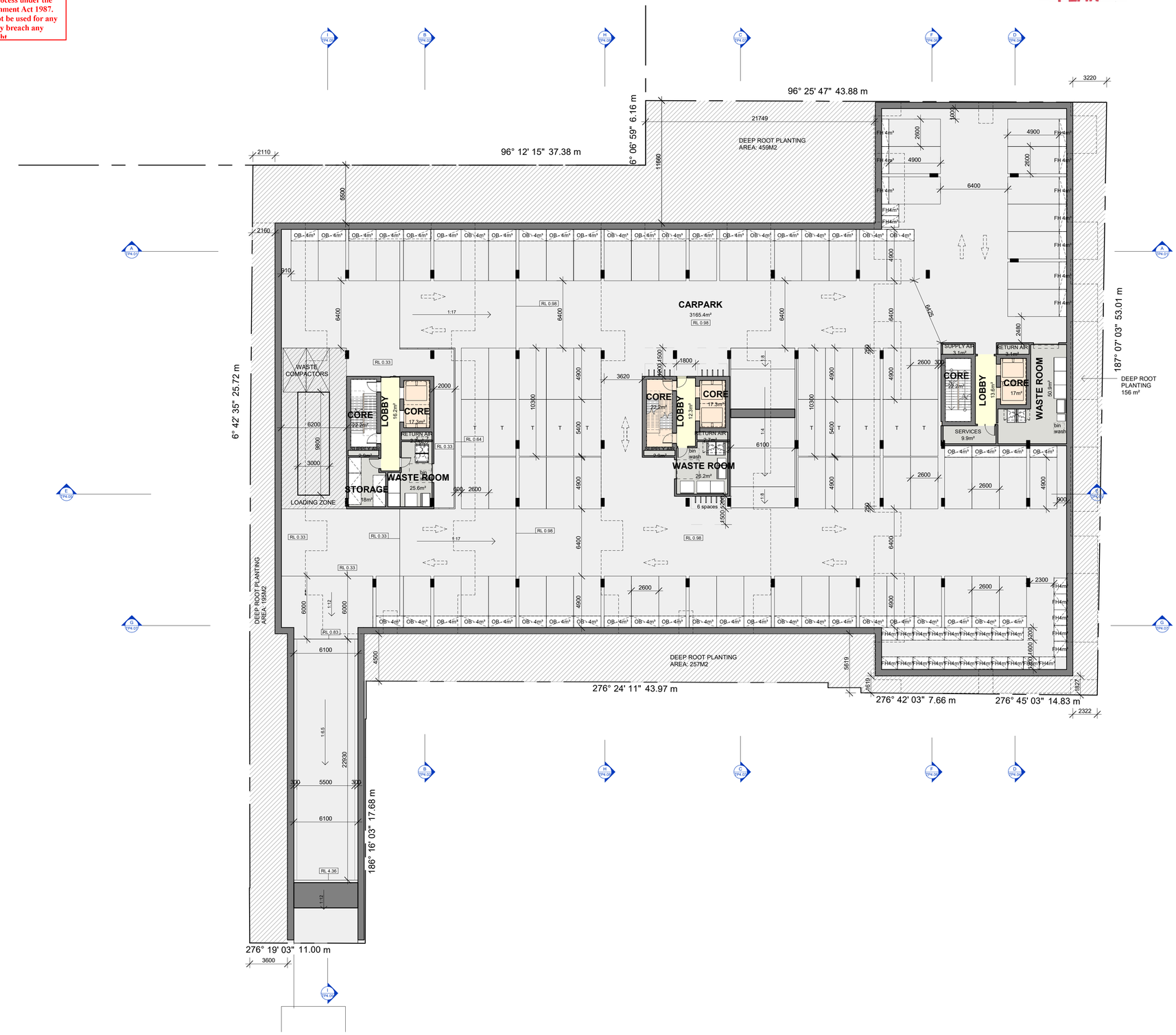
18113 - 2/12/2019 11:04:15 AM

ADVERTISED PLAN



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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
BASEMENT 01

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.02

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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Client
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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
LOWER GROUND FLOOR PLAN

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.03

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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PROPOSED DEVELOPMENT
87 RACECOURSE ROAD

SITE BOUNDARY

COMMON GARDEN

C-TH01 TOWNHOUSE TYPE B - UPPER GF 52.5 m²
C-TH02 TOWNHOUSE TYPE B - UPPER GF 52.5 m²
C-TH03 TOWNHOUSE TYPE A - UPPER GF 52 m²
C-TH04 TOWNHOUSE TYPE A - UPPER GF 52 m²
C-TH05 TOWNHOUSE TYPE A - UPPER GF 52.5 m²
C-TH06 TOWNHOUSE TYPE A - UPPER GF 52.5 m²
C-TH07 TOWNHOUSE TYPE C - UPPER 52.5 m²
C-TH08 TOWNHOUSE TYPE A - UPPER GF 52.5 m²

B-TH09 TOWNHOUSE TYPE B - UPPER GF 52.5 m²
B-TH10 TOWNHOUSE TYPE A - UPPER GF 52 m²
B-TH11 TOWNHOUSE TYPE A - UPPER GF 52.5 m²
B-TH12 TOWNHOUSE TYPE A - UPPER GF 52.5 m²

BAL 10.2m² / BAL 10.3m²

STAIR 20m²
LIFT 17.3m³
LOBBY 57.6m²
RETURN AIR 2.7m²
BIN ROOM 6m³ / 5.5m³
SUPPLY AIR 3m²
VOID

PRIVATE DINING
COMMUNAL 144.5 m²
RL 8.78

COURTYARD
702.4m²
RL 8.78

ARCADE GAMES
COMMUNAL 120 m²
RL 8.78

GYM
COMMUNAL 296.5 m²
RL 8.78

CORE 22.2m²
CORE 16.1m²
SUPPLY AIR 3.3m²
RETURN AIR 3.3m²
SERVICE 1.3m²

RETAIL 172.9m²
RL 9.00

GAS BOOSTER 9.7m²

MAIL ROOM
LOBBY 143.5m²
RL 9.00
1:20

COMMUNAL 40.5m²
RL 8.78
SERVICE SERVICE 17.4m²

RETAIL 78.3m²
RL 9.00

WELLNESS
COMMUNAL 157 m²
RL 8.78

SUBSTATION 47m²
Switch Room 36.1m²
RL 9.00

RL 7.01
RL 7.45
RL 7.93
RL 7.55
RL 5.92
RL 4.58
RL 4.50
RL 9.55
RL 9.13
RL 9.04
RL 9.01

15170
28530
3430
5000
16140
12000
5970
13940
11155
9835
2857
2432
4345
3400
5500
14798
9462
14843
4500
4655
24925
11000

BUILDING A 14202
BUILDING B 15170
BUILDING C 18695

BOUNDARY ROAD

ALFRED STREET

TOWN PLANNING

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
UPPER GROUND FLOOR PLAN

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.04

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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18113 - 2/12/2019 11:04:38 AM

