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CIVIL INTEGRATED WATER MANAGEMENT PLAN
OPAL HEALTHCARE
ST IVES

For SSDA
October 2024
Revision 02

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henry&hymas

TABLE OF CONTENTS

Page

1. INTRODUCTION 2

1.1 General 2
1.2 Engineering Objectives/ Principles 3
1.3 Council Policies 3
1.4 The Site & Its Context 3
1.5 SEARS REQUIREMENTS 3
1.6 Response to Council Feedback 4

2. STORMWATER MANAGEMENT 5

2.1 Introduction 5
2.2 Stormwater Quantity 6
2.3 Water Quality 6

3. CONSULTATION WITH COUNCIL 7

4. BASEMENT DRAINAGE 8

5. WATER DEMAND AND REUSE 8

6. CONCLUSION 9

REFERENCES 10

APPENDIX A: DEVELOPMENT APPLICATION DRAWINGS

APPENDIX B: SURVEY

APPENDIX C: OSD CALCULATION SPREADSHEET

1. INTRODUCTION

1.1 General

This Engineering Report has been prepared to supplement the proposed State Significant Development Application (SSDA) for the proposed Opal St Ives development located at 285-289 Mova Vale Rd and 1 Flinders Avenue, St Ives NSW. The development will consist of a proposed retirement aged care facility (RACF), external courtyards and a basement car park.

Figure 1.1 Locality Sketch

The following Engineering matters have been addressed in this report:

- Water Sensitive Urban Design (WSUD)
- Stormwater Detention
- Water Demand

The purpose of this report is to provide an overview of the various Engineering issues that relate to the site and how these issues have been addressed.

A full set of DA Drawings is provided in Appendix A of this report.

1.2 Engineering Objectives/ Principles

One of the Engineering objectives for the development is to provide a safe and efficient road and pedestrian footpath network for the residents and visitors to the development. In addition, driveway and footpath grades must comply with the relevant Australian standards and also be sympathetic to the needs of the users of the network.

The site has been designed such that the grades are sympathetic to the end users whilst giving consideration for earthworks quantities. This was done to assist in minimising construction costs, minimising the impact on local landfill resources whilst ensuring the site levels tie into existing levels at the site boundaries. As a result of the above, retaining walls will be required throughout the site (refer to engineering drawings in Appendix A). These walls have been designed taking into account both construction costs and with due consideration for the existing levels along the site boundaries.

The stormwater network must be designed to safely convey minor storm events via a pit and pipe stormwater system with provision for larger, more infrequent storm events overland via the road network. Another aspect of the stormwater system is to ensure that the design takes into account water sensitive urban design (WSUD) measures. The stormwater network has been designed in accordance with these principles.

1.3 Council Policies

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

- Ku-ring-Gai Council DCP Part 24 – Water Management
- Ku-ring-Gai Council DCP Part 21 – General Site Design
- KMC Draft Music Modelling Guidelines 2010

1.4 The Site & Its Context

The existing site is approximately 0.9324 hectares, with the existing levels falling from the North-West corner to the South-East corner near Flinders avenue.

Stormwater is to be managed via swales and a pit + pipe system, which directs flows to the rainwater tank, water quality chamber and on-site detention chamber. The stormwater system is proposed to discharge to an existing stormwater pit within Flinders Avenue. Refer to drawings C100 and C101 in Appendix A for more details.

Access to the site's porte cochere will be via a driveway located off Mona Vale Road. Similarly, access to the site's basement parking will be via a basement ramp located off Mona Vale Road. The grading of these driveways are compliant with AS2890.1 standards.

1.5 SEARS REQUIREMENTS

Refer to the following SEARs requirements and how each item has been addressed:

Provide an Integrated Water Management Plan for the development that:

- **is prepared in consultation with the local council and any other relevant drainage or water authority.**

Council has been consulted with regards to the drainage design. This consultation was in the form of email correspondence on the 17th of February 2022 and the 17th of September 2024. The key items discussed were basement drainage and rainwater tank sizing. Council's feedback has been incorporated into the current SSDA design.

- **Outlines the water-related servicing infrastructure required by the development (informed by the anticipated annual and ultimate increase in servicing demand) and evaluates opportunities to reduce water demand (such as recycled water provision).**

Refer to the engineering plan in Appendix A showing the required infrastructure to service the development. Refer to Section 4 of this report which addresses water demand.

- **Details the proposed drainage design for the site including any on-site treatment, reuse and detention facilities, water quality management measures, and the nominated discharge points.**

This information has been provided within the civil engineering DA drawings included within Appendix A. An OSD tank has been provided. Water quality measures have been incorporated into the design in the form of pit baskets, a rainwater tank and Psorb stormfilter cartridges. The stormwater discharge point is to the existing stormwater system within Flinders Avenue.

- **Demonstrates compliance with the local council or other drainage or water authority requirements and avoids adverse impacts on any downstream properties.**

Refer to Part 2 of this report, as well as the civil engineering drawings in Appendix A which demonstrate compliance with Council's stormwater controls. There are not expected to be any adverse impacts on downstream properties.

- **Where drainage infrastructure works are required that would be handed over to the local council, or other drainage or water authority, provide full hydraulic details and detailed plans and specification of proposed works that have been prepared in consultation with, and comply with the relevant standards, the local council or other drainage or water authority.**

Refer to the DRAINS model which has been included as part of the SSDA submission. Also included as part of the SSDA submission is the civil engineering plans (refer to Appendix A). These two documents demonstrate the necessary hydraulic and engineering information necessary to ensure that all relevant standards and local council requirements have been adhered to.

1.6 Response to Council Feedback

Council provided the following feedback in relation to the previous civil engineering SSDA design that was submitted to the Department of Planning:

A water balance model is required to evaluate the size of the rainwater tank to capture all roof runoffs. This should be accompanied by supporting hydraulic calculations.

No clarification has been provided as to the purpose of the proposed rainwater tank given that a retention component would also be required.

The basement pump out pit within the basement has not been shown. It would need to be designed to capture the driveway area and basement perimeter subsoil drainage. The pump out tank volume should be of a sufficient size to cope with a 100yr 2 hour storm. The rising main is required to be discharged to the OSD system.

Refer to the following responses to the above items, which have been incorporated into the current civil engineering SSDA design:

- Council's Water Balance Spreadsheet has been used in order to ascertain the required rainwater tank size to comply with Council's requirements. A total roof area of 4936m^2 is proposed, with an irrigation area of 1500m^2 (irrigation rate of 0.6kL/m^2/yr. This results in 20kL of rainwater storage in order to reduce runoff days by 50%, as per KMC requirements.
- A MUSIC model has been prepared in order to provide further details on the water balance for the site. The MUSIC model demonstrates that with a 20kL tank and 4936m^2 roof area, a reuse rate of 71.04% is achieved. MUSIC demonstrates that a demand of 0.9ML/yr is expected based off the irrigation area, and 0.64ML/yr is able to be provided via the rainwater tank. This means that 0.26ML/yr is provided via top up from the potable main supply, giving a total reuse of 70.04%.
- Council's request for the entire roof area to be directed to the rainwater has not been incorporated into the design. The subject site has many trees around the perimeter of the site (within the setback) which are proposed to be retained. In order to reduce the amount of impact on these trees, the services being reticulated through these areas is proposed to be reduced as much as possible. Having two stormwater lines (stormwater and rainwater) is not consistent with these principles. Therefore, it is proposed to reduce the roof area catchment to the rainwater tank to 1800m^2.
- MUSIC modelling has been undertaken to remodel the rainwater tank size with the new roof catchment area. With a rainwater tank size of 31kL, a reuse rate of 71.17% can be achieved. Therefore a rainwater tank size of 31kL, with a roof catchment area of 1800m2 has been proposed, which will ensure an identical water balance result as per the 20kL/4936m^2 arrangement dictated by Council's spreadsheet.
- No basement pump out pit is proposed with the new SSDA scheme, as gravity drainage can be provided.

2. STORMWATER MANAGEMENT

2.1 Introduction

2.1.1 Background

Stormwater controls will be implemented that ensure that the proposed development does not adversely impact on stormwater flows and water quality of the stormwater system downstream of the site.

The principles and operation of the proposed stormwater system for the development including water quality measures and the components of the internal drainage system are detailed on the Development Application Drawings included in Appendix A.

2.1.2 Key Issues

The key issues and the proposed mitigation measures to be implemented as part of the proposed development are:

- **Stormwater Quantity** - The increased impervious surfaces (such as roads, roofs, driveways, etc) associated with the development will result in an increase in peak stormwater flows from the site during storm events. On-site Stormwater Detention (OSD) will be proposed for the development to ensure that runoff from the development is appropriately managed in accordance with Council's requirements. The site stormwater system has been designed to safely convey the flows through the site and within the capacity of the downstream system. The design and operation of the proposed stormwater system is described in Section 2.2 below.

- **Water Quality** - Urban developments have the potential to increase gross pollutants, sediments, hydrocarbons and nutrient concentrations in stormwater runoff. To limit impact on the downstream water quality, water quality measures at source and end of line treatments will be provided. Section 2.3 further describes the specific implementation of these measures for the proposed development.

2.2 Stormwater Quantity

On Site Detention

As per Ku-Ring-Gai Council's DCP, on-site detention will be required to ensure post-developed flows are reduced to pre-developed flows in all storms up to the 100yr ARI event. Council's OSD spreadsheet has been used in order to appropriately size the detention system and orifice. The following parameters have been used:

- Catchment Name: Middle Harbour
- Catchment Discharge Rate = 0.0166litres/sec/m2
- Catchment Storage Rate = 0.0241m3/m2
- Total Site Area = 9324m2

Based on the OSD calculation sheet, a total on-site detention volume of 135m3 is required for the development.

Refer to Appendix C for further details.

Capacity of Downstream Council Stormwater System

A DRAINS model has been developed in order to model the proposed stormwater system for the subject site. A total pre-developed flow rate of 456L/s has been estimated for the 1 in 100yr ARI storm event. An on-site detention system has been proposed to form part of the site stormwater design, to ensure that the post-developed flow rates are reduced to below pre-developed values. Refer to the table below which demonstrates the pre and post developed flow rates for the various storm events.

Storm ARI	Pre-Developed Flow Rates	Post-Developed Flow Rates
10yr ARI	267L/s	211L/s
20yr ARI	325L/s	305L/s
100yr ARI	456L/s	437L/s

Table 2.2 Pre and Post developed flows

As shown by the above table, with the inclusion of on-site detention, post-developed flow rates are reduced to below pre-developed values. This ensures that there is no negative impact on the downstream capacity of Council's stormwater system.

2.3 Water Quality

Council's requirements also dictate that the stormwater be treated before discharging from the site. The requirements dictate that the post developed pollutants be reduced by the following factors when compared to the pre-developed pollutant generation:

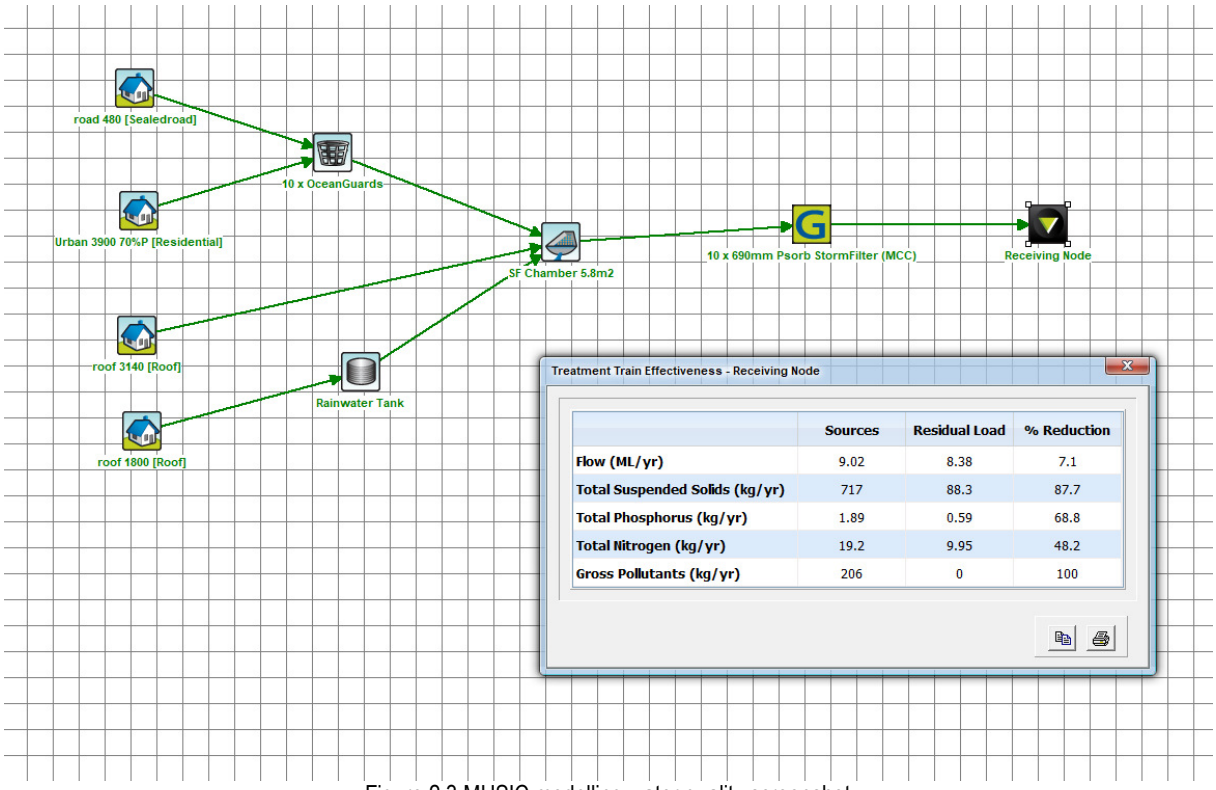
- Total Nitrogen to be reduced by 45%
- Total Phosphorus to be reduced by 65%
- Total Suspended Solids to be reduced by 85%

A MUSIC model has been prepared in order to design the stormwater quality system. Stormwater from the site is proposed to be treated by a combination of 690mm Psorb stormfilter cartridges, a 15kL rainwater tank and Oceanguard pit baskets. Refer to drawings 22K93_D2_C201 and 22K93_D2_C250 for further details on the stormwater treatment system. The results from the MUSIC model has been summarised in the table below.

Pollutant	Pre-Developed Pollutant Loads (kg/yr)	Post Developed Pollutant Loads (kg/yr)	Target Reduction	Pollutant Reduction
Nitrogen	19.2	9.95	45%	48.2%
Phosphorus	1.89	0.59	65%	68.8%
Suspended Solids	717	88.3	85%	87.7%

Table 2.3 Catchment 1 Pollutant Loads

The proposed development meets Ku-Ring-Gai Council's water quality requirements as shown by the table above, and figure 2.3 below.



	Sources	Residual Load	% Reduction
Flow (ML/yr)	9.02	8.38	7.1
Total Suspended Solids (kg/yr)	717	88.3	87.7
Total Phosphorus (kg/yr)	1.89	0.59	68.8
Total Nitrogen (kg/yr)	19.2	9.95	48.2
Gross Pollutants (kg/yr)	206	0	100

Figure 2.3 MUSIC modelling water quality screenshot

3. CONSULTATION WITH COUNCIL

Consultation with Ku-ring-gai Municipal Council has been undertaken via email correspondence on the 17th of February 2023 wherein the matters of on-site detention and basement drainage were being clarified. No meeting took place with Council's engineering department as it was not considered to be necessary.

An additional conference call with Council's engineers took place on the 17th of September 2024 to discuss the rainwater tank requirements and basement drainage requirements. Council's feedback has been incorporated into the current SSDA design.

4. BASEMENT DRAINAGE

The proposed basement is to be drained conventionally with a shoring wall and shotcrete basement wall design, which diverts subsurface flows to the in-ground basement drainage via strip drains in between the shoring piers. The subsoil pipes will discharge to the in-ground stormwater system, which connects via gravity to the OSD and Council's stormwater system in Flinders Avenue.

Ku-Ring-Gai Council's DCP Part 24C.3 dictates that basements are to be fully tanked unless it can be demonstrated that ongoing dewatering will be less than 3ML/year.

A geotechnical investigation has been undertaken by Geologix (refer to reports 2201040GTRpt01FinalV01_21July22.pdf and 2201040Ltr02FinalV01_4Oct22.pdf) which has determined through borehole investigations, that no stable groundwater is expected to be encountered during the basement excavation. It can be therefore surmised that the basement excavation is not impacting on any groundwater table, and that only local subsurface flows will be discharged into the basement drainage system.

Calculations have been undertaken using MUSIC to determine the likely yearly discharge rate into the basement drainage system. Based of a total pervious area of 1317m2 which is adjacent to the basement shoring walls, a total of 1.68ML/year is the expected rainfall on this catchment. Of this total rainfall, 1.00ML/yr is expected to be lost through evapotranspiration, and a further 0.29ML/yr lost through surface flows overland. This gives a total subsurface baseflow of 0.39ML/yr which can be expected to be discharged into the basement stormwater system. Given that this value is far less than the 3ML/yr outlined in Council's DCP, it is expected that the conventionally drained basement system is compliant.

5. WATER DEMAND AND REUSE

As per Ku-Ring-Gai Council's DCP Part 24C.4, for a type 6 development, a rainwater tank needs to be provided for the development. As per email correspondence with Council on the 17th of September 2024, a rainwater tank spreadsheet was provided by Vincent Ooi (senior development engineer) to size the rainwater tank appropriately. The following parameters were input into the spreadsheet:

- A total roof area of 4936m^2
- An iirrigation area of 1500m^2 (irrigation rate of 0.6kL/m^2/yr.
- This results in 20kL of rainwater storage in order to reduce runoff days by 50%, as per KMC requirements.

Refer to Figure 5.0 below.

Project: St Ives 22K93

BoM Station: Turrumurra [Kissing Point Rd] - Daily Rainfall (66158) 1990 - 2016

Assumptions	Rainfall loss	1	mm	Water Usage - Landscape Watering		
** Wet day = greater than 0mm of daily rain*	Roof area	4936	m2	Area to be watered	1500	m2
** Total water usage is calculated in m3/day and subtracted on each day*	Rainwater tank size	20	m3	Watering rate	0.6	m3/yr/m2 *[a]*
** Target is 50% reduction in runoff days*	%Full at start	0	%	Total water used	2.464	m3/day
** Assume that if rainwater tank does not overflow on a wet day,*				Water Usage - Car Wash Bay		
this is no longer a 'runoff day'. OF = Overflow Day	Total# days	9611	days	Number units	0	
** %Reduction in wet days = (wet days - OF days) / wet days*	Total# wet days	3875	days	% of units using car wash	50	%
	Total# OF days	1929	days	Average washes	4	washes/yr/unit
References	%reduction in wet days	50.2	%	Usage Rate	100	L/wash *[b]*
[a] Blacktown Council WSUD guidelines				Total water used	0.000	m3/day
[b] AW / Sydney Water	%of time tank is empty	24	%			
[c] Melbourne Household Water Use calculator	%of time tank is full	20	%	**Total Water usage**	2.464	m3/day

Figure 5.0 Council Rainwater Tank Sizing Spreadsheet

Alternative Rainwater Tank Design that has been adopted

- A MUSIC model has been prepared in order to provide further details on the water balance for the site. The MUSIC model demonstrates that with a 20kL tank and 4936m^2 roof area, a reuse rate of 71.04% is achieved. MUSIC demonstrates that a demand of 0.9ML/yr is expected based off the irrigation area, and 0.64ML/yr is able to be provided via the rainwater tank. This means that 0.26ML/yr is provided via top up from the potable main supply, giving a total reuse of 70.04%.
- Council's request for the entire roof area to be directed to the rainwater has not been incorporated into the design. The subject site has many trees around the perimeter of the site (within the setback) which are proposed to be retained. In order to reduce the amount of impact on these trees, the services being reticulated through these areas is proposed to be reduced as much as possible. Having two stormwater lines (stormwater and rainwater) is not consistent with these principles. Therefore, it is proposed to reduce the roof area catchment to the rainwater tank to 1800m^2. Refer to drawing C250 in Appendix A for details.
- MUSIC modelling has been undertaken to remodel the rainwater tank size with the new roof catchment area. With a rainwater tank size of 31kL, a reuse rate of 71.17% can be achieved. Therefore a rainwater tank size of 31kL, with a roof catchment area of 1800m2 has been proposed, which will ensure an identical water balance result as per the 20kL/4936m^2 arrangement dictated by Council's spreadsheet.

