

GLENWOOD HIGH SCHOOL

CIVIL ENGINEERING FLOOD STUDY REPORT



Prepared for: School Infrastructure NSW
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Executive Summary

enstruct have been engaged by School Infrastructure NSW to provide civil engineering flooding advice for the proposed development at Glenwood High School (hereafter GHS). This report relates to the flooding characteristics relevant to the Main Works Building that is proposed in the northeast portion of the school site and aims to satisfy the requirements of *Section 16: Flooding* of the Secretary's Environmental Assessment Requirements (SEARs) for State Significant Development Application (SSD-23512960) for Glenwood High School Upgrade.

This report identifies flood depths in and around the proposed Main Works Building area during the Probable Maximum Flood (PMF), 1% Annual Exceedance Probability (AEP), 0.5% AEP, and 0.2% AEP storm events, and outlines any flood risks associated with these depths. The flood heights, depths, and risks, have been identified through the preparation and analysis of a TUFLOW stormwater model.

The TUFLOW model indicates that the proposed new building location is not susceptible to flood inundation during the 1% AEP, 0.5% AEP, and 0.2% AEP storm events as the flood water is contained within the road reserve of Glenwood Park Drive and the drainage channel/water course. The new building location is affected by the flood depths caused by the very rare PMF storm event.

The north-eastern portion of the site is designated as a Low Hazard Risk area due to the extents of the PMF flood. Since the development site is in an elevated position in comparison to the flood heights contained in Glenwood Park Drive and the drainage channel during the 1%, 0.5% and 0.2% AEP storm events, no flood waters will be adversely impacted when the new building is constructed. Therefore, the overland flow paths and flood extents remain unaffected by the proposed development. In addition, neighbouring properties, existing assets, and infrastructure will not be impacted post construction of the new building works.

A freeboard of 0.5m above the 1% AEP flood level nearest to the site is required when setting Finished Floor Levels (FFL) and Flood Planning Levels (FPL) for building entrances. The current proposed FFL of the new building is RL60.90m AHD which is sufficiently above the 1% AEP flood height nearest to the building location.

There will be negligible building impacts due to climate change consequences such increased rainfall frequency and intensity. The design has sufficient controls and redundancy to cope with additional water without impact the proposed or existing buildings on the school campus.

This report specifically responds to the following Council comments:

46	The flood report is vague and does not provide critical information carried out for the flood modelling. Provide details of blockages, pipes, total catchment area, boundary conditions, flows, velocities etc.	All pipes are assumed and modelled blocked. All other information is included in report with the Tuflow model sent to Council. Refer section 2.2
47	Allow for a maximum isolated rise in flood level of 0.02 m external to the site in the 1% AEP event as a result of the development.	The 1% AEP flood extents does not inundate the school site. As the proposed development does not interact with the 1% AEP i.e. the school is flood free from the 1% AEP catchment flood flow. Refer Figure 13
48	All buildings in the floodplain (including both existing and proposed) are to be modelled as complete (i.e. 100%) blockages in the flood model. Simply applying Mannings 'n' value as suggested in Table 1 of the report is not accepted.	Flood model has been revised to include existing and proposed buildings as 100% blockages. Refer section 2.1
49	The post-development DEM is to be included to accurately represent any proposed ground level changes (i.e. cut and fill areas) in the post development model. This includes fill for areas such as driveway.	File provided
50	Adopt an impervious area of minimum 80% for the catchment. Amend the DRAINS model and flood report accordingly.	80% impervious has been adopted for DRAINS model
51	The maximum travel times for impervious catchment is 12 minutes and pervious catchment is 14 minutes. Amend the DRAINS model and catchment areas breakdown accordingly.	Travel times have been adopted in the DRAINS model
52	The flood report is to include flood maps for both the existing and post developed scenarios for the various storm events. This report is to include flood maps for the velocity, depths, hazard etc.	Refer Section 4.9 showing the flood hazard maps
53	Provide a flood difference map (developed - existing) for the 1% AEP. Include a 0 to 20 mm category with gradations below or above this figure.	As the proposed development does not interact with the 1% AEP i.e. the school is flood free from the 1% AEP catchment flood flow.
54	Ensure the inflow hydrograph in HECRAS matches the DRAINS model.	No HECRAS modelling is required to be undertaken
55	Provide a Flood Management Plan to address emergency flood management of the site include the use of appropriate warning signs, notices of procedures and depth gauges (if required).	Refer to Flood evacuation plan now produced
56	Provide the DRAINS hydrology and amended TUFLOW model electronically to Council.	TUFLOW and DRAINS Models provided for review

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1 Introduction

This Flood Study Report accompanies an Environmental Impact Statement (EIS) pursuant to Part 4 of the Environmental Planning and Assessment Act 1979 (EP&A Act) in support of a State Significant Development Application (SSD - 23512960).

The development is for upgrading works comprising alterations and additions to Glenwood High School at 85 Forman Avenue, Glenwood. The site is legally described as Lot 5227 DP 868693.

The site is roughly rectangular in shape, with a total area of 60,790m² and street frontages to Forman Avenue to the south and Glenwood Drive to the east. Glenwood Reserve adjoins the northern and western boundaries of the school.

This report addresses the relevant Secretary's Environmental Assessment Requirements (SEARs), specifically:

16. Flooding

- Identify any flood risk on site in consultation with Council and having regard to the most recent flood studies for the development area and the potential effects of climate change, sea level rise and an increase in rainfall intensity (**Section 4**).
- Assess the impacts of the development, including any changes to flood risk onsite or off-site, and detail design solutions to mitigate flood risk where required (**Section 4**).
- Address Clause 5.21 of the Blacktown Local Environmental Plan 2015 (**throughout report**)
- Refer to relevant Policies and Guidelines: NSW Floodplain Development Manual (DIPNR, 2005).

This report also addresses the flooding requirements set out by Blacktown City Council and the Environment, Energy and Science Group (EES) within the NSW Department of Planning, Industry and Environment. Their submission to the SEARs flooding requirements can be referred to in **Appendix B** and **Appendix C**, respectively.

1.1 The Proposal

The proposed development seeks to upgrade Glenwood High School. The upgrade consists of the following alterations and additions:

- Construction of a new three-storey building at the north-eastern portion of the site facing Glenwood Park Drive which will accommodate new learning spaces;
- Construction of one storey performance pavilion;
- Refurbishment of existing Building Block A (ground floor only) to provide one new support unit within the space of an existing general learning space;

- Refurbishment of Building Block D (ground floor only) to provide an additional office space and storeroom;
- Refurbishment of Building Block E to re-purpose it on the ground floor for computer learning spaces, staff and administration spaces as well as upgrades to the library on the first floor;
- Refurbishment of Building Block J to re-purpose it from visual arts and performing arts to learning spaces and workshops for food tech and woods/metal unit;
- Demolition of existing botany room and construction of a new single storey pavilion comprising of interview rooms and end-of trip facilities; and
- The proposed development will also involve ancillary works at the site associated with the proposed upgrades.



Figure 1: New Building Ground Floor Plan (Source: PTW Architects)



Figure 2: New Building East Elevation (Source: PTW Architects)

1.2 The Site

Glenwood High School is located at 85 Forman Avenue, Glenwood. An existing childcare centre is also located within the site. The site is located within the Blacktown City Council (BCC) Local Government Area (LGA) in the suburb of Glenwood. The school campus is situated within a well-established residential area approximately 4.7 km northeast of Blacktown Train Station.

The site is bound by residential development and Forman Street to the south, Glenwood Reserve to the north and west with residential development beyond, and Glenwood Park Road to the east, with a drainage channel/water course and residential development beyond. Refer to **Figure 3** and **Figure 4** below for the location of the school and surrounding neighbourhood.

Glenwood High School is located approximately 520m south of Parklea Public School, 1.5km to the southwest of Bella Vista Public School, and 3.5km to the east of Quakers Hill High School.

The built form and land use character surrounding the site is predominantly low scale, 1-2 storey dwelling houses. The site has a total area of 60,790m². The site is legally described as Lot 5227 in Deposited Plan 868693.



Figure 3: Local Context Map (Source: Metromaps 2021 with Architectus overlay)



Figure 4: Site Context Map (Source: Metromaps 2021 with Architectus overlay)

2 Existing Site

Glenwood High School is currently a co-educational high school and includes the following existing buildings and facilities:

- Ten (10) existing buildings comprising:
 - Building A and B: double storey classroom building;
 - Building C: double storey classroom building with a fitness laboratory on the ground floor;
 - Building D: double storey building with administration and staff facilities on the ground floor and classrooms on the first floor;
 - Building E: double storey building with classrooms and science laboratories on the ground floor and main library on the first floor;
 - Building F: staff building;
 - Building G, H and J: single storey classroom buildings (Block J contains school canteen); Building K: single storey gymnasium; and
- There is an existing single storey childcare centre (known as Building L) at the southwestern corner of the site;
- Nineteen (19) single-storey demountable buildings, seventeen (17) of which comprise general learning spaces and two (2) which comprise of staff rooms;
- At-grade carpark providing for 93 car parking spaces accessed from two separate vehicular access points on Forman Avenue for high school staff;
- Three (3) support learning units.
- Existing on site bicycle parking racks are provided in the southeast corner of the school near the staff parking facility;
- Outdoor spaces comprising:
 - Quadrangle space between Buildings C, B and E;
 - Playing Field at the north-western corner of the site;
 - Games Court to the east of the playing field;
 - Covered outdoor space adjacent to the canteen, and
 - Grassed open play area in the centre of the site.

- There are three (3) pedestrian access points to the school, including:
 - One access point from Glenwood Park Drive; and
 - Two access points from Forman Avenue.
- The primary drop-off and pick-up area is located at Forman Avenue.

2.1 Site Topography

The existing school site generally grades from the southwest from approximately RL69.00m AHD, to the northeast at RL59.00m AHD. The site is elevated above Glenwood Park Drive which bounds the site to the east and the road is lower than the school ground level along the entire eastern site boundary. Similarly, Foreman Avenue along the southern site frontage is below the ground level within the school site at all locations. Refer **Appendix A** for the site survey. The development location of the proposed Main Works Building on the site also grades from the southwest to the northeast corner of the school site. Therefore, the fall and height of the land in the location of the proposed building, and the school site in general, does not facilitate overland flow of stormwater. The site grades all runoff towards the road frontages of the site and collects any minor overland flow in existing in-ground drainage in paved areas and around buildings.

Existing buildings within the catchment have been modelled as blockages.

2.2 Existing Stormwater

Existing in-ground stormwater throughout the school consists of stormwater pits and pipes collecting downpipes from the existing buildings, with water on surface areas and minor stormwater overland flow collected in pits. Council's stormwater infrastructure is located in Glenwood Park Drive and Forman Avenue. Refer to **Figure 6** for existing Council drainage infrastructure. In addition, there are five culverts allowing stormwater to flow within the drainage channel/water course beneath Glenwood Park Drive. This water course flows towards the north and into Glenwood Lake. Refer to **Figure 5** for Sydney Water culvert layout under Glenwood Park Drive.

The school site does not have any existing onsite stormwater attenuation or pollutant removal systems.

The TUFLOW model assumes the existing in-ground pit and pipe system is blocked.

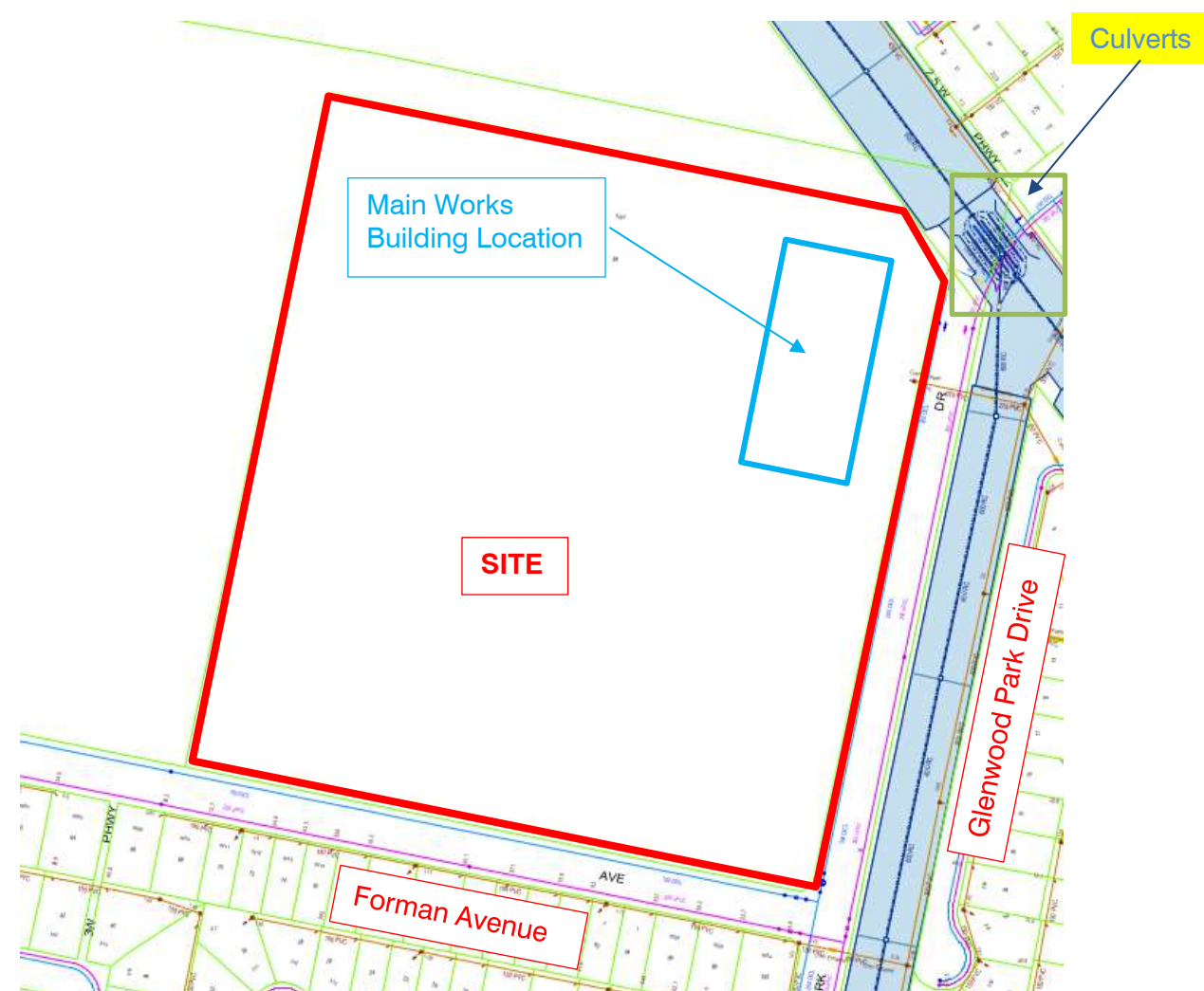


Figure 5: Existing Stormwater Infrastructure (Source: Sydney Water)

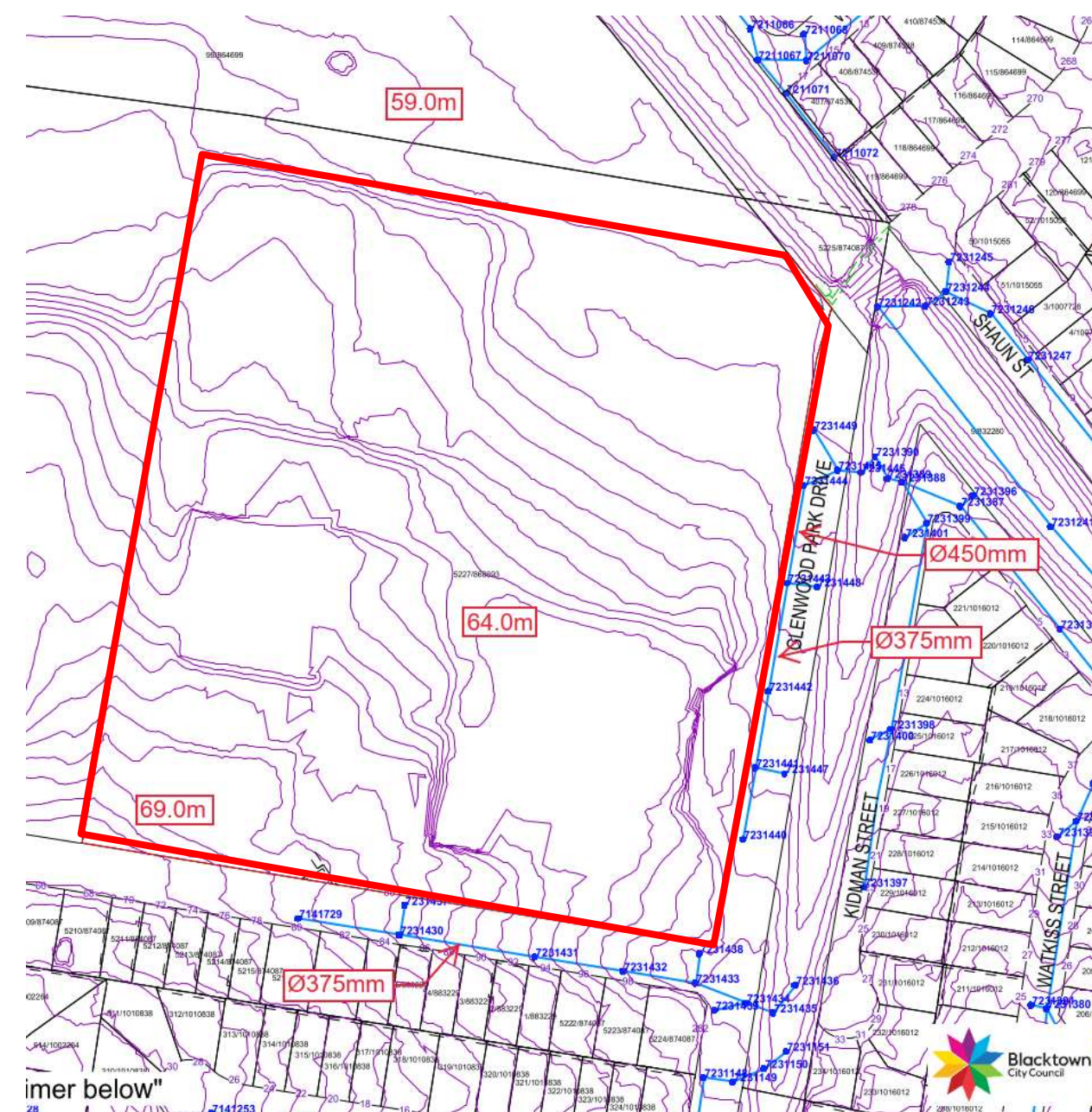


Figure 6: Existing Stormwater Infrastructure (Source: BCC Correspondence as provided in Appendix B)

3 Flooding

As per the BCC Engineering Guide for Development 2005 and Section 10.7 Planning Certificate for the site issued by Council, the site is not identified as flood prone, as shown in **Figure 7** and is identified as being in the Low Flood Risk Precinct of the Caddies Creek floodplain.

A few hundred metres north of the school site is Glenwood Lake. Glenwood Lake acts as a detention basin that holds water and discharges flows to Caddies Creek. Caddies Creek is a tributary of Cattai Creek. The watercourse adjacent the school site is a tributary of Caddies Creek and is a Class 1 stream order as classified by the NSW Department of Planning, Industry and Environment publication: *Determining stream order Fact sheet*. Refer to **Figure 8** for the location of Glenwood Lake with respect to the school campus.

Flood management of the site is to be in accordance with the NSW Floodplain Development Manual (DIPNR, 2005).



4 Hydraulic Modelling

To confirm the development site’s susceptibility to flooding and assess the potential for flooding impacts affecting the site, a TUFLOW flood model was developed by enstruct using publicly available Digital Terrain Models (DTMs) from LIDAR survey data for the catchment area surrounding the site. The DTM represents the bare ground surface without any elevated objects, such as trees, cars, and items of a similar nature.

4.1 TUFLOW Model Setup

DTM surface levels and terrain data was retrieved from the ICSM Elvis Elevation and Depth – Foundation Spatial Data website for the area surrounding the site, ensuring the upstream stormwater catchment area that would drain towards the school site was included. The DEMs were provided in grid sizes of 2m. This contour data was then imported into QGIS, an open source Geographic Information System, whereby an accurate catchment plan could be produced for site. Refer to **Figure 10** for the development catchment extent.

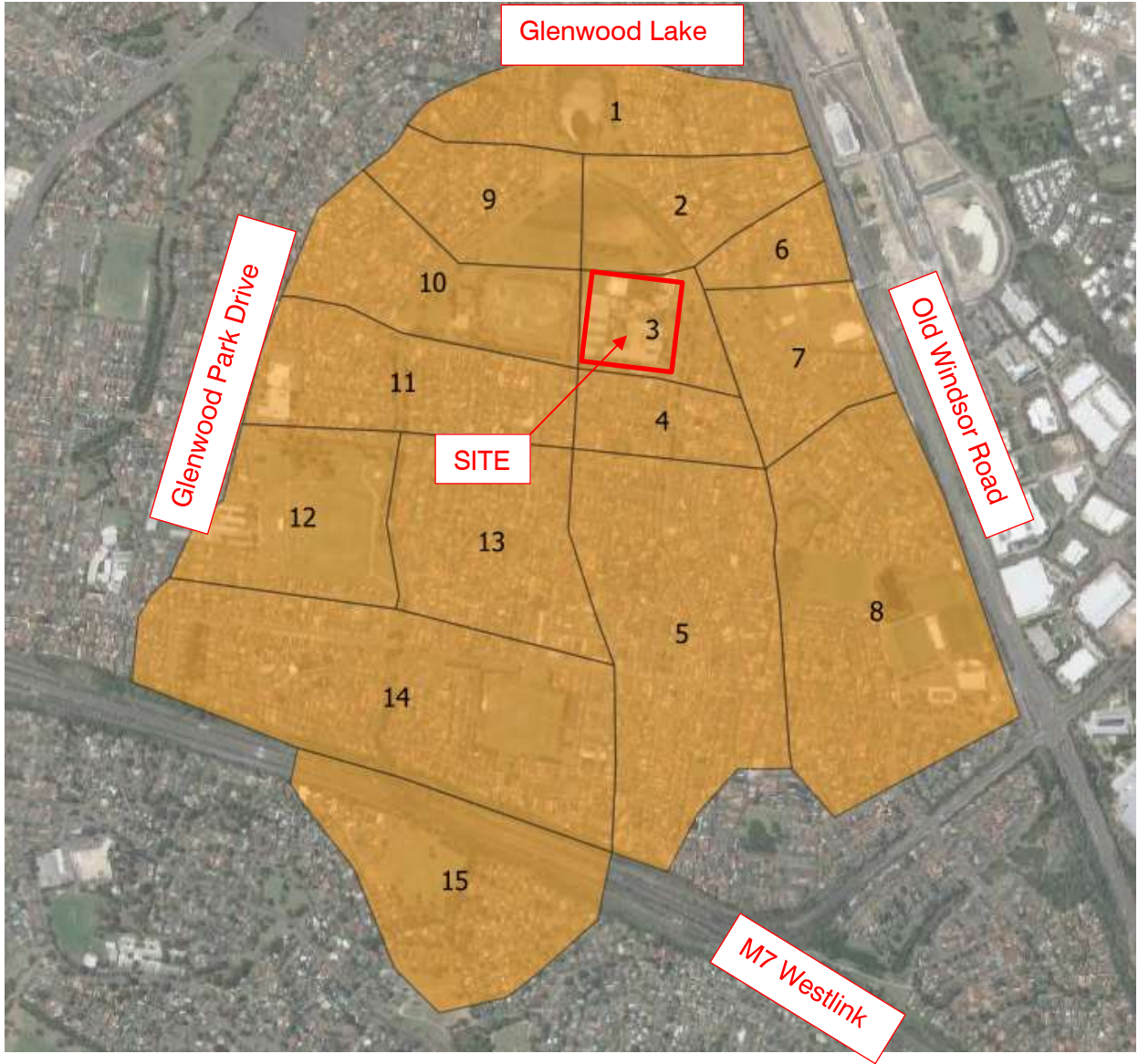


Figure 10: Stormwater catchment plan surrounding school site

4.2 Model Extent

The TUFLOW Model boundary is shown in **Figure 10**. The catchment area extends to Old Windsor Road in the east, the M7 Westlink to the south, Glenwood Park Drive in the west, and Glenwood Lake to the north. The model is comprised of a 2D domain of the study area ground surface reflecting the catchment topography, with varying roughness as dictated by land use.

