REMEDIAL ACTION PLAN

CENTRAL & NW PORTIONS OF OUTER SYDNEY ORBITAL
221-227 AND 289-311 LUDDENHAM ROAD, ORCHARD HILLS, NSW

Prepared for **Co-ordinated Infrastructure**

1 October 2024

Ref: DRM P23.1039.V12-R02r1

Prepared for	Co-ordinated Infrastructure
Report Title	Remedial Action Plan
Site	Central & NW Portions Of Outer Sydney Orbital 221-227 And 289-311 Luddenham Road, Orchard Hills, NSW
File Reference	DRM P23.1039.V12-R02r1
Date	1 October 2024

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DOCUMENT HISTORY & DISTRIBUTION

Version	Date	Author	Reviewer	Distributed to
Final	30 September 2024	Rahabar Alam	Nalin De Silva	George Henien of Co-ordinated Infrastructure
Revision r1	1 October 2024	Rahabar Alam	Nalin De Silva	George Henien of Co-ordinated Infrastructure
This revision is issued to update section 9 based on discussion with client				

Limitations and General Notes

LIMITATIONS

The report was prepared in accordance with the scope agreed between **Development Risk Management Pty Ltd (DRM)** and the client. The scope of services was agreed to with due consideration of a range of factors including time, budget, access and site constraints. The report is provided for the specific purpose as described in the report. The report may not contain sufficient information for purposes other than that described in the report.

The information in this report is considered accurate at the date of issue.

In preparing the report, DRM has relied upon information provided by the Client and/or their Agents. Such data may include surveys, analyses, designs, maps and plans. DRM has not verified the accuracy or completeness of the data except as stated in this report.

Unless otherwise stated, the report, or sections of the report, should not be used as part of a specification for a project, without review and agreement by DRM.

The report must be read in its entirety and should be kept in its entirety without separation of individual pages or section or attachments.

DRM cannot be held responsible for interpretations or conclusions from review by others of this report or test data, which are not otherwise supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

GENERAL NOTES

Geotechnical and environmental reporting relies on the interpretation of factual information based on judgment and opinion and is far less exact than other engineering or design disciplines due to a range of uncertainties and variabilities. Geotechnical and environmental reports are for a specific purpose, development and site as described in the report and may not contain sufficient information for other purposes, developments or sites (including adjacent sites) other than that described in the report.

Subsurface conditions can change with time and can vary between test locations. Therefore, actual conditions in areas not sampled may differ from those predicted since no subsurface investigation, no matter how comprehensive, can reveal all subsurface details and anomalies. Anthropogenic impact and natural causes can also affect subsurface conditions and thus the continuing adequacy of these reports. Seasonal variations can also affect subsurface conditions. DRM should be kept informed of any such events and should be retained to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

Data obtained from nominated discrete locations, subsequent laboratory testing and empirical or external sources are interpreted by trained professionals in order to provide an opinion about overall site conditions, their likely impact with respect to the report purpose and recommended actions in accordance with any relevant industry standards, guidelines or procedures.

Executive Summary

Development Risk Management Pty Ltd (DRM) was engaged by Co-ordinated Infrastructure, to prepare a Remedial Action Plan (RAP) to remediate contaminated soils identified at the land located at Central & NW Portions Of Outer Sydney Orbital 221-227 And 289-311 Luddenham Road, Orchard Hills, NSW (the site).

This RAP has been prepared in accordance with the requirements of the NSW EPA (2020) *Guidelines for Consultants Reporting on Contaminated Sites and the National Environmental Protection Measure NEPM* (NEPC, 2013).

Objectives and Scope

The objective of the RAP is to provide a strategy to remediate identified contamination. This report presents:

- The nature and extent of currently identified contamination requiring remediation;
- The applicable remediation strategies;
- Provisions for additional assessments to be conducted following the demolition of the existing buildings and pavement;
- The remediation works to be conducted for the preferred remediation option; and
- A validation strategy to demonstrate that the remediation works have been conducted satisfactorily.