As per the above, the proposed water conservation strategy complies with the Ku-ring-gai Councils DCP.

6. CONCLUSION

The design provides a safe and efficient road and pedestrian footpath network for the proposed development which will be sympathetic to the needs of the users of the network. The road and footpath network will be integrated with appropriate traffic facilities to assist in controlling parking, traffic guidance and pedestrian safety.

Appropriate stormwater management practices will be implemented that minimise the impact of development on the existing stormwater system in terms of water quality whilst ensuring safe and efficient conveyance of runoff and the provision of adequate freeboard to habitable dwellings.

The design is in accordance with both Ku-Ring-Gai Council's requirements and best practice principles, hence it can be ensured that there will be minimal impact on the existing environment as a result of the proposed development.

It should be noted that the results shown in this report are limited to use for SSDA purposes only. During the detailed design stages, a further refinement of the modelling based on the detail design of the development will be necessary.

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REFERENCES

- Landcom - "Soils and Construction Volume 1 – 4th Edition", March 2004
- Institution of Engineers, Australia - "Australian Rainfall and Runoff 3rd Edition", 1987
- Sixmaps, 2018 - <https://maps.six.nsw.gov.au/>
- Ku-ring-Gai Council DCP Part 24 – Water Management
- Ku-ring-Gai Council DCP Part 21 – General Site Design
- KMC Draft Music Modelling Guidelines 2010

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APPENDIX A – DEVELOPMENT APPLICATION DRAWINGS

PROPOSED HEALTHCARE DEVELOPMENT
285-289 MONA VALE ROAD & 1 FLINDERS AVENUE, ST IVES, NSW
CIVIL ENGINEERING WORKS

GENERAL NOTES:

1. ALL WORK TO BE CARRIED OUT IN ACCORDANCE WITH KU-RING-GAI COUNCIL'S 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 KU-RING-GAI 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

THE EXISTING SITE CONDITIONS SHOWN ON THE FOLLOWING DRAWINGS HAVE BEEN INVESTIGATED BY THE SURVEYOR SPECIFIED IN THE TITLE BLOCK.
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.
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.

LOCALITY SKETCH

SCALE: N.T.S.

DRAWING SCHEDULE	
22K93_D3_C000	COVER SHEET, DRAWING SCHEDULE, NOTES AND LOCALITY SKETCH
22K93_D3_C101	DETAIL PLAN - LOWER GROUND - SHEET 1 OF 3
22K93_D3_C102	DETAIL PLAN - GROUND - SHEET 2 OF 3
22K93_D3_C103	DETAIL PLAN - LEVEL 1 - SHEET 3 OF 3
22K93_D3_C110	TYPICAL SECTIONS, SHEET 1 OF 2
22K93_D3_C111	TYPICAL SECTIONS, SHEET 2 OF 2
22K93_D3_C200	STORMWATER MISCELLANEOUS DETAILS AND PIT LID SCHEDULE
22K93_D3_C201	OSD TANK PLAN, SECTIONS AND DETAILS
22K93_D3_C250	STORMWATER CATCHMENT PLAN
22K93_D3_SE01	SEDIMENT AND EROSION CONTROL PLAN
22K93_D3_SE02	SEDIMENT AND EROSION CONTROL DETAILS
22K93_D3_BE01	BULK EARTHWORKS CUT AND FILL PLAN

SITEWORKS NOTES

- DATUM : A.H.D.
- ORIGIN OF LEVELS : REFER TO BENCH OR STATE SURVEY MARKS WHERE SHOWN ON PLAN.
- CONTRACTOR MUST VERIFY ALL DIMENSIONS AND EXISTING LEVELS ON SITE PRIOR TO THE COMMENCEMENT OF WORK.
- ALL WORKS TO BE UNDERTAKEN IN ACCORDANCE WITH THE DETAILS SHOWN ON THE DRAWINGS & THE DIRECTIONS OF THE SUPERINTENDENT.
- 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.
- WHERE NEW WORKS ABUT EXISTING THE CONTRACTOR SHALL ENSURE THAT A SMOOTH EVEN PROFILE, FREE FROM ABRUPT CHANGES IS ACHIEVED.
- THE CONTRACTOR SHALL ARRANGE ALL SURVEY SETOUT TO BE CARRIED OUT BY A REGISTERED SURVEYOR.
- 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.
- CONTRACTOR TO OBTAIN AUTHORITY APPROVALS WHERE APPLICABLE.
- MAKE SMOOTH TRANSITION TO EXISTING SURFACES AND MAKE GOOD.
- THESE PLANS SHALL BE READ IN CONJUNCTION WITH APPROVED LANDSCAPE, ARCHITECTURAL, STRUCTURAL, HYDRAULIC AND MECHANICAL DRAWINGS AND SPECIFICATIONS OR WRITTEN INSTRUCTIONS THAT MAY BE ISSUED RELATING TO DEVELOPMENT AT THE SITE.
- TRENCHES THROUGH EXISTING ROAD AND CONCRETE PAVEMENTS SHALL BE SAWCUT TO FULL DEPTH OF CONCRETE AND A MINIMUM OF 50mm IN BITUMINOUS PAVING.
- 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.
- 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.
- ALL COVERS AND GRATES ETC TO EXISTING SERVICE UTILITIES ARE TO BE ADJUSTED TO SUIT NEW FINISHED SURFACE LEVELS WHERE APPLICABLE.

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.

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY: SDG
DATUM: AHD
ORIGIN OF LEVELS:
SSM 85414
RL163393

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	MB	NH	15.10.2024					

Client
OPAL HEALTHCARE

Architect
GROUP GSA

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DRAWING TO BE PRINTED IN COLOUR

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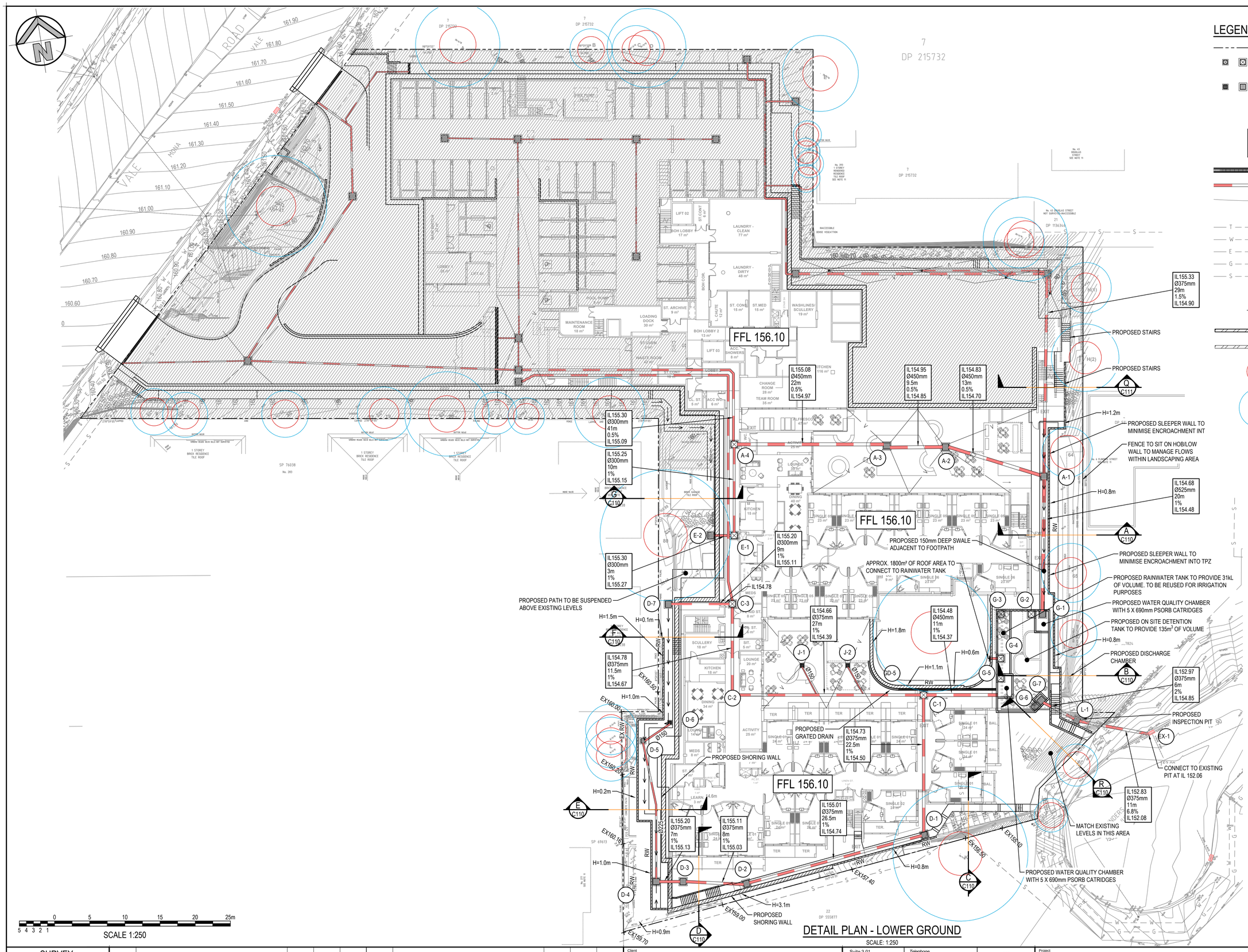
Project
PROPOSED HEALTHCARE DEVELOPMENT
285-289 MONA VALE ROAD & 1 FLINDERS AVENUE, ST IVES, NSW

Title
COVER SHEET, DRAWING SCHEDULE, NOTES AND LOCALITY SKETCH

Drawn	Designed	Date
M.Pereira	N.Heazlewood	FEB 2024
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	N.T.S

Drawing number: 22K93_D3_C000
Revision: 01



LEGEND

- EXISTING BOUNDARY
- PROPOSED JUNCTION PITS
- PROPOSED SURFACE INLET PITS
- A-1 — LINE LETTER / PIT NUMBER — PROPOSED PIT TAG
- 40.125 / Ø425RCP / 20.450m / 1.5% / 39.818 — STORMWATER UPSTREAM INVERT RL. / STORMWATER PIPE DIAMETER & CLASS / STORMWATER PIPE LENGTH / STORMWATER PIPE GRADE / STORMWATER DOWNSTREAM INVERT RL.
- PROPOSED GRATED DRAIN
- PROPOSED STORMWATER PIPE
- 162.60 — EXISTING CONTOURS
- RL160.00 — PROPOSED SPOT LEVEL
- T — EXISTING TELSTRA LINES
- W — EXISTING WATER LINE
- E — EXISTING ELECTRICAL MAINS LINE
- G — EXISTING GAS LINE
- S — EXISTING SEWER LINE
- EXISTING STORMWATER PITS
- 1% — PROPOSED FALL
- RW — PROPOSED RETAINING WALL
- EX RW — EXISTING RETAINING WALL
- STRUCTURAL ROOT ZONE (SRZ) OF EXISTING TREE
- TREE PROTECTION ZONE (TPZ)

0 5 10 15 20 25m

5 4 3 2 1

SCALE 1:250

DETAIL PLAN - LOWER GROUND

SCALE: 1:250

FOR DA ONLY

SURVEY INFORMATION

SURVEYED BY: SDG

DATUM: AHD

ORIGIN OF LEVELS:

SSM 85414

RL163393

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
03	ISSUED FOR DA ONLY	NH	NH	23.10.2024
02	ISSUED FOR DA ONLY	NH	NH	18.10.2024
01	ISSUED FOR DA ONLY	MB	NH	17.10.2024

Client: OPAL HEALTHCARE

Architect: GROUP GSA

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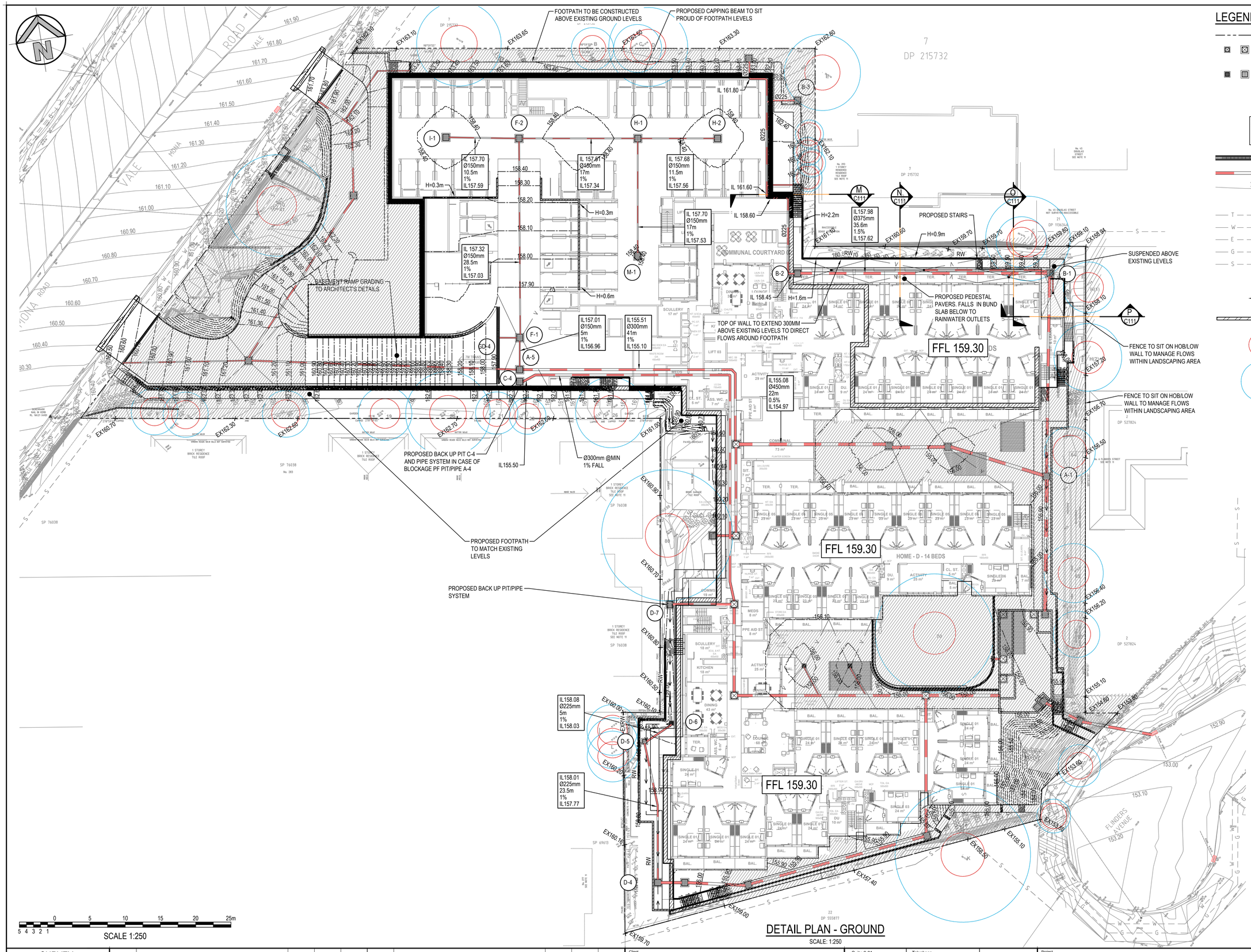
Project: PROPOSED HEALTHCARE DEVELOPMENT
285-289 MONA VALE ROAD & 1 FLINDERS AVENUE, ST IVES, NSW

Title: DETAIL PLAN - LOWER GROUND
SHEET 1 OF 3

Drawn	Designed	Date
A.Fernandes	N.Heazlewood	SEP 2024
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	1:250

Drawing number: 22K93_D3_C101

Revision: 03



DETAIL PLAN - GROUND

SCALE: 1:250

LEGEND

- EXISTING BOUNDARY
- PROPOSED JUNCTION PITS
- PROPOSED SURFACE INLET PITS
- A-1 — LINE LETTER / PIT NUMBER — PROPOSED PIT TAG
- 40.125 / Ø425RCP / 20.450m / 1.5% / 39.818 — STORMWATER UPSTREAM INVERT RL. / STORMWATER PIPE DIAMETER & CLASS / STORMWATER PIPE LENGTH / STORMWATER PIPE GRADE / STORMWATER DOWNSTREAM INVERT RL.
- PROPOSED GRATED DRAIN
- PROPOSED STORMWATER PIPE
- 162.60 — EXISTING CONTOURS
- RL160.00 — PROPOSED SPOT LEVEL
- T — EXISTING TELSTRA LINES
- W — EXISTING WATER LINE
- E — EXISTING ELECTRICAL MAINS LINE
- G — EXISTING GAS LINE
- S — EXISTING SEWER LINE
- EXISTING STORMWATER PITS
- 1% — PROPOSED FALL
- RW — PROPOSED RETAINING WALL
- STRUCTURAL ROOT ZONE (SRZ) OF EXISTING TREE
- TREE PROTECTION ZONE (TPZ)

FOR DA ONLY

SURVEY INFORMATION

SURVEYED BY: SDG

DATUM: AHD

ORIGIN OF LEVELS:
SSM 85414
RL163393

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
03	ISSUED FOR DA ONLY	NH	NH	23.10.2024
02	ISSUED FOR DA ONLY	NH	NH	18.10.2024
01	ISSUED FOR DA ONLY	MB	NH	17.10.2024

