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CIVIL ENGINEERING REPORT

RESIDENTIAL UNIT DEVELOPMENT

17-27 HARDWICKE STREET, RIVERWOOD NSW

Revision 2.0

JUNE 2024

Our Ref No. 22T46

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Project verification

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Preface

Henry & Hymas has been engaged by NSW Government Land & Housing Corporation to prepare this Civil Engineering Report (The Report) to satisfy civil engineering matters in support of the Development Approval for the proposed Residential Development at 17-27 Hardwicke Street, Riverwood.

The existing site comprises of six residential lots. It is proposed to demolish all the existing residential buildings and develop into a new three-level apartment building with on-site parking, pedestrian footpaths, and landscaped areas.

This Report aims to provide a summary of key civil engineering design elements of the proposed Development Application:

- General site locality, topography and existing characteristics;
- The proposed site works – earthworks and site stability;
- Stormwater management;
- Sediment and Erosion.

This Report has been prepared in conjunction with a set of Civil Engineering Drawings which show the general proposed civil and stormwater design for the development. The drawings are available for review in Appendix A of this Report.

The following principles have been adopted as part of the design process:

- Consideration of design intent in relation to functionality, expectations and requirements of the end user.
- Compliance with relevant Council and authority standards and policies.
- Design coordination with the project team.
- A design philosophy sympathetic to the site constraints, environment, terrain, and landform.
- Retention of existing infrastructure where suitable.

The civil and stormwater engineering component of the aforementioned project has been designed in accordance with the following Council codes and policies:

- Georges River Development Control Plan (DCP) 2021.
- Georges River Council – Stormwater Management Policy, April 2021.

1. Site overview and Proposed Development

The subject development site is located at 17-27 Hardwicke Street, Riverwood in the Georges River Council Local Government Area (LGA) and covers an area of approximately 3658m^2. The site is enclosed by Hardwicke Street to the north, and surrounded by existing dwelling houses along the western, eastern and southern boundary lines and further bounded by Hedley Street to the south. Vehicular access to the on-site car park can be achieved via the vehicle crossing and driveway off Hardwicke Street along the eastern site boundary. Pedestrians can access the building via the footpaths and ramps off Hardwicke Street. Refer to Figure 1 below for the locality plan.

Figure 1: Locality plan (Google Maps)

A review of the survey prepared for the subject site shows the site generally falls in an south-westerly direction towards the existing residential lot adjacent to the south-western corner of the site at an average grade of 4.4%. A copy of the feature survey for the development is included in Appendix B of this report. A reduced size image is included below in Figure 2.

The proposed development comprises a three-story residential apartment building with on-grade parking spaces, pedestrian footpaths, and landscaped areas.

An architectural concept has been prepared for the development by Custance Associates Australia. Architectural concept drawings can be found in Appendix C of this report, and excerpt of the site plan is shown below in Figure 3.

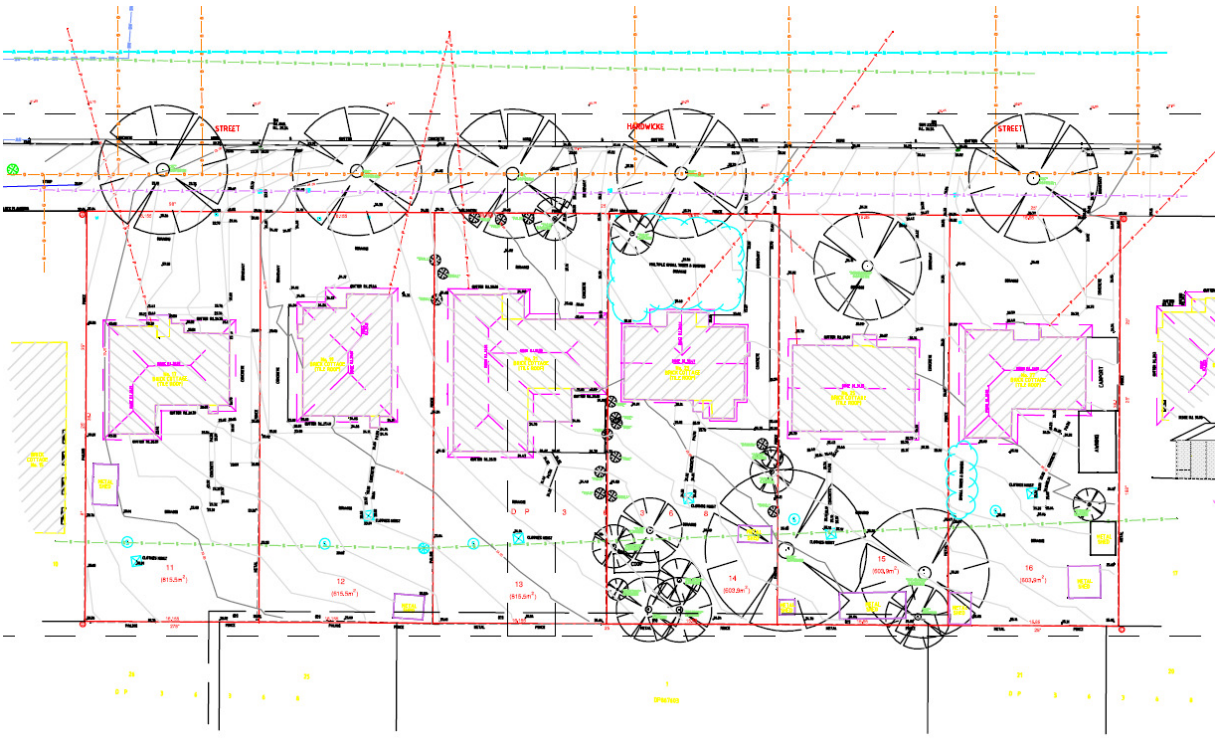

Figure 2: Feature Survey – Northon Survey Partners

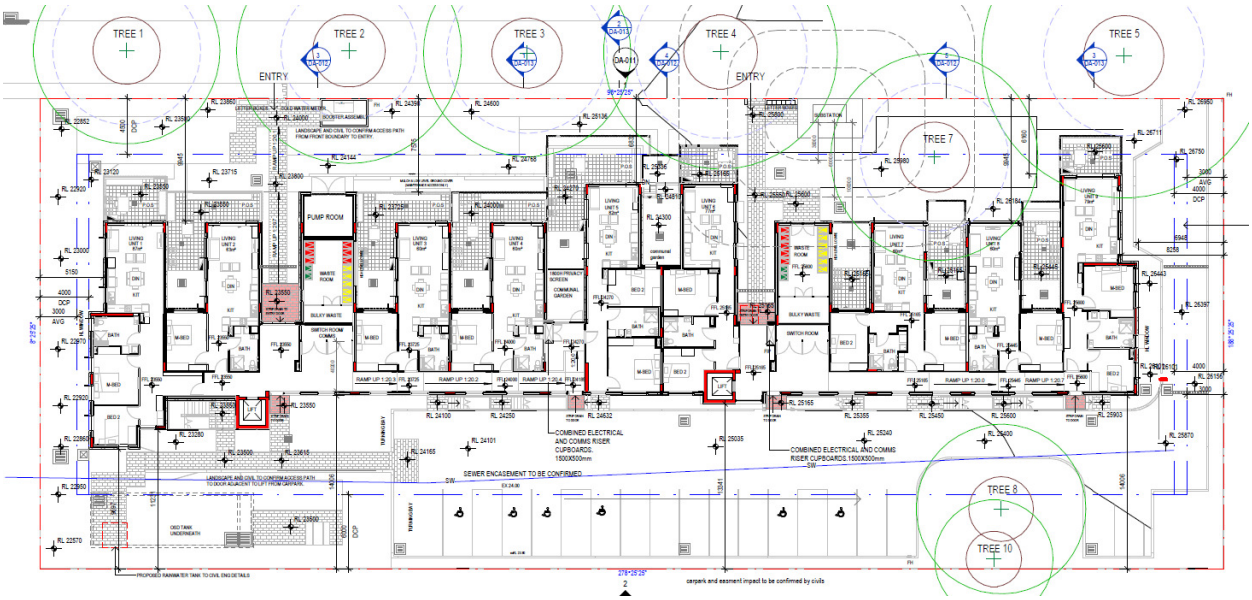

Figure 3: Architectural site plan – ground floor. Custance 2024

2. Site Works

2.1 Bulk Earthworks

Cut and fill earthworks are required to achieve the grades and levels required to construct the proposed apartment building and the associated pedestrian access paths, driveway and car park. The cut and fill earthworks calculations have been undertaken for the overall site. The cut and fill quantities for the site result in a site spoil of material in the order of 969m^3. The distribution of cut and fill throughout the site is shown on civil engineering drawings 22T46_DA_BE01, Appendix A. A smaller-scale figure is shown below, Figure 4. Green represents filling and red represents cutting.

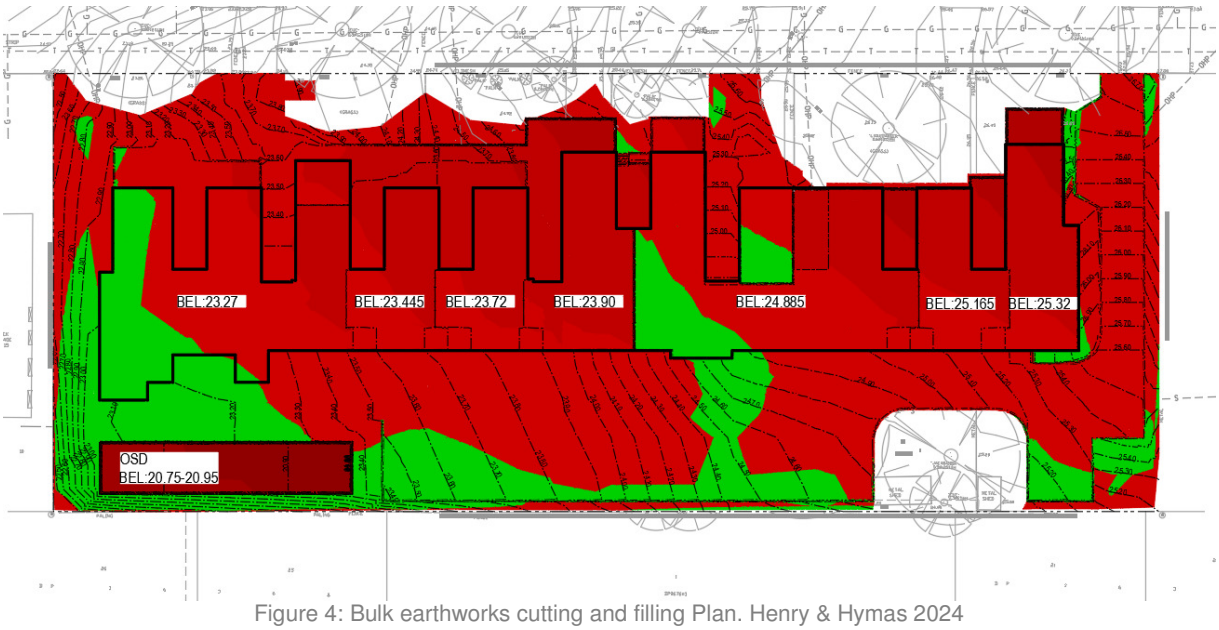

Figure 4: Bulk earthworks cutting and filling Plan. Henry & Hymas 2024

2.2 Site Stability and Retaining Walls

Earthworks batters are provided wherever possible as part of the grading scheme for the development. Earthworks batters will be provided at maximum slopes of 1 in 2 as per geotechnical advice by Section 5.2 of the Geotechnical Report prepared STS Geotechnics dated February 2023, and where short-term construction batters at maximum slopes of 1 in 1 are implemented, these will be protected from erosion by appropriately installed sediment and erosion control measures.

Whilst earthworks batters will be provided wherever possible, retaining walls will be required in some instances where there are significant level changes typically narrow interfaces between existing and proposed levels or fixed site constraints such as Tree Protection Zones (TPZs). The locations and heights of these retaining walls are shown on the engineering drawings located in Appendix A. Retaining walls are required to form compliant grading for the proposed access road, reinforced core-filled blockwork walls are proposed to provide a 'maintenance free' retaining solution for all retaining elements.

3. Stormwater Management

3.1 Existing System

The site generally falls in a south-westerly direction towards the southern site boundary, with the exception of a portion of the site near the north-western corner of the site which fall towards the north-western corner of the site. Based on the existing topography of the site, the stormwater catchment plan under the pre-development scenario can be summarised in Figure 4 below. The red hatch represents the area naturally draining to Hardwicke Street and in the order of 475m^2. The area shown in green hatch (3183m^2) drains to the neighboring sites to the south of the subject development site.

Figure 4: Pre-development stormwater catchment plan. Henry and Hymas 2024

It should be noted that an existing easement for drainage is located along the southern site boundary and extends further towards the south (towards Hedley Street). However, there is no stormwater pipe located within this easement. It is understood under the current scenario that stormwater collected by roof drainage systems is discharged to absorption pits or at ground. Run-off generated by smaller structure or impervious surfaces drains overland towards the southern boundary.

3.2 Proposed Stormwater System

The proposed stormwater management system has been designed to reduce the overall impact of the development on the existing onsite and surrounding stormwater systems and flow regime. The proposed stormwater management system responds to the architectural layout and incorporates the natural topography and site constraints to produce a layout that meets best industry practices and water quality and quantity objectives.

The stormwater management system for the proposed development has been designed to collect all concentrated flows from the proposed impervious areas as well as stormwater runoff generated by pervious areas such as landscaping and earthworks batters. In the event of a total system blockage/failure, site grading is such that overland flow will be directed away from buildings with no impact on habitable areas.

The proposed stormwater system for the development has been designed in accordance and in consideration of the following:

- Institution of Engineers, Australia publication “Australian Rainfall and Runoff” (1987 Edition), Volumes 1 and 2 (AR&R).
- AS 3500.3: National Plumbing and Drainage Code Part 3 – Stormwater Drainage.
- Georges River Council Stormwater Management Policy 2021

Another aspect of the stormwater system is to ensure that the design considers water sensitive urban design (WSUD) objectives. The stormwater network has been designed such that it incorporates proprietary Stormwater Quality Improvement Devices (SQIDs) such as Ocean Protect Ocean Guards and Stormfilters as a means of treating stormwater before it leaves the site to ensure there is no adverse impact on the downstream drainage system, Refer Chapter 3.4 and 3.4 for additional details.

As previously noted, the existing drainage easement to the rear (southern boundary) does not contain a stormwater pipe. It should also be noted that Hedley Street itself does not contain in-ground stormwater system so providing a new pipe in the existing easement would be of no benefit. In ground drainage is located within Hardwicke Street. The location of the existing in-ground stormwater system in Hardwicke Street is noted on the feature survey and civil engineering drawings included in Appendix B and A respectively. The post developed site catchment is proposed to be discharged to the existing in-ground stormwater system in Hardwick Street. To facilitate the connection a short section of inground stormwater is proposed to be constructed from the property boundary to the nearest pit On-site Stormwater Detention (OSD) system is proposed to be provided to maintain the flow rate of the stormwater discharging to Hardwicke Street in the pre-development scenario. Further details of the OSD system will be discussed in Section 3.2 below. Refer to Figure 5 below for the stormwater catchment plan under the post-development scenario.

It is understood through discussions with Council Engineers that existing residences in Hardwicke Street (number 7 and 9) are currently affected by overland flow/flooding. As such, it is critical to ensure post-developed flow directed to Hardwick Street are equal or less to pre-developed flows. It should be noted that the additional of the piped connection (and new kerb inlet pit in Hardwicke Street) would be of benefit by increasing the inlet capacity of the inground system (reduction in kerb gutter flows) in Hardwicke Street).

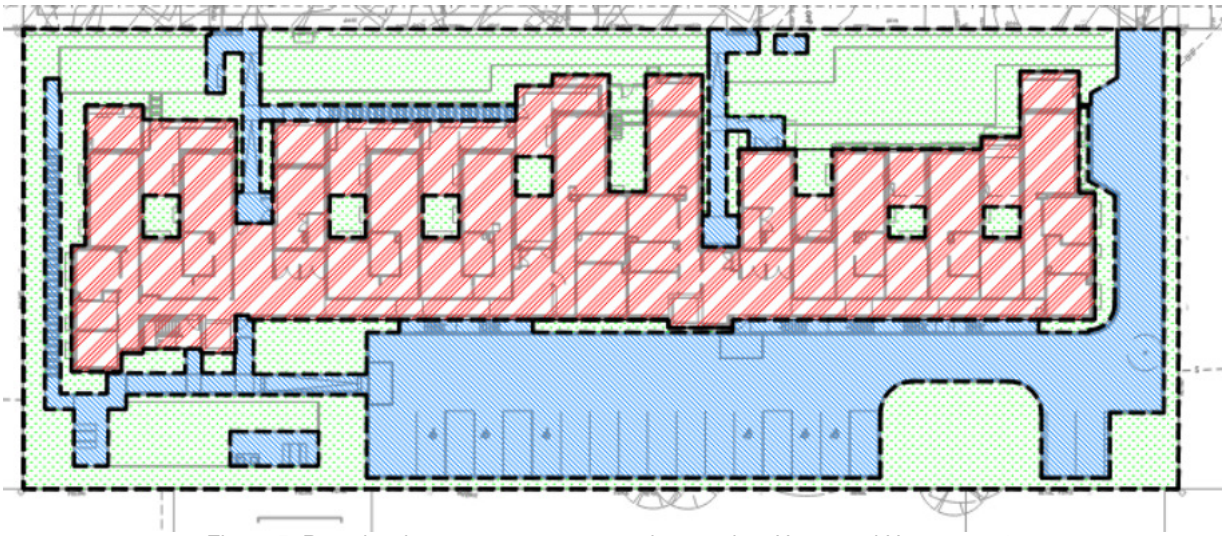

Figure 5: Post-development stormwater catchment plan. Henry and Hymas 2024

3.3 Proposed Stormwater System - On-site Stormwater Detention (OSD)

On-site Stormwater Detention (OSD) will be provided to control the peak stormwater flows from the site by temporarily detaining stormwater from major storms in an underground tank which is then discharged to the downstream drainage system at a controlled rate. In accordance with Georges River Council Stormwater Policy, OSD will be provided to control stormwater runoff from the subject development site such that, for 5-to-100-year ARI events, peak stormwater discharges from the site do not exceed pre-development stormwater discharges.

As mentioned above, the majority of the existing site currently discharges to the southern neighboring sites, only a small portion of the site that is near the north-western corner discharges to Hardwicke Street in the predeveloped scenario.

As per Council Stormwater Management Policy 2021, On-site Stormwater Detention (OSD) system will be required for the site. The required OSD storage requirements and permissible discharge are to be calculated in accordance with the following table.

Site's Impervious Area Percentage upon completion of development (as calculated in accordance with Appendix A7) **	**Maximum Permissible Discharge (PSD) L/s/ha**	**Minimum Site Storage Requirements (SSR) m^3/ha**
Less than 55%	OSD not required	
55% to less than 65%	182	206
65% to less than 75%	166	240
75% to less than 85%	152	270
85% or higher	136	295

Table 1: Maximum Permissible Discharge (PSD) and Minimum Site Storage Requirements (SSR)

The site's total impervious area percentage is approximately 65.1% which corresponds to a maximum PSD of 166L/s/ha and minimum SSR of 240m^3/ha. The total site area of 3,658m^2 (0.3658ha) results in a site-specific maximum PSD of 60.72L/s and minimum SSR of 87.79m^3.

However, given that the site area discharging to Hardwicke Street increases under the post-development scenario, the OSD is designed to ensure that the post-developed flow to Hardwicke Street are reduced to the pre-developed flow to the street for the 100, 20, 10 and 5 year ARI storm events. The flows discharging to the southern neighboring sites are expected to be significantly reduced post development as it is proposed to drain the entire site towards the north, with the exception of a small portion which is in the order of 65m^2 and is located at the south-western corner. This small area bypasses the OSD system because it consists of batter down to the boundary levels and is impractical to be drained to the OSD at a higher level. Since this area is significantly smaller than the area draining to the southern neighboring properties under the existing condition, it is expected that the stormwater runoff from this area will infiltrate into the ground without adversely affecting the neighboring properties and is a significant improvement (decrease in run-off) that the current scenario.

The OSD system was designed and the site discharge flows were modelled by using DRAINS modelling software. Refer to the Table 2 below for a summary of the pre and post developed flows for the relevant storm events.

.

Detailed drawings and specifications of the proposed below ground OSD tank can be found on the civil engineering drawings 22T4617_DA_C202 included in Appendix A.

The OSD was designed using DRAINS modelling software under design and analysis methods recommend by 2019 edition of Australian Rainfall and Runoff and Council Stormwter policy. Based on the modelling results, the required storage volume for the OSD was calculated to be 160m^3. Table 2 below summarises the site discharge flow rates under the pre and post-development conditions for 5 to 100 year ARI events.

ARI	Pre-Development (L/s) North	Pre-Development (L/s) South	Pre-Development (L/s) Total	Post-Development (L/s) From OSD Directed North	Post-Development (L/s) Bypass OSD Overland South	Post-Development (L/s) Total
5	13	59	72	12	0	12
10	16	73	89	13	0	13
20	17	85	102	14	0	14
100	20	115	135	16	0	16

Table 2: Site discharge flow rates for OSD sizing - Pre and post-development conditions

By providing OSD, and from review of Table 1 above summarising the OSD sizing, it is evident that:

- The post-development flows directed to the northwestern corner of the site are less than pre-development flow for 5-to-100-year ARI storm events.
- The post-development flows directed to the southwestern corner of the site are less than pre-development flow for 5-to-100-year ARI storm events.
- The overall post-development flows discharging from the site are less than pre-development flow for 5-to-100-year ARI storm events.

The OSD will be provided in the form of a proposed below ground tank under the Communal Open Space (COS) near the south-western corner of the site with a volume of 160m^3 and a 77mm orifice. The post-developed flow to Hardwicke Street has been restricted to 15L/S (1 in 100 Year ARI storm event) to matches the pre-developed flow to the street by incorporating the OSD system.

It is noted that the proposed design:

1. Exceeds Council's SSR requirements for OSD.
2. Reduced total site discharge rate in the post developed scenario.
3. Matches post developed flows in the 5-year ARI storm event and reduced post developed flows in all other storms directed to Hardwicke Street. It is understood a reduction in post developed flows in the 10-, 20- and 100-Year flow rates would contribute in reducing overland flow in Hardwicke Street to the west of the development.
4. Significantly reduces total post developed flow rates. Similarly with point 3, it is understood this would reduce downstream overland flow/flooding.
5. Significantly reduces total post developed flow rates for the southern catchments. Similarly with point 3, it is understood this would reduce downstream overland flow/flooding.

3.4 Stormwater Quality

Pollution and contamination dislodged or inherent to and in stormwater and stormwater run-off from urban developments have the potential to damage the ecology and health of local creeks and waterways. As such stormwater quality improvement devices (SQIDs) that aim to minimise pollution during construction and operation of the development have been incorporated into the overall stormwater management design. Further details of the SQIDs that have been proposed for the subject development can be found in Section 3.5: Stormwater Quality Improvement Devices.

Stormwater quality improvement devices (SQIDs) have been sized and measured according to the following guidelines:

- Georges River Council Stormwater Management Policy 2021

The performance of the stormwater quality improvement devices (SQIDs) in mitigating pollution from urban development can be assessed by simulating a post developed pollutant reduction rate for the stormwater system. In order to satisfy the water quality treatment targets in Council's policy, development subject to water quality requirements must achieve a minimum percentage reduction of the post developed average annual loads of pollutants in accordance with the Table e below:

Pollutant	**% Post development pollutant reduction targets**
Gross Pollutants (GP)	90
Total Suspended Solids (TSS)	80
Total Phosphorous (TP)	40
Total Nitrogen (TN)	40

Table e: Post development pollutant reduction targets

To better determine the conceptual design of the water quality treatment trains and to ensure the treatment trains satisfy the reduction parameters outlined in Table 3, a Model for Urban Stormwater Improvement Conceptualisation (MUSIC) was developed. A schematic of the MUSIC model can be viewed below in Figure 6

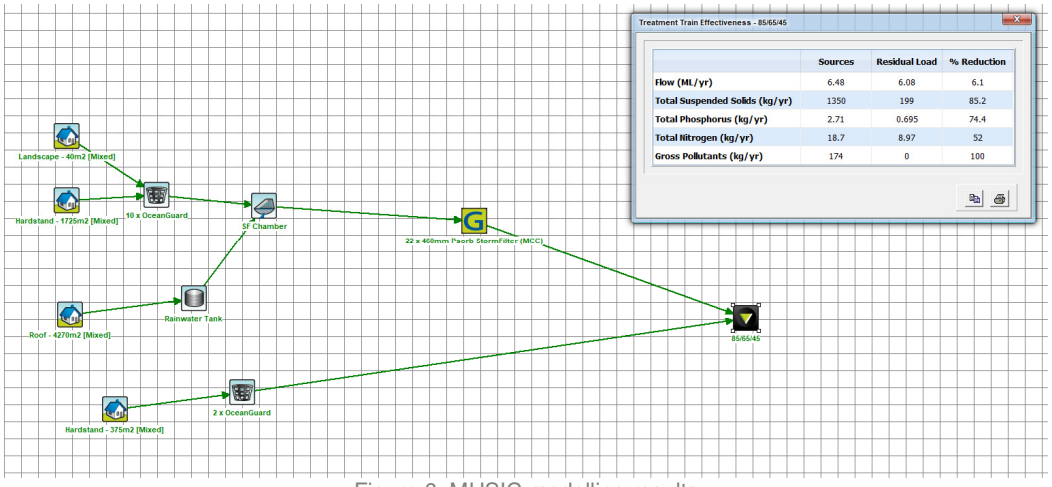

Figure 6: MUSIC modelling results

The resultant reduction in post developed pollutants calculated by the simulation is presented in Table 4 below. With the implementation of the following stormwater quality improvement (SQIDs) devices, the resultant post developed pollutant loads have been reduced below the reduction target for all targeted pollutants.

Pollutant	% Post Development Reduction Target	Resultant % Post Development
Litter / Gross pollutants	90	100
Total Suspended Solids	80	85.2
Total Phosphorous	40	74.4
Total Nitrogen	40	52.0

Table 4: Post development pollutant reduction targets

3.5 Stormwater quality improvement devices (SQIDs)

Primary Treatment - Pit Baskets

As part of an effective treatment train for the site system, selected areas of the development or targeted removal zones (TRZs), will be pre-treated via passive screening pit baskets. To form a site-wide primary treatment system the TRZ for the development encompasses all external areas not beneath roofs and exposed to surface run-off. Target zones, mostly comprising of highly trafficked and hardstand areas that have suitable hydraulics to drain through the basket, are subject to higher instances of pollution and litter and stand most to benefit from effective pre-treatment and have been modelled in MUSIC.

The pit basket proposed to be used is the “200-micron mesh Oceanguard” pit basket filter by Ocean Protect. Pit baskets to be fitted with the “Oceanguard” bit basket are noted on drawing 22T46_DA_C200. A detailed of the pit baskets is provide on civil engineering drawings 22T46_DA_C201.

The maintenance of the pit baskets is important to ensure the effective removal of pollutants. As such, a maintenance schedule will be required to be detailed at the Construction Certificate stage. For this submission we have provided the generic maintenance schedule as prepared by Ocean Protect, refer to Appendix D.

Secondary treatment – Filter cartridges

To meet the water quality requirements, and to achieve a successful implement a treatment train approach, a media filtration chamber is located at the end of the major stormwater drainage line. The media filtration (PSorb Stormfilter cartridges by Ocean Protect) targets the removal of gross pollutants, suspended solids, targeted nutrients and hydrocarbons within the stormwater run-off generated by the developed site areas and is proposed to be used in this development.

Media filtration will be incorporated into the stormwater system by the addition of an offline Stormfilter chamber housed with the OSD tank. The Stormfilter chamber is proposed to house three (3) x 690mm PSorb filter cartridges. Internal site stormwater will be directed to the filter chamber as shown on the civil engineering plan 22T46_DA_C202.

The maintenance of the filter cartridges is important to ensure the effective removal of pollutants. As such, a maintenance schedule will be required to be detailed at the Construction Certificate stage. For this submission we have provided the generic maintenance schedule as prepared by Ocean Protect, refer Appendix D.

4. Sediment and Erosion Controls

During construction, appropriate sediment and erosion control measures need to be implemented to ensure that downstream receiving waters are not adversely impacted as a result of construction activities. The engineering drawings 22T46_DA_SE01-SE02 by Henry & Hymas outline appropriately designed and detailed measures to mitigate against this risk. These measures have been designed in accordance with the requirements of the publication "Landcom – Managing Urban Stormwater - Soils and Construction, Volume 1, 4th Edition March 2004" and Georges River Council's requirements.

The below table is provided to indicate all factors accounted for in the design of the sediment basin.

Constraint	Value	(Source)*
Rainfall Erosivity (R-factor)	2800	Appendix B - Map 10
Length/Slope Gradient Factor, LS	0.97	Appendix A - Table A1
Soil Erodibility (K-factor)	0.038	Appendix C –Table 19
Erosion Control Practice Factor (P-Factor)	1.3	Appendix A - Table A2
Cover Factor (C-Factor)	1.0 (During earthworks)	Appendix A - Figure A5
Calculated Soil Loss, A (RUSLE equation)	134.2	A = R K LS P C
Soil Hydrologic Group	C	Appendix C Table 19
75th Percentile 5-day Rainfall Event	19.4mm (Bankstown)	Table 6.3a
Volumetric Runoff Coefficient, Cv	0.39	(App. F Table F2)
Catchment Area, A	0.3658 ha	

3. *Table 3.1: Sediment Basin design parameters*

Settling Zone volumes and Sediment Zone volumes were calculated using the below calculations

Volume	Formula
Settling Zone Volume	10 Cv A R
Sediment Zone Volume	0.17A(R K LS P C)/1.3 (if <50% of settling zone, nominate 50% of settling zone)
Total Sediment Basin Volume Required :	Settling Zone + Sediment Zone

4. *Table 3.2: Sediment Basin calculations*

5.

Below is a table indicating the total sediment basin volumes required for the site.

	Area (ha)	Settling zone (m^3)	Sediment zone (m^3)	Total Sediment Basin Vol. (m^3)
Subject Site	0.3658	27.7	17.5	45.2

6. Table 3.3: Sediment Basin volumes

5. Conclusion

In general, the engineering objectives of civil design and stormwater management elements mentioned above are to create a system that is based on the architectural layout and incorporates the natural topography and site constraints to produce a cost-effective and appropriate drainage system that meets best industry practices and governing water quality and quantity objectives.

We trust the information provided in this report satisfies matters relating to bulk earthworks, site stability and stormwater matters such as surrounding drainage, On-site Stormwater Detention, and water quality.

6. Appendices

Appendix A: Civil Engineering Drawings by Henry & Hymas Engineers

Appendix B: Site Survey

Appendix C: Architectural concept drawings – Site plan

Appendix D: Maintenance Manual

Appendix A: Civil Engineering Drawings by Henry & Hymas Engineers

PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW
CIVIL WORKS

LOCALITY SKETCH

SCALE: N.T.S.

DRAWING SCHEDULE

22T46_DA_C000	COVER SHEET, DRAWINGS SCHEDULE AND LOCALITY SKETCH
22T46_DA_C010	NOTES
22T46_DA_C100	GENERAL ARRANGEMENT PLAN
22T46_DA_C101	DETAIL PLAN - SHEET 1 OF 2
22T46_DA_C102	DETAIL PLAN - SHEET 2 OF 2
22T46_DA_C110	TYPICAL KERB AND CONCRETE DETAILS
22T46_DA_C160	STANDARD DRAWINGS - CROSSOVER, FOOTPATH
22T46_DA_C200	STORMWATER MISCELLANEOUS DETAILS AND PIT LID SCHEDULE
22T46_DA_C201	STORMWATER MISCELLANEOUS DETAILS
22T46_DA_C202	OSD TANK PLAN DETAILS AND SECTIONS
22T46_DA_C250	PRE-DEVELOPMENT STORMWATER CATCHMENT PLAN
22T46_DA_C251	POST-DEVELOPMENT STORMWATER CATCHMENT PLAN
22T46_DA_C310	RETAINING WALL DETAILS
22T46_DA_SE01	SEDIMENT AND EROSION CONTROL PLAN
22T46_DA_SE02	SEDIMENT AND EROSION CONTROL DETAILS
22T46_DA_EX01	EXTERNAL WORKS PLAN - SHEET 1 OF 4
22T46_DA_EX02	EXTERNAL WORKS PLAN - SHEET 2 OF 4
22T46_DA_EX03	EXTERNAL WORKS PLAN - SHEET 3 OF 4
22T46_DA_EX04	EXTERNAL WORKS PLAN - SHEET 4 OF 4
22T46_DA_BE01	BULK EARTHWORKS CUT AND FILL PLAN
22T46_DA_BE02	BULK EARTHWORKS CUTAND FILL DEPTH PLAN
22T46_DA_EX10	EXTERNAL FOOTPATH LONG SECTION
22T46_DA_EX11	EXTERNAL FOOTPATH CROSS SECTIONS
22T46_DA_EX12	EXTERNAL FOOTPATH RAMP SECTIONS

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
03	ISSUED FOR DA ONLY	AFe	NW	06.06.2024					
02	ISSUED FOR DA ONLY	MP	NW	23.02.2024					
01	ISSUED AS CONCEPT	SC	NW	15.12.2023					

Client
NSW GOVERMENT LAND & HOUSING CORPORATION

Architect
CUSTANCE ARCHITECTURE

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DRAWING TO BE PRINTED IN COLOUR

henry&hymas

Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title
COVER SHEET, DRAWING SCHEDULE AND LOCALITY SKETCH

Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	DECEMBER 2023
Checked	**Approved**	**Scale @A1**
N.Wetzlar	A.Francis	N.T.S.

Drawing number: 22T46_DA_C000

Revision: 03

GENERAL NOTES:

1. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH GEORGES RIVER COUNCIL SPECIFICATION. CONTRACTOR TO OBTAIN AND RETAIN A COPY ON SITE DURING THE COURSE OF THE WORKS.
2. ALL NEW WORKS ARE TO MAKE A SMOOTH JUNCTION WITH EXISTING CONDITIONS AND MARRY IN A 'WORKMANLIKE' MANNER.
3. THE CONTRACTOR IS TO VERIFY THE LOCATION OF ALL SERVICES WITH EACH RELEVANT AUTHORITY. ANY DAMAGE TO SERVICES SHALL BE RECTIFIED BY THE CONTRACTOR OR THE RELEVANT AUTHORITY AT THE CONTRACTOR'S EXPENSE. SERVICES SHOWN ON THESE PLANS ARE ONLY THOSE EVIDENT AT THE TIME OF SURVEY OR AS DETERMINED FROM SERVICE DIAGRAMS. H & H CONSULTING ENGINEERS PTY. LTD CANNOT GUARANTEE THE INFORMATION SHOWN NOR ACCEPT ANY RESPONSIBILITY FOR INACCURACIES OR INCOMPLETE DATA.
4. SERVICES & ACCESSES TO THE EXISTING PROPERTIES ARE TO BE MAINTAINED IN WORKING ORDER AT ALL TIMES DURING CONSTRUCTION.
5. ADJUST EXISTING SERVICE COVERS TO SUIT NEW FINISHED LEVELS TO RELEVANT AUTHORITY REQUIREMENTS WHERE NECESSARY.
6. REINSTATE AND STABILISE ALL DISTURBED LANDSCAPED AREAS.
7. MINIMUM GRADE OF SUBSOIL SHALL BE 0.5% (1:200) FALL TO OUTLETS.
8. ALL TEMPORARY SEDIMENT AND EROSION CONTROL DEVICES ARE TO BE CONSTRUCTED, PLACED AND MAINTAINED IN ACCORDANCE WITH THE TECHNICAL SPECIFICATIONS, EROSION AND SEDIMENTATION CONTROL PLAN AND CAMDEN COUNCIL'S REQUIREMENTS WHERE APPLICABLE.
9. CONTRACTOR TO CHECK AND CONFIRM SITE DRAINAGE CONNECTIONS ACROSS THE VERGE PRIOR TO COMMENCEMENT OF SITE DRAINAGE WORKS.
10. PROPERTIES AFFECTED BY THE WORKS ARE TO BE NOTIFIED IN ADVANCE WHERE DISRUPTION TO EXISTING ACCESS IS LIKELY.

SURVEY NOTES

1. THE EXISTING SITE CONDITIONS SHOWN ON THE FOLLOWING DRAWINGS HAVE BEEN INVESTIGATED BY THE SURVEYOR SPECIFIED IN THE TITLE BLOCK.
2. THE INFORMATION IS SHOWN TO PROVIDE A BASIS FOR DESIGN. HENRY AND HYMAS PTY. LTD. DOES NOT GUARANTEE THE ACCURACY OR COMPLETENESS OF THE SURVEY BASE OR ITS SUITABILITY AS A BASIS FOR CONSTRUCTION DRAWINGS.
3. SHOULD DISCREPANCIES BE ENCOUNTERED DURING CONSTRUCTION BETWEEN THE SURVEY DATA AND ACTUAL FIELD DATA, CONTACT HENRY AND HYMAS PTY. LTD. THE FOLLOWING NOTES HAVE BEEN TAKEN DIRECTLY FROM ORIGINAL SURVEY DOCUMENTS.

EXISTING SERVICES & FEATURES

- THE CONTRACTOR SHALL ALLOW FOR THE CAPPING OFF, EXCAVATION AND REMOVAL (IF REQUIRED) OF ALL EXISTING SERVICES IN AREAS AFFECTED BY WORKS WITHIN THE CONTRACT AREA OR AS SHOWN ON THE DRAWINGS UNLESS DIRECTED OTHERWISE BY THE SUPERINTENDENT.
- THE CONTRACTOR SHALL ENSURE THAT AT ALL TIMES SERVICES TO ALL BUILDINGS NOT AFFECTED BY THE WORKS ARE NOT DISRUPTED.
- PRIOR TO COMMENCEMENT OF ANY WORKS THE CONTRACTOR SHALL GAIN APPROVAL OF HIS PROGRAM FOR THE RELOCATION/ CONSTRUCTION OF TEMPORARY SERVICES.
- CONTRACTOR SHALL CONSTRUCT TEMPORARY SERVICES TO MAINTAIN SUPPLY TO EXISTING BUILDING REMAINING IN OPERATION DURING WORKS TO THE SATISFACTION AND APPROVAL OF THE SUPERINTENDENT. ONCE DIVERSION IS COMPLETE AND COMMISSIONED, THE CONTRACTOR SHALL REMOVE ALL SUCH TEMPORARY SERVICES AND MAKE GOOD TO THE SATISFACTION OF THE SUPERINTENDENT.
- INTERRUPTION TO SUPPLY OF EXISTING SERVICES SHALL BE DONE SO AS NOT TO CAUSE ANY INCONVENIENCE TO THE PRINCIPAL. CONTRACTOR TO GAIN APPROVAL FROM THE SUPERINTENDENT FOR TIME OF INTERRUPTION.
- EXISTING SERVICES, BUILDINGS, EXTERNAL STRUCTURES AND TREES SHOWN ON THESE DRAWINGS ARE EXISTING FEATURES PRIOR TO ANY DEMOLITION WORKS.
- EXISTING SERVICES UNLESS SHOWN ON SURVEY PLAN HAVE BEEN PLOTTED FROM SERVICES SEARCH PLANS AND AS SUCH THEIR ACCURACY CANNOT BE GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO COMPLETE A 'DIAL BEFORE YOU DIG' SEARCH AND TO ESTABLISH THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE SUPERINTENDENT. CLEARANCES SHALL BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY.
- ALL BRANCH GAS AND WATER SERVICES UNDER DRIVEWAYS AND BRICK PAVING SHALL BE LOCATED IN Ø80 uPVC SEWER GRADE CONDUITS EXTENDING A MINIMUM OF 500mm BEYOND EDGE OF PAVING.

SITEWORKS NOTES

1. DATUM : A.H.D.
2. ORIGIN OF LEVELS : REFER TO BENCH OR STATE SURVEY MARKS WHERE SHOWN ON PLAN.
3. CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO THE COMMENCEMENT OF WORK.
4. ALL WORKS TO BE UNDERTAKEN IN ACCORDANCE WITH THE DETAILS SHOWN ON THE DRAWINGS & THE DIRECTIONS OF THE SUPERINTENDENT.
5. EXISTING SERVICES UNLESS SHOWN ON THE SURVEY PLAN HAVE BEEN PLOTTED FROM SERVICES SEARCH PLANS AND AS SUCH THEIR ACCURACY CANNOT BE GUARANTEED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH THE LOCATION AND LEVEL OF ALL EXISTING SERVICES PRIOR TO THE COMMENCEMENT OF ANY WORK. ANY DISCREPANCIES SHALL BE REPORTED TO THE SUPERINTENDENT. CLEARANCES SHALL BE OBTAINED FROM THE RELEVANT SERVICE AUTHORITY.
6. WHERE NEW WORKS ABUT EXISTING THE CONTRACTOR SHALL ENSURE THAT A SMOOTH EVEN PROFILE, FREE FROM ABRUPT CHANGES IS ACHIEVED.
7. THE CONTRACTOR SHALL ARRANGE ALL SURVEY SETOUT TO BE CARRIED OUT BY A REGISTERED SURVEYOR.
8. CARE IS TO BE TAKEN WHEN EXCAVATING NEAR EXISTING SERVICES. NO MECHANICAL EXCAVATION IS TO BE UNDERTAKEN OVER TELSTRA OR ELECTRICAL SERVICES. HAND EXCAVATE IN THESE AREAS.
9. CONTRACTOR TO OBTAIN AUTHORITY APPROVALS WHERE APPLICABLE.
10. MAKE SMOOTH TRANSITION TO EXISTING SURFACES AND MAKE GOOD.
11. THESE PLANS SHALL BE READ IN CONJUNCTION WITH APPROVED LANDSCAPE, ARCHITECTURAL, STRUCTURAL, HYDRAULIC AND MECHANICAL DRAWINGS AND SPECIFICATIONS
12. OR WRITTEN INSTRUCTIONS THAT MAY BE ISSUED RELATING
13. TO DEVELOPMENT AT THE SITE.
14. TRENCHES THROUGH EXISTING ROAD AND CONCRETE PAVEMENTS SHALL BE SAWCUT TO FULL DEPTH OF CONCRETE AND A MINIMUM OF 50mm IN BITUMINOUS PAVING.
15. ALL BRANCH GAS AND WATER SERVICES UNDER DRIVEWAYS AND BRICK PAVING SHALL BE LOCATED IN Ø80 uPVC SEWER GRADE CONDUITS EXTENDING A MINIMUM OF 500mm BEYOND EDGE OF PAVING.
16. GRADES TO PAVEMENTS TO BE AS IMPLIED BY RL'S ON PLAN . GRADE EVENLY BETWEEN NOMINATED RL'S. AREAS EXHIBITING PONDING GREATER THAN 5mm DEPTH WILL NOT BE ACCEPTED UNLESS IN A DESIGNATED SAG POINT.
17. ALL COVERS AND GRATES ETC TO EXISTING SERVICE UTILITIES ARE TO BE ADJUSTED TO SUIT NEW FINISHED SURFACE LEVELS WHERE APPLICABLE.