TOWN PLANNING

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
LEVEL 01

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.05

Revision
B

Scale
1 : 200@A1

Date
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18113

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ADVERTISED PLAN

TOWN PLANNING

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
LEVEL 02

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.06

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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18113--2/12/2019 11:05:05 AM

TOWN PLANNING

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
LEVEL 03

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.07

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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ADVERTISED PLAN

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
LEVEL 04

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.08

Revision
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Scale
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Date
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TOWN PLANNING

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
LEVEL 05

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PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.09

Revision
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Scale
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Date
02/12/2019

18113

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ADVERTISED PLAN

TOWN PLANNING

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
LEVEL 06

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.10

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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TOWN PLANNING

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Client
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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
LEVEL 07

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.11

Revision
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Scale
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Date
02/12/2019

18113

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18113 - 2/12/2019 11:06:29 AM

TOWN PLANNING

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Project
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139 - 149 Boundary Road, North Melbourne

Client
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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
LEVEL 08

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.12

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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Project
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139 - 149 Boundary Road, North Melbourne

Client
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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
LEVEL 09

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.13

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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18113 - - 2/12/2019 11:07:07 AM

TOWN PLANNING

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
LEVEL 10

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.14

Revision
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Scale
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Date
02/12/2019

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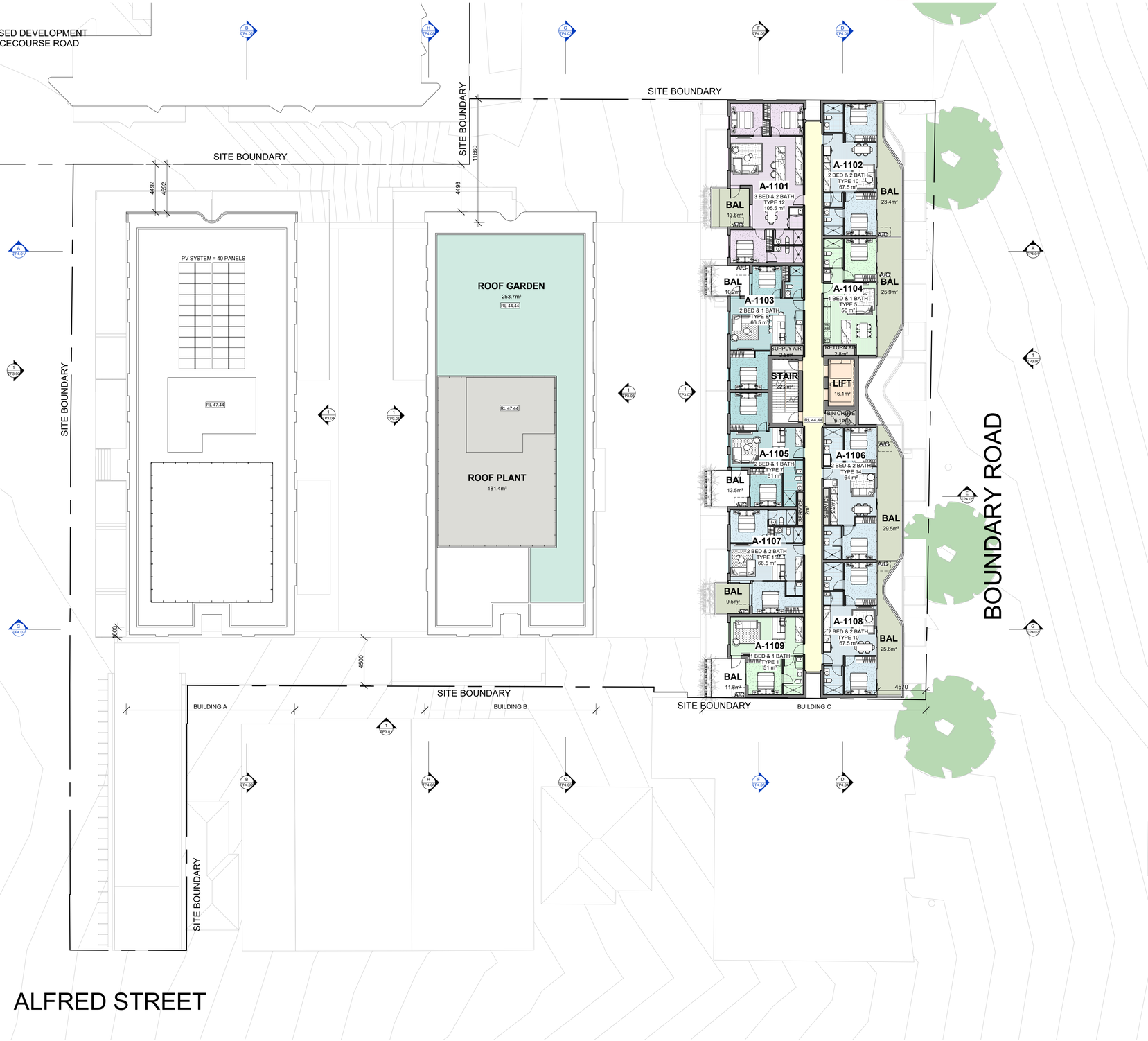

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Project
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139 - 149 Boundary Road, North Melbourne