Client: OPAL HEALTHCARE

Architect: GROUP GSA

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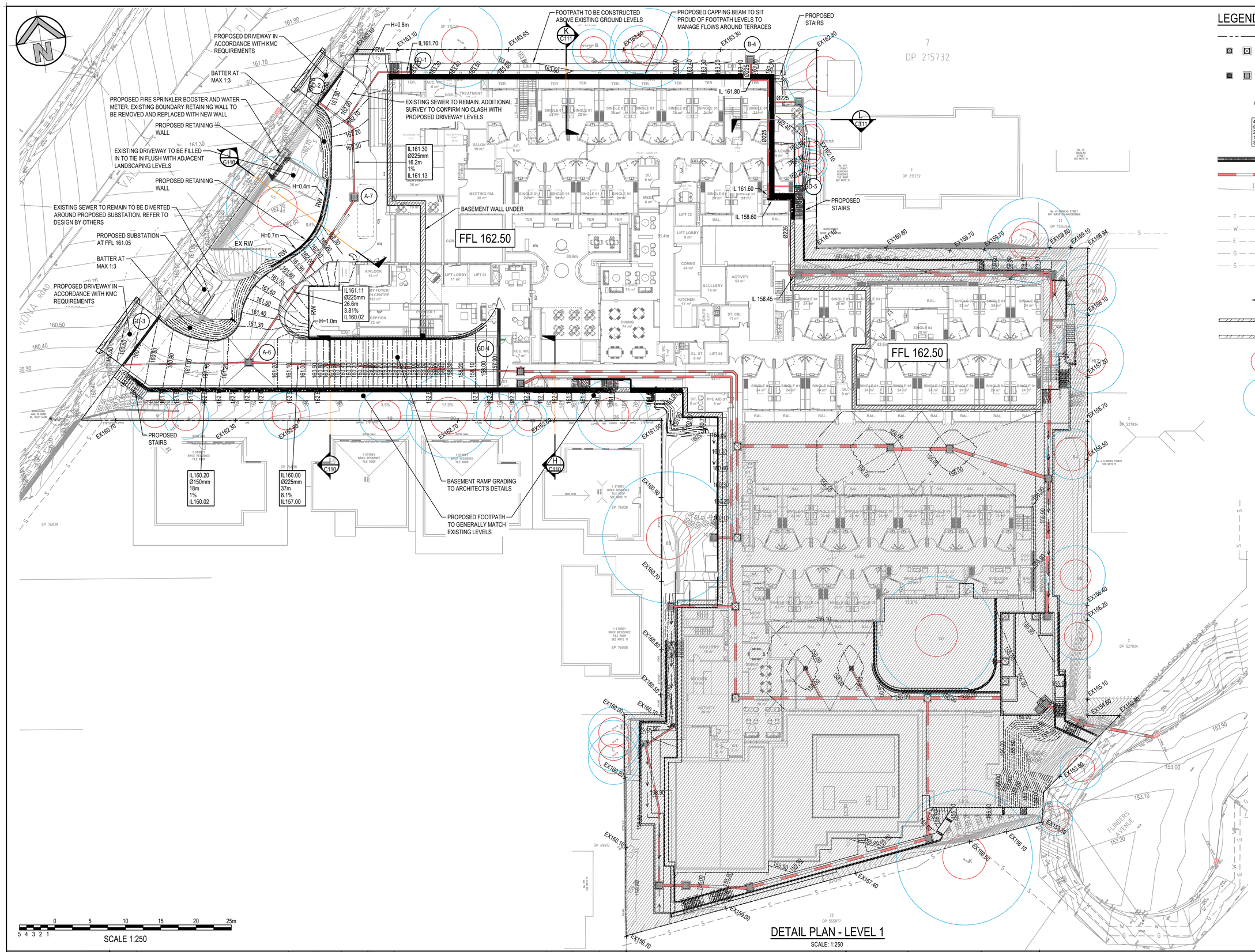
Project: PROPOSED HEALTHCARE DEVELOPMENT
285-289 MONA VALE ROAD & 1 FLINDERS AVENUE, ST IVES, NSW

Title: DETAIL PLAN - GROUND
SHEET 2 OF 3

Drawn	Designed	Date
A.Fernandes	N.Heazlewood	SEP 2024
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	1:250

Drawing number: 22K93_D3_C102

Revision: 03



LEGEND

- EXISTING BOUNDARY
- PROPOSED JUNCTION PITS
- PROPOSED SURFACE INLET PITS
- PROPOSED PIT TAG (LINE LETTER / PIT NUMBER)
- STORMWATER UPSTREAM INVERT RL. (40.125)
- STORMWATER PIPE DIAMETER & CLASS (Ø425RCP)
- STORMWATER PIPE LENGTH (20.450m)
- STORMWATER PIPE GRADE (1.5%)
- STORMWATER DOWNSTREAM INVERT RL. (39.818)
- PROPOSED GRATED DRAIN
- PROPOSED STORMWATER PIPE
- EXISTING CONTOURS (162.60)
- PROPOSED SPOT LEVEL (RL160.00)
- EXISTING TELSTRA LINES
- EXISTING WATER LINE
- EXISTING ELECTRICAL MAINS LINE
- EXISTING GAS LINE
- EXISTING SEWER LINE
- EXISTING STORMWATER PITS
- PROPOSED FALL (1%)
- PROPOSED RETAINING WALL (RW)
- EXISTING RETAINING WALL (EX RW)
- STRUCTURAL ROOT ZONE (SRZ) OF EXISTING TREE
- TREE PROTECTION ZONE (TPZ)

0 5 10 15 20 25m

SCALE 1:250

DETAIL PLAN - LEVEL 1

SCALE: 1:250

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY: SDG
DATUM: AHD
ORIGIN OF LEVELS:
SSM 85414
RL163393

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
03	ISSUED FOR DA ONLY	NH	NH	23.10.2024
02	ISSUED FOR DA ONLY	NH	NH	18.10.2024
01	ISSUED FOR DA ONLY	NH	NH	17.10.2024

Client: OPAL HEALTHCARE

Architect: GROUP GSA

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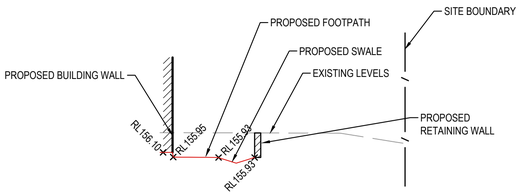
Project: PROPOSED HEALTHCARE DEVELOPMENT
285-289 MONA VALE ROAD & 1 FLINDERS AVENUE, ST IVES, NSW

Title: DETAIL PLAN - LEVEL 1
SHEET 3 OF 3

Drawn	Designed	Date
A.Fernandes	N.Heazlewood	SEP 2024
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	1:250

Drawing number: 22K93_D3_C103
Revision: 03



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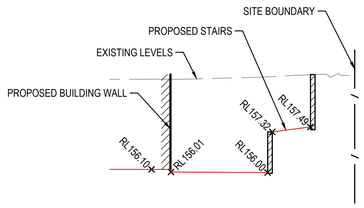

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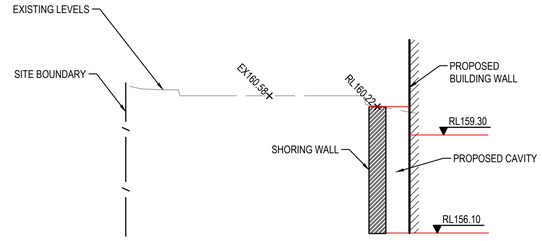

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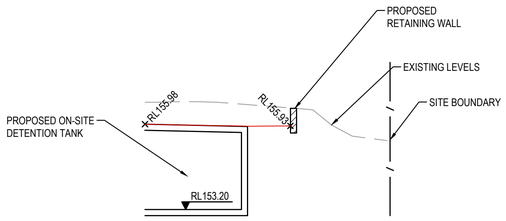

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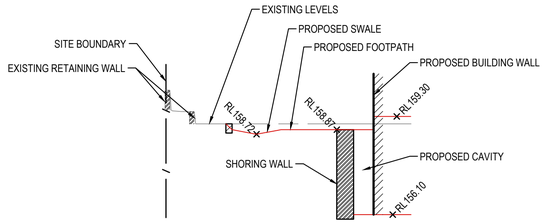

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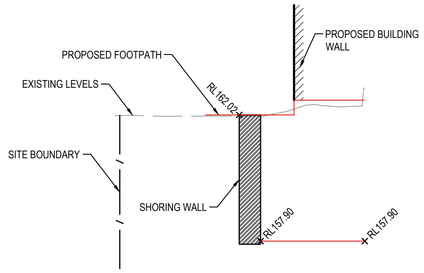

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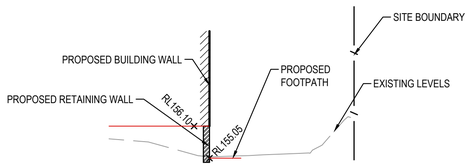

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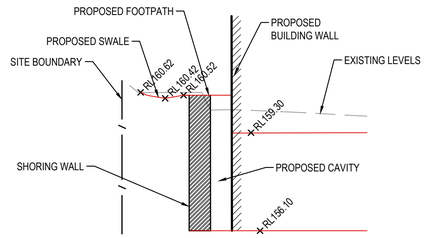

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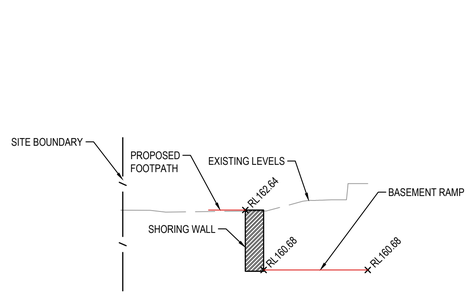

SECTION I C103
SCALE: 1:100

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

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY: SDG
DATUM: AHD
ORIGIN OF LEVELS:
SSM 85414
RL163393

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
02	ISSUED FOR DA ONLY	NH	NH	18.10.2024					
01	ISSUED FOR DA ONLY	IK	NH	17.10.2024					

Client
OPAL HEALTHCARE

Architect
GROUP GSA

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DRAWING TO BE PRINTED IN COLOUR

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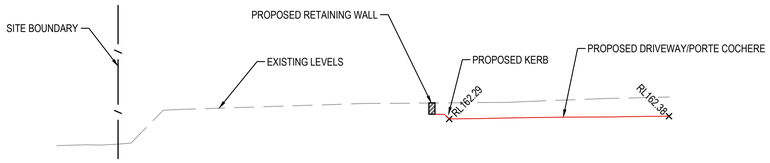
Project
PROPOSED HEALTHCARE DEVELOPMENT
285-289 MONA VALE ROAD & 1 FLINDERS AVENUE, ST IVES, NSW

Title
TYPICAL SECTIONS
SHEET 1 OF 2

Drawn	Designed	Date
M.Pereira	N.Heazlewood	FEB 2024
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	1:100

Drawing number 22K93_D3_C110
Revision 02



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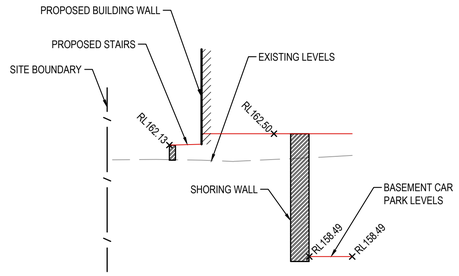

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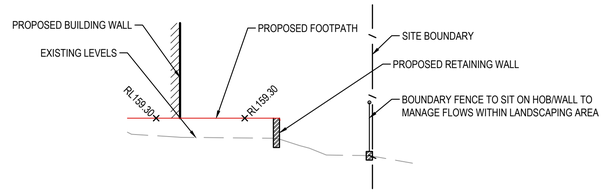

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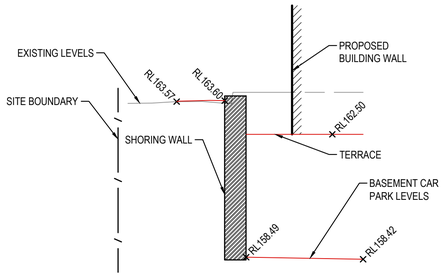

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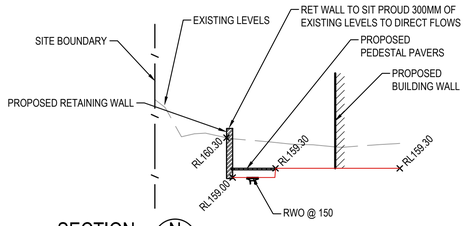

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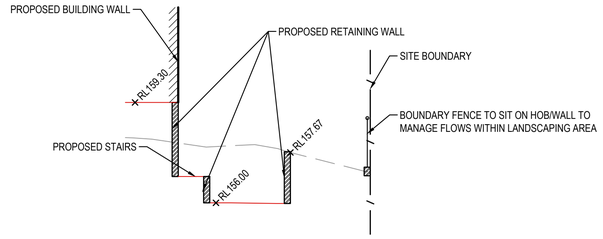

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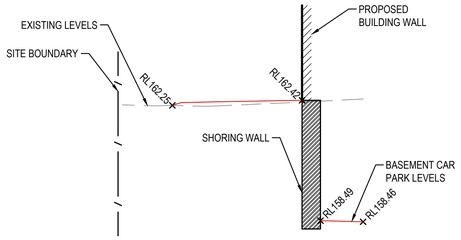

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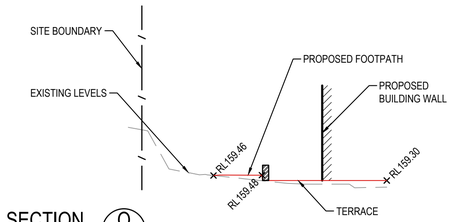

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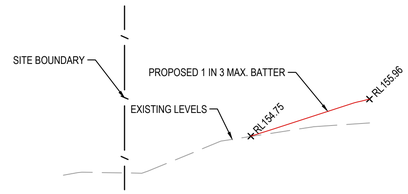

SECTION R C101
SCALE: 1:100

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

FOR DA ONLY

SURVEY INFORMATION
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DATUM: AHD
ORIGIN OF LEVELS:
SSM 85414
RL163393

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	IK	NH	17.10.2024					

Client
OPAL HEALTHCARE

Architect
GROUP GSA

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DRAWING TO BE PRINTED IN COLOUR

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Project
PROPOSED HEALTHCARE DEVELOPMENT
285-289 MONA VALE ROAD & 1 FLINDERS AVENUE, ST IVES, NSW

Title
TYPICAL SECTIONS
SHEET 2 OF 2

Drawn	Designed	Date
M.Pereira	N.Heazlewood	FEB 2024
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	1:100

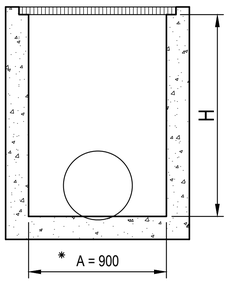
Drawing number 22K93_D3_C111
Revision 01

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.

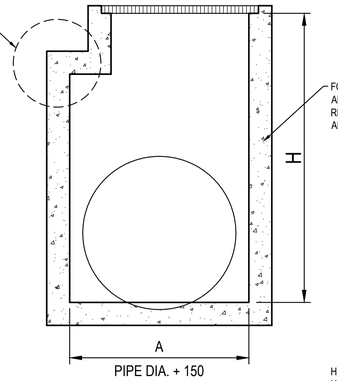
FOR B = 600mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 225mm
FOR B = 900mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 375mm
FOR B = 1200mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 600mm
FOR B = 1500mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 825mm
FOR B = 1900mm - MAX. SIDE ENTRY PIPE AT 45° SKEW = 1050mm



SECTION
NTS

*A = 600 FOR PIPES UP TO 375 DIA.

1 PIT CHAMBER DIMENSIONS FOR PIPES UP TO 600 DIA.

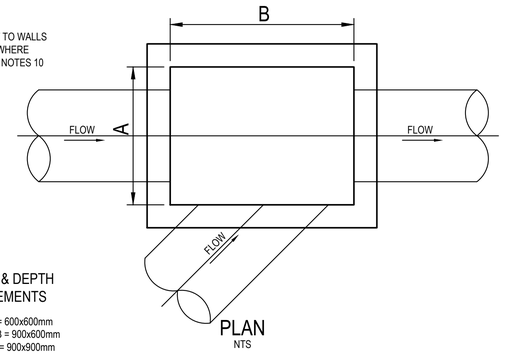


PIPE DIA. + 150
SECTION
NTS

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



PLAN
NTS

3 PIT CHAMBER FOR SIDE ENTRY ON SKEW

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

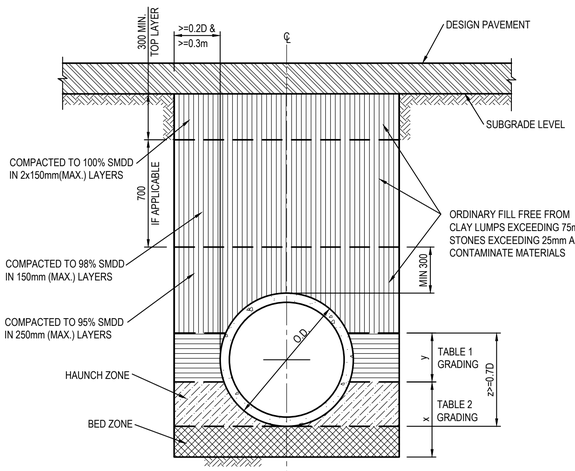
TABLE 2	
SIEVE SIZE (MM)	WEIGHT PASISNG (%)
19.0	100
2.36	100 TO 50
0.60	90 TO 20
0.30	60 TO 10
0.15	25 TO 0
0.075	10 TO 0

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

NOTE:
1. ALL INLET PITS TO BE FITTED WITH OCEANGUARD PIT BASKET

PIT LID SCHEDULE

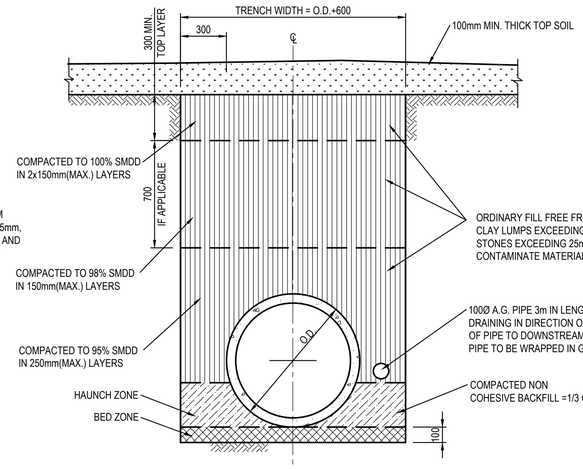
PIT/STRUCTURE NUMBER	DESCRIPTION
EX-1	EXISTING PIT TO REMAIN
L-1, D-1, D-2, D-3, D-4, D-7, A-1, A-3, E-2, A-2, B-1, B-2	PROPOSED INLET PIT WITH 900x900 HINGED LIGHT DUTY GRATED LID INTEL PIT CLASS "B" IN ACCORDANCE WITH KU-RING-GAI COUNCIL'S REQUIREMENT.
D-5, D-6, J-1, J-2, B-3, B-4	PROPOSED INLET PIT WITH 600x600 HINGED LIGHT DUTY GRATED LID INTEL PIT CLASS "B" IN ACCORDANCE WITH KU-RING-GAI COUNCIL'S REQUIREMENT.
C-1, C-2, C-3, E-1, A-4	PROPOSED JUNCTION PIT WITH 900x900 HEAVY DUTY JUNCTION PIT SEALED LID CLASS "D", IN ACCORDANCE WITH ACCORDANCE WITH KU-RING-GAI COUNCIL'S REQUIREMENT.
GD-5, GD-1	PROPOSED 300mm WIDE GRATED DRAIN WITH HEELPROOF GRATE IN ACCORDANCE WITH KU-RING-GAI COUNCIL'S REQUIREMENT.
GD-2, GD-3, GD-4	PROPOSED 200mm WIDE HEAVY DUTY GRATED DRAIN IN ACCORDANCE WITH KU-RING-GAI COUNCIL'S REQUIREMENT.
C-4, A-5, F-1, F-2, F-3, H-1, A-6, A-7	PROPOSED INLET PIT WITH 900x900 HINGED HEAVY DUTY GRATED LID INTEL PIT CLASS "D" IN ACCORDANCE WITH KU-RING-GAI COUNCIL'S REQUIREMENT.
H-2, I-1, M-1	PROPOSED INLET PIT WITH 600x600 HINGED HEAVY DUTY GRATED LID WITH HEELPROOF GRATE INLET PIT CLASS "D" IN ACCORDANCE WITH KU-RING-GAI COUNCIL'S REQUIREMENT.
G-1, G-6, G-7	PROPOSED OSD ACCESS LID WITH 900x900 HINGED LIGHT DUTY GRATED LID CLASS "C" IN ACCORDANCE WITH KU-RING-GAI COUNCIL'S REQUIREMENT.
G-2, G-3, G-4, G-5	PROPOSED OSD ACCESS LID WITH 900x900 HINGED LIGHT DUTY SEALED LID CLASS "C" IN ACCORDANCE WITH KU-RING-GAI COUNCIL'S REQUIREMENT.