4.3 Model Topography

The model topography is based on a 2m DTM derived from LiDAR data. The model has a 2m regular grid which is considered adequate to represent flood behaviour for this flood assessment as the channels in the vicinity of the site are 20m and 30m wide. These are well defined by a 2m grid. As the LiDAR data has a 2m resolution, so there is no benefit in preparing a flood model with a grid finer than 2m, as required by Chapter 15 of the BCC WSUD Developer Handbook.

4.4 Surface Hydraulic Roughness

Manning’s ‘n’ values were applied to represent the roughness of the various land uses in the model domain. The aerial photographs were used to define spatial extent and type of land use in the study area. Adopted Manning’s n values in the TUFLOW model are summarised in **Table 1**. Buildings within the floodplain have been modelled as full obstructions. A Manning’s ‘n’ of 0.05 has been applied to residential lots to capture various flow obstructions such as fences, garden beds and the like, as required by Chapter 15 of the BCC WSUD Developer Handbook.

Table 1: Materials in catchment area

Material Number	Manning’s Value ‘n’	Surface Type
1	0.100	Heavy Vegetation
2	0.070	Medium Vegetation
3	0.050	Residential
4	0.025	Roadways
5	0.025	Pavement
6	0.04	Light Vegetation
7	0.070	Waterway/Channels
8	0.050	Residential High Density

4.5 Boundary Conditions

Boundary conditions were set for locations of inflow to the catchment area alongside defining flows through the outlet structure from Glenwood Lake and the culverts located under Old Windsor Road. The flow calculation for the outlet structure from Glenwood Lake is shown in **Appendix D**. A site inspection undertaken by enstruct allowed an accurate flow profile to be developed for the basin outlet structure (**Figure 11 & 12**). One low flow outlet structure was noted, with two chambers being 1.5m x 1.5m with a total of 4.5m² inlet area. The low flow structure connects to the downstream chamber with two 1.5m wide x 0.9m high box culverts. One high flow inlet structure with two chambers of 3m x 3m with a total inlet area of 9m². This structure connects to the downstream open channel with two 3m wide x 1.2m high box culverts (**Figure 12**).

There are five culverts below old Windsor Road, measuring at least 3m wide and 0.9m in height. Two 600mm diameter pipes are in the ground with one 600mm diameter pipe downstream of the bridge.



Figure 11: Looking upstream in the high flow culvert outlet, with low flow culvert seen beyond.

4.6 Existing Stormwater

The in-ground drainage system (Council and Sydney Water) adjacent to the site was assumed to be blocked during the flood modelling in accordance with Chapter 15 of the BCC WSUD Developer Handbook.



Figure 12: Photo downstream of Glenwood Lake showing two 3.0m wide x 1.2m high box culverts from outlet structure, discharging into an open culvert (adjacent Parklea Public School)

4.7 Hydrological Modelling

A DRAINS model was set up to prepare the rainfall data specific to the site for the 1% AEP, 0.5% AEP, 0.2% AEP and Probable Maximum Flood (PMF) storm events. Design rainfall data for the catchment during the 1%, 0.5% and 0.2% AEP storm events was sourced from the Australia Rainfall and Runoff (ARR) 2016 Data Hub online.

The Probable Maximum Precipitation (PMP) rainfall profile for the site was estimated using the Commonwealth Bureau of Meteorology Estimation of Probable Maximum Precipitation in Australia: Generalised Short-Duration Method (GSDM). This allowed analysis of the PMF storm event to assess the sensitivity of the site to an increase in rainfall intensity and flood producing rainfall events due to climate change. This addresses the scope of works required in the *SEARS Advice SSD-23512960*. PMP rainfall calculations for the site can be seen in **Appendix E**.

4.7.1 Hydrological Model Parameters

An initial and continuing loss model was utilised in the DRAINS model to represent rainfall losses during storm events such as depression storage and soil infiltration. Initial and continuing loss values are consistent with losses adopted when using ARR 1987. While ARR 2016 has proposed revised default losses, these are subject to uncertainty. Retaining the 1987 values provides appropriately conservative estimates for flood levels for design purposes. The following loss values were adopted:

1% AEP storm event:

- Pervious areas: initial loss 17.4mm, continuing loss 1mm/hr
- Impervious areas: initial loss 1.5mm, continuing loss 0mm/hr.

0.5% AEP storm event:

- Pervious areas: initial loss 17.4mm, continuing loss 1mm/hr
- Impervious areas: initial loss 1.5mm, continuing loss 0mm/hr.

0.2% storm event:

- Pervious areas: initial loss 17.4mm, continuing loss 1mm/hr
- Impervious areas: initial loss 1.5mm, continuing loss 0mm/hr.

PMF storm event:

- Pervious areas: initial loss mm, continuing loss mm/hr
- Impervious areas: initial loss mm, continuing loss mm/hr.

4.7.2 Design Flood Events

For the 1%, 0.5% and 0.2% AEP storm events, storm durations of 5, 10, 15, 20, 25, 20, 45, 60, 90, 120, 180, 270, 360, and 540 minutes were run. The PMF event was analysed at storm durations of 15, 30, 45, 60, 90, 120, 150, 180, 240, 300, and 360 minutes. Each duration was modelled with 10 temporal patterns and the median value for the inflow hydrograph for the 1%, 0.5%, and 0.2% AEP storm events was selected. The results were exported for use in the TUFLOW model. For the PMF event, the hydrological model was run with the temporal pattern outlined in the GSDM.

4.8 TUFLOW Model Flood Depths and Levels Results

The TUFLOW model indicates that the new building location in the northeast corner of the school site is unaffected by flood water in the 1% AEP, 0.5% AEP, and 0.2% AEP storm events as per **Figures 13, 14 & 15**. During each of these storm events, the stormwater is contained within the roadway of Glenwood Park Drive and the grassed drainage channel/water course (Refer to **Figure 4** for the drainage channel location) to the northeast of the site, with the maximum flood height of RL 58.80m AHD, RL59.00m AHD, and RL59.20m AHD being the closest proximity to the site in each respective storm event whilst still being contained within the road reserve or within the drainage channel.



Figure 13: 1% AEP Storm Event Flood Levels



Figure 14: 0.5% AEP Storm Event Flood Levels



Figure 15: 0.2% AEP Storm Event Flood Levels

The PMF storm event is defined as ‘the greatest depth of precipitation for a given duration meteorologically possible for a given size storm area at a particular location at a particular time of year’ by the World Meteorological Organisation. The risk of it happening in any 1 year is extremely rare and is considered to be between a 1 in 10,000 to 1 in 10,000,000 chance. The TUFLOW model indicates that the new building location is susceptible to PMF flood heights of up to RL 60.30m AHD (Figure 16).



Figure 16: PMF Flood Levels

4.9 TUFLOW Model Hazard Results

The Flood Risk Precincts at the site have been analysed in accordance with BCC and ARR 2019 classifications. As shown in **Figure 17**, the northeast portion of the site where the Main Works Building is proposed is within in a Low Risk precinct due to the extent of flood water in a PMF storm event (PMF extent as shown in **Figure 16**). There are High Risk areas in Glenwood Park Drive as well as within the drainage channel which corresponds to the high hazard caused in the 1% AEP storm event, but no high risk hazard areas exist within the school campus.

Medium High Risk zones are also present in Glenwood Park Drive and the drainage channel which represent the non-high hazard areas during the 1% AEP storm event. As the maximum flood depth traversing the site is 0.5m during the PMF storm event, this corresponds to a H2 level site in accordance with Figure 6.7.9 Combined Flood Hazard Curves in the Australian Rainfall and Runoff (2019) A Guide to Flood Estimation. No areas of higher hazard risk are located within the school campus.



Figure 17: Hazard Map

4.10 Proposed development implications

4.10.1 Flood Planning Levels and Finished Floor levels

Since the new proposed building location is not susceptible to flooding in the 1%, 0.5%, and 0.2% AEP storm events, there is no impact on the proposed building design. BCC requires a freeboard for Finished Floor Levels (FFL) of 500mm above the 1% AEP flood level in the trunk drainage area (Blacktown City Council Engineering Guide for Development 2005). It is therefore recommended that the FFL for the new classroom building is a minimum of RL58.80m AHD to maximise safety against flooding. This is 500mm above the 1% AEP flood height in Glenwood Park Drive of RL58.80m AHD. The current proposed FFL of the new building at RL60.90m AHD is sufficiently above the 1% AEP flood depth in the nearby roadway and drainage channel as well as the flood height in the PMF event. This meets the minimum freeboard requirement.

4.10.2 Impact on Neighbouring Properties

It is evident from the TUFLOW model that the proposed new building development will not cause detrimental increases in the potential flood affectation of other neighbouring properties, assets, and infrastructure, as the floodwater remains contained within the roadway and drainage channel. Since the location of the proposed building is not within an overland flow path or flooding extents during the 1%, 0.5%, and 0.2% AEP events, no flood waters will be adversely diverted when the new building is constructed. Likewise, no increase in flow velocity will be caused as the stormwater flow is not being diverted, compensating a downstream system. Therefore, the overland flow paths and flood extents remain unaffected by the proposed development, and hazard category does not increase.

4.10.3 Erosion, Siltation, and Destruction of Riparian Zones

As the stormwater flow paths in the 1%, 0.5% and 0.2% AEP storm events are not obstructed or altered by the proposed development, by an increase in stormwater volume or velocity causing erosion or siltation within a flow path is not anticipated to occur.

The stormwater runoff pollutant profile may change slightly due to the change from impervious grassed land to pervious building roof post development. This alteration will be very minimal as the proposed building structure largely matches the extent of the existing demountable buildings on the site. Water filtration devices and methods are also to be incorporated into the civil design for the new building to manage any increase in stormwater pollution. The water balance including water quantity and quality of Glenwood Lake will therefore not be impacted by the development. Refer to the **Civil Engineering** report for WSUD and stormwater pollutant removal and treatment proposed.

4.11 Climate Change

As shown in the TUFLOW model results, the flood levels during a 1%, 0.5%, and 0.2% AEP storm event are located outside the school site boundaries and are contained within the roadway of Glenwood Park Drive and the drainage channel/water course. As these major storm events are only expected to occur once in every 100, 200 and 500 years and are an approximation of the future 1% AEP storm events due to climate change, it is suggested that the site is at minimal flood risk due to climate change. The school campus is in an elevated position in relation to the flood heights in major storm events. With the proposed building FFL of RL60.90m AHD is also 0.6m above the very rare PMF storm event flood levels (RL60.30m AHD). Therefore, the effects of climate change on the proposed development design has been taken into consideration and it is believed that the Main Works Building will remain above flood heights even with an increase in flood depths due to climate change by having FFLs significantly above the anticipated flood heights for future 1% AEP storm events.

4.12 Refuge

In case of an unprecedented flood emergency or occurrence of a PMF flood event, personnel on the site are to seek refuge within the site and shelter-in place at a level above the PMF flood height (Section 15.3.1 of the BCC WSUD Developer Handbook). As the Glenwood Park Drive road reserve contains flood water up to 1m in depth in the 1%, 0.5%, and 0.2% AEP storm events, leaving the site and access to Glenwood Park Drive bridge of the drainage channel will be unsafe and as such, remaining in the building above the flood levels is the desired option of refuge in this event. Alternatively, leaving the school site on roads away from the bridge is possible as roads to the south are still flood free.

As required by the SEARs, consultation with the NSW State Emergency Service (SES) has been made. Correspondence with the SES is provided in **Appendix F**.

5 Conclusion

The TUFLOW model indicates that the new building location in the northeast corner of the school site is unaffected by flood water in the 1% AEP, 0.5% AEP, and 0.2% AEP storm events. The new building location is susceptible to PMF flood heights of up to RL 60.30m AHD.

The site is nominated as a Low Risk area in its north-eastern portion, and H2 hazard level in accordance with Figure 6.7.9 Combined Flood Hazard Curves in the Australian Rainfall and Runoff (2019) A Guide to Flood Estimation.

Since the location of the proposed building is not within an overland flow path or flooding extents during the 1%, 0.5%, and 0.2% AEP events, no flood waters will be adversely diverted when the new building is constructed. Likewise, no increase in flow velocity will be caused as the stormwater flow is not being diverted, compensating a downstream system.

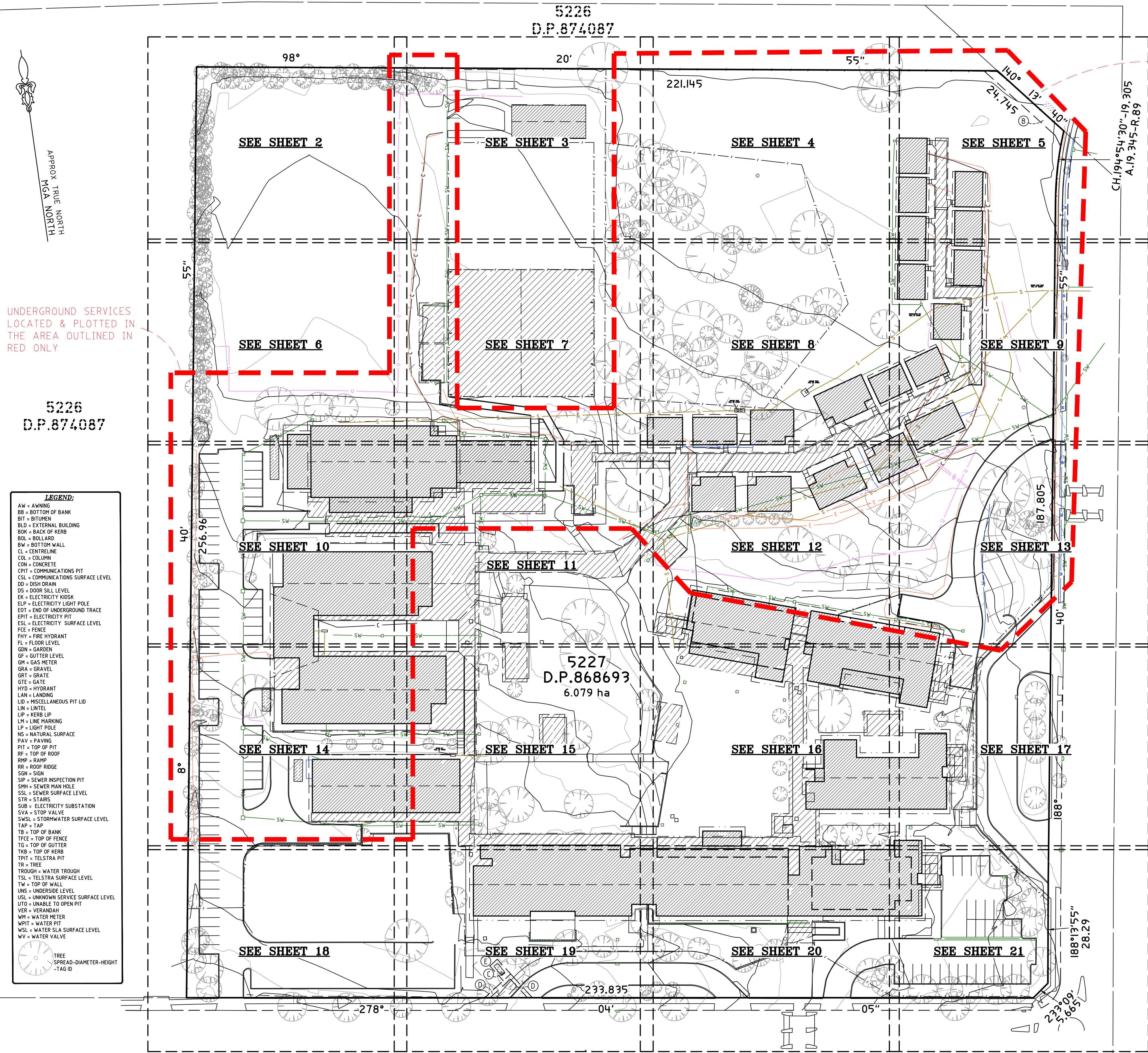
The current proposed FFL of the new building at RL60.90m AHD is sufficiently above the 1% AEP flood depth in the nearby roadway and drainage channel as well as the flood height in the PMF event. This meets the minimum freeboard requirement.

The school site is in an elevated position in relation to the flood heights in major storm events. The proposed FFL of RL60.90m AHD is also 0.6m above the very rare PMF storm event flood levels (RL60.30m AHD). It is believed that the Main Works Building will remain above flood heights even with an increase in flood depths due to climate change.

A shelter-in-place refuge approach is recommended for the site in a rare/large storm events where departure from the site onto Glenwood Park Drive can be unsafe, especially towards to the watercourse/bridge. Departure away from the watercourse, Glenmore Park Drive, may still be possible, noting that the risk of flash flooding and overland flow still exists, but with limited depth of water.

APPENDIX A

SITE SURVEY



UNDERGROUND SERVICES
LOCATED & PLOTTED IN
RED ONLY

UNDERGROUND SERVICES LOCATED &
PLOTTED IN THE AREA OUTLINED IN
RED ONLY

- LEGEND:**
- AW = AWWING
 - BB = BOTTOM OF BANK
 - BIT = BITUMEN
 - BLD = EXTERNAL BUILDING
 - BOX = BACK OF KERB
 - BOL = BOLLARD
 - BW = BOTTOM WALL
 - CL = CENTRELINE
 - COL = COLUMN
 - COW = CONCRETE
 - CPIT = COMMUNICATIONS PIT
 - CSL = COMMUNICATIONS SURFACE LEVEL
 - DD = DISH DRAIN
 - DS = DOOR SILL LEVEL
 - EK = ELECTRICITY KIOSK
 - ELP = ELECTRICITY LIGHT POLE
 - EOT = END OF UNDERGROUND TRACE
 - EPIT = ELECTRICITY PIT
 - ESL = ELECTRICITY SURFACE LEVEL
 - FCE = FENCE
 - FHY = FIRE HYDRANT
 - FL = FLOOR LEVEL
 - GDN = GARDEN
 - GF = GUTTER LEVEL
 - GM = GAS METER
 - GRA = GRAVEL
 - GRT = GRATE
 - GTE = GATE
 - HYD = HYDRANT
 - LAN = LANDING
 - LD = MISCELLANEOUS PIT LID
 - LIN = LINTEL
 - LP = KERB LP
 - LP = LINE MARKING
 - LP = LIGHT POLE
 - NS = NATURAL SURFACE
 - PAV = PAVING
 - PIT = TOP OF PIT
 - RF = TOP OF ROOF
 - RHP = RAMP
 - RR = ROOF RIDGE
 - SGN = SIGN
 - SP = SEWER INSPECTION PIT
 - SMH = SEWER MAN HOLE
 - SSL = SEWER SURFACE LEVEL
 - STR = STAIRS
 - SUB = ELECTRICITY SUBSTATION
 - SVA = STOP VALVE
 - SWSL = STORMWATER SURFACE LEVEL
 - TAP = TAP
 - TB = TOP OF BANK
 - TFCE = TOP OF FENCE
 - TG = TOP OF GUTTER
 - TKB = TOP OF KERB
 - TPIT = TELSTRA PIT
 - TR = TREE
 - TROUGH = WATER TROUGH
 - TSL = TELSTRA SURFACE LEVEL
 - TW = TOP OF WALL
 - UNS = UNDERSIDE LEVEL
 - USL = UNKNOWN SERVICE SURFACE LEVEL
 - UTO = UNABLE TO OPEN PIT
 - VER = VERANDAH
 - WM = WATER METER
 - WPIT = WATER PIT
 - WSL = WATER SLA SURFACE LEVEL
 - WV = WATER VALVE
 - TREE
SPREAD-DIAMETER-HEIGHT
-TAG ID

TITLE INDICATES THAT LOT 5227 IN D.P.868693 IS SUBJECT TO:

- 315922 RIGHT OF WAY APPURTENANT TO THE PART(S) SHOWN SO BENEFITED IN THE TITLE DIAGRAM
- DP862902 RESTRICTION(S) ON THE USE OF LAND (NOT INVESTIGATED)
- DP868693 EASEMENT TO DRAIN WATER 2.5 WIDE AND VARIABLE AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM
- DP108312 EASEMENT FOR PADMOUNT SUBSTATION 2.75 METRE(S) WIDE AFFECTING THE PART(S) SHOWN SO BURDENED IN DP108312
- DP108312 EASEMENT FOR UNDERGROUND CABLES 1 METRE(S) WIDE AFFECTING THE PART(S) SHOWN SO BURDENED IN DP108312
- DP108312 RESTRICTION(S) ON THE USE OF LAND

- LEGEND: (SEE NOTES 1)**
- C = COMMUNICATIONS LINES (UNDERGROUND)
 - E = ELECTRICITY LINE (UNDERGROUND)
 - S = SEWER LINE (UNDERGROUND)
 - SW = STORMWATER LINE (UNDERGROUND)
 - T = TELSTRA LINES (UNDERGROUND)
 - U = UNKNOWN SERVICE (UNDERGROUND)
 - W = WATER LINE (UNDERGROUND)

NOTES 1

- THE PURPOSE OF THIS PLAN IS FOR DESIGN ONLY. CURRENT PLANS ISSUED BY SERVICE PROVIDERS THROUGH "DIAL BEFORE YOU DIG" ARE STILL REQUIRED. CONTRACTORS AND SUBCONTRACTORS WILL NEED TO EXERCISE THEIR OWN "DUTY OF CARE" AND SHOULD MAKE THEIR OWN DIAL BEFORE YOU DIG ENQUIRY BEFORE EXCAVATION/CONSTRUCTION. YOU MUST ENSURE "DIAL BEFORE YOU DIG" ARE CURRENT AS THEY HAVE VARYING EXPIRATION DATES, AND MAY REQUIRE RE-ISSUE OTHERWISE THE INFORMATION ON THIS PLAN MAY NO LONGER BE CURRENT.
- WARNING: UNKNOWN SERVICES MAY EXIST THAT COULD NOT BE ELECTRONICALLY DETECTED. THE DIAGRAMS OF THE SERVICE PROVIDER MAY NOT DEPICT ALL ASSETS WITHIN THEIR NETWORK AND SERVICE PROVIDERS MAY SHARE CONDUITS AND/OR TRENCHES AT THIS LOCATION.
- WARNING: SINGLE MARKED LINES MAY REPRESENT MULTIPLE CONDUITS, PIPES AND/OR CABLES AT THIS LOCATION. THE RECORDING OF DEPTHS AND POSITION OF UTILITIES CANNOT BE GUARANTEED AS CORRECT. WE RECOMMEND NON DESTRUCTIVE DIGGING/POTHOLING TO EXPOSE SERVICES FOR ACCURATE IDENTIFICATION AND DEPTH.