Client
BLUE EARTH GROUP

Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
LEVEL 11

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.15

Revision
B

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Date
02/12/2019

18113

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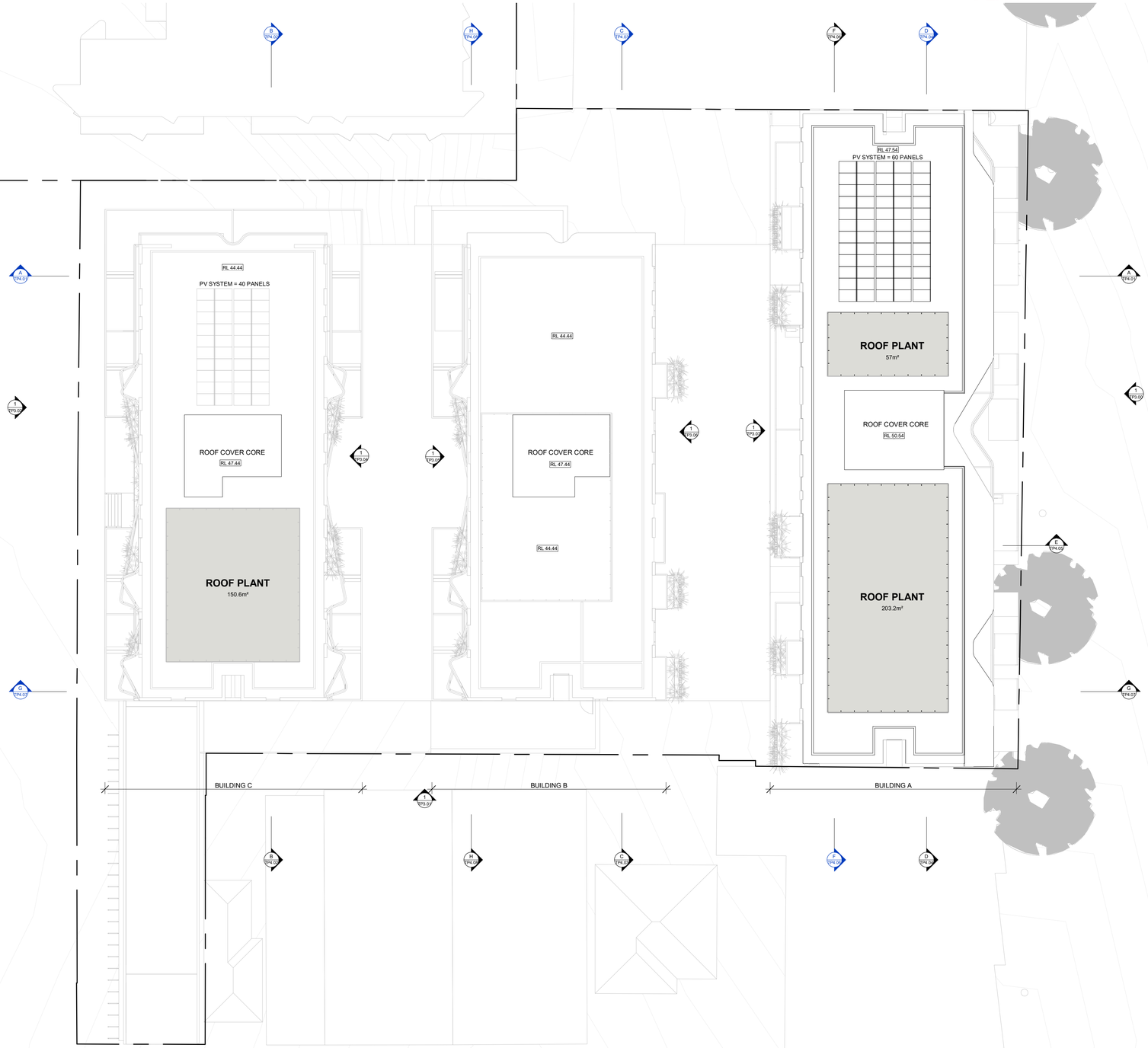

TOWN PLANNING

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Project
MIXED USE DEVELOPMENT
139 - 149 Boundary Road, North Melbourne

Client
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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
ROOF

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP2.16

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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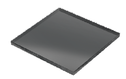
18113 - 2/12/2019 11:07:51 AM

1 EAST ELEVATION
SCALE 1 : 200

MATERIALS LEGEND

GL01 CLEAR GLASS


GL02 BRONZE GLASS


GL03 DARK GREY GLASS


GL04 SPANDREL PANEL


GL05 OBACURE GLAZING - 70% TRANSPARENT


ST01 BLACK STREEL BALUSTRADES


PC01 PRECAST CONCRETE TYPE 1


PC02 PRECAST CONCRETE TYPE 2


PC03 PRECAST CONCRETE TYPE 3

PC04 PRECAST CONCRETE TYPE 4


MF METAL FINISH - DARK GREY

TOWN PLANNING

CHT ARCHITECTS

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Project
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139 - 149 Boundary Road, North Melbourne

Client
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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
ELEVATIONS

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP3.00

Revision
B

Scale
As indicated@A1

Date
02/12/2019

18113

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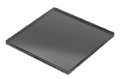
18113 - 2/12/2019 11:08:54 AM

1 SOUTH ELEVATION
SCALE 1 : 200

MATERIALS LEGEND

GL01 CLEAR GLASS


GL02 BRONZE GLASS


GL03 DARK GREY GLASS

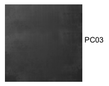

GL04 SPANDREL PANEL


GL05 OBACURE GLAZIN TRANSPARENT


ST01 BLACK STREEL BALUSTRADES


PC01 PRECAST CONCRETE TYPE 1


PC02 PRECAST CONCRETE TYPE 2


PC03 PRECAST CONCRETE TYPE 3

PC04 PRECAST CONCR


MF METAL FINISH - DARK GREY

TOWN PLANNING

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Project
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Client
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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
ELEVATIONS

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP3.01

Revision
B

Scale
As indicated@A1

Date
02/12/2019

18113

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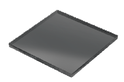
18113 - 2/12/2019 11:11:16 AM

1 WEST ELEVATION
SCALE 1 : 200

MATERIALS LEGEND

GL01 CLEAR GLASS


GL02 BRONZE GLASS


GL03 DARK GREY GLASS

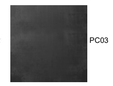

GL04 SPANDREL PANEL


GL05 OBACURE GLAZIN TRANSPARENT


ST01 BLACK STREEL BALUSTRADES


PC01 PRECAST CONCRETE TYPE 1


PC02 PRECAST CONCRETE TYPE 2


PC03 PRECAST CONCRETE TYPE 3

PC04 PRECAST CONCRE


MF METAL FINISH - DARK GREY

TOWN PLANNING

CHT ARCHITECTS

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Project
MIXED USE DEVELOPMENT
139 - 149 Boundary Road, North Melbourne

Client
BLUE EARTH GROUP

Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
ELEVATIONS

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP3.02

Revision
B

Scale
As indicated@A1

Date
02/12/2019

18113

Drawn by:AuthoChecked by:Checker

18113 - 2/12/2019 11:12:06 AM

1 NORTH ELEVATION
SCALE 1 : 200

MATERIALS LEGEND

GL01 CLEAR GLASS
GL02 BRONZE GLASS
GL03 DARK GREY GLASS
GL04 SPANDREL PANEL
GL05 OBACURE GLAZIN TRANSPARENT
ST01 BLACK STREEL BALUSTRADES
PC01 PRECAST CONCRETE TYPE 1
PC02 PRECAST CONCRETE TYPE 2
PC03 PRECAST CONCRETE TYPE 3
PC04 PRECAST CONCR
MF METAL FINISH - DARK GREY

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
ELEVATIONS

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP3.03

Revision
B

Scale
As indicated@A1

Date
02/12/2019

18113

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18113 - 2/12/2019 11:14:17 AM

1 INTERNAL EAST ELEVATION_BUILDING A
SCALE 1 : 200

MATERIALS LEGEND

GL01 CLEAR GLASS
GL02 BRONZE GLASS
GL03 DARK GREY GLASS
GL04 SPANDREL PANEL
GL05 OBACURE GLAZIN TRANSPARENT
ST01 BLACK STREEL BALUSTRADES
PC01 PRECAST CONCRETE TYPE 1
PC02 PRECAST CONCRETE TYPE 2
PC03 PRECAST CONCRETE TYPE 3
PC04 PRECAST CONCR
MF METAL FINISH - DARK GREY