The scope of work undertaken to address the project objective included:

- Review of the stage 1 preliminary site investigation (DRM, 2023a);
- Review of the stage 2 detailed site investigation (DRM, 2023b);
- Correspondence with the client regarding the remediation strategy; and
- Preparation of this RAP.

Extent of Remediation

The inferred extent of remedial works for the NW portion is presented on Figure 4.

The intrusive assessment conducted by DRM (2024a) with 193 test pits in the central OSO portion did not identify asbestos in areas outside of the asbestos remediation areas specified in the asbestos remediation plan (CS, 2021). As such, the remediation extent for the central portion of OSO will be exactly as specified in ARP prepared by CS (2021a). The remediation extents for Central OSO, as specified by CS (2021a) and confirmed by DRM, are shown on Figure 5.

Preferred Remediation Strategy

Based on the above assessment of applicable remediation options, discussions with the client and based on our experience, the preferred remedial strategy is:

- Offsite disposal of the waste stockpiles present in the NW portion;
- Onsite treatment of bonded asbestos impacted soils across the site; and
- Offsite disposal of friable asbestos impacted soils (AF/FA).

Conclusion

DRM considers that the remedial goal can be achieved, and **the site can be made suitable for the proposed industrial land use, if the measures specified in this remedial action plan are implemented**. The proposed remediation strategy (excavation and offsite disposal) is a proven strategy that removes identified contamination and can be conducted safely and effectively.

A validation report will be prepared to document the remediation and validation works undertaken, and to demonstrate that the remediation goal has been achieved.

This report must be read in conjunction with the *Limitations and General Notes* page at the front of this report.

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1. INTRODUCTION

1.1. Background

Development Risk Management Pty Ltd (DRM) was engaged by Co-ordinated Infrastructure, to prepare a Remedial Action Plan (RAP) to remediate asbestos contaminated soils identified at a portion of land or land located at 221-227 and 289-311 Luddenham Road, Orchard Hills, NSW (the property). The proposed assessment area is shown in Figure-1 will be referred to as "the site" from here on.

The property is proposed to be developed for commercial/industrial land use (Alspec Industrial Business Park). Based on information provided by the client, DRM understood:

- The site forms a portion of Outer Sydney Orbital (OSO) corridor, and comprises of two separate portions, being the North western (NW) portion and central portion of OSO;
- North western portion of the OSO has not been previously assessed for contamination;
- Following the observations of asbestos impacted soils being imported to the central portion of the OSO, Construction Sciences (CS) conducted an Asbestos in Soil Assessment (CS, 2021)[1], which identified asbestos in soils and stockpiled material within the assessed area. Identified asbestos was bonded ACM, though three samples also reported asbestos fines/fibrous asbestos (AF/FA) at concentrations that were well below the acceptable level of 0.001% w/w);
- CS subsequently prepared an asbestos remedial plan (CS, 2021a[2]) to remediate the asbestos impacted soils within specified areas of the central OSO. However, DRM understands that this recommended remediation has not been conducted;
- Since the preparation of the asbestos remedial plan (ARP) in 2021, aerial photographs of the site suggested potential disturbance of the remediation areas, as well as importation of new stockpiles, may have occurred. It is therefore possible that the asbestos impacted areas identified by CS (2021 and 2021a) have been disturbed and areas previously identified as not impacted may have been impacted by asbestos;
- The Final Validation report prepared by DRM (2024[3]) for the property concluded that "*…The central portion of the Outer Sydney Orbital corridor requires further assessment and remediation, to remove previously identified asbestos impacted soils (CS, 2021 and 2021a).*" DRM recommended to "*Conduct a thorough assessment of the asbestos contamination status of the central portion of the OSO corridor, given the time elapsed since the previous investigations by CS (2021i). The identified contamination should be remediated in accordance with an updated asbestos remedial plan.*";
- Subsequently DRM conducted an extensive intrusive assessment with 253 test pits across both the central OSO and NW OSO portions and prepared a stage 2 detailed site investigation report (DRM, 2024a[4]) concluding:
  - Asbestos and waste material identified in the north western portion, together with the together with the asbestos at central portion, requires remediation; and
  - The lateral extent of asbestos contamination in the central portion of OSO appears to be consistent with that previously reported by CS (2021a); and
- DRM (2024a) recommended the preparation of a remedial action plan (RAP) for north western portion and central portion of OSO.