CAUTION: DURKIN HAVE SURVEYED AND MARKED OUT EXISTING SERVICES IN THE AREA SPECIFIED BY THE CLIENT. THESE SERVICE LINES HAVE BEEN LOCATED BY ABOVE GROUND SERVICE TRACING METHODS AND HAVE NOT BEEN SIGHTED. CMS SURVEYORS HAVE THEN LOCATED THE LINE MARKED BY DURKIN. THE LOCATION OF THESE MARKED SERVICES ARE APPROXIMATE ONLY. THE POSITION OF THE MARKED SERVICE LINES HAS BEEN MADE WITH REFERENCE TO THE RELEVANT SERVICE AUTHORITY DIAGRAMS. ALL SERVICES MAY NOT HAVE BEEN SHOWN AND UTILITY DESCRIPTIONS HAVE BEEN TAKEN FROM UTILITY PROVIDED DIAGRAMS WHERE AVAILABLE. WE RECOMMEND NON DESTRUCTIVE DIGGING/POTHOLING TO EXPOSE MARKED SERVICES TO IDENTIFY AND SHOW EXACT DEPTH AND LOCATION OF SERVICE LINES PRIOR TO EARTHWORKS. COMMENCING UTILITIES PLOTTED ON THE PLAN THAT TERMINATE IN THE SPECIFIED AREA MAY GO TO FEATURES THAT HAVE NOT BEEN SHOWN ON THE BACKGROUND DETAIL SURVEY PROVIDED BY CLIENT. THE RISK REMAINS WITH THE CLIENT AND/OR SUB CONTRACTOR AND THEIR RESPONSIBILITY TO EXERCISE CAUTION AT ALL TIMES.

CODE	PIPE	DIAMETER
106.78	SSL	B 131 0.10 EOT
RL	LOCATION	QUALITY
	DEPTH	NOTE

SUBSURFACE UTILITY INFORMATION

QL-D IS THE LOWEST OF THE FOUR QUALITY LEVELS STIPULATED IN ASS488. IT IS AN INDICATIVE POSITION COMPILED FROM EXISTING RECORDS, CURSORY SITE INSPECTION, ANECDOTAL EVIDENCE.

QL-C IS THE NEXT LEVEL UP FROM QL-D. ASS488 STATES THAT QL-C IS A SURFACE FEATURE CORRELATION OR AN INTERPRETATION OF THE APPROXIMATE LOCATIONS AND ATTRIBUTES OF A SURFACE FEATURE USING A COMBINATION OF EXISTING RECORDS (ANECDOTAL EVIDENCE) SONIC BOOM TECHNIQUES AND A SITE SURVEY OF VISIBLE EVIDENCE.

QL-B ELECTRONICALLY TRACED AS PER ASS488 (DIRECT CONNECTION, INDUCTION, FLEXITRACE/SONDE, FLEXIROD/SONDE) WITH AN ESTIMATED POSITIONAL TOLERANCE OF +/-300MM IN PLAN, +/-500MM IN DEPTH (HIGH CONFIDENCE LEVEL).

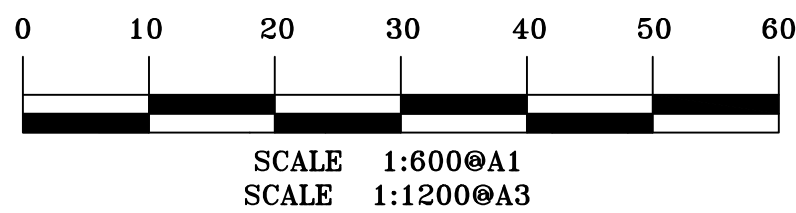
QL-A IS THE HIGHEST QUALITY LEVEL AS PER ASS488 AND CONSISTS OF THE POSITIVE IDENTIFICATION OF THE ATTRIBUTE AND LOCATION OF A SUBSURFACE UTILITY AT A POINT TO AN ABSOLUTE SPATIAL POSITION IN THREE DIMENSIONS. THIS CAN BE ACHIEVED AT OPENED PITS AND IN THE POTHOLE WHERE THE UTILITY IS EXPOSED.

HORIZONTAL AND VERTICAL TOLERANCE: +/- 50MM.

QL-X ELECTRONICALLY LOCATED WITH GROUND PENETRATING RADAR OR OTHER ELECTRONIC LOCATING TECHNIQUES NOT COMPLIANT WITH ASS488. ESTIMATED POSITIONAL TOLERANCE IS +/-300MM IN PLAN, +/-500MM IN DEPTH (HIGH CONFIDENCE LEVEL).

QL-Y ELECTRONICALLY LOCATED BUT WITH REDUCED CONFIDENCE IN PLAN POSITION/DEPTH (MEDIUM CONFIDENCE LEVEL).

QL-Z ELECTRONICALLY LOCATED WITH LOW CONFIDENCE LEVEL IN PLAN POSITION/DEPTH (LOW CONFIDENCE LEVEL).



NOTES

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- CONTOURS SHOWN DEPICT THE TOPOGRAPHY. THEY DO NOT REPRESENT THE EXACT LEVEL AT ANY PARTICULAR POINT. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION.
- CONTOUR INTERVAL - 0.5 metre. - SPOT LEVELS SHOULD BE ADOPTED.
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"SEE SHEET 1 FOR EXTRA
LEGEND & NOTES"

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: MGA (GDA2020)
MARKS ADOPTED: SSM 101811 & SSM 101817

VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: SSM 101817
R.L. 62.228 (CLASS B)
SOURCE: S.C.I.M.S. (02/07/2020)

CLIENT:
**PERUMAL PEDAVOLI ARCHITECTS
PTY LTD**
**LEVEL 2, 458 WATTLE STREET
ULTIMO, NSW, 2007**

SURVEY PLAN
**SHOWING DETAIL, LEVELS &
UNDERGROUND SERVICES**
OVER LOT 5227 IN DP868693
GLENWOOD HIGH SCHOOL
GLENWOOD PARK DRIVE
& FORMAN AVENUE
GLENWOOD, NSW, 2768

**C.M.S. Surveyors
Pty Limited**
ACN: 096 240 201
PO Box 463 Dee Why
NSW 2099
2/90A South Creek Road,
Dee Why NSW 2099
Telephone: (02) 9971 4802
Facsimile: (02) 9971 4822
E-mail: info@cmsurveyors.com.au

LGA: BLACKTOWN		SHEET 1 OF 21	
SURVEYED ME	DRAWN GP	CHECKED ME	APPROVED AF
SURVEY INSTRUCTION 17713A	SCALE 1:600 @ A1 1:1200 @ A3	DATE OF SURVEY 6-10/07/2020	
DRAWING NAME 17713Adefail			ISSUE 1
CAD FILE 17713Adefail.dwg			

5226
D.P.874087

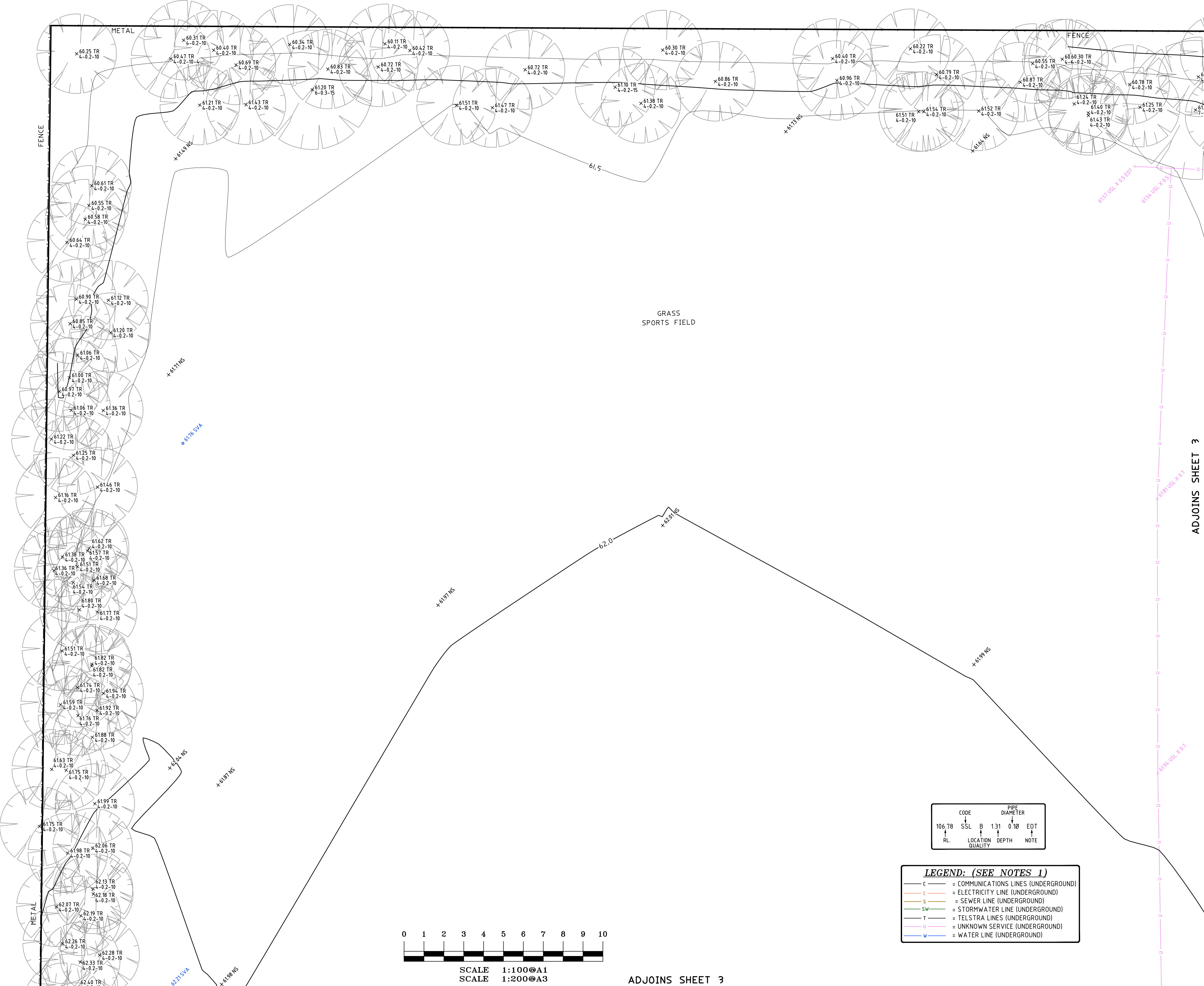
APPROX TRUE NORTH
MGA NORTH

5226
D.P.874087

LEGEND:

AW = AWNING
BB = BOTTOM OF BANK
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VER = VERANDAH
WM = WATER METER
WPIT = WATER PIT
WSL = WATER SLA SURFACE LEVEL
WV = WATER VALVE

TREE
SPREAD-DIAMETER-HEIGHT
-TAG ID



- NOTES**
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"SEE SHEET 1 FOR EXTRA
LEGEND & NOTES"

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: MGA (GDA2020)
MARKS ADOPTED: SSM 101811 & SSM 101817

VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: SSM 101817
R.L. 62.228 (CLASS B)
SOURCE: S.C.I.M.S. (02/07/2020)

I	FIRST ISSUE	31/07/2020
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CLIENT:
**PERUMAL PEDAVOLI ARCHITECTS
PTY LTD**
**LEVEL 2, 458 WATTLE STREET
ULTIMO, NSW, 2007**

**SURVEY PLAN
SHOWING DETAIL, LEVELS &
UNDERGROUND SERVICES
OVER LOT 5227 IN DP868693
GLENWOOD HIGH SCHOOL
GLENWOOD PARK DRIVE
& FORMAN AVENUE
GLENWOOD, NSW, 2768**

**C.M.S. Surveyors
Pty Limited**
ACN: 096 240 201
PO Box 463 Dee Why
NSW 2099
2/90A South Creek Road,
Dee Why NSW 2099
Telephone: (02) 9971 4802
Facsimile: (02) 9971 4822
E-mail: info@cmsurveyors.com.au

LGA: BLACKTOWN		SHEET 2 OF 21	
SURVEYED ME	DRAWN GP	CHECKED ME	APPROVED AF
SURVEY INSTRUCTION 17713A		SCALE 1:100 A1 1:200 A3	DATE OF SURVEY 6-10/07/2020
DRAWING NAME 17713Adefail			ISSUE 1
CAD FILE 17713Adefail.dwg			

NOTES

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HORIZONTAL DATUM:
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R.L. 62.228 (CLASS B)
SOURCE: S.C.I.M.S. (02/07/2020)

I FIRST ISSUE 31/07/2020

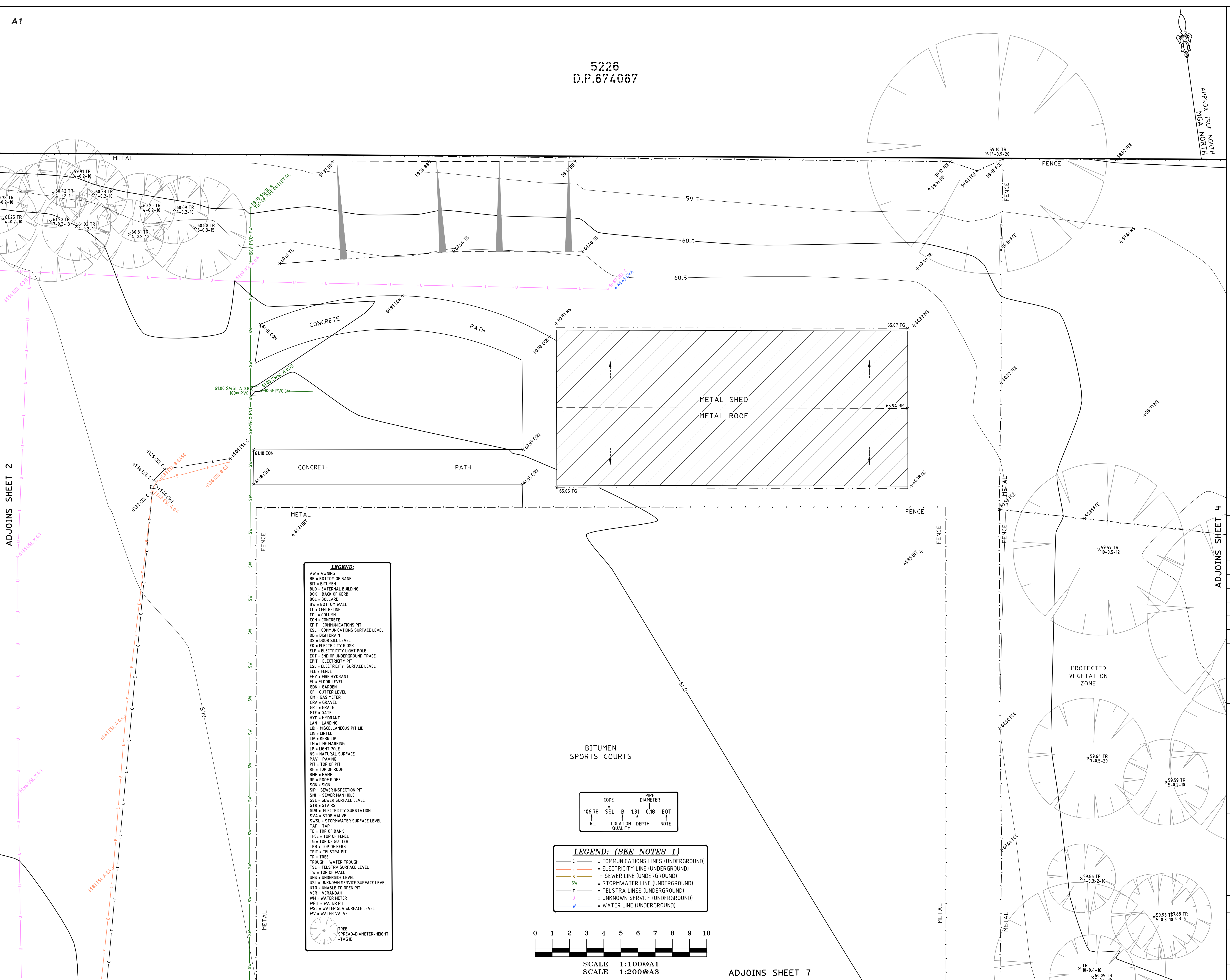
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E-mail: info@cmsurveyors.com.au

LGA: BLACKTOWN		SHEET 3 OF 21	
SURVEYED ME	DRAWN GP	CHECKED ME	APPROVED AF
SURVEY INSTRUCTION 17713A		SCALE 1:100 1:200	DATE OF SURVEY 6-10/07/2020
DRAWING NAME 17713A Detail			ISSUE 1
CAD FILE 17713A Detail 1.dwg			



LEGEND:

AW = AWNING
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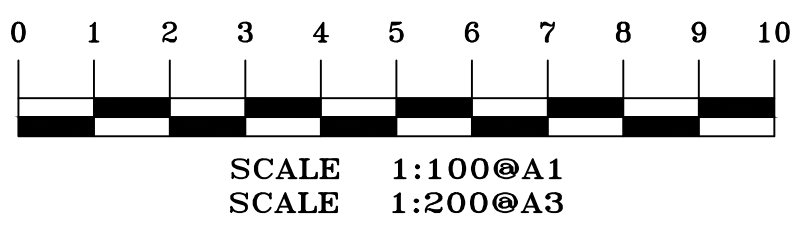
TREE
SPREAD-DIAMETER-HEIGHT
-TAG ID

BITUMEN
SPORTS COURTS

CODE	PIPE DIAMETER
106.78 SSL B	1.31 0.10
RL	LOCATION QUALITY
	DEPTH NOTE

LEGEND: (SEE NOTES 1)

C = COMMUNICATIONS LINES (UNDERGROUND)
E = ELECTRICITY LINE (UNDERGROUND)
S = SEWER LINE (UNDERGROUND)
SW = STORMWATER LINE (UNDERGROUND)
T = TELSTRA LINES (UNDERGROUND)
U = UNKNOWN SERVICE (UNDERGROUND)
W = WATER LINE (UNDERGROUND)



ADJOINS SHEET 7

5226
D.P.874087

NOTES

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- IF CONSTRUCTION ON OR NEAR BOUNDARIES IS REQUIRED IT IS RECOMMENDED THAT THE BOUNDARIES OF THE LAND BE MARKED.
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- EXCEPT WHERE SHOWN BY DIMENSION LOCATION OF DETAIL WITH RESPECT TO BOUNDARIES IS INDICATIVE ONLY.
- ONLY VISIBLE SERVICES HAVE BEEN LOCATED. UNDERGROUND SERVICES HAVE NOT BEEN LOCATED. DIAL BEFORE YOU DIG SERVICES (ph 1100) SHOULD BE USED AND A FULL UTILITY INVESTIGATION, INCLUDING A UTILITY LOCATION SURVEY, SHOULD BE UNDERTAKEN BEFORE CARRYING OUT ANY CONSTRUCTION ACTIVITY IN OR NEAR THE SURVEYED AREA.
- SEWER MAIN PLOTTED FROM SYDNEY WATER SEWER DIAGRAM. LOCATION SHOULD BE MARKED ON SITE IF CRITICAL.
- CRITICAL SPOT LEVELS SHOULD BE CONFIRMED WITH SURVEYOR.
- CONTOURS SHOWN DEPICT THE TOPOGRAPHY. THEY DO NOT REPRESENT THE EXACT LEVEL AT ANY PARTICULAR POINT. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION.
- CONTOUR INTERVAL - 0.5 metre. - SPOT LEVELS SHOULD BE ADOPTED.
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- THIS PLAN HAS BEEN PREPARED UNDER THE SUPERVISION OF REGISTERED SURVEYOR S B McEVROY, BOSSI NUMBER 265.
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- THIS NOTICE MUST NOT BE ERASED.