COMPACTION REQUIREMENTS

1. PREPARATION FOR PAVEMENT: CLEAR SITE, STRIP TOP-SOIL, CUT AND FILL AND PREPARATIONS OF SUB-GRADE SHALL BE AS DESCRIBED IN "SUBGRADE PREPARATION - SITEWORKS".
2. SUB-GRADE SHALL BE COMPACTED TO 98% STANDARD MAXIMUM DRY DENSITY RATIO AT OPTIMUM MOISTURE CONTENT ± 2% IN ACCORDANCE WITH AS 1289 5.1.1., TOP 300MM TO 100% SDD.
3. FOR A SAND SUBGRADE, COMPACTION SHALL BE TO MIN.90% DENSITY INDEX AS PER AS1289 E6.1
4. LOWER BASE COURSE SHALL BE CONSTRUCTED FROM CRUSHED ROCK COMPACTED TO 98% MODIFIED MAXIMUM DRY DENSITY RATIO AT OPTIMUM MOISTURE CONTENT ± 2% IN ACCORDANCE WITH AS 1289 5.1.1. OF THICKNESS NOTED ON DRAWINGS.
5. BASE COURSE SHALL BE CONSTRUCTED FROM FINE CRUSHED ROCK COMPACTED TO 98% MODIFIED MAXIMUM DRY DENSITY RATIO AT OPTIMUM MOISTURE CONTENT ± 2% IN ACCORDANCE WITH AS 1289 5.1.1 OF THICKNESS NOTED ON DRAWINGS.
6. WEARING SURFACE SHALL BE ASPHALTIC CONCRETE TO STANDARD SPECIFICATION
7. TESTING OF THE SUBGRADE AND PAVEMENT LAYERS SHALL BE CARRIED OUT BY APPROVED N.A.T.A. REGISTERED LABORATORY

BULK EARTHWORKS/ SUBGRADE PREPARATION - SITEWORKS.

1. REFER TO GEOTECHNICAL INVESTIGATION REPORT OR INFORMATION RELATING TO EXISTING GROUND CONDITIONS, SITE TREATMENT AND SUPERVISION. REPORT BY STS GEOTECHNICS REFERENCE 23/0234.
2. THE LOCATIONS OF UNDERGROUND SERVICES SHOWN ON THESE DRAWINGS HAVE BEEN PLOTTED FROM SURVEY AND AUTHORITY INFORMATION. THE SERVICE INFORMATION HAS BEEN PREPARED ONLY TO SHOW THE APPROXIMATE POSITIONS OF ANY KNOWN SERVICES AND MAY NOT BE AS CONSTRUCTED OR ACCURATE.
3. HENRY AND HYMAS PTY LTD CAN NOT GUARANTEE THAT THE SERVICES INFORMATION SHOWN ON THESE DRAWINGS, ACCURATELY INDICATES THE PRESENCE OR ABSENCE OF SERVICES OR THEIR LOCATION AND WILL ACCEPT NO LIABILITY FOR INACCURACIES IN THE SERVICES INFORMATION SHOWN ARISING FROM ANY CAUSE WHATSOEVER.
CONTRACTORS ARE TO CONTACT THE RELEVANT SERVICE AUTHORITY PRIOR TO COMMENCEMENT OF EXCAVATION.
FOR COMMENCEMENT OF WORKS ON SITE, SEARCH RESULTS ARE TO BE KEPT ON SITE AT ALL TIMES.
4. ALL SERVICES ARE TO BE LOCATED AND CUT OFF PRIOR TO THE COMMENCEMENT OF EXCAVATION AND FILLING OPERATIONS.
5. ALL TOP SOIL, ORGANIC MATTER AND FILL MATERIAL SHALL BE REMOVED FROM ALL AREAS UNDER BUILDING AND CARPARK LOCATIONS TO THE SATISFACTION OF THE GEOTECHNICAL ENGINEER. AREAS TO BE FULLY STRIPPED OF EXISTING FILL AND DARK BROWN BLACK UPPER ORGANIC ALLUVIUM, OR OBVIOUS UNSUITABLE MATERIAL.
6. EXCAVATE TO ACHIEVE SUBGRADE LEVELS WHERE NECESSARY.
7. THE EXPOSED SUBGRADE AFTER STRIPPING AND/ OR EXCAVATION IS TO BE PROOF ROLLED TO GEOTECHNICAL ENGINEERS SPECIFICATIONS UNDER THE SUPERVISION OF AN EXPERIENCED GEOTECHNICAL ENGINEER OR AN EXPERIENCED CIVIL ENGINEER. ANY AREAS ON THE SUBGRADE EXHIBITING EXCESSIVE DEFLECTION / MOVEMENT UNDER ROLLER TO BE EXCAVATED TO A MIN. DEPTH OF 0.5m AND REPLACED WITH APPROVED GRANULAR MATERIAL COMPACTED IN 250mm LOOSE LAYERS OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
8. ENGINEERED FILL FOR REPLACEMENT OF SOFT OR HEAVING AREAS OR FOR BULK FILLING TO COMPRISE ESSENTIALLY OF GRANULAR MATERIALS (EG. EXCAVATED SHALE), WITH A PARTICLE SIZE NOT GREATER THAN 75mm DIAMETER. ENGINEERED FILL TO BE PLACED IN LAYERS NOT EXCEEDING 250mm LOOSE THICKNESS AND COMPACTED TO 100% OF STANDARD MAXIMUM DRY DENSITY (SMDD) WITHIN ± 2% OF OPTIMUM MOISTURE CONTENT (OMC).
9. IMPORTED FILLING (IF REQUIRED) IS TO BE TO THE APPROVAL OF THE GEOTECHNICAL ENGINEER. THE CONTRACTOR IS TO NOMINATE THE SOURCE AND PROVIDE A SAMPLE FOR APPROVAL PRIOR TO IMPORTATION AND PLACEMENT ON SITE.
10. ALL FILL MATERIAL SHALL BE FROM A SOURCE APPROVED BY THE SUPERINTENDENT AND SHALL COMPLY WITH THE FOLLOWING.
FREE FORM ORGANIC AND PERISHABLE MATTER
MAXIMUM PARTICLE SIZE = 75mm
MAXIMUM PLASTICITY INDEX = 15%
MIN CBR 5%

    ALL IMPORTED FILL MATERIAL SHALL BE IN ACCORDANCE WITH SPECIFICATIONS FROM GEOTECH REPORT.
11. ALL EARTHWORKS SHALL BE CARRIED OUT IN ACCORDANCE WITH GEOTECH REPORT.
12. IN-SITU DENSITY TESTING AND SUPERVISION MUST BE CARRIED OUT IN ACCORDANCE WITH THE RECOMMENDATIONS CONTAINTED WITHIN GEOTECH REPORT.

SUBGRADE PREPARATION - SITEWORKS.

1. THE EXISTING SURFACE IS TO BE STRIPPED OF ANY PAVEMENTS, TOPSOIL OR OBVIOUS UNSUITABLE MATERIAL.
2. EXCAVATE TO ACHIEVE SUBGRADE LEVELS WHERE NECESSARY.
3. THE EXPOSED SUBGRADE AFTER STRIPPING AND/ OR EXCAVATION IS TO BE PROOF ROLLED USING NOT FEWER THAN 5 PASSES OF A MINIMUM 8 TONNE DEAD WEIGHT STEEL SMOOTH-DRUM ROLLER UNDER THE SUPERVISION OF AN EXPERIENCED GEOTECHNICAL ENGINEER OR AN EXPERIENCED CIVIL ENGINEER. ANY AREAS ON THE SUBGRADE EXHIBITING EXCESSIVE DEFLECTION / MOVEMENT UNDER ROLLER TO BE EXCAVATED TO A MIN. DEPTH OF 0.5m AND REPLACED WITH APPROVED GRANULAR MATERIAL COMPACTED IN 250mm LOOSE LAYERS OR AS DIRECTED BY THE GEOTECHNICAL ENGINEER.
4. ENGINEERED FILL FOR REPLACEMENT OF SOFT OR HEAVING AREAS OR FOR BULK FILLING TO COMPRISE ESSENTIALLY OF GRANULAR MATERIALS (EG. EXCAVATED SHALE), WITH A PARTICLE SIZE NOT GREATER THAN 75mm DIAMETER. ENGINEERED FILL TO BE PLACED IN LAYERS NOT EXCEEDING 250mm LOOSE THICKNESS AND COMPACTED TO BETWEEN 98% AND 102% OF STANDARD MAXIMUM DRY DENSITY (SMDD) WITHIN ± 2% OF OPTIMUM MOISTURE CONTENT (OMC).
5. IMPORTED FILLING (IF REQUIRED) IS TO BE TO THE APPROVAL OF THE GEOTECHNICAL ENGINEER. THE CONTRACTOR IS TO NOMINATE THE SOURCE AND PROVIDE A SAMPLE FOR APPROVAL PRIOR TO IMPORTATION AND PLACEMENT ON SITE.
6. ALL FILL MATERIAL SHALL BE FROM A SOURCE APPROVED BY THE SUPERINTENDENT AND SHALL COMPLY WITH THE FOLLOWING.
FREE FORM ORGANIC AND PERISHABLE MATTER
MAXIMUM PARTICLE SIZE = 75mm
MAXIMUM PLASTICITY INDEX = 15%

FLEXIBLE PAVEMENT NOTES:

BASE, SUB BASE AND SELECT MATERIAL

1. GENERAL:
PAVEMENT "BASE" (I.E. THE HIGHEST COURSE OF THE PAVEMENT BELOW THE SURFACING) SHALL BE CONSTRUCTED OF FINE CRUSHED ROCK (EXCEPT CONCRETE PAVEMENT. WHERE THE CONCRETE IS THE BASE).
PAVEMENT "SUB-BASE" (I.E. THE INTERMEDIATE OR LOWER COURSE OF THE PAVEMENT BELOW THE BASE) SHALL BE CONSTRUCTED OF CRUSHED ROCK OR NATURAL GRAVELS.
PAVEMENT "SELECT MATERIAL LAYER" (I.E. THE LOWER COURSE OF THE PAVEMENT BELOW THE SUB-BASE) SHALL BE CONSTRUCTED OF CRUSHED ROCK, NATURAL GRAVELS OR SUITABLE SOILS. THE SUBGRADE SURFACE SHALL BE THE SURFACE THAT UNDERLIES EITHER:
   - THE SELECT MATERIAL LAYER WHEN SELECT MATERIAL LAYER IS PRESENT, OR
   - THE SUB-BASE WHEN SELECT MATERIAL LAYER IS ABSENT FROM THE PAVEMENT CONSTRUCTION, OR
   - THE BASE WHEN BOTH SELECT MATERIAL LAYER AND SUB-BASE ARE ABSENT FROM THE PAVEMENT CONSTRUCTION
2. MATERIALS:
PRIOR TO THE DELIVERY OF ANY MATERIAL TO THE SITE, THE SOURCE OF ALL MATERIALS AND CERTIFICATES THAT THE MATERIAL SATISFIES THE SPECIFIED REQUIREMENTS SHALL BE PROVIDED FOR APPROVAL. ADDITIONALLY FOR EACH MATERIAL SOURCE, COMPLIANCE WITH THE APPROVED QUALITY ASSURANCE PROGRAM FOR INDIVIDUAL MATERIALS SHALL BE PROVIDED TO THE SUPERINTENDENT AS REQUIRED IN THE QUALITY SYSTEM REQUIREMENTS. TESTING OF PAVEMENT MATERIALS WILL NORMALLY BE PERFORMED ON SAMPLES TAKEN AT THE SOURCE PRIOR TO DELIVERY TO THE SITE AND IN THEIR FINAL CONDITIONS AFTER PLACEMENT AND COMPACTION IN THE PAVEMENT. HOWEVER, THE PROPERTIES SPECIFIED AND FINAL ACCEPTANCE ARE APPLICABLE TO THE MATERIALS IN THEIR FINAL CONDITION IN THE PAVEMENT. FINAL ACCEPTANCE WILL BE CONDITIONAL ON NO SIGNIFICANT CHANGE IN PROPERTIES DUE TO SEGREGATION OR CONTAMINATION DURING SUBSEQUENT PAVEMENT WORKS.

   FINE CRUSHED ROCK BASE MATERIAL

   FINE CRUSHED ROCK SHALL CONFORM TO THE REQUIREMENTS OF CLASS DGB20 MATERIAL AS SPECIFIED IN RMS SPECIFICATION 3051 AND SHALL BE HARD, DURABLE STONE FREE OF CLAY LUMPS, ORGANIC MATTER AND OBJECTIONABLE QUANTITIES OF DELETERIOUS SUBSTANCES. THE MATERIAL MAY BE CRUSHER RUN OR SCREENED AND RECOMBINED. ALL THE MATERIAL REQUIREMENTS APPLY BOTH PRIOR TO AND AFTER PLACEMENT IN THE PAVEMENT.

   SUB-BASE MATERIALS

   SUB-BASE MATERIALS SHALL BE CRUSHED ROCK SUB-BASE OR SUITABLE NATURAL GRAVELS AND CONFORM TO THE REQUIREMENTS OF CLASS DGS40 OR DGS20 OF RMS SPECIFICATION 3051. STONE SHALL BE HARD, DURABLE AND THE MATERIALS SHALL BE FREE OF CLAY LUMPS, ORGANIC MATTER AND OBJECTIONABLE QUANTITIES OF DELETERIOUS SUBSTANCES. ALL MATERIAL REQUIREMENTS WILL APPLY BOTH PRIOR TO AND AFTER PLACEMENT IN THE PAVEMENT.

KERBING NOTES:

INCLUDES ALL KERBS, GUTTERS, DISH DRAINS, CROSSING AND EDGES.

1. ALL KERBS, GUTTERS, DISH DRAINS AND CROSSING TO BE CONSTRUCTED ON MINIMUM 75mm GRANULAR BASE COURSE COMPACTED TO MINIMUM 98% MODIFIED MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 5.2.1.
2. EXPANSION JOINTS (EJ) TO BE FORMED FROM 10mm COMPRESSIBLE CORK FILTER BOARD FOR THE FULL DEPTH OF THE SECTION AND CUT TO PROFILE. EXPANSION JOINTS TO BE LOCATED AT DRAINAGE PITS, ON TANGENT POINTS OF CURVES AND ELSEWHERE AT 12m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE EXPANSION JOINTS ARE TO MATCH THE JOINT LOCATION IN KERBS.
3. WEAKENED PLANE JOINTS TO BE MIN 3mm WIDE AND LOCATED AT 3m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE WEAKENED PLANE JOINTS ARE TO MATCH THE JOINT LOCATIONS IN SLABS.
4. BROAMED FINISHED TO ALL RAMPED AND VEHICULAR CROSSINGS, ALL OTHER KERBING OR DISH DRAINS TO BE STEEL FLOAT FINISHED.
5. IN THE REPLACEMENT OF KERBS
EXISTING ROAD PAVEMENT IS TO BE SAWCUT 900mm FROM LIP OF GUTTER. UPON COMPLETION OF NEW KERBS, NEW BASE COURSE AND SURFACE IS TO BE LAID 900mm WIDE TO MATCH EXISTING MATERIALS AND THICKNESS.
EXISTING ALLOTMENT DRAINAGE PIPE ARE TO BE BUILT INTO NEW KERB WITH A 100mm DIA HOLE.
EXISTING KERBS ARE TO BE COMPLETELY REMOVED WHERE NEW KERBS ARE SHOWN.

RIGID CONCRETE PAVEMENT NOTES

GENERAL:

1. CARRY OUT ALL CONCRETE WORK IN ACCORDANCE WITH AS3600-2018 AND THE SPECIFICATION. KEEP A COPY OF THESE DOCUMENTS ON SITE.
2. VERIFY ALL SETTING OUT DIMENSIONS WITH THE ARCHITECT AND OR THE SURVEYOR.
3. DO NOT OBTAIN DIMENSIONS BY SCALING THE DRAWINGS.
4. IN CASE OF DOUBT - ASK.

CONCRETE:

1. PLACE CONCRETE OF THE FOLLOWING CHARACTERISTIC COMPRESSIVE STRENGTH F'C AS DEFINED IN AS3600-2018 OR RTA FORM 609. ADD WATER REDUCING ADMIXTURE EQUAL TO WRDA.

	AS3600 F'c MPa AT 28 DAYS	SPECIFIED SLUMP	NOMINAL AGG. SIZE
ALL KERBS, PITS ETC.	25	80	20
VEHICULAR PAVING	REFER TO CONCRETE PAVEMENT NOTES BELOW		

2. USE TYPE GP CEMENT IN ACCORDANCE WITH AS3972.
3. ALL CONCRETE SHALL BE SUBJECT TO PROJECT CONTROL SAMPLE AND TESTING TO AS3600-2018.
4. CONSOLIDATE BY VIBRATION. CURE SURFACES BY COVERING WITH PLASTIC AND KEEPING SURFACE MOIST FOR MIN 7 DAYS.

REINFORCEMENT:

1. FIX REINFORCEMENT AS SHOWN ON DRAWINGS. THE TYPE AND GRADE IS INDICATED BY A SYMBOL AS SHOWN BELOW.
   - N. HOT ROLLED DEFORMED BAR. GRADE 500
   - R. PLAIN ROUND BAR. GRADE 250
   - SL OR RL HARD DRAWN WIRE FABRIC SQUARE OR RECTANGULAR
2. PROVIDE BAR SUPPORTS OR SPACERS TO GIVE THE FOLLOWING CONCRETE COVER TO ALL REINFORCEMENT UNLESS NOTED OTHERWISE.
   - FOOTINGS: 75 BOTTOM. 65 TOP AND SIDES 40
   - SLABS: 40 WHEN EXPOSED TO WEATHER.
   - DRAINAGE STRUCTURES: 30 WHEN CAST IN FORMS BUT LATER EXPOSED TO WEATHER OR GROUND. 65 WHEN CAST DIRECTLY IN CONTACT WITH GROUND.
3. FOR ALL PITS LOCATED IN CONCRETE PROVIDE 2N16 TRIMMER BARS AROUND 1200mm LONG AROUND ALL CORNERS OF PITS UNLESS SHOWN OTHERWISE.

CONCRETE VEHICULAR PAVEMENT NOTES:

1. CONCRETE MIX PARAMETERS:
   - MAXIMUM AGGREGATE SIZE 20mm
   - FLEXURAL STRENGTH AT 28 DAYS = 3.5 MPa (F'c=32MPa)
   - FLEXURAL STRENGTH AT 90 DAYS = 3.85 MPa
   - MAXIMUM WATER / CEMENT RATIO =0.45
   - MAXIMUM SHRINKAGE LIMIT = 600 MICROSTRAINS (AS1012.13) AFTER 8 WEEKS OF DRYING
   - MINIMUM CEMENT CONTENT = 300kg/m3
   - CEMENT TO BE TYPE GP (NORMAL CEMENT) TO AS 3972
   - SLUMP = 50mm
2. SAWN JOINTS ARE TO BE CUT BETWEEN 2-4 HOURS AFTER CONCRETE POUR USING SOFF CUT SAW TO AVOID DAMAGING THE SURFACE DURING SAWCUT.
3. FOR EXPANSION JOINTS, PRIOR TO THE PLACEMENT OF CONCRETE IN THE ADJACENT SLAB, SELF EXPANDING CORK FILLER SHALL BE ADHERED TO THE ALREADY CAST AND CLEANED CONCRETE FACE USING AN APPROVED WATERPROOF ADHESIVE. ADHESIVE SHALL BE LIBERALLY APPLIED TO THE FULL FACE OF THE CONCRETE SLAB TO BE COVERED BY THE FILLER. AND ON THE FULL FACE OF THE FILLER TO BE ADHERED. THE BUILDER SHALL PROVIDE CONSTANT SUPERVISION OF CONCRETE POURS EXECUTED BY SUB-CONTRACTORS TO ENSURE:
   - REINFORCEMENT DISPLACED OFF CHAIRS ARE REPLACED PRIOR TO CONCRETE PLACEMENT.
   - NO SITE WATER IS ADDED TO CONCRETE OR CONCRETE IN WAITING TRUCKS. (REQUIRED SLUMP FOR PLACEMENT SHALL BE ACHIEVED USING SUPER PLASTICISER).
   - ALL CONCRETE IS FULLY COMPACTED USING A POKER VIBRATOR.
   - NO POURS ARE EXECUTED WHEN THE AMBIENT TEMPERATURE EQUALS OR EXCEEDS 35°C.
   - POURS ARE PROTECTED FROM ANY HOT DRYING WINDS.
4. REFER TO COMPACTION NOTES FOR PREPARATION OF SUB-BASE AND SUB-GRADE.
5. CURING: THE FINISHED CONCRETE SHALL BE CURED FOR A MINIMUM OF SEVEN DAYS USING AT LEAST ONE OF THE FOLLOWING METHODS:
   - PONDING OR CONTINUOUS SPRINKLING WITH WATER.
   - THE USE OF AN ABSORBENT COVER KEPT CONSTANTLY WET. (WHEN THE AMBIENT TEMPERATURE EXCEEDS 32°C CURING MAY ONLY BE ACHIEVED USING THE ABOVE 2 METHODS.
   - THE USE OF AN IMPERMEABLE SHEET MEMBRANE OVER A MOISTENED SURFACE. (THE MEMBRANE SHALL BE FIXED AND LAPPED SO THAT NO AIR CIRCULATION CAN OCCUR AT THE CONCRETE SURFACE).
   - THE USE OF A CURING COMPOUND COMPLYING WITH AS3799, APPLIED UNIFORMLY IN ACCORDANCE WITH THE MANUFACTURERS RECOMMENDATIONS, AND WHEN DRY THE COAT SHOULD BE CONTINUOUS, FLEXIBLE AND WITHOUT VISIBLE BREAKS OR PIN HOLES FOR SEVEN DAYS.
6. BROOM CONCRETE FINISH UNLESS SPECIFIED OTHERWISE TO ARCHITECTS REQUIREMENTS.

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
03	ISSUED FOR DA ONLY	PS	NW	06.06.2024					
02	ISSUED FOR DA ONLY	MP	NW	23.02.2024					
01	ISSUED AS CONCEPT	SC	NW	15.12.2023					

Client
NSW GOVERMENT LAND & HOUSING CORPORATION

Architect
CUSTANCE ARCHITECTURE

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DRAWING TO BE PRINTED IN COLOUR

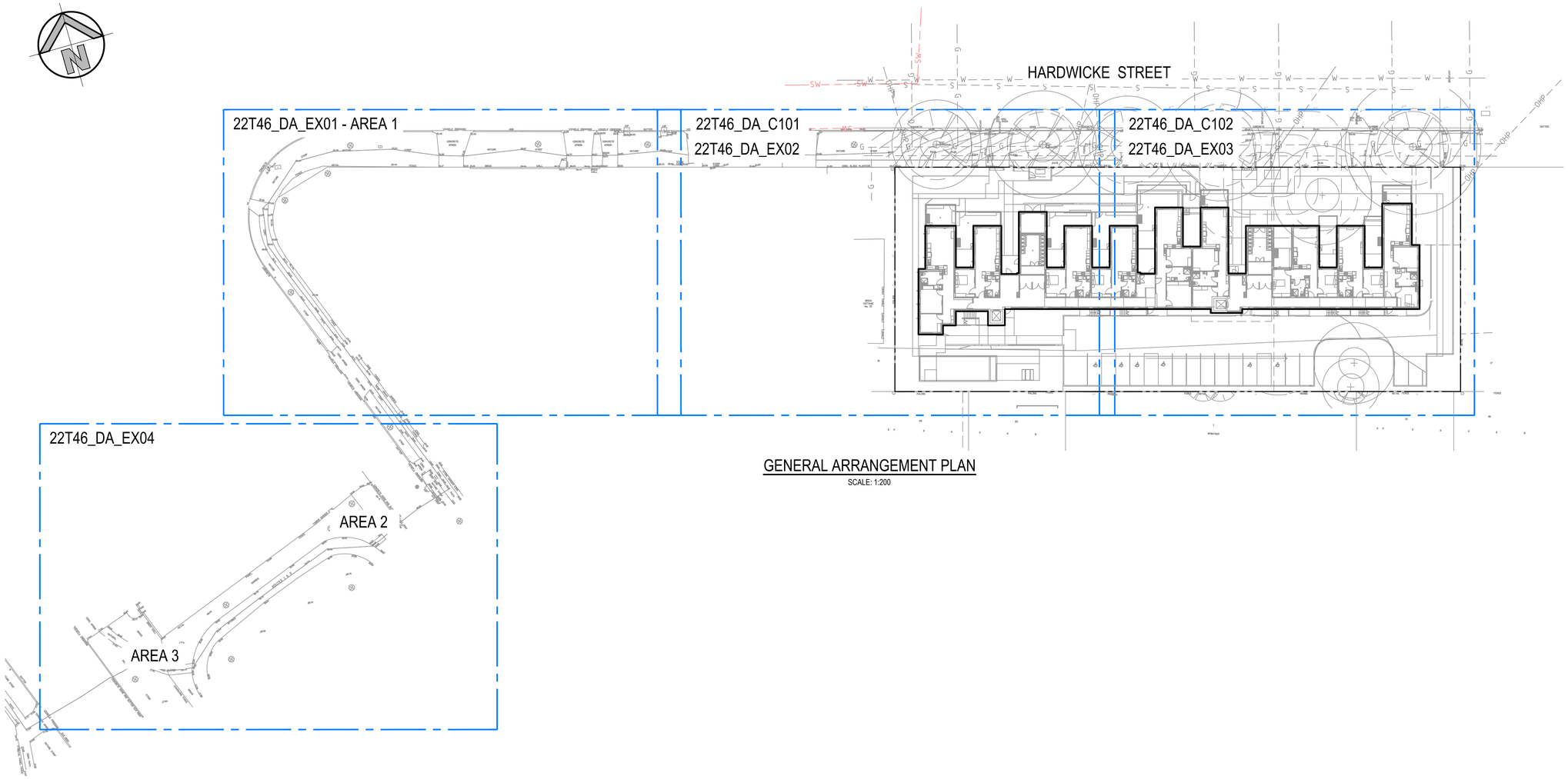
henry&hymas

Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title
NOTES

Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	DECEMBER 2023
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	N.T.S.

Drawing number: 22T46_DA_C010
Revision: 03



GENERAL ARRANGEMENT PLAN

SCALE: 1:200

LEGEND

	PROPERTY LEASE LINE
	BUILDING OUTLINE
	PROPOSED SURFACE INLET PITS
	PROPOSED JUNCTION PITS
	PROPOSED LINTEL ONGRADE & SAG PITS
	PROPOSED GRATED DRAIN
	PROPOSED STORMWATER PIPE
	PROPOSED ALLOWANCE FOR CONNECTION OF ROOF WATER INTO INGROUND SYSTEM
SS	PROPOSED SUBSOIL LINE
RW	PROPOSED RETAINING WALL
RL24.27	PROPOSED SPOT LEVEL
EX24.90	EXISTING SPOT LEVEL
23.58	EXISTING SPOT LEVEL
23.70	PROPOSED CONTOURS
23.00	EXISTING CONTOURS
E	EXISTING ELECTRICAL MAINS LINE
G	EXISTING GAS LINE
S	EXISTING SEWER LINE
T	EXISTING TELSTRA LINES
W	EXISTING WATER LINE
SW	EXISTING STORMWATER LINE
IL11.11	STORMWATER UPSTREAM INVERT RL.
Ø300	STORMWATER PIPE DIAMETER & CLASS
30m	STORMWATER PIPE LENGTH
1%	STORMWATER PIPE GRADE
IL10.96	STORMWATER DOWNSTREAM INVERT RL.
A-1 (LINE LETTER / PIT NUMBER)	PROPOSED PIT TAG
DP	PROPOSED DOWNPIPE
FP	PROPOSED FLUSHING POINT
IR	PROPOSED INTERMEDIATE RISER
SD	PROPOSED SPOON DRAIN
	PROPOSED BATTER LINE
K&G	PROPOSED KERB & GUTTER
KO	PROPOSED KERB ONLY
IK	PROPOSED INTEGRAL KERB
IK&G	PROPOSED INTEGRAL KERB & GUTTER
UK	PROPOSED UPSTAND KERB

0 10 20 30 40 50m

10 8 6 4 2

SCALE 1:500

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
03	ISSUED FOR DA ONLY	AFe	NW	30.05.2024					
02	ISSUED FOR DA ONLY	MP	NW	23.02.2024					
01	ISSUED AS CONCEPT	SC	NW	15.12.2023					

Client
NSW GOVERMENT LAND & HOUSING CORPORATION

Architect
CUSTANCE ARCHITECTURE

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DRAWING TO BE PRINTED IN COLOUR

henry&hymas

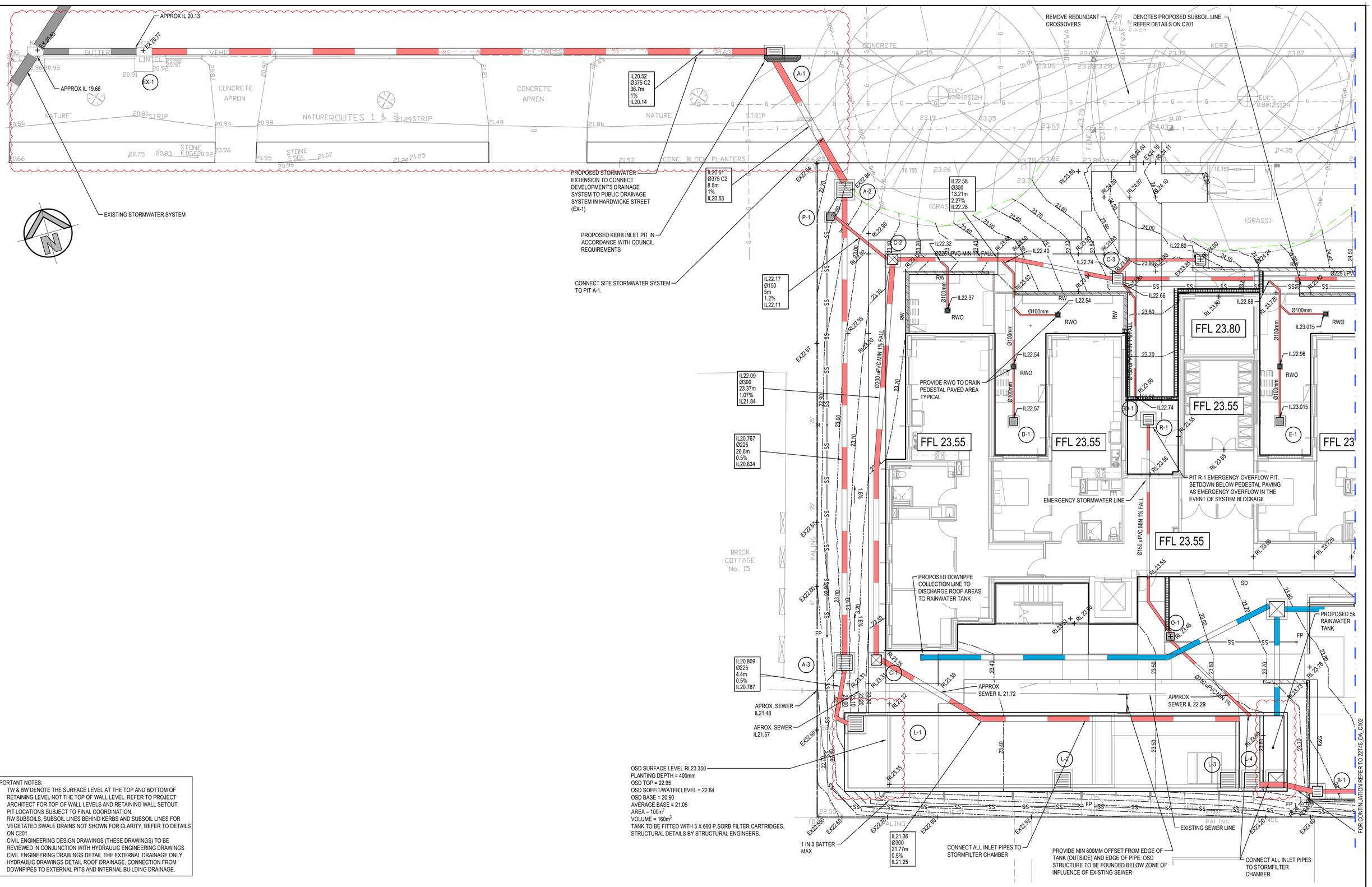
Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title
GENERAL ARRANGEMENT PLAN

Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	DECEMBER 2023
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:500

Drawing number: 22T46_DA_C100

Revision: 03



IMPORTANT NOTES:

- TW & BW DENOTE THE SURFACE LEVEL AT THE TOP AND BOTTOM OF RETAINING LEVEL NOT THE TOP OF WALL LEVEL. REFER TO PROJECT ARCHITECT FOR TOP OF WALL LEVELS AND RETAINING WALL SETOUT.
- PIT LOCATIONS SUBJECT TO FINAL COORDINATION.
- RW SUBSOILS, SUBSOIL LINES BEHIND KERBS AND SUBSOIL LINES FOR VEGETATED SWALE DRAINS NOT SHOWN FOR CLARITY, REFER TO DETAILS ON C201.
- CIVIL ENGINEERING DESIGN DRAWINGS (THESE DRAWINGS) TO BE REVIEWED IN CONJUNCTION WITH HYDRAULIC ENGINEERING DRAWINGS CIVIL ENGINEERING DRAWINGS DETAIL THE EXTERNAL DRAINAGE ONLY, HYDRAULIC DRAWINGS DETAIL ROOF DRAINAGE, CONNECTION FROM DOWNPIPES TO EXTERNAL PITS AND INTERNAL BUILDING DRAINAGE.

0 2 4 6 8 10m

2 1

SCALE 1:100

DETAIL PLAN

SCALE: 1:100

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
04	ISSUED FOR DA ONLY	PS	NW	06.06.2024
03	ISSUED FOR DA ONLY	NH	NW	27.05.2024
02	ISSUED FOR DA ONLY	MP	NW	23.02.2024
01	ISSUED AS CONCEPT	SC	NW	15.12.2023

Client: NSW GOVERMENT LAND & HOUSING CORPORATION

Architect: CUSTANCE ARCHITECTURE

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DRAWING TO BE PRINTED IN COLOUR

henry&hymas

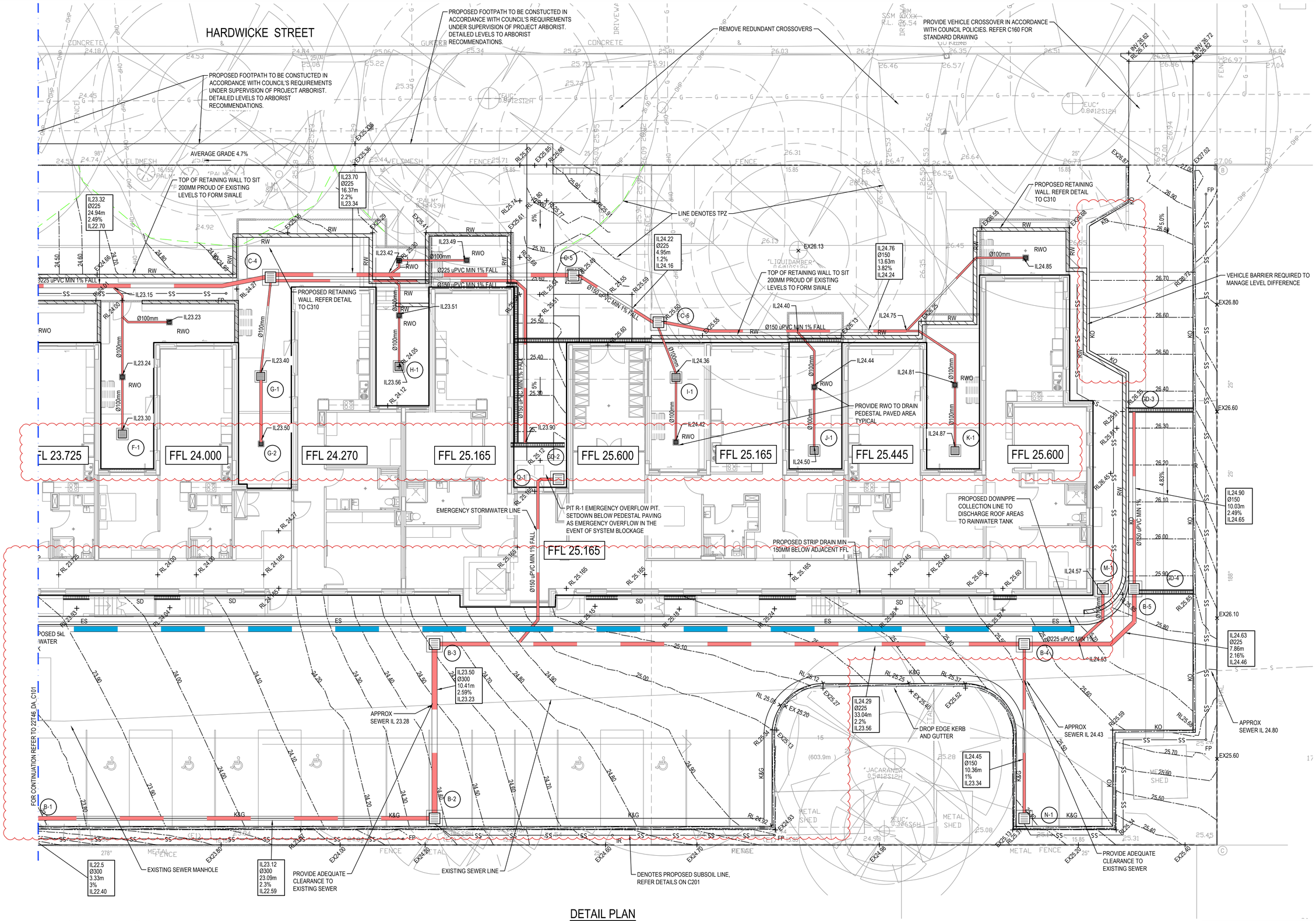
Project: PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title: DETAIL PLAN
SHEET 1 OF 2

Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	DECEMBER 2023
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:100

Drawing number: 22T46_DA_C101

Revision: 04



DETAIL PLAN

SCALE: 1:100

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
04	ISSUED FOR DA ONLY	PS	NW	06.06.2024
03	ISSUED FOR DA ONLY	AFe	NW	27.05.2024
02	ISSUED FOR DA ONLY	MP	NW	23.02.2024
01	ISSUED AS CONCEPT	SC	NW	15.12.2023

Client: NSW GOVERMENT LAND & HOUSING CORPORATION

Architect: CUSTANCE ARCHITECTURE

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DRAWING TO BE PRINTED IN COLOUR

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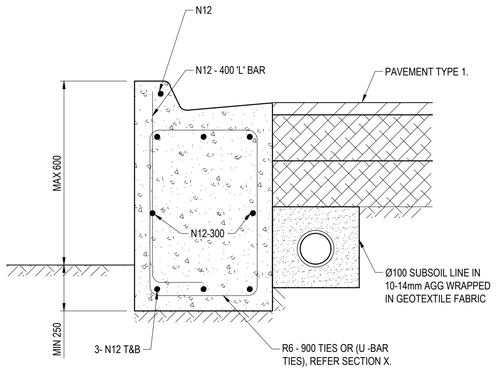
Project: PROPOSED RESIDENTIAL DEVELOPMENT 17-27 HARDWICKE ST, RIVERWOOD, NSW

Title: DETAIL PLAN SHEET 2 OF 2

Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	DECEMBER 2023
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:100

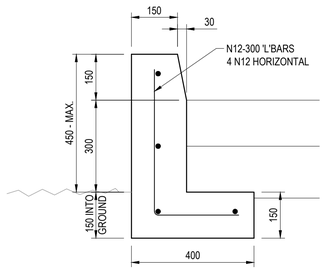
Drawing number: 22T46_DA_C102

Revision: 04



DROP EDGE KERB & GUTTER (DEK&G)

N.T.S.

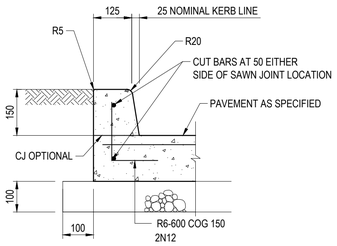


UPSTAND KERB (UK)

SCALE 1:10

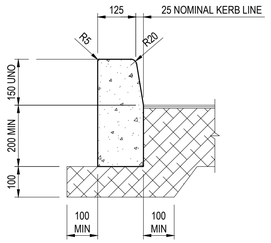
NOTED HK ON PLAN

(EXTENT TO BE CONFIRMED ON SITE)



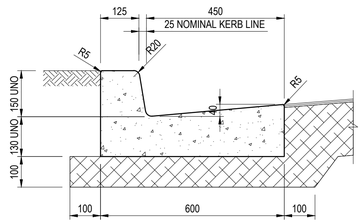
INTEGRAL KERB (IK)

SCALE 1:10



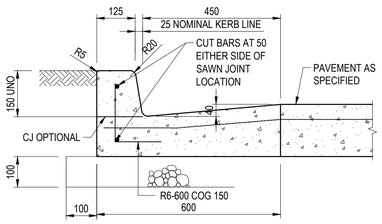
KERB ONLY (KO)

SCALE 1:10



KERB & GUTTER (K&G)

SCALE 1:10



INTEGRAL KERB & GUTTER (IK&G)

SCALE 1:10

KERBING NOTES:

INCLUDES ALL KERBS, GUTTERS, DISH DRAINS, CROSSING AND EDGES.