PIPE TRENCH INSTALLATION BENEATH PAVEMENT

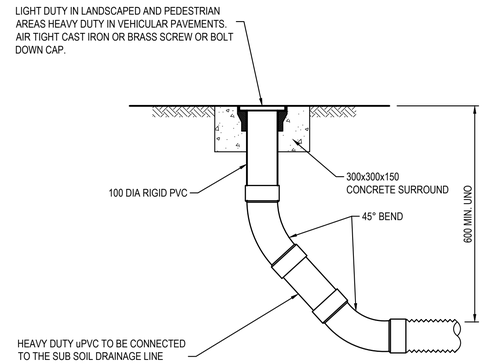
(HS SUPPORT TO BE USED UNDER ROADWAY)
SCALE 1:20

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



PIPE TRENCH INSTALLATION IN LANDSCAPE AREAS

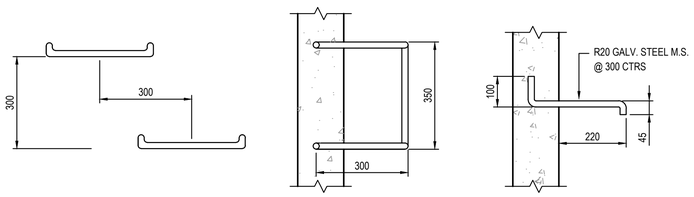
(H1 & H2 SUPPORT)
SCALE 1:20



FLUSHING POINT (FP)

SCALE 1:10

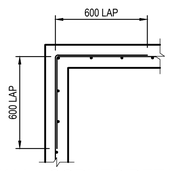
NOTE: SLOTTED RIGID PVC PIPE AND FITTINGS MAY BE USED



ELEVATION PLAN SECTION

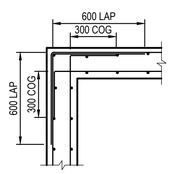
TYPICAL STEP IRON DETAIL

SCALE 1:10



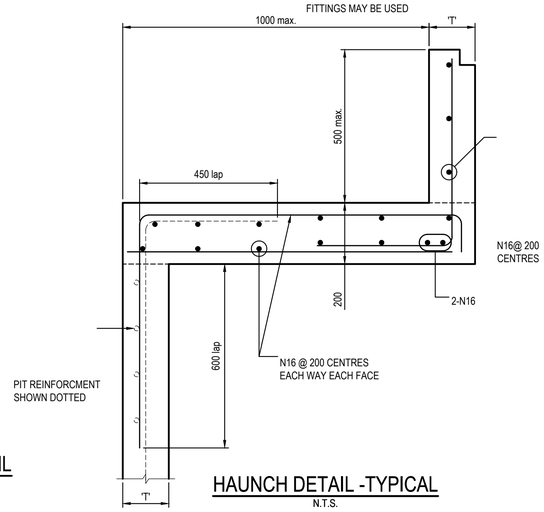
150 WALL - CORNER DETAIL

SCALE 1:20



200 WALL - CORNER DETAIL

SCALE 1:20



HAUNCH DETAIL -TYPICAL

N.T.S.

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.

FOR DA ONLY

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

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

SURVEY INFORMATION
SURVEYED BY: SDG
DATUM: AHD
ORIGIN OF LEVELS:
SSM 85414
RL163393

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	MB	NH	17.10.2024					

Client
OPAL HEALTHCARE

Architect
GROUP GSA

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DRAWING TO BE PRINTED IN COLOUR

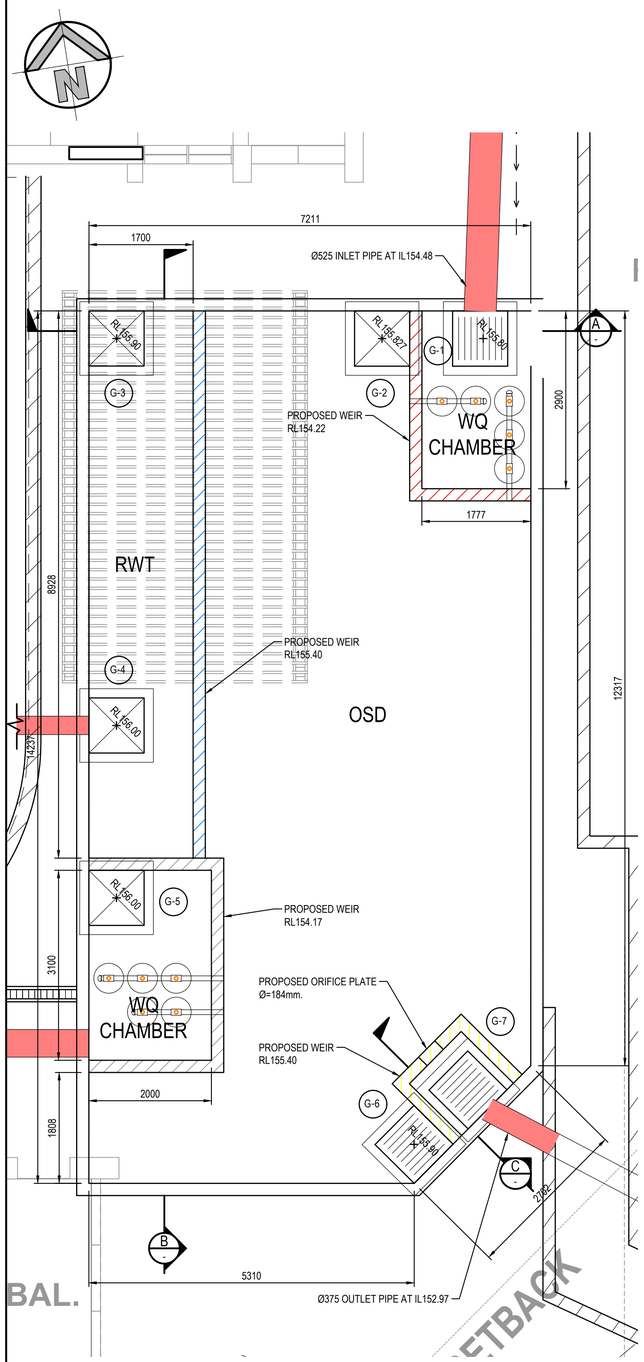
henry&hymas

Project
PROPOSED HEALTHCARE DEVELOPMENT
285-289 MONA VALE ROAD & 1 FLINDERS AVENUE, ST IVES, NSW

Title
STORMWATER MISCELLANEOUS DETAILS AND PIT LID SCHEDULE

Drawn	Designed	Date
M.Pereira	N.Heazlewood	FEB 2024
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	1:100

Drawing number 22K93_D3_C200
Revision 01



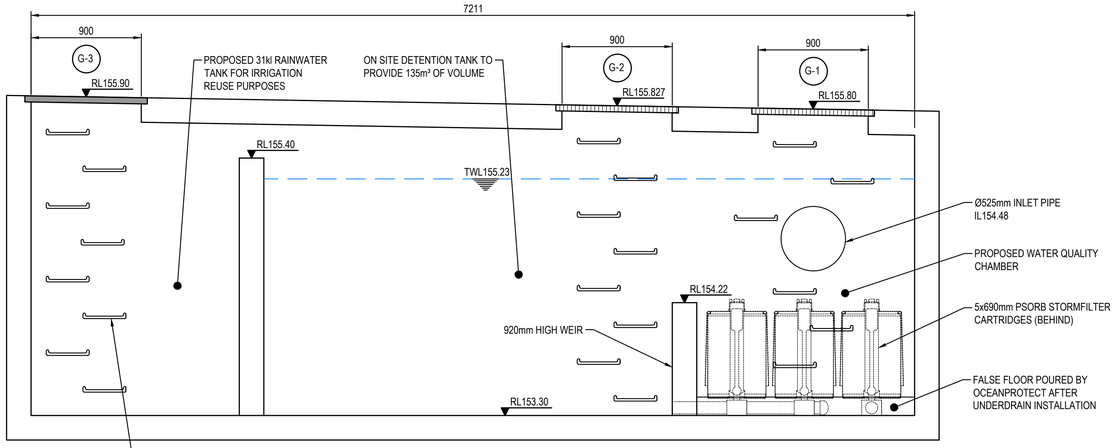
OSD PLAN

SCALE: 1:50

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

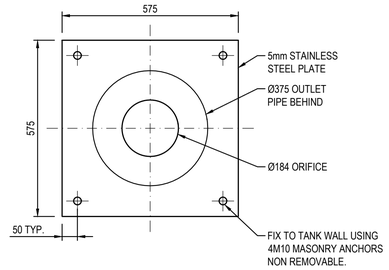
0 500 1000 1500 2000 2500mm
500 300 100
SCALE 1:25

0 1000 2000 3000 4000 5000mm
1000 600 200
SCALE 1:50



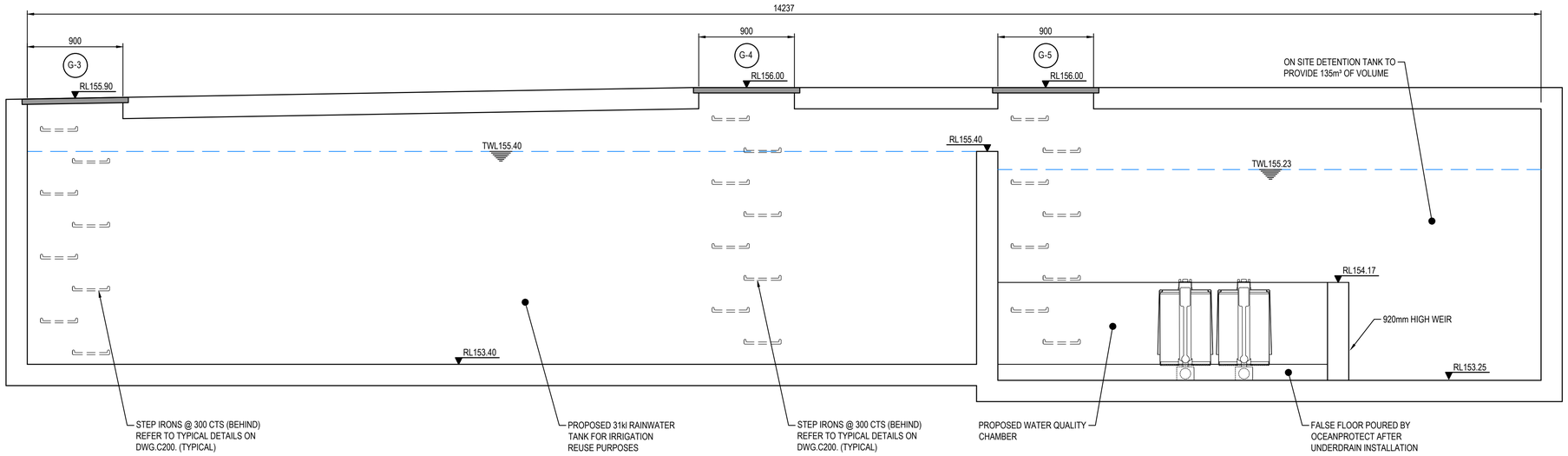
SECTION A

SCALE: 1:25



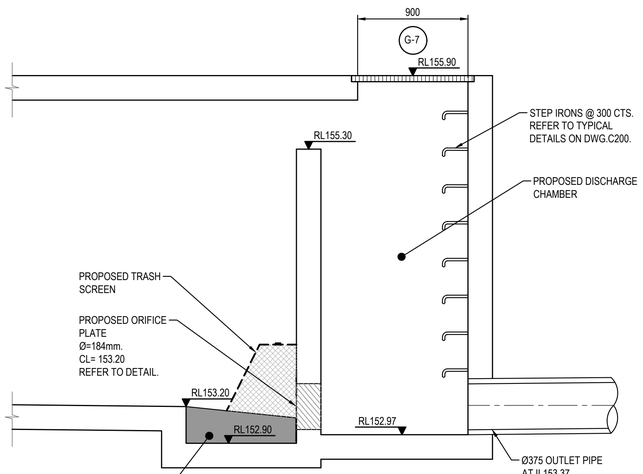
ORIFICE PLATE DETAIL

SCALE 1:10



SECTION B

SCALE: 1:25



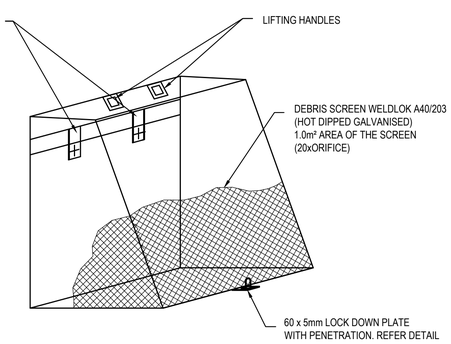
SECTION C

SCALE: 1:25

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.

SCREEN TYPE WELDLOK A40/203 IS RECOMENDED FOR ORIFICES LARGER THAN 150mm AND SCREEN AREA 20 x THE ORIFICE AREA FOR THAT TYPE OF SCREEN - REFER UPRCT SECTION 4-13

MAXIMESH RH3030 IS RECOMMENDED FOR ORIFICES LESS THAN 150mm IN DIAMETER AND SCREEN AREA 50xTHE ORIFICE AREA REFER COUNCIL CATCHMENT TRUST HANDBOOK.



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.

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY: SDG
DATUM: AHD
ORIGIN OF LEVELS:
SSM 85414
RL163393

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	MB	NH	17.10.2024					

Client
OPAL HEALTHCARE

Architect
GROUP GSA

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DRAWING TO BE PRINTED IN COLOUR

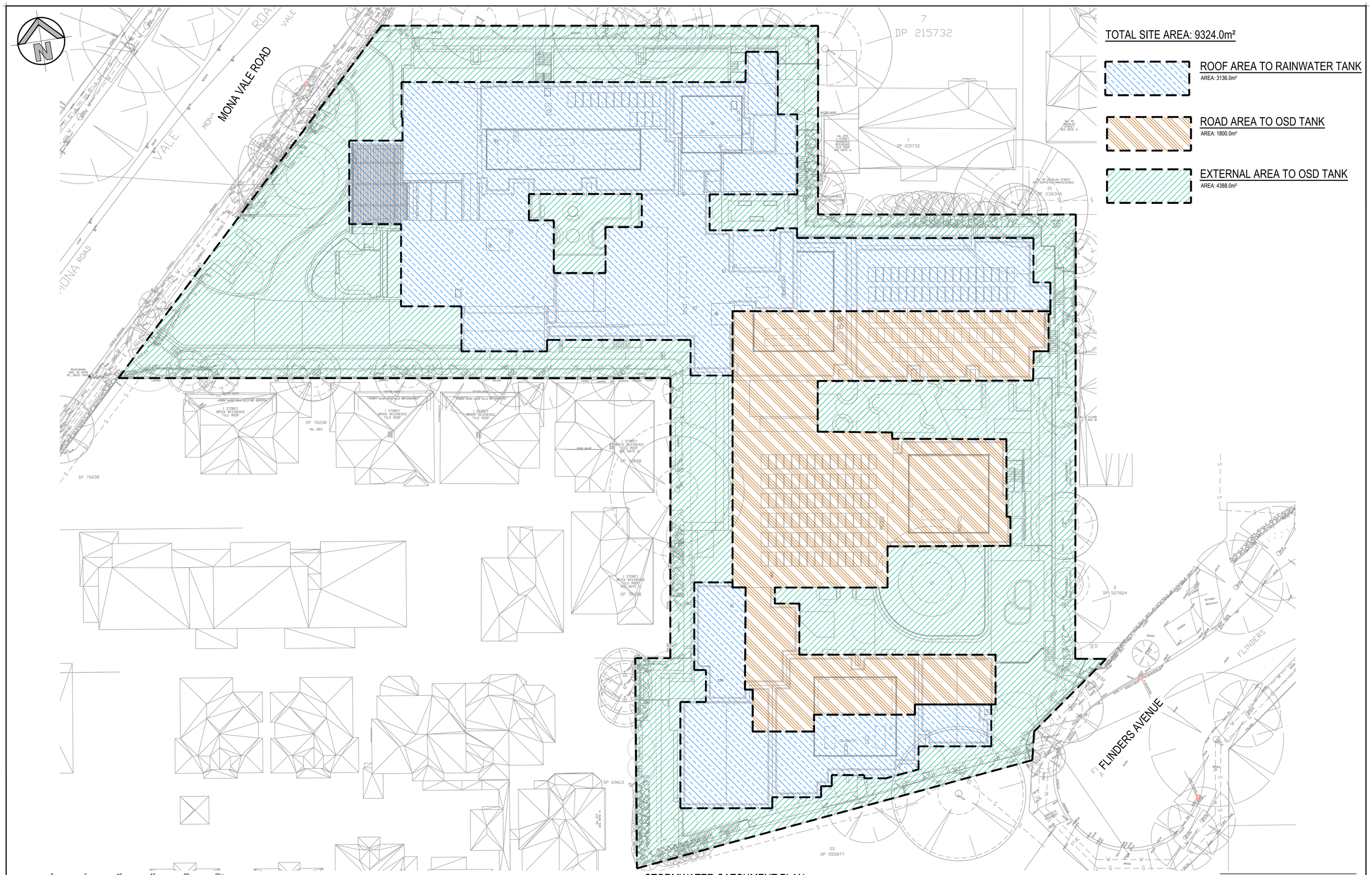
henry&hymas

Project
PROPOSED HEALTHCARE DEVELOPMENT
285-289 MONA VALE ROAD & 1 FLINDERS AVENUE, ST IVES, NSW

Title
OSD TANK PLAN, SECTIONS AND DETAILS

Drawn	Designed	Date
M.Pereira	N.Heazlewood	FEB 2024
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	AS NOTED

Drawing number 22K93_D3_C201
Revision 01



STORMWATER CATCHMENT PLAN

SCALE: 1:250

FOR DA ONLY

SURVEY INFORMATION										
SURVEYED BY: SDG DATUM: AHD ORIGIN OF LEVELS: SSM 85414 RL163393	01	ISSUED FOR DA ONLY	MB	NH	17.10.2024					
	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE

Client
OPAL HEALTHCARE

Architect
GROUP GSA

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DRAWING TO BE PRINTED IN COLOUR

henry&hymas

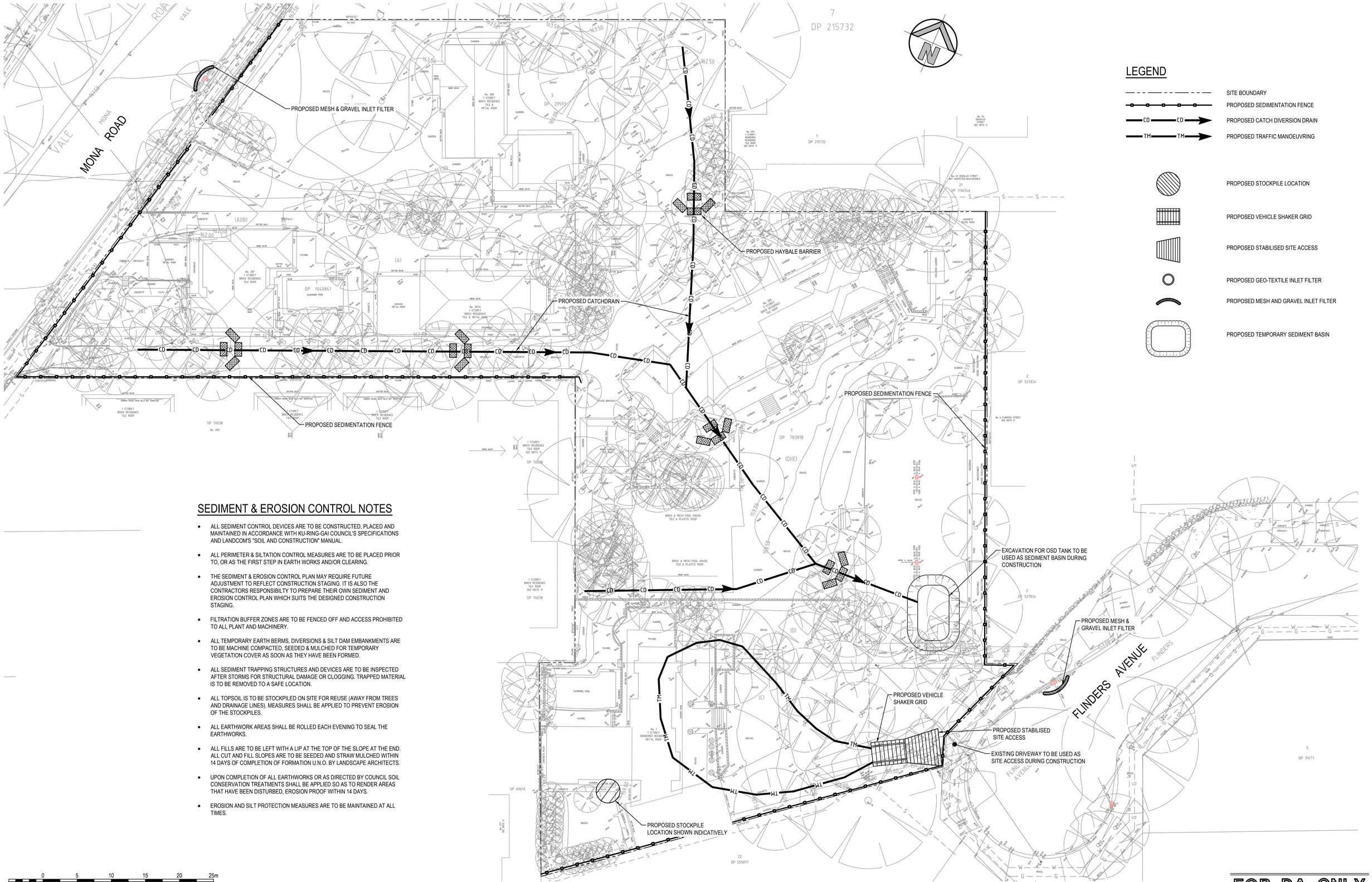
Project
PROPOSED HEALTHCARE DEVELOPMENT
285-289 MONA VALE ROAD & 1 FLINDERS AVENUE, ST IVES, NSW

Title
STORMWATER CATCHMENT PLAN

Drawn	Designed	Date
M.Pereira	N.Heazlewood	FEB 2024
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	1:250

Drawing number: 22K93_D3_C250

Revision: 01



LEGEND

- SITE BOUNDARY
- PROPOSED SEDIMENTATION FENCE
- CD — CD — PROPOSED CATCH DIVERSION DRAIN
- TM — TM — PROPOSED TRAFFIC MANOEUVRING
- PROPOSED STOCKPILE LOCATION
- PROPOSED VEHICLE SHAKER GRID
- PROPOSED STABILISED SITE ACCESS
- PROPOSED GEO-TEXTILE INLET FILTER
- PROPOSED MESH AND GRAVEL INLET FILTER
- PROPOSED TEMPORARY SEDIMENT BASIN

SEDIMENT & EROSION CONTROL NOTES

- ALL SEDIMENT CONTROL DEVICES ARE TO BE CONSTRUCTED, PLACED AND MAINTAINED IN ACCORDANCE WITH KU-RING-GAI COUNCIL'S 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 5 10 15 20 25m

5 4 3 2 1

SCALE 1:250

SEDIMENT AND EROSION CONTROL PLAN

SCALE: 1:250

FOR DA ONLY

SURVEY INFORMATION

SURVEYED BY: SDG

DATUM: AHD

ORIGIN OF LEVELS:

SSM 85414

RL163393

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	MB	NH	15.10.2024					

Client: OPAL HEALTHCARE

Architect: GROUP GSA

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henry&hymas

DRAWING TO BE PRINTED IN COLOUR

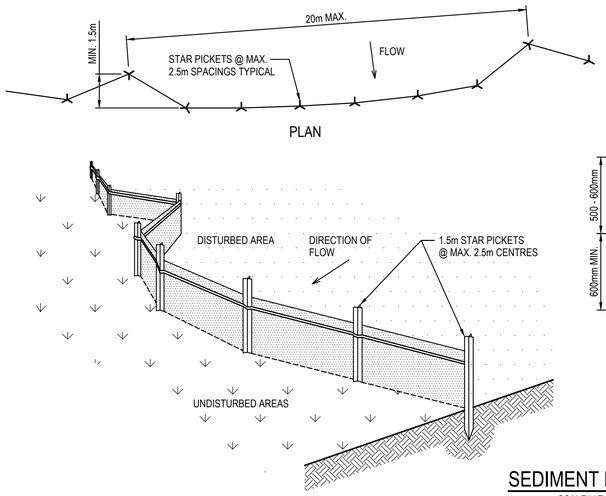
Project: PROPOSED HEALTHCARE DEVELOPMENT
285-289 MONA VALE ROAD & 1 FLINDERS AVENUE, ST IVES, NSW

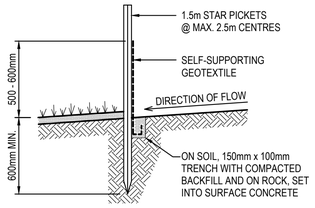
Title: SEDIMENT AND EROSION CONTROL PLAN

Drawn	Designed	Date
M.Pereira	N.Heazlewood	FEB 2024
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	1:250

Drawing number: 22K93_D3_SE01

Revision: 01





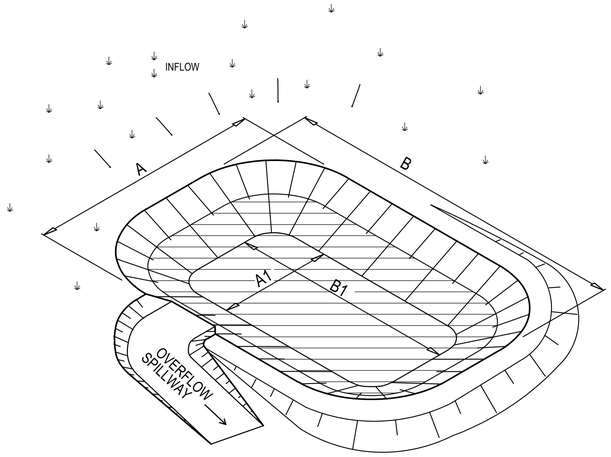
SECTION DETAIL

SEDIMENT FENCE

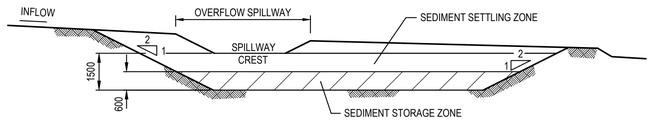
SCALE N.T.S.

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. 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. 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. 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.



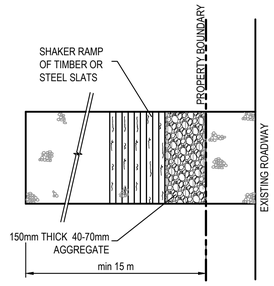
PERSPECTIVE VIEW



TYPICAL SECTION

TYPE 'D' & 'F' SEDIMENTATION BASIN

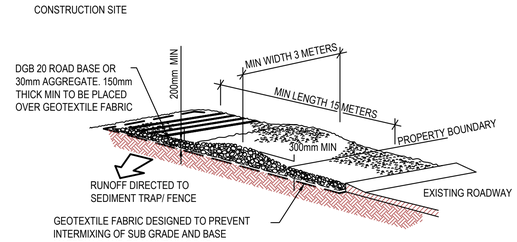
N.T.S.



PLAN

STABILISED SITE ACCESS WITH SHAKER RAMP

N.T.S.



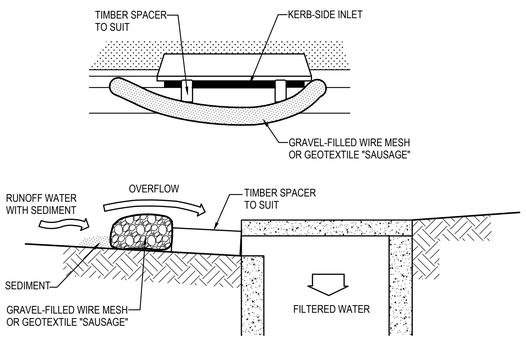
GEOTEXTILE MAY BE A WOVEN OR NEEDLE PUNCHED PRODUCT WITH A MINIMUM CBR BURST STRENGTH (AS3706.4-90) OF 2500 N

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.

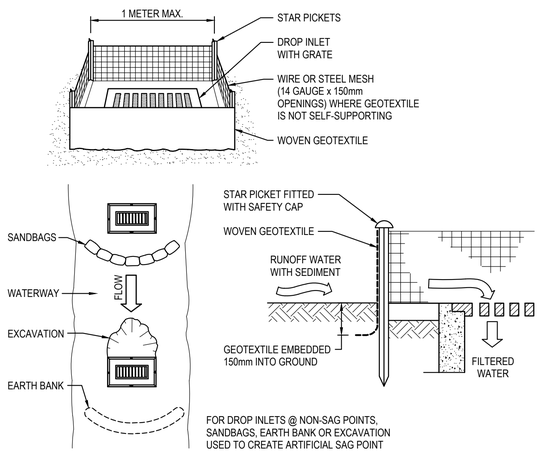


MESH & GRAVEL INLET FILTER CONSTRUCTION NOTES:

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.

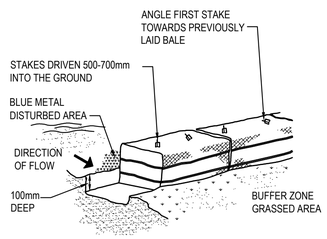


GEOTEXTILE INLET FILTER CONSTRUCTION NOTES:

1. FABRICATE A SEDIMENT BARRIER MADE FROM GEOTEXTILE.
2. PICKET SPACING TO BE MAXIMUM 1.0m.
3. IN WATERWAYS, ARTIFICIAL SAG POINTS CAN BE CREATED WITH SANDBAGS OR EARTH BANKS AS SHOWN IN THE DRAWING.
4. DO NOT COVER THE INLET WITH GEOTEXTILES UNLESS THE DESIGN IS ADEQUATE TO ALLOW FOR ALL WATERS TO BYPASS IT.

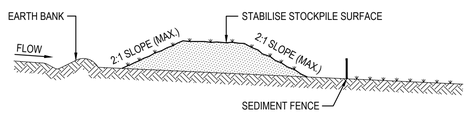
GEOTEXTILE INLET FILTER

SCALE N.T.S.



HAYBALE BARRIERS

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.

FOR DA ONLY

SURVEY INFORMATION
SURVEYED BY: SDG
DATUM: AHD
ORIGIN OF LEVELS:
SSM 85414
RL163393

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE	REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
01	ISSUED FOR DA ONLY	MB	NH	15.10.2024					

Client: OPAL HEALTHCARE

Architect: GROUP GSA

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DRAWING TO BE PRINTED IN COLOUR

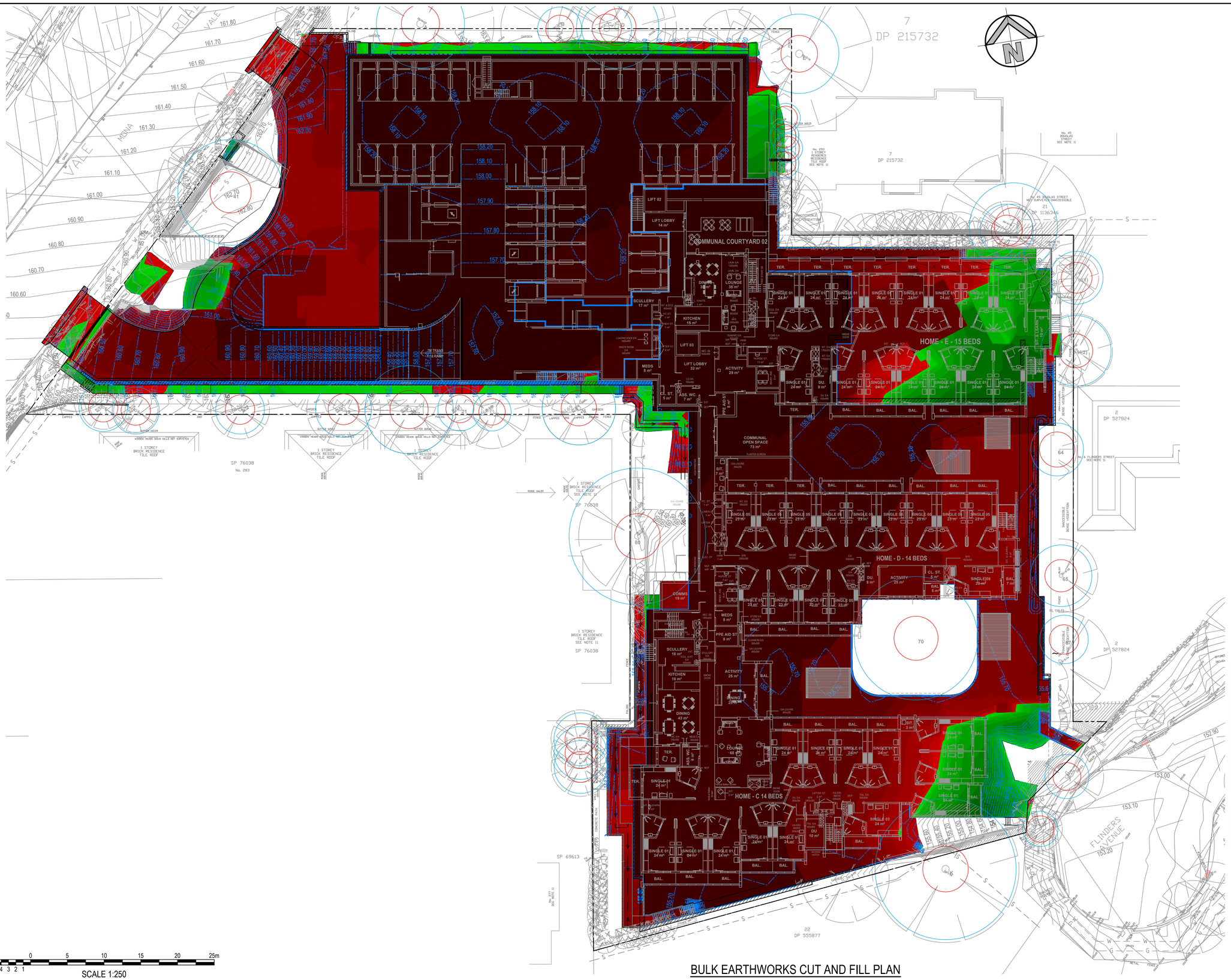
henry&hymas

Project: PROPOSED HEALTHCARE DEVELOPMENT
285-289 MONA VALE ROAD & 1 FLINDERS AVENUE, ST IVES, NSW

Title: SEDIMENT AND EROSION CONTROL DETAILS

Drawn	Designed	Date
M.Pereira	N.Heazlewood	FEB 2024
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	N.T.S.

Drawing number: 22K93_D3_SE02
Revision: 01



LEGEND

— — — — — —	EXISTING BOUNDARY
148.60	EXISTING CONTOURS
154.60	CONTOURS BE

LEGEND

DEPTH OF CUT & FILL RANGE

LOWER VALUE		UPPER VALUE		COLOUR
-8.00	to	-4.00	m	
-4.00	to	-2.00	m	
-2.00	to	-1.00	m	
-1.00	to	-0.80	m	
-0.80	to	-0.60	m	
-0.60	to	-0.40	m	
-0.40	to	-0.20	m	
-0.20	to	-0.10	m	
-0.10	to	-0.05	m	
-0.05	to	0.00	m	
0.00	to	0.05	m	
0.05	to	0.10	m	
0.10	to	0.20	m	
0.20	to	0.40	m	
0.40	to	0.60	m	
0.60	to	0.80	m	
0.80	to	1.00	m	
1.00	to	2.00	m	
2.00	to	4.00	m	
4.00	to	8.00	m	

BULK EARTHWORKS QUANTITIES

TOTAL AREA (7914m²)		
CUT	20291	m³
FILL	297	m³
EXCESS OF CUT OVER FILL	19994	m³
EXCAVATION FOR RETAINING WALLS NOT INCLUDED IN CALCULATION		
EXCAVATION FOR SERVICE TRENCHES NOT INCLUDED IN CALCULATION		
VOLUME HAS BEEN CALCULATED AFTER STRIPPING THE SITE OF TOPSOIL - ASSUMED TOPSOIL DEPTH 300mm. STRIPPED MATERIAL NOT INCLUDED IN ABOVE QUANTITIES		
SETDOWN FOR EXTERNAL AREAS = 300mm		
SETDOWN FOR BUILDING SLAB = 250mm		

NOTE:

QUANTITIES ARE PRELIMINARY ONLY AND NOT TO BE USED FOR TENDERING PURPOSES.