"SEE SHEET 1 FOR EXTRA
LEGEND & NOTES"

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: MGA (GDA2020)
MARKS ADOPTED: SSM 101811 & SSM 101817

VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: SSM 101817
R.L. 62.228 (CLASS B)
SOURCE: S.C.I.M.S. (02/07/2020)

I	FIRST ISSUE	31/07/2020
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CLIENT:
**PERUMAL PEDAVOLI ARCHITECTS
PTY LTD**
**LEVEL 2, 458 WATTLE STREET
ULTIMO, NSW, 2007**

**SURVEY PLAN
SHOWING DETAIL, LEVELS &
UNDERGROUND SERVICES
OVER LOT 5227 IN DP868693
GLENWOOD HIGH SCHOOL
GLENWOOD PARK DRIVE
& FORMAN AVENUE
GLENWOOD, NSW, 2768**

**C.M.S. Surveyors
Pty Limited**

ACN: 096 240 201
PO Box 463 Dee Why
NSW 2099
2/90A South Creek Road,
Dee Why NSW 2099
Telephone: (02) 9971 4802
Facsimile: (02) 9971 4822
E-mail: info@cmsurveyors.com.au

LGA: BLACKTOWN		SHEET 4 OF 21	
SURVEYED ME	DRAWN GP	CHECKED ME	APPROVED AF
SURVEY INSTRUCTION 17713A		SCALE 1:100 A1 1:200 A3	DATE OF SURVEY 6-10/07/2020
DRAWING NAME 17713Adefail			ISSUE 1
CAD FILE 17713Adefail 1.dwg			

LEGEND:

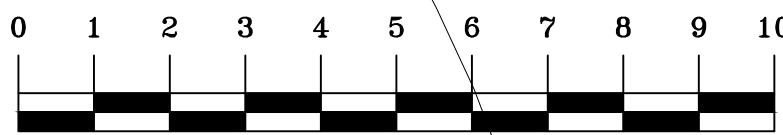
AW = AWNING
BB = BOTTOM OF BANK
BIT = BITUMEN
BLD = EXTERNAL BUILDING
BOK = BACK OF KERB
BOL = BOLLARD
BW = BOTTOM WALL
CL = CENTRELINE
COL = COLUMN
CON = CONCRETE
CPIT = COMMUNICATIONS PIT
CSL = COMMUNICATIONS SURFACE LEVEL
DD = DISH DRAIN
DS = DOOR SILL LEVEL
EK = ELECTRICITY KIOSK
ELP = ELECTRICITY LIGHT POLE
EOT = END OF UNDERGROUND TRACE
EPIT = ELECTRICITY PIT
ESL = ELECTRICITY SURFACE LEVEL
FCE = FENCE
FHY = FIRE HYDRANT
FL = FLOOR LEVEL
GDN = GARDEN
GF = GUTTER LEVEL
GM = GAS METER
GRA = GRAVEL
GRT = GRATE
GTE = GATE
HYD = HYDRANT
LAN = LANDING
LID = MISCELLANEOUS PIT LID
LIN = LINTEL
LIP = KERB LIP
LM = LINE MARKING
LP = LIGHT POLE
NS = NATURAL SURFACE
PAV = PAVING
PIT = TOP OF PIT
RF = TOP OF ROOF
RMP = RAMP
RR = ROOF RIDGE
SGN = SIGN
SIP = SEWER INSPECTION PIT
SMH = SEWER MAN HOLE
SSL = SEWER SURFACE LEVEL
STR = STAIRS
SUB = ELECTRICITY SUBSTATION
SVA = STOP VALVE
SWSL = STORMWATER SURFACE LEVEL
TAP = TAP
TB = TOP OF BANK
TREE = TOP OF FENCE
TG = TOP OF GUTTER
TKB = TOP OF KERB
TRIT = TELSTRA PIT
TR = TREE
TROUG = WATER TROUGH
TSL = TELSTRA SURFACE LEVEL
TW = TOP OF WALL
UNK = UNDERSIDE LEVEL
USL = UNKNOWN SERVICE SURFACE LEVEL
UTO = UNABLE TO OPEN PIT
VER = VERANDAH
WM = WATER METER
WPIT = WATER PIT
WSL = WATER SLA SURFACE LEVEL
WV = WATER VALVE

TREE
SPREAD-DIAMETER-HEIGHT
-TAG ID

CODE		PIPE DIAMETER		
106.78	SSL B	1.31	0.10	EOT
	RL	LOCATION QUALITY	DEPTH	NOTE

LEGEND: (SEE NOTES 1)

— c — = COMMUNICATIONS LINES (UNDERGROUND)
— e — = ELECTRICITY LINE (UNDERGROUND)
— s — = SEWER LINE (UNDERGROUND)
— sw — = STORMWATER LINE (UNDERGROUND)
— t — = TELSTRA LINES (UNDERGROUND)
— u — = UNKNOWN SERVICE (UNDERGROUND)
— w — = WATER LINE (UNDERGROUND)

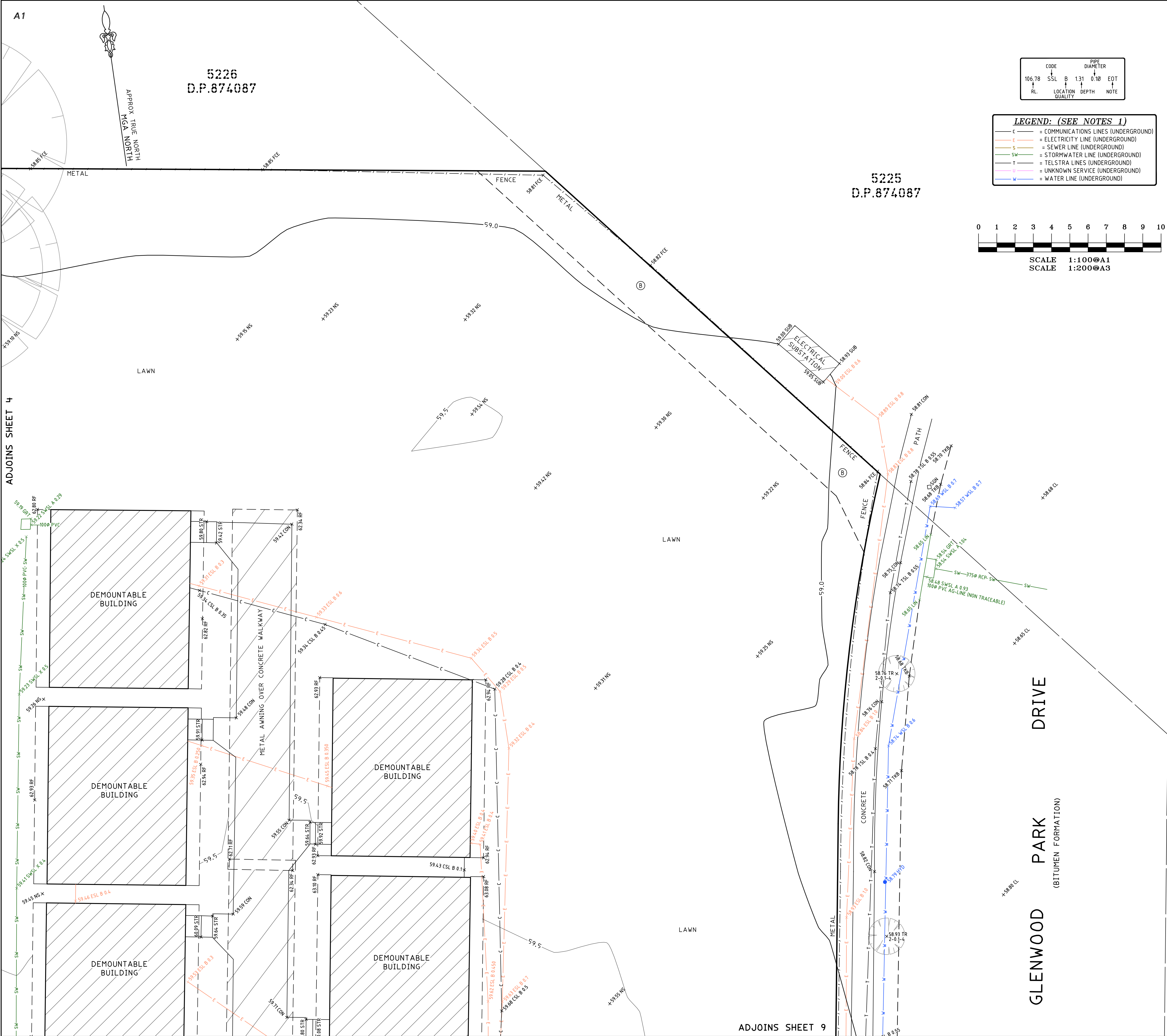


SCALE 1:100@A1
SCALE 1:200@A3

ADJOINS SHEET 8

ADJOINS SHEET 5

ADJOINS SHEET 3



LEGEND:

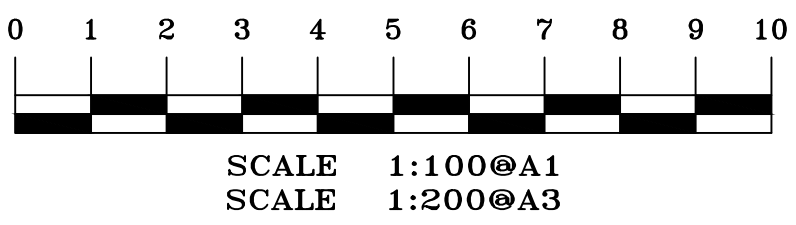
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	DEPTH
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MARKS ADOPTED: SSM 101811 & SSM 101817

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DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: SSM 101817
R.L. 62.228 (CLASS B)
SOURCE: S.C.I.M.S. (02/07/2020)

I	FIRST ISSUE	31/07/2020
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ULTIMO, NSW, 2007

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GLENWOOD PARK DRIVE & FORMAN AVENUE
GLENWOOD, NSW, 2768

C.M.S. Surveyors Pty Limited
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2/90A South Creek Road, Dee Why NSW 2099
Telephone: (02) 9971 4802
Facsimile: (02) 9971 4822
E-mail: info@cmsurveyors.com.au

LGA: BLACKTOWN		SHEET 5 OF 21	
SURVEYED ME	DRAWN GP	CHECKED ME	APPROVED AF
SURVEY INSTRUCTION 17713A		SCALE 1:100 @ A1 1:200 @ A3	DATE OF SURVEY 6-10/07/2020
DRAWING NAME 17713Adefail			ISSUE I
CAD FILE 17713Adefail 1.dwg			

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: MGA (GDA2020)
MARKS ADOPTED: SSM 1018II & SSM 1018I7

VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: SSM 1018I7
R.L. 62.228 (CLASS B)
SOURCE: S.C.I.M.S. (02/07/2020)

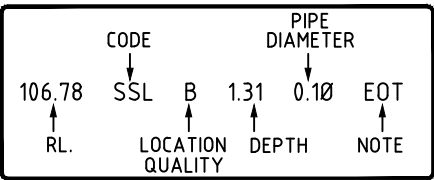
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ACN: 096 240 201

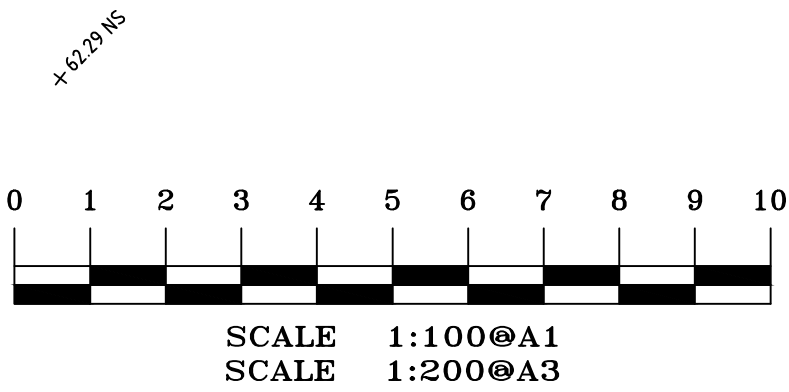
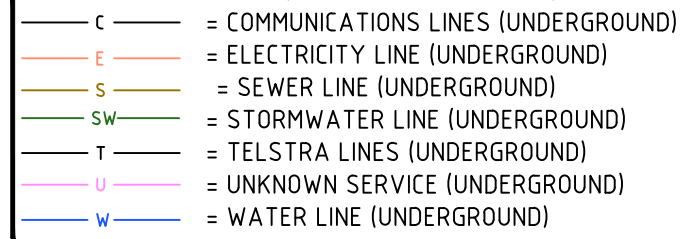
PO Box 463 Dee Why
NSW 2099
2/99A South Creek Road,
Dee Why NSW 2099
Telephone: (02) 9971 4802
Facsimile: (02) 9971 4822
E-mail: info@cmssurveyors.com.au

SURVEYED ME	DRAWN GP	CHECKED ME	APPROVED AF
SURVEY INSTRUCTION 17713A		SCALE 1:100 1:200 1:400 1:800 1:1600 1:3200 1:6400 1:12800 1:25600 1:51200 1:102400 1:204800 1:409600 1:819200 1:1638400 1:3276800 1:6553600 1:13107200 1:26214400 1:52428800 1:104857600 1:209715200 1:419430400 1:838860800 1:1677721600 1:3355443200 1:6710886400 1:13421772800 1:26843545600 1:53687091200 1:107374182400 1:214748364800 1:429496729600 1:858993459200 1:1717986918400 1:3435973836800 1:6871947673600 1:13743895347200 1:27487790694400 1:54975581388800 1:109951162777600 1:219902325555200 1:439804651110400 1:879609302220800 1:1759218604441600 1:3518437208883200 1:7036874417766400 1:14073748835532800 1:28147497671065600 1:56294995342131200 1:112589990684262400 1:225179981368524800 1:450359962737049600 1:900719925474099200 1:1801439850948198400 1:3602879701896396800 1:7205759403792793600 1:14411518807585587200 1:28823037615171174400 1:57646075230342348800 1:115292150460684697600 1:230584300921369395200 1:461168601842738790400 1:922337203685477580800 1:1844674407370955161600 1:3689348814741910323200 1:7378697629483820646400 1:14757395258967641292800 1:29514790517935282585600 1:59029581035870565171200 1:118059162071741130342400 1:236118324143482260684800 1:472236648286964521369600 1:944473296573929042739200 1:1888946593147858085478400 1:3777893186295716170956800 1:7555786372591432341913600 1:15111572745182864683827200 1:30223145490365729367654400 1:60446290980731458735308800 1:120892581961462917470617600 1:241785163922925834941235200 1:483570327845851669882470400 1:967140655691703339764940800 1:1934281311383406679529881600 1:3868562622766813359059763200 1:7737125245533626718119526400 1:15474250491067253436239052800 1:30948500982134506872478105600 1:61897001964269013744956211200 1:123794003928538027489912422400 1:247588007857076054979824844800 1:495176015714152109959649689600 1:990352031428304219919299379200 1:198070406285660843983859875200 1:396140812571321687967719750400 1:792281625142643375935439500800 1:1584563250285287551870879001600 1:3169126500570575103741758003200 1:6338253001141150207483516006400 1:12676506002282300414967032012800 1:25353012004564600829934064025600 1:50706024009129201659868128051200 1:101412048018258403199736256102400 1:202824096036516806399472512204800 1:405648192073033612798945024409600 1:811296384146067225597890048819200 1:1622592768292134451195780097638400 1:3245185536584268902391560195276800 1:6490371073168537804783120390553600 1:12980742146337075609566240781107200 1:25961484292674151219132481562214400 1:51922968585348302438264963124428800 1:103845937170696604876529926248857600 1:207691874341393209753059852497715200 1:415383748682786419506119704995430400 1:830767497365572839012239409990860800 1:1661534994731145678024478819981721600 1:3323069989462291356048957639963443200 1:6646139978924582712097915279926886400 1:13292279957849165424195830559853772800 1:26584559915698330848391661119707545600 1:53169119831396661696783322239415091200 1:106338239662793323393566644478830182400 1:212676479325586646787133288957660364800 1:425352958651173293574266577915320729600 1:850705917302346587148533155830641459200 1:1701411834604693174297066311661282918400 1:3402823669209386348594132623322565836800 1:6805647338418772697188265246645131673600 1:13611294676837545394376530493290263347200 1:27222589353675090788753060986580526694400 1:54445178707350181577506121973161053388800 1:108890357414700363155012243946322106777600 1:217780714829400726310024487892644213555200 1:435561429658801452620048975785288427110400 1:871122859317602905240097951570576854220800 1:1742245718635205810480195903141153708441600 1:3484491437270411620960391806282307416883200 1:6968982874540823241920783612564614833766400 1:13937965749081646483841567225129229667532800 1:27875931498163292967683134450258459335065600 1:55751862996326585935366268900516918670131200 1:111503725992653171870732537801033837340262400 1:22300745198530634	

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LEGEND: (SEE NOTES 1)



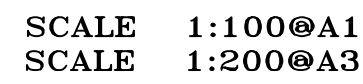
LEGEND:

AV = AVEINING
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B = BATHYMETRY
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TREE
SPREAD-DIAMETER-HEIGHT
-TAG ID

ADJOINS SHEET 10



LEGEND: (SEE NOTES 1)

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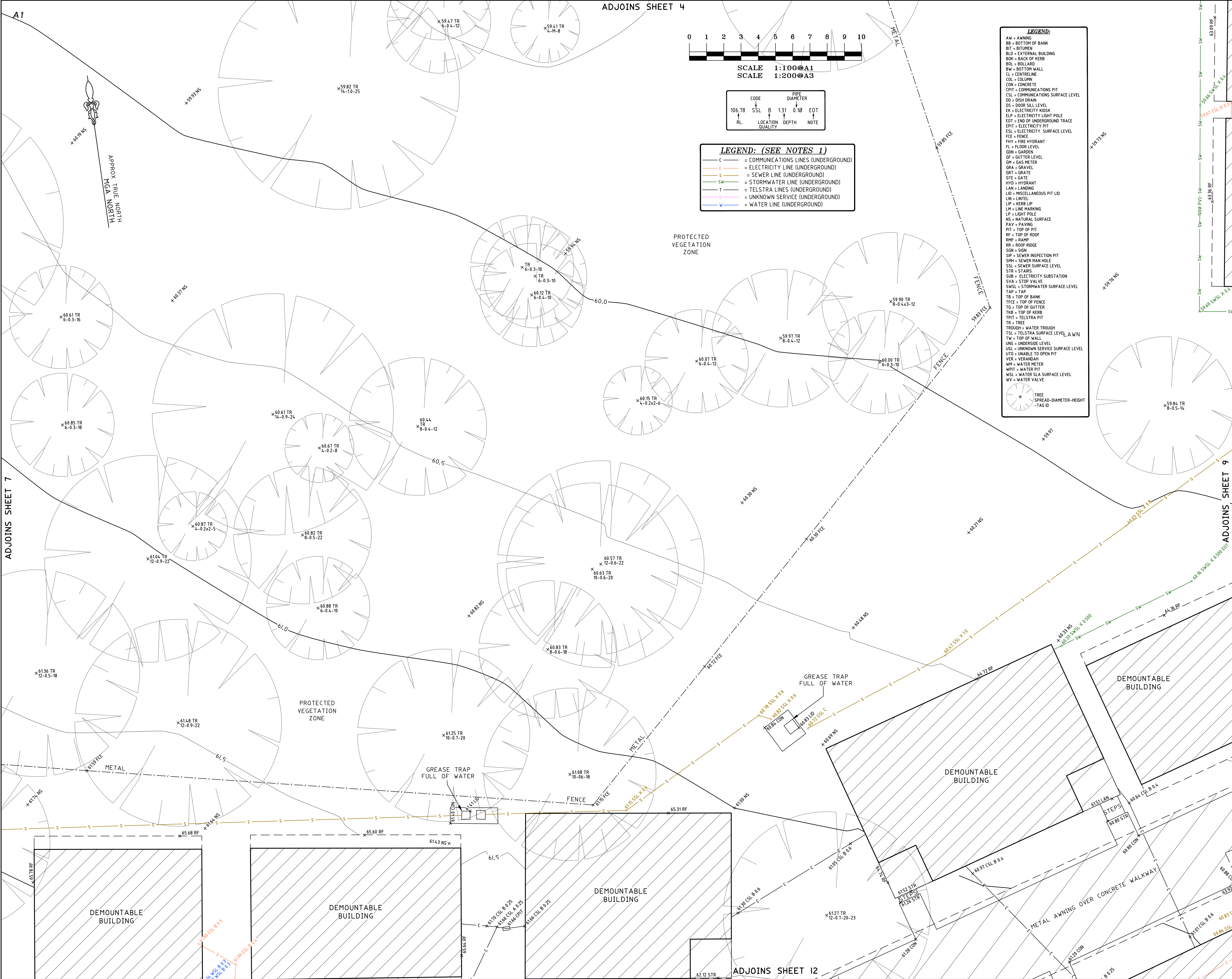
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 DS = DOWN SLOPE
 E = ELECTRICITY KIOSK
 EP = ELECTRICITY LIGHT POLE
 EOT = END OF UNDERGROUND TRACE
 ELT = ELECTRICITY PIT
 ELS = ELECTRICITY SURFACE LEVEL
 F = FENCE
 FHY = FRY HYDRANT
 FL = FLOOR LEVEL
 G = GARDEN
 GDN = GUTTER
 GR = GASPIETER
 GRA = GRAVEL
 GRV = GRATE
 GTE = GATE
 HYD = HYDRANT
 LAN = LANDING
 LID = MISCELLANEOUS PIT LID
 LIP = LID
 LK = LEAD
 LM = LINE MARKING
 LP = LIGHT POLE
 NS = NATURAL SURFACE
 PAV = PAVING
 PIT = TOP OF PIT
 PR = TOP OF ROOF
 RAMP = RAMP
 RR = ROOF RIDGE
 SDN = SDN
 SKP = SINKER INSPECTION PIT
 SMR = SEWER MAIN HOLE
 SSL = SEWER SURFACE LEVEL
 STR = STAIRS
 STW = ELECTRICITY SUBSTATION
 TAP = STOP VALVE
 TB = TOP OF BANK
 TBG = TOP OF FENCE
 TG = TOP OF GUTTER
 THB = TOP OF KERB
 TELPIT = TELSPIT
 TR = TREE
 TROUGH = WATER TROUGH
 TELPIT = TELSPIT SURFACE LEVEL
 TW = TOP OF WALL
 UN = UNDERSIDE
 UNK = UNKNOWN SURFACE LEVEL
 UNO = UNABLE TO OPEN PIT
 VER = VERANDAH
 WH = WATER NET
 WHIT = WATER PIT
 WSL = WATER SURFACE LEVEL
 WV = WATER VALVE