1. ALL KERBS, GUTTERS, DISH DRAINS AND CROSSING TO BE CONSTRUCTED ON MINIMUM 75mm GRANULAR BASE COURSE COMPACTED TO MINIMUM 98% MODIFIED MAXIMUM DRY DENSITY IN ACCORDANCE WITH AS 1289 5.2.1.
2. EXPANSION JOINTS (EJ) TO BE FORMED FROM 10mm COMPRESSIBLE CORK FILTER BOARD FOR THE FULL DEPTH OF THE SECTION AND CUT TO PROFILE. EXPANSION JOINTS TO BE LOCATED AT DRAINAGE PITS, ON TANGENT POINTS OF CURVES AND ELSEWHERE AT 12m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE THE EXPANSION JOINTS ARE TO MATCH THE JOINT LOCATION IN KERBS.
3. WEAKENED PLANE JOINTS TO BE MIN 3mm WIDE AND LOCATED AT 3m CENTRES EXCEPT FOR INTEGRAL KERBS WHERE WEAKENED PLANE JOINTS ARE TO MATCH THE JOINT LOCATIONS IN SLABS.
4. BROAMED FINISHED TO ALL RAMPED AND VEHICULAR CROSSINGS, ALL OTHER KERBING OR DISH DRAINS TO BE STEEL FLOAT FINISHED.
5. IN THE REPLACEMENT OF KERBS
   EXISTING ROAD PAVEMENT IS TO BE SAWCUT 900mm FROM LIP OF GUTTER.
   UPON COMPLETION OF NEW KERBS, NEW BASE COURSE AND SURFACE IS TO BE LAID 900mm WIDE TO MATCH EXISTING MATERIALS AND THICKNESS.
   EXISTING ALLOTMENT DRAINAGE PIPE ARE TO BE BUILT INTO NEW KERB WITH A 100mm DIA HOLE.
   EXISTING KERBS ARE TO BE COMPLETELY REMOVED WHERE NEW KERBS ARE SHOWN.

0 200 400 600 800 1000mm

200 100

SCALE 1:10

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	MP	NW	23.02.2024					

Client
NSW GOVERMENT LAND & HOUSING CORPORATION

Architect
CUSTANCE ARCHITECTURE

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DRAWING TO BE PRINTED IN COLOUR

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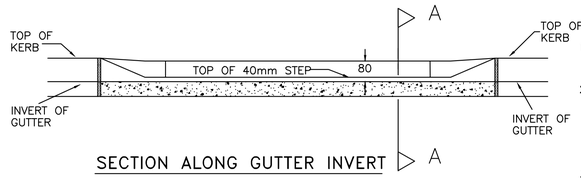
Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title
TYPICAL KERB AND CONCRETE DETAILS

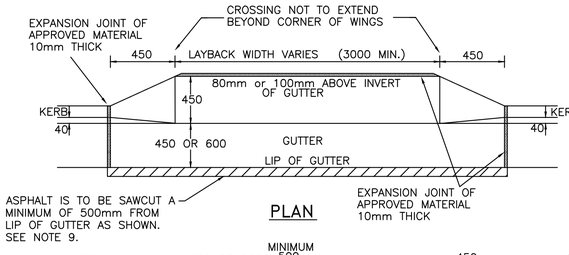
Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	DECEMBER 2023
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	AS NOTED

Drawing number: 22T46_DA_C110

Revision: 01



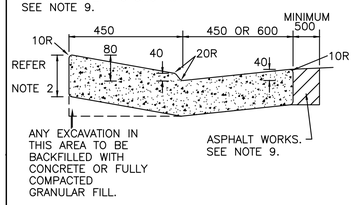
SECTION ALONG GUTTER INVERT



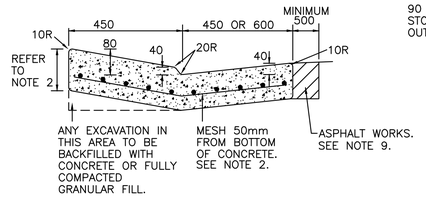
PLAN

NOTES:

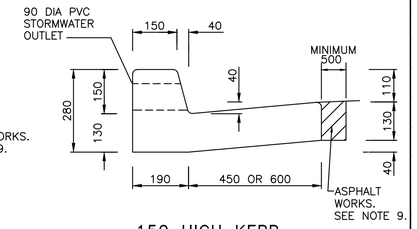
1. LAYBACK HEIGHT: –
   - STANDARD HEIGHT IS 80mm or 100mm. VARIATIONS FROM THIS HEIGHT OCCUR ONLY WHEN INDICATED ON CONSTRUCTION DRAWINGS.
2. MINIMUM LAYBACK THICKNESS: –
   - STANDARD (SINGLE RESIDENTIAL DWELLING) – 130mm THICK 25MPa CONCRETE WITH SL62 MESH 40mm COVER (TOP)
   - HEAVY DUTY (MEDIUM DENSITY/UNITS/COMMERCIAL) – 150mm THICK, 25MPa CONCRETE WITH SL82 MESH 40mm COVER (TOP)
   - INDUSTRIAL – 200mm THICK, 25MPa CONCRETE WITH SL82 MESH 50mm COVER (TOP)
3. MINIMUM CROSSING THICKNESS: –
   - STANDARD (SINGLE RESIDENTIAL DWELLING) – 130mm THICK 25MPa CONCRETE WITH SL62 MESH 40mm COVER (BOTTOM)
   - HEAVY DUTY (MEDIUM DENSITY/UNITS/COMMERCIAL) – 150mm THICK, 25MPa CONCRETE WITH SL62 MESH 50mm COVER (BOTTOM)
   - INDUSTRIAL – 200mm THICK, 25MPa CONCRETE AND SL82 MESH 50mm COVER (BOTTOM)
4. TURF AND TIDY SITE TO ENGINEERS SATISFACTION.
5. FOOTPATH DUMMY JOINTS ARE TO BE PLACED ACROSS PATHS AND SPACED AT 1000mm
6. FOOTPATH 80mm THICK, 20MPa CONCRETE.
7. EXPANSION (MASTIC) JOINT MAX. SPACING 6m IN FOOTPATHS, EXPANSION JOINTS ARE TO BE PLACED AT PROPERTY BOUNDARY, BACK AND ENDS OF LAYBACK AND JOINTS WITH CONCRETE PATHS.
8. DUMMY JOINTS ON DRIVEWAYS TO BE PLACED ACROSS DRIVEWAY AND TO ALIGN WITH FRONT AND BACK OF PATH.
9. ROAD PAVEMENT TO BE SAWCUT A MINIMUM OF 500mm FROM THE LIP OF GUTTER AND REMOVED. APPLICANT IS TO LAY ROADBASE AND COMPACT TO 40mm BELOW FINISHED SURFACE LEVEL FOR COUNCIL TO PROVIDE ASPHALT RENIT
10. SAWCUT EXISTING KERB AND GUTTER WHERE MATCHING TO EXISTING KERB AND GUTTER.



SECTION A – A
STANDARD



SECTION A – A
HEAVY DUTY & INDUSTRIAL

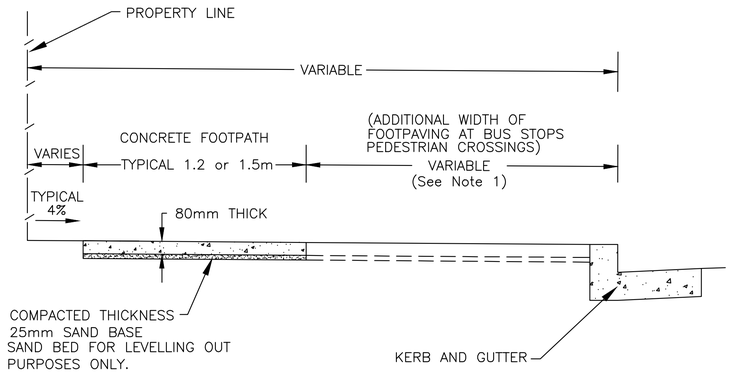


150 HIGH KERB

SCALE AT A3	SURVEYED	DESIGNED	CHECKED	APPROVED
AS SHOWN		DB		
SURV REF.		MAR 20		

GEORGES RIVER COUNCIL
LAYBACK AND ACCESS DETAILS
FOR DRIVEWAY APPLIVATIONS

REV. A
SHEET 1 OF 1
PLAN No.



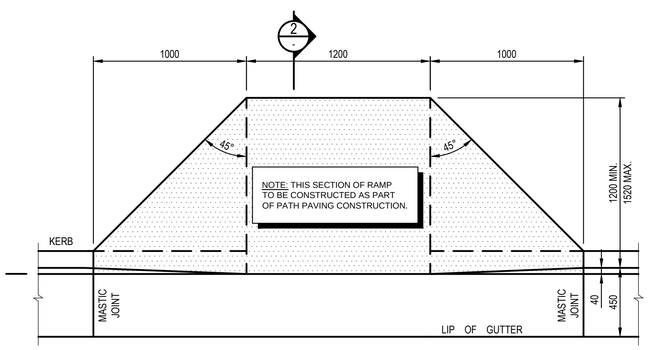
CONCRETE FOOTPATH CONSTRUCTION

NOTES:
1. AS DIRECTED BY ENGINEER.
2. DUMMY JOINTS EVERY 1.0m WITH EXPANSION JOINTS EVERY 6.0m
3. FOOTPATH CROSSFALL 2.5% (MAX) OR AS DIRECTED BY ENGINEER.
4. ALL WORKMANSHIP TO A.S.3600 CONCRETE STRUCTURES
5. CONCRETE TO BE 25 mPa COMPRESSIVE STRENGTH (fc) @ 28 DAYS

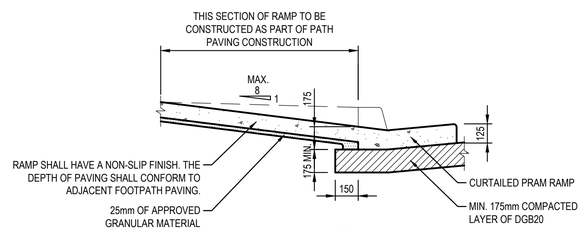
				SURVEYED	
				DESIGNED	JUL 16
O	REVISION DETAILS	APPROVED	DATE	CHECKED	
ENGINEERS REF.	SURVEYORS REF.	DATUM	SCALE AT A4	APPROVED	
		NA	NTS		

GEORGES RIVER COUNCIL
FOOTPATH CONSTRUCTION
FOR DRIVEWAY APPLICATIONS

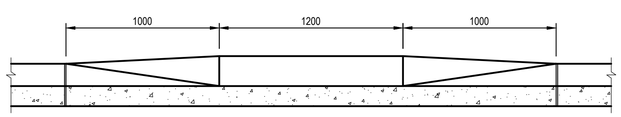
FILE No. SD047 | DRG. No. SD047 | SHT 1 OF 1 | REV.



PRAM RAMP DETAIL
SCALE 1:20



SECTION 2 / - 1:20



SECTION 1 / - 1:20

0 400 800 1200 1600 2000mm
400 200
SCALE 1:20

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
03	ISSUED FOR DA ONLY	AFe	NW	06.06.2024					
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01	ISSUED AS CONCEPT	SC	NW	15.12.2023					

Client
NSW GOVERMENT LAND & HOUSING CORPORATION

Architect
CUSTANCE ARCHITECTURE

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DRAWING TO BE PRINTED IN COLOUR

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Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title
STANDARD DRAWINGS
CROSSOVER, FOOTPATH

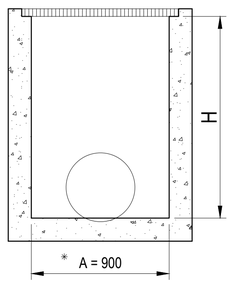
Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	DECEMBER 2023
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	AS NOTED

Drawing number: 22T46_DA_C160
Revision: 03

TYPICAL PIT CHAMBER SIZES

IT IS THE CONTRACTORS RESPONSIBILITY TO SELECT PIT CHAMBER SIZE WITH REGARDS TO PIPE SIZE, DEPTH TO INVERT AND SKEW ANGLE. REFER SKETCHES BELOW.

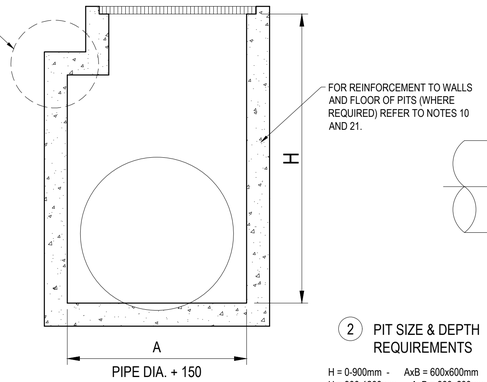
1. SELECT PIT CHAMBER USING THE STEPS BELOW:
2. SELECT PIT CHAMBER SIZE DEPENDING ON THE PIPE DIAMETERS.
3. CHECK PIT CHAMBER SIZE TO SATISFY DEPTH TO INVERT REQUIREMENTS.
   CHECK PIT CHAMBER DIMENSIONS TO SATISFY THE SKEW ANGLE IN THE TABLE.



SECTION
NTS

*A = 600 FOR PIPES UP TO 375 DIA.

1 PIT CHAMBER DIMENSIONS FOR PIPES UP TO 600 DIA.



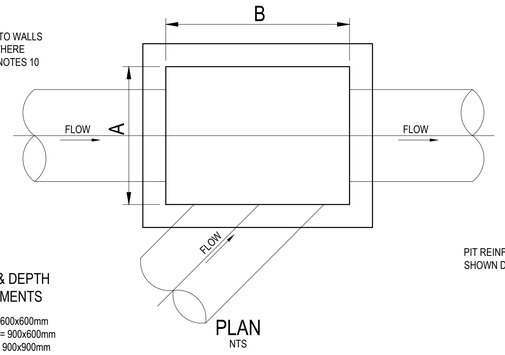
SECTION
NTS

1 PIT CHAMBER FOR PIPES GREATER THAN 600 DIA.

2 PIT SIZE & DEPTH REQUIREMENTS

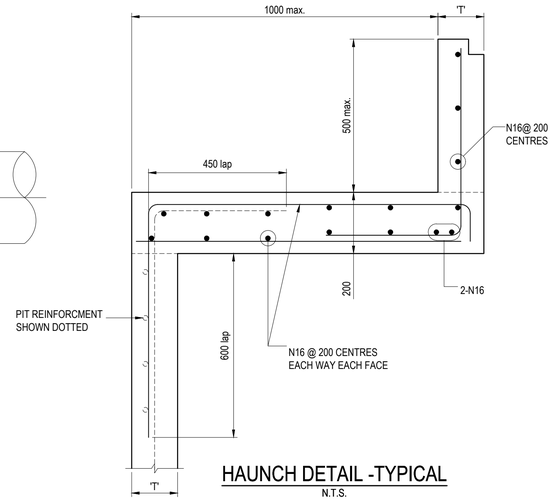
H = 0-900mm - AxB = 600x600mm
H = 900-1200mm - AxB = 900x600mm
H = >1200mm - AxB = 900x900mm

FOR B = 600mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 225mm
FOR B = 900mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 375mm
FOR B = 1200mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 600mm
FOR B = 1500mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 825mm
FOR B = 1900mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 1050mm



PLAN
NTS

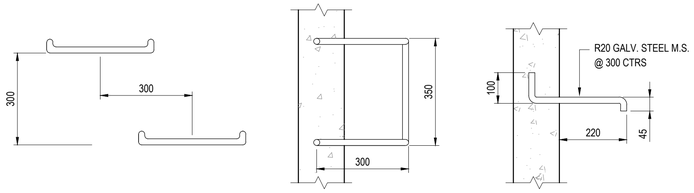
3 PIT CHAMBER FOR SIDE ENTRY ON SKEW



HAUNCH DETAIL -TYPICAL
N.T.S.

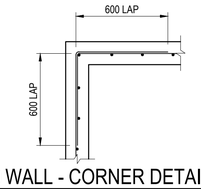
PIT LID AND HEADWALL SCHEDULE

PIT/STRUCTURE NUMBER	DESCRIPTION
A-2 A-3	PROPOSED 900x900 SURFACE INLET PIT WITH HINGED GRATED LID LIGHT DUTY CLASS "B" IN ACCORDANCE WITH CAMDEN COUNCIL'S REQUIREMENTS.
D-1 E-1 F-1 G-1 I-1 H-1 J-1 K-1 C-1 O-1 P-1 M-1	PROPOSED 450x450 SURFACE INLET PIT WITH HINGED GRATED LID LIGHT DUTY CLASS "B" IN ACCORDANCE WITH CAMDEN COUNCIL'S REQUIREMENTS.
C-3 C-4 C-5 C-6 Q-1 R-1	PROPOSED 600x600 SURFACE INLET PIT WITH HINGED GRATED LID LIGHT DUTY CLASS "B" IN ACCORDANCE WITH CAMDEN COUNCIL'S REQUIREMENTS.
B-1 B-2 L-1 L-2 L-3 L-4	PROPOSED 900x900 SURFACE INLET PIT WITH HINGED GRATED LID MEDIUM DUTY CLASS "C" IN ACCORDANCE WITH CAMDEN COUNCIL'S REQUIREMENTS.
B-3 B-5 N-1 N-4	PROPOSED 600x600 SURFACE INLET PIT WITH HINGED GRATED LID MEDIUM DUTY CLASS "C" IN ACCORDANCE WITH CAMDEN COUNCIL'S REQUIREMENTS.
C-2 C-1	PROPOSED JUNCTION PIT WITH 900x900 MEDIUM DUTY SEALED LID CLASS "C" IN ACCORDANCE WITH CAMDEN COUNCIL'S REQUIREMENTS.
A-1	PROPOSED 1.2m KERB INLET PIT WITH 900x450 INLET GRATE HEAVY DUTY CLASS 'D' IN ACCORDANCE WITH CAMDEN COUNCIL'S REQUIREMENTS.
GD-3 GD-4	200mm WIDE HEAVY DUTY GRATED DRAIN AND FRAME CLASS "D" IN ACCORDANCE WITH CAMDEN COUNCIL'S REQUIREMENTS
GD-1 GD-2	150mm WIDE LIGHT DUTY GRATED DRAIN TO ARCHITECTS SPECIFICATIONS
EX-1	EXISTING PIT TO BE MODIFIED, REFER NOTES ON PLAN

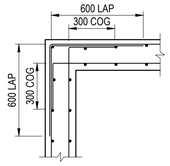


ELEVATION PLAN SECTION

TYPICAL STEP IRON DETAIL
SCALE 1:10



150 WALL - CORNER DETAIL
SCALE 1:20



200 WALL - CORNER DETAIL
SCALE 1:20

NOTES:

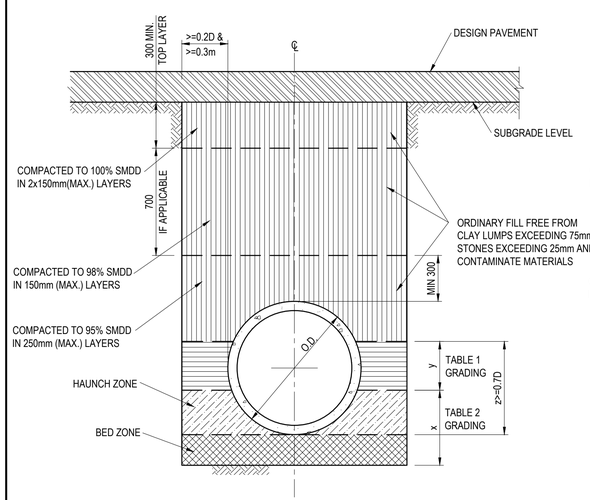
- ALL GRATED INLET PITS TO CONTAIN OCEAN PROTECT 200 MICRON PIT BASKETS OR APPROVED EQUIVALENT UNLESS NOTED ON PLAN. REFER DRAWING C201 FOR DETAILS.
- REFER C201 FOR DRAINAGE AND SUBSOIL NOTES.
- ALL PITS IN FOOTPATH, OR ADJACENT TO FOOTPATHS, TO BE FITTED WITH SLIP RESISTANT HEELGUARD LID.
- PIT SCHEDULE ABOVE DOES NOT INCLUDE PIT LIDS FOR WATER QUALITY DEVICES OR BELOW GROUND OSD TANKS
- ALL RAINWATER OUTLETS (RWO) TO BE MIN 200MM IN DIAMETER. ALL RAINWATER OUTLETS TO BE HEELPROOF FINISH AND TO ARCHITECTS SPECIFICATIONS UNLESS NOTED ON PLAN.

TABLE 1

SIEVE SIZE (MM)	WEIGHT PASISNG (%)
75.0	100
9.5	100 TO 50
2.36	100 TO 30
0.60	50 TO 15
0.075	25 TO 0

TABLE 2

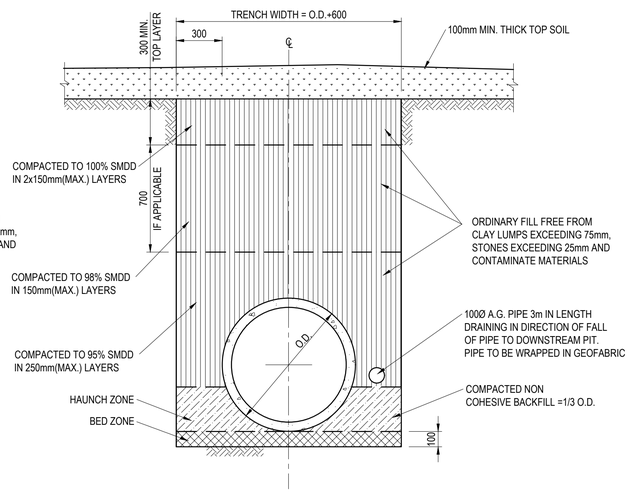
SIEVE SIZE (MM)	WEIGHT PASISNG (%)
19.0	100
2.36	100 TO 50
0.60	90 TO 20
0.30	60 TO 10
0.15	25 TO 0
0.075	10 TO 0



PIPE TRENCH INSTALLATION BENEATH PAVEMENT

(HS SUPPORT TO BE USED UNDER ROADWAY)
SCALE 1:20

NOTE:
TYPE HS2 TO BE USED AS A TYPICAL SUPPORT FOR TRENCHES UNDER ROADWAY UNLESS SPECIFIED SEPERATELY



PIPE TRENCH INSTALLATION IN LANDSCAPE AREAS

(H1 & H2 SUPPORT)
SCALE 1:20

TABLE 3

SUPPORT TYPE	BED ZONE X	HAUNCH ZONE Y	BED AND HAUNCH ZONES COMPACTION	MAX BEDDING FACTOR
HS1	100 IF D<=1500, OR 150 IF D>=1500	0.1D	50	2.0
HS2		0.3D	60	2.5
HS3		0.3D	70	4.0

0 400 800 1200 1600 2000mm
400 200
SCALE 1:20

0 200 400 600 800 1000mm
200 100
SCALE 1:10

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
02	ISSUED FOR DA ONLY	MP	NW	23.02.2024					
01	ISSUED AS CONCEPT	SC	NW	15.12.2023					

Client
NSW GOVERMENT LAND & HOUSING CORPORATION

Architect
CUSTANCE ARCHITECTURE

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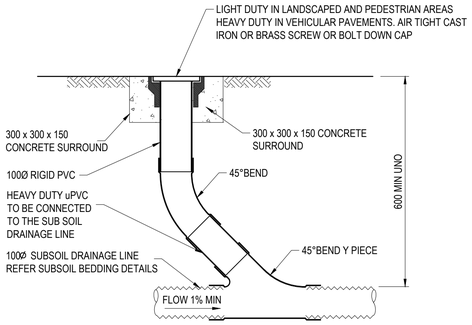
DRAWING TO BE PRINTED IN COLOUR

Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title
STORMWATER MISCELLANEOUS DETAILS AND PIT LID SCHEDULE

Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	DECEMBER 2023
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:200

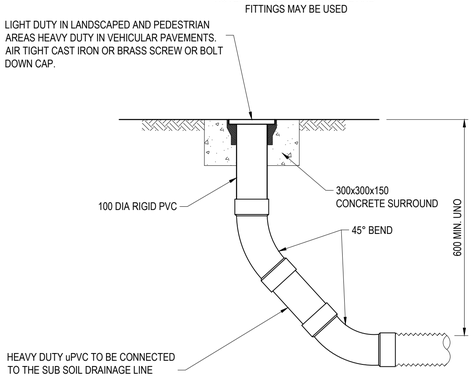
Drawing number 22T46_DA_C200
Revision 02



INTERMEDIATE RISER (IR)

SCALE 1:10

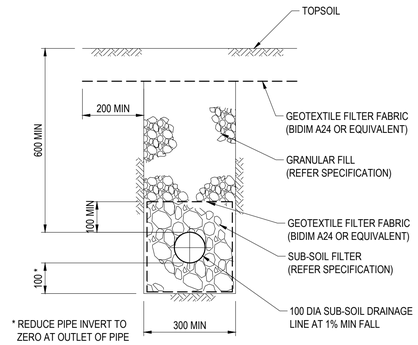
NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



FLUSHING POINT (FP)

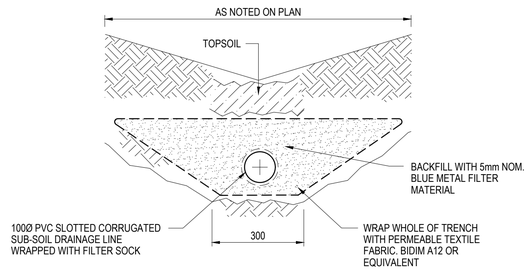
SCALE 1:10

NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



SUB-SOIL IN LANDSCAPED AREAS

SCALE 1:10



SUBSOIL DRAIN DETAIL IN SWALES

SCALE 1:10

SWALE SUBSOIL NOT SHOWN ON PLAN FOR CLARITY.

SUBSOIL DRAINAGE NOTES

1. GENERALY PROVIDE SUBSOIL DRAINS TO INTERCEPT GROUNDWATER SEEPAGE AND PREVENT WATER BUILD-UP BEHIND WALLS AND UNDER FLOORS AND PAVEMENTS. CONNECT SUBSOIL TO SURFACE DRAINS OR TO THE STORMWATER DRAINAGE SYSTEM AS APPLICABLE.

2. PIPE DEPTH:
PROVIDE THE FOLLOWING MINIMUM CLEAR DEPTH, MEASURED TO THE CROWN OF THE PIPE, WHERE THE PIPE PASSES BELOW THE FOLLOWING ELEMENTS:

- 100mm BELOW FORMATION LEVEL OF THE PAVEMENT, KERB OR CHANNEL.
- 100mm BELOW THE AVERAGE GRADIENT OF THE BOTTOM OF FOOTINGS.

3. JOINTING:
AT JUNCTIONS OF SUBSOIL PIPES PROVIDE TEES, COUPLINGS OR ADAPTORS TO AS2439.1.

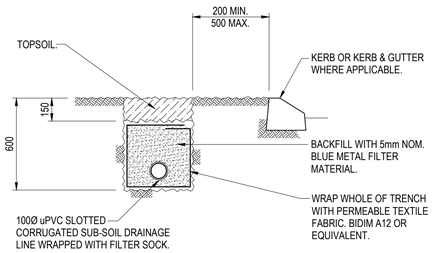
4. TRENCH WIDTH MINIMUM 300mm.

5. PIPE UNDERLAY
GENERAL: GRADE THE TRENCH FLOOR EVENLY TO THE GRADIENT OF THE PIPELINE. IF THE TRENCH FLOOR IS ROCK, CORRECT ANY IRREGULARITIES WITH COMPACTED BEDDING MATERIAL. BED PIPING ON A CONTINUOUS UNDERLAY OF BEDDING MATERIAL, AT LEAST 75mm THICK AFTER COMPACTION. LAY THE PIPE WITH ONE LINE OF PERFORATIONS AT THE BOTTOM.

CHASES: IF NECESSARY TO PREVENT PROJECTIONS SUCH AS SOCKETS AND FLANGES FROM BEARING ON THE TRENCH BOTTOM OR UNDERLAY.

6. PIPE SURROUNDS:
GENERAL: PLACE THE MATERIAL IN THE PIPE SURROUND IN LAYERS SMALLER THAN OR EQUAL TO 200mm LOOSE THICKNESS, AND COMPACT WITHOUT DAMAGING OR DISPLACING PIPING.
DEPTH OF OVERLAY: TO THE UNDERSIDE OF THE BASE OF OVERLYING STRUCTURES SUCH AS PAVEMENTS, SLABS AND CHANNELS TO WITHIN 150mm OF THE FINISHED SURFACE OF UNPAVED OR LANDSCAPED AREAS.

7. FILTER SOCKS:
PROVIDE POLYESTER PERMEABLE SOCKS CAPABLE OF RETAINING PARTICLES OF 0.25mm SIZES. SECURELY FIT OR JOIN THE SOCK AT EACH JOINT.



SUB-SOIL DRAIN DETAIL

SCALE 1:20

DRAINAGE NOTES:

1. ALL STORMWATER WORK TO COMPLY WITH AS 3500 PART 3.

2. CONTRACTOR SHALL BE RESPONSIBLE FOR MAINTAINING THE MINIMUM COVER OF 600mm ON ALL PIPES.

3. PROTECTION OF PIPES DUE TO LOADS EXCEEDING W7 WHEEL LOAD SHALL BE THE CONTRACTOR'S RESPONSIBILITY.

4. BEDDING TYPE SHALL BE TYPE H2 FOR RCP. WHERE NECESSARY THE OVERLAY ZONE SHALL BE REDUCED TO ACCOMMODATE PAVEMENT REQUIREMENTS. REFER TO THIS DRAWING FOR DETAILS.

5. MINIMUM COVER OVER EXISTING PIPES FOR PROTECTION DURING CONSTRUCTION SHALL BE 800mm.

6. NO CONSTRUCTION LOADS SHALL BE APPLIED TO PLASTIC PIPES.

7. FINISHED SURFACE LEVELS SHOWN ON LAYOUT PLAN DRGS TAKE PRECEDENCE OVER DESIGN DRAINAGE SURFACE LEVELS.

8. ALL PIPES UP TO AND INCLUDING 300 DIA. SHALL BE SOLVENT OR RUBBER RING JOINTED PVC CLASS SH PIPE TO AS1260. ALL OTHER PIPES TO BE RCP USING CLASS 2 RUBBER RING JOINTED PIPE. HARDIES FRC PIPE MAY BE USED IN LIEU OF RCP IF DESIRED IN GROUND. ALL AERIAL PIPES TO BE PVC CLASS SH.

9. ALL PITS IN NON TRAFFICABLE AREAS TO BE PREFABRICATED POLYESTER CONCRETE "POLYCRETE" WITH "LIGHT DUTY" CLASS B GALV. MILD STEEL GRATING AND FRAME.
ALL PITS IN TRAFFICABLE AREAS (CLASS "D" LOADING MAX) TO HAVE 150mm THICK CONCRETE WALLS AND BASE CAST IN-SITU f'c=32 MPa, REINFORCED WITH N12-200 BOTH LOADING WAYS CENTRALLY PLACE .U.N.O. ON SEPARATE DESIGN DRAWINGS IN THIS SET. GALV.MILD STEEL GRATING AND FRAME TO SUIT DESIGN LOADING. PRECAST PITS, RECTANGULAR OR CIRCULAR IN SHAPE, MAY BE USED IN LIEU AND SHALL COMPLY WITH RELEVANT AUSTRALIAN STANDARDS.

10. ALL PITS, GRATINGS AND FRAMES SHALL BE INSTALLED IN ACCORDANCE WITH THE MANUFACTURERS SPECIFICATION AND TO BE IN ACCORDANCE WITH AS3500.3 AND AS3996.

11. PIT CHAMBER DIMENSIONS ARE TO BE SELECTED TO SATISFY THE FOLLOWING:
- PIPE SIZE
- DEPTH TO INVERT
- SKEW ANGLE
REFER TYPICAL PIT CHAMBER DETAILS BELOW
IF PIT LID SIZE IS SMALLER THAN THE PIT CHAMBER SIZE THEN THE PIT LID IS TO BE CONSTRUCTED ON THE CORNER OF THE PIT CHAMBER WITH THE STEP IRONS DIRECTLY BELOW. ALTERNATIVELY THE PIT LID TO BE USED, IS TO BE THE SAME SIZE AS THE PIT CHAMBER.

12. FOR PIPE SIZES GREATER THAN Ø300mm, PIT FLOOR IS TO BE BENCHED TO FACILITATE FLOW.

13. GALVANISED STEP IRONS SHALL BE PROVIDED AT 300 CTS FOR PITS HAVING A DEPTH EXCEEDING 1200mm. SUBSOIL DRAINAGE PIPE SHALL BE PROVIDED IN PIPE TRENCHES ADJACENT TO INLET PIPES. (MINIMUM LENGTH 3m).

14. ALL SUBSOIL PIPES SHALL BE 100mm SLOTTED PVC IN A FILTER SOCK, UNO, WITH 3m INSTALLED UPSTREAM OF ALL PITS.

15. ALL PIPEWORK SHALL HAVE MINIMUM DIAMETER 100.

16. MINIMUM GRADE FOR ROOFWATER DRAINAGE LINES SHALL BE 1%.

17. ALL PIPE JUNCTIONS AND TAPER UP TO AND INCLUDING 300 DIA. SHALL BE VIA PURPOSE MADE FITTINGS.

18. ALL ROOF DRAINAGE TO BE INSTALLED IN ACCORDANCE WITH AS3500, PART 3. TESTING TO BE UNDERTAKEN AND REPORTS PROVIDED TO THE SUPERINTENDENT.

19. LOCATION OF THE DIRECT DOWN PIPE CONNECTIONS MAY VARY ON SITE TO SUIT SITE CONDITIONS, WHERE CONNECTION SHOWN ON LONG SECTIONS CHAINAGES ARE INDICATIVE ONLY.

20. PITS IN EXCESS OF 1.5 m DEEP TO HAVE WALL AND FLOOR THICKNESS INCREASED TO 200mm. REINFORCED WITH N12@200 CTS CENTRALLY PLACED BOTH WAYS THROUGHOUT U.N.O.ON SEPARATE DESIGN DRAWINGS IN THIS SET. IF DEPTH EXCEEDS 5m CONTACT ENGINEER.

21. SUBSOIL DRAINAGE LINES FOR LANDSCAPE AREA NOT SHOWN ON THESE DRAWINGS. REFER TO LANDSCAPING PLANS FOR DETAILS.

22. ALL STORMWATER PITS TO HAVE Ø100 uPVC SLOTTED SUBSOIL PIPES CONNECTED TO THEM. THESE SUBSOILS TO EXTEND 3m UPSTREAM OF THE PIT AT A MINIMUM GRADE.

PLAN ID	MAXIMUM PIT PLAN DIMENSIONS
S	450mm x 450mm
M	600mm x 600mm
L	900mm x 900mm
XL	1200mm x 1200mm

DEPTH ID	BAG DEPTH	OVERALL DEPTH
1	170	270
2	300	450
3	600	700

		DEPTH ID		
		1	2	3
PLAN ID	S	■		
	M	■	■	
	L	■	■	■
	XL	■	■	■

GENERAL NOTES

1. THE MINIMUM CLEARANCE DEPENDS ON THE CONFIGURATION (SEE NOTE 2) AND THE LOCAL COUNCIL REQUIREMENTS.
2. CLEARANCE FOR ANY PIT WITHOUT AN INLET PIPE (ONLY USED FOR SURFACE FLOW) CAN BE AS LOW AS 50mm. FOR OTHER PITS, THE RECOMMENDED CLEARANCE SHOULD BE GREATER OR EQUAL TO THE PIPE OBVERT SO AS NOT TO INHIBIT HYDRAULIC CAPACITY.
3. OCEAN PROTECT PROVIDES TWO FILTRATION BAG TYPES:- 200 MICRON BAGS FOR HIGHER WATER QUALITY FILTERING AND A COARSE BAG FOR TARGETING GROSS POLLUTANTS.
4. DRAWINGS NOT TO SCALE.

OCEAN PROTECT

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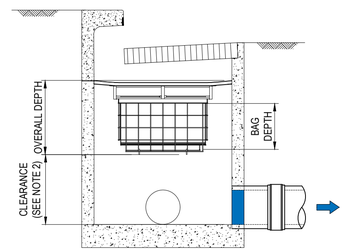
TYPCIAL ARRANGEMENTS
SPECIFICATION DRAWING



SURFACE FLOW CONFIGURATION

SCALE: 1:20

PIPE FLOW CONFIGURATION

SCALE: 1:20

0 400 800 1200 1600 2000mm
400 200
SCALE 1:20

0 200 400 600 800 1000mm
200 100
SCALE 1:10

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

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01	ISSUED AS CONCEPT	SC	NW	15.12.2023					

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Architect
CUSTANCE ARCHITECTURE

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DRAWING TO BE PRINTED IN COLOUR

henry&hymas

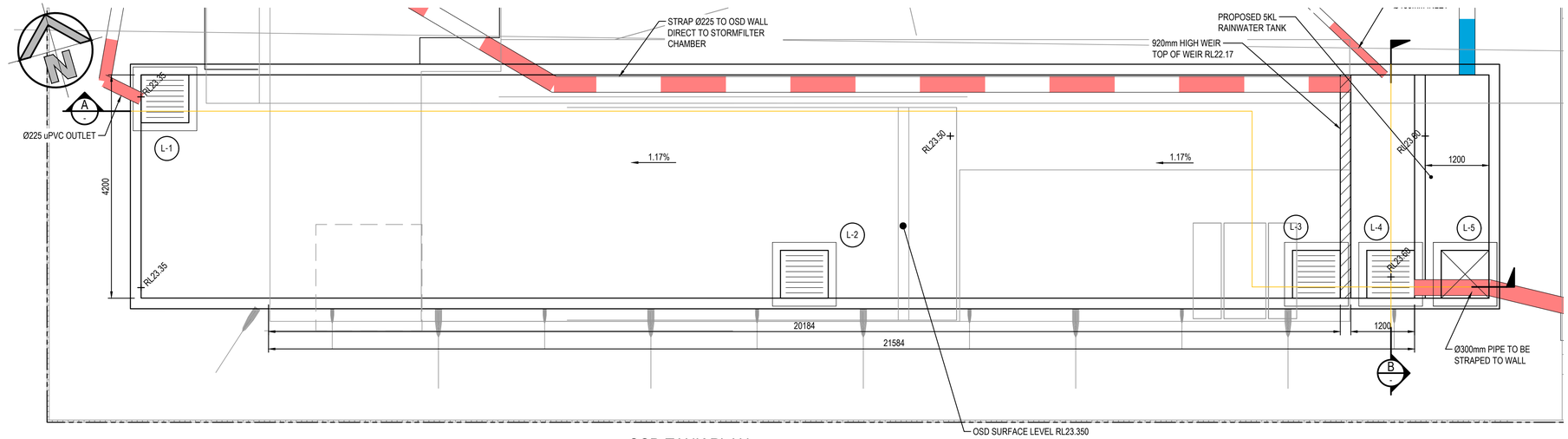
Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title
STORMWATER MISCELLANEOUS DETAILS

Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	DECEMBER 2023
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:200

Drawing number 22T46_DA_C201

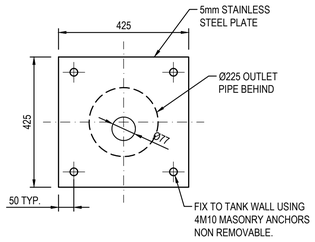
Revision 02



OSD TANK PLAN

SCALE: 1:50

OSD SURFACE LEVEL RL23.350
PLANTING DEPTH = 400mm
OSD TOP = 22.95
OSD SOFFIT/WATER LEVEL = 22.75
OSD BASE = 20.90
AVERAGE BASE = 21.05
AREA = 90m^2
VOLUME = 160m^3
TANK TO BE FITTED WITH 3 X 690 P.SORB FILTER CARTRIDGES.
STRUCTURAL DETAILS BY STRUCTURAL ENGINEERS.

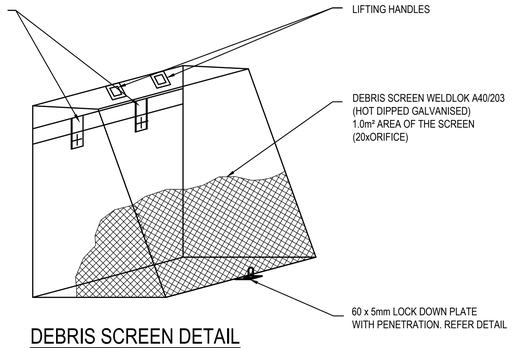


ORIFICE PLATE DETAIL

SCALE 1:10

100 x 16 MOUNTING BAR WITH BRACKETS, SCREEN TO BE ATTACHED (GENERALLY ON A SLIDING MECHANISM) TO THE WALL, BUT SHOULD BE REMOVABLE (WITHOUT THE USE OF TOOLS) TO PERMIT CLEANSING AND EASY INSPECTION OF THE OUTLET CONTROL. ALL STEEL TO BE HOT DIPPED GALVANISED.

MAXIMESH RH3030 IS RECOMMENDED FOR ORIFICES LESS THAN 150mm IN DIAMETER AND SCREEN AREA 50xTHE ORIFICE AREA



DEBRIS SCREEN DETAIL

NOT TO SCALE
ALL STEEL TO BE HOT DIPPED GALVANISED

DANGER

CONFINED SPACE

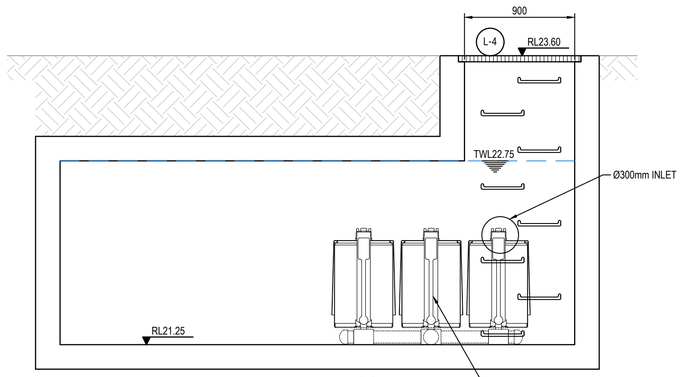
NO ENTRY WITHOUT CONFINED SPACE TRAINING

A) A CONFINED SPACE DANGER SIGN SHALL BE POSITIONED IN A LOCATION SUCH THAT IT IS CLEARLY VISIBLE TO PERSONS PROPOSING TO ENTER THE BELOW GROUND TANKS/ CONFINED SPACE AT ALL ACCESS POINTS OF THE TANK/ CONFINED SPACE.