This RAP has been prepared in accordance with the requirements of the NSW EPA (2020) *Guidelines for Consultants Reporting on Contaminated Sites and the National Environmental Protection Measure NEPM* (NEPC, 2013).

[1] CS, 2021. "Asbestos in Soil Assessment, 221-227 Luddenham Rd, Orchard Hills, NSW, PART LOT 1, IN DP 1099147" (ref: 10791EV.P.68-R05 dated 15 February 2021)
[2] CS, 2021a. "Asbestos Remedial Plan, 221-227 Luddenham Rd, Orchard Hills, NSW, 'Portion of Lot 1, IN DP 1099147' " (ref: 10791EV.P.68-R08 dated 17 February 2021)
[3] DRM, 2024. "Final Validation Report, 221-227 & 289-311 Luddenham Rd, Orchard Hills, NSW" (ref: DRM P23.1039-R05r1 dated 23 August 2024)
[4] DRM, 2024a. "Stage 2 Detailed Site Investigation, Central & NW Portions Of Outer Sydney Orbital 221-227 And 289-311 Luddenham Road, Orchard Hills, NSW" (ref: DRM P23.1039.V12-R01 dated 27 September 2024)

1.2. Objectives

The objective of the RAP is to provide a strategy to remediate identified contamination, to render the site suitable for the proposed commercial/industrial land use. This report presents:

- The nature and extent of currently identified contamination requiring remediation;
- The applicable remediation strategies;
- The remediation works to be conducted for the preferred remediation option;
- A validation strategy to demonstrate that the remediation works have been conducted satisfactorily;
- A site management plan and general safety measures to be implemented for the remediation works; and
- An unexpected finds protocol (UFP) to manage unexpected contamination issues that may be encountered during remediation works.

1.3. Scope of Work

The scope of work undertaken to address the project objective included:

- Review of the following reports:
  - Asbestos assessment by CS (2021);
  - Asbestos remedial plan by CS (2021a);
  - Stage 2 detailed site investigation (DRM, 2024);
- Correspondence with the client regarding the remediation strategy; and
- Preparation of this RAP.

The scope of works was undertaken with reference to the relevant sections of NEPC (2013) and NSW EPA (2020).

2. SITE IDENTIFICATION

Site identification details are presented below:

Table 2-1 Site identification details

Identifier	Description
Site locality	The property is located to the west of Luddenham Road. North western portion of OSO is located at the corner of Patons Lane and Stockdale Road and Central portion of OSO is located at east of Stockdale Road as presented in Figure 1
Site Layout	North western portion covers an area of approximately 7ha and Central portion of OSO covers an area of approximately 8ha. The general layout and current site features are presented in Figure 2
Lot Number and Deposited Plan	Part of Lot 1 in DP1293805
Local Government Authority	Penrith City Council
Zoning (NSW Government's online Planning Portal)	North west portion is zoned as C2 Environmental Conservation and Central OSO is zoned as RU2 Rural Landscape
Detail and Level Survey	Attached in Appendix A

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3. SITE CHARACTERISATION

3.1 Geology

The Department of Mineral Resources Geological Survey of NSW Penrith 1:100,000 Geological Series Sheet 9030 (Edition 1) 1991, indicated that most of the site is likely to be underlain by Bringelly shale of Wianamatta Group comprising shale, carbonaceous claystone, laminite, lithic sandstone and rare coal.