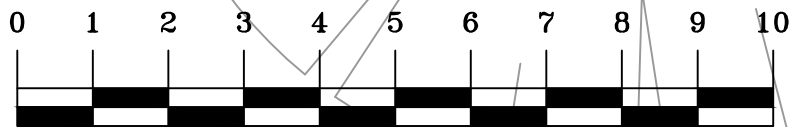
 × TREE
 DIAMETER-HEIGHT
 -TAG ID-

- A BASIC BOUNDARY SURVEY HAS BEEN UNDERTAKEN SUITABLE FOR CADASTRAL DATA SUBMISSION (TITLE DIMENSIONS ONLY).
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- THIS SURVEY IS FOR CADASTRAL PURPOSES OF THE SUBJECT LAND ONLY. THIS PLAN MUST NOT BE USED FOR ANY OTHER MATTER, PURPOSE OR CONSTRUCTION SETOUT.
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- RELATIONSHIP OF IMPROVEMENTS TO BOUNDARIES IS DIAGRAMMATIC ONLY. WHERE OFFSETS ARE CRITICAL THEY SHOULD BE CONFIRMED BY FURTHER SURVEY.
- EXCEPT WHERE SHOWN BY DIMENSION LOCATION OF DETAIL WITH RESPECT TO BOUNDARIES IS INDICATIVE ONLY.
- ONLY VISIBLE SERVICES HAVE BEEN LOCATED. UNDERGROUND SERVICES HAVE NOT BEEN LOCATED. DIAL BEFORE YOU DIG SERVICES (60/100) SHOULD BE USED AND A FULL UTILITY INVESTIGATION, INCLUDING GROUND PENETRATING RADAR, SHOULD BE UNDERTAKEN BEFORE CARRYING OUT ANY CONSTRUCTION ACTIVITY IN OR NEAR THE SURVEYED AREA.
- SEWER MAIN PLOTTED FROM SYDNEY WATER SEWER DIAGRAM. LOCATION SHOULD BE MARKED ON SITE IF CRITICAL.
- CRITICAL SPOT LEVELS SHOULD BE CONFIRMED WITH SURVEYOR.
- CONTOURS SHOWN DEPict THE TOPOGRAPHY. THEY DO NOT REPRESENT THE SPOT LEVEL AT ANY PARTICULAR POINT. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION.
- CONTOUR INTERVAL = 0.5 metre. - SPOT LEVELS SHOULD BE ADOPTED.
- POSITION OF RIDGE LINES ARE DIAGRAMMATIC ONLY (NOT TO SCALE).
- THE INFORMATION IS ONLY TO BE USED AT A SCALE ACCURACY OF 1:100.
- DO NOT SCALE OFF THIS PLAN / FIGURED DIMENSIONS TO BE TAKEN IN PREFERENCE TO SCALED READINGS.
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- COPYRIGHT © CMS SURVEYS 2020.
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VERTICAL DATUM:
 DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
 B.M. ADOPTED: SSM 101817
 R.L. 62.228 (CLASS B)
 SOURCE: S.C.I.M.S. (02/07/2020)




ADJOINS SHEET 4



SCALE 1:100@A1
SCALE 1:200@A3

CODE	PIPE	DIAMETER
106.78	SSL	B
RL	LOCATION	QUALITY
1.31	DEPTH	NOTE
0.10		
EOT		

LEGEND: (SEE NOTES 1)	
C	= COMMUNICATIONS LINES (UNDERGROUND)
E	= ELECTRICITY LINE (UNDERGROUND)
S	= SEWER LINE (UNDERGROUND)
SW	= STORMWATER LINE (UNDERGROUND)
T	= TELSTRA LINES (UNDERGROUND)
U	= UNKNOWN SERVICE (UNDERGROUND)
W	= WATER LINE (UNDERGROUND)

LEGEND:	
AW	= AWNING
BB	= BOTTOM OF BANK
BIT	= BITUMEN
BLD	= EXTERNAL BUILDING
BOK	= BACK OF KERB
BOL	= BOLLARD
BW	= BOTTOM WALL
CL	= CENTRELIN
COL	= COLUMN
CON	= CONCRETE
CPT	= COMMUNICATIONS PIT
CSL	= COMMUNICATIONS SURFACE LEVEL
CO	= DITCH DRAIN
DS	= DOOR SILL LEVEL
EX	= ELECTRICITY XBOX
ELP	= ELECTRICITY LIGHT POLE
EOT	= END OF UNDERGROUND TRACE
EPIT	= ELECTRICITY PIT
ESL	= ELECTRICITY SURFACE LEVEL
FCE	= FENCE
FHY	= FIRE HYDRANT
FL	= FLOOR LEVEL
GDN	= GARDEN
GP	= GUTTER LEVEL
GM	= GAS METER
GRA	= GRAVEL
GRT	= GRATE
GTE	= GATE
HYD	= HYDRANT
LAN	= LANDING
LID	= MISCELLANEOUS PIT LID
LIN	= LINTEL
LIP	= KERB LIP
LM	= LINE MARKING
LP	= LIGHT POLE
NS	= NATURAL SURFACE
PAV	= PAVING
PIT	= TOP OF PIT
RP	= TOP OF ROOF
RMP	= RAMP
RR	= ROOF RIDGE
SDN	= SIGN
SIP	= SEWER INSPECTION PIT
SMH	= SEWER MAN HOLE
SSL	= SEWER SURFACE LEVEL
STR	= STAIRS
SUB	= ELECTRICITY SUBSTATION
SVA	= STOP VALVE
SWSL	= STORMWATER SURFACE LEVEL
TAP	= TAP
TB	= TOP OF BANK
TTEE	= TOP OF FENCE
TG	= TOP OF GUTTER
TKB	= TOP OF KERB
TPIT	= TELSTRA PIT
TR	= TREE
TROUGH	= WATER TROUGH
TSL	= TELSTRA SURFACE LEVEL
TW	= TOP OF WALL
UNS	= UNDERSIDE LEVEL
USL	= UNKNOWN SERVICE SURFACE LEVEL
UTO	= UNABLE TO OPEN PIT
VER	= VERANDAH
WM	= WATER METER
WPIT	= WATER PIT
WSL	= WATER SLA SURFACE LEVEL
WV	= WATER VALVE
	
TREE SPREAD-DIAMETER-HEIGHT - TAG ID	

- ### NOTES
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 - CONTOUR INTERVAL - 0.5 metre. - SPOT LEVELS SHOULD BE ADOPTED.
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"SEE SHEET 1 FOR EXTRA
LEGEND & NOTES"

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: MGA (GDA2020)
MARKS ADOPTED: SSM 101811 & SSM 101817

VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: SSM 101817
R.L. 62.228 (CLASS B)
SOURCE: S.C.I.M.S. (02/07/2020)

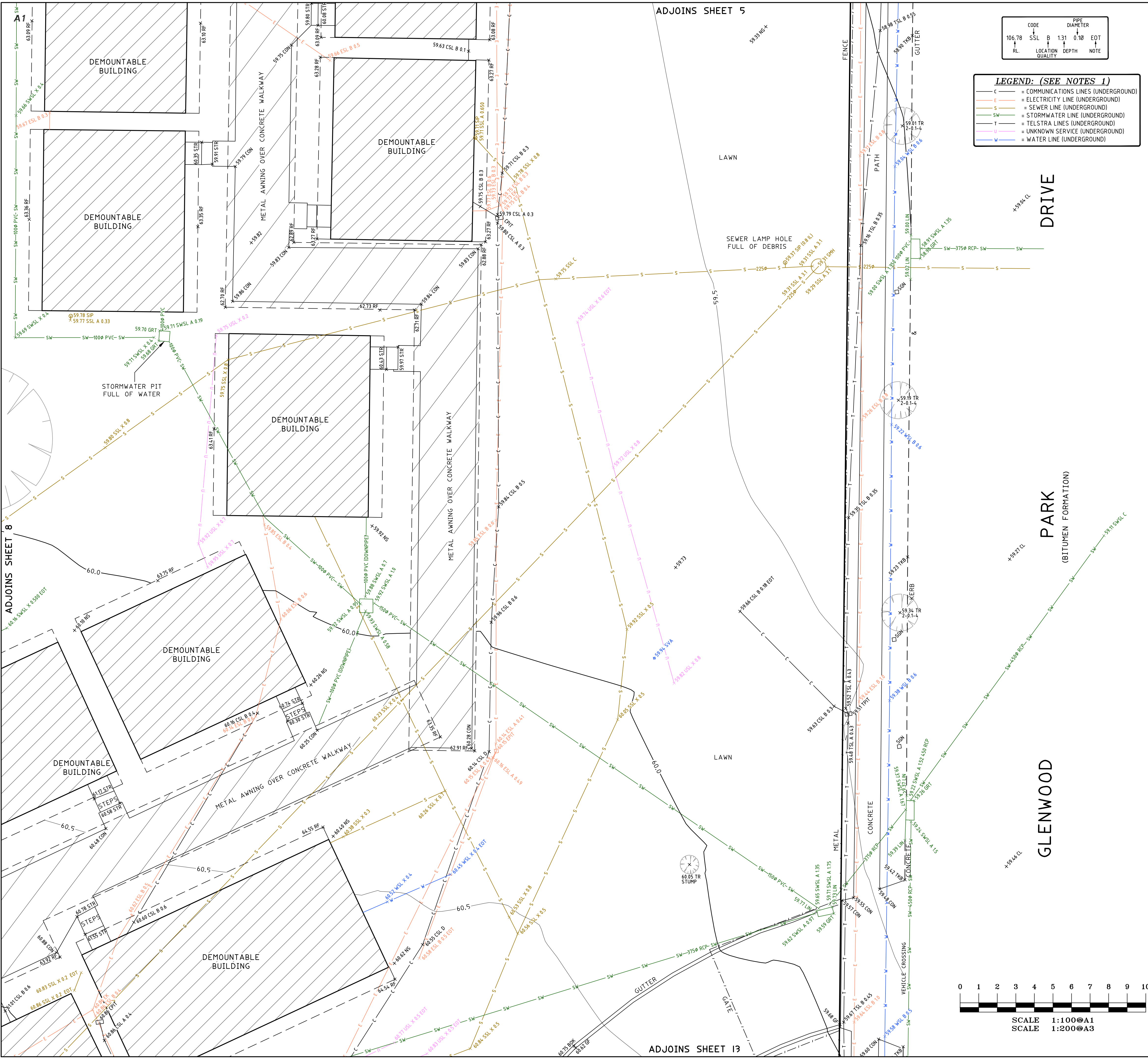
I	FIRST ISSUE	31/07/2020
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CLIENT:
**PERUMAL PEDAVOLI ARCHITECTS
PTY LTD**
**LEVEL 2, 458 WATTLE STREET
ULTIMO, NSW, 2007**

**SURVEY PLAN
SHOWING DETAIL, LEVELS &
UNDERGROUND SERVICES
OVER LOT 5227 IN DP868693
GLENWOOD HIGH SCHOOL
GLENWOOD PARK DRIVE
& FORMAN AVENUE
GLENWOOD, NSW, 2768**

**C.M.S. Surveyors
Pty Limited**
ACN: 096 240 201
PO Box 463 Dee Why
NSW 2099
2/90A South Creek Road,
Dee Why NSW 2099
Telephone: (02) 9971 4802
Facsimile: (02) 9971 4822
E-mail: info@cmsurveyors.com.au

LGA: BLACKTOWN		SHEET 8 OF 21	
SURVEYED ME	DRAWN GP	CHECKED ME	APPROVED AF
SURVEY INSTRUCTION 17713A		SCALE 1:100 @ A1 1:200 @ A3	DATE OF SURVEY 6-10/07/2020
DRAWING NAME 17713A Detail			ISSUE 1
CAD FILE 17713A Detail 1.dwg			



LEGEND: (SEE NOTES 1)

- C = COMMUNICATIONS LINES (UNDERGROUND)
- E = ELECTRICITY LINE (UNDERGROUND)
- S = SEWER LINE (UNDERGROUND)
- SW = STORMWATER LINE (UNDERGROUND)
- T = TELSTRA LINES (UNDERGROUND)
- U = UNKNOWN SERVICE (UNDERGROUND)
- W = WATER LINE (UNDERGROUND)

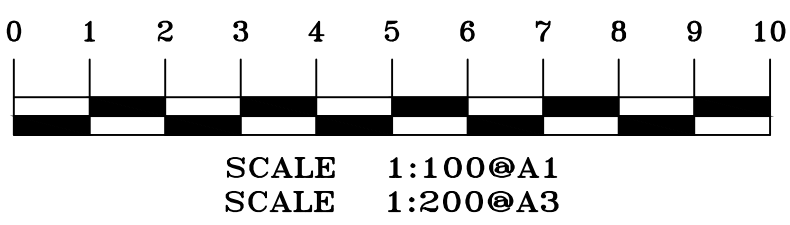
CODE

CODE	PIPE DIAMETER	NOTE
106.78	SSL	B
1.31	0.10	EOT
RL	LOCATION	DEPTH

LEGEND:

- AW = AWNING
- BB = BOTTOM OF BANK
- BIT = BITUMEN
- BLD = EXTERNAL BUILDING
- BOK = BACK OF KERB
- BOL = BOLLARD
- BW = BOTTOM WALL
- CL = CENTRELINE
- COL = COLUMN
- CON = CONCRETE
- CPIT = COMMUNICATIONS PIT
- CSL = COMMUNICATIONS SURFACE LEVEL
- DD = DISH DRAIN
- DS = DOOR SILL LEVEL
- EK = ELECTRICITY KIOSK
- ELP = ELECTRICITY LIGHT POLE
- EOT = END OF UNDERGROUND TRACE
- EPIT = ELECTRICITY PIT
- ESL = ELECTRICITY SURFACE LEVEL
- FE = FENCE
- FHY = FIRE HYDRANT
- FL = FLOOR LEVEL
- GDN = GARDEN
- GF = GUTTER LEVEL
- GM = GAS METER
- GRA = GRAVEL
- GRT = GRATE
- GTE = GATE
- HYD = HYDRANT
- LAN = LANDING
- LID = MISCELLANEOUS PIT LID
- LIN = LINTEL
- LIP = KERB LIP
- LM = LINE MARKING
- LP = LIGHT POLE
- NS = NATURAL SURFACE
- PAV = PAVING
- PIT = TOP OF PIT
- RF = TOP OF ROOF
- RMP = RAMP
- RR = ROOF RIDGE
- SGN = SIGN
- SIP = SEWER INSPECTION PIT
- SHH = SEWER MAN HOLE
- SSL = SEWER SURFACE LEVEL
- STR = STAIRS
- SUB = ELECTRICITY SUBSTATION
- SVA = STOP VALVE
- SWSL = STORMWATER SURFACE LEVEL
- TAP = TAP
- TB = TOP OF BANK
- TTEE = TOP OF FENCE
- TG = TOP OF GUTTER
- TKB = TOP OF KERB
- TPIT = TELSTRA PIT
- TR = TREE
- TROUGH = WATER TROUGH
- TSL = TELSTRA SURFACE LEVEL
- TW = TOP OF WALL
- UNS = UNDERSIDE LEVEL
- USL = UNKNOWN SERVICE SURFACE LEVEL
- UTO = UNABLE TO OPEN PIT
- VER = VERANDAH
- WM = WATER METER
- WPIT = WATER PIT
- WSL = WATER SLA SURFACE LEVEL
- WV = WATER VALVE

TREE
SPREAD-DIAMETER-HEIGHT
-TAG ID



NOTES

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"SEE SHEET 1 FOR EXTRA LEGEND & NOTES"

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: MGA (GDA2020)
MARKS ADOPTED: SSM 101811 & SSM 101817

VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: SSM 101817
R.L. 62.228 (CLASS B)
SOURCE: S.C.I.M.S. (02/07/2020)

I	FIRST ISSUE	31/07/2020
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CLIENT:
PERUMAL PEDAVOLI ARCHITECTS PTY LTD
LEVEL 2, 458 WATTLE STREET
ULTIMO, NSW, 2007

SURVEY PLAN
SHOWING DETAIL, LEVELS & UNDERGROUND SERVICES
OVER LOT 5227 IN DP868693
GLENWOOD HIGH SCHOOL
GLENWOOD PARK DRIVE & FORMAN AVENUE
GLENWOOD, NSW, 2768

C.M.S. Surveyors Pty Limited
ACN: 096 240 201
PO Box 463 Dee Why NSW 2099
2/90A South Creek Road, Dee Why NSW 2099
Telephone: (02) 9971 4802
Facsimile: (02) 9971 4822
E-mail: info@cmsurveyors.com.au

LGA: BLACKTOWN		SHEET 9 OF 21	
SURVEYED ME	DRAWN GP	CHECKED ME	APPROVED AF
SURVEY INSTRUCTION 17713A		SCALE 1:100 @ A1 1:200 @ A3	DATE OF SURVEY 6-10/07/2020
DRAWING NAME 17713Adefail			ISSUE 1
CAD FILE 17713Adefail.dwg			

CODE	PIPE	DIAMETER
106.78	SSL	B
1.31		0.10
EDT		
RL	LOCATION	DEPTH
QUALITY		NOTE

LEGEND: (SEE NOTES 1)

C	= COMMUNICATIONS LINES (UNDERGROUND)
E	= ELECTRICITY LINE (UNDERGROUND)
S	= SEWER LINE (UNDERGROUND)
SW	= STORMWATER LINE (UNDERGROUND)
T	= TELSTRA LINES (UNDERGROUND)
U	= UNKNOWN SERVICE (UNDERGROUND)
W	= WATER LINE (UNDERGROUND)

LEGEND:

AW	= AWNING
BB	= BOTTOM OF BANK
BIT	= BITUMEN
BLD	= EXTERNAL BUILDING
BOK	= BACK OF KERB
BOL	= BOLLARD
BW	= BOTTOM WALL
CL	= CENTRELINE
COL	= COLUMN
CON	= CONCRETE
CPT	= COMMUNICATIONS PIT
CSL	= COMMUNICATIONS SURFACE LEVEL
DD	= DISH DRAIN
DS	= DOOR SILL LEVEL
EL	= ELECTRICITY KIOSK
ELP	= ELECTRICITY LIGHT POLE
EDT	= END OF UNDERGROUND TRACE
EPIT	= ELECTRICITY PIT
ESL	= ELECTRICITY SURFACE LEVEL
FCE	= FENCE
FHY	= FIRE HYDRANT
FL	= FLOOR LEVEL
GDN	= GARDEN
GP	= GUTTER LEVEL
GM	= GAS METER
GRA	= GRAVEL
GRT	= GRATE
GTE	= GATE
HYD	= HYDRANT
LAN	= LANDING
LID	= MISCELLANEOUS PIT LID
LIN	= LINTEL
LIP	= KERB LIP
LM	= LINE MARKING
LP	= LIGHT POLE
NS	= NATURAL SURFACE
PAV	= PAVING
PIT	= TOP OF PIT
RF	= TOP OF ROOF
RMP	= RAMP
RR	= ROOF RIDGE
SCH	= SIGN
SIP	= SEWER INSPECTION PIT
SMH	= SEWER MAN HOLE
SSL	= SEWER SURFACE LEVEL
STR	= STAIRS
SUB	= ELECTRICITY SUBSTATION
SVA	= STOP VALVE
SWSL	= STORMWATER SURFACE LEVEL
TAP	= TAP
TB	= TOP OF BANK
TCEE	= TOP OF FENCE
TG	= TOP OF GUTTER
TIB	= TOP OF KERB
TPIT	= TELSTRA PIT
TR	= TREE
TROUGH	= WATER TROUGH
TSL	= TELSTRA SURFACE LEVEL
UWS	= TOP OF WALL
UNS	= UNDERSIDE LEVEL
USL	= UNKNOWN SERVICE SURFACE LEVEL
UTO	= UNABLE TO OPEN PIT
VER	= VERANDAH
WM	= WATER METER
WPIT	= WATER PIT
WSL	= WATER SLA SURFACE LEVEL
WV	= WATER VALVE

5226
D.P.874087

ADJOINS SHEET 10

SHIPPING CONTAINER

BRICK BUILDING
METAL ROOF

METAL ROOF OVER CONCRETE RAMP

BRICK BUILDING
METAL ROOF

ADJOINS SHEET 14

NOTES

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"SEE SHEET 1 FOR EXTRA
LEGEND & NOTES"HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: MGA (GDA2020)
MARKS ADOPTED: SSM 101811 & SSM 101817VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: SSM 101817
R.L. 62.228 (CLASS B)
SOURCE: S.C.I.M.S. (02/07/2020)

I FIRST ISSUE 31/07/2020

CLIENT:
PERUMAL PEDAVOLI ARCHITECTS
PTY LTD
LEVEL 2, 458 WATTLE STREET
ULTIMO, NSW, 2007**SURVEY PLAN**
SHOWING DETAIL, LEVELS &
UNDERGROUND SERVICES
OVER LOT 5227 IN DP868693
GLENWOOD HIGH SCHOOL
GLENWOOD PARK DRIVE
& FORMAN AVENUE
GLENWOOD, NSW, 2768**C.M.S. Surveyors**
Pty Limited

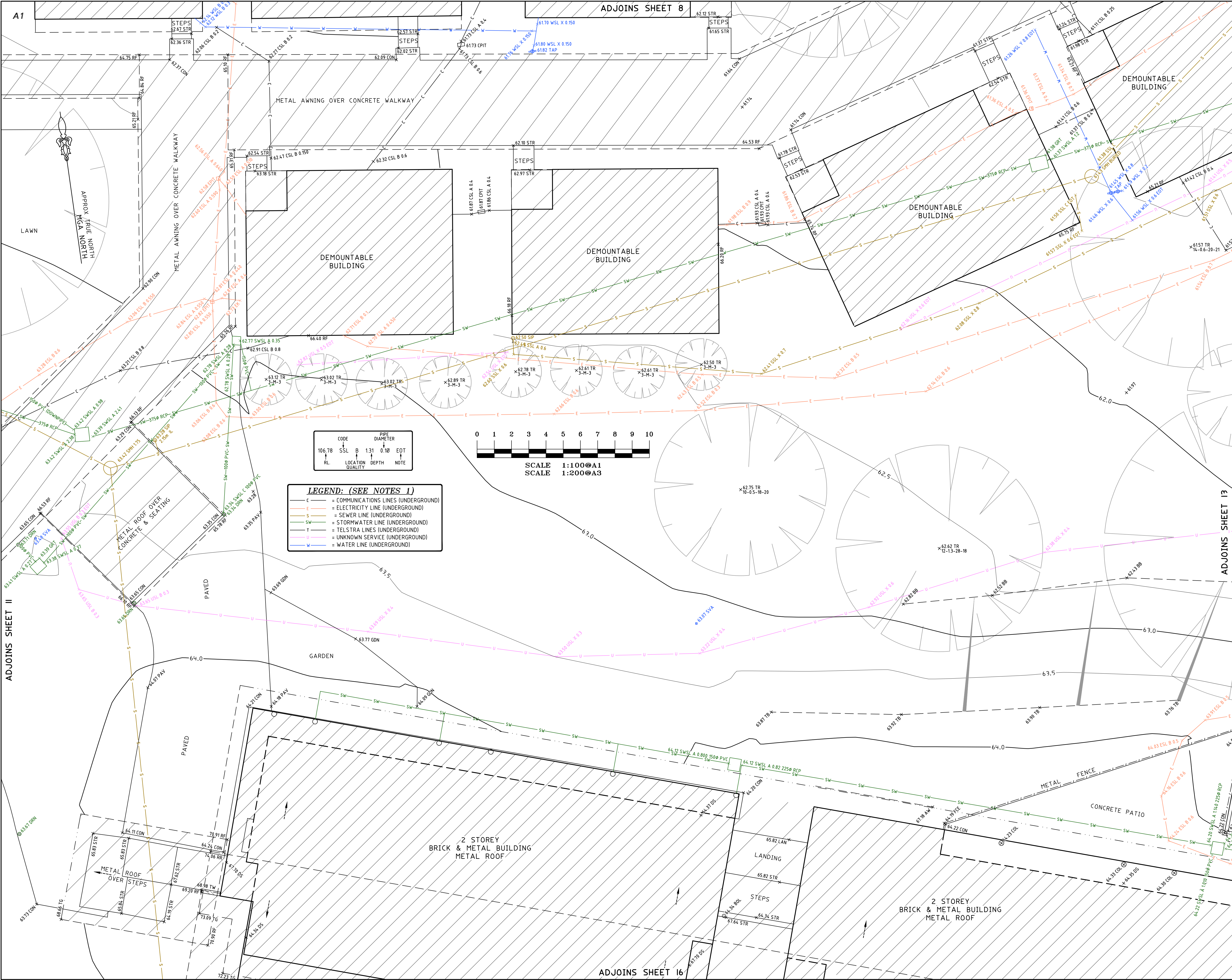
ACN: 096 240 201

PO Box 463 Dee Why
NSW 2099
27/99A South Creek Road,
Dee Why NSW 2099
Telephone: (02) 9971 4802
Facsimile: (02) 9971 4822
E-mail: info@cmsurveyors.com.au