B) SIGN TO BE MINIMUM DIMENSIONS: 250mm x 180mm ENTRIES I.E.. GRATES, MANHOLES

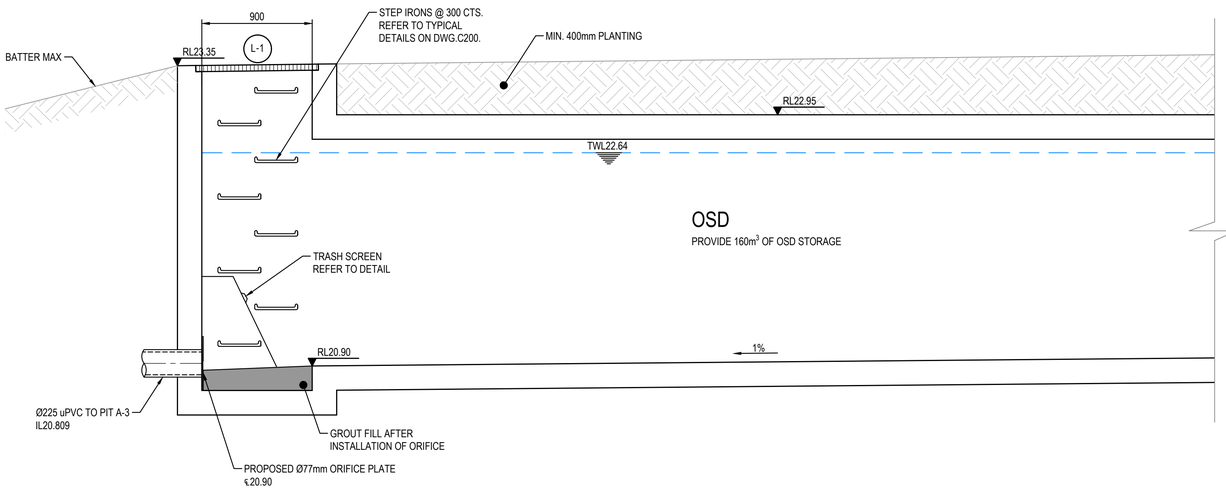
C) SIGN SHALL BE MANUFACTURED FROM COLOUR BONDED METAL OR POLYPROPYLENE

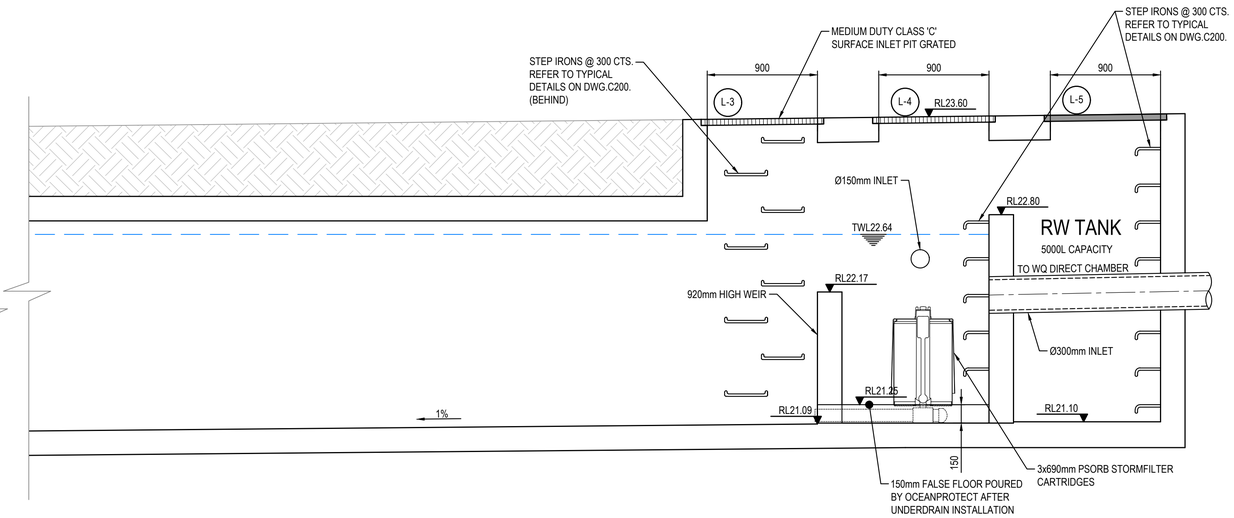
D) SIGN SHALL BE AFFIXED TO A SURFACE WITH SCREWS AT EACH CORNER.



SECTION B

SCALE: 1:25





0 2 4 6 8 10m — 2 1 — SCALE 1:100

0 500 1000 1500 2000 2500mm — 500 300 100 — SCALE 1:25

0 200 400 600 800 1000mm — 200 100 — SCALE 1:10

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NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
02	ISSUED FOR DA ONLY	AFe	NW	06.06.2024
01	ISSUED FOR DA ONLY	MP	NW	23.02.2024

Client: NSW GOVERMENT LAND & HOUSING CORPORATION

Architect: CUSTANCE ARCHITECTURE

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DRAWING TO BE PRINTED IN COLOUR

henry&hymas

Project: PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title: OSD TANK PLAN DETAILS AND SECTIONS

Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	DECEMBER 2023
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:100

Drawing number: 22T46_DA_C202

Revision: 02

TOTAL SITE =3658m²

NORTH CATCHMENT
AREA = 81m² (100% IMPERVIOUS)

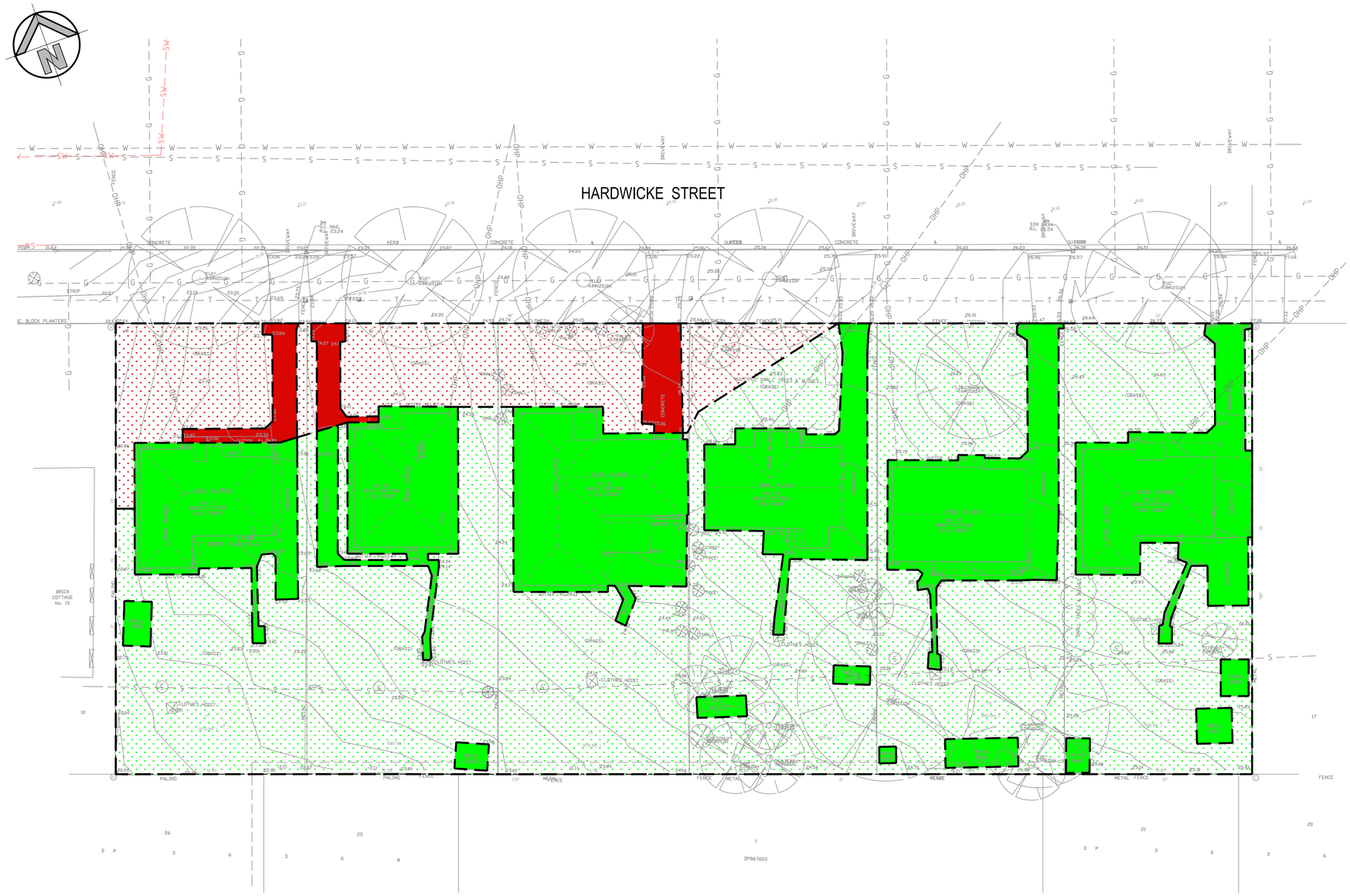
NORTH CATCHMENT
AREA = 394m² (100% PERVIOUS)

SOUTH CATCHMENT
AREA = 1124m² (100% IMPERVIOUS)

SOUTH CATCHMENT
AREA = 2059m² (100% PERVIOUS)

PRE-DEVELOPMENT FLOW RATES

ARI (YEAR)	CATCHMENT	
	FLOW RATE NORTH (L/s)	FLOW RATE SOUTH (L/s)
5	13	59
10	16	73
20	17	85
100	20	115



PRE-DEVELOPMENT STORMWATER CATCHMENT PLAN

SCALE: 1:200

0 4 8 12 16 20m
4 3 2 1
SCALE 1:200

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REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
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DRAWING TO BE PRINTED IN COLOUR

henry&hymas

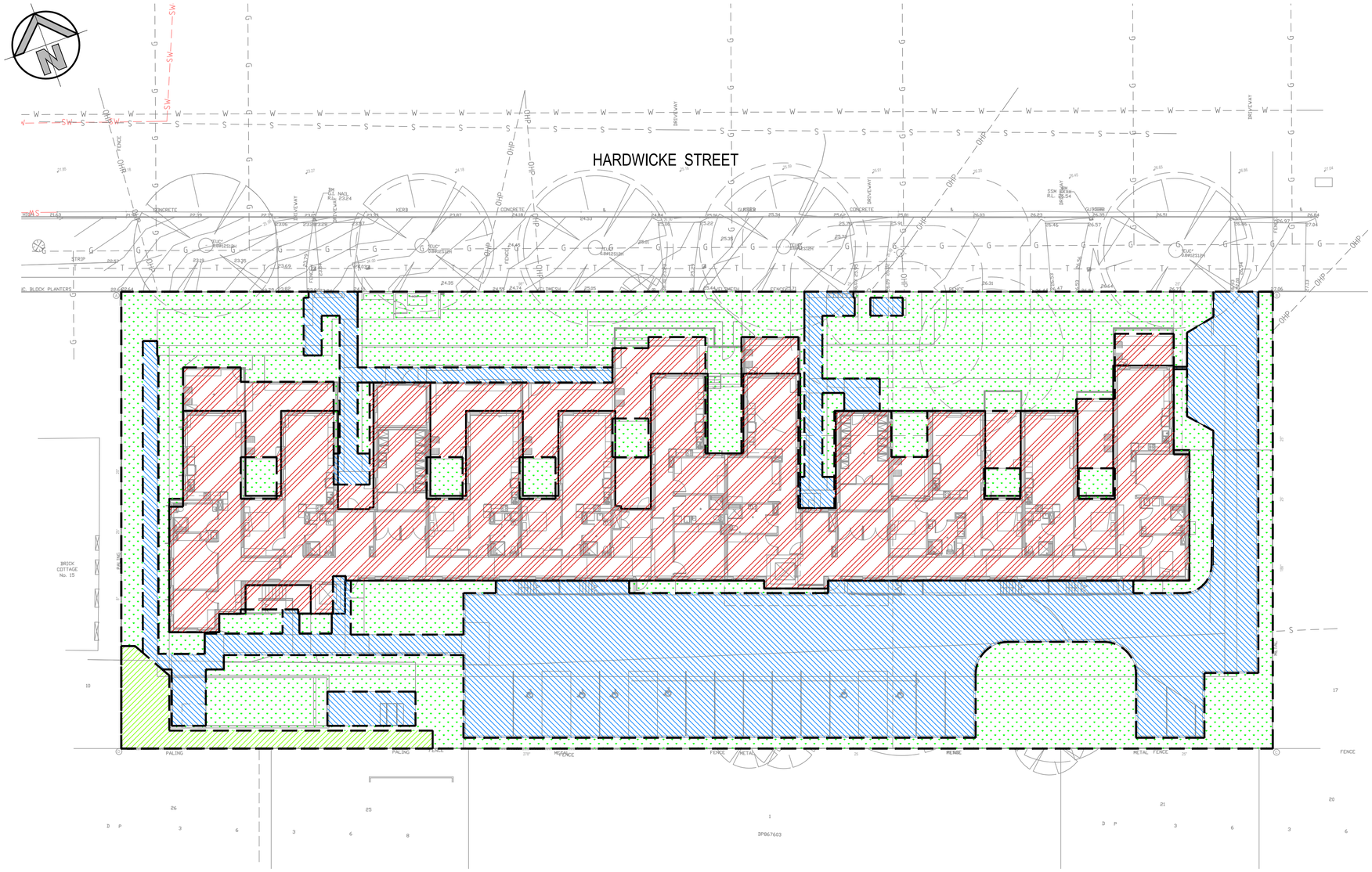
Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title
PRE-DEVELOPMENT STORMWATER CATCHMENT PLAN

Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	APRIL 2023
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:200

Drawing number: 22T46_DA_C250

Revision: 02



TOTAL SITE =3658m²

HARDSTAND CATCHMENT
AREA = 1064m²

ROOF CATCHMENT
AREA = 1308m²

LANDSCAPE CATCHMENT
AREA = 1222m²

AREA DRAINING SOUTH
AREA = 63.5m²

POST-DEVELOPMENT FLOW RATES

ARI (YEAR)	CATCHMENT	
	FLOW RATE NORTH (DETAINED) (L/s)	FLOW RATE SOUTH (UNDETAINED) (L/s)
5	12	0
10	13	0
20	14	0
100	17	0

POST-DEVELOPMENT STORMWATER CATCHMENT PLAN

SCALE: 1:200

0 4 8 12 16 20m
4 3 2 1
SCALE 1:200

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
02	ISSUED FOR DA ONLY	PS	NW	06.06.2024					
01	ISSUED FOR DA ONLY	MP	NW	23.02.2024					

Client
NSW GOVERMENT LAND & HOUSING CORPORATION

Architect
CUSTANCE ARCHITECTURE

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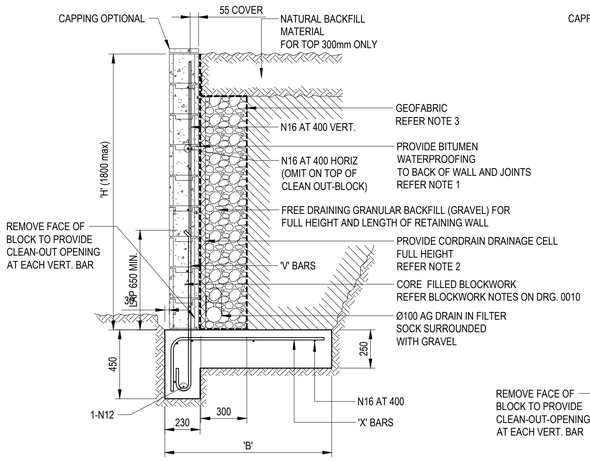
Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

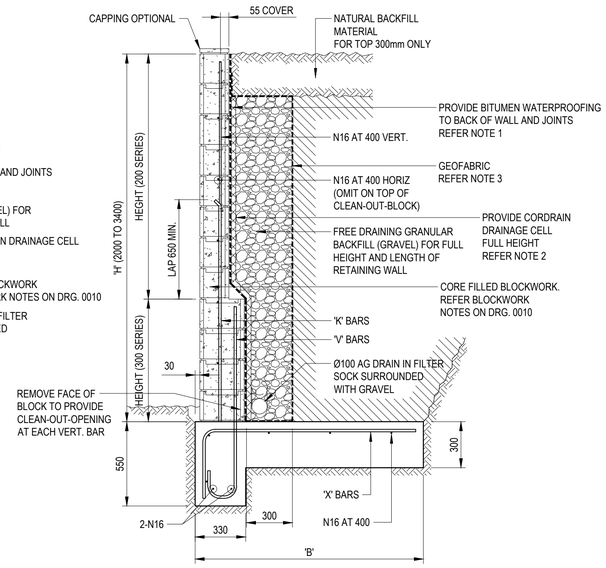
Title
POST-DEVELOPMENT STORMWATER CATCHMENT PLAN

Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	APRIL 2023
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:200

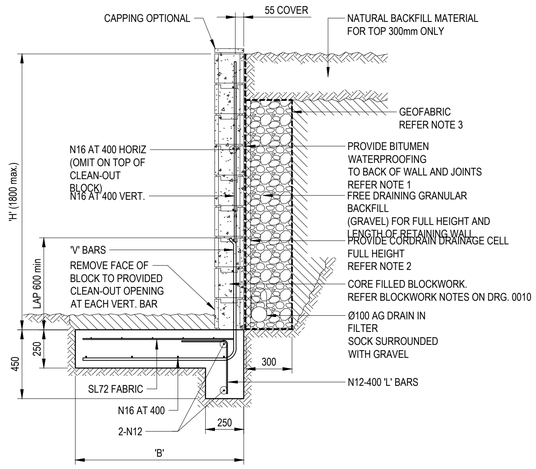
Drawing number: 22T46_DA_C251
Revision: 02



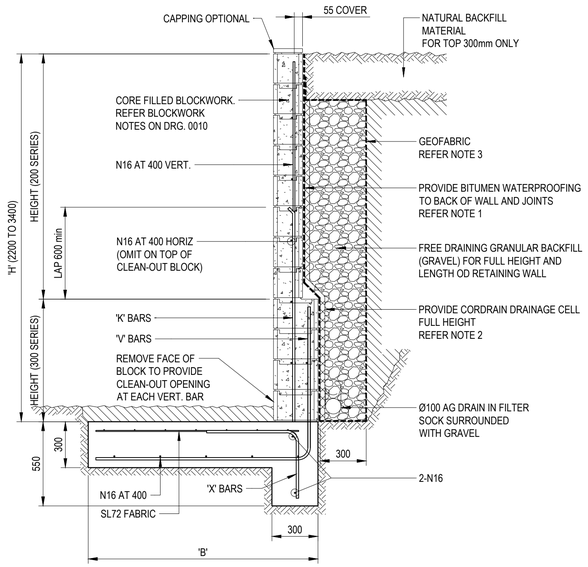
150 AND 200 SERIES BLOCK WALL - TYPE A



200 AND 300 SERIES BLOCK WALL



150 OR 200 SERIES BLOCK WALL - TYPE B



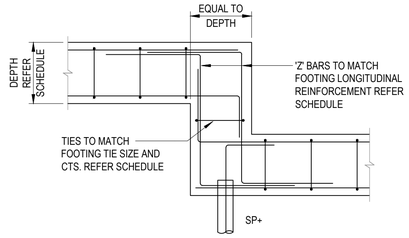
200 OR 300 SERIES BLOCK WALL

RETAINING WALL SCHEDULE - TYPE A

TOTAL HEIGHT 'H' (mm)	HEIGHT OF BLOCK TYPE		'B' (mm)	'V' & 'X' BARS	'K' BARS
	200 SERIES	300 SERIES			
800	800	-	900	N16 AT 400	-
1000	1000	-	1000	N16 AT 400	-
1200	1200	-	1100	N16 AT 400	-
1400	1400	-	1200	N16 AT 400	-
1600	1600	-	1300	N16 AT 400	-
1800	1800	-	1400	N20 AT 400	-

NOTES:

1. ENSURE REAR FACE OF RETAINING WALL IS FULLY WATERPROOFED. USE EMER-PROOF ECOFLEX OR APPROVED EQUIVALENT IN ACCORDANCE WITH MANUFACTURERS SPECIFICATION. EG: 2 COATS min. APPLIED IN OPPOSITE DIRECTIONS AND ALLOWED TO CURE FOR 7 DAYS. (TO BE CONIRMED BY THE ARCHITECT)
2. INSTALL FULL HEIGHT DRAINAGE CELL TO REAR OF WALL, USE NYLEX CORDRAIN/18 OR APPROVED EQUIVALENT, AT 1500 CENTRES.
3. PROVIDE GEOFABRIC MATERIAL AS SEPARATION BETWEEN GRANULAR BACKFILL (GRAVEL) AND NATURAL BACKFILL MATERIAL. USE BIDIM A24 OR APPROVED EQUIVALENT.
4. MINIMUM ALLOWABLE BEARING PRESSURE AT BASE = 150 kPa



TYPICAL FOOTING STEP DETAIL

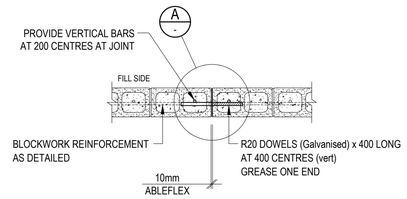
SCALE 1:20

RETAINING WALL SCHEDULE - TYPE B

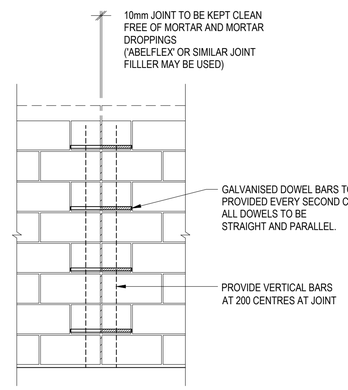
TOTAL HEIGHT 'H' (mm)	HEIGHT OF BLOCK TYPE		'B' (mm)	'V' & 'X' BARS	'K' BARS
	200 SERIES	300 SERIES			
800	800	-	800	N16 AT 400	-
1000	1000	-	1200	N16 AT 400	-
1200	1200	-	1500	N16 AT 400	-
1400	1400	-	1700	N16 AT 400	-
1600	1600	-	1900	N16 AT 400	-
1800	1800	-	2200	N20 AT 400	-

NOTES:

1. ENSURE REAR FACE OF RETAINING WALL IS FULLY WATERPROOFED. USE EMER-PROOF ECOFLEX OE APPROVE EQUIVALENT IN ACCORDANCE WITH MANUFACTURERS SPECIFICATIONS. EG: 2 COATS min. APPLIED IN OPPOSITE DIRECTIONS AND ALLOWED TO CURE FOR 7 DAYS.
2. INSTALL FULL HEIGHT DRAINAGE CELL TO REAR OF WALL, USE NYLEX CORDRAIN/18 OR APPROVED EQUIVALENTS.
3. PROVIDE GEOFABRIC MATERIAL AS SEPARATION BETWEEN GRANULAR BACKFILL (GRAVEL) AND NATURAL BACKFILL MATERIAL. USE BIDIM A24 OR APPROVED EQUIVALENT.
4. MINIMUM ALLOWABLE BEARING PRESSURE AT BASE = 150 kPa



PLAN

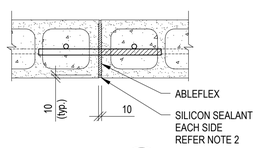


ELEVATION

TYPICAL BLOCKWORK VERTICAL EXPANSION JOINT

NOTES:

1. UNLESS OTHERWISE NOTED ON PLAN JOINTS SHALL BE LOCATED AT 8000 CENTRES max. AND 4000 FROM CORNERS.
2. PROVIDE SILICON SEALANT BOTH FACES IN ALL JOINTS, USE PARCHEM EMER-SEAL CR OR AN APPROVED EQUIVALENT.



DETAIL A -

EXPANSION JOINT - PLAN & ELEVATION

SCALE 1:20

MASONRY CONSTRUCTION:

B1 ALL WORKMANSHIP AND MATERIALS SHALL BE IN ACCORDANCE WITH AS3700 AND AS NOTED ON THE DRAWINGS.

B2 BRICK AND BLOCK COMPRESSIVE STRENGTH (f'uc) SHALL BE 15 MPa MINIMUM UNO. STRENGTH GRADE SHALL BE CLEARLY INDICATED ON THE DELIVERY DOCKETS.

B3 JOINT MORTAR SHALL BE OF CLASS M3 WITH 1:1:6 (CEMENT: LIME: SAND) PROPORTIONS BY VOLUME AND COMPLY WITH AS3700. MORTAR JOINTS SHALL BE 10 mm THICK AND HAVE A MAXIMUM TOOLED DEPTH OF 3 mm UNO.

B4 NON-LOAD BEARING WALLS SHALL BE SEPARATED FROM THE LOAD-BEARING ELEMENTS BY 15 mm THICK 'CANEITE' OR EXPANDED POLYSTYRENE UNO AT BOTH HORIZONTAL AND VERTICAL FACES.

NON-LOAD BEARING WALLS SHALL BE TIED TO THE SOFFITS OF BEAMS OR SLABS OVER BY USING 'MET 4-1' TIES (OR APPROVED EQUIVALENT), AT 800 mm MAX. CENTRES, UNO ON THE DRAWINGS, TO MANUFACTURER'S SPECIFICATIONS

B5 WHERE CONCRETE SLABS BEAR ON UNREINFORCED MASONRY, INCLUDING CLAY BRICKS, RENDER THE BEARING SURFACE OF THE MASONRY WALL WITH 1:3 (CEMENT : SAND) MORTAR TO ACHIEVE A LEVEL SURFACE AND PLACE A PRE-GREASED METAL SLIP JOINT PROTECTED BY 0.2 mm POLYETHYLENE SHEET TAPED TO THE FORMWORK BEFORE PLACING CONCRETE. SPECIAL DETAILS SUCH AS WATER-PROOFING MAY APPLY FOR ROOF SLABS OR SIMILARLY EXPOSED ELEMENTS.

B6 CONTROL JOINTS

1. CONTROL JOINTS SHALL BE PROVIDED IN MASONRY WALLS AS PER THE TABLE BELOW UNLESS CLOSER SPACINGS ARE SPECIFIED ELSEWHERE IN THE DOCUMENTATION.

MASONRY TYPE	LOCATION	JOINT SIZE (mm)	SPACING (m)
CONCRETE MASONRY	- EXTERNAL	10	7.0
	- EXTERNAL (WITH OPENINGS > 900mm IN HEIGHT)	10	5.0
	- INTERNAL (FACE FINISHED)	10	6.0
	- INTERNAL (RENDERED)	10	5.0
LIGHT-WEIGHT MASONRY	- INTERNAL / EXTERNAL	10	6.0
CLAY MASONRY	- INTERNAL / EXTERNAL	15	6.0 *
	- PARAPET WALLS	15	4.0

* - FOR REACTIVE ' CLASS M' SITES ONLY. REFER TABLE 4.3 OF AS3700.2011 FOR ARTICULATION JOINTS IN CLAY MASONRY.

2. CONTROL JOINTS SHALL BE PLACED AT HALF THE SPECIFIED SPACING FROM A CORNER. PROVIDE JOINTS TO MATCH JOINTS IN THE SUPPORTING STRUCTURE.
3. CONTROL JOINTS MUST BE KEPT FREE OF MORTAR AND SEALED WITH A POLYETHYLENE FOAM BACKING ROD SQUEEZED INTO THE GAP AND A GUNNED-IN MASTIC SEALANT. IF THE WALL IS TO BE FIRE-RATED, A FIRE-RATED SEALING SYSTEM WILL BE REQUIRED INSTEAD.

B7 BLOCKWORK

1. IN CORE-FILLED BLOCKWORK, EXCESS MORTAR PROTRUDING INTO THE CORES SHALL BE REMOVED BY RODDING AFTER EACH COURSE IS LAID. EVERY CORE FILLED WITH GROUT SHALL HAVE A CLEANOUT BLOCK IN THE BOTTOM COURSE.
2. REINFORCEMENT SHALL BE PLACED AND SECURELY TIED IN POSITION AS SHOWN ON THE DRAWINGS. STARTER BARS SHALL BE HELD IN PLACE BY TYING TO HORIZONTAL BARS AT CLEANOUT BLOCKS. PROVIDE COVER TO REINFORCEMENT AS SHOWN IN THE DETAILS.
3. CORE FILLING GROUT SHALL BE AS NOTED IN CONCRETE NOTES IN LIFTS NO MORE THAN 1200mm IN HEIGHT.

Element	Slump	Max. Agg. Size	Cement Type	Exposure Classifn.	Min. Conc. Grade (f'c) MPa U.N.O	Conc. Cover (U.N.O.)
Core Filling Grout	230±30	10	GP	-	20	-

0 400 800 1200 1600 2000mm
400 200

SCALE 1:20

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	MP	NW	23.02.2024					

Client
NSW GOVERMENT LAND & HOUSING CORPORATION

Architect
CUSTANCE ARCHITECTURE

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DRAWING TO BE PRINTED IN COLOUR

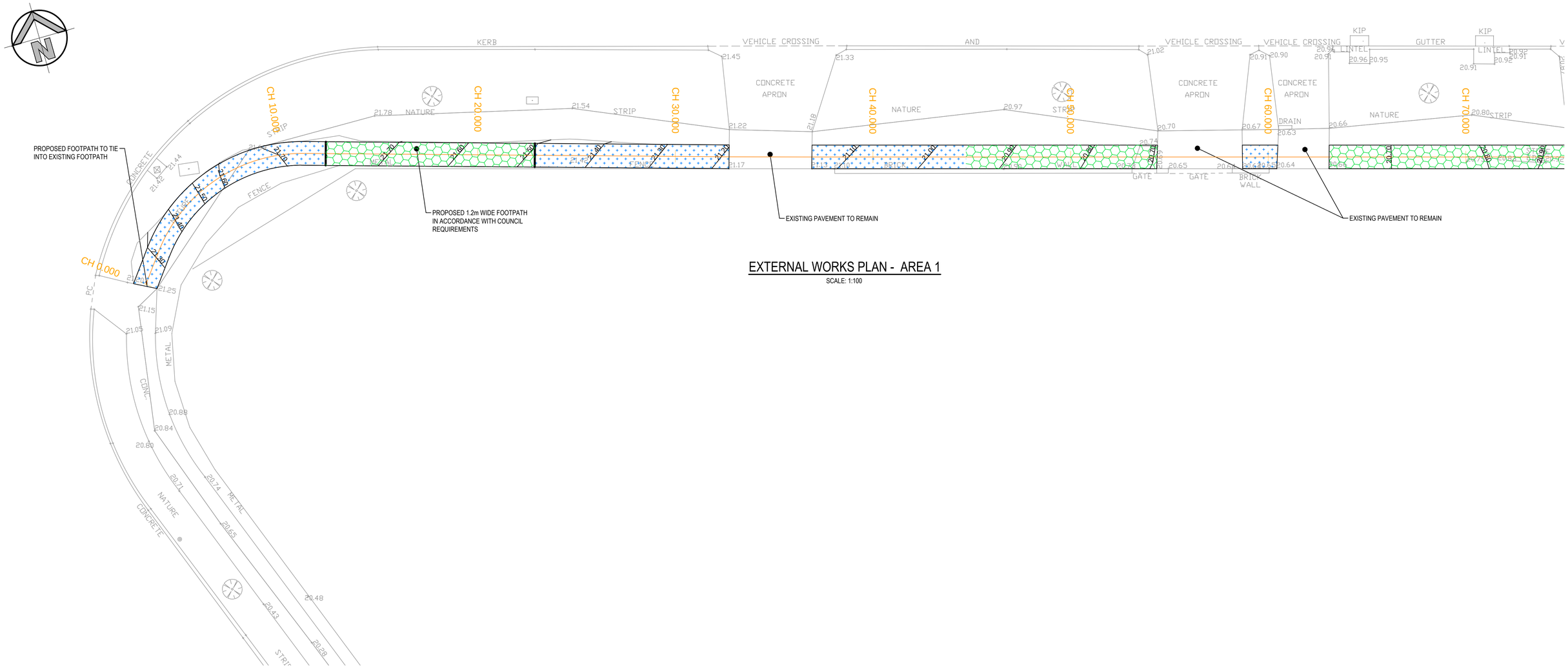
henry&hymas

Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title
RETAINING WALL DETAILS

Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	DECEMBER 2023
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	AS NOTED

Drawing number 22T46_DA_C310
Revision 01



EXTERNAL WORKS PLAN - AREA 1

SCALE: 1:100

PAVEMENT TYPE 1

HEAVY DUTY CONCRETE PAVEMENT

- 80mm THICK 25MPa CONCRETE SLAB (UNREINFORCED)
- 25mm SAND BEDDING
- COMPACTED SUBGRADE (ASSUMED MIN. CBR 3%)

PAVEMENT TYPE 3

FILTAPAVE

- FILTAPAVE OR EQUIVALENT
- 100mm COMPACTED DGB20
- COMPACTED SUBGRADE (ASSUMED MIN. CBR 3%)

0 2 4 6 8 10m

2 1

SCALE 1:100

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	AFe	NW	06.06.2024

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE

Client
NSW GOVERMENT LAND & HOUSING CORPORATION

Architect
CUSTANCE ARCHITECTURE

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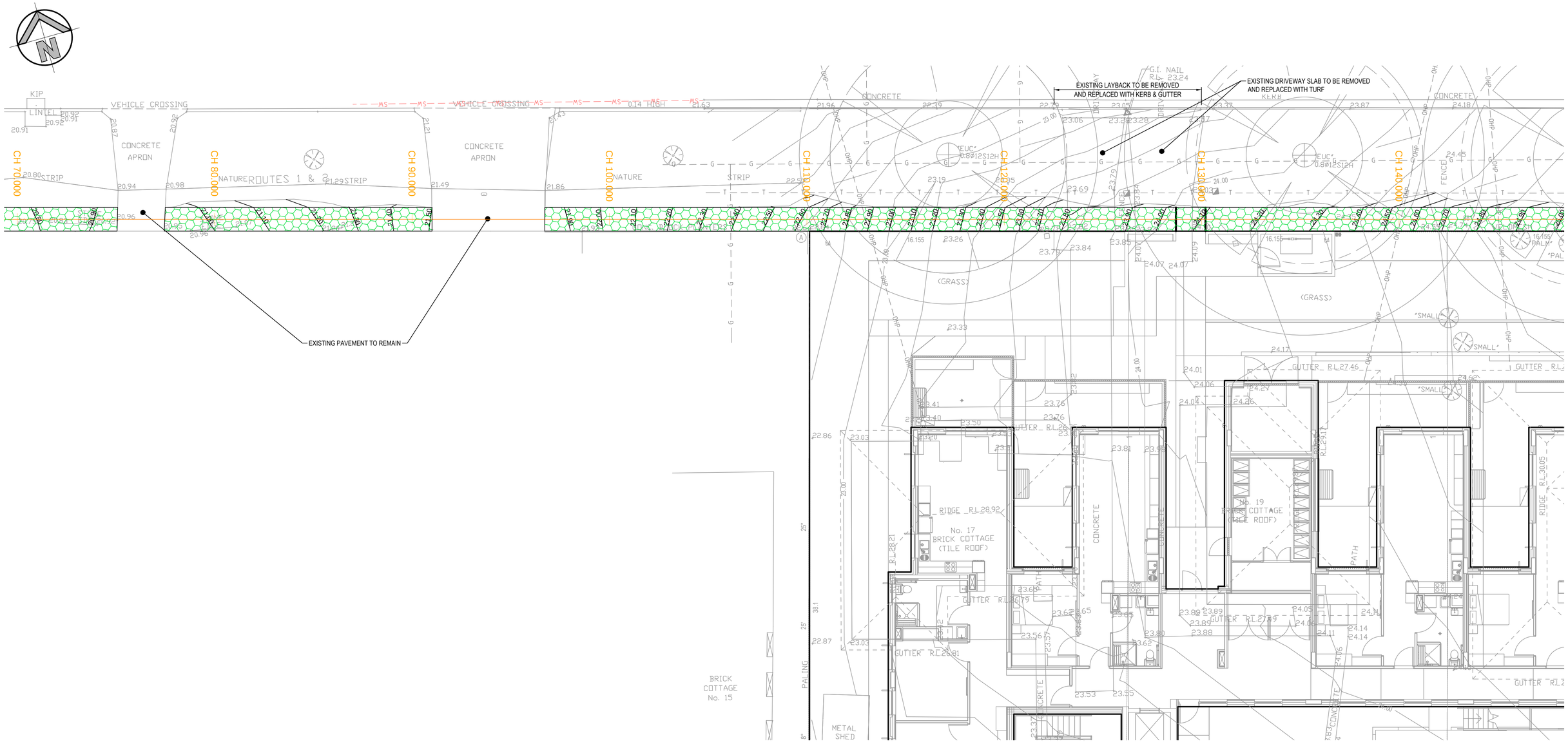
Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title
EXTERNAL WORKS PLAN
SHEET 1 OF 4

Drawn	Designed	Original issue date
A.Fernandes	N.Wetzlar	MAY 2024
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:100

Drawing number: 22T46_DA_EX01

Revision: 01



EXTERNAL WORKS PLAN

SCALE: 1:100

PAVEMENT TYPE 3

FILTAPAVE

- FILTAPAVE OR EQUIVALENT
- 100mm COMPACTED DGB20
- COMPACTED SUBGRADE (ASSUMED MIN. CBR 3%)

0 2 4 6 8 10m

2 1

SCALE 1:100

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	AFe	NW	06.06.2024

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE

Client
NSW GOVERMENT LAND & HOUSING CORPORATION

Architect
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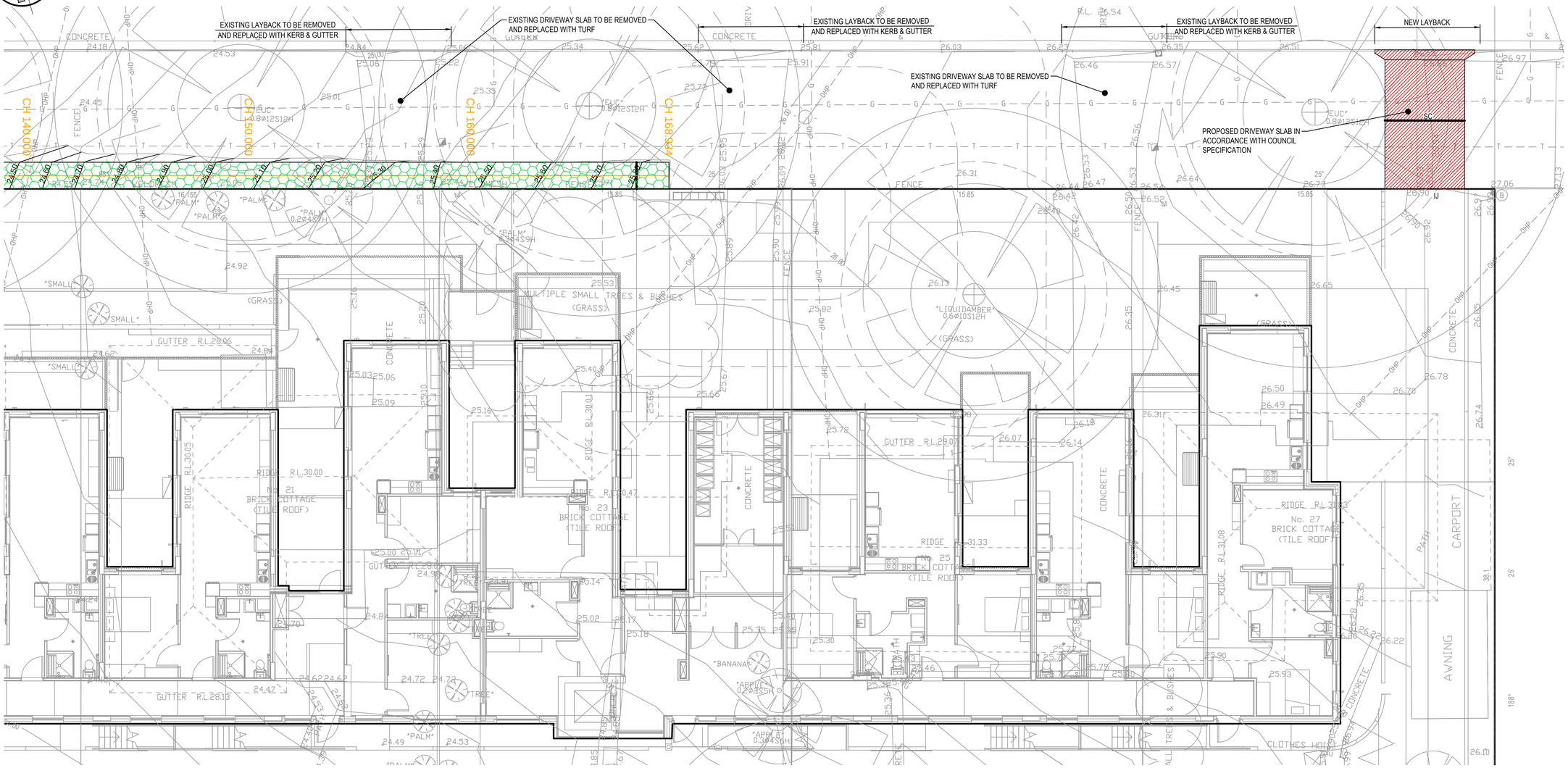
Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title
EXTERNAL WORKS PLAN
SHEET 2 OF 4

Drawn	Designed	Original issue date
A.Fernandes	N.Wetzlar	MAY 2024
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:100

Drawing number: 22T46_DA_EX02

Revision: 01



EXTERNAL WORKS PLAN

SCALE: 1:100

PAVEMENT TYPE 2

150mm THICK 32MPa CONCRETE SLAB WITH TOP SLP2 MESH (MIN.40mm COVER)
100mm COMPACTED DGB 20
COMPACTED SUBGRADE (ASSUMED MIN. CBR 3%)