TOWN PLANNING

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139 - 149 Boundary Road, North Melbourne

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
ELEVATIONS

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP3.04

Revision
B

Scale
As indicated@A1

Date
02/12/2019

18113

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18113 - 2/12/2019 11:15:02 AM

1 INTERNAL WEST ELEVATION_BUILDING B
SCALE 1 : 200

MATERIALS LEGEND

GL01	CLEAR GLASS	GL02	BRONZE GLASS	GL03	DARK GREY GLASS	GL04	SPANDREL PANEL	GL05	OBACURE GLAZIN TRANSPARENT
ST01	BLACK STREEL BALUSTRADES	PC01	PRECAST CONCRETE TYPE 1	PC02	PRECAST CONCRETE TYPE 2	PC03	PRECAST CONCRETE TYPE 3	PC04	PRECAST CONCRE
MF	METAL FINISH - DARK GREY								

TOWN PLANNING

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
ELEVATIONS

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP3.05

Revision
B

Scale
As indicated@A1

Date
02/12/2019

18113

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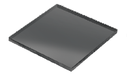
18113 - 2/12/2019 11:16:30 AM

1 INTERNAL EAST ELEVATION_BUILDING B
SCALE 1 : 200

MATERIALS LEGEND

GL01 CLEAR GLASS


GL02 BRONZE GLASS


GL03 DARK GREY GLASS


GL04 SPANDREL PANEL


GL05 OBACURE GLAZIN TRANSPARENT


ST01 BLACK STREEL BALUSTRADES


PC01 PRECAST CONCRETE TYPE 1


PC02 PRECAST CONCRETE TYPE 2


PC03 PRECAST CONCRETE TYPE 3

PC04 PRECAST CONCRE


MF METAL FINISH - DARK GREY

TOWN PLANNING

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
ELEVATIONS

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP3.06

Revision
B

Scale
As indicated@A1

Date
02/12/2019

18113

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18113--2/12/2019 11:17:43 AM

1 INTERNAL WEST ELEVATION_BUILDING C
SCALE 1 : 200

MATERIALS LEGEND

GL01	CLEAR GLASS	GL02	BRONZE GLASS	GL03	DARK GREY GLASS	GL04	SPANDREL PANEL	GL05	OBACURE GLAZIN TRANSPARENT
ST01	BLACK STREEL BALUSTRADES	PC01	PRECAST CONCRETE TYPE 1	PC02	PRECAST CONCRETE TYPE 2	PC03	PRECAST CONCRETE TYPE 3	PC04	PRECAST CONCRE
MF	METAL FINISH - DARK GREY								

TOWN PLANNING

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
ELEVATIONS

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP3.07

Revision
B

Scale
As indicated@A1

Date
02/12/2019

18113

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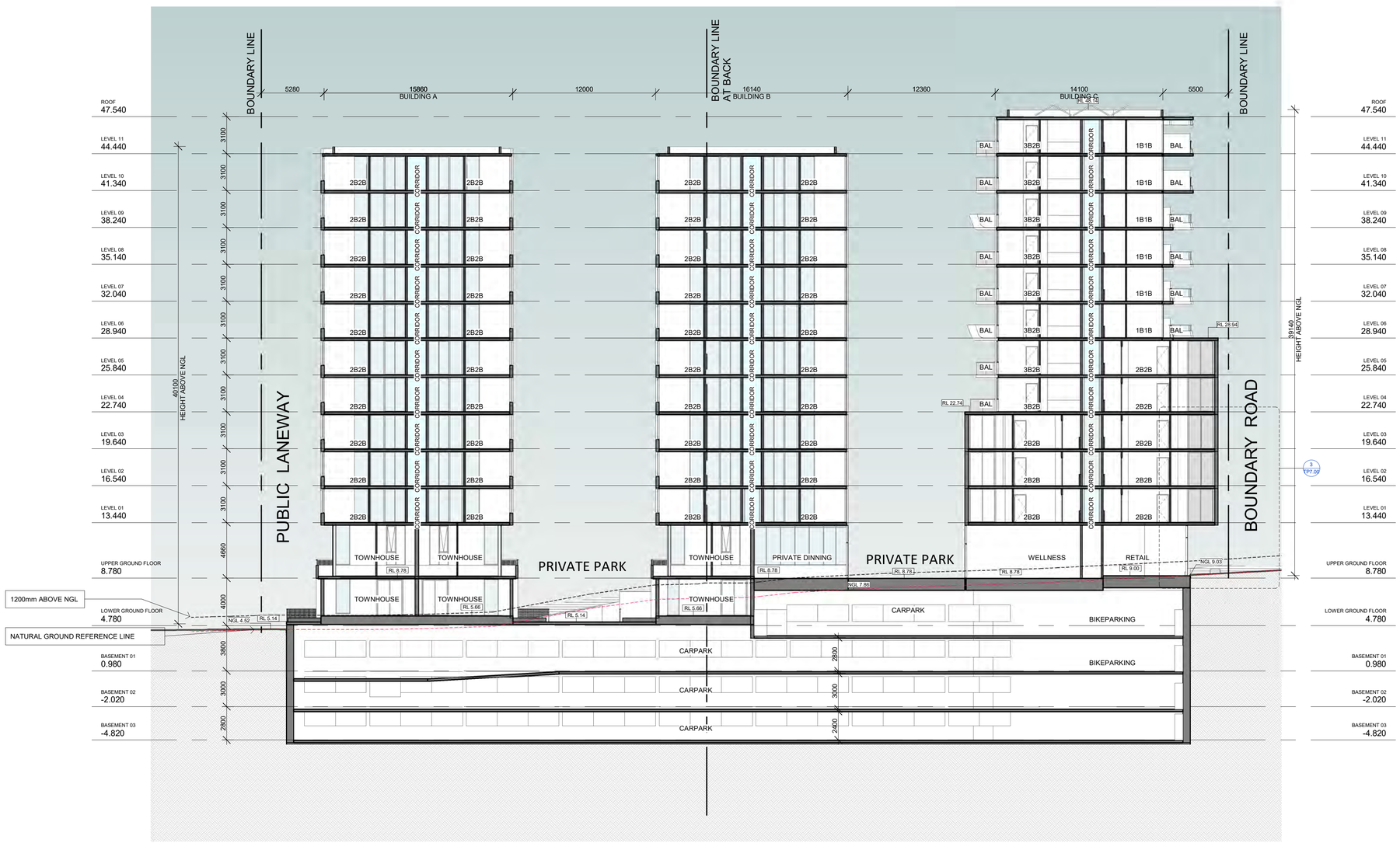

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Amendments

No.	Date	Notes
A	29/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
SECTION A-A

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP4.01

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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18113 - 2/12/2019 11:18:44 AM

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
SECTION B-B

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP4.02

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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18113--2/12/2019 11:18:58 AM