A portion of the site to the east of north western portion and north west of central OSO is underlain by alluvial floodplain deposits comprising of silt, very fine to medium grained lithic to quartz rich sand, clay.

3.2 Topography and Elevation

According to the survey plan of the site:

North Western Portion of OSO

- The topography of this portion is generally flat with a gentle slope to the south and east towards the creek (Section 3.3); and
- The elevation was approximately 41.9m Australian Height Datum (AHD) in the north west and 38.2m AHD in the south.

Central Portion of OSO

- The topography of this portion is generally flat with a gentle slope to the south east towards north west; and
- The elevation was approximately 46.3m Australian Height Datum (AHD) in the south east and 40.3m AHD in the north west.

3.3 Hydrogeology and Hydrology

WaterNSW Groundwater online data base indicated one registered groundwater bore (ID: GW105382.1.1) located within a 500m radius of the site. There were no registered bores for authorised extraction purposes within a 2km radius of the site. Summary information presented for the bore GW105382.1.1 indicated that:

- The bore was drilled in 2004 to a depth of 252m below ground level (bgl) at a reference elevation of 40.9 m AHD;
- The geology encountered during drilling included clay (0-5m bgl), shale (5-80m bgl). Sandstone was encountered at a depth of 80m;
- The salinity in groundwater was measured at 2500 TDS mg/L indicating highly saline water; and
- The depth to standing water level was reported at 24m bgl.

A review of Google Maps, indicated that surface water bodies near the site included:

- A tributary of South Creek is located immediately to the south east of the north western portion, and flows south east to South Creek, which is located approximately 1.8km to the east; and
- Blaxland Creek is located approximately 2.3km to the west.

Based on site surface topography and elevation, the inferred general surface water flow direction on the site is considered likely to be towards the northeast, towards Eastern Creek.

3.4 Acid Sulphate Soils

A review of the NSW Government's ESPADE website, indicated that the site is not mapped as having acid sulphate soil risks.

The stage 2 DSI (2024a)[5] report prepared by DRM stated that acid sulphate soils appear to be sporadically distributed within the alluvial clays at depths between 0.5m and 2.5m bgl in the outer Sydney orbital area. If the site requires excavation beyond 0.5m bgl into alluvial clays, acid sulphate risks should be considered and further assessment will be warranted.

3.5 PFAS Investigation & Management Programs

Perfluoroalkyl and Polyfluoroalkyl Substances (PFAS) is an emerging contamination risk that requires consideration.

Based on a review of the NSW EPA PFAS Investigation Sites Map (accessed 23.09.2024), there were no known NSW EPA PFAS Investigation Sites within the vicinity of the site.

[5] DRM, 2024a. "Stage 2 Detailed Site Investigation Proposed Flood Basins, 221-227 Luddenham Rd, Orchard Hills, NSW" (ref: DRM P23.1039-R06 dated 5 May 2024

4. SITE HISTORY

4.1 Review of Historical Aerial Images

A selection of historical aerial photographs of the site, were reviewed by DRM (2024a). The review of aerial images identified the following potentially contaminating activities:

- The land disturbance (potential uncontrolled filling) in 2024 in the north western portion; and
- Potential land disturbance and stockpiling between 2019 to 2021 and demolition of structures in 2023.

4.2 Previous Contamination assessments

DRM reviewed the following reports to achieve the stated objectives:

- CS, 2021. "Asbestos in Soil Assessment, 221-227 Luddenham Rd, Orchard Hills, NSW, PART LOT 1, IN DP 1099147" (ref: 10791EV.P.68-R05 dated 15 February 2021);
- CS, 2021a. "Asbestos Remedial Plan, 221-227 Luddenham Rd, Orchard Hills, NSW, 'Portion of Lot 1, IN DP 1099147' " (ref: 10791EV.P.68-R08 dated 17 February 2021); and
- DRM, 2024a. "Stage 2 Detailed Site Investigation, Central & NW Portions Of Outer Sydney Orbital 221-227 And 289-311 Luddenham Road, Orchard Hills, NSW" (ref: DRM P23.1039.V12-R01 dated 27 September 2024).