LGA: BLACKTOWN

SHEET 10 OF 21

SURVEYED ME	DRAWN GP	CHECKED ME	APPROVED AF
SURVEY INSTRUCTION 17713A	SCALE 1:100 1:200 A1 A3	DATE OF SURVEY 6-10/07/2020	ISSUE I
DRAWING NAME 17713Adefail	CAD FILE 17713Adefail.dwg		



NOTES

- A BASIC BOUNDARY SURVEY HAS BEEN UNDERTAKEN SUITABLE FOR COUNCIL DA SUBMISSION (TITLE DIMENSIONS ONLY).
- IF CONSTRUCTION ON OR NEAR BOUNDARIES IS REQUIRED IT IS RECOMMENDED THAT THE BOUNDARIES OF THE LAND BE MARKED.
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- THIS SURVEY IS FOR DESIGN PURPOSES OF THE SUBJECT LAND ONLY. THIS PLAN MUST NOT BE USED FOR ANY OTHER MATTER, PURPOSE OR CONSTRUCTION SETOUT.
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- THIS PLAN HAS BEEN PREPARED FOR THE EXCLUSIVE USE OF PERUMAL PEDAVOLI ARCHITECTS PTY LTD.
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- SEWER MAIN PLOTTED FROM SYDNEY WATER SEWER DIAGRAM. LOCATION SHOULD BE MARKED ON SITE IF CRITICAL.
- CRITICAL SPOT LEVELS SHOULD BE CONFIRMED WITH SURVEYOR.
- CONTOURS SHOWN DEPICT THE TOPOGRAPHY. THEY DO NOT REPRESENT THE EXACT LEVEL AT ANY PARTICULAR POINT. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION.
- CONTOUR INTERVAL - 0.5 metre. - SPOT LEVELS SHOULD BE ADOPTED.
- POSITION OF RIDGE LINES ARE DIAGRAMMATIC ONLY (NOT TO SCALE).
- THE INFORMATION IS ONLY TO BE USED AT A SCALE ACCURACY OF 1:100.
- DO NOT SCALE OFF THIS PLAN / FIGURED DIMENSIONS TO BE TAKEN IN PREFERENCE TO SCALED READINGS.
- THIS PLAN HAS BEEN PREPARED UNDER THE SUPERVISION OF REGISTERED SURVEYOR S B McEVROY, BOSSI NUMBER 265.
- COPYRIGHT © CMS SURVEYORS 2020.
- NO PART OF THIS SURVEY MAY BE REPRODUCED, STORED IN A RETRIEVAL SYSTEM OR TRANSMITTED IN ANY FORM, WITHOUT THE WRITTEN PERMISSION OF THE COPYRIGHT OWNER EXCEPT AS PERMITTED BY THE COPYRIGHT ACT 1968.
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"SEE SHEET 1 FOR EXTRA
LEGEND & NOTES"

HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: MGA (GDA2020)
MARKS ADOPTED: SSM 101811 & SSM 101817

VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: SSM 101817
R.L. 62.228 (CLASS B)
SOURCE: S.C.I.M.S. (02/07/2020)

I FIRST ISSUE 31/07/2020

CLIENT:
**PERUMAL PEDAVOLI ARCHITECTS
PTY LTD**
**LEVEL 2, 458 WATTLE STREET
ULTIMO, NSW, 2007**

**SURVEY PLAN
SHOWING DETAIL, LEVELS &
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LGA: BLACKTOWN		SHEET 12 OF 21	
SURVEYED ME	DRAWN GP	CHECKED ME	APPROVED AF
SURVEY INSTRUCTION 17713A		SCALE 1:100 @ A1 1:200 @ A3	DATE OF SURVEY 6-10/07/2020
DRAWING NAME 17713Adefail			ISSUE 1
CAD FILE 17713Adefail.l.dwg			

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<p>HORIZONTAL DATUM: CO-ORDINATE SYSTEM: MGA (GDA2020) MARKS ADOPTED: SSM 10I811 & SSM 10I817</p>
<p>VERTICAL DATUM: DATUM: AUSTRALIAN HEIGHT DATUM (AHD) B.M. ADOPTED: SSM 10I817 R.L. 62.228 (CLASS B) SOURCE: S.C.I.M.S. (02/07/2020)</p>

I	FIRST ISSUE	31/07/2020

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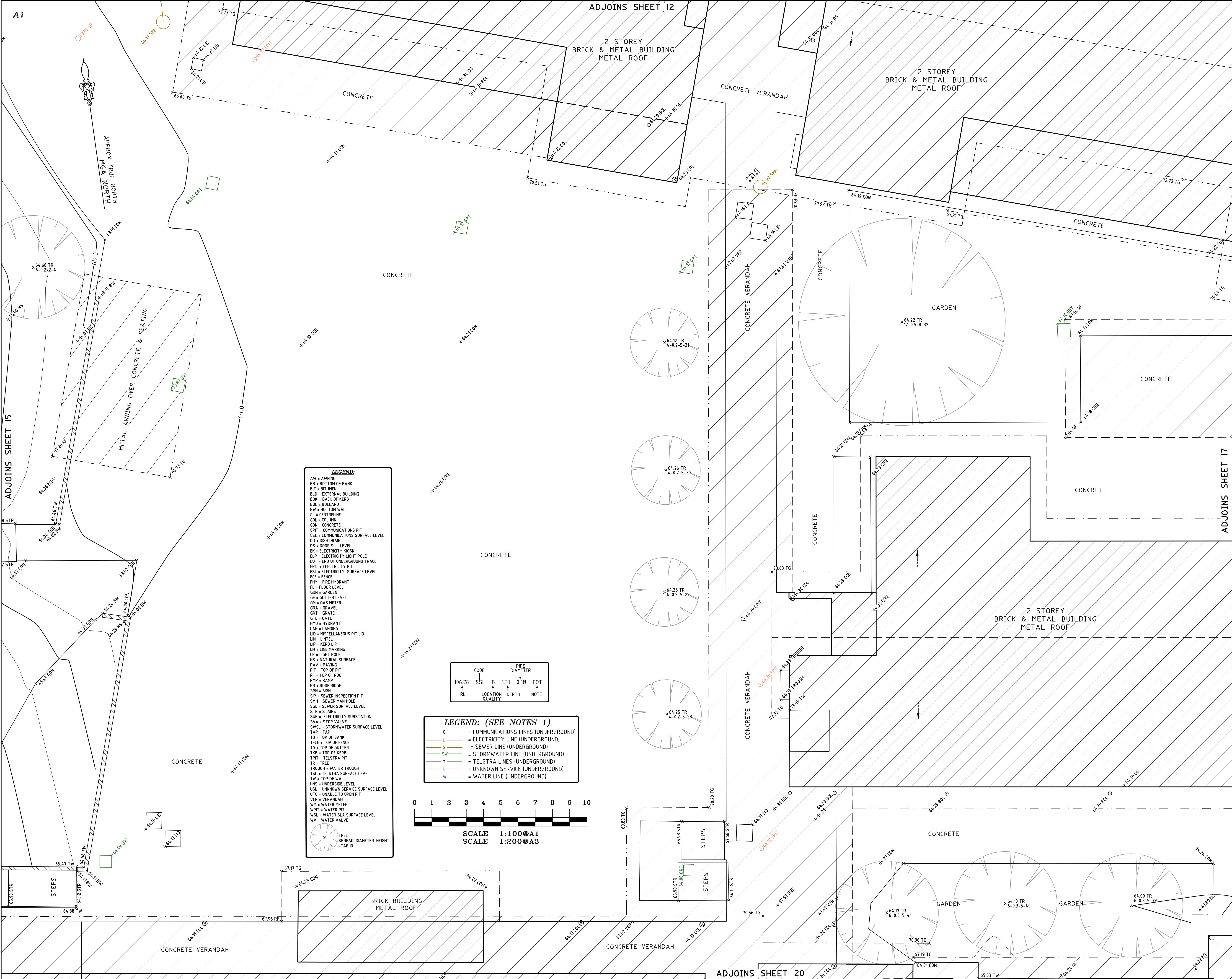
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LGA: BLACKTOWN			SHEET 14 OF 21	
SURVEYED ME	DRAWN GP	CHECKED ME	APPROVED AF	
SURVEY INSTRUCTION 17713A		SCALE 1:100 A1 1:200 <input checked="" type="checkbox"/> A3	DATE OF SURVEY 6-10/07/2020	
DRAWING NAME 17713Adetail			ISSUE 1	
CAD FILE 17713Adetail.dwg				



LEGEND:

AW = AWNING
BB = BOTTOM OF BANK
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EK = ELECTRICITY KIOSK
ELP = ELECTRICITY LIGHT POLE
EDT = END OF UNDERGROUND TRACE
EPT = ELECTRICITY PIT
ESL = ELECTRICITY SURFACE LEVEL
FCE = FENCE
FRY = FIRE HYDRANT
FL = FLOOR LEVEL
GDN = GARDEN
GR = GUTTER LEVEL
GM = GAS METER
GRA = GRAVEL
GRT = GRATE
GTE = GATE
HYD = HYDRANT
LAN = LANDING
LID = MISCELLANEOUS PIT LID
LIN = LINTEL
LIP = KERB LIP
LM = LINE MARKING
LP = LIGHT POLE
NS = NATURAL SURFACE
PAV = PAVING
PIT = TOP OF PIT
RF = TOP OF ROOF
RMP = RAMP
RR = ROOF RIDGE
SDN = SIGN
SIP = SEWER INSPECTION PIT
SMH = SEWER MAIN HOLE
SSL = SEWER SURFACE LEVEL
STR = STAIRS
SUB = ELECTRICITY SUBSTATION
SVA = STOP VALVE
SWSL = STORMWATER SURFACE LEVEL
TAP = TAP
TB = TOP OF BANK
TFCE = TOP OF FENCE
TG = TOP OF GUTTER
TGB = TOP OF KERB
TPIT = TELSTRA PIT
TR = TREE
TROU = WATER TROUGH
TSL = TELSTRA SURFACE LEVEL
TW = TOP OF WALL
UNS = UNDERSIDE LEVEL
USL = UNKNOWN SERVICE SURFACE LEVEL
UTD = UNABLE TO OPEN PIT
VER = VERANDAH
WM = WATER METER
WPIT = WATER PIT
WSL = WATER SLA SURFACE LEVEL
WV = WATER VALVE

TREE
SPREAD-DIAMETER-HEIGHT
-TAG ID

LEGEND: (SEE NOTES 1)

C = COMMUNICATIONS LINES (UNDERGROUND)
E = ELECTRICITY LINE (UNDERGROUND)
S = SEWER LINE (UNDERGROUND)
SW = STORMWATER LINE (UNDERGROUND)
T = TELSTRA LINES (UNDERGROUND)
U = UNKNOWN SERVICE (UNDERGROUND)
W = WATER LINE (UNDERGROUND)

CODE PIPE DIAMETER
106.78 SSL B 1.31 0.10 EDT
RL LOCATION QUALITY DEPTH NOTE

SCALE 1:100@A1
SCALE 1:200@A3

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HORIZONTAL DATUM:
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MARKS ADOPTED: SSM 101811 & SSM 101817

VERTICAL DATUM:
DATUM: AUSTRALIAN HEIGHT DATUM (AHD)
B.M. ADOPTED: SSM 101817
R.L. 62.228 (CLASS B)
SOURCE: S.C.I.M.S. (02/07/2020)

1	FIRST ISSUE	31/07/2020
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CLIENT:
PERUMAL PEDAVOLI ARCHITECTS PTY LTD
LEVEL 2, 458 WATTLE STREET
ULTIMO, NSW, 2007

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LGA: BLACKTOWN		SHEET 16 OF 21	
SURVEYED ME	DRAWN GP	CHECKED ME	APPROVED AF
SURVEY INSTRUCTION 17713A		SCALE 1:100 @ A1 1:200 @ A3	DATE OF SURVEY 6-10/07/2020
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EK = ELECTRICITY KIOSK
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EOT = END OF UNDERGROUND TRACE
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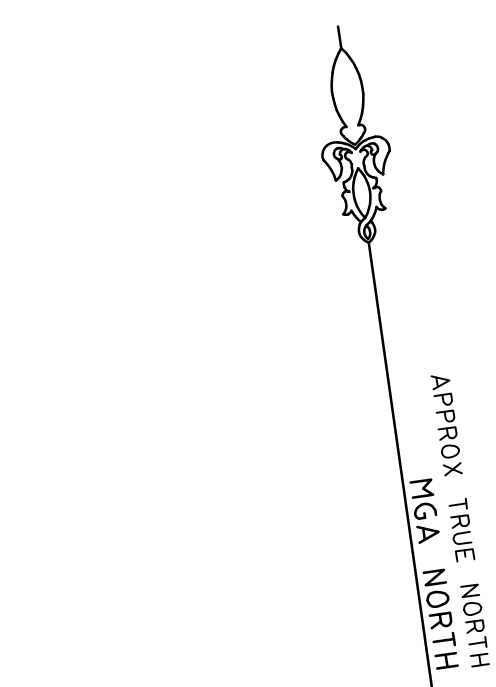
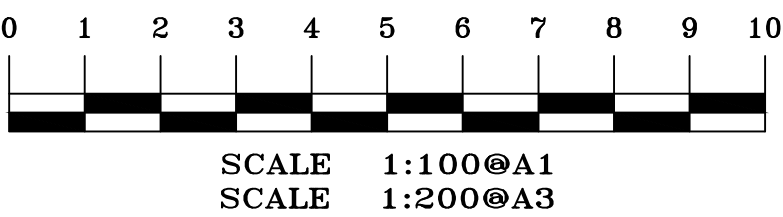
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LGA: BLACKTOWN		SHEET 18 OF 21	
SURVEYED ME	DRAWN GP	CHECKED ME	APPROVED AF
SURVEY INSTRUCTION 17713A		SCALE 1:100 A1 1:200 A3	DATE OF SURVEY 6-10/07/2020
DRAWING NAME 17713Adefail			ISSUE 1
CAD FILE 17713Adefail 1.dwg			



5226
D.P.874087

CODE	PIPE DIAMETER	PIPE LOCATION	PIPE DEPTH	PIPE NOTE
106.78	SSL	B	1.31	EOT
RL				

LEGEND: (SEE NOTES 1)

— C — = COMMUNICATIONS LINES (UNDERGROUND)
— E — = ELECTRICITY LINE (UNDERGROUND)
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— T — = TELSTRA LINES (UNDERGROUND)
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— W — = WATER LINE (UNDERGROUND)

FORMAN

(BITUMEN FORMATION)

AVENUE

ADJOINS SHEET 18

AVENUE

ET 19 OF 21

LGA: BLACKTOWN			SHEET 19 OF 21	
SURVEYED ME	DRAWN GP	CHECKED ME	APPROVED AF	
SURVEY INSTRUCTION 17713A		SCALE 1:100 <input checked="" type="checkbox"/> A1 1:200 <input checked="" type="checkbox"/> A3	DATE OF SURVEY 6-10/07/2020	
DRAWING NAME 17713Adetail			ISSUE 1	
CAD FILE 17713Adetail 1.dwg				

TREE
SPREAD-DIAMETER-HEIGHT
-TAG ID

ADJOINS SHEET 18

[illegible]

A - 315922 RIGHT OF WAY APPURTENANT TO THE PART(S) SHOWN SO BENEFITED IN THE TITLE DIAGRAM

B - DP862902 RESTRICTIONS(ON) ON THE USE OF LAND (NOT INVESTIGATED)

C - DP866893 EASEMENT TO DRAIN WATER 2.5 WIDE AND VARIABLE AFFECTING THE PART(S) SHOWN SO BURDENED IN THE TITLE DIAGRAM

D - DP108312 EASEMENT FOR PADMOUNT SUBSTATION 2.75 METRE(S) WIDE AFFECTING THE PART(S) SHOWN SO BURDENED IN DP108312

E - DP108312 EASEMENT FOR UNDERGROUND CABLES 1 METRE(S) WIDE AFFECTING THE PART(S) SHOWN SO BURDENED IN DP108312

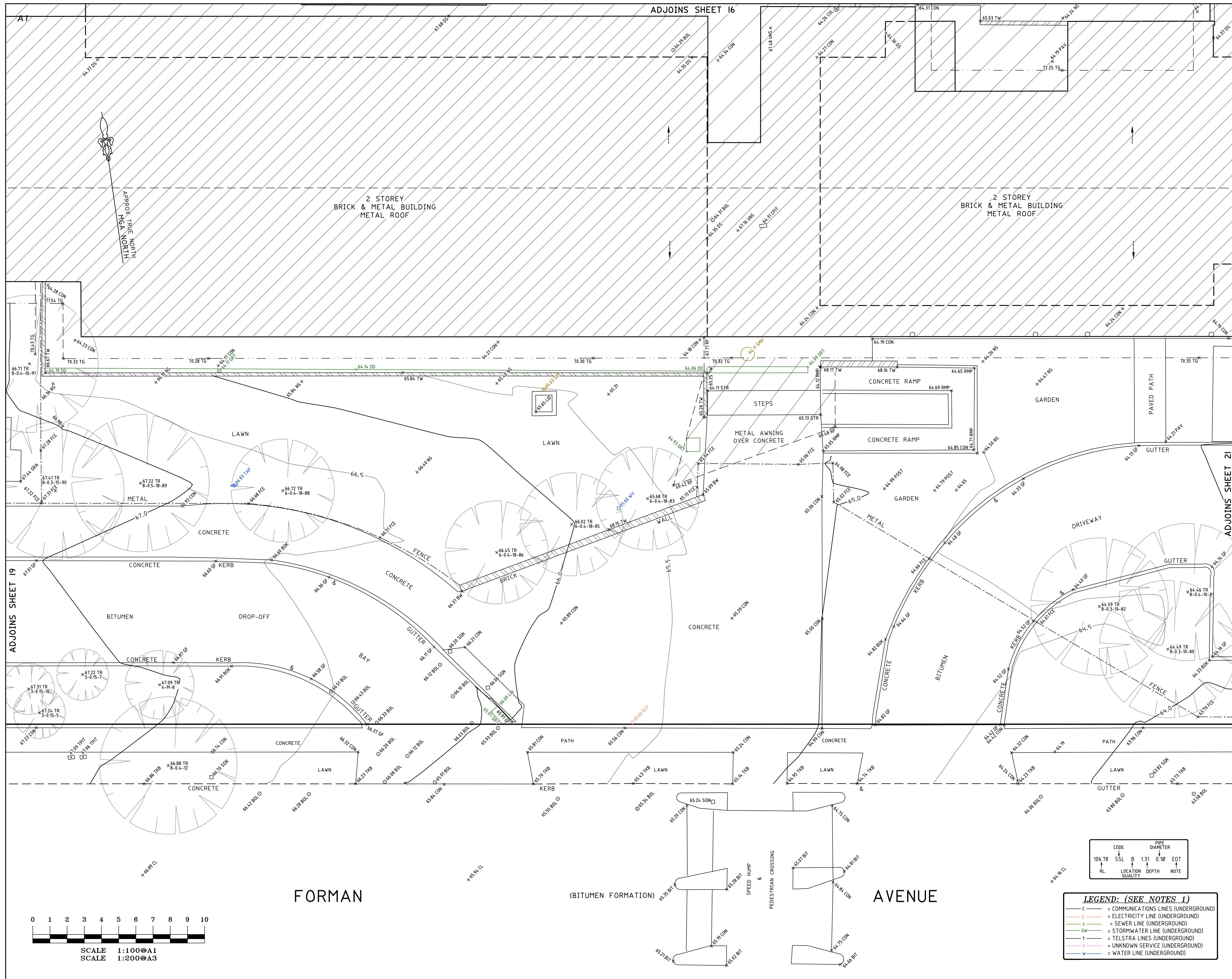
F - DP108312 RESTRICTIONS(ON) ON THE USE OF LAND

(BITUMEN FORMATION)

SCALE 1:100@A1
SCALE 1:200@A3

C — = COMMUNICATIONS LINES (UNDERGROUND)
E — = ELECTRICITY LINE (UNDERGROUND)
S — = SEWER LINE (UNDERGROUND)
SW — = STORMWATER LINE (UNDERGROUND)
T — = TELSTRA LINES (UNDERGROUND)
U — = UNKNOWN SERVICE (UNDERGROUND)
W — = WATER LINE (UNDERGROUND)

C.M.S. Surveyors
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- ## NOTES
- A BASIC BOUNDARY SURVEY HAS BEEN UNDERTAKEN SUITABLE FOR COUNCIL DATA SUBMISSION (TILE DIMENSIONS ONLY).
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 - EXCEPT WHERE SHOWN BY DIMENSION LOCATION OF DETAIL WITH RESPECT TO BOUNDARIES IS INDICATIVE ONLY.
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 - SEWER MAIN PLOTTED FROM SYDNEY WATER SEWER DIAGRAM. LOCATION SHOULD BE MARKED ON SITE IF CRITICAL.
 - CRITICAL SPOT LEVELS SHOULD BE CONFIRMED WITH SURVEYOR.
 - CONTOURS SHOWN DEPICT THE TOPOGRAPHY. THEY DO NOT REPRESENT THE EXACT LEVEL AT ANY PARTICULAR POINT. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION.
 - CONTOUR INTERVAL - 0.5 metre - SPOT LEVELS SHOULD BE ADOPED.
 - POSITION OF RIDGE LINES ARE DIAGNOSTIC ONLY (NOT TO SCALE).
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"SEE SHEET 1 FOR EXTRA
LEGEND & NOTES"