PAVEMENT TYPE 3

FILTAPAVE

FILTAPAVE OR EQUIVALENT
100mm COMPACTED DGB20
COMPACTED SUBGRADE (ASSUMED MIN. CBR 3%)

0 2 4 6 8 10m
2 1
SCALE 1:100

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	AFe	NW	06.06.2024					

Client
NSW GOVERMENT LAND & HOUSING CORPORATION

Architect
CUSTANCE ARCHITECTURE

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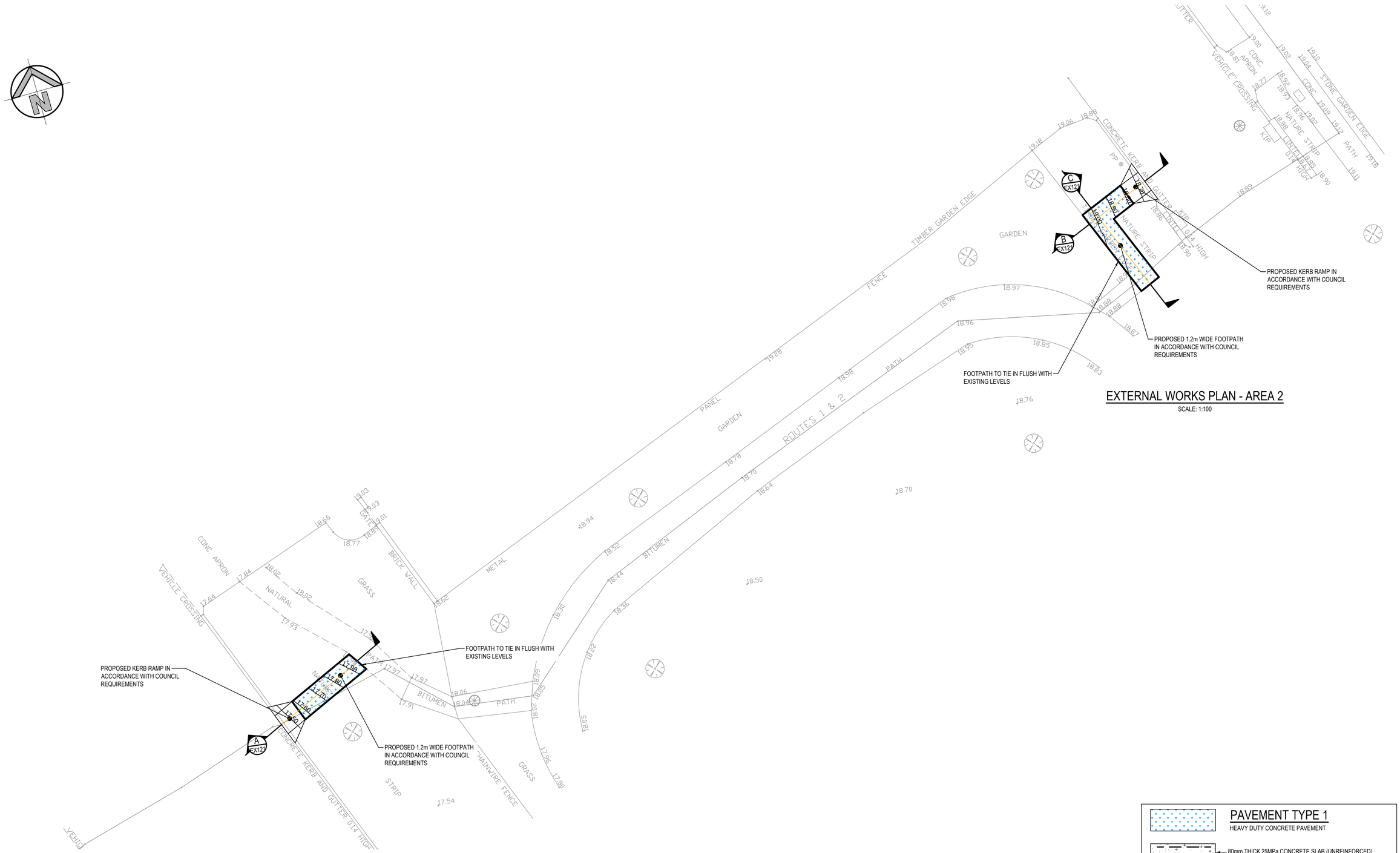
Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title
EXTERNAL WORKS PLAN
SHEET 3 OF 4

Drawn	Designed	Original issue date
A.Fernandes	N.Wetzlar	MAY 2024
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:100

Drawing number 22T46_DA_EX03
Revision 01



0 2 4 6 8 10m

2 1

SCALE 1:100

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	AFe	NW	06.06.2024					

Client
NSW GOVERMENT LAND & HOUSING CORPORATION

Architect
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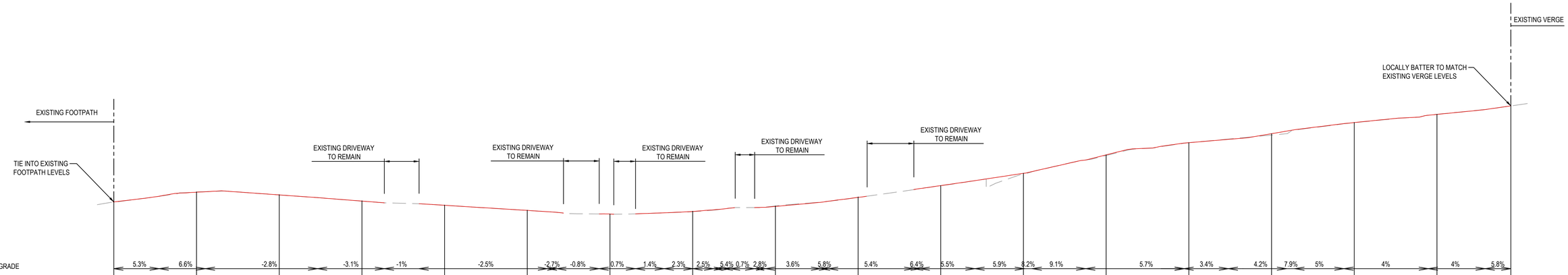
Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title
EXTERNAL WORKS PLAN
SHEET 4 OF 4

Drawn	Designed	Original issue date
A.Fernandes	N.Wetzlar	MAY 2024
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:100

Drawing number: 22T46_DA_EX04

Revision: 01



Datum RL17

DESIGN LEVELS	21.232	21.702	21.572	21.273	21.069	20.822	20.645	20.768	21.014	21.452	22.022	22.617	23.511	24.101	24.538	25.076	25.471	25.885
EXISTING LEVELS	21.229	21.715	21.571	21.271	21.069	20.819	20.646	20.763	21.037	21.448	22.017	22.580	23.478	24.100	24.468	25.070	25.476	25.882
CHAINAGE	0.000	10.000	20.000	30.000	40.000	50.000	60.000	70.000	80.000	90.000	100.000	110.000	120.000	130.000	140.000	150.000	160.000	168.934

PROPOSED EXTERNAL FOOTPATH CL LONGITUDINAL SECTION

HORIZONTAL SCALE 1:250
VERTICAL SCALE 1:100

0 5 10 15 20 25m
5 4 3 2 1
SCALE 1:250

0 2 4 6 8 10m
2 1
SCALE 1:100

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
WATSDON BUCHAN
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM 22740 RL41.10

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	SC	NW	06.06.2024					

Client
NSW GOVERMENT LAND & HOUSING CORPORATION

Architect
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DRAWING TO BE PRINTED IN COLOUR

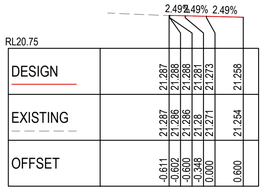
henry&hymas

Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title
EXTERNAL FOOTPATH LONG SECTION

Drawn	Designed	Original issue date
M.Barrozo	S.Chen	FEB 2024
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	AS NOTED

Drawing number 22T46_DA_EX10
Revision 01



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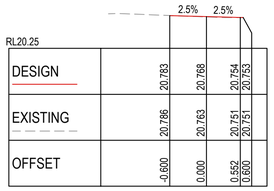

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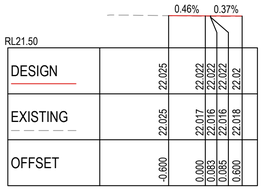

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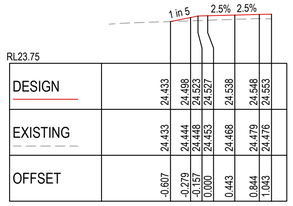

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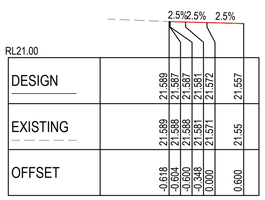

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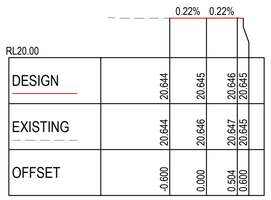

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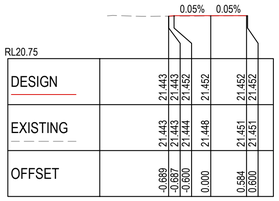

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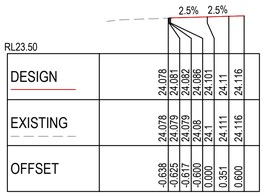

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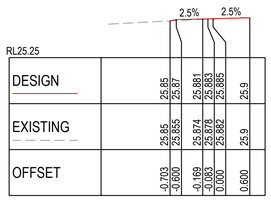

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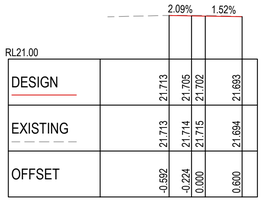

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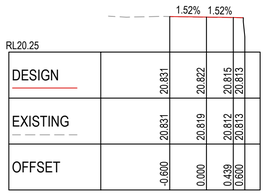

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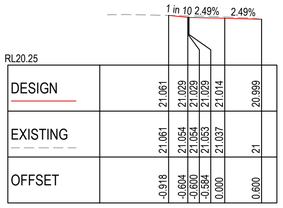

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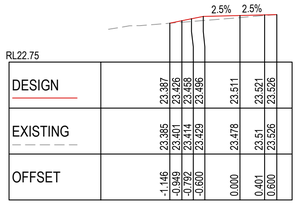

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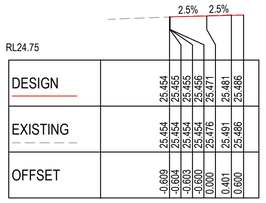

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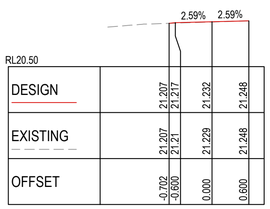

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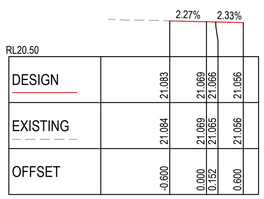

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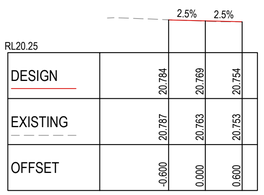

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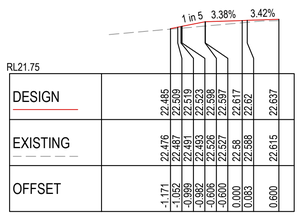

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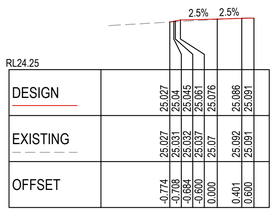

CH 150

0 1000 2000 3000 4000 5000mm

1000 600 200

SCALE 1:50

FOR DA ONLY

SURVEY INFORMATION

SURVEYED BY WATSDON BUCHAN

DATUM: A.H.D.

ORIGIN OF LEVELS: SSM 22740 RL41.10

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	SC	NW	06.06.2024					

Client: NSW GOVERMENT LAND & HOUSING CORPORATION

Architect: CUSTANCE ARCHITECTURE

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DRAWING TO BE PRINTED IN COLOUR

henry&hymas

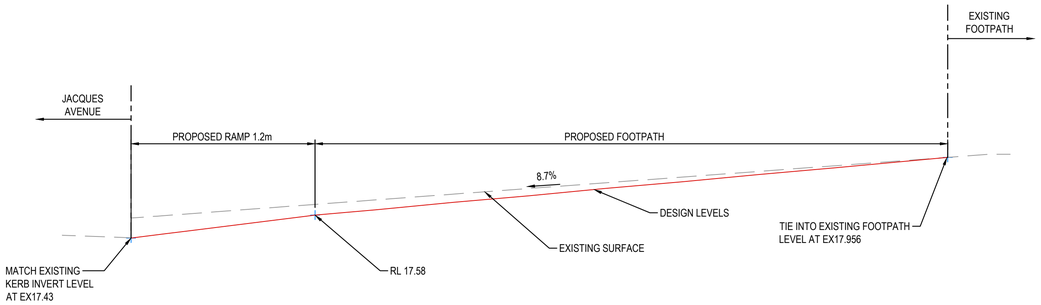
Project: PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title: EXTERNAL FOOTPATH CROSS SECTIONS

Drawn	Designed	Original issue date
M.Barrozo	S.Chen	FEB 2024
Checked	**Approved**	**Scale @A1**
N.Heazlewood	A.Francis	AS NOTED

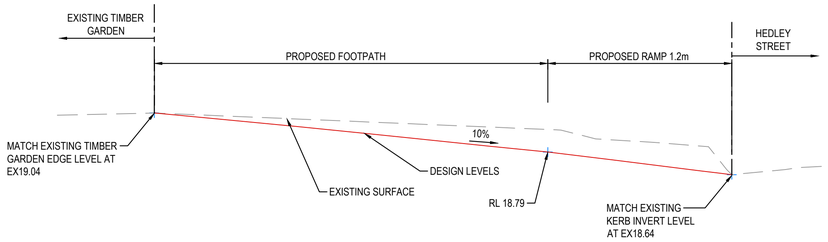
Drawing number: 22T46_DA_EX11

Revision: 01



EXTERNAL WORKS AREA 3 SECTION - A

HORIZONTAL SCALE 1:20
VERTICAL SCALE 1:20



EXTERNAL WORKS AREA 2 SECTION - B

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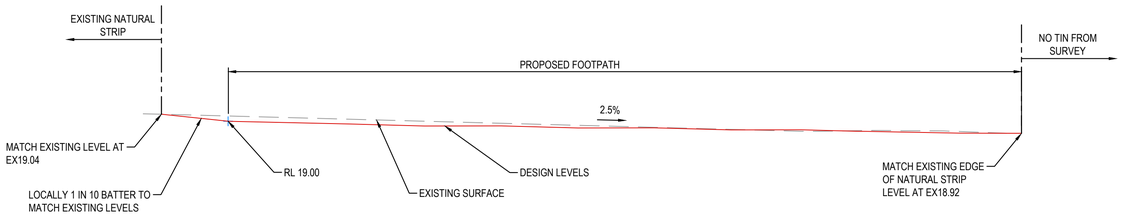

EXTERNAL WORKS AREA 2 SECTION - C

HORIZONTAL SCALE 1:20
VERTICAL SCALE 1:20

0 400 800 1200 1600 2000mm
400 200
SCALE 1:20

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
WATSDON BUCHAN
DATUM: A.H.D.
ORIGIN OF LEVELS: SSM 22740 RL41.10

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	SC	NW	06.06.2024					

Client
NSW GOVERMENT LAND & HOUSING CORPORATION

Architect
CUSTANCE ARCHITECTURE

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DRAWING TO BE PRINTED IN COLOUR

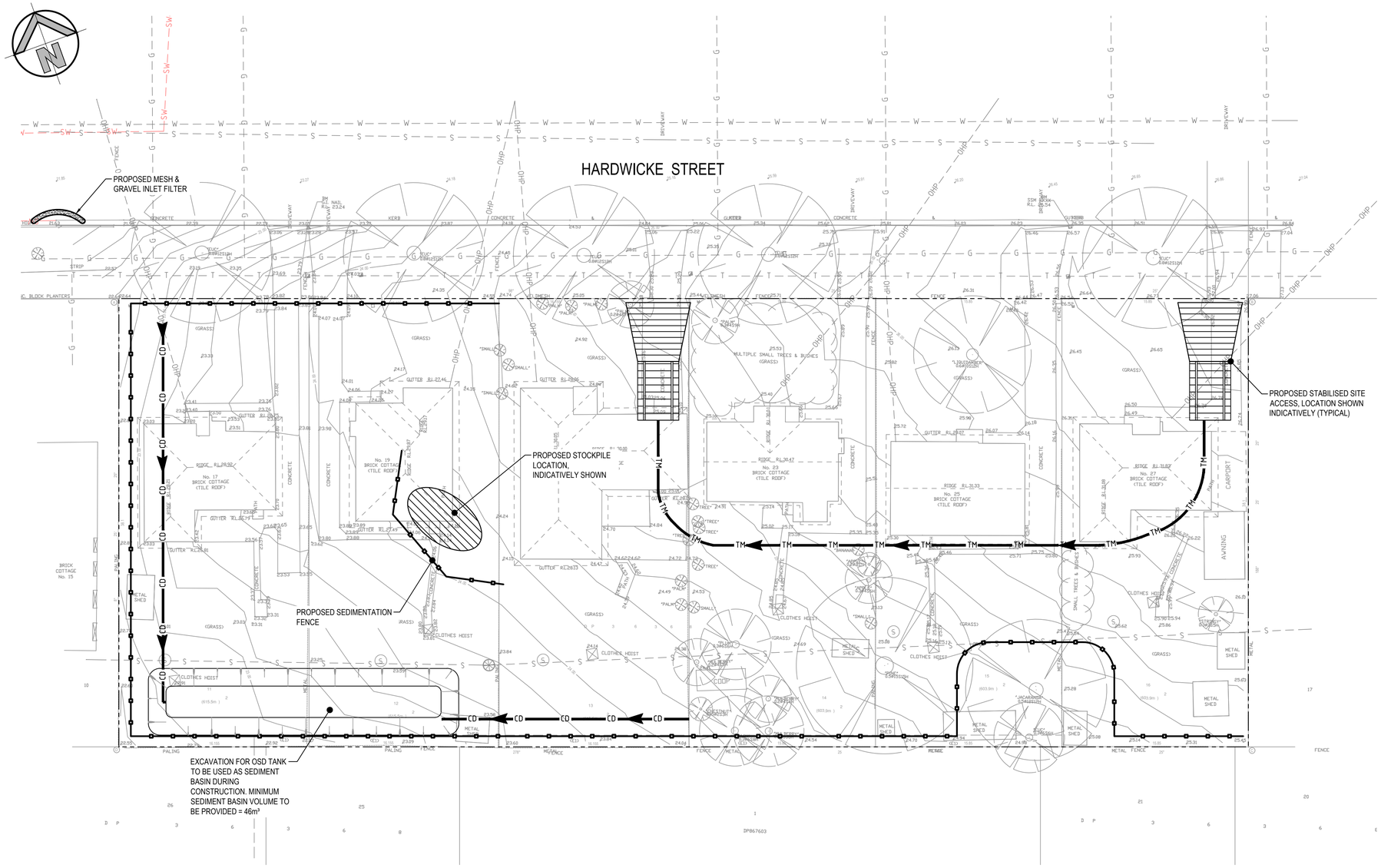
henry&hymas

Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title
EXTERNAL FOOTPATH RAMP SECTIONS

Drawn	Designed	Original issue date
M.Barrozo	S.Chen	FEB 2024
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	AS NOTED

Drawing number: 22T46_DA_EX12
Revision: 01



SEDIMENT AND EROSION CONTROL PLAN

SCALE: 1:200

LEGEND

- TRAFFIC MANOEUVRING
- PROPOSED CATCH DRAIN
- PROPOSED SEDIMENTATION FENCE
- PROPOSED VEHICLE SHAKER GRID
- PROPOSED STABILISED SITE ACCESS
- PROPOSED MESH & GRAVEL INLET FILTER
- PROPOSED STOCKPILE LOCATION
- SEDIMENT BASIN

SEDIMENT & EROSION CONTROL NOTES

- ALL SEDIMENT CONTROL DEVICES ARE TO BE CONSTRUCTED, PLACED AND MAINTAINED IN ACCORDANCE WITH RESPECTIVE COUNCIL SPECIFICATIONS AND LANDCOM'S "SOIL AND CONSTRUCTION" MANUAL.
- ALL PERIMETER & SILTATION CONTROL MEASURES ARE TO BE PLACED PRIOR TO, OR AS THE FIRST STEP IN EARTH WORKS AND/OR CLEARING.
- THE SEDIMENT & EROSION CONTROL PLAN MAY REQUIRE FUTURE ADJUSTMENT TO REFLECT CONSTRUCTION STAGING. IT IS ALSO THE CONTRACTORS RESPONSIBILTY TO PREPARE THEIR OWN SEDIMENT AND EROSION CONTROL PLAN WHICH SUITS THE DESIGNED CONSTRUCTION STAGING.
- FILTRATION BUFFER ZONES ARE TO BE FENCED OFF AND ACCESS PROHIBITED TO ALL PLANT AND MACHINERY.
- ALL TEMPORARY EARTH BERMS, DIVERSIONS & SILT DAM EMBANKMENTS ARE TO BE MACHINE COMPACTED, SEEDED & MULCHED FOR TEMPORARY VEGETATION COVER AS SOON AS THEY HAVE BEEN FORMED.
- ALL SEDIMENT TRAPPING STRUCTURES AND DEVICES ARE TO BE INSPECTED AFTER STORMS FOR STRUCTURAL DAMAGE OR CLOGGING. TRAPPED MATERIAL IS TO BE REMOVED TO A SAFE LOCATION.
- ALL TOPSOIL IS TO BE STOCKPILED ON SITE FOR REUSE (AWAY FROM TREES AND DRAINAGE LINES). MEASURES SHALL BE APPLIED TO PREVENT EROSION OF THE STOCKPILES.
- ALL EARTHWORK AREAS SHALL BE ROLLED EACH EVENING TO SEAL THE EARTHWORKS.
- ALL FILLS ARE TO BE LEFT WITH A LIP AT THE TOP OF THE SLOPE AT THE END. ALL CUT AND FILL SLOPES ARE TO BE SEEDED AND STRAW MULCHED WITHIN 14 DAYS OF COMPLETION OF FORMATION U.N.O. BY LANDSCAPE ARCHITECTS.
- UPON COMPLETION OF ALL EARTHWORKS OR AS DIRECTED BY COUNCIL SOIL CONSERVATION TREATMENTS SHALL BE APPLIED SO AS TO RENDER AREAS THAT HAVE BEEN DISTURBED, EROSION PROOF WITHIN 14 DAYS.
- EROSION AND SILT PROTECTION MEASURES ARE TO BE MAINTAINED AT ALL TIMES.

0 4 8 12 16 20m

4 3 2 1

SCALE 1:200

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
02	ISSUED FOR DA ONLY	AFe	NW	06.06.2024
01	ISSUED FOR DA ONLY	MP	NW	23.02.2024

Client: NSW GOVERMENT LAND & HOUSING CORPORATION

Architect: CUSTANCE ARCHITECTURE

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DRAWING TO BE PRINTED IN COLOUR

henry&hymas

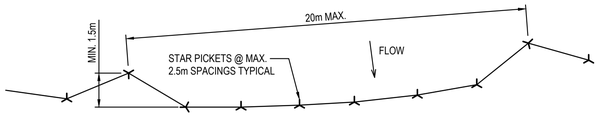
Project: PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title: SEDIMENT AND EROSION CONTROL PLAN

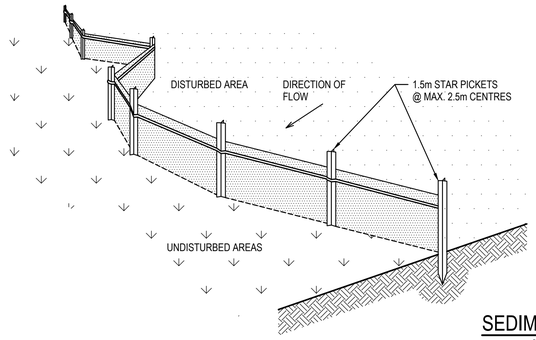
Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	APRIL 2023
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:200

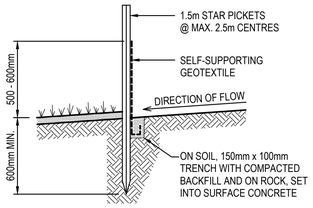
Drawing number: 22T46_DA_SE01

Revision: 02



PLAN





SECTION DETAIL

SEDIMENT FENCE

SCALE N.T.S.

SEDIMENT FENCE CONSTRUCTION NOTES:

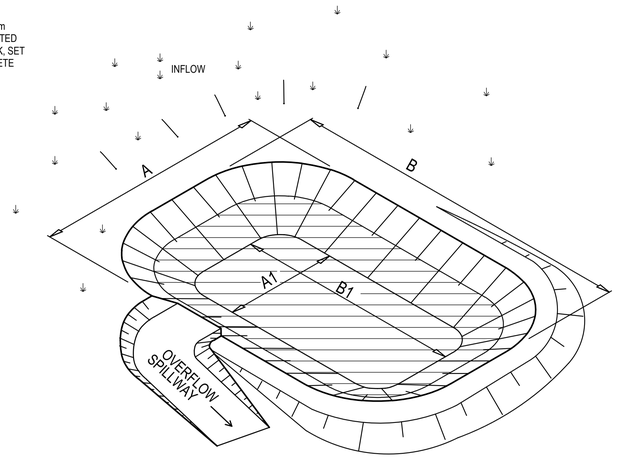
1. CONSTRUCT SEDIMENT FENCES AS CLOSE AS POSSIBLE TO BEING PARALLEL TO THE CONTOURS OF THE SITE, BUT WITH SMALL RETURNS AS SHOWN IN THE DRAWING TO LIMIT THE CATCHMENT AREA OF ANY ONE SECTION. THE CATCHMENT AREA SHOULD BE SMALL ENOUGH TO LIMIT WATER FLOW IF CONCENTRATED AT ONE POINT TO 50 LITRES PER SECOND IN THE DESIGN STORM EVENT, USUALLY THE 10-YEAR EVENT.

2. CUT A 150mm DEEP TRENCH ALONG THE UPSLOPE LINE OF THE FENCE FOR THE BOTTOM OF THE FABRIC TO BE ENTRENCHED.

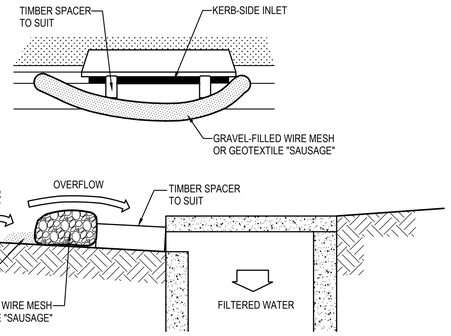
3. 3. DRIVE 1.5m LONG STAR PICKETS INTO GROUND @ 2.5m INTERVALS (MAX.) AT THE DOWNSLOPE EDGE OF THE TRENCH. ENSURE ANY STAR PICKETS ARE FITTED WITH SAFETY CAPS.

4. 4. FIX SELF-SUPPORTING GEOTEXTILE TO THE UPSLOPE SIDE OF THE POSTS ENSURING IT GOES TO THE BASE OF THE TRENCH. FIX THE GEOTEXTILE WITH WIRE TIES OR AS RECOMMENDED BY THE MANUFACTURER. ONLY USE GEOTEXTILE SPECIFICALLY PRODUCED FOR SEDIMENT FENCING. THE USE OF SHADE CLOTH FOR THIS PURPOSE IS NOT SATISFACTORY.

5. 5. JOIN SECTIONS OF FABRIC AT A SUPPORT POST WITH A 150mm OVERLAP. 6. BACKFILL THE TRENCH OVER THE BASE OF THE FABRIC AND COMPACT IT THOROUGHLY OVER THE GEOTEXTILE.



PERSPECTIVE VIEW

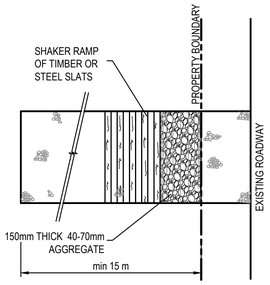


MESH & GRAVEL INLET FILTER CONSTRUCTION NOTES:

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

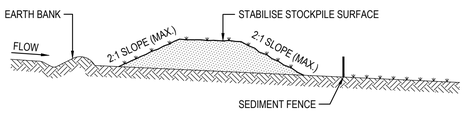
MESH & GRAVEL INLET FILTER

SCALE N.T.S.



PLAN
STABILISED SITE ACCESS WITH SHAKER RAMP

N.T.S.

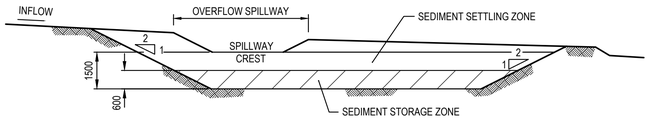


STOCKPILE CONSTRUCTION NOTES:

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

STOCKPILES

SCALE N.T.S.



TYPICAL SECTION

TYPE 'D' & 'F' SEDIMENTATION BASIN

N.T.S.

SEDIMENTATION BASIN CALCULATIONS: (FOR TYPE D & F SOILS) - PER 1 ha

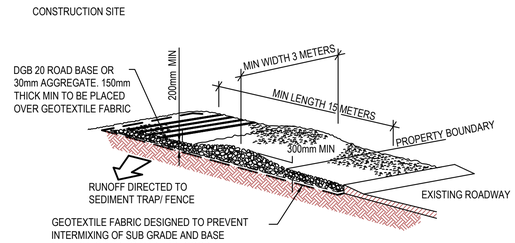
BASIN CAPACITY = SETTLING ZONE + SEDIMENT STORAGE ZONE

Settling Zone = 10 x C_v x A x $R_{(y\ \%lle\ ,\ 5\ day)}$
= 10 x 0.5 x 1.00 x 19.0
= 95.0 m³/ha
and
Sediment Storage Zone = 50 % Settling Zone
= 0.5 x 95.0 m³/ha
= 47.5 m³ /ha
therefore
BASIN CAPACITY = 95.0 + 47.5 = 142.5 m³/ha

CHECK THIS NUMBERS IN THE BLUE BOOK

CROSS NUMBERS TO BE REPLACED WITH RESPECTIVE NUMBERS

The basin is to be a slow settling basin with a slow discharge to the level of required storage capacity. This will mean that sediment will settle over a period of approximatly 5 days.



GEOTEXTILE MAY BE A WOVEN OR NEEDLE PUNCHED PRODUCT WITH A MINIMUM CBR BURST STRENGTH (AS3706.4-90) OF 2500 N

STABILISED SITE ACCESS WITH SHAKER RAMP

N.T.S.

NOTES:

1. THIS DEVICE IS TO BE LOCATED AT ALL EXITS FROM CONSTRUCTION SITE.

2. THIS DEVICE IS TO BE REGULARLY CLEANED OF DEPOSITED MATERIAL SO AS TO MAINTAIN A 50mm DEEP SPACE BETWEEN PLANKS.

3. ANY UNSEALED ROAD BETWEEN THIS DEVICE AND NEAREST ROADWAY IS TO BE TOPPED WITH 100mm THICK 40-70mm SIZE AGGREGATE.

4. ALTERNATIVELY, THREE(3) PRECAST CONCRETE CATTLE GRIDS (AS MANUFACTURED BY "HUMES CONCRETE MAY BE USED. 1, 2 & 3 ABOVE ALSO APPLY.

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY
NORTON SURVEY PARTNERS
DATUM: A.H.D
ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
02	ISSUED FOR DA ONLY	AFe	NW	06.06.2024					
01	ISSUED FOR DA ONLY	MP	NW	23.02.2024					

Client
NSW GOVERMENT LAND & HOUSING CORPORATION

Architect
CUSTANCE ARCHITECTURE

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DRAWING TO BE PRINTED IN COLOUR

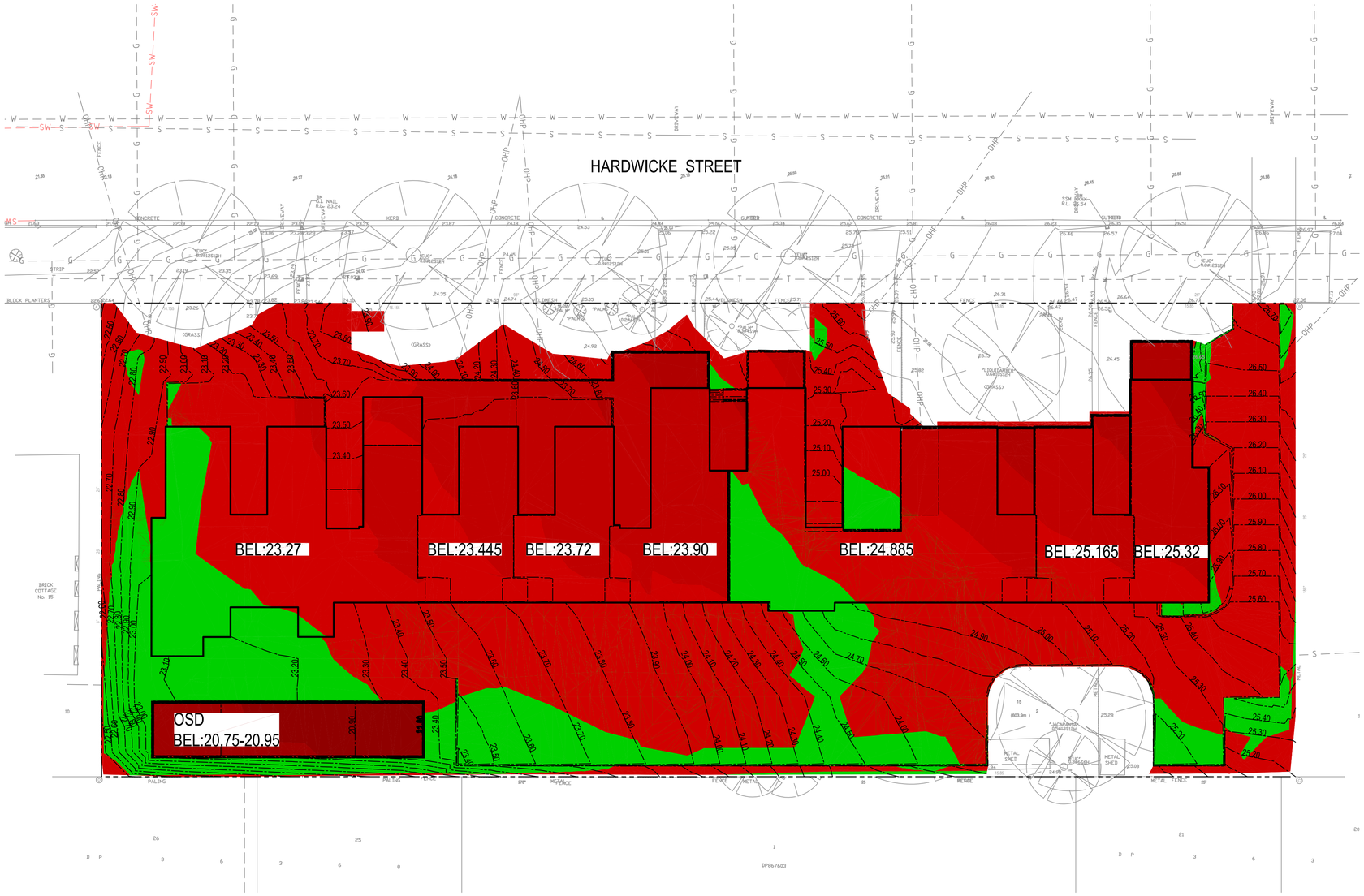
henry&hymas

Project
PROPOSED RESIDENTIAL DEVELOPMENT
17-27 HARDWICKE ST, RIVERWOOD, NSW

Title
SEDIMENT AND EROSION CONTROL DETAILS

Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	APRIL 2023
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	NTS

Drawing number: 22T46_DA_SE02
Revision: 02



BULK EARTHWORKS CUT AND FILL PLAN

SCALE: 1:200

LEGEND

EXISTING BOUNDARY

25.70 BE CONTOURS

DEPTH RANGE Lower_value		Upper_value		Colour
-10	to	-7	m	
-7	to	-6	m	
-6	to	-5	m	
-5	to	-4	m	
-4	to	-3	m	
-3	to	-2.5	m	
-2.5	to	-2	m	
-2	to	-1.5	m	
-1.5	to	-1	m	
-1	to	-.5	m	
-.5	to	.0	m	
.0	to	.5	m	
.5	to	1	m	
1	to	1.5	m	
1.5	to	2.	m	
2	to	2.5	m	
2.5	to	3.	m	
3.	to	4	m	
4	to	5	m	
5	to	6	m	
6	to	7	m	
7	to	10	m	
10	to	90	m	

EARTHWORKS QUANTITIES

(APPROXIMATE ONLY)

NOT TO BE USED FOR CONTRACTUAL PURPOSES. TENDERERS TO DETERMINE VOLUMES USING THEIR OWN METHOD OF CALCULATION.