0 5 10 15 20 25m

5 4 3 2 1

SCALE 1:250

BULK EARTHWORKS CUT AND FILL PLAN

SCALE: 1:250

FOR DA ONLY

SURVEY INFORMATION

SURVEYED BY: SDG

DATUM: AHD

ORIGIN OF LEVELS:

SSM 85414

RL 163393

REVISION	AMENDMENT	DRAWN	DESIGNED	DATE
03	ISSUED FOR DA ONLY	NH	NH	18.10.2024
02	ISSUED FOR DA ONLY	IK	NH	17.10.2024
01	ISSUED FOR DA ONLY	IK	NH	11.10.2024

Client: OPAL HEALTHCARE

Architect: GROUP GSA

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DRAWING TO BE PRINTED IN COLOUR

henry&hymas

Project: PROPOSED HEALTHCARE DEVELOPMENT
285-289 MONA VALE ROAD & 1 FLINDERS AVENUE, ST IVES, NSW

Title: BULK EARTHWORKS CUT AND FILL PLAN

Drawn	Designed	Date
M.Pereira	N.Heazlewood	FEB 2024
Checked	Approved	Scale @A1
N.Heazlewood	A.Francis	1:250

Drawing number: 22K93_D3_BE01

Revision: 03

henry&hymas

APPENDIX B – SURVEY

EASEMENTS

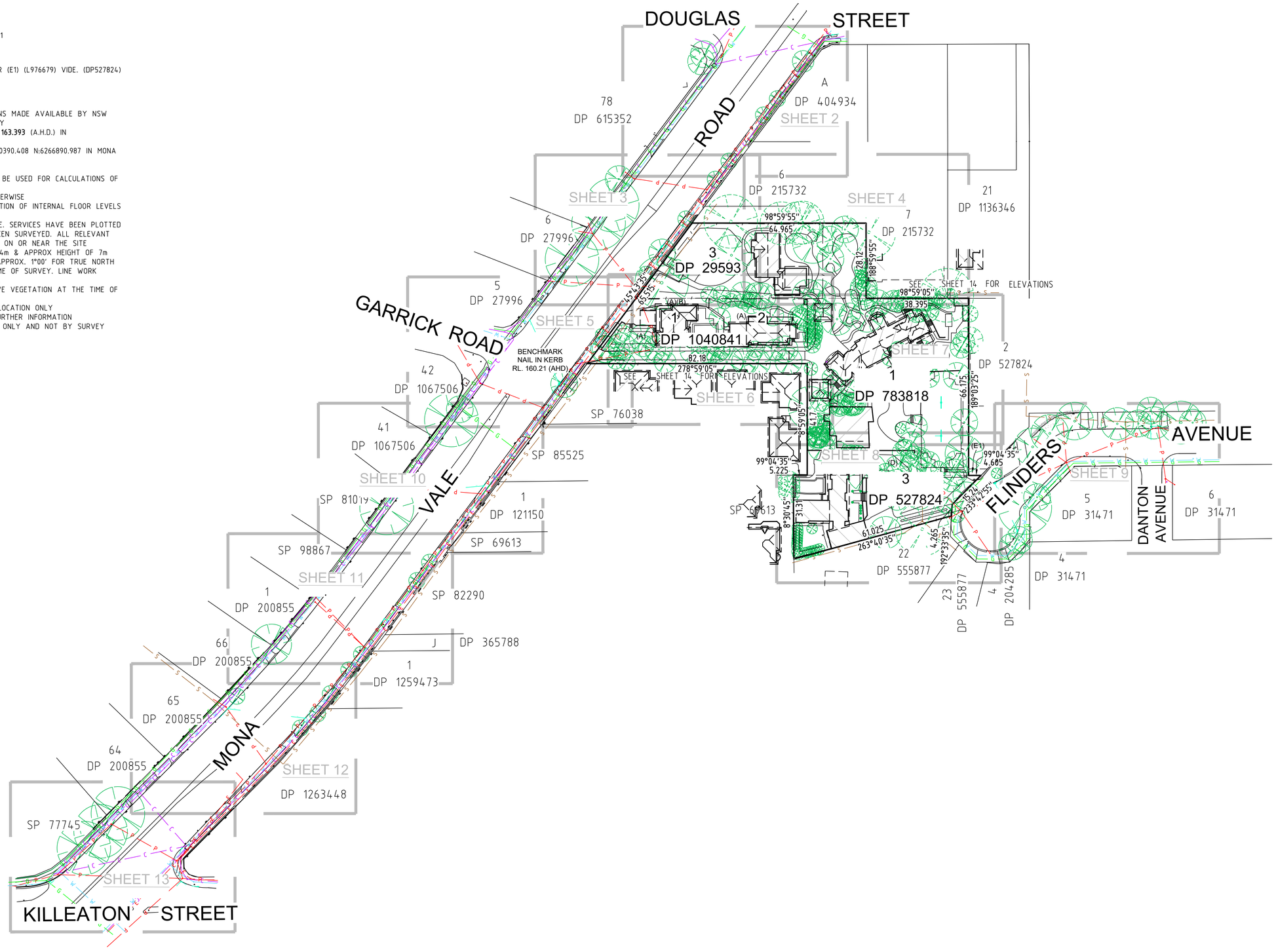
(A) COVENANT (F741185)
(B) EASEMENT FOR SERVICES 2.5 WIDE & VARIABLE (DP1040841)
EASEMENT TO DRAIN WATER 2.5 WIDE & VARIABLE (DP1040841
RIGHT OF CARRIAGEWAY 2.5 WIDE & VARIABLE (DP1040841)
(C) COVENANT (D121906) & (G983834)
(D) COVENANT (F738817)
(E) LAND BENEFITS FROM APPURTENANT EASEMENT TO DRAIN WATER (E1) (L976679) VIDE. (DP527824)

NOTES

1. THE BOUNDARIES HAVE NOT BEEN MARKED ON GROUND
2. ALL AREAS AND DIMENSIONS HAVE BEEN COMPILED FROM PLANS MADE AVAILABLE BY NSW LAND REGISTRY SERVICES AND ARE SUBJECT TO FINAL SURVEY
3. ORIGIN OF LEVELS ON A.H.D. IS TAKEN FROM **SSM 85414** R.L. **163.393** (A.H.D.) IN MONA VALE ROAD
4. ORIGIN OF MGA COORDINATES IS TAKEN FROM SSM 85414 E:330390.408 N:6266890.987 IN MONA VALE ROAD
5. CONTOUR INTERVAL **0.5m**
6. CONTOURS ARE INDICATIVE ONLY. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION
7. KERB LEVELS ARE TO THE TOP OF KERB UNLESS SHOWN OTHERWISE
8. FLOOR LEVELS SHOWN ARE THRESHOLD LEVELS. NO INVESTIGATION OF INTERNAL FLOOR LEVELS HAS BEEN UNDERTAKEN
9. NO INVESTIGATION OF UNDERGROUND SERVICES HAS BEEN MADE. SERVICES HAVE BEEN PLOTTED FROM RELEVANT AUTHORITIES INFORMATION AND HAVE NOT BEEN SURVEYED. ALL RELEVANT AUTHORITIES SHOULD BE NOTIFIED PRIOR TO ANY EXCAVATION ON OR NEAR THE SITE
10. 8/.4/7 DENOTES TREE SPREAD OF 8m, TRUNK DIAMETER OF 0.4m & APPROX HEIGHT OF 7m
11. BEARINGS SHOWN ARE MGA (MAP GRID OF AUSTRALIA) ADD APPROX. 1°00' FOR TRUE NORTH
12. ADJACENT BUILDINGS SHOWN DASHED NOT VISIBLE AT THE TIME OF SURVEY. LINE WORK TAKEN FROM NEARMAP ORTHOIMAGERY IS APPROXIMATE ONLY.
13. VISIBILITY OF ADJOINING LOTS SEVERELY LIMITED BY EXTENSIVE VEGETATION AT THE TIME OF SURVEY
14. TREES WITH SPREADS SHOWN DASHED ARE APPROXIMATE IN LOCATION ONLY
15. SEWER PIT INTERIOR OVERGROWN. CLEAROUT REQUIRED FOR FURTHER INFORMATION
16. RLs SHOWN GREY TO ONE DECIMAL PLACE ARE APPROXIMATE ONLY AND NOT BY SURVEY

LEGEND

BENCH MARK	▲
TELSTRA PIT	TEL
ELECTRIC LIGHT BOLLARD	LB
POWER POLE	PP
ELECTRIC LIGHT POLE	ELP
POWER POLE WITH LIGHT	PPL
ELECTRICITY BOX	EL
GRATED INLET PIT	GIP
KERB INLET PIT	KIP
KERB INLET (NO GRATE)	KI
SEWER INSPECTION POINT	SIP
SEWER MANHOLE	SMH
HYDRANT	HYD
WATER METER	WM
WATER VALVE	WV
STOP VALVE	SV
IRRIGATION CONTROL VALVE	ICV
GAS METER	GM
TOP OF WALL	TW
GATE	
BASE OF KERB	BK
STREET SIGN	SS
PIT WITH CONCRETE LID	CLID
PIT WITH METAL LID	MLID
BOLLARD	BOL
VEHICLE CROSSING	(VC)
PRAM CROSSING	(PC)
GAS (DBYD)	G
COMMUNICATIONS (DBYD)	C
WATER (DBYD)	W
SEWER (DBYD)	S
STORMWATER	SW
ELECTRICITY (OVERHEAD)	P



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G	00/00/00	–	00
F	00/00/00	–	00
E	25/11/22	SELECTED ELEVATIONS ADDED	002

Revision	Date	Description	Reference
D	08/11/22	ELEVATIONS ADDED	002
C	31/08/22	LOT INFORMATION AMENDED	002
B	15/06/22	FURTHER TREES ADDED	002
A	11/05/22	DETAIL ADDED MONA VALE ROAD & FLETCHER AVENUE	002

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THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:
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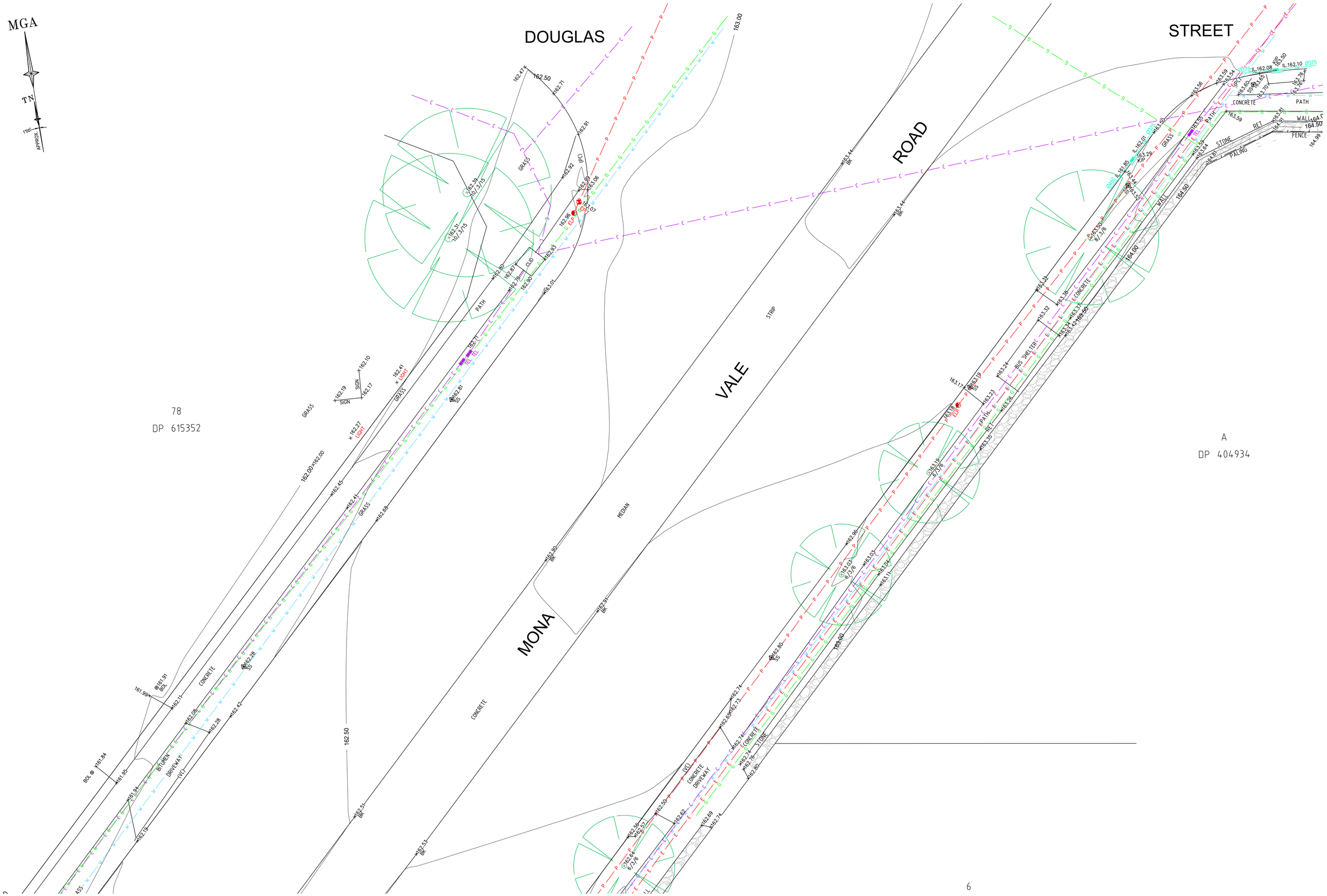
Registered Surveyor NSW

Client OPAL HEALTHCARE

Drawing title
PLAN OF DETAIL AND LEVELS OVER LOT 3 IN DP 29593, LOTS 1 & 2 IN DP 1040841, LOT 1 IN DP 783818 & LOT 3 IN DP 527824, KNOWN AS 285-289 MONA VALE ROAD & 1 FLINDERS AVENUE, ST IVES

datum AHD
site Area 9324m² (CALC)
LGA KU-RING-GAI
reference number 51694 001DT
scale 1:750 @A1
date of survey 11/04/2022
SHEET 1 OF 14



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LGA KU-RING-GAI

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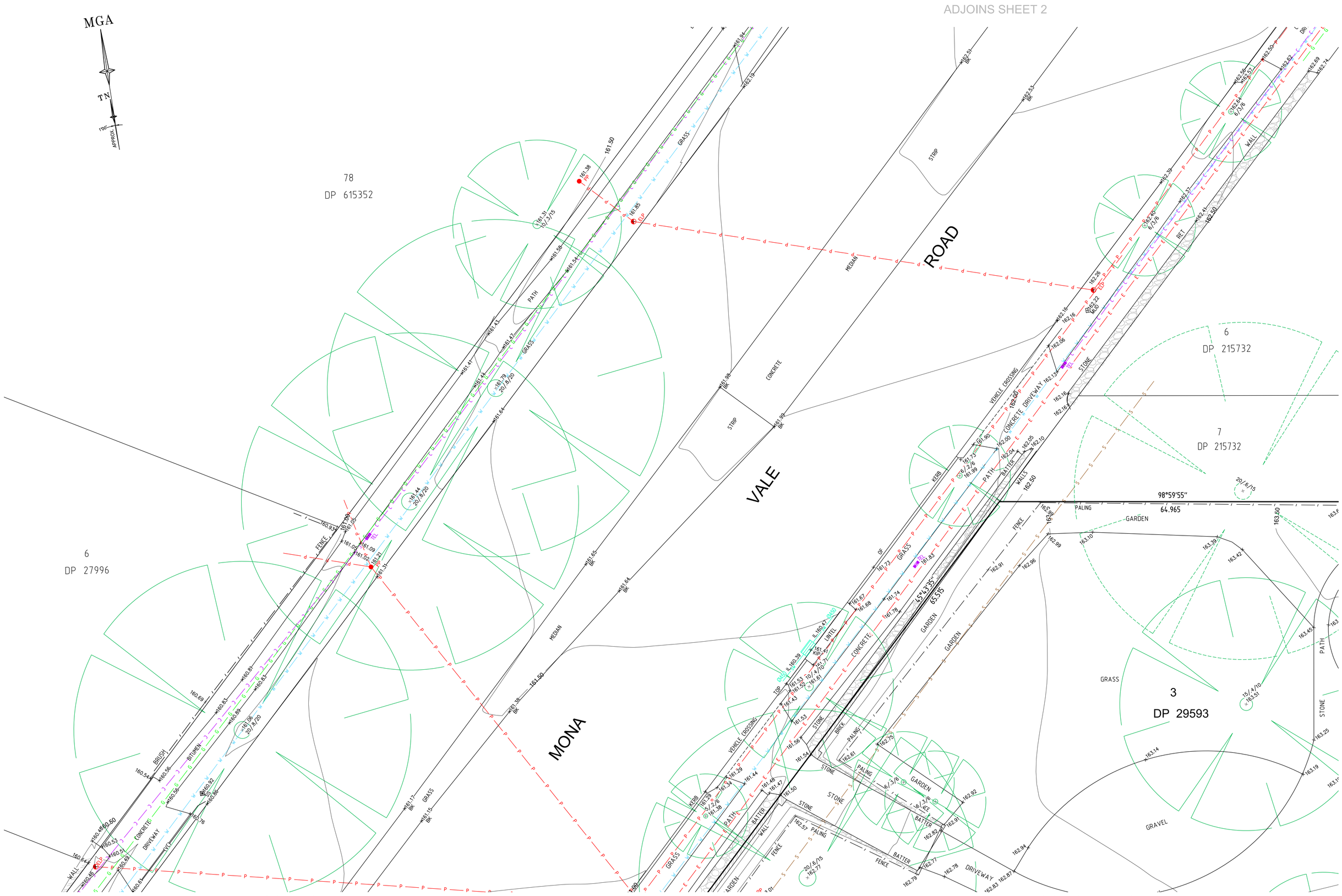

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datum: AHD

site Area: 9324m² (CALC)

LGA: KU-RING-GAI

reference number: 51694 001DT

scale: 1:100 @A1

date of survey: 11/04/2022

SHEET 3 OF 14

ADJOINS SHEET 2

MGA

TN

190°
APPROX

ADJOINS SHEET 3

6
DP 215732

7
DP 215732

98°59'
64.965
GARDEN
PATH
PAVING
FENCE
No. 289
1 STOREY
BRICK RESIDENCE
TILE &
METAL ROOF
RIDGE 169.71
GUTTER 166.54
3
DP 29593
GRASS
STONE PAVING
RIDGE 167.44
ROOF 166.77
GUTTER 166.43
RIDGE 167.59
DRIVEWAY
STONE
GUTTER 166.17
SHED
PALING
No. 293
1 STOREY
RENDERED
RESIDENCE
TILE ROOF
SEE NOTE 11
GUTTER 165.15
188°59'55"
28.12
INACCESSIBLE
DENSE VEGEATTION
7
DP 215732
98°59'05"
38.39
MESH
CONCRETE
BLOCK WALL
No. 45
DOUGLAS STREET
1 STOREY RENDERED
RESIDENCE
TILE ROOF
SEE SHEET 14 FOR
ELEVATIONS
21
DP 1136346
CONCRETE
BLOCK SHED

ADJOINS SHEET 6

ADJOINS SHEET 7

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site Area 9324m² (CALC)
LGA KU-RING-GAI

reference number 51694 001DT
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date of survey 11/04/2022
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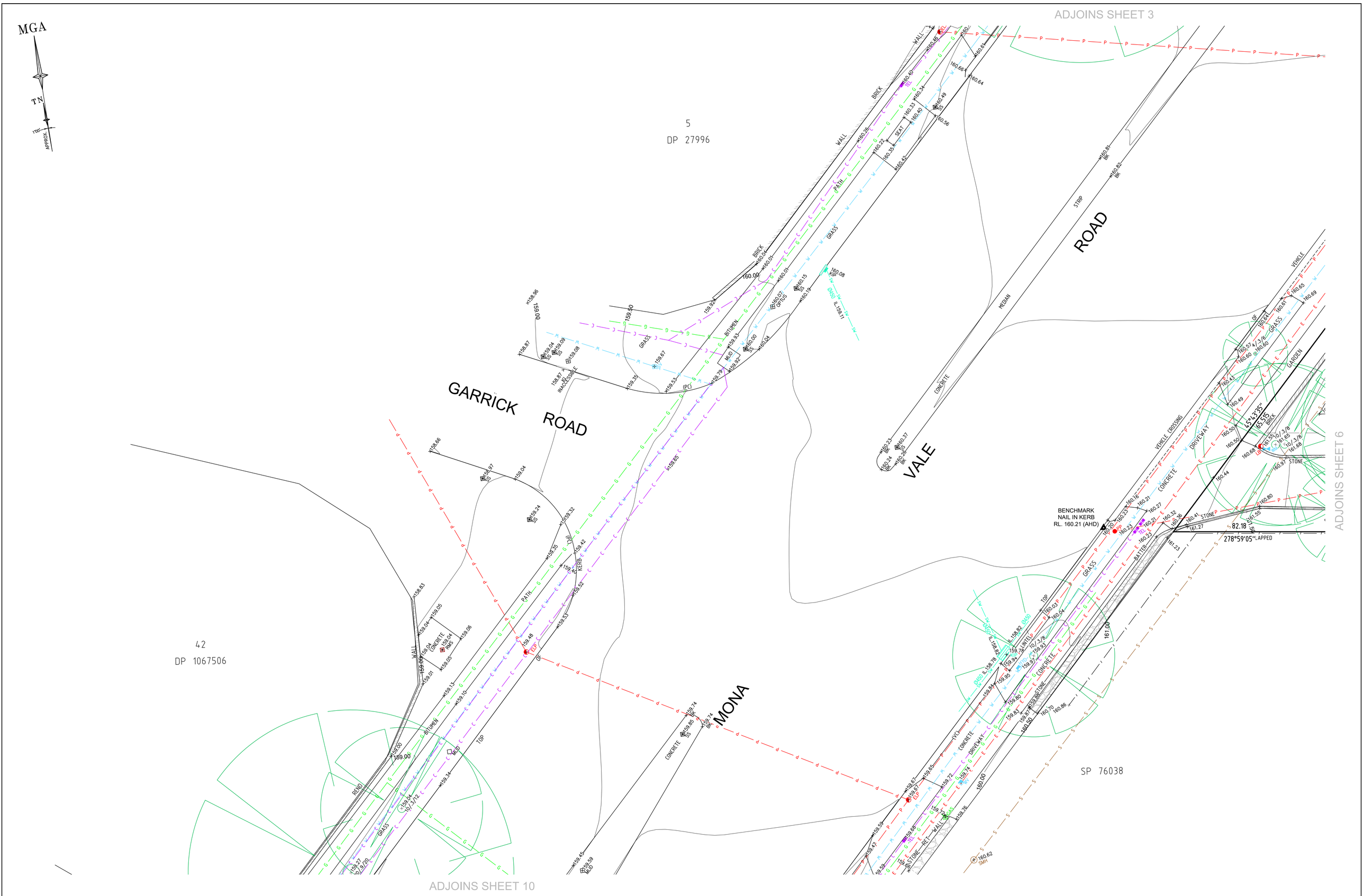