HORIZONTAL DATUM: CO-ORDINATE SYSTEM: MGA (GDA2020) MARKS ADOPTED: SSM 101811 & SSM 101817	
VERTICAL DATUM: DATUM: AUSTRALIAN HEIGHT DATUM (AHD) B.M. ADOPTED: SSM 101817 R.L. 62.228 (CLASS B) SOURCE: S.C.I.M.S. (02/07/2020)	

CLIENT:
PERUMAL PEDAVOLI ARCHITECTS
PTY LTD
LEVEL 2, 458 WATTLE STREET
ULTIMO, NSW, 2007

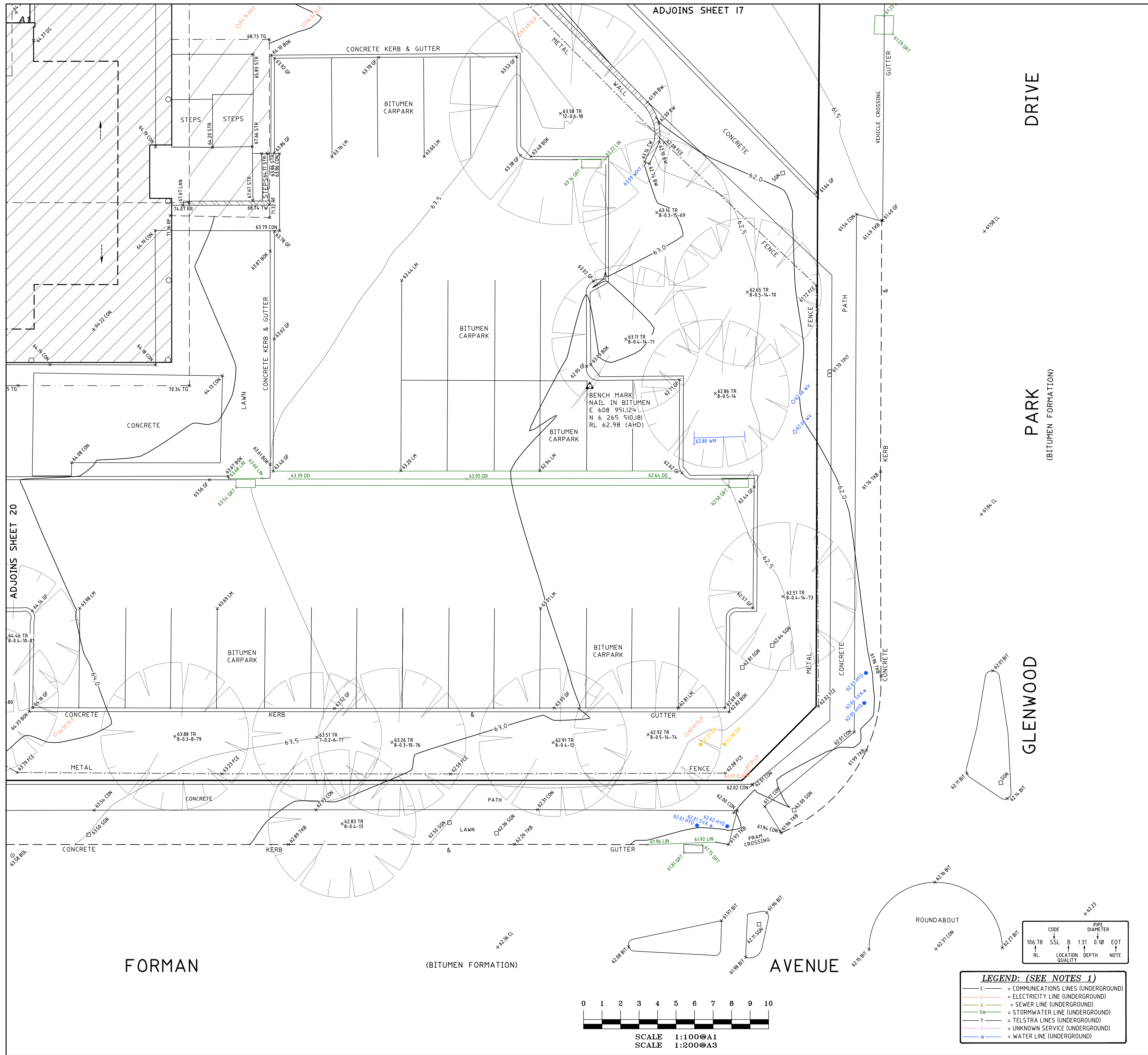
SURVEY PLAN
SHOWING DETAIL, LEVELS &
UNDERGROUND SERVICES
OVER LOT 5227 IN DP868693
GLENWOOD HIGH SCHOOL
GLENWOOD PARK DRIVE
& FORMAN AVENUE
GLENWOOD, NSW, 2768

 **C.M.S. Surveyors
Pty Limited**

ACN: 096 240 201

PO Box 463 Dee Why
NSW 2099
2/99A South Creek Road,
Dee Why NSW 2099
Telephone: (02) 9971 4802
Facsimile: (02) 9971 4822
E-mail: info@cmssurveyors.com.au

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- ## NOTES
1. A BASIC BOUNDARY SURVEY HAS BEEN UNDERTAKEN SUITABLE FOR COUNCIL DA SUBMISSION [TITLE DIMENSIONS ONLY].
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HORIZONTAL DATUM:
CO-ORDINATE SYSTEM: MGA (GDA2020)
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PO Box 463 Dee Why NSW 2099 2/99A South Creek Road, Dee Why NSW 2099 Telephone: (02) 9971 4802 Facsimile: (02) 9971 4822 E-mail: info@omseurysurvey.com.au				SHEET 22 OF 21	
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APPENDIX B

BCC FLOOD ADVICE LETTER



File no: 326021

1 September 2021

Boris Santana

Dear Boris

85 Forman Avenue Glenwood being Lot 5227 in DP 868693

I refer to your email on 6th August 2021 regarding flood information for the above property.

Flood Assessment

Based on the latest information available to us from consultants and/or statutory authorities, there are no flood planning controls that apply to this property.

Council's position is that a Complying Development Certificate (CDC) is not available for this site.

Recommendations

Council's Asset Design section's only requirement relating to flooding or drainage would be for the habitable floor level to be a minimum of 225 mm above finished ground levels.

However, given the contour information available for the site, there is the possibility that the lot is subject to currently un-mapped overland flooding. To determine if it is, the following should be assessed by the applicant:

1. A development application must provide a detail survey to Australian Height Datum (AHD) and certified (signed) by a registered surveyor. The survey is to include:
 - Sufficient spot levels with contours
 - Any existing floor levels
 - The origin and level of the benchmark used and a local benchmark on top of kerb installed for use during construction.
2. The applicant needs to review site topography that directly concentrates flows to the site including trapped drainage low points.

Connect - Create - Celebrate

Council Chambers - 62 Flushcombe Road - Blacktown NSW 2148

Telephone: (02) 9839 6000 - DX 8117 Blacktown

Email: council@blacktown.nsw.gov.au - Website: www.blacktown.nsw.gov.au

All correspondence to: The General Manager - PO Box 63 - Blacktown NSW 2148

3. Any future development within the overland flow area, if identified, would have to prove that it does not increase the flood risk to life or the surrounding area and it must maintain an appropriate overland flow path. This will require a Flood Study Report at your cost unless the future development is contained within the existing building footprint. Should you wish to proceed with a flood study please contact Council for specific flood modelling requirements.
4. Any future development must comply with general requirements for Flood Modelling as outlined in **Blacktown City Council's Water Sensitive Urban Design (WSUD) Developer Handbook. Chapter 15.3: Design Standards outlines a number of different developments, and states minimum requirements with regards to flooding.**

This document is published on Blacktown City Council's website:

<https://www.blacktown.nsw.gov.au/Plan-build/Stage-2-plans-and-guidelines/Developers-toolkit-for-water-sensitive-urban-design-WSUD/MUSIC-modelling>

5. Allow for the pipes adjacent to the site to be blocked in accordance with Chapter 15 of the WSUD Developer Handbook and include in a Flood Model of the property.
6. *Submit to Council a copy of this Flood Advice Letter, the Flood Study Report and electronic files of the Flood Model with the Development Application (DA).*
7. Council can supply additional information, such as catchment plans and/or ALS/Lidar data for a fee. Contact floodadvice@blacktown.nsw.gov.au for this information.

Background

Please read this letter in conjunction with Attachment A, General Flood Information, and B Complying Development Information.

Please find attached a copy of an extract from Council's Geographical Information System (GIS) showing the approximate extent of Blacktown City's flood information in this area. Please note the disclaimer and the contour interval of 0.5 metres.

Council's flood mapping is available on Council's web site. To start go to <http://maps.blacktown.nsw.gov.au>. Council's flood mapping only covers the areas where it has information. A property that is not identified does not mean that there are no flood issues. It is the responsibility of the person enquiring to check the natural fall of the land and to ensure that the subject property is not affected by local stormwater overland flows that might affect existing or future development on this land.

The above comments are preliminary and not complete. A more detailed assessment at development application stage may result in modifications and/or additions to these comments (This advice is not a guarantee of approval).

However, please also be advised that there may be other non-flood related issues that might impact on the use of the land.

If you would like to discuss this matter further, please contact me on 9839 6384.

Yours faithfully

A handwritten signature in black ink, appearing to read 'Philip Mcateer', with a stylized, cursive script.

Philip Mcateer
Senior Stormwater Engineer

Encl. Attachment A & B, Flood map

Disclaimer:

The information contained in this letter is only valid on the date of issue. This letter has been prepared with all due care and in good faith using the best information available to us.

We provide no warranties in relation to the completeness or accuracy of the information contained in this letter, and do not accept liability for any loss or damage resulting from, or in connection with, its contents or its use.

Attachment A

General Flood Information

The flood levels supplied are for the pre-developed existing conditions

The flood levels supplied do not take climate change into consideration. These flood levels should not be used to set floor levels or to identify the extent of flooding over the property as our current flood models may not have included blockage factors nor changes in land-use and landform since the date of the study.

Probable Maximum Flood

This is the largest flood that could conceivably occur at a particular location. The PMF defines the extent of flood prone land that is, the floodplain. The risk of it happening in any one year is extremely rare and is considered to be between a 1 in 100,000 to a 1 in 10,000,000 chance.

1% AEP Flood

This is a flood that has a probability of 1% (or a 1 in 100 chance) of occurring in any given year.

Flood risk precincts

Precincts have been defined based on hydraulic and survey information available to Council. In many cases a more definitive indication of flood risk precinct extents can be determined by relating surveyed ground levels at AHD to the relevant hydraulic and/or flood level criteria.

The Low Flood Risk Precinct is all land within the floodplain, i.e. within the extent of the Probable Maximum Flood (PMF) but not identified as either a high flood risk or medium flood risk precinct. Therefore, the Low Flood Risk Precinct is all the land between the 1% AEP and PMF flood extents.

The Medium Flood Risk Precinct is the land below the 1% AEP flood level subject to a low hydraulic hazard (in accordance with the provisional criteria outlined in the N.S.W. Government Floodplain Development Manual 2005).

The High Flood Risk Precinct is the land subject to a high hydraulic hazard (in accordance with the provisional criteria outlined in the N.S.W. Government Floodplain Development Manual 2005) in a 1% AEP flood event and/or subject to potential evacuation difficulties during a flood.

“Development on Flood Prone Land” guidelines

Our guidelines can be found in “Blacktown Development Control Plan (DCP) 2015 Part A” publication. This publication is available on Council’s Website “www.blacktown.nsw.gov.au”. To find this document click on Planning and Development tab on the home page and then select Blacktown Development Control Plan 2015. This publication is currently under review in respect of floodplain planning issues.

Council’s flood mapping is available on Council’s web site

To start click Discover Blacktown tab on the home page and then select Maps Online and follow the instructions. Council’s flood mapping only covers the areas where it has information. A property that is not identified does not mean that there are no flood issues. It is the responsibility of the person enquiring to check the natural fall of the land and to ensure that the subject property is not affected by local stormwater overland flows that might affect existing or future development on this land.

Flood Planning Level

The Flood Planning Level is a special area of the Low Flood Risk Precinct that is within the 0.5m freeboard of the 1% AEP flood level.

We are currently reviewing the flood modelling in this area

Finalisation of this modelling work may result in a variation to the quoted flood levels and amendments to our current flood mapping extents. The flood levels shown are under review and therefore are preliminary information only.

Attachment B

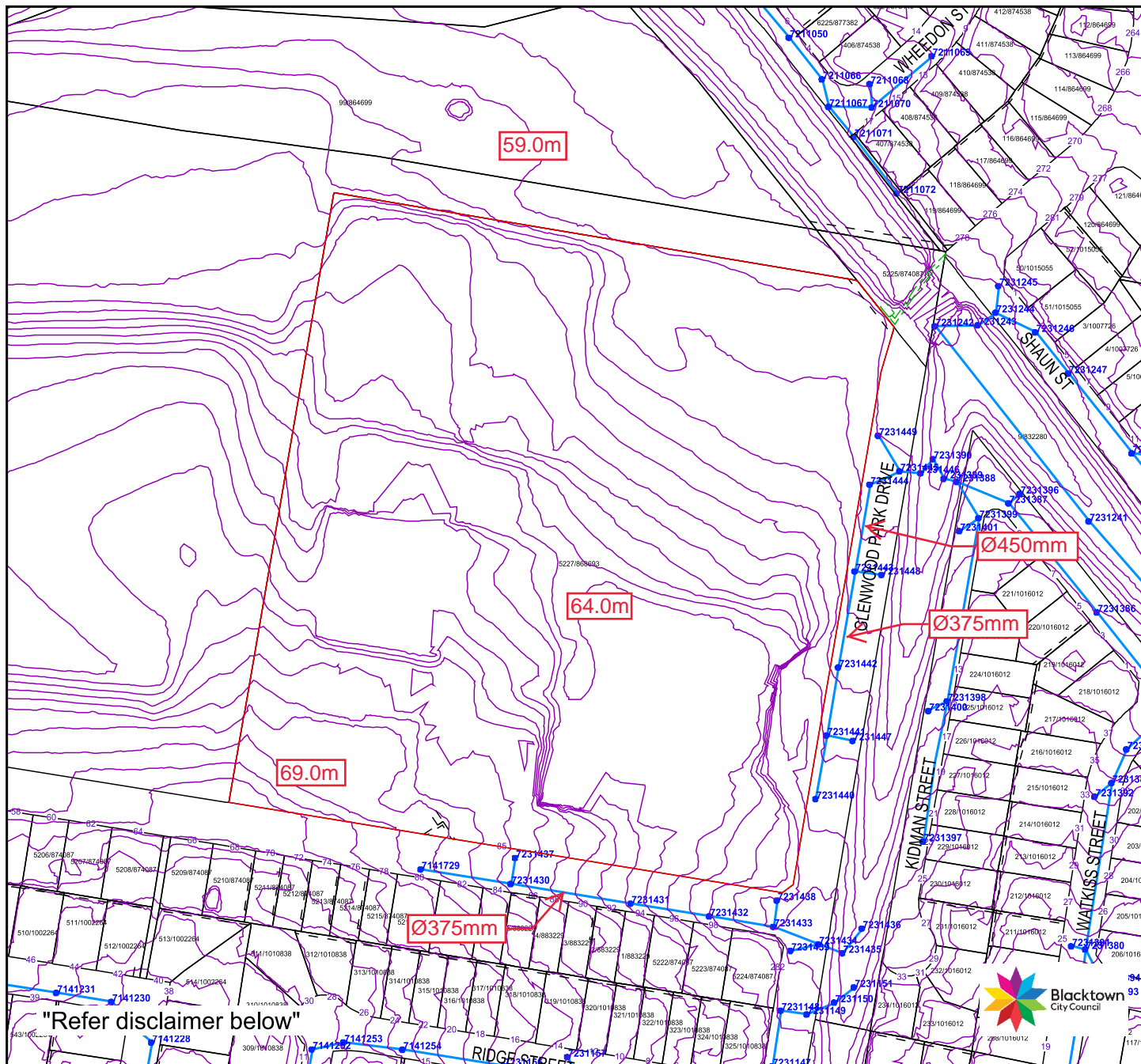
Complying Development Information

The information you seek may vary between “complying development” i.e.: routine development which has minimal environmental impact, providing the design complies with each relevant development standard of the pertinent State Environmental Planning Policy (SEPP) or “local development” i.e.: development, including State significant development, which may have significant environmental impact and for which a Development Consent and Construction Certificate are required under the Environmental Planning and Assessment Act 1979.

The property is identified on Council’s records as affected by “Local Runoff” according to the latest information available to Council. Local Runoff is considered to be the equivalent of a “flow path” for the purposes of State Environmental Planning Policy (Exempt and Complying Development Codes) 2008.

Where your enquiry relates to a proposed Complying Development Certificate (CDC), any flood control lot provisions of the relevant SEPP must be investigated.

The SEPP may provide that a CDC cannot be issued for any flood control lot until either Council or a professional engineer who specialises in hydraulic engineering (e.g.: a person holding the relevant accreditation under the NSW Building Professionals Board accreditation scheme) certifies that the land is not a flood storage area, a floodway area, a flow path, a high hazard area or a high-risk area.



Copyright NSW Land Information Centre 1996

Plot Date: 30/08/2021

Copyright Blacktown City Council

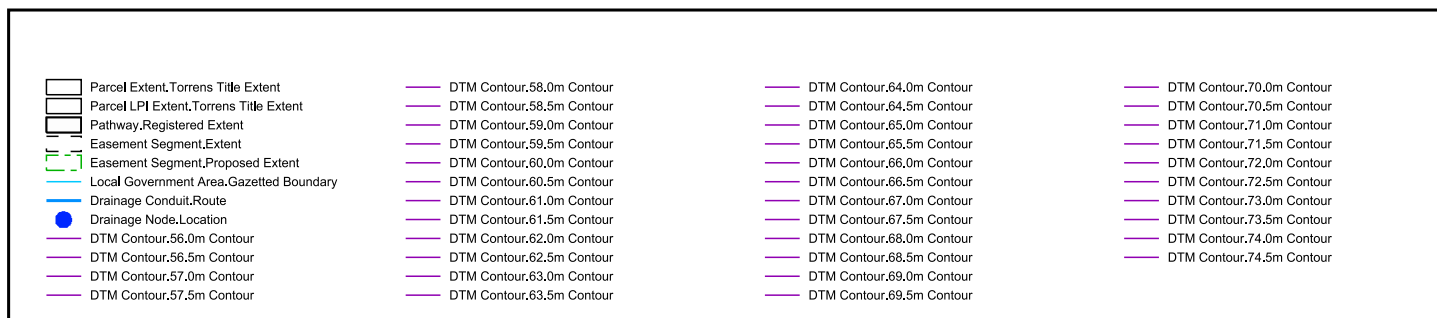
BLACKTOWN CITY COUNCIL Flood Risk Map

This is Council's current flood map. However Council is currently reviewing the flood modelling in this area. Finalisation of this modelling work may result in a variation to the quoted flood levels and amendments to Council's current flood mapping extents.

DISCLAIMER: The flood risk precincts shown are based on information available to Council and should be regarded as an indicative guide only. A more accurate indication of the extent of the respective flood risk precincts can be determined by relating surveyed ground levels at Australian Height Datum (AHD) to the hydraulic and/or flood level criteria determining flood risk precinct boundaries. This information may be obtained by a written request to Council accompanied by a ground level survey to AHD prepared by a Registered Surveyor. Should flood risk precinct extents be required for the purpose of a financial transaction of any nature, then the parties to that transaction should apply to Council for formal certification and/or seek independent legal or professional advice.



Scale 1:3000



APPENDIX C

EES ADVICE



DOC21/591115
SSD-23512960

Jenny Chu
Infrastructure Assessments
Planning and Assessment Group
Department of Planning, Industry and Environment
4 Parramatta Square, 12 Darcy Street
Parramatta NSW 2150

Dear Ms Chu,

Glenwood High School Upgrade (SSD-23512960)

I refer to the e-mail of 5 July 2021, requesting advice from Environment, Energy and Science Group (EES) in the Department of Planning, Industry and Environment on the Secretary's Environmental Assessment Requirements (SEARs) for the above.

EES has reviewed the 1 July 2021 request for SEARs and the draft SEARs and provides the following comments and attached recommended Environmental Assessment Requirements.

Biodiversity

EES recommends that key issue No.11 be amended to include the attached biodiversity requirements within the SEARs. Please note in relation to the 4th dot point, the minimum information and spatial data requirements are in Tables 24 and 25 of the Biodiversity Assessment Method (BAM), and as required more broadly by the revised BAM 2020. Other requirements, such as those relating to the BAM Calculator and Biodiversity Offsets and Agreements Management System (BOAMS), are detailed in various guidelines, practice notes, updates and other advices issued by EES to BAM accredited assessors (see: www.environment.nsw.gov.au/topics/animals-and-plants/biodiversity/accredited-assessors/assessor-resources).

Flooding

EES recommends that key issue No.16 be amended to include the attached flooding requirements within the SEARs.

Soil and Water

EES recommends that key issue No.17 be amended to include the attached soil and water requirements within the SEARs.

Should you have any queries on this advice please contact Richard Bonner, Senior Conservation Planning Officer, on 9995 6917 or richard.bonner@environment.nsw.gov.au

Yours sincerely

16/07/21

Susan Harrison
Senior Team Leader Planning
Greater Sydney Branch
Biodiversity and Conservation Division

**Environment, Energy and Science Group recommended Environmental Assessment
Requirements – Glenwood High School Upgrade (SSD-23512960)**

Biodiversity
<ul style="list-style-type: none"> • Biodiversity impacts related to the proposed development are to be assessed in accordance with Section 7.9 of the <i>Biodiversity Conservation Act 2016</i>, the Biodiversity Assessment Method 2020 and documented in a Development Assessment Report (BDAR). The BDAR must include information in the form detailed in the <i>Biodiversity Conservation Act 2016</i> (s.6.12), <i>Biodiversity Conservation Regulation 2017</i> (s.6.8) and Biodiversity Assessment Method. • The BDAR must document the application of the avoid, minimise and offset framework including assessing all direct, indirect and prescribed impacts in accordance with the Biodiversity Assessment Method 2020. • The BDAR must include details of the measures proposed to address the offset obligation as follows; <ul style="list-style-type: none"> a. The total number and classes of biodiversity credits required to be retired for the development; b. The number and classes of like-for-like biodiversity credits proposed to be retired; c. The number and classes of biodiversity credits proposed to be retired in accordance with the variation rules; d. Any proposal to fund a biodiversity conservation action; e. Any proposal to make a payment to the Biodiversity Conservation Fund. <p>If seeking approval to use the variation rules, the BDAR must contain details of the reasonable steps that have been taken to obtain requisite like-for-like biodiversity credits.</p> • The BDAR must be submitted with all spatial data associated with the survey and assessment as per Appendix 11 of the BAM. • The BDAR must be prepared by a person accredited in accordance with the <i>Accreditation Scheme for the Application of the Biodiversity Assessment Method Order 2017</i> under s.6.10 of the <i>Biodiversity Conservation Act 2016</i>.
Flooding
<ul style="list-style-type: none"> • The EIS must map the following features relevant to flooding as described in the <i>Floodplain Development Manual 2005</i> (NSW Government 2005) including: <ul style="list-style-type: none"> a. Flood prone land. b. Flood planning area, the area below the flood planning level. c. Hydraulic categorisation (floodways and flood storage areas). d. Flood Hazard. • The EIS must describe flood assessment and modelling undertaken in determining the design flood levels for events, including a minimum of the 5% Annual Exceedance Probability (AEP), 1% AEP, flood levels and the probable maximum flood, or an equivalent extreme event. • The EIS must model the effect of the proposed development (including fill) on the flood behaviour under current flood behaviour for a range of design events as identified above. This includes the 0.5% and 0.2% AEP year flood events as proxies for assessing sensitivity to an increase in rainfall intensity of flood producing rainfall events due to climate change.