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
SECTION C-C

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No. TP4.03
Revision B
Scale 1 : 200@A1
Date 02/12/2019

18113

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18113 - 2/12/2019 11:19:11 AM

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
SECTION D-D

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP4.04

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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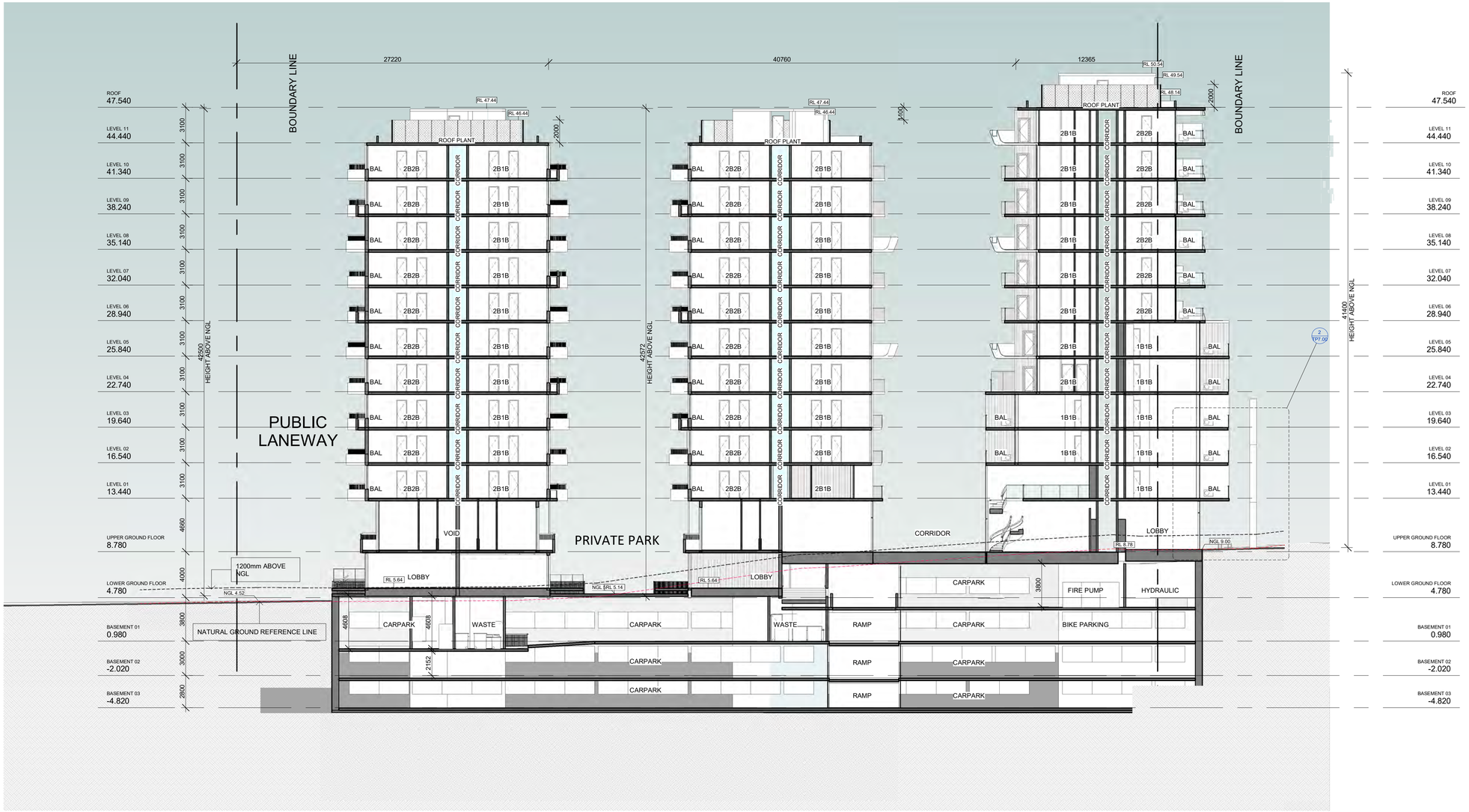
18113 - 2/12/2019 11:19:25 AM

ADVERTISED PLAN



TOWN PLANNING

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Amendments

No.	Date	Notes
A	29/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
SECTION E-E

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No. TP4.05
Revision B
Scale 1 : 200@A1
Date 02/12/2019

18113

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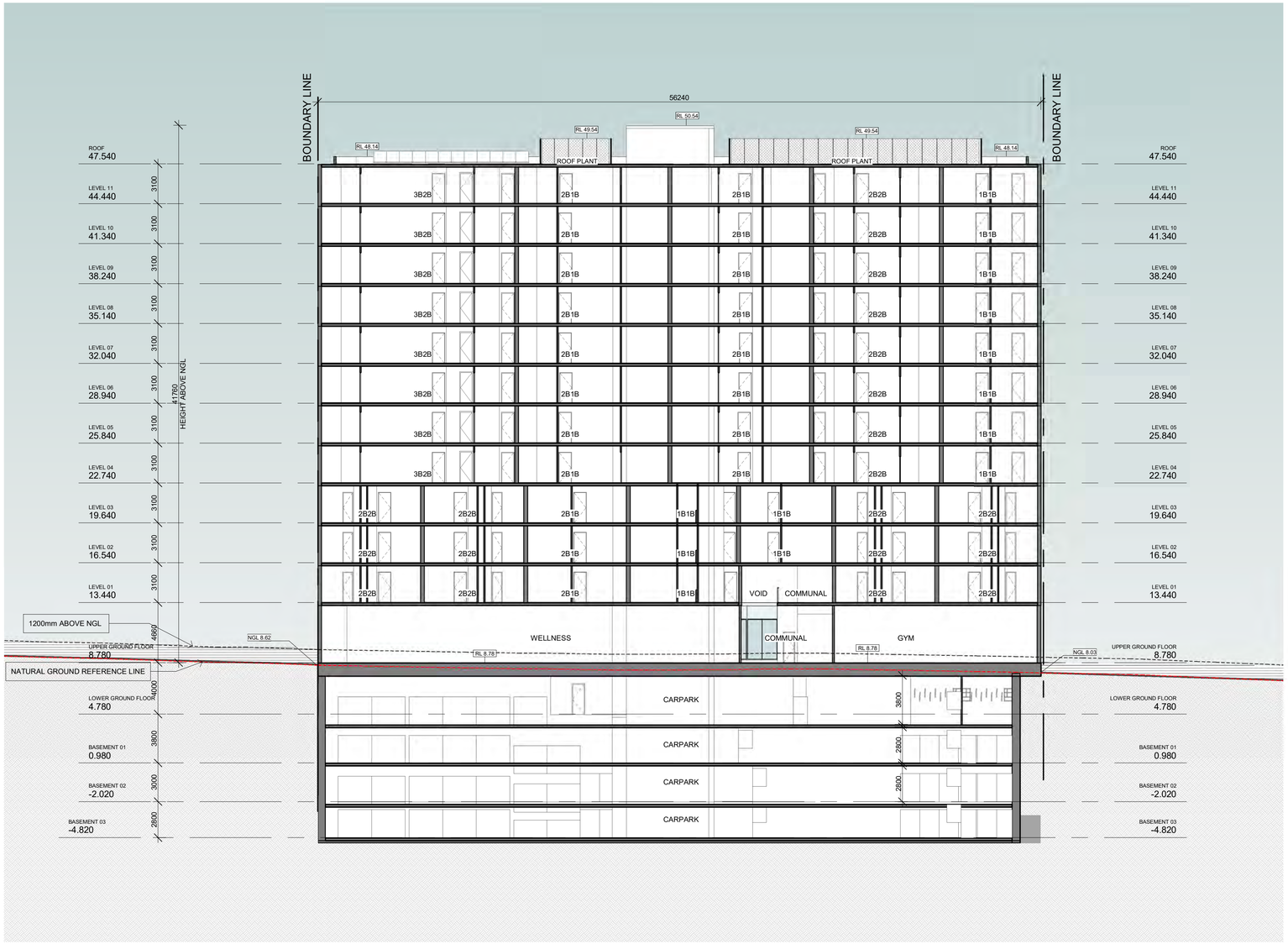