4.2.1 Asbestos in Soil Assessment - (CS, 2021)

CS conducted a contamination assessment within the central portion of the Outer Sydney Orbital corridor (CS, 2021) to assess the potential human health exposure risks associated with known the asbestos impacted soils identified in CS (2020[6]). The objectives of the assessment were to:

- Assess accessible disturbed areas of the central portion of OSO where recent historical aerial photographs indicate the potential for uncontrolled filling;
- Provide advice on the likely lateral and vertical extent of unacceptable asbestos related human health exposure risks at the site, associated with recently imported fill material; and
- Provide recommendations for further assessment, management and/or remediation of site soils (if warranted).

The scope included a desktop review, walkover, intrusive sampling, laboratory analysis, data assessment and reporting. The assessment concluded that the asbestos identified (in the form of asbestos fines, bonded ACM and free fibres) within assessed area could present an unacceptable human health exposure risk.

CS (2021) recommended the preparation of an asbestos remediation plan (ARP) to address the identified human health exposure risks. CS stated that an asbestos remediation and validation report should be prepared at the completion of the recommended remedial works.

This report (CS, 2021) can be accessed by clicking the link Asbestos in Soil Assessment - (CS, 2021)

4.2.2 Asbestos Remedial Plan - (CS, 2021a)

CS prepared an asbestos remedial plan (ARP) (CS, 2021a) to address unacceptable asbestos exposure risks identified for the site in CS (2021a). The scope included a desktop review of site history, data assessment and reporting. The ARP specified the remediation extents as shown below.

[6] CS, 2020. "Asbestos Assessment of Surface Soils, 221-227 and 289-317 Luddenham Rd, Orchard Hills, NSW, 2748" (ref: 10791EV.P.68-R02 dated 15 December 2020)

Table 4.2.2-1 Remediation extents identified by the ARP (CS, 2021a)

AEC ID	AEC Description and Lateral Extent	Nominal Depth	COPC
OSO AEC01a	Former stockpile area, ~600m^2 area, (Western portion)	0.3m bgl	Bonded ACM
OSO AEC01b	Former stockpile area, ~3,000m^2, (Eastern portion)	0.1m bgl	Bonded ACM
OSO AEC01c	Former stockpile area ~700m^2, (Southern portion)	0.2m bgl	Asbestos fines
OSO AEC01d	Former stockpile area ~900m^2, (Eastern portion)	0.2-0.4m bgl	Asbestos fines
OSO AEC02	Data gap: Disturbed soils, obscured by vegetation (~150m^2)		Asbestos
OSO AEC03a	Site disturbed areas with ACM on surface (~300m^2)	0.1m bgl	Bonded ACM
OSO AEC03b	Site disturbed areas with ACM on surface (~200m^2),	0.1m bgl	Bonded ACM
OSO AEC03c	Site disturbed areas with ACM on surface (~200m^2)	0.1m bgl	Bonded ACM
OSO AEC03d	Site disturbed areas with ACM on surface (~500m^2)	0.25m bgl	Bonded ACM
OSO AEC04	Stockpile with demolition waste (~20m^3)	Base of stockpile	Bonded ACM)

CS (2021a) recommended the following remediation strategies:

- Bonded Asbestos impacted soils at depth was to be excavated, spread on a treatment pad and subjected to emu picking to remove bonded asbestos;
- Bonded asbestos on the surface (up to 0.1m deep) was to be treated in -situ by tyning and emu picking to remove bonded asbestos;
- Asbestos fines impacted soils were to be excavated and disposed offsite; and
- Asbestos impacted stockpile was to be either disposed offsite or emu picked on a treatment pad.

This report can be accessed by clicking the link Remedial Action Plan – CS (2021a).