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reference number 51694 001DT

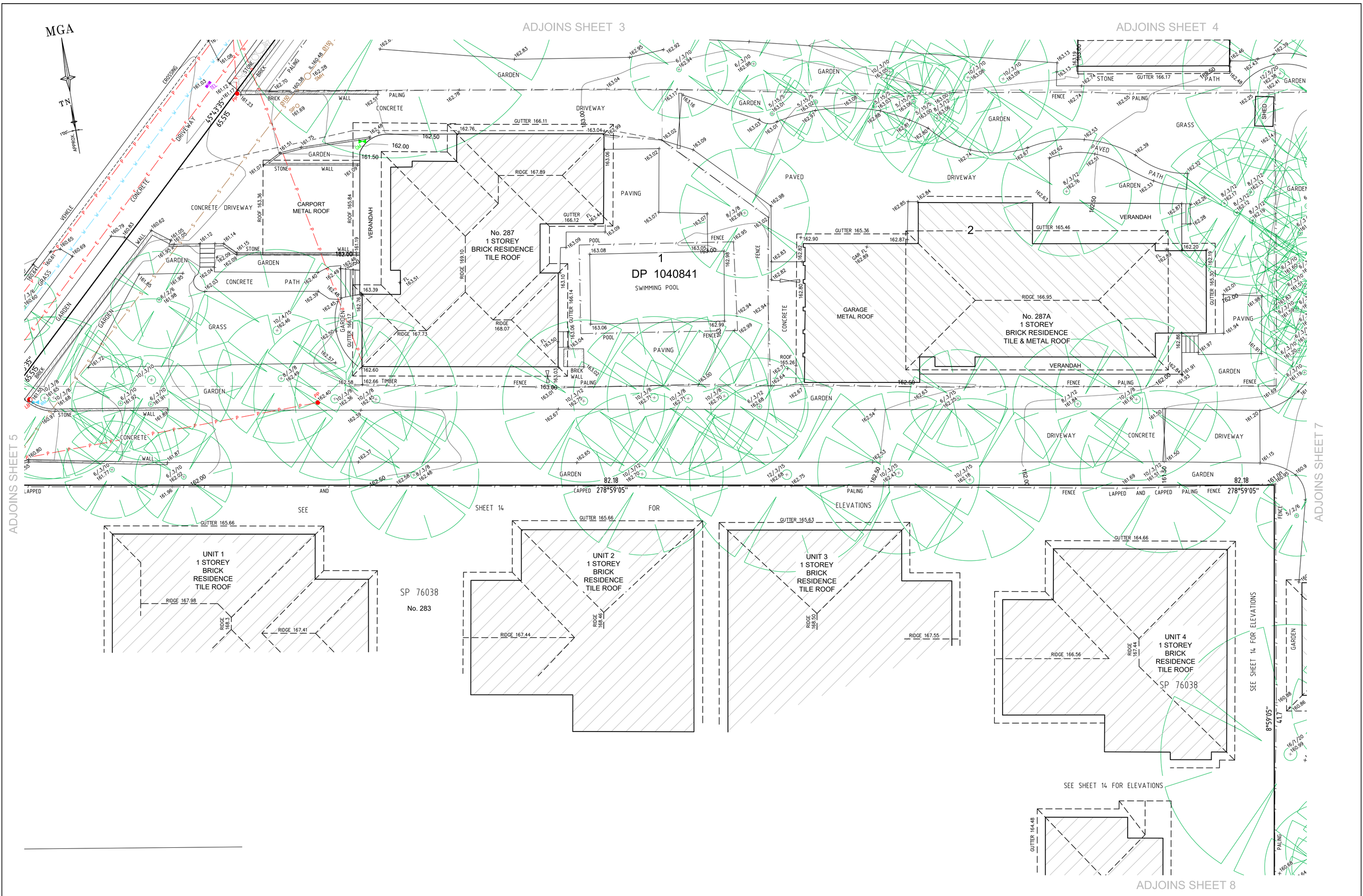
site Area 9324m² (CALC)

scale 1:100 @A1

date of survey 11/04/2022

LGA KU-RING-GAI

SHEET 5 OF 14



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SCALE 1: ### @ A1

Revision	Date	Description	Reference
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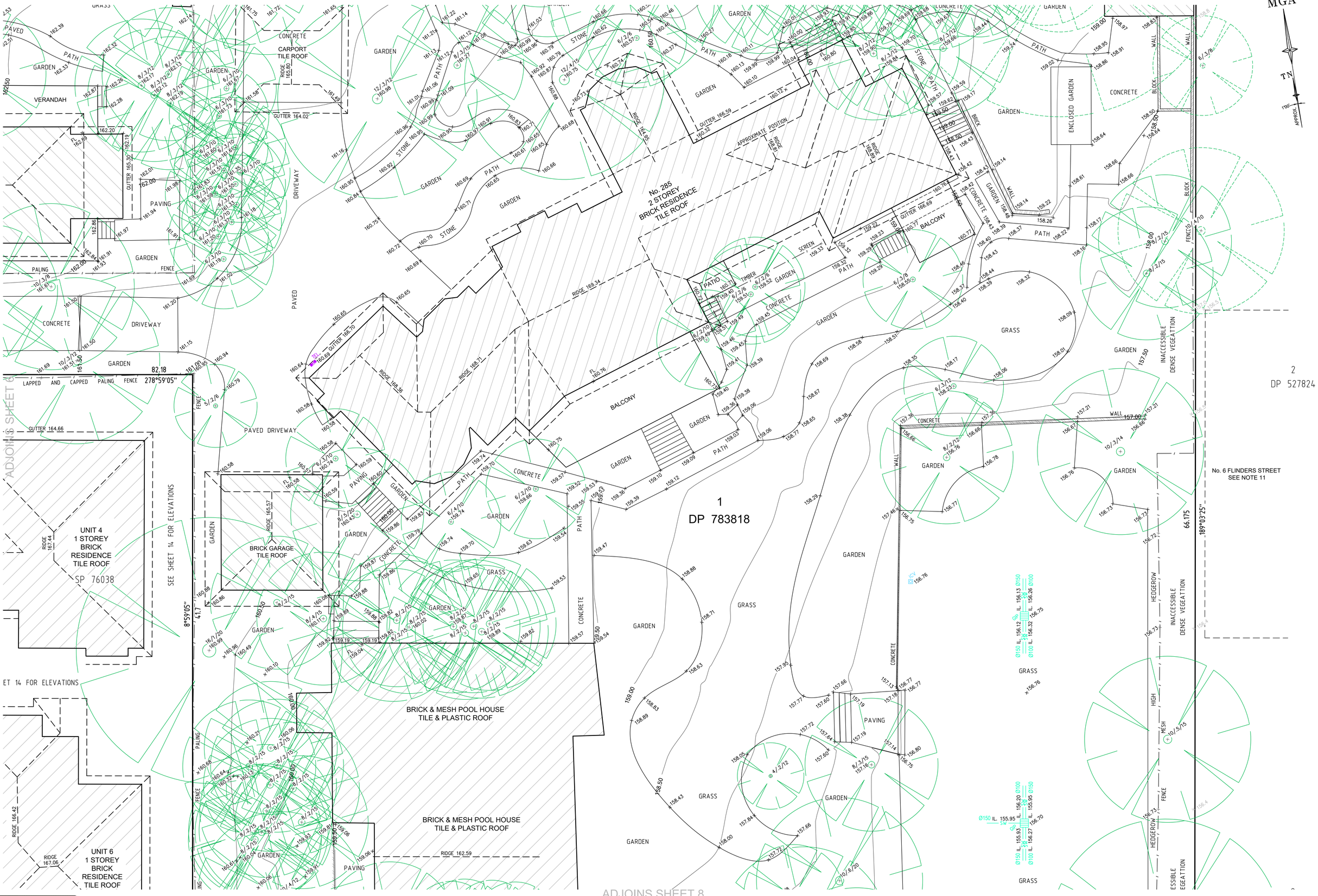
datum: AHD
site Area: 9324m² (CALC)
LGA: KU-RING-GAI
scale: 1:100 @A1
reference number: 51694 001DT
date of survey: 11/04/2022
SHEET 6 OF 14

ADJOINS SHEET 4



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SCALE 1:100 @ A1

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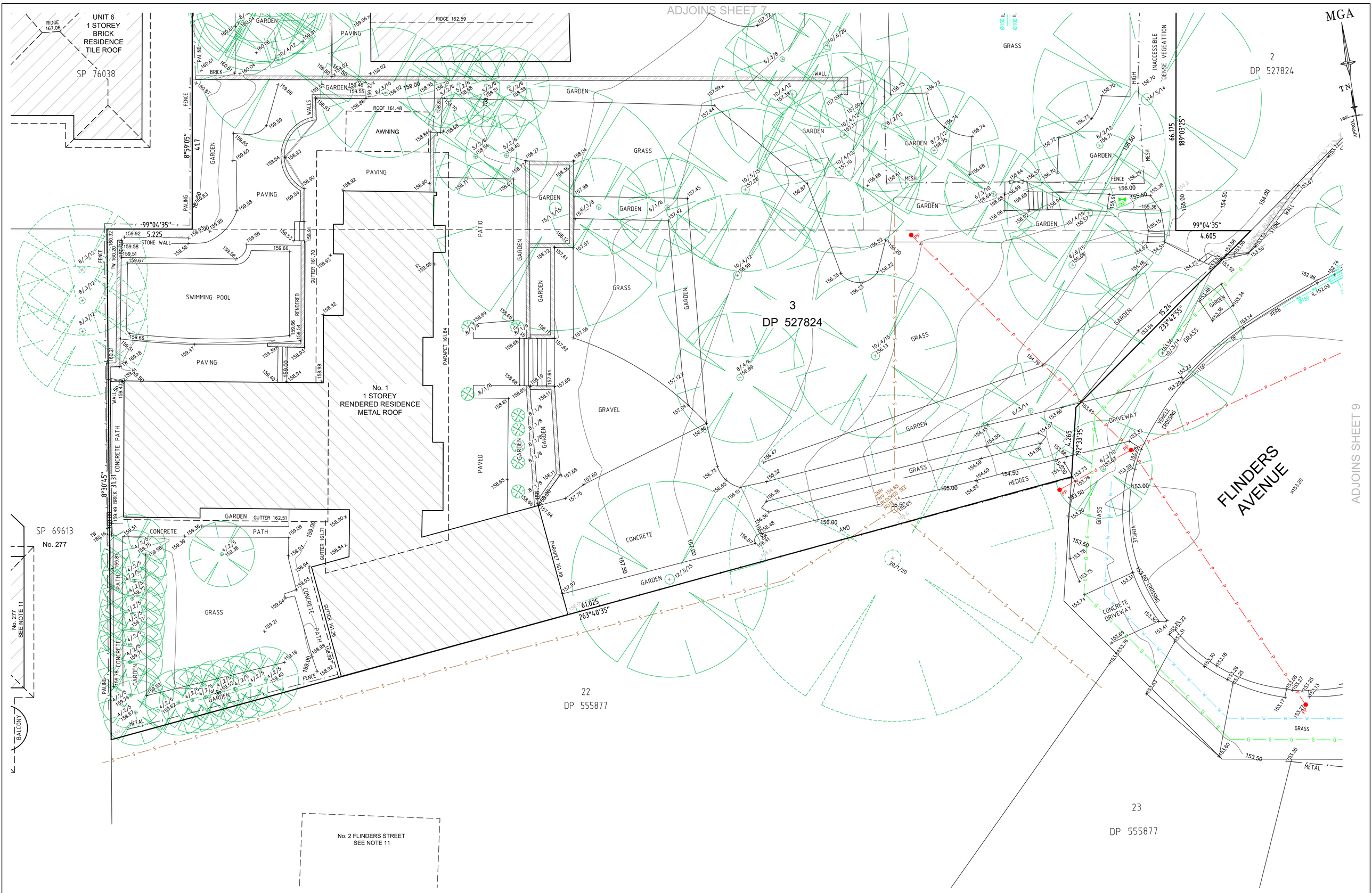

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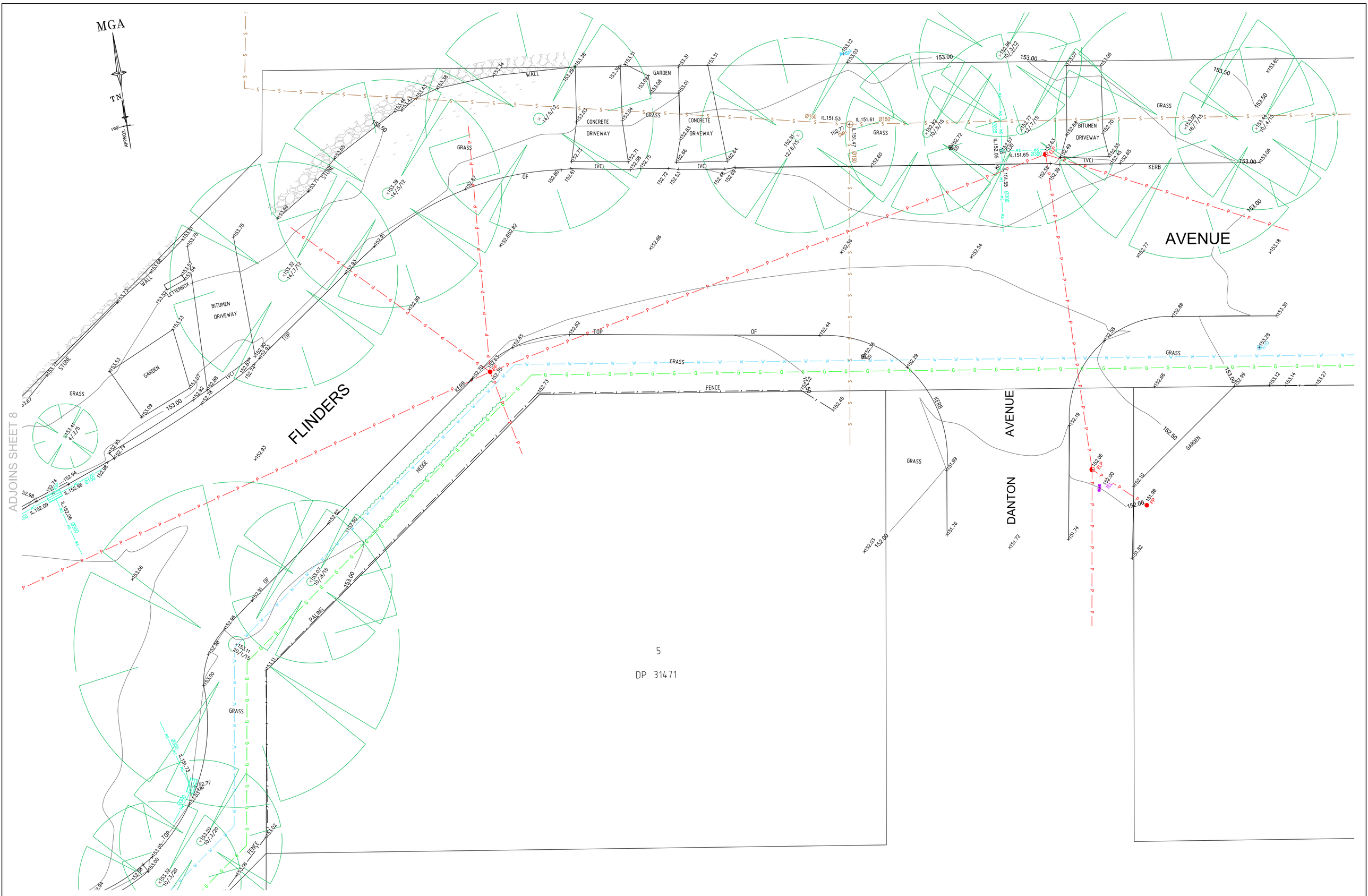

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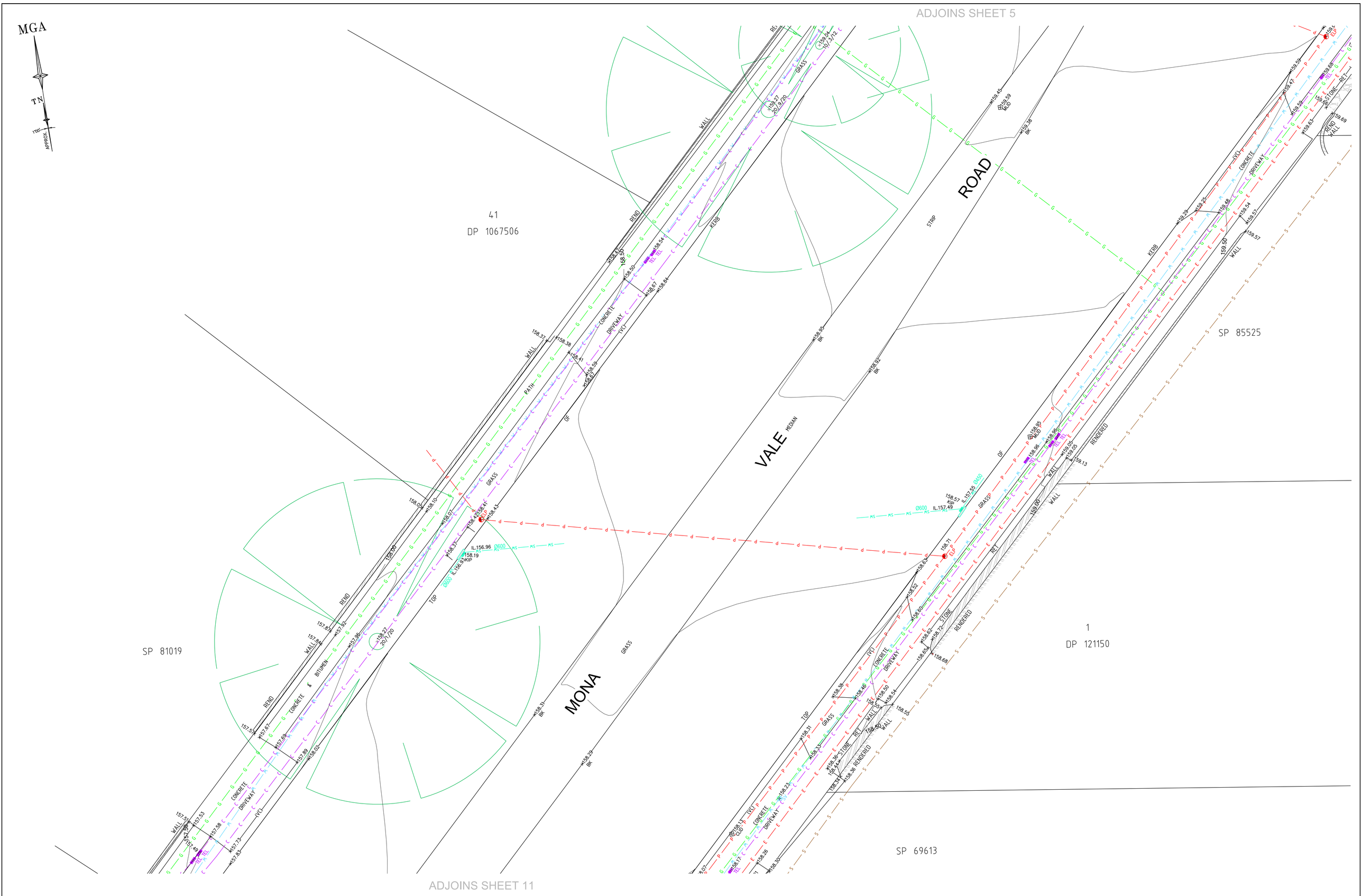