TOWN PLANNING

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Client
BLUE EARTH GROUP

Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
SECTION F-F

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP4.06

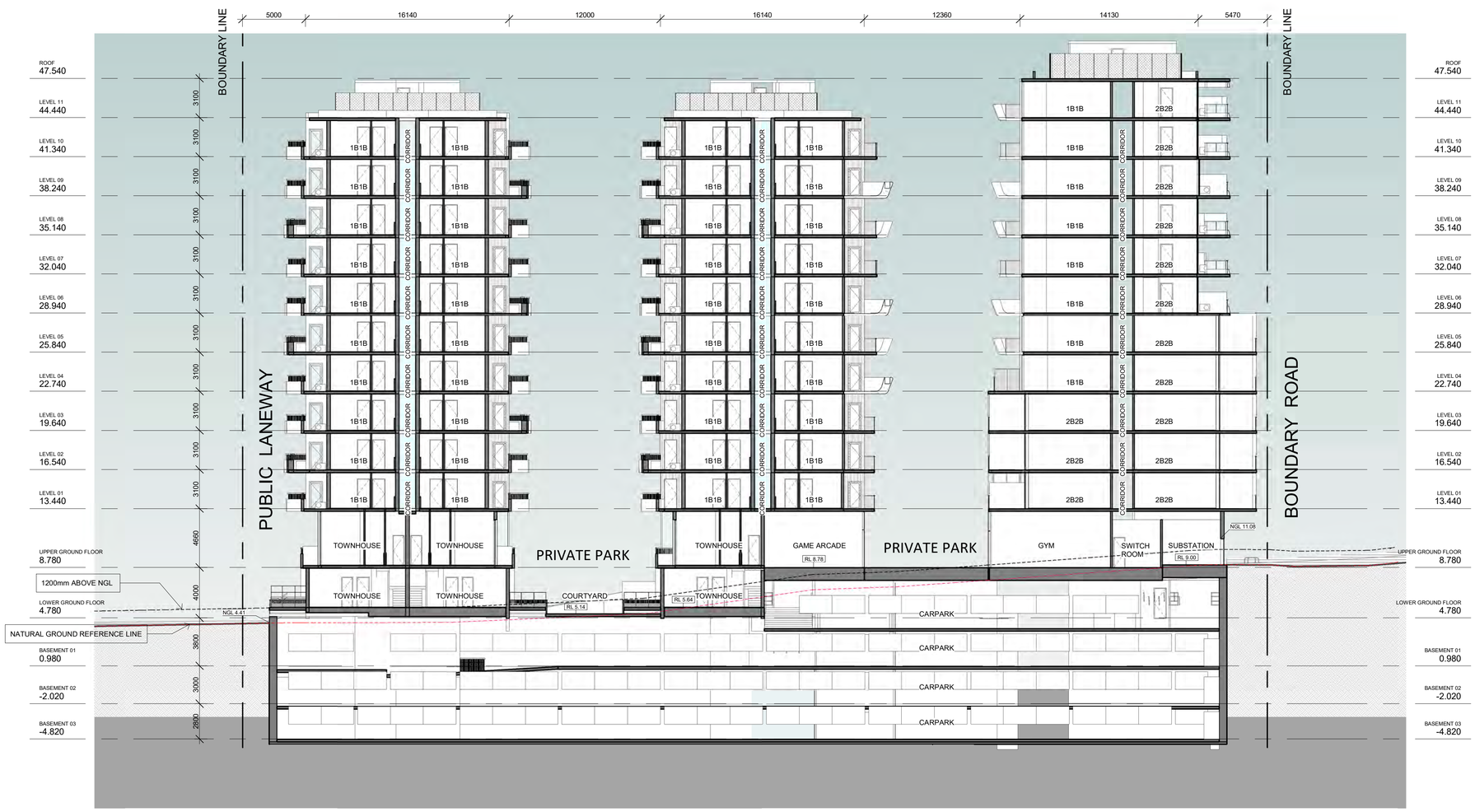
Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