- EARTHWORKS QUANTITIES -	
TOTAL AREA (3131 m²)	
CUT	1044 m³
FILL	75 m³
EXCESS OF CUT OVER FILL	969 m³
TOPSOIL STRIPPING "200mm" OF 632.2m³ NOT INCLUDED IN CALCULATION	
EXCAVATION FOR SERVICE TRENCHES NOT INCLUDED IN CALCULATION	
EXCAVATION FOR RETAINING WALLS NOT INCLUDED IN CALCULATION	

PAVEMENT THICKNESS "INCLUDING BEDDING THICKNESS"		
BUILDING SLAB	280	mm
OTHER AREAS	250	mm

0 4 8 12 16 20m

4 3 2 1

SCALE 1:200

FOR DA ONLY

SURVEY INFORMATION

SURVEYED BY

NORTON SURVEY PARTNERS

DATUM: A.H.D

ORIGIN OF LEVELS: SSM135870 RL26.542

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
02	ISSUED FOR DA ONLY	SC	NH	06.06.2024					
01	ISSUED FOR DA ONLY	SC	NW	23.02.2024					

Client: NSW GOVERMENT LAND & HOUSING CORPORATION

Architect: CUSTANCE ARCHITECTURE

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DRAWING TO BE PRINTED IN COLOUR

henry&hymas

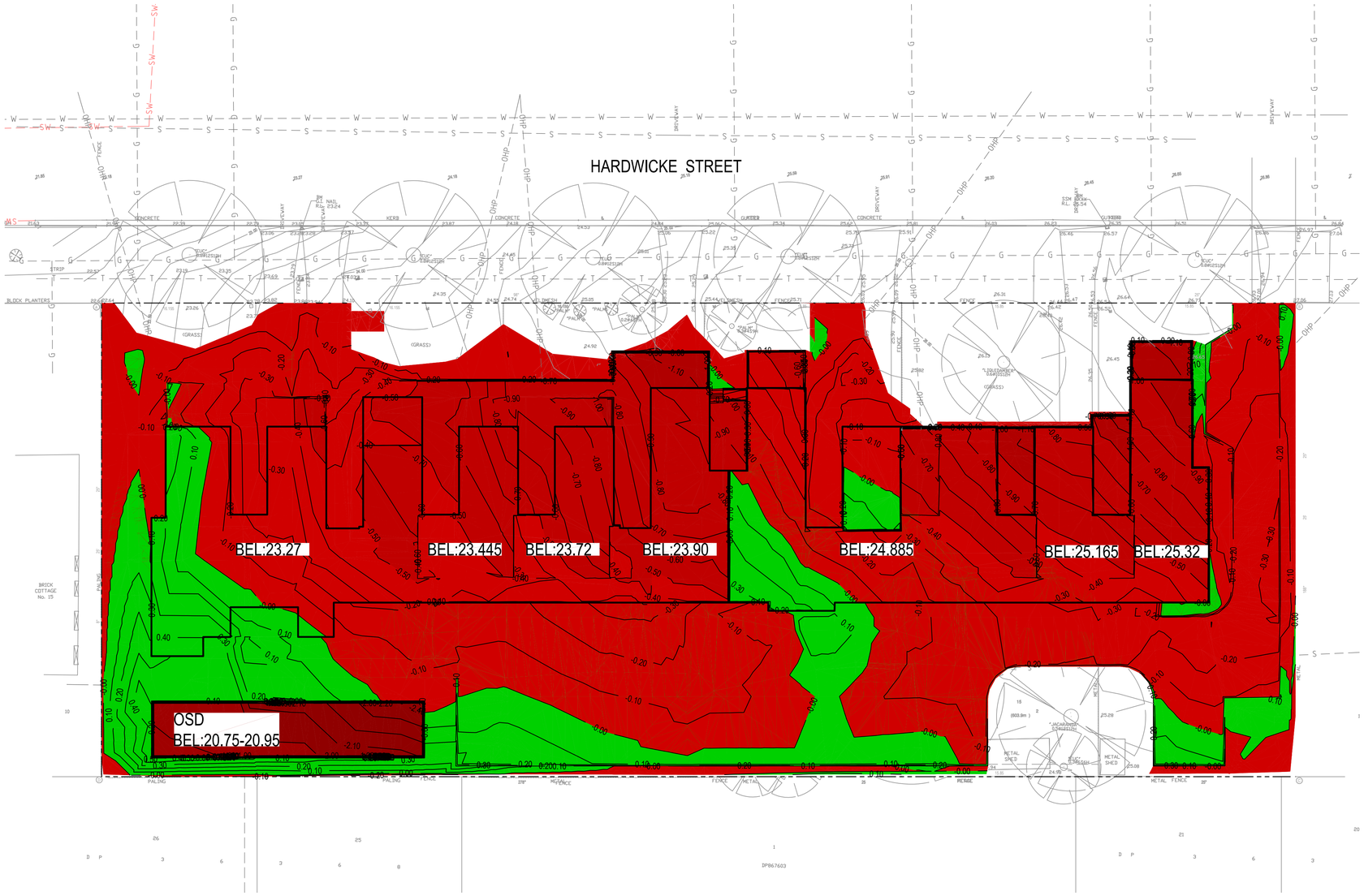
Project: PROPOSED RESIDENTIAL DEVELOPMENT 17-27 HARDWICKE ST, RIVERWOOD, NSW

Title: BULK EARTHWORKS CUT AND FILL PLAN

Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	DECEMBER 2023
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:200

Drawing number: 22T46_DA_BE01

Revision: 02



BULK EARTHWORKS CUT AND FILL DEPTH PLAN

SCALE: 1:200

LEGEND

EXISTING BOUNDARY

-0.20 BE DEPTH CONTOURS

DEPTH RANGE Lower_value		Upper_value		Colour
-10	to	-7	m	
-7	to	-6	m	
-6	to	-5	m	
-5	to	-4	m	
-4	to	-3	m	
-3	to	-2.5	m	
-2.5	to	-2	m	
-2	to	-1.5	m	
-1.5	to	-1	m	
-1	to	-.5	m	
-.5	to	.0	m	
.0	to	.5	m	
.5	to	1	m	
1	to	1.5	m	
1.5	to	2.	m	
2	to	2.5	m	
2.5	to	3.	m	
3.	to	4	m	
4	to	5	m	
5	to	6	m	
6	to	7	m	
7	to	10	m	
10	to	90	m	

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EXCESS OF CUT OVER FILL	969 m³
TOPSOIL STRIPPING "200mm" OF 632.2m³ NOT INCLUDED IN CALCULATION	
EXCAVATION FOR SERVICE TRENCHES NOT INCLUDED IN CALCULATION	
EXCAVATION FOR RETAINING WALLS NOT INCLUDED IN CALCULATION	

PAVEMENT THICKNESS "INCLUDING BEDDING THICKNESS"		
BUILDING SLAB	280	mm
OTHER AREAS	250	mm

0 4 8 12 16 20m

4 3 2 1

SCALE 1:200

FOR DA ONLY

SURVEY INFORMATION

SURVEYED BY

NORTON SURVEY PARTNERS

DATUM: A.H.D

ORIGIN OF LEVELS: SSM135870 RL26.542

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Client: NSW GOVERMENT LAND & HOUSING CORPORATION

Architect: CUSTANCE ARCHITECTURE

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DRAWING TO BE PRINTED IN COLOUR

henry&hymas

Project: PROPOSED RESIDENTIAL DEVELOPMENT 17-27 HARDWICKE ST, RIVERWOOD, NSW

Title: BULK EARTHWORKS CUT AND FILL DEPTH PLAN

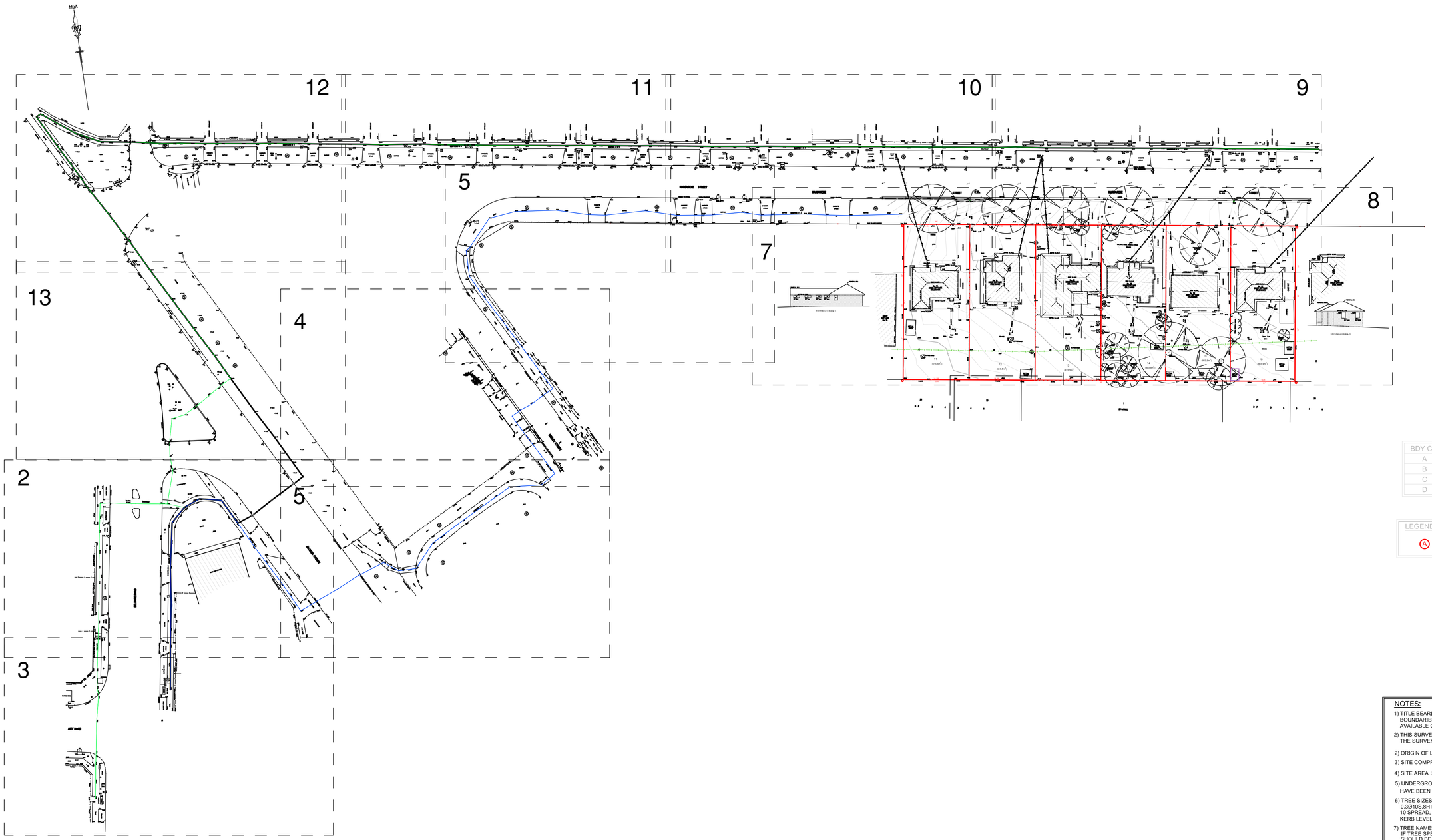
Drawn	Designed	Original issue date
S.Chen	N.Wetzlar	DECEMBER 2023
Checked	Approved	Scale @A1
N.Wetzlar	A.Francis	1:200

Drawing number: 22T46_DA_BE02

Revision: 02

Appendix B: Site Survey

L.G.A. GEORGES RIVER



BOUNDARY CO-ORDINATES

BDY CNR	EASTING	NORTHING
A	320 158.170	6 241 030.383
B	320 253.149	6 241 016.318
C	320 247.568	6 240 978.629
D	320 152.589	6 240 992.694

LEGEND :

(A) - DENOTES BOUNDARY CORNER

NOTES:

1) TITLE BEARINGS AND DIMENSIONS ARE SHOWN. BOUNDARIES DETERMINED FROM PLANS AVAILABLE ON PUBLIC RECORD.
2) THIS SURVEY HAS BEEN MADE PURSUANT TO SECTION 9 OF THE SURVEYING & SPATIAL INFORMATION REGULATION 2017.
2) ORIGIN OF LEVELS: SSM 135870 RL26.542(A.H.D.) SCIMS
3) SITE COMPRISES LOTS 11 TO 16 IN DP 36368
4) SITE AREA 3658m² BY TITLE DIMENSIONS.
5) UNDERGROUND SEWER & STORMWATER MAIN SERVICES HAVE BEEN INVESTIGATED BY SERVICE LOCATION CONSULTANTS
6) TREE SIZES ARE INDICATIVE. 0.3Ø10S,8H DENOTES TREE SIZE 0.3 TRUNK DIAMETER, 10 SPREAD, 8 HIGH. KERB LEVELS ARE GUTTER INVERT UNLESS OTHERWISE SHOWN
7) TREE NAMES SHOWN CONSTITUTE OUR OPINION ONLY IF TREE SPECIES IDENTIFICATION IS IMPORTANT THEY SHOULD BE DETERMINED BY A QUALIFIED ARBORIST.
8) SERVICE PIT LOCATIONS HAVE DETERMINED BY SURVEY. LOCATION OF UNDERGROUND SERVICES HAVE BEEN DETERMINED ONSITE BY DURKIN CONSTRUCTION PTY LTD, USING HAND WAND UNDERGROUND DETECTION AND GROUND PENETRATING RADAR (GPR). DUE TO SITE SOIL DENSITIES AND CONDITIONS SOME SERVICES WERE UNTRACEABLE AT POINTS. NON-SIGNAL PRODUCING SERVICES MAY EXIST AND ARE NOT SHOWN. PRIOR TO ANY CONSTRUCTION OR DEMOLITION, THOROUGH SEARCH OF ALL AUTHORITIES SHOULD BE MADE TO DETERMINE THE EXTENT AND NATURE OF SERVICES POT HOLING AND HAND AUGERS SHOULD BE USED WHEN EXAMINING SERVICES.

No.	DATE	NOTATION/AMENDMENT
2	8/1/24	- ADDITIONAL BUS ROUTES ADDED TO SURVEY.
3	8/3/24	- ADDITIONAL DETAIL IN HEDLEY STREET ADDED

No.	DATE	NOTATION/AMENDMENT

FILE	FILE SIZE (MB)	CHECKED BY

CONTOUR INTERVAL:

DATUM: A.H.D.

ORIGIN OF DATUM: SSM 135870 RL 26.542 (SCIMS)

100 YEAR FLOOD RL: N/A

RECOMMENDED MINIMUM FLOOR RL: N/A

SOURCE OF FLOOD INFO: N/A

LEGEND OF COMMONLY USED SYMBOLS

WATER — W — W — W — W
SEWER — S — S — S — S
ELECTRICITY O/H — P — P — P — P
ELECTRICITY U/G — E — E — E — E
TELECOM O/H U/G — T — T — T — T
GAS — G — G — G — G
STORMWATER — SW — SW — SW — SW

BENCH MARK △ SURVEY CONTROL MARK ◘ PM SSM

REDUCTION RATIO 1 : 500 (A1)

0 5 10 15 20

LAND TITLE INFORMATION

LOTS: -

PLAN NOs : -

OTHER:

AREA: -

DATE OF SURVEY: 14.02.23
SURVEY CONSULTANT:

Norton Survey Partners
SURVEYORS & LAND TITLE CONSULTANTS
PH +61 2 9555 2744
office@nspartners.com.au
SUITE 1 /505 BALMAIN ROAD
LILYFIELD N.S.W. 2040

REGISTERED SURVEYOR
JACK HUGHES

REF: 55027.DWG

NSW GOVERNMENT
Family & Community Services
Land & Housing Corporation

DRAWING TITLE

DETAIL & LEVEL SURVEY

LOCATION

RIVERWOOD

STREET ADDRESS

17-27 HARDWICKE STREET

TYPE

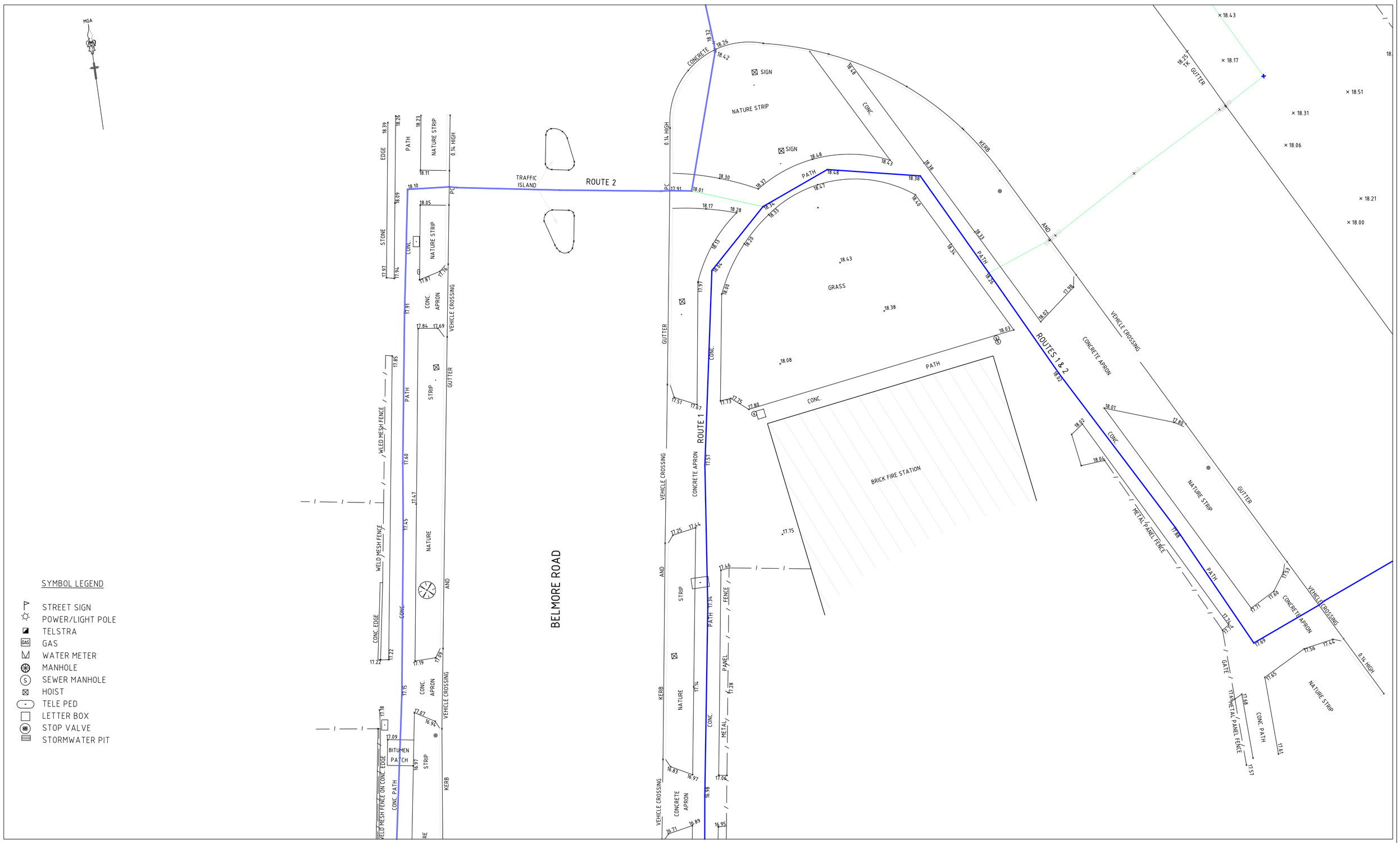
S

JOB NUMBER

55027

SHT. 1 OF 17

L.G.A. GEORGES RIVER



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DATUM: A.H.D.

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RECOMMENDED MINIMUM FLOOR RL: N/A

SOURCE OF FLOOD INFO: N/A

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WATER — W
SEWER — S
ELECTRICITY O/H — P
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TELECOM O/H U/G — T
GAS — G
STORMWATER — SW

BENCH MARK

SURVEY CONTROL MARK — PM SSM

REDUCTION RATIO 1 : 100 (A1)

0 5 10 15 20

LAND TITLE INFORMATION

LOTS: -

PLAN NOs : -

OTHER:

AREA: -

DATE OF SURVEY: 14.02.23

SURVEY CONSULTANT:

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DETAIL & LEVEL SURVEY

LOCATION

RIVERWOOD

STREET ADDRESS

17-27 HARDWICKE STREET

TYPE

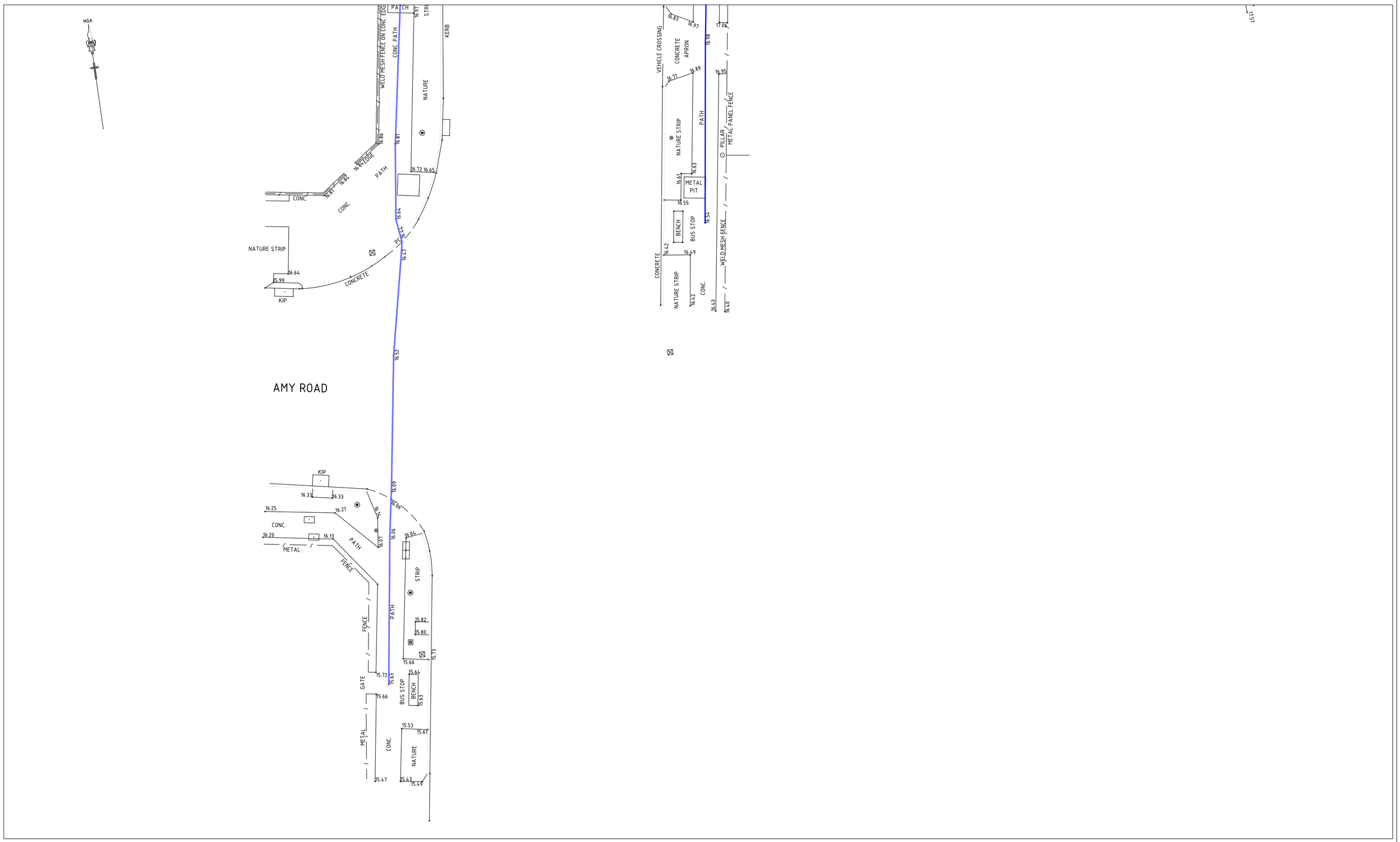
S

JOB NUMBER

55027

SHT. 2 OF 17

L.G.A. GEORGES RIVER



No.	DATE	NOTATION/AMENDMENT
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3	8/3/24	- ADDITIONAL DETAIL IN HEDLEY STREET ADDED

No.	DATE	NOTATION/AMENDMENT

FILE	FILE SIZE (MB)	CHECKED BY

CONTOUR INTERVAL:

DATUM: A.H.D.

ORIGIN OF DATUM: SSM 135870 RL 26.542(SCIMS)

100 YEAR FLOOD RL: N/A

RECOMMENDED MINIMUM FLOOR RL: N/A

SOURCE OF FLOOD INFO: N/A

LEGEND OF COMMONLY USED SYMBOLS

WATER — W — W — W — W —
SEWER — S — S — S — S —
ELECTRICITY O/H — P — P — P — P —
ELECTRICITY U/G — E — E — E — E —
TELECOM O/H U/G — T — T — T — T —
GAS — G — G — G — G —
STORMWATER — SW — SW — SW — SW —

BENCH MARK SURVEY CONTROL MARK PM SSM

REDUCTION RATIO 1 : 100 (A1)

0 5 10 15 20

LAND TITLE INFORMATION

LOTS: -

PLAN NOs : -

OTHER:

AREA: -

DATE OF SURVEY: 14.02.23
SURVEY CONSULTANT:

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REGISTERED SURVEYOR
JACK HUGHES

REF: 55027.DWG

NSW GOVERNMENT
Family & Community Services
Land & Housing Corporation

DRAWING TITLE

DETAIL & LEVEL SURVEY

LOCATION

RIVERWOOD

STREET ADDRESS

17-27 HARDWICKE STREET

TYPE

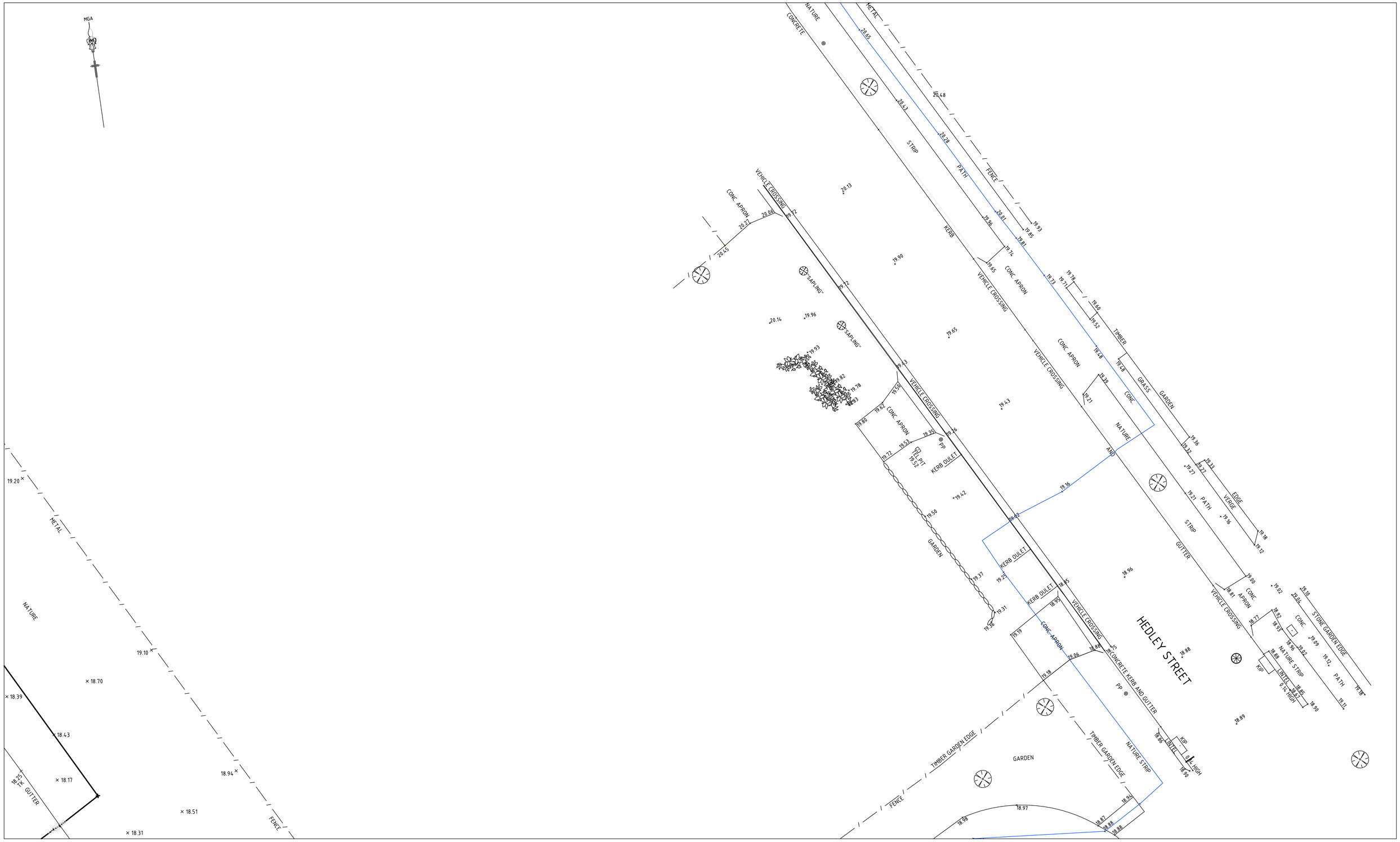
S

JOB NUMBER

55027

SHT. 3 OF 17

L.G.A. GEORGES RIVER



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No.	DATE	NOTATION/AMENDMENT

FILE	FILE SIZE (MB)	CHECKED BY

CONTOUR INTERVAL:

DATUM: A.H.D.

ORIGIN OF DATUM: SSM 135870 RL 26.542(SCIMS)

100 YEAR FLOOD RL: N/A

RECOMMENDED MINIMUM FLOOR RL: N/A

SOURCE OF FLOOD INFO: N/A

LEGEND OF COMMONLY USED SYMBOLS

WATER — W
SEWER — S
ELECTRICITY O/H — P
ELECTRICITY U/G — E
TELECOM O/H U/G — T
GAS — G
STORMWATER — SW

BENCH MARK

SURVEY CONTROL MARK — PM SSM

REDUCTION RATIO 1 : 100 (A1)

0 5 10 15 20

LAND TITLE INFORMATION

LOTS: -

PLAN NOs : -

OTHER:

AREA: -

DATE OF SURVEY: 14.02.23

SURVEY CONSULTANT:

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LILYFIELD N.S.W. 2040

REGISTERED SURVEYOR JACK HUGHES

REF: 55027.DWG

NSW GOVERNMENT | Family & Community Services Land & Housing Corporation

DRAWING TITLE

DETAIL & LEVEL SURVEY

LOCATION

RIVERWOOD

STREET ADDRESS

17-27 HARDWICKE STREET

TYPE

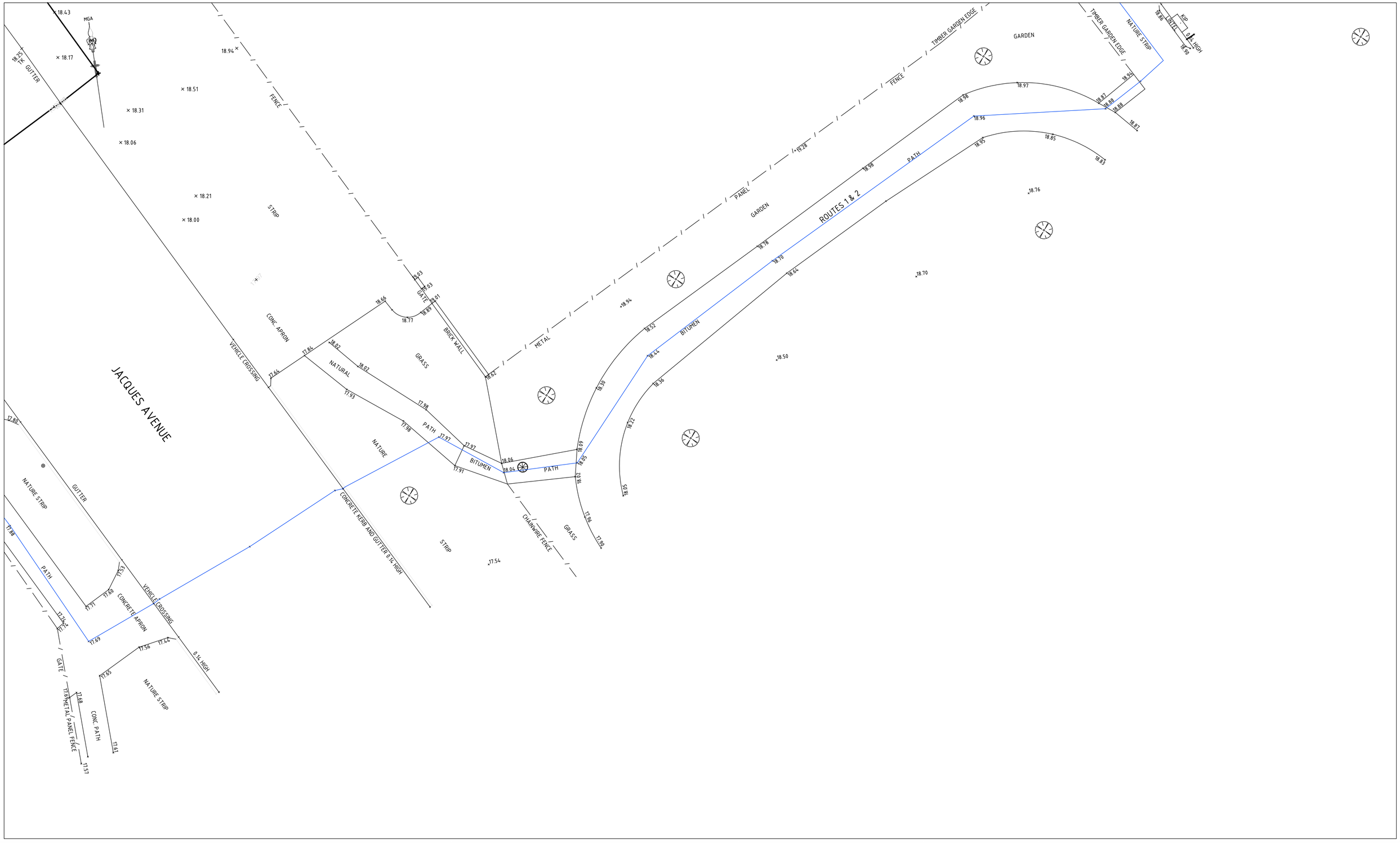
S

JOB NUMBER

55027

SHT. 4 OF 17

L.G.A. GEORGES RIVER



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No.	DATE	NOTATION/AMENDMENT

FILE	FILE SIZE (MB)	CHECKED BY

CONTOUR INTERVAL:

DATUM: A.H.D.

ORIGIN OF DATUM: SSM 135870 RL 26.542(SCIMS)

100 YEAR FLOOD RL: N/A

RECOMMENDED MINIMUM FLOOR RL: N/A

SOURCE OF FLOOD INFO: N/A

LEGEND OF COMMONLY USED SYMBOLS

WATER	W	W	W	W
SEWER	S	S	S	S
ELECTRICITY O/H	P	P	P	P
ELECTRICITY U/G	E	E	E	E
TELECOM O/H U/G	T	T	T	T
GAS	G	G	G	G
STORMWATER	SW	SW	SW	SW

BENCH MARK ▲ SURVEY CONTROL MARK ■ PM SSM

REDUCTION RATIO 1 : 100 (A1)

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LAND TITLE INFORMATION

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AREA: -

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LOCATION

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17-27 HARDWICKE STREET

TYPE

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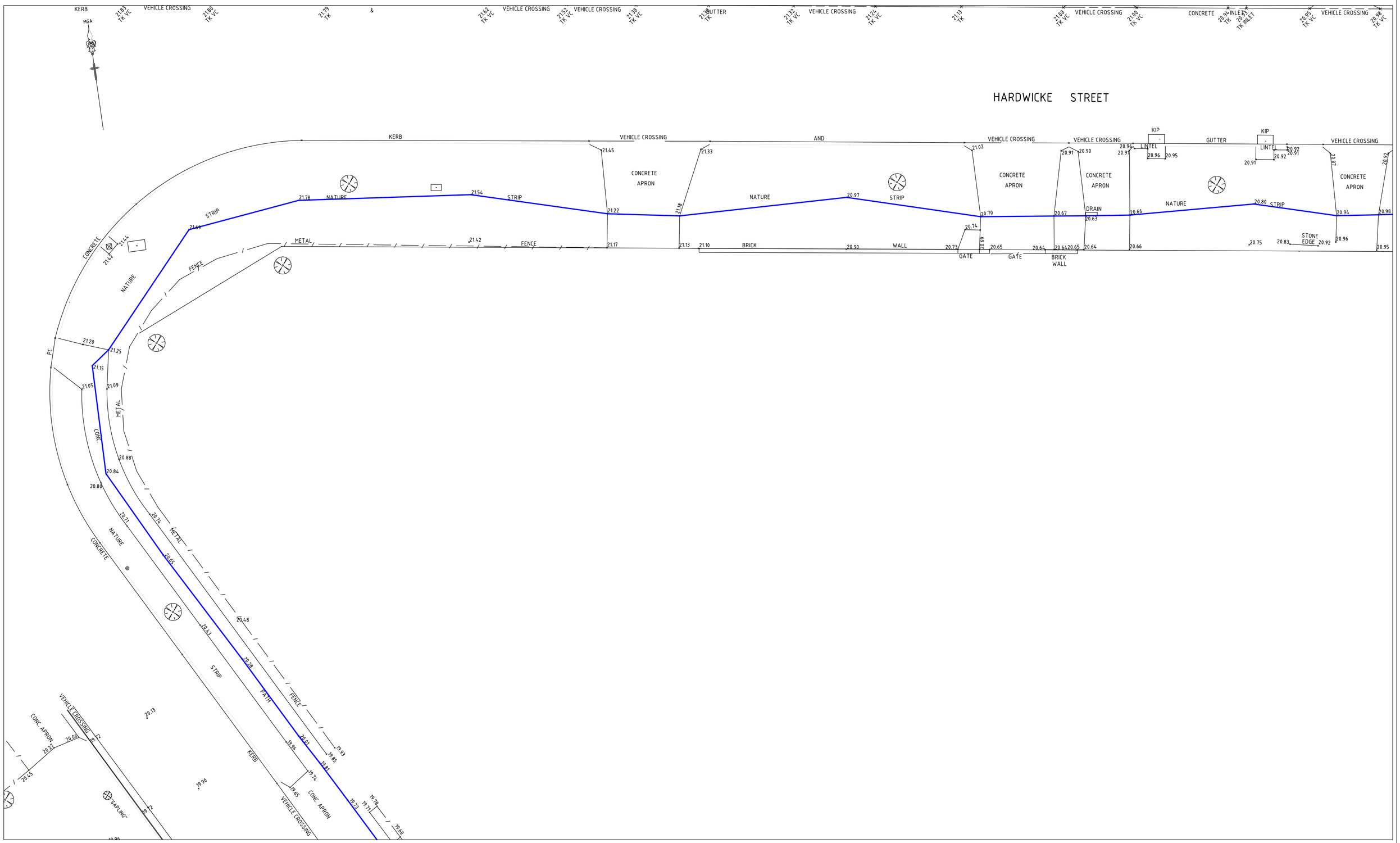

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DATUM: A.H.D.

ORIGIN OF DATUM: SSM 135870 RL 26.542(SCIMS)

100 YEAR FLOOD RL: N/A

RECOMMENDED MINIMUM FLOOR RL: N/A

SOURCE OF FLOOD INFO: N/A

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GAS — G — G — G — G —
STORMWATER — SW — SW — SW — SW —

BENCH MARK ▲ SURVEY CONTROL MARK ■ PM SSM

REDUCTION RATIO 1 : 100 (A1)

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LAND TITLE INFORMATION

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NSW GOVERNMENT Family & Community Services Land & Housing Corporation

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DETAIL & LEVEL SURVEY

LOCATION

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STREET ADDRESS

17-27 HARDWICKE STREET

TYPE

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JOB NUMBER

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SHT. 6 OF 17

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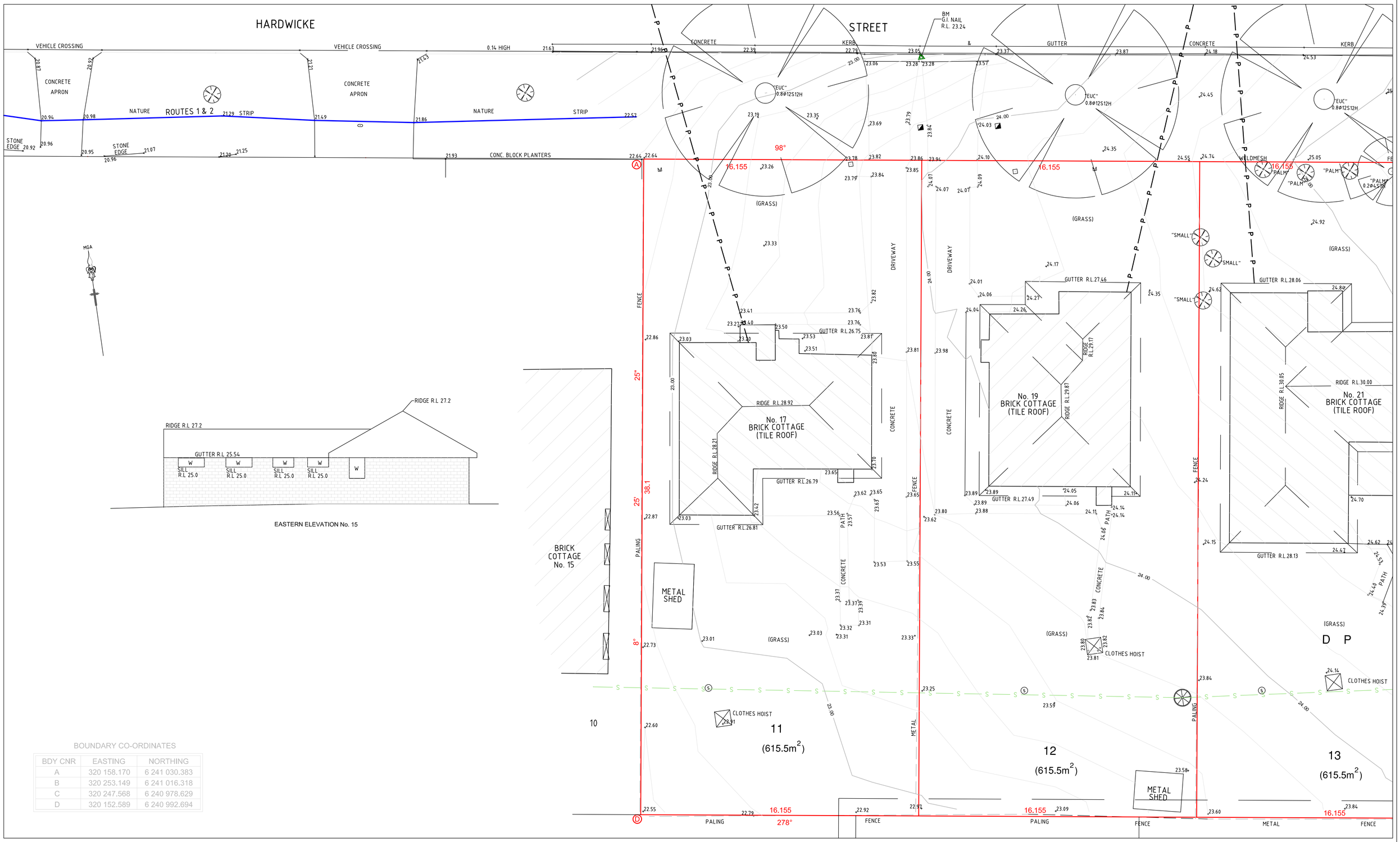

EASTERN ELEVATION No. 15

BOUNDARY CO-ORDINATES

BDY CNR	EASTING	NORTHING
A	320 158.170	6 241 030.383
B	320 253.149	6 241 016.318
C	320 247.568	6 240 978.629
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ORIGIN OF DATUM: SSM 135870 RL 26.542(SCIMS)
100 YEAR FLOOD RL: N/A
RECOMMENDED MINIMUM FLOOR RL: N/A
SOURCE OF FLOOD INFO: N/A

LEGEND OF COMMONLY USED SYMBOLS

WATER — W
SEWER — S
ELECTRICITY O/H — P
ELECTRICITY U/G — E
TELECOM O/H U/G — T
GAS — G
STORMWATER — SW
BENCH MARK
SURVEY CONTROL MARK
PM SSM

REDUCTION RATIO 1 : 100 (A1)

0 5 10 15 20

LAND TITLE INFORMATION
LOTS: -
PLAN NOs : -
OTHER:
AREA: -

DATE OF SURVEY: 14.02.23
SURVEY CONSULTANT:

Norton Survey Partners
SURVEYORS & LAND TITLE CONSULTANTS
PH +61 2 9555 2744
office@nspartners.com.au
SUITE 1 /505 BALMAIN ROAD
LILYFIELD N.S.W. 2040
REGISTERED SURVEYOR JACK HUGHES

REF: 55027.DWG

NSW GOVERNMENT
Family & Community Services
Land & Housing Corporation

DRAWING TITLE
DETAIL & LEVEL SURVEY

LOCATION
RIVERWOOD

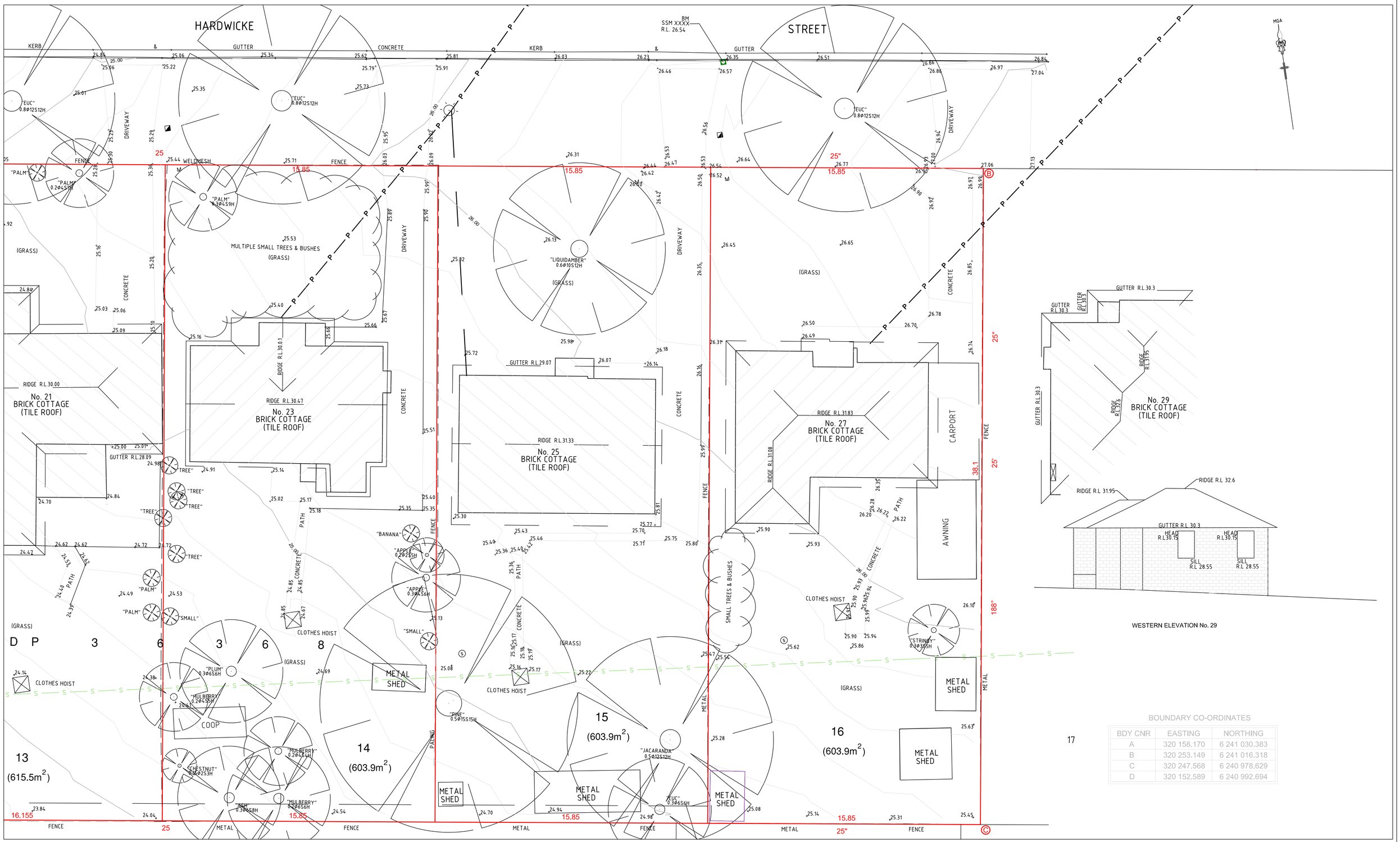
STREET ADDRESS
17-27 HARDWICKE STREET

TYPE
S

JOB NUMBER
55027

SHT. 7 OF 14

L.G.A. GEORGES RIVER



BOUNDARY CO-ORDINATES

BDY CNR	EASTING	NORTHING
A	320 158.170	6 241 030.383
B	320 253.149	6 241 016.318
C	320 247.568	6 240 978.629
D	320 152.589	6 240 992.694