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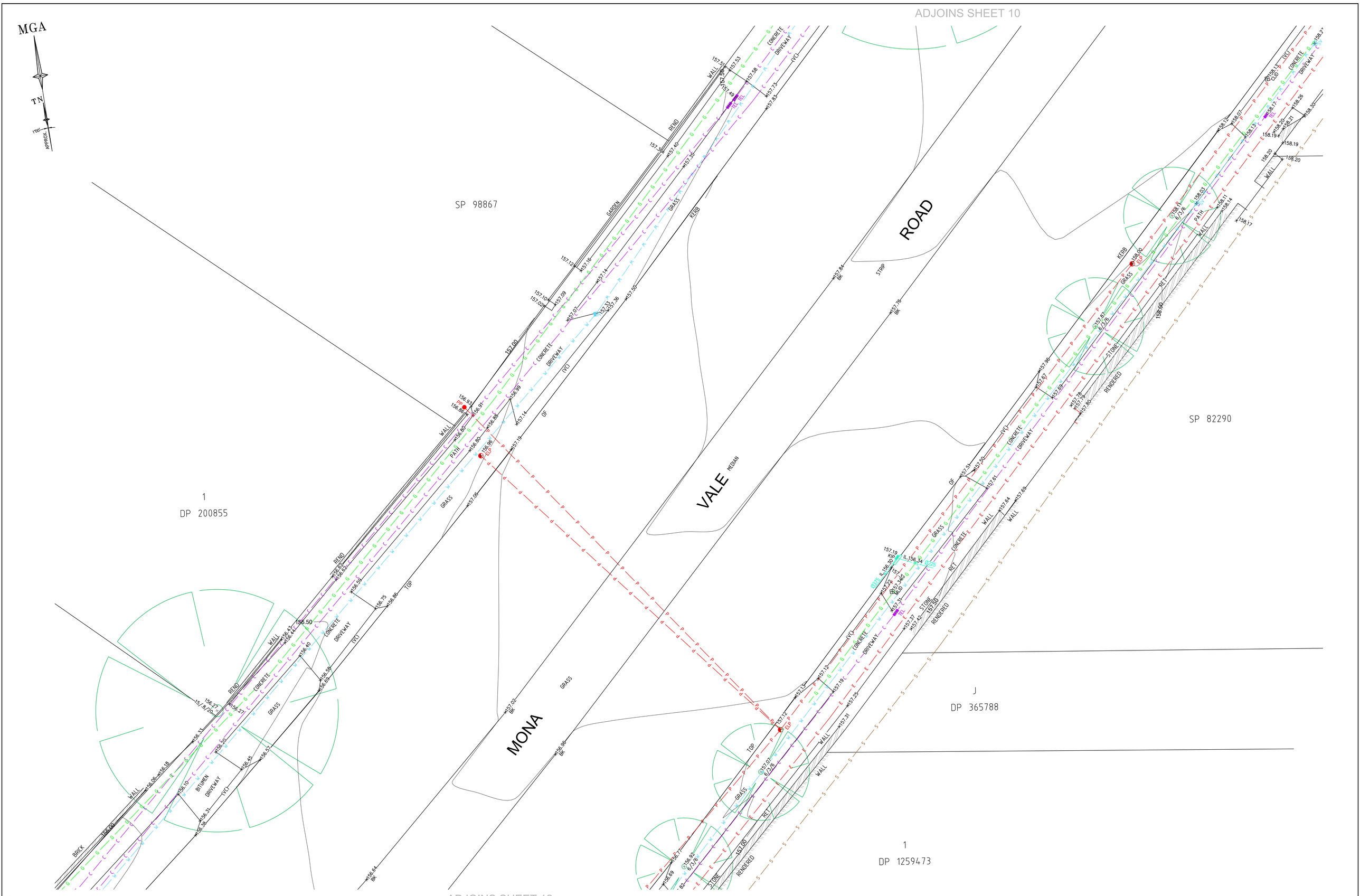

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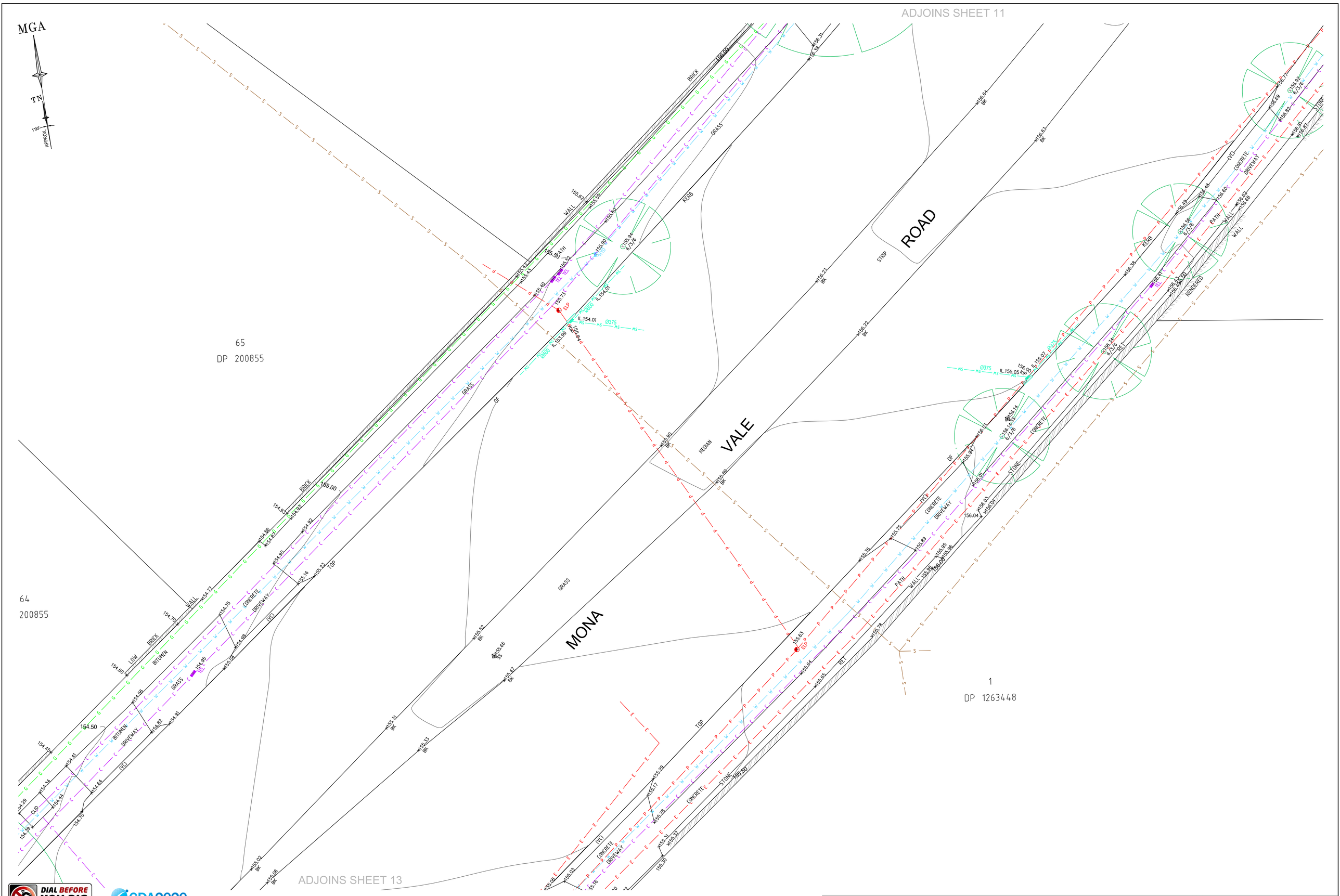

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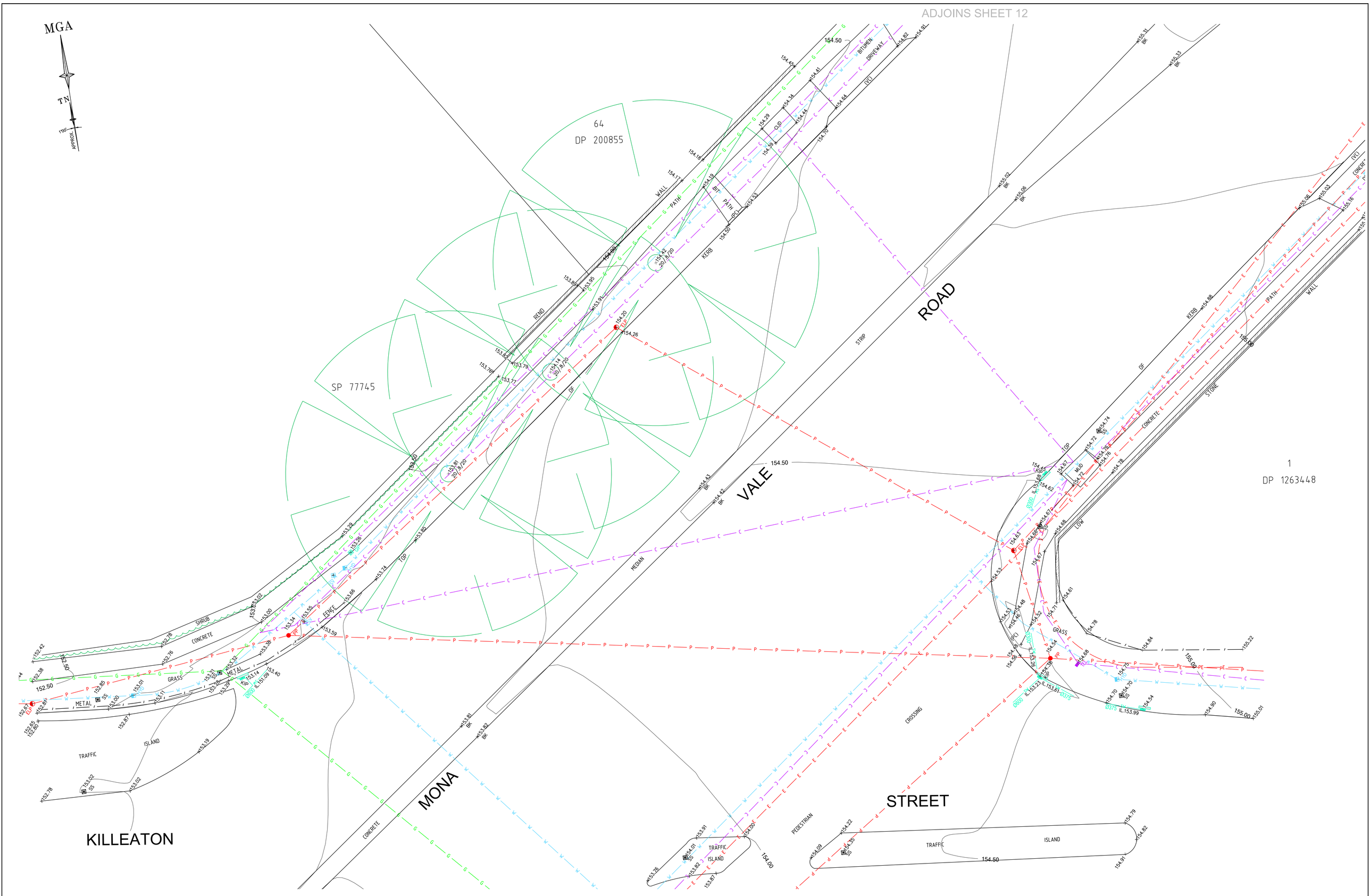

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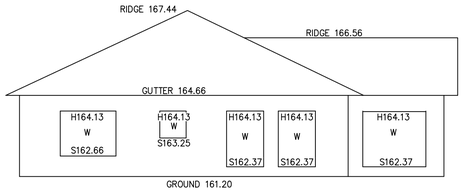
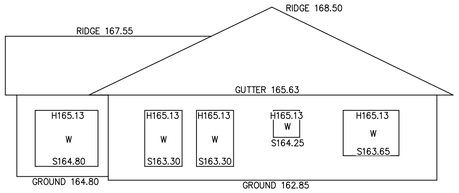
SHEET 13 OF 14

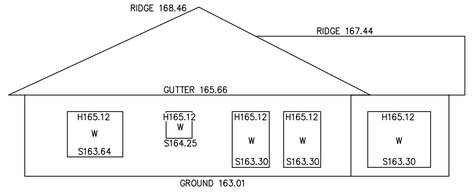
ELEVATIONS:
No. 283 MONA VALE ROAD



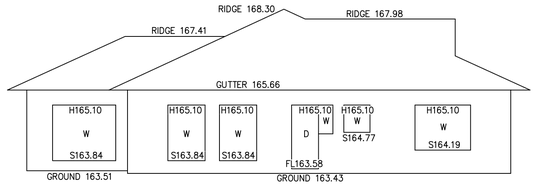
UNIT 4
NORTHERN ELEVATION



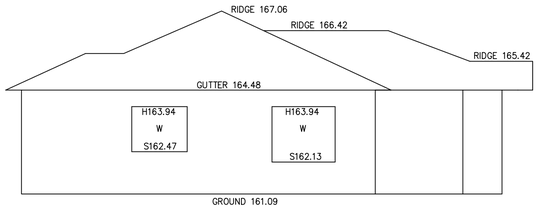
UNIT 3
NORTHERN ELEVATION



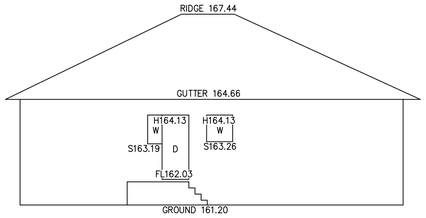
UNIT 2
NORTHERN ELEVATION



UNIT 1
NORTHERN ELEVATION



UNIT 6
EASTERN ELEVATION



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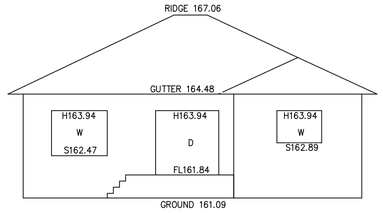
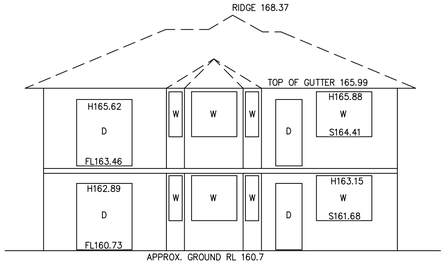
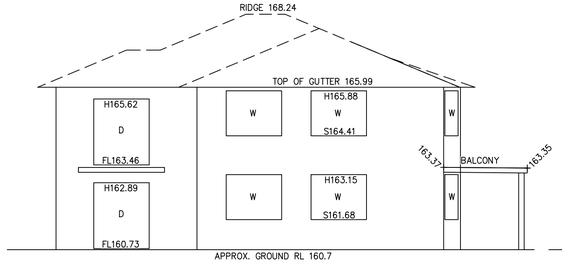


UNIT 6
SOUTHERN ELEVATION

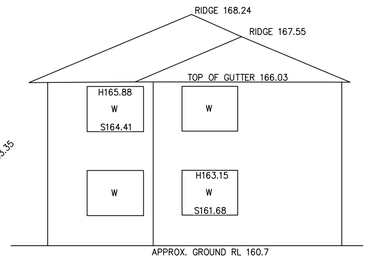
ELEVATIONS:
No. 277 MONA VALE ROAD



UNIT 8
UNIT 3
NORTHERN ELEVATION

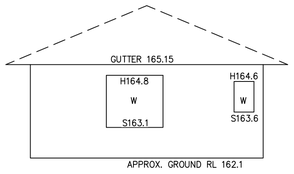


UNIT 8
UNIT 3
EASTERN ELEVATION



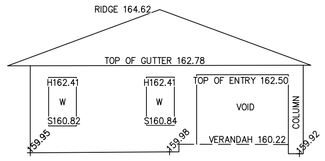
UNIT 7
UNIT 2
EASTERN ELEVATION

ELEVATION:
No. 293 MONA VALE ROAD



No. 293 MONA VALE ROAD
WESTERN ELEVATION

ELEVATION:
No. 45 DOUGLAS STREET



No. 45 DOUGLAS STREET
SOUTHERN ELEVATION

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LGA KU-RING-GAI
SHEET 14 OF 14

APPENDIX C – OSD CALCULATION SPREADSHEET

24R.4 ON-SITE DETENTION CALCULATION SHEET

Address .....

Catchment Detail				
1.	Catchment Name middle harbour			
2.	Catchment Discharge Rate	0.0166	l/sec/m^2	**A**
3.	Catchment Storage Rate	0.0241	m^3/m^2	**B**
Site Details				
4.	Site Area 9324 m^2 ^ 60% of site area	5594	m^2	**C**
5.	Area(s) not draining to the detention system 0 m^2			
6.	Total impervious area (roofs, driveways, paving, etc.)	6000	m^2	**D**
7.	Impervious area bypassing detention system	0	m^2	**E**
Permitted Site Discharge				
8.	**C** [5594 m^2] x **A** [0.0166 l/sec/m^2] =	93	l/sec	**Flow 1**
9.	Adjustment for any uncontrolled impervious flow **E** / **D** =	0	(<0.25)	**F**
10.	**Flow 1** [..... l/sec] x **F** [.....] =	0	l/sec	**Flow 2**
11.	**Flow 1** [.....] – **Flow 2** [.....] =	93	**l/sec**	**PSD**
Site Storage Requirement				
12.	**C** [5594 m^2] x **B** [0.0241 m^3/m^2 =	135	**m^3**	**SSR1**
13.	If the storage is in a landscaped basin, **SSR1** x 1.2 =	n/a	**m^3**	**SSR2**
Outlet Control				
14.	Height difference between top water surface level and the centre of the orifice	1.7	m	**G**
15.	Orifice Diameter $21.8 \times \sqrt{\frac{PSD}{\sqrt{G}}}$	184	**mm**	**OD**

PSD = Permitted Site Discharge
SSR1 = Site Storage Requirement (except for landscaped basins)
SSR2 = Site Storage Requirement (landscaped basins) **(Note: Use only SSR1 or SSR2)**
OD = Orifice Diameter

Signature..... **Name** Nick Heazlewood

Qualifications B.E Civil **Date** 25.03.2024