Flooding

- Modelling in the EIS must consider and document:
 - a. Existing council flood studies in the area and examine consistency to the flood behaviour documented in these studies.
 - b. The impact on existing flood behaviour for a full range of flood events including up to the probable maximum flood, or an equivalent extreme flood.
 - c. Impacts of the development on flood behaviour resulting in detrimental changes in potential flood affection of other developments or land. This may include redirection of flow, flow velocities, flood levels, hazard categories and hydraulic categories
 - d. Relevant provisions of the *NSW Floodplain Development Manual 2005*.
- The EIS must assess the impacts on the proposed development on flood behaviour, including:
 - a. Whether there will be detrimental increases in the potential flood affection of other properties, assets and infrastructure.
 - b. Consistency with Council floodplain risk management plans.
 - c. Consistency with any Rural Floodplain Management Plans.
 - d. Compatibility with the flood hazard of the land.
 - e. Compatibility with the hydraulic functions of flow conveyance in floodways and storage in flood storage areas of the land.
 - f. Whether there will be adverse effect to beneficial inundation of the floodplain environment, on, adjacent to or downstream of the site.
 - g. Whether there will be direct or indirect increase in erosion, siltation, destruction of riparian vegetation or a reduction in the stability of river banks or watercourses.
 - h. Any impacts the development may have upon existing community emergency management arrangements for flooding. These matters are to be discussed with the NSW SES and Council.
 - i. Whether the proposal incorporates specific measures to manage risk to life from flood. These matters are to be discussed with the NSW SES and Council.
 - j. Emergency management, evacuation and access, and contingency measures for the development considering the full range of flood risk (based upon the probable maximum flood or an equivalent extreme flood event). These matters are to be discussed with and have the support of Council and the NSW SES.
 - k. Any impacts the development may have on the social and economic costs to the community as consequence of flooding.

Soil and Water

- The EIS must map the following features relevant to water and soils including:
 - a. Acid sulfate soils (Class 1, 2, 3 or 4 on the Acid Sulfate Soil Planning Map).
 - b. Rivers, streams, wetlands, estuaries (as described in s.4.2 of the Biodiversity Assessment Method).
 - c. Wetlands as described in s.4.2 of the Biodiversity Assessment Method.
 - d. Groundwater.
 - e. Groundwater dependent ecosystems.
 - f. Proposed intake and discharge locations.
- The EIS must describe background conditions for any water resource likely to be affected by the development, including:
 - a. Existing surface and groundwater.
 - b. Hydrology, including volume, frequency and quality of discharges at proposed intake and discharge locations.
 - c. Water Quality Objectives (as endorsed by the NSW Government <http://www.environment.nsw.gov.au/ieo/index.htm>) including groundwater as appropriate that represent the community's uses and values for the receiving waters.
 - d. Indicators and trigger values/criteria for the environmental values identified at (c) in accordance with the [ANZECC \(2000\) Guidelines for Fresh and Marine Water Quality](#) and/or local objectives, criteria or targets endorsed by the NSW Government.
 - e. The *Risk-based Framework for Considering Waterway Health Outcomes in Strategic Land-use Planning Decisions* (OEH, 2017).
- The EIS must assess the impacts of the development on water quality, including:
 - a. The nature and degree of impact on receiving waters for both surface and groundwater, demonstrating how the development protects the Water Quality Objectives where they are currently being achieved, and contributes towards achievement of the Water Quality Objectives over time where they are currently not being achieved. This should include an assessment of the mitigating effects of proposed stormwater and wastewater management during and after construction.
 - b. Identification of proposed monitoring of water quality.
 - c. Consistency with any relevant certified Coastal Management Program (or Coastal Zone Management Plan).
- The EIS must assess the impact of the development on hydrology, including:
 - a. Water balance including quantity, quality and source.
 - b. Effects to downstream rivers, wetlands, estuaries, marine waters and floodplain areas.
 - c. Effects to downstream water-dependent fauna and flora including groundwater dependent ecosystems.
 - d. Impacts to natural processes and functions within rivers, wetlands, estuaries and floodplains that affect river system and landscape health such as nutrient flow, aquatic connectivity and access to habitat for spawning and refuge (e.g. river benches).
 - e. Changes to environmental water availability, both regulated/licensed and unregulated/rules-based sources of such water.
 - f. Mitigating effects of proposed stormwater and wastewater management during and after construction on hydrological attributes such as volumes, flow rates, management methods and re-use options.
 - g. Identification of proposed monitoring of hydrological attributes.

(END OF SUBMISSION)

APPENDIX D

GLENWOOD LAKE OUTLET STRUCTURE FLOW CALCULATIONS

Flow Weir RL (m)		High Flow Weir RL (m)		H (m)		Q (m3/s)		Road RL (m)		H		Q (m3/s)		RL		Through the Culvert 1.5x0.9				Through the culvert 3x1.5			

(m)	H (m)	Q Low Flow	Q High Flow	Q Road	Q 1.5x0.9 culverts	Q 3x1.5 culverts	TOTAL
52.1	-1.9	0	0	0	0	0	0
52.2	-1.8	0	0	0	0	0	0.8088
52.3	-1.7	0	0	0	0.3962	2.4544	0
52.4	-1.6	0	0	0	1.1816	4.6444	0
52.5	-1.5	0	0	0	2.2008	7.2568	0
52.6	-1.4	0	0	0	3.389	10.214	0
52.7	-1.3	0	0	0	4.707	13.463	0
52.8	-1.2	0	0	0	6.1284	16.9626	0
52.9	-1.1	0	0	0	7.6344	20.6814	0
53	-1	0	0	0	9.2104	24.5932	0
53.1	-0.9	0	0	0	10.8454	28.6768	0
53.2	-0.8	0	0	0	10.8454	32.9144	0
53.3	-0.7	0	0	0	10.8454	37.2908	0
53.4	-0.6	0	0	0	10.8454	41.793	0
53.5	-0.5	0	0	0	10.8454	46.4094	0
53.6	-0.4	0	0	0	10.8454	51.1302	0
53.7	-0.3	0	0	0	10.8454	51.1302	0
53.8	-0.2	0	0	0	10.8454	51.1302	0
53.9	-0.1	0	0	0	10.8454	51.1302	0
54	0	0	0	0	10.8454	51.1302	0
54.1	0.1	0.082535447	0	0	10.8454	51.1302	0.082535447
54.2	0.2	0.233445497	0	0	10.8454	51.1302	0.233445497
54.3	0.3	0.428866763	0	0	10.8454	51.1302	0.428866763
54.4	0.4	0.660283575	0	0	10.8454	51.1302	0.660283575
54.5	0.5	0.922774349	0	0	10.8454	51.1302	0.922774349
54.6	0.6	1.213018384	0	0	10.8454	51.1302	1.213018384
54.7	0.7	1.528577868	0	0	10.8454	51.1302	1.528577868
54.8	0.8	1.867563975	0	0	10.8454	51.1302	1.867563975
54.9	0.9	2.228457067	0	0	10.8454	51.1302	2.228457067
55	1	2.61	0	0	10.8454	51.1302	2.61
55.1	1.1	3.011130203	0	0	10.8454	51.1302	3.011130203
55.2	1.2	3.4309341	0	0	10.8454	51.1302	3.4309341
55.3	1.3	3.868615217	0	0	10.8454	51.1302	3.868615217
55.4	1.4	4.323471105	0	0	10.8454	51.1302	4.323471105
55.5	1.5	4.794876171	0	0	10.8454	51.1302	4.794876171
55.6	1.6	5.282268604	0	0	10.8454	51.1302	5.282268604
55.7	1.7	5.785140214	0	0	10.8454	51.1302	5.785140214
55.8	1.8	6.303028415	0	0	10.8454	51.1302	6.303028415
55.9	1.9	6.835509776	0	0	10.8454	51.1302	6.835509776
56	2	7.382194796	0	0	10.8454	51.1302	7.382194796
56.1	2.1	7.942723595	0.165070894	0	10.8454	51.1302	8.107794488
56.2	2.2	8.516762343	0.466890994	0	10.8454	51.1302	8.983653336
56.3	2.3	9.104000258	0.857733525	0	10.8454	51.1302	9.961733783
56.4	2.4	9.704147072	1.320567151	0	10.8454	51.1302	11.02471422
56.5	2.5	10.31693087	1.845548699	0	10.8454	51.1302	12.16247957
56.6	2.6	10.94209622	2.426036768	0	10.8454	51.1302	13.27143677
56.7	2.7	11.57940259	3.057155737	0	10.8454	51.1302	13.90255574
56.8	2.8	12.22862295	3.73512795	2.529622128	10.8454	51.1302	17.11035008
56.9	2.9	12.88954254	4.45691413	7.155417528	10.8454	51.1302	22.45773166
57	3	13.56195782	5.22	13.14534138	10.8454	51.1302	29.21074138
57.1	3.1	14.24567552	6.022260406	20.23857703	10.8454	51.1302	37.10623743
57.2	3.2	14.9405118	6.8618682	28.28427125	10.8454	51.1302	45.99153945
57.3	3.3	15.6462915	7.737230435	37.18064012	10.8454	51.1302	55.76327056
57.4	3.4	16.3628475	8.64694221	46.85296149	10	51.1302	66.34533033
57.5	3.5	17.09000211	9.59575231	57.24330422	10.8454	51.1302	77.67494257
57.6	3.6	17.82765654	10.56453723	68.30519746	10.8454	51.1302	89.71531467
57.7	3.7	18.57561309	11.57028043	80	10.8454	51.1302	102.4156804
57.8	3.8	19.33371126	12.6056568	92.29571584	10.8454	51.1302	115.7646555
57.9	3.9	20.10191433	13.67101955	105.162731	10.8454	51.1302	129.6791506
58	4	20.88	14.7643899	118.578242	10.8454	51.1302	144.188038
58.1	4.1	21.66787355	15.8844719	132.520181	10.8454	51.1302	159.2501043
58.2	4.2	22.4651486	17.03352467	146.969386	10.8454	51.1302	174.8862093
58.3	4.3	23.27256813	18.2080052	161.906814	10.8454	51.1302	191.6206161
58.4	4.4	24.08904162	19.40829414	177.322054	10.8454	51.1302	207.2575996
58.5	4.5	24.91490744	20.63386173	193.196273	10.8454	51.1302	224.7535335
58.6	4.6	25.75000217	21.88419243	209.517517	10.8454	51.1302	242.6413533
58.7	4.7	26.59422227	23.1580805	226.274717	10.8454	51.1302	260.7285752
58.8	4.8	27.44741728	24.4574259	243.452193	10.8454	51.1302	278.7577152
58.9	4.8	28.3066583	25.7790588	261.0501867	10.8454	51.1302	297.67646718
59	5	29.18068171	27.12391565	279.048913	10.8454	51.1302	317.17019132
59.1	5.1	30.0691034	28.49135107	297.445121	10.8454	51.1302	337.3481872
59.2	5.2	30.94982174	29.8810236	316.227766	10.8454	51.1302	356.954196
59.3	5.3	31.84955754	31.292583	335.3899223	10.8454	51.1302	377.5279053
59.4	5.4	32.75149637	32.72569501	354.9242173	10.8454	51.1302	398.4953123
59.5	5.5	33.65459192	34.1809402	374.8236919	10.8454	51.1302	419.8622752
59.6	5.6	34.56776884	35.65531307	395.671037	10.8454	51.1302	441.8247686
59.7	5.7	35.48358068	37.15122078	415.6921938	10.8454	51.1302	463.8888168

APPENDIX E

PMP CALCULATION

PMF ESTIMATION CALCULATION WORKSHEET

PROJECT:	6393	
MODELLER:	NKK	
DATE:	27/09/2021	
Site Area:	1 km2	m2
Type of generalised method:	GSAM Coastal Zone	Refer Figure 1
Duration Limit:	6	Refer Figure 2
Terrain Category:	Rough	
Elevation Adjustment Factor:	1	Elevation <= 1500m
Moisture Adjustment Factor:	0.7	Refer Figure 3
PMP Value:		

Where;

S = smooth % of catchment area
Ds = initial rainfall depth for the smooth terrain categories
R = rough % of catchment area
Dr = initial rainfall depth for the rough terrain categories
MAF = moistuer adjustment factor
EAF = Elevation adjustment factor

Storm Event	PMP
0.25hr	171.5
0.5hr	245
0.75hr	308
1hr	357
1.5hr	458.5
2hr	539
2.5hr	595
3hr	656.6
4hr	745.5
5hr	823.9
6hr	870.1

Refer to Commonwealth Bureau of Meteorology The Estimation of Probable Maximum Precipitation in Australia: Generalised Short-Duration Method Report for complete method.

Figure 1:

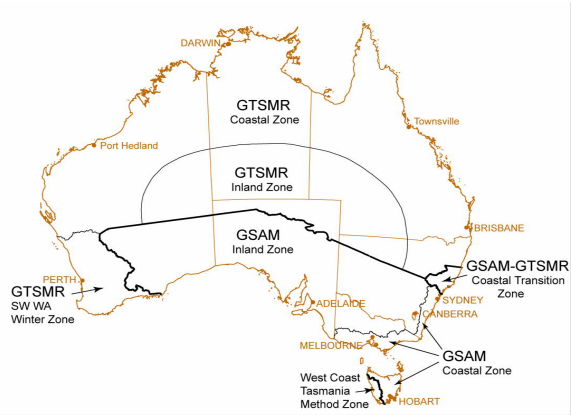


Figure 2:

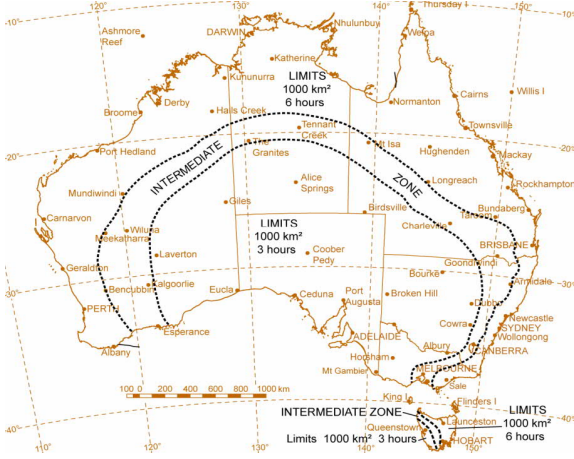
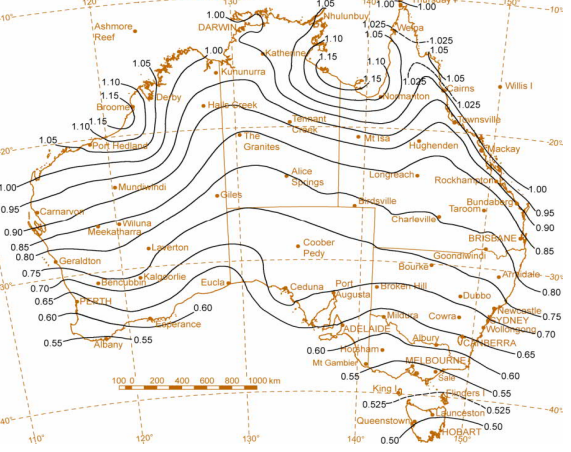


Figure 3:



Depth Duration Area Curve
Refer to Figure 4 in BOM PMF Report

Storm Event	R	S	units
0.25hr	245	245	mm
0.5hr	350	350	mm
0.75hr	440	440	mm
1hr	510	510	mm
1.5hr	655	570	mm
2hr	770	647	mm
2.5hr	850	690	mm
3hr	938	727	mm
4hr	1065	793	mm
5hr	1177	855	mm
6hr	1243	900	mm

PMP Value

Storm Event	PMP	Nearest 10mm
0.25hr	171.5	170
0.5hr	245	250
0.75hr	308	310
1hr	357	360
1.5hr	458.5	460
2hr	539	540
2.5hr	595	600
3hr	656.6	660
4hr	745.5	750
5hr	823.9	820
6hr	870.1	870

RAINFALL PER STORM EVENT

15 MIN STORM EVENT				30 MIN STORM EVENT				45 MIN STORM EVENT				1HR STORM EVENT							
0.25hr				0.50hr				0.75hr				0.75hr							
mm	mm/hr			mm	mm/hr			mm	mm/hr			mm	mm/hr						
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0				
0.75	4	4	6.8	544	1.5	4	4	10	400	2.25	4	4	12.4	330.6667	3	4	14.4	288	
1.5	10	6	10.2	816	3	10	6	15	600	4.5	10	6	18.6	496	6	10	21.6	432	
2.25	18	8	13.6	1088	4.5	18	8	20	800	6.75	18	8	24.8	641.3333	9	18	28.8	576	
3	25	7	11.9	952	6	25	7	17.5	700	9	25	7	21.7	578.6667	12	25	35.2	504	
3.75	32	7	11.9	952	7.5	32	7	17.5	700	11.25	32	7	21.7	578.6667	15	32	7	25.2	504
4.5	39	7	11.9	952	9	39	7	17.5	700	13.5	39	7	21.7	578.6667	18	39	7	25.2	504
5.25	46	7	11.9	952	10.5	46	7	17.5	700	15.75	46	7	21.7	578.6667	21	46	7	25.2	504
6	52	6	10.2	816	12	52	6	15	600	18	52	6	18.6	496	24	52	6	21.6	432
6.75	59	7	11.9	952	13.5	59	7	17.5	700	20.25	59	7	21.7	578.6667	27	59	7	25.2	504
7.5	64	5	8.5	680	15	64	5	12.5	500	22.5	64	5	15.5	413.3333	30	64	5	18	360
8.25	70	6	10.2	816	16.5	70	6	15	600	24.75	70	6	18.6	496	33	70	6	21.6	432
9	75	5	8.5	680	18	75	5	12.5	500	27	75	5	15.5	413.3333	36	75	5	18	360
9.75	80	5	8.5	680	19.5	80	5	12.5	500	29.25	80	5	15.5	413.3333	39	80	5	18	360
10.5	85	5	8.5	680	21	85	5	12.5	500	31.5	85	5	15.5	413.3333	42	85	5	18	360
11.25	89	4	6.8	544	22.5	89	4	10	400	33.75	89	4	12.4	330.6667	45	89	4	14.4	288
12	92	3	5.1	408	24	92	3	7.5	300	36	92	3	9.3	248	48	92	3	10.8	216
12.75	95	3	5.1	408	25.5	95	3	7.5	300	38.25	95	3	9.3	248	51	95	3	10.8	216
13.5	97	2	3.4	272	27	97	2	5	200	40.5	97	2	6.2	165.3333	54	97	2	12	144
14.25	99	2	3.4	272	28.5	99	2	5	200	42.75	99	2	6.2	165.3333	57	99	2	7.2	144
15	100	1	1.7	136	30	100	1	2.5	100	45	100	1	3.1	82.66667	60	100	1	3.6	72
			170				250			310			360						

1.5HR STORM EVENT

1.5hr	mm	mm/hr
0	0	0
4.5	4	18.4
9	10	6
13.5	18	8
18	25	7
22.5	32	7
27	39	7
31.5	46	7
36	52	36
40.5	59	7
45	64	5
49.5	70	6
54	75	5
58.5	80	5
63	85	5
67.5	89	4
72	92	3
76.5	95	3
81	97	2
85.5	99	2
90	100	1

2HR STORM EVENT

2hr	mm	mm/hr
0	0	0
6	4	21.6
12	10	6
18	18	8
24	25	7
30	32	7
36	39	7
42	46	7
48	52	36
54	59	7
60	64	5
66	70	6
72	75	5
78	80	5
84	85	5
90	89	4
96	92	3
102	95	3
108	97	2
114	99	2
120	100	1

2.5HR STORM EVENT

2.5hr	mm	mm/hr
0	0	0
7.5	4	24
15	10	6
22.5	18	8
30	25	7
37.5	32	7
45	39	7
52.5	46	7
60	52	36
67.5	59	7
75	64	5
82.5	70	6
90	75	5
97.5	80	5
105	85	5
112.5	89	4
120	92	3
127.5	95	3
135	97	2
142.5	99	2
150	100	1

2.5HR STORM EVENT

2.5hr	mm	mm/hr
0	0	
4	24	192
6	36	288
8	48	384
7	42	336
7	42	336
7	42	336
6	36	288
7	42	336
5	30	240
6	36	288
5	30	240
5	30	240
4	24	192
3	18	144
3	18	144
2	12	96
2	12	96
1	6	48
	600	

APPENDIX F

NSW STATEMENT EMERGENCY SERVICE CONSULTATION

From: Kelvin Holey
Sent: Tuesday, 26 October 2021 12:57 PM
To: rra@ses.nsw.gov.au
Cc: Boris Santana; Sidoti, Marisa; Morrison, Peter (AU)
Subject: Glenwood High School - Redevelopment: SEARS Flood requirements [Filed 26 Oct 2021 12:56]
Attachments: 6393-SEARs Flood Study Report-211018-verA-NKK.pdf; Appendix C - EES Group advice.pdf

To whom it may concern:

As per the requirements of consent and the need to liaise with the SES for the redevelopment of Glenwood High School, please find attached draft flood study which will be issued as part of the approval submission. This report indicates that the redevelopment is above the 0.2% AEP flood height and will not have an impact on flooding or on neighbouring properties.

Any feedback or comments on the report to satisfy development consent is appreciated. I have been given Maria Frazer's number should I need to get touch: 0458 737 188

I have included the correspondence from EES for information and background. Should there be any questions, do not hesitate to contact me on 0421 421 847

Regards,
Kelvin