No.	DATE	NOTATION/AMENDMENT
2	8/1/24	- ADDITIONAL BUS ROUTES ADDED TO SURVEY.
3	8/3/24	- ADDITIONAL DETAIL IN HEDLEY STREET ADDED

No.	DATE	NOTATION/AMENDMENT

FILE	FILE SIZE (MB)	CHECKED BY

CONTOUR INTERVAL:
DATUM: A.H.D.
ORIGIN OF DATUM: SSM 135870 RL 26.542(SCIMS)
100 YEAR FLOOD RL: N/A
RECOMMENDED MINIMUM FLOOR RL: N/A
SOURCE OF FLOOD INFO: N/A

LEGEND OF COMMONLY USED SYMBOLS
WATER — W
SEWER — S
ELECTRICITY O/H — P
ELECTRICITY U/G — E
TELECOM O/H U/G — T
GAS — G
STORMWATER — SW
BENCH MARK
SURVEY CONTROL MARK — PM SSM

REDUCTION RATIO 1 : 100 (A1)
0 5 10 15 20

LAND TITLE INFORMATION
LOTS: -
PLAN NOs : -
OTHER:
AREA: -

DATE OF SURVEY: 14.02.23
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NSW GOVERNMENT Family & Community Services Land & Housing Corporation

DRAWING TITLE
DETAIL & LEVEL SURVEY

LOCATION
RIVERWOOD

STREET ADDRESS
17-27 HARDWICKE STREET

TYPE
S

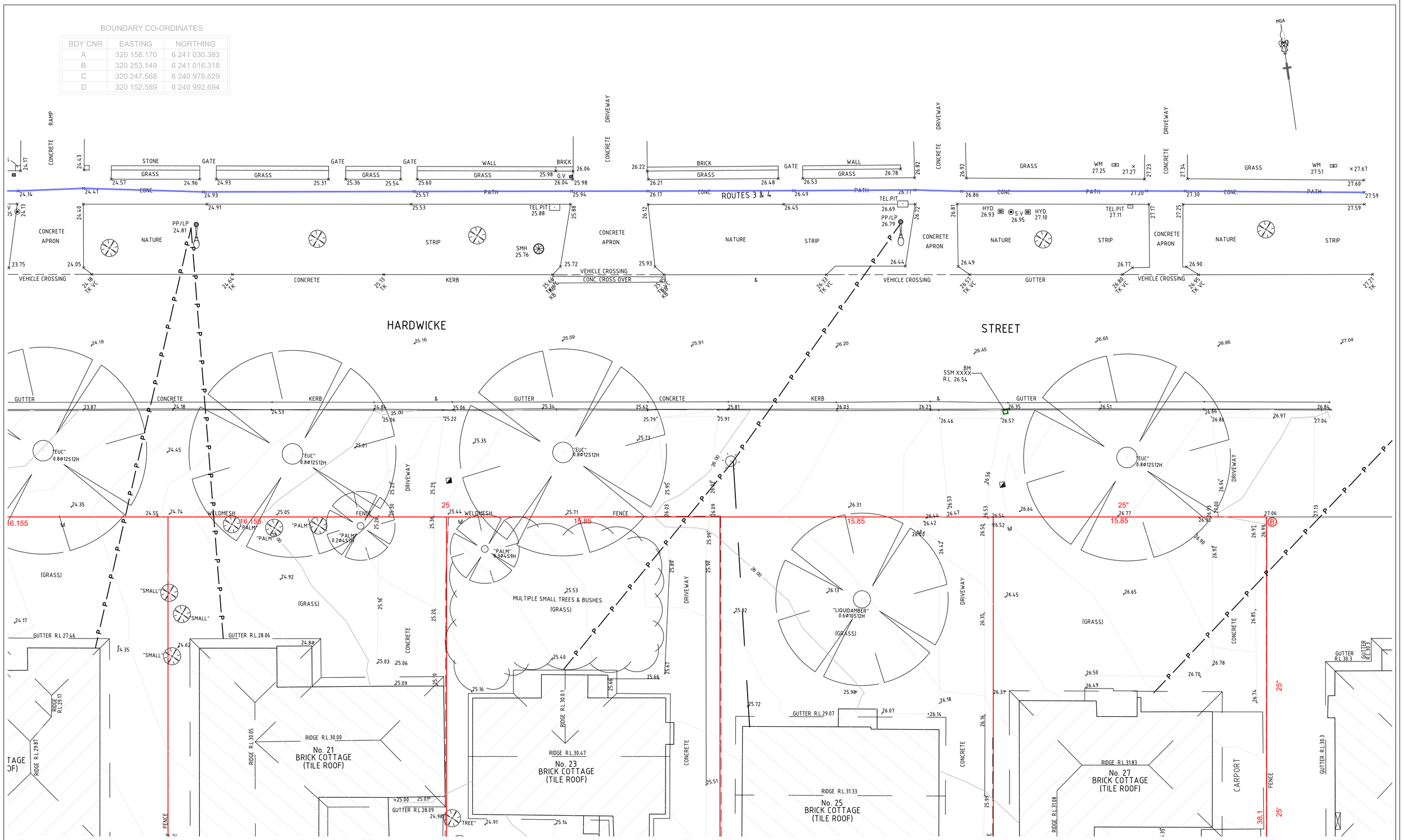
JOB NUMBER
55027

SHT. 8 OF 17

L.G.A. GEORGES RIVER

BOUNDARY CO-ORDINATES

BDY CNR	EASTING	NORTHING
A	320 158.170	6 241 030.383
B	320 253.149	6 241 016.318
C	320 247.568	6 240 978.629
D	320 152.589	6 240 992.694



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No.	DATE	NOTATION/AMENDMENT

FILE	FILE SIZE (MB)	CHECKED BY

CONTOUR INTERVAL:

DATUM: A.H.D.

ORIGIN OF DATUM: SSM 135870 RL 26.542(SCIMS)

100 YEAR FLOOD RL: N/A

RECOMMENDED MINIMUM FLOOR RL: N/A

SOURCE OF FLOOD INFO: N/A

LEGEND OF COMMONLY USED SYMBOLS

WATER — W — W — W — W
SEWER — S — S — S — S
ELECTRICITY O/H — P — P — P — P
ELECTRICITY U/G — E — E — E — E
TELECOM O/H U/G — T — T — T — T
GAS — G — G — G — G
STORMWATER — SW — SW — SW — SW

BENCH MARK ▲ SURVEY CONTROL MARK ■ PM SSM

REDUCTION RATIO 1 : 100 (A1)

0 5 10 15 20

LAND TITLE INFORMATION

LOTS: -

PLAN NOs : -

OTHER:

AREA: -

DATE OF SURVEY: 14.02.23
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LILYFIELD N.S.W. 2040

REGISTERED SURVEYOR JACK HUGHES

REF: 55027.DWG

NSW GOVERNMENT Family & Community Services Land & Housing Corporation

LOCATION: RIVERWOOD

STREET ADDRESS: 17-27 HARDWICKE STREET

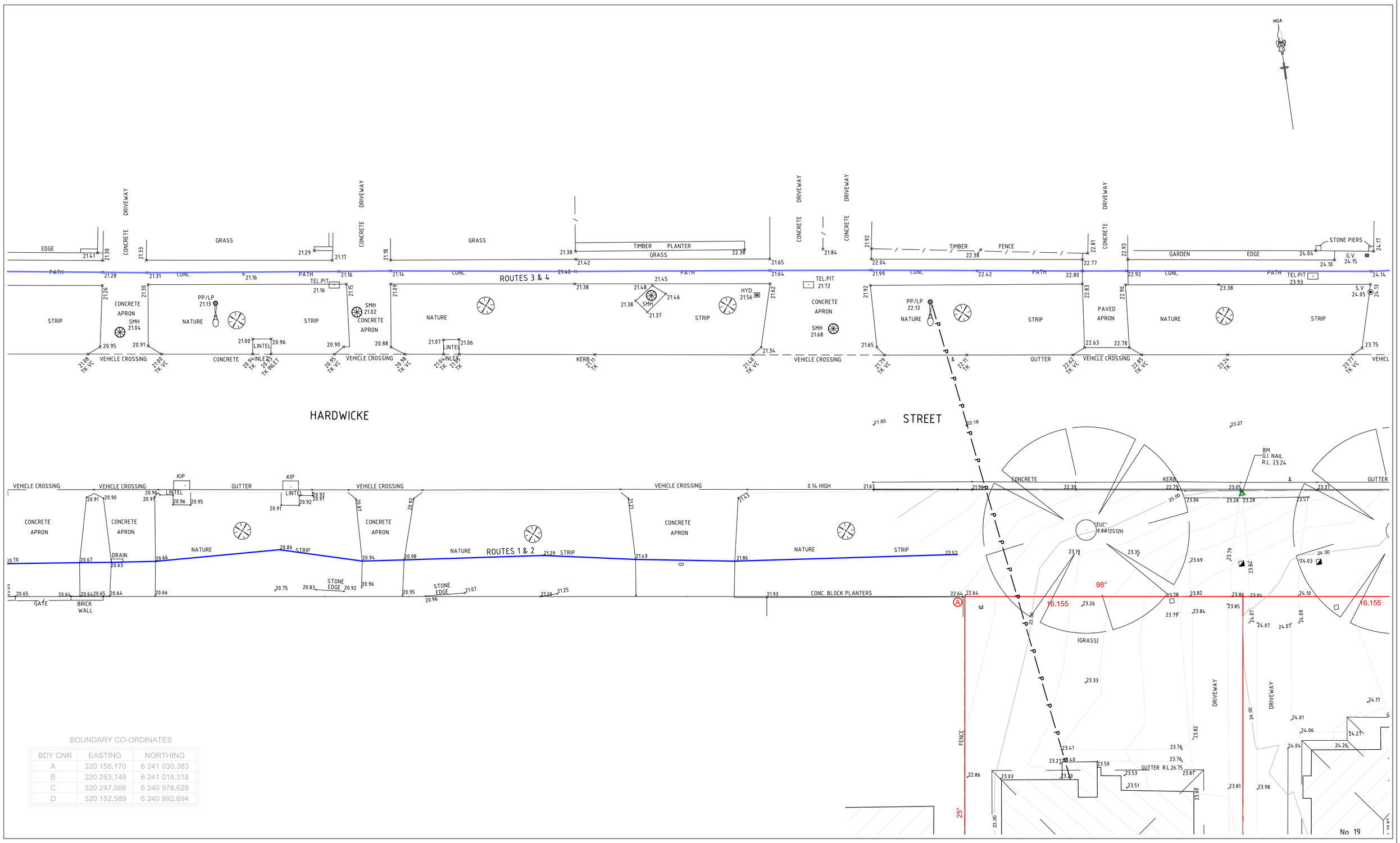
TYPE: S

DRAWING TITLE: DETAIL & LEVEL SURVEY

JOB NUMBER: 55027

SHT. 9 OF 17

L.G.A. GEORGES RIVER



BOUNDARY CO-ORDINATES

BDY CNR	EASTING	NORTHING
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RECOMMENDED MINIMUM FLOOR RL: N/A

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TELECOM O/H U/G — T — T — T — T
GAS — G — G — G — G
STORMWATER — SW — SW — SW — SW

BENCH MARK ▲ SURVEY CONTROL MARK ■ PM SSM

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DRAWING TITLE

DETAIL & LEVEL SURVEY

LOCATION

RIVERWOOD

STREET ADDRESS

17-27 HARDWICKE STREET

TYPE

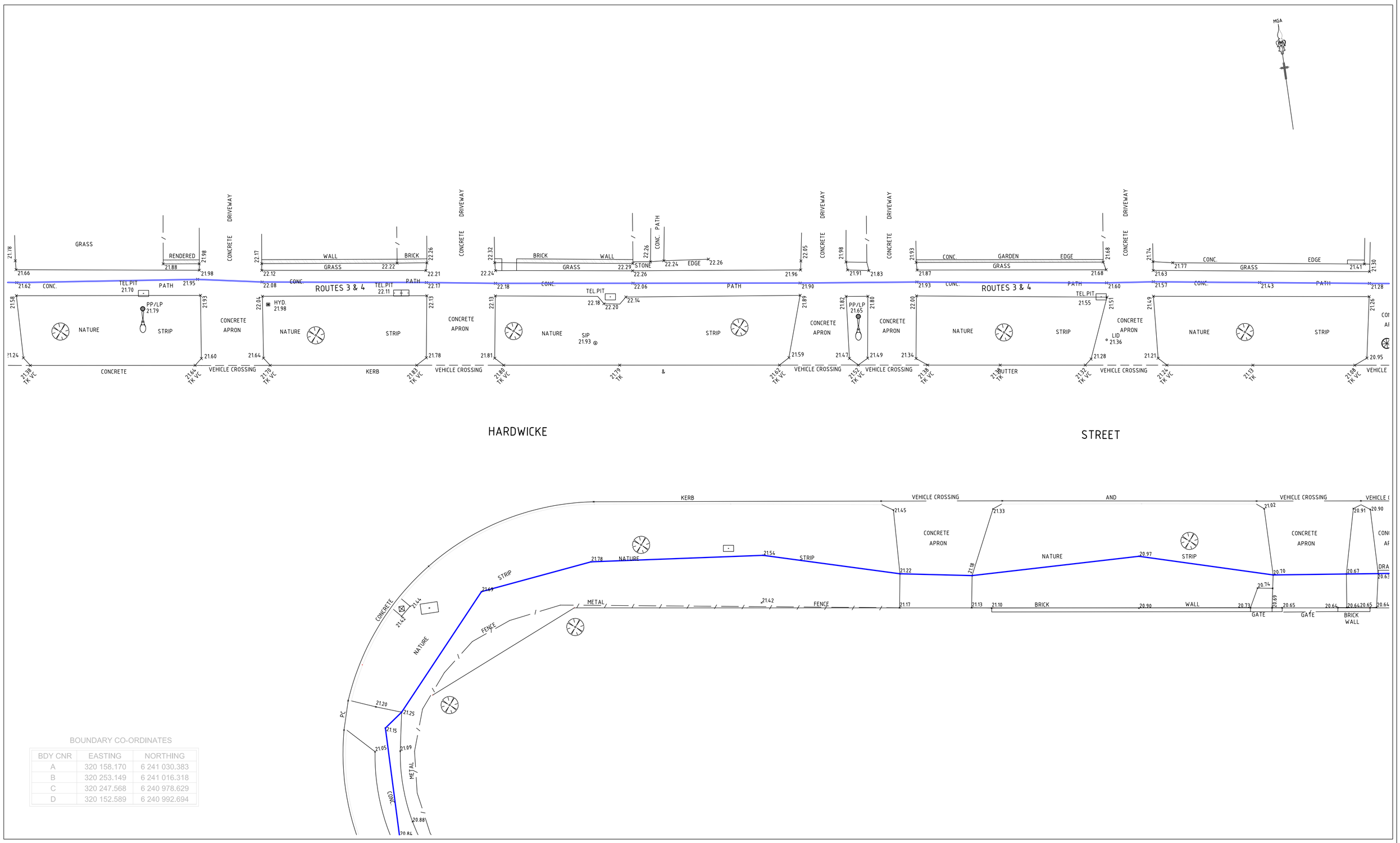
S

JOB NUMBER

55027

SHT. 10 OF 17

L.G.A. GEORGES RIVER



BOUNDARY CO-ORDINATES

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RECOMMENDED MINIMUM FLOOR RL: N/A

SOURCE OF FLOOD INFO: N/A

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SEWER — S — S — S — S —
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ELECTRICITY U/G — E — E — E — E —
TELECOM O/H U/G — T — T — T — T —
GAS — G — G — G — G —
STORMWATER — SW — SW — SW — SW —

BENCH MARK ▲ SURVEY CONTROL MARK PM SSM

REDUCTION RATIO 1 : 100 (A1)

0 5 10 15 20

LAND TITLE INFORMATION

LOTS: -

PLAN NOs : -

OTHER:

AREA: -

DATE OF SURVEY: 14.02.23
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LILYFIELD N.S.W. 2040

REGISTERED SURVEYOR
JACK HEGHES

REF: 55027.DWG

NSW GOVERNMENT
Family & Community Services
Land & Housing Corporation

DRAWING TITLE

DETAIL & LEVEL SURVEY

LOCATION

RIVERWOOD

STREET ADDRESS

17-27 HARDWICKE STREET

TYPE

S

JOB NUMBER

55027

SHT. 11 OF 17

L.G.A. GEORGES RIVER

BOUNDARY CO-ORDINATES

BDY CNR	EASTING	NORTHING
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FILE	FILE SIZE (MB)	CHECKED BY

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DATUM: A.H.D.

ORIGIN OF DATUM: SSM 135870 RL 26.542(SCIMS)

100 YEAR FLOOD RL: N/A

RECOMMENDED MINIMUM FLOOR RL: N/A

SOURCE OF FLOOD INFO: N/A

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STORMWATER — SW — SW — SW — SW

BENCH MARK SURVEY CONTROL MARK PM SSM

REDUCTION RATIO 1 : 100 (A1)

0 5 10 15 20

LAND TITLE INFORMATION

LOTS: -

PLAN NOs : -

OTHER:

AREA: -

DATE OF SURVEY: 14.02.23
SURVEY CONSULTANT:

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LILYFIELD N.S.W. 2040

REGISTERED SURVEYOR JACK HUGHES

REF: 55027.DWG

NSW GOVERNMENT Family & Community Services Land & Housing Corporation

DRAWING TITLE

DETAIL & LEVEL SURVEY

LOCATION

RIVERWOOD

STREET ADDRESS

17-27 HARDWICKE STREET

TYPE

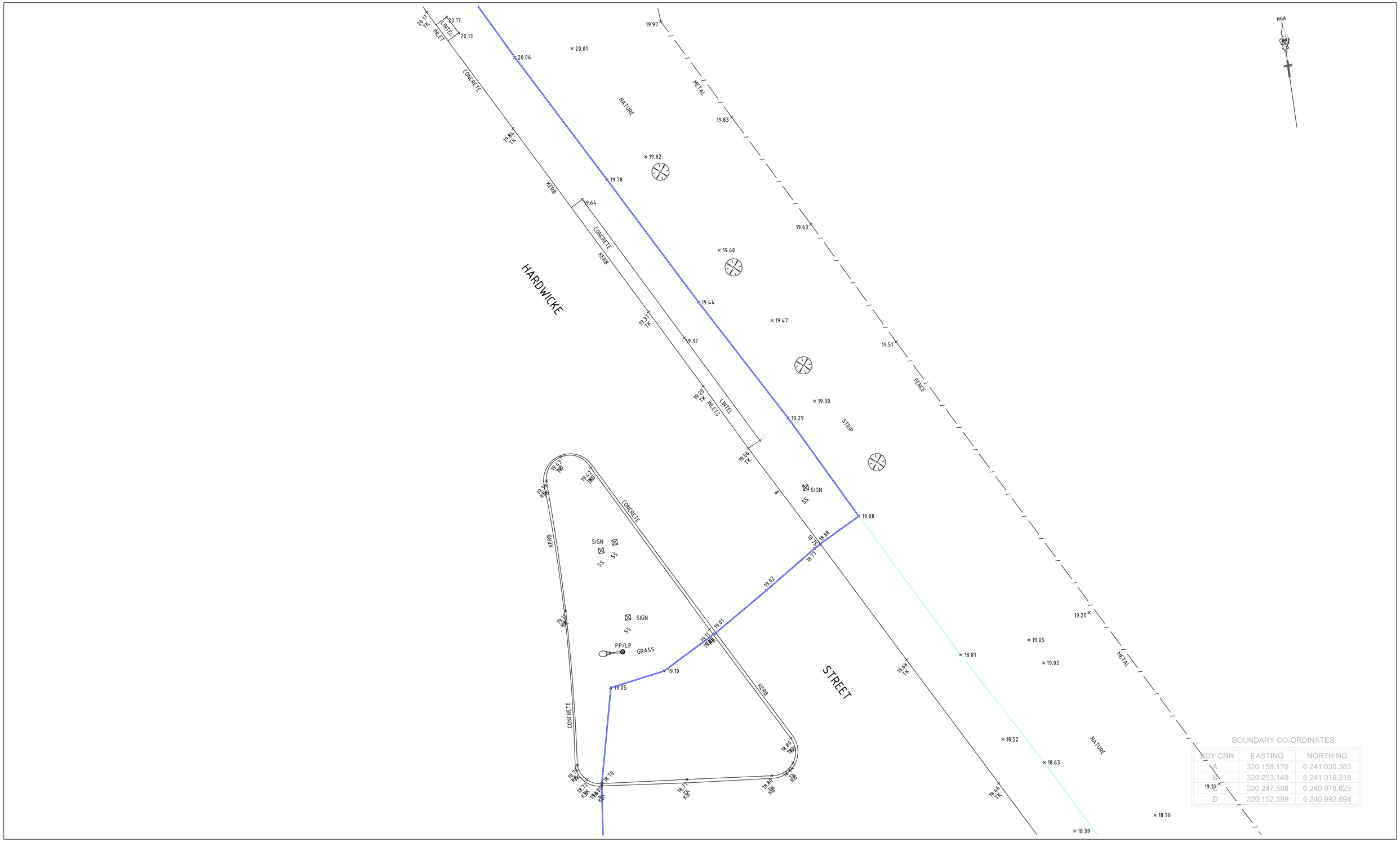
S

JOB NUMBER

55027

SHT. 12 OF 17

L.G.A. GEORGES RIVER



BOUNDARY CO-ORDINATES

BDY CNR	EASTING	NORTHING
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RECOMMENDED MINIMUM FLOOR RL: N/A

SOURCE OF FLOOD INFO: N/A

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ELECTRICITY U/G — E — E — E — E
TELECOM O/H U/G — T — T — T — T
GAS — G — G — G — G
STORMWATER — SW — SW — SW — SW

BENCH MARK ▲ SURVEY CONTROL MARK ■ PM SSM

REDUCTION RATIO 1 : 100 (A1)

0 5 10 15 20

LAND TITLE INFORMATION

LOTS: -

PLAN NOs : -

OTHER:

AREA: -

DATE OF SURVEY: 14.02.23
SURVEY CONSULTANT:

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SURVEYORS & LAND TITLE CONSULTANTS
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LILYFIELD N.S.W. 2040

REGISTERED SURVEYOR
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NSW GOVERNMENT Family & Community Services Land & Housing Corporation

DRAWING TITLE

DETAIL & LEVEL SURVEY

LOCATION

RIVERWOOD

STREET ADDRESS

17-27 HARDWICKE STREET

TYPE

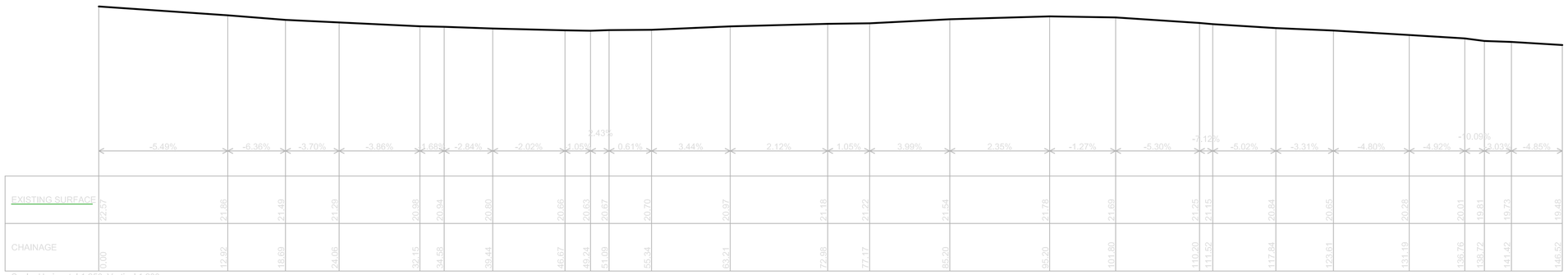
S

JOB NUMBER

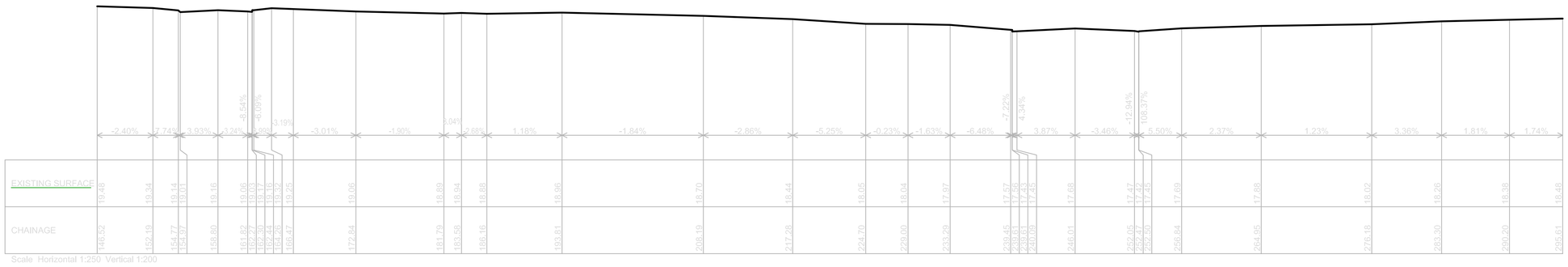
55027

SHT. 13 OF 17

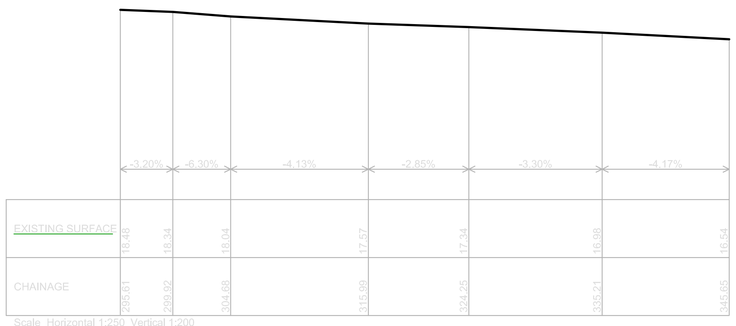
L.G.A. GEORGES RIVER



ROUTE 1
CHAINAGE 0.00 - 146.52



ROUTE 1
CHAINAGE 146.52 - 295.61



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CHAINAGE 295.61 - 345.65

No.	DATE	NOTATION/AMENDMENT
2	8/1/24	- ADDITIONAL BUS ROUTES ADDED TO SURVEY.
3	8/3/24	- ADDITIONAL DETAIL IN HEDLEY STREET ADDED

No.	DATE	NOTATION/AMENDMENT

FILE	FILE SIZE (MB)	CHECKED BY

CONTOUR INTERVAL:
DATUM: A.H.D.
ORIGIN OF DATUM: SSM 135870 RL 26.542 (SCIMS)
100 YEAR FLOOD RL: N/A
RECOMMENDED MINIMUM FLOOR RL: N/A
SOURCE OF FLOOD INFO: N/A

LEGEND OF COMMONLY USED SYMBOLS
WATER — W —
SEWER — S —
ELECTRICITY O/H — P —
ELECTRICITY U/G — E —
TELECOM O/H U/G — T —
GAS — G —
STORMWATER — SW —
BENCH MARK
SURVEY CONTROL MARK
PM SSM

REDUCTION RATIO 1 : 200 (A1)
0 5 10 15 20

LAND TITLE INFORMATION
LOTS: -
PLAN NOs : -
OTHER:
AREA: -

DATE OF SURVEY: 14.02.23
SURVEY CONSULTANT:

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SURVEYORS & LAND TITLE CONSULTANTS
PH +61 2 9555 2744
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LILYFIELD N.S.W. 2040

REGISTERED SURVEYOR JACK HUGHES
REF: 55027.DWG

NSW GOVERNMENT Family & Community Services Land & Housing Corporation

DRAWING TITLE
DETAIL & LEVEL SURVEY

LOCATION
RIVERWOOD

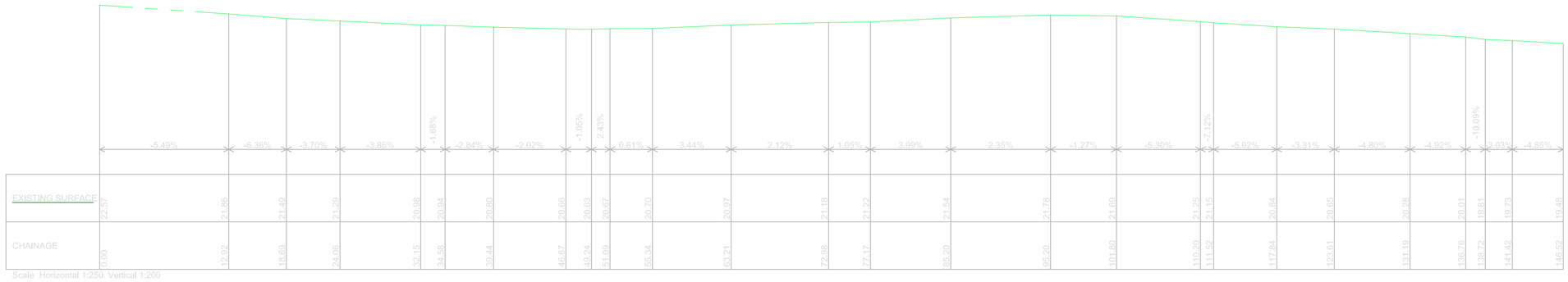
STREET ADDRESS
17-27 HARDWICKE STREET

TYPE
S

JOB NUMBER
55027

SHT. 14
OF 17

L.G.A. GEORGES RIVER



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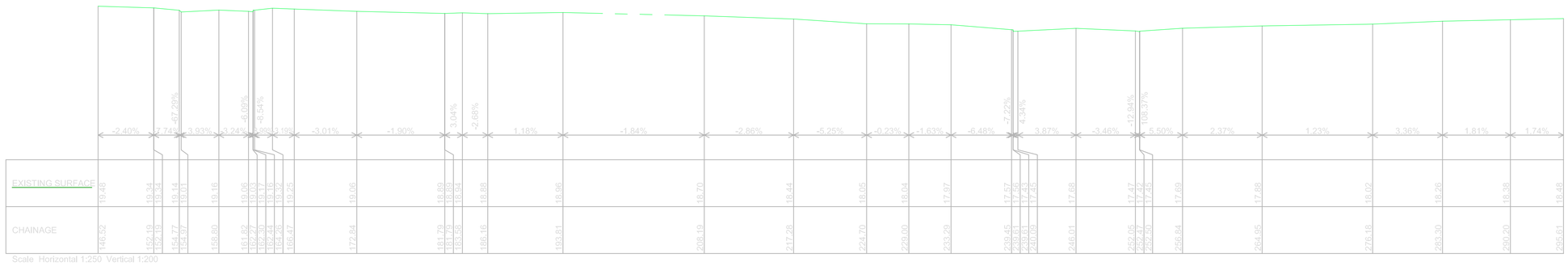

ROUTE 1
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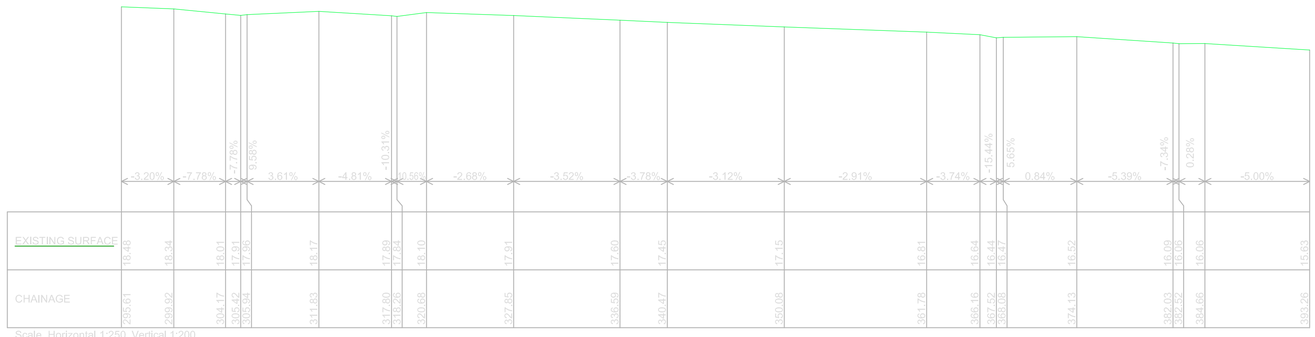

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No.	DATE	NOTATION/AMENDMENT
2	8/1/24	- ADDITIONAL BUS ROUTES ADDED TO SURVEY.
3	8/3/24	- ADDITIONAL DETAIL IN HEDLEY STREET ADDED

No.	DATE	NOTATION/AMENDMENT

FILE	FILE SIZE (MB)	CHECKED BY

CONTOUR INTERVAL:
DATUM: A.H.D.
ORIGIN OF DATUM: SSM 135870 RL 26.542 (SCIMS)
100 YEAR FLOOD RL: N/A
RECOMMENDED MINIMUM FLOOR RL: N/A
SOURCE OF FLOOD INFO: N/A

LEGEND OF COMMONLY USED SYMBOLS
WATER — W —
SEWER — S —
ELECTRICITY O/H — P —
ELECTRICITY U/G — E —
TELECOM O/H U/G — T —
GAS — G —
STORMWATER — SW —
BENCH MARK
SURVEY CONTROL MARK
PM SSM

REDUCTION RATIO 1 : 200 (A1)
0 5 10 15 20

LAND TITLE INFORMATION
LOTS: -
PLAN NOs : -
OTHER:
AREA: -

DATE OF SURVEY: 14.02.23
SURVEY CONSULTANT:

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REGISTERED SURVEYOR JACK HUGHES
REF: 55027.DWG

NSW GOVERNMENT | Family & Community Services | Land & Housing Corporation

DRAWING TITLE
DETAIL & LEVEL SURVEY

LOCATION
RIVERWOOD

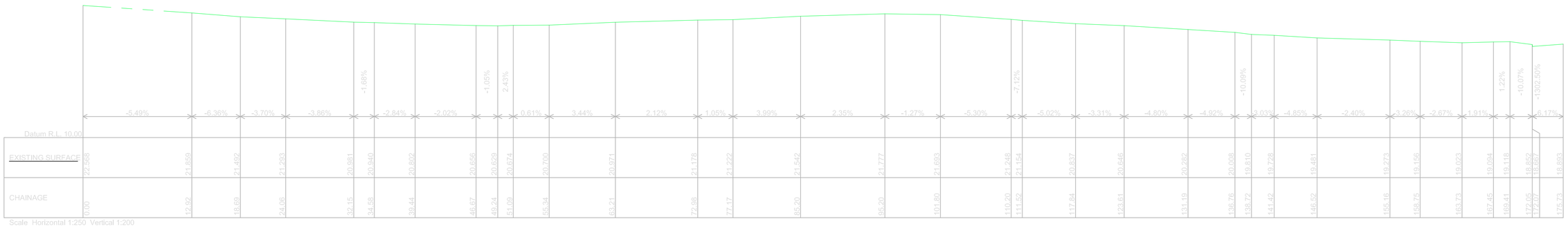
STREET ADDRESS
17-27 HARDWICKE STREET

TYPE
S

JOB NUMBER
55027

SHT. 15
OF 17

L.G.A. GEORGES RIVER



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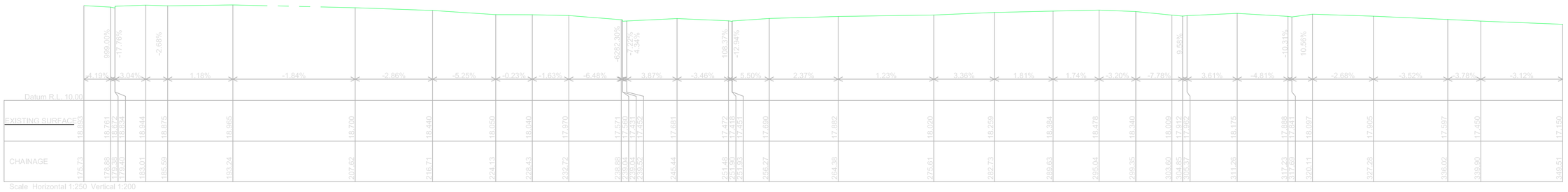
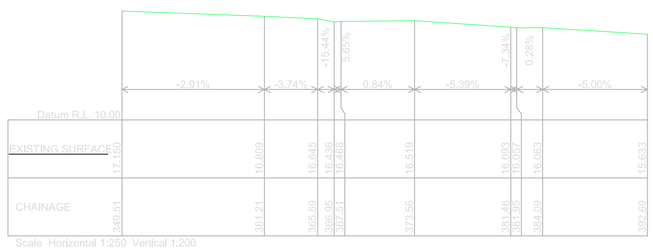


ROUTE 2

CHAINAGE 175.73 - 349.51



ROUTE 2

CHAINAGE 349.51 - 175.73

No.	DATE	NOTATION/AMENDMENT
2	8/1/24	- ADDITIONAL BUS ROUTES ADDED TO SURVEY.
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No.	DATE	NOTATION/AMENDMENT

FILE	FILE SIZE (MB)	CHECKED BY

CONTOUR INTERVAL:

DATUM: A.H.D.