Drawn by:AuthoChecked by:Checker



TOWN PLANNING

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
SECTION G-G

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP4.07

Revision
B

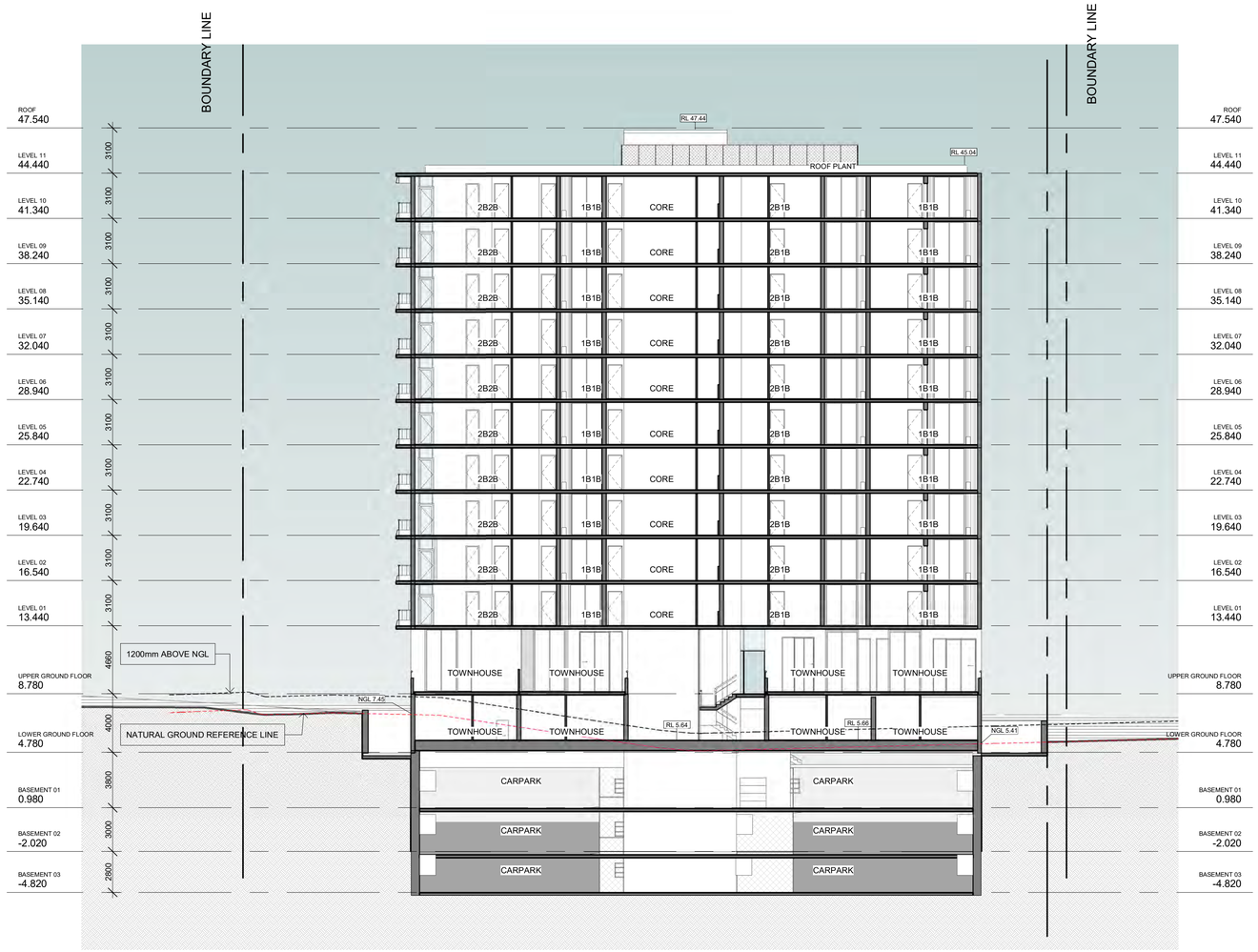
Scale
1 : 200@A1

Date
02/12/2019

18113

Drawn by:AuthoChecked by:Checker

18113 - 2/12/2019 11:20:15 AM



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Client
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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
SECTION H-H

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP4.08

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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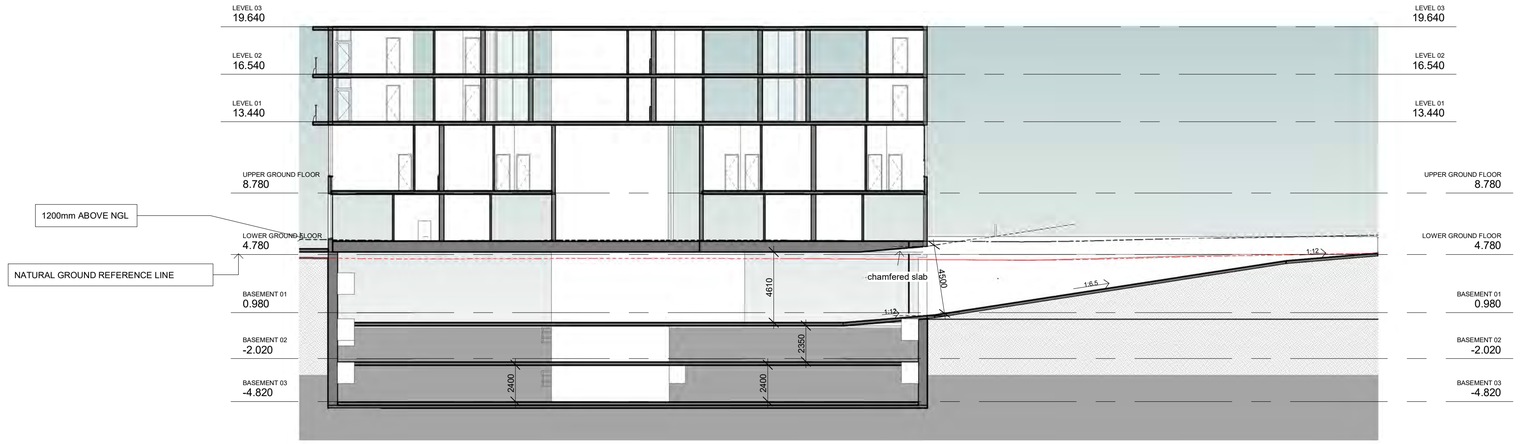

I SECTION I-I
SCALE 1 : 200

TOWN PLANNING

CHT ARCHITECTS

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139 - 149 Boundary Road, North Melbourne

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
SECTION I-I

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No.
TP4.09

Revision
B

Scale
1 : 200@A1

Date
02/12/2019

18113

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18113 - 2/12/2019 11:20:38 AM

ADVERTISED PLAN

Driveway
Ramp
Fence
Iron
Double Storey Carpark
Gate
POTENTIAL DEVELOPMENT OF 155-161 BOUNDARY ROAD
SUBJECT SITE 139-149 BOUNDARY ROAD
BOUNDARY ROAD
A/C
Shed
Private Open Space
Iron Fence
Fence
BAL.
2 BED
NATURAL LIGHT COURT
CORE
1 BED
POTENTIAL DEVELOPMENT OF 50-62 ALFRED STREET & 127-135 BOUNDARY ROAD
Awning
Fence
ALFRED ROAD

No.174 Single Storey Brick Dwelling
No.172 Single Storey Brick Dwelling
Timber
Driveway
Carpark Spaces
Metal Grill Fence
No.164-170 Double Storey Brick Building
Double Storey Brick Building
Fence
Woven Wire Fence
No.146 Vacant Site
Fence
Private Open Space
Iron Fence
No.48 Single Storey WBoard Dwelling

1 LEVEL 02 EDR
SCALE 1 : 200

TOWN PLANNING

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Project
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139 - 149 Boundary Road, North Melbourne

Client
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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
B	02/12/2019	TP Submission

Title
EQUITABLE DEVELOPMENT RIGHTS

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No. TP5.01
Revision B
Scale 1 : 200@A1
Date 02/12/2019

18113

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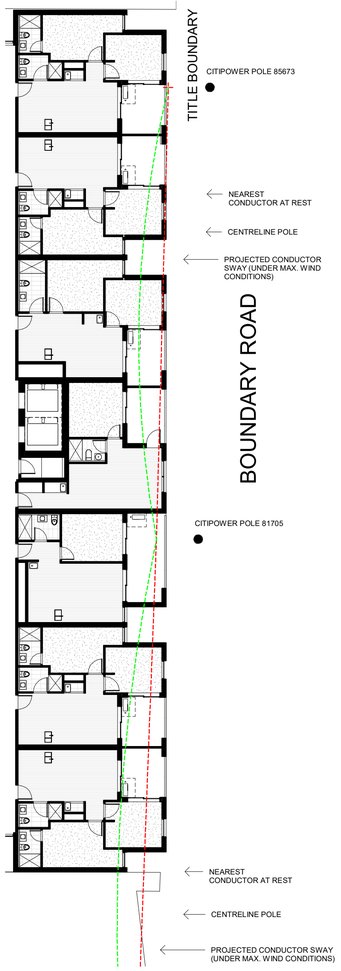
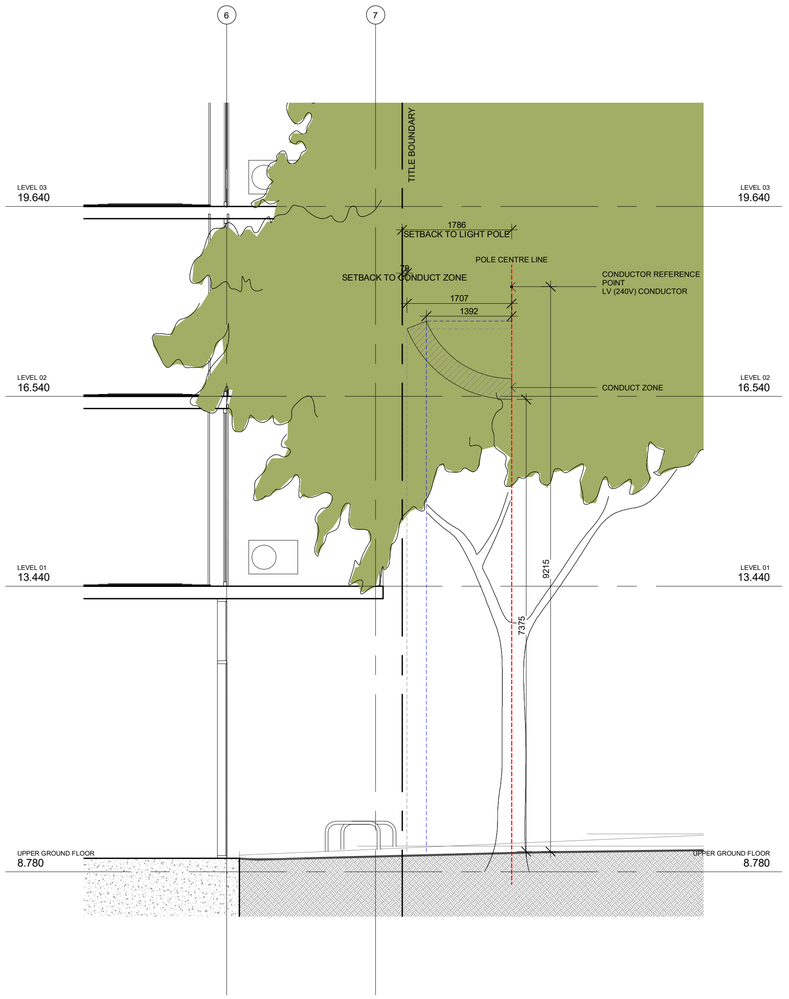
18113--2/12/2019 11:20:53 AM

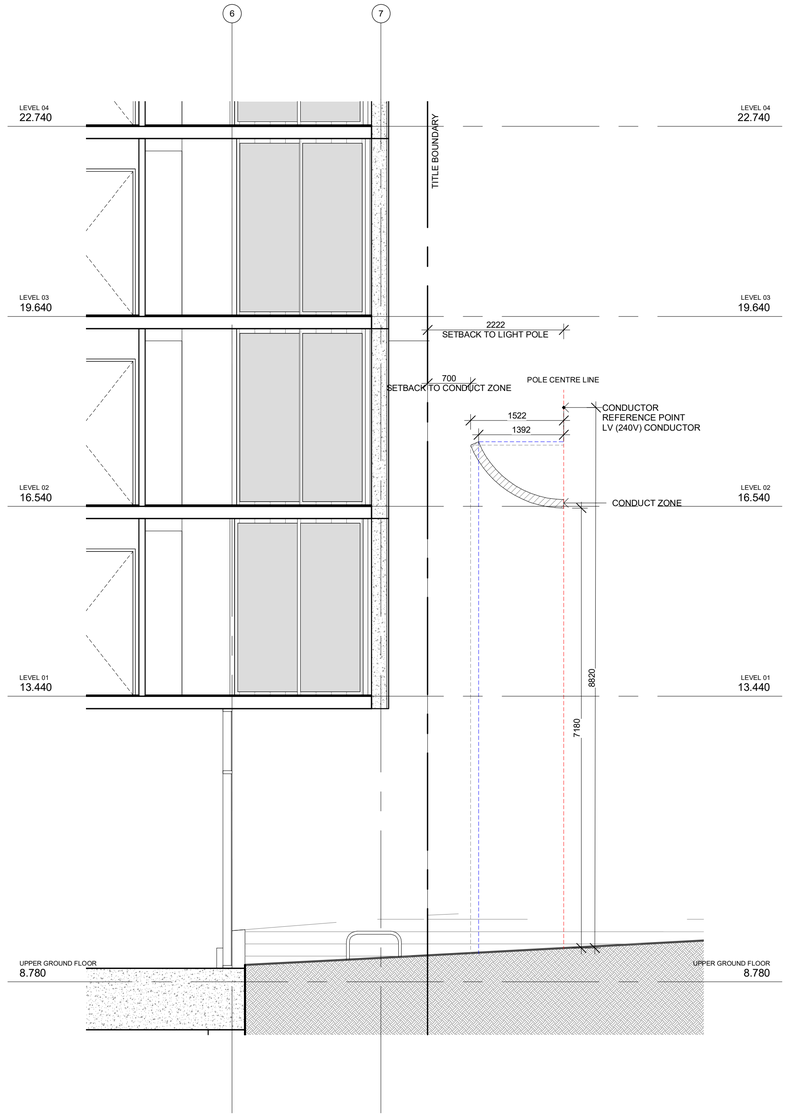
ADVERTISED PLAN



1 PLAN
SCALE 1 : 200



2 SECTION E-E - Callout 1
SCALE 1 : 50



3 SECTION A-A - Callout 1
SCALE 1 : 50

TOWN PLANNING

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Amendments

No.	Date	Notes
A	26/11/2019	TP Submission
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Title
POWERLINE SAG & SWAY

Sheet
PRELIMINARY
NOT FOR CONSTRUCTION

Sheet No. TP7.00
Revision B
Scale As indicated@A1
Date 02/12/2019

18113

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18113--2/12/2019 11:20:59 AM