ORIGIN OF DATUM: SSM 135870 RL 26.542 (SCIMS)

100 YEAR FLOOD RL: N/A

RECOMMENDED MINIMUM FLOOR RL: N/A

SOURCE OF FLOOD INFO: N/A

LEGEND OF COMMONLY USED SYMBOLS

WATER — W — W — W — W — W — W — W — W — W —

SEWER — S — S — S — S — S — S — S — S — S —

ELECTRICITY O/H — P — P — P — P — P — P — P — P — P —

ELECTRICITY U/G — E — E — E — E — E — E — E — E — E —

TELECOM O/H U/G — T — T — T — T — T — T — T — T —

GAS — G — G — G — G — G — G — G — G — G —

STORMWATER — SW — SW — SW — SW — SW — SW — SW — SW —

BENCH MARK SURVEY CONTROL MARK PM SSM

REDUCTION RATIO 1 : 200 (A1)

0 5 10 15 20

LAND TITLE INFORMATION

LOTS: -

PLAN NOs : -

OTHER:

AREA: -

DATE OF SURVEY: 14.02.23

SURVEY CONSULTANT:

Norton Survey Partners

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REGISTERED SURVEYOR JACK HUGHES

REF: 55027.DWG

NSW GOVERNMENT Family & Community Services Land & Housing Corporation

DRAWING TITLE

DETAIL & LEVEL SURVEY

LOCATION

RIVERWOOD

STREET ADDRESS

17-27 HARDWICKE STREET

TYPE

S

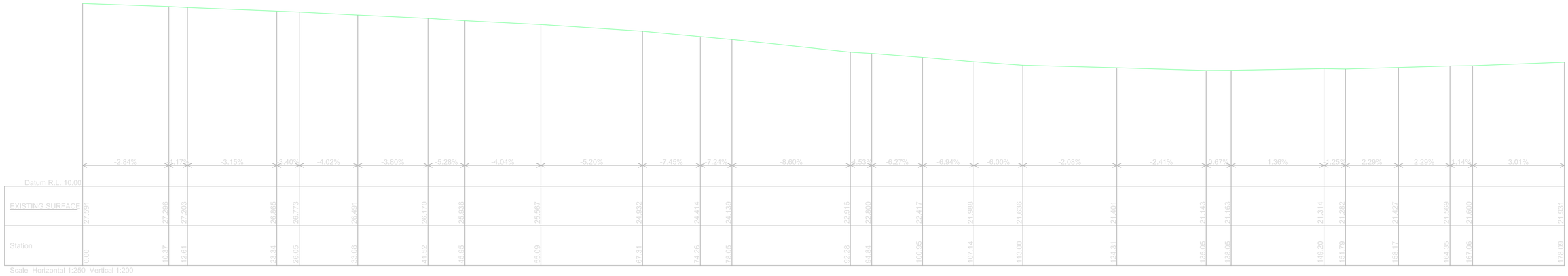
JOB NUMBER

55027

SHT. 15

OF 17

L.G.A. GEORGES RIVER



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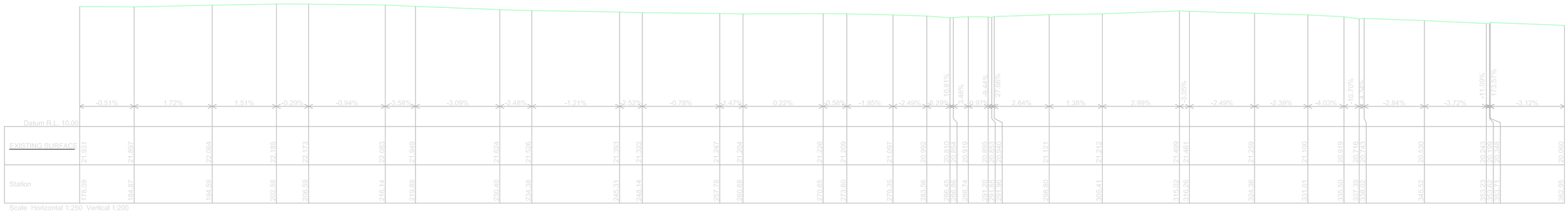

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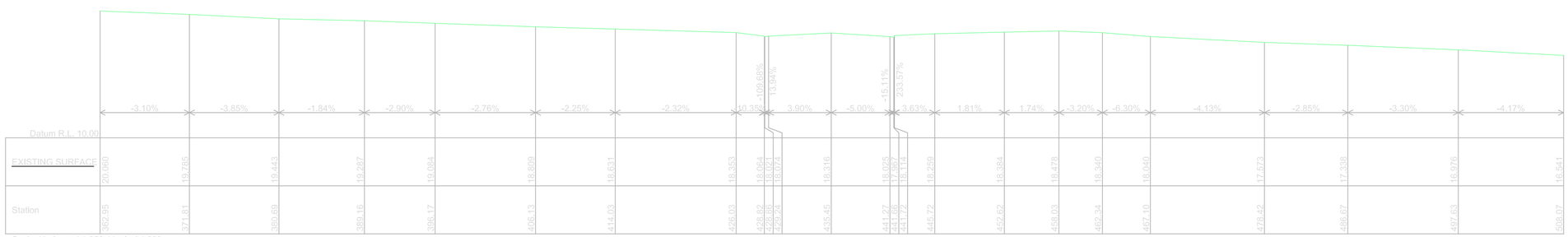

ROUTE 4
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No.	DATE	NOTATION/AMENDMENT
2	8/1/24	- ADDITIONAL BUS ROUTES ADDED TO SURVEY.
3	8/3/24	- ADDITIONAL DETAIL IN HEDLEY STREET ADDED

No.	DATE	NOTATION/AMENDMENT

FILE	FILE SIZE (MB)	CHECKED BY

CONTOUR INTERVAL:
DATUM: A.H.D.
ORIGIN OF DATUM: SSM 135870 RL 26.542 (SCIMS)
100 YEAR FLOOD RL: N/A
RECOMMENDED MINIMUM FLOOR RL: N/A
SOURCE OF FLOOD INFO: N/A

LEGEND OF COMMONLY USED SYMBOLS
WATER — W —
SEWER — S —
ELECTRICITY O/H — P —
ELECTRICITY U/G — E —
TELECOM O/H U/G — T —
GAS — G —
STORMWATER — SW —
BENCH MARK
SURVEY CONTROL MARK PM SSM

REDUCTION RATIO 1 : 200 (A1)
0 5 10 15 20

LAND TITLE INFORMATION
LOTS:
PLAN NOs :
OTHER:
AREA:

DATE OF SURVEY: 14.02.23
SURVEY CONSULTANT:

Norton Survey Partners
SURVEYORS & LAND TITLE CONSULTANTS
PH +61 2 9555 2744
office@nspartners.com.au
SUITE 1 /505 BALMAIN ROAD
LILYFIELD N.S.W. 2040

REGISTERED SURVEYOR JACK HUGHES
REF: 55027.DWG

NSW GOVERNMENT
Family & Community Services
Land & Housing Corporation

DRAWING TITLE
DETAIL & LEVEL SURVEY

LOCATION
RIVERWOOD

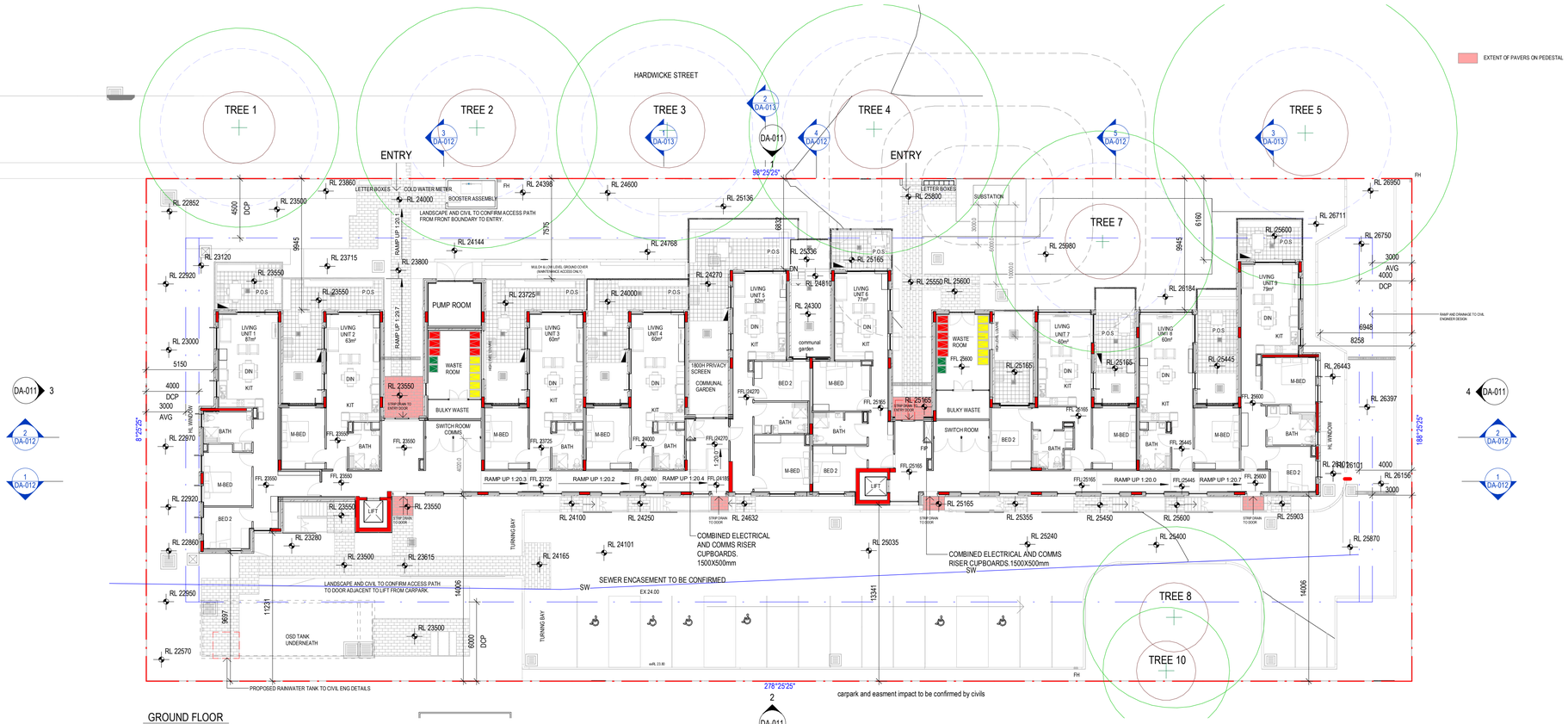
STREET ADDRESS
17-27 HARDWICKE STREET

TYPE
S

JOB NUMBER
55027

SHT. 16
OF 17

Appendix C: Architectural concept drawings – Site plan



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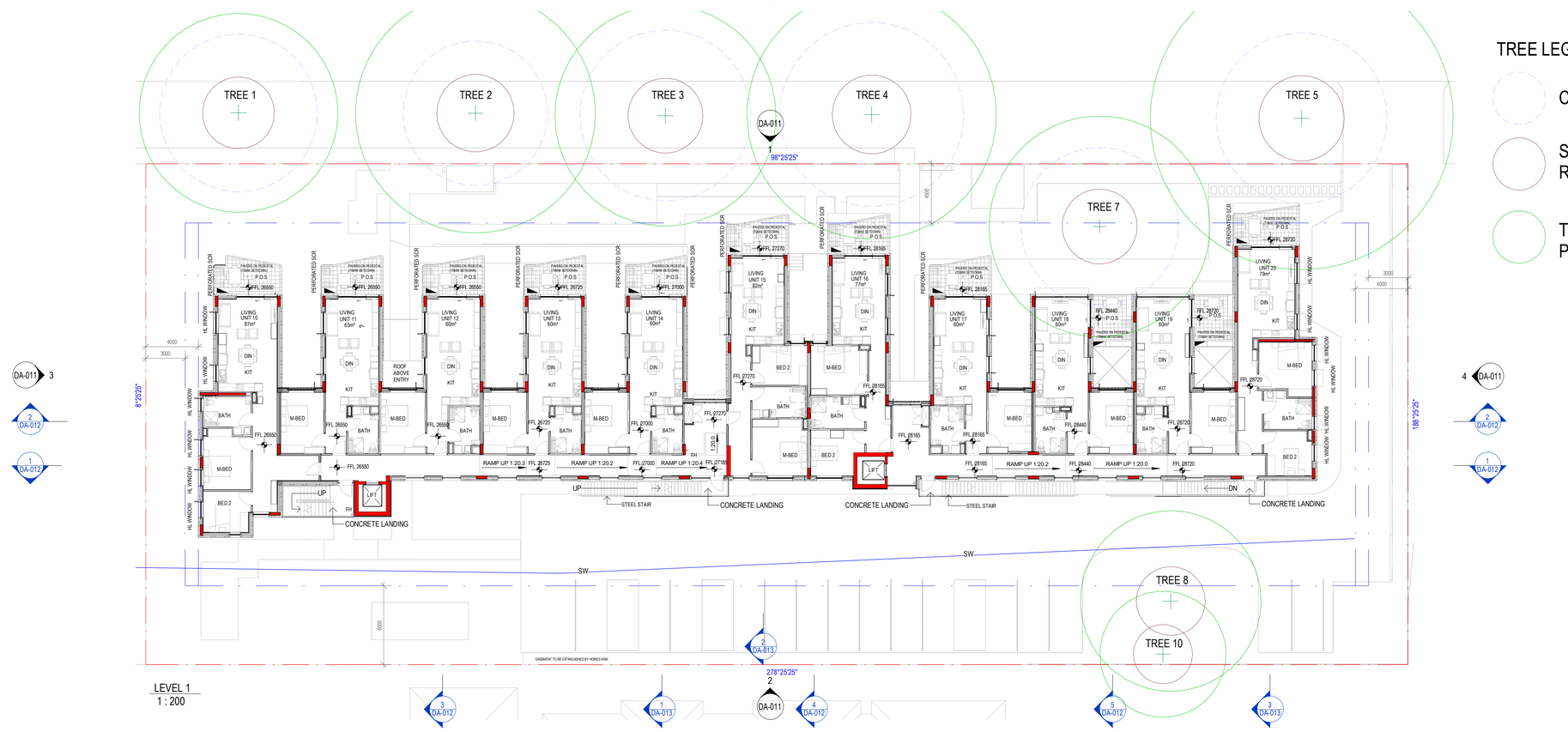

LEVEL 1
1 : 200

TREE LEGEND

- CANOPY
- SRZ - STRUCTURAL ROOT ZONE
- TPZ - TREE PROTECTION ZONE

SERVICES GENERAL NOTES
- INDUCTION COOK TOPS
- NO GAS REQUIREMENTS
- PHOTO VOLTAICS ON THE ROOF FOR COMMON AREAS ONLY
- CEILING FANS IN LIVING AND BEDROOMS
- STRUCTURAL COLUMNS TO BE COORINDATED WITH DESIGN
- CIVIL ENGINEER TO CONFIRM GROUND FLOOR SETDOWN REQUIREMENTS
- CIVIL ENGINEER TO APPROVE 70MM SETDOWN ON UPPER LEVEL BALCONIES TO ENSURE ADEQUATE WATER STOP IN 1:100 YEAR FLOOR.

MAINTENANCE ACCESS
THE CONTRACTOR IS TO PROVIDE SAFE ACCESS SYSTEMS TO FACILITATE THE CLEANING AND MAINTENANCE OF ALL EXTERNAL ELEMENTS AND FIXTURES INCLUDING:
- ROOF FIXTURES - INCLUDING PVC'S AND ROOF COWLS, ROOFING, GUTTERS AND DOWNPIPES,
- ROOF PLANT REPLACEMENT, EXTERNAL WALLS AND GLAZING;
- EXTERNAL SCREENS;
- PLANTER BOXES;
ACCESS & MAINTENANCE STRATEGIES ARE TO BE IN ACCORDANCE WITH HOMES NSW GUIDELINES

Revision	Description	Date
1	Requesting Client Sign Off & Consultant Coordination	27.10.2023
2	AMZ ISSUE	15.12.2023
3	Preliminary Issue For Coordination	30.01.2024
4	Preliminary Issue For Coordination	09.02.2024

PRELIMINARY
WORK-IN-PROGRESS

NOTES : DEVELOPMENT APPLICATION

1. DESIGN RESOLUTION
- The drawings represent general architectural intent for the purpose of this development application only.
- The internal layout is shown indicatively and is subject to further design development.
- The dimensions shown are general only and are subject to further design resolution.
- Location of car park entry point is general only and will be confirmed and dimensioned at later stage.
- The size and position of privacy screens, louvres is indicative and shown in open and closed positions.
- Please refer to Landscape drawings for Landscape component (shown indicatively only in this set)
- Location & sizes of plant, equipment, service areas and service risers on drawings is general and indicative only, and does not include minor elements, such as vent pipes, flues, aerials, etc.

2. GRAPHIC PRESENTATION
Colours presented on drawings are generic only and indicative of the architectural design intent.

3. EXISTING STRUCTURES AND SERVICES
Extent and location of existing and proposed neighbouring structures and services is according to the available survey information and will need to be verified on site at later stage.

THIS DRAWING IS TO BE PRINTED IN COLOUR

Consultants

Client
LAND AND HOUSING CORPORATION

CUSTANCE
Strategy
Urban Design
Architecture
Interior Design

SYDNEY
Suite 604 Level 6, 46 Kippax Street
Surry Hills NSW 2010
Australia
PH (02) 9051 0177
www.custance.com.au

Project
HARDWICKE ST SENIOR HOUSING
17-27 HARDWICKE ST, RIVERWOOD

Sheet Title
GA PLAN - GROUND FLOOR & LEVEL 1

NORTH
SCALE @ A1
1:100
0 2.5 5M

Drawn	Checked	Scale
JL	RW	As indicated @ A1

It is intended that the drawings only represent the visual design of the work. Any technical details are for outline purposes only. The Contractor/ Manufacturer must separately provide all necessary shop drawings or calculations for compliance with any relevant industry, safety standards or Australian Standards, regulations or by-laws. Dimensions are to be checked on site, any discrepancies are to be referred to Custance Associates Australia Pty Ltd, in writing, prior to proceeding. Use written dimensions only. Do not use scaled dimensions. Check for latest revision issue. ©Copyright of this drawing is vested with Custance Associates Australia Pty Ltd

Nominated Architect: Craig Shelsher 6259 (NSW), 5612 (QLD)

Project No.	Sheet No.	Revision
3420	DA-006	4

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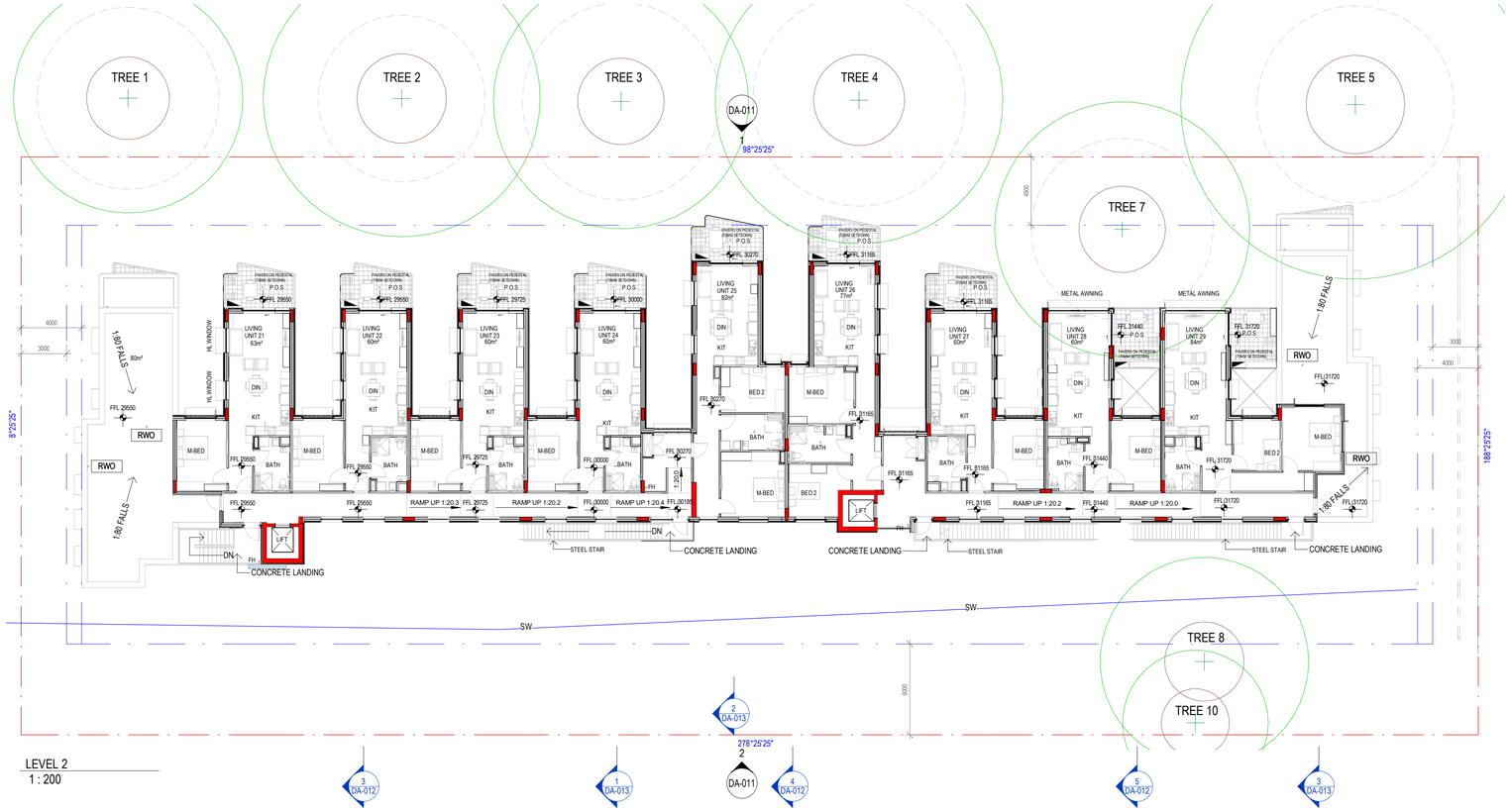
Revision	Description	Date
1	Requesting Client Sign Off & Consultant Coordination	27.10.2023
2	AMZ ISSUE	15.12.2023
3	Preliminary Issue For Coordination	30.01.2024
4	Preliminary Issue For Coordination	09.02.2024



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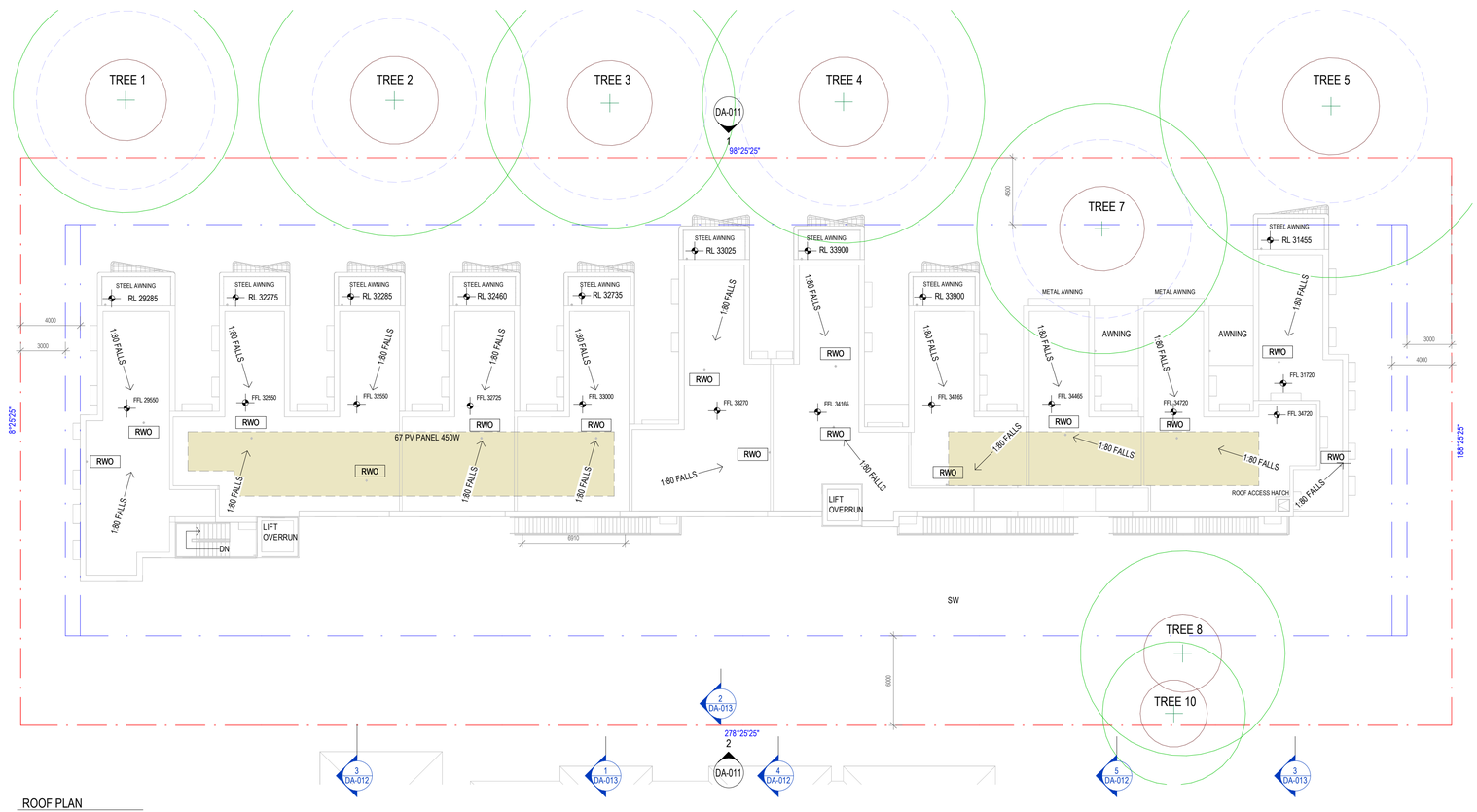

ROOF PLAN
1 : 200

TREE LEGEND

CANOPY

SRZ - STRUCTURAL ROOT ZONE

TPZ - TREE PROTECTION ZONE

PRELIMINARY
WORK-IN-PROGRESS

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THIS DRAWING IS TO BE PRINTED IN COLOUR

Consultants

SERVICES GENERAL NOTES
- INDUCTION COOK TOPS
- NO GAS REQUIREMENTS
- PHOTO VOLTAICS ON THE ROOF FOR COMMON AREAS ONLY
- CEILING FANS IN LIVING AND BEDROOMS
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www.custance.com.au

Project
HARDWICKE ST SENIOR HOUSING
17-27 HARDWICKE ST, RIVERWOOD

Sheet Title
GA PLAN - LEVEL 2 & ROOF PLAN

NORTH

SCALE @ A1
1:100
0 2.5 5M

Drawn	Checked	Scale
JL	RW	As indicated @ A1

It is intended that the drawings only represent the visual design of the work. Any technical details are for outline purposes only. The Contractor/ Manufacturer must separately provide all necessary shop drawings or calculations for compliance with any relevant industry, safety standards or Australian Standards, regulations or by-laws. Dimensions are to be checked on site, any discrepancies are to be referred to Custance Associates Australia Pty Ltd, in writing, prior to proceeding. Use written dimensions only. Do not use scaled dimensions. Check for latest revision issue. ©Copyright of this drawing is vested with Custance Associates Australia Pty Ltd.

Nominated Architect: Craig Sheibner 8259 (NSW), 5612 (QLD)

Project No.	Sheet No.	Revision
3420	DA-007	4

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Appendix D: Maintenance manuals

StormFilter

Operations & Maintenance Manual

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Introduction 2

Why do I need to perform maintenance? 2

Health and Safety 3

Personnel health and safety 3

How does it Work? 4

Maintenance Procedures 4

Primary Types of Maintenance 4

Inspection 5

Minor Service 5

Major Service (Filter Cartridge Replacement) 5

Additional Types of Maintenance 6

Hazardous Material Spill 6

Blockages 6

Major Storms and Flooding 6

Disposal of Waste Materials 6

Maintenance Services 6

Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes for the StormFilter as recommended by the manufacturer.

The StormFilter is designed and sized to meet stringent regulatory requirements. It removes the most challenging target pollutants (including fine solids, soluble heavy metals, oil, and soluble nutrients) using a variety of media. For more than two decades, StormFilter has helped clients meet their regulatory needs and, through ongoing product enhancements, the design continues to be refined for ease of use and improved performance.

Why do I need to perform maintenance?

Adhering to the inspection and maintenance schedule of each stormwater treatment device is essential to ensuring that it functions properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up), but most of all ensures the long term effective operation of the StormFilter.

Health and Safety

Access to a StormFilter unit requires removing heavy access covers/grates, and it is necessary to enter into a confined space. Pollutants collected by the StormFilter will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or objects such as broken glass and syringes. For these reasons, all aspects of maintaining and cleaning your StormFilter require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel. As a result, it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

Personnel health and safety

Whilst performing maintenance on the StormFilter, precautions should be taken in order to minimise (or, if possible, prevent) contact with sediment and other captured pollutants by maintenance personnel. The following personal protective equipment (PPE) is subsequently recommended:

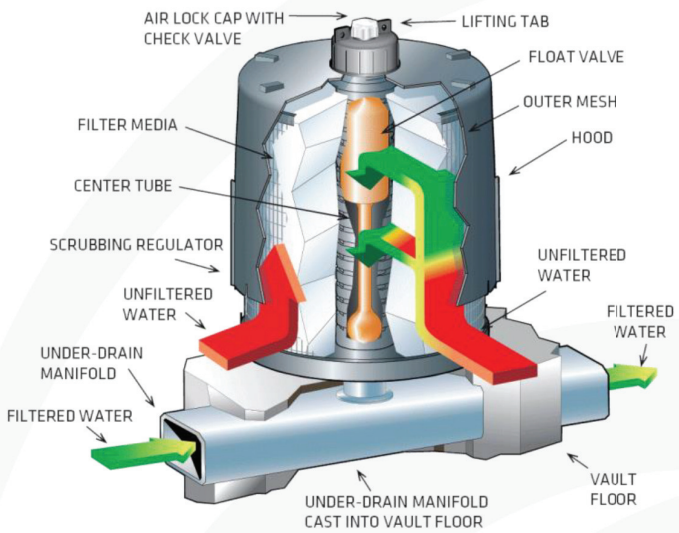
- Puncture resistant gloves
- Steel capped safety boots
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities, it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site-specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

Whilst some aspects of StormFilter maintenance can be performed from surface level, there will be a need to enter the StormFilter system (confined space) during a major service. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification for confined space entry applications.

How does it Work?

Stormwater enters the cartridge chamber, passes through the filtration media and begins filling the cartridge center tube. When water reaches the top of the cartridge the float valve opens and filtered water is allowed to drain at the designed flow rate. Simultaneously, a one-way check valve closes activating a siphon that draws stormwater evenly throughout the filter media and into the center tube. Treated stormwater is then able to discharge out of the system through the underdrain manifold pipework.



As the rain event subsides, the water level outside the cartridge drops and approaches the bottom of the hood, air rushes through the scrubbing regulators releasing the water column and breaking the siphon. The turbulent bubbling action agitates the surface of the cartridge promoting trapped sediment to drop to the chamber floor. After a rain event, the chamber is able to drain dry by way of an imperfect seal at the base of the float valve.

Maintenance Procedures

To ensure optimal performance, it is advisable that regular maintenance is performed. Typically, the StormFilter requires an inspection every 6 months with a minor service at 12 months. Additionally, as the StormFilter cartridges capture pollutants the media will eventually become occluded and require replacement (expected media life is 1-3 years).

Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the StormFilter.

	Description of Typical Activities	Frequency
Inspection	Visual Inspection of cartridges & chamber Remove larger gross pollutants Perform minimal rectification works (if required)	Every 6 Months
Minor Service	Evaluation of cartridges and media Removal of accumulated sediment (if required) Wash-down of StormFilter chamber (if required)	Every 12 Months
Major Service	Replacement of StormFilter cartridge media	As required

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

Inspection

The purpose of the inspecting the StormFilter system is to assess the condition of the StormFilter chamber and cartridges. When inspecting the chamber, particular attention should be taken to ensure all cartridges are firmly connected to the connectors. It is also an optimal opportunity to remove larger gross pollutants and inspect the outlet side of the StormFilter weir.

Minor Service

This service is designed to ensure the ongoing operational effectiveness of the StormFilter system, whilst assessing the condition of the cartridge media.

1. Establish a safe working area around the access point(s)
2. Remove access cover(s)
3. Evaluate StormFilter cartridge media (if exhausted schedule major service within 6 months)
4. Measure and record the level of accumulated sediment in the chamber
   (if sediment depth is less than 100 mm skip to step 9)
5. Remove StormFilter cartridges from the chamber
6. Use vacuum unit to removed accumulated sediment and pollutants in the chamber
7. Use high pressure water to clean StormFilter chamber
8. Re-install StormFilter cartridges
9. Replace access cover(s)

Major Service (Filter Cartridge Replacement)

For the StormFilter system a major service is reactionary process based on the outcomes from the minor service, specifically the evaluation of the cartridge media.

Trigger Event	Maintenance Action
Cartridge media is exhausted[1]	Replace StormFilter cartridge media[2]

[1] Multiple assessment methods are available, contact Ocean Protect for assistance
[2] Replacement filter media and components are available for purchase from Ocean Protect.

This service is designed to return the StormFilter device back to optimal operating performance

1. Establish a safe working area around the access point(s)
2. Remove access cover(s)
3. By first removing the head cap, remove each individual cartridge hood to allow access to the exhausted media.
4. Utilise a vacuum unit to remove exhausted media from each cartridge
5. Use vacuum unit to remove accumulated sediment and pollutants in the chamber
6. Use high pressure water to clean StormFilter chamber
7. Inspect each empty StormFilter cartridges for any damage, rectify damage as required
8. Re-fill each cartridge with media in line with project specifications
9. Re-install replenished StormFilter cartridges
10. Replace access cover(s)

Additional Types of Maintenance

Occasionally, events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

Hazardous Material Spill

If there is a spill event on site, the StormFilter unit should be inspected and cleaned. Specifically, all captured pollutants and liquids from within the unit should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event. Additionally, it will be necessary to inspect the filter cartridges and assess them for contamination, depending on the type of spill event it may be necessary to replace the filtration media.

Blockages

In the unlikely event that flooding occurs upstream of the StormFilter system the following steps should be undertaken to assist in diagnosing the issue and determining the appropriate response.

1. Inspect the upstream diversion structure (if applicable) ensuring that it is free of debris and pollutants
2. Inspect the StormFilter unit checking the underdrain manifold as well as both the inlet and outlet pipes for obstructions (e.g. pollutant build-up, blockage), which if present, should be removed.

Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the StormFilter after a major storm event. The focus is to inspect for damage and higher than normal sediment accumulation that may result from localised erosion. Where necessary damaged components should be replaced and accumulated pollutants should be removed and disposed.

Disposal of Waste Materials

The accumulated pollutants found in the StormFilter must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the filter media has been contaminated with any unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

Maintenance Services

With over a decade and a half of maintenance experience Ocean Protect has developed a systematic approach to inspecting, cleaning and maintaining a wide variety of stormwater treatment devices. Our fully trained and professional staff are familiar with the characteristics of each type of system, and the processes required to ensure its optimal performance.

Ocean Protect has several stormwater maintenance service options available to help ensure that your stormwater device functions properly throughout its design life. In the case of our StormFilter system we offer long term pay-as-you-go contracts, pre-paid once off servicing and replacement media for cartridges.

For more information please visit www.OceanProtect.com.au

OCEAN PROTECT

OceanGuard™

Operations & Maintenance Manual

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Introduction 2

Why do I need to perform maintenance? 2

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Primary Types of Maintenance 4

Minor Service 5

Hand Maintenance 5

Vacuum Maintenance 5

Major Service (Filter Bag Replacement) 5

Additional Reasons of Maintenance 6

Hazardous Material Spill 6

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Major Storms and Flooding 6

Disposal of Waste Materials 6

Maintenance Services 6

Rev: *1* ***Last Updated:*** *March 2019*

Introduction

The primary purpose of stormwater treatment devices is to capture and prevent pollutants from entering waterways, maintenance is a critical component of ensuring the ongoing effectiveness of this process. The specific requirements and frequency for maintenance depends on the treatment device and pollutant load characteristics of each site. This manual has been designed to provide details on the cleaning and maintenance processes as recommended by the manufacturer.

The OceanGuard technology is a gully pit basket designed to fit within new and existing gully pits to remove pollution from stormwater runoff. The system has a choice of Filtration liners, designed to remove gross pollutants, total suspended solids and attached pollutants as either a standalone technology or as part of a treatment train with our StormFilter or Jellyfish Filtration products. OceanGuard pit baskets are highly effective, easy to install and simple to maintain.

Why do I need to perform maintenance?

Adhering to the maintenance schedule of each stormwater treatment device is essential to ensuring that it functions properly throughout its design life.

During each inspection and clean, details of the mass, volume and type of material that has been collected by the device should be recorded. This data will assist with the revision of future management plans and help determine maintenance interval frequency. It is also essential that qualified and experienced personnel carry out all maintenance (including inspections, recording and reporting) in a systematic manner.

Maintenance of your stormwater management system is essential to ensuring ongoing at-source control of stormwater pollution. Maintenance also helps prevent structural failures (e.g. prevents blocked outlets) and aesthetic failures (e.g. debris build up), but most of all ensures the long term effective operation of the OceanGuard.

Health and Safety

Access to pits containing an OceanGuard typically requires removing (heavy) access covers/grates, but typically it is not necessary to enter into a confined space. Pollutants collected by the OceanGuard will vary depending on the nature of your site. There is potential for these materials to be harmful. For example, sediments may contain heavy metals, carcinogenic substances or sharp objects such as broken glass and syringes. For these reasons, there should be no primary contact with the waste collect and all aspects of maintaining and cleaning your OceanGuard require careful adherence to Occupational Health and Safety (OH&S) guidelines.

It is important to note that the same level of care needs to be taken to ensure the safety of non-work personnel, as a result it may be necessary to employ traffic/pedestrian control measures when the device is situated in, or near areas with high vehicular/pedestrian activity.

Personnel health and safety

Whilst performing maintenance on the OceanGuard pit insert, precautions should be taken in order to minimise (or when possible prevent) contact with sediment and other captured pollutants by maintenance personnel. In order to achieve this the following personal protective equipment (PPE) is recommended:

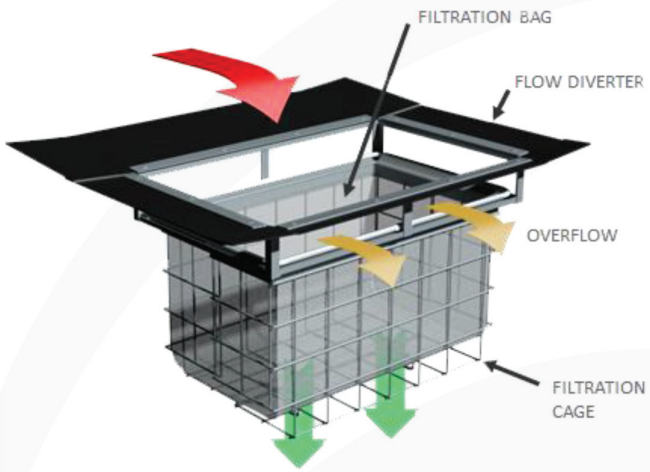
- Puncture resistant gloves
- Steel capped safety boots,
- Long sleeve clothing, overalls or similar skin protection
- Eye protection
- High visibility clothing or vest

During maintenance activities it may be necessary to implement traffic control measures. Ocean Protect recommend that a separate site specific traffic control plan is implemented as required to meet the relevant governing authority guidelines.

The OceanGuard pit insert is designed to be maintained from surface level, without the need to enter the pit. However depending on the installation configuration, location and site specific maintenance requirements it may be necessary to enter a confined space occasionally. It is recommended that all maintenance personnel evaluate their own needs for confined space entry and compliance with relevant industry regulations and guidelines. Ocean Protect maintenance personnel are fully trained and carry certification for confined space entry.

How does it Work?

OceanGuard is designed to intercept stormwater as it enters the stormwater pits throughout a site. The OceanGuard has diversion panels that sit flush with the pit walls, this ensures that as stormwater enters at the top of the pit it is directed to the middle of the insert where the Filtration bag is situated. The filtration bag allows for screening to occur removing 100% of pollutants greater than the opening of the filtration material (200micron, 1600micron bags available).



During larger rain events the large flows overflow slots in the flow diverter of the OceanGuard ensure that the conveyance of stormwater is not impeded thus eliminating the potential for surface flooding. As the flow subsides, the captured pollutants are held in the OceanGuard Filtration bag dry. The waste then starts to dry which reduces the magnitude of organic material decomposition transitioning between maintenance intervals.

Maintenance Procedures

To ensure that each OceanGuard pit insert achieves optimal performance, it is advisable that regular maintenance is performed. Typically the OceanGuard requires 2-4 minor services annually, pending the outcome of these inspections additional maintenance servicing may be required.

Primary Types of Maintenance

The table below outlines the primary types of maintenance activities that typically take place as part of an ongoing maintenance schedule for the OceanGuard.

	Description of Typical Activities	Frequency
Minor Service	Filter bag inspection and evaluation Removal of capture pollutants Disposal of material	2-4 Times Annually
Major Service	Filter Bag Replacement Support frame rectification	As required

Maintenance requirements and frequencies are dependent on the pollutant load characteristics of each site. The frequencies provided in this document represent what the manufacturer considers to be best practice to ensure the continuing operation of the device is in line with the original design specification.

Minor Service

This service is designed to return the OceanGuard device back to optimal operating performance. This type of service can be undertaken either by hand or with the assistance of a Vacuum unit.

Hand Maintenance

1. Establish a safe working area around the pit insert
2. Remove access cover/grate
3. Use two lifting hooks to remove the filtration bag
4. Empty the contents of the filtration bag into a disposal container
5. Inspect and evaluate the filtration bag
6. Inspect and evaluate remaining OceanGuard components (i.e. flow diverter, filtration cage and supporting frame)
7. Rejuvenate filtration bag by removing pollutant build up with a stiff brush, additionally the filtration bag can be washed using high pressure water
8. Re-install filtration bag and replace access cover/grate

Vacuum Maintenance

1. Establish a safe working area around the pit insert
2. Remove access cover/grate
3. Vacuum captured pollutants from the filtration bag
4. Remove filtration bag
5. Inspect and evaluate the filtration bag
6. Inspect and evaluate remaining OceanGuard components (i.e. flow diverter, filtration cage and supporting frame)
7. Rejuvenate filtration bag by removing pollutant build up with a stiff brush, additionally the filtration bag can be washed using high pressure water
8. Re-install filtration bag and replace access cover/grate

Major Service (Filter Bag Replacement)

For the OceanGuard system, a major service is a reactionary process based on the outcomes from the minor service.

Trigger Event from Minor Service	Maintenance Action
Filtration bag inspection reveals damage	Replace the filtration bag[1]
Component inspection reveals damage	Perform rectification works and if necessary replace components[1]

[1] Replacement filtration bags and components are available for purchase from Ocean Protect.

Additional Reasons of Maintenance

Occasionally, events on site can make it necessary to perform additional maintenance to ensure the continuing performance of the device.

Hazardous Material Spill

If there is a spill event on site, all OceanGuard pits that potentially received flow should be inspected and cleaned. Specifically all captured pollutants from within the filtration bag should be removed and disposed in accordance with any additional requirements that may relate to the type of spill event. All filtration bags should be rejuvenated (replaced if required) and re-installed.

Blockages

The OceanGuards internal high flow bypass functionality is designed to minimise the potential of blockages/flooding. In the unlikely event that flooding occurs around the stormwater pit the following steps should be undertaken to assist in diagnosing the issue and implementing the appropriate response.

1. Inspect the OceanGuard flow diverter, ensuring that they are free of debris and pollutants
2. Perform a minor service on the OceanGuard
3. Remove the OceanGuard insert to access the pit and inspect both the inlet and outlet pipes, ensuring they are free of debris and pollutants

Major Storms and Flooding

In addition to the scheduled activities, it is important to inspect the condition of the OceanGuard pit insert after a major storm event. The inspection should focus on checking for damage and higher than normal sediment accumulation that may result from localised erosion. Where necessary damaged components should be replaced and accumulated pollutants disposed.

Disposal of Waste Materials

The accumulated pollutants found in the OceanGuard must be handled and disposed of in a manner that is in accordance with all applicable waste disposal regulations. When scheduling maintenance, consideration must be made for the disposal of solid and liquid wastes. If the filtration bag has been contaminated with any unusual substance, there may be additional special handling and disposal methods required to comply with relevant government/authority/industry regulations.

Maintenance Services

With over a decade and a half of maintenance experience Ocean Protect has developed a systematic approach to inspecting, cleaning and maintaining a wide variety of stormwater treatment devices. Our fully trained and professional staff are familiar with the characteristics of each type of system, and the processes required to ensure its optimal performance.

Ocean Protect has several stormwater maintenance service options available to help ensure that your stormwater device functions properly throughout its design life. In the case of our OceanGuard system we offer long term pay-as-you-go contracts, pre-paid once off servicing and replacement filter bags.

For more information please visit www.OceanProtect.com.au