4.2.3. Stage 2 Detailed Site Investigation (DRM, 2024a)

Subsequently DRM conducted an extensive intrusive assessment with 253 test pits across both portions and prepared a stage 2 detailed site investigation report (DRM, 2024a[7]) concluding

- The potential for significant unacceptable **chemical contamination** to be present at the northwestern portion is low, but the potential to encounter isolated patches of contamination cannot be precluded;
- Asbestos identified on the surface of uncontrolled fill pad and stockpiles in the north western portion requires remediation;
- Waste material present in the north western portion requires removal; and
- The lateral extent of asbestos contamination in the central portion of OSO remains consistent with that previously proposed by CS (2021a). Asbestos does not appear to have been spread to other areas of the Central OSO portion.

DRM (2024a) recommended:

- Preparation of a remedial action plan (RAP) for north western portion to remove the identified bonded asbestos;
- Remediation of NW portion of OSO in accordance with the new RAP and remediation of the Central portion of OSO in accordance with the ARP (CS, 2021a);
- If isolated pockets of unexpected contamination are encountered during construction works, DRM recommends preparing and implementing an Unexpected Finds Protocol (UFP) to manage such instances; and
- Incorporation of the validation works into a revised final validation report for the site.

This report can be accessed by clicking the link Stage 2 Detailed Site Investigation - (DRM, 2024a).

[7] DRM, 2024a. "Stage 2 Detailed Site Investigation, Central & NW Portions Of Outer Sydney Orbital 221-227 And 289-311 Luddenham Road, Orchard Hills, NSW" (ref: DRM P23.1039.V12-R01 dated 27 September 2024)

5. PRE-REMEDIATION CONCEPTUAL SITE MODEL

A conceptual site model (CSM) is a representation of site-related information regarding contamination sources and receptors, and exposure pathways between those sources and receptors. The following CSM is based on the site history review the site walkover and the results of the stage 2 DSI (DRM, 2024a). The identified areas of environmental concern (AECs) requiring remediation are shown on Figure 3.

Table 5.1 Pre-Remediation Source, Receptor and Pathway Model

ID	AEC	COPC	Exposure Pathway	Receptor	Potential Unacceptable Risk
DRM - AEC 01	Fill material and land disturbance across Northwestern portion	Asbestos	Dust inhalation	Future site workers	Remediation for asbestos impacted soils required
DRM - AEC 02	Central OSO portion				
	Waste Materials in NW Portion	Waste and potential asbestos	Dust inhalation	Future site workers	Removal all observed waste materials

Contingency measures have been provided below to address other contamination issues that may be identified during remediation and construction works at the site.

6. REMEDIAL GOAL, CRITERIA AND EXTENT

6.1 Remedial Goal

The remedial goal is to remediate the currently identified asbestos impacted soils at the site to a level that does not pose an unacceptable risk to human health and the environment, in the context of the proposed industrial land use.

6.2 Remediation Acceptance Criteria

Remediation acceptance criteria (RAC) for the project, adopted from NEPM (NEPC, 2013), are specified below.

Table 6.2-1 Remediation Acceptance Criteria

Contaminant	Remediation Acceptance Criteria
Bonded asbestos (ACM)	0.05% w/w
Asbestos fines and fibrous asbestos (AF/FA)	0.001% w/w
Asbestos at surface (0-0.1m)	No visible asbestos at the surface

6.3. Remediation Extent

The extents of remediation required is discussed below.

6.3.1. North western portion of OSO

The inferred extent of remedial works for the NW portion is presented on Figure 4. The inferred extent of remedial works required to address the remedial goal, is set out in below.

Table 6.3.1-1 Remediation Extent in NW Portion

AEC ID	AEC Description and Lateral Extent	Nominal Depth	COPC
DRM AEC01a	Stockpile area, ~200m^2 area	1m	Bonded ACM
DRM AEC01b	Uncontrolled fill pad, ~1850 m^2 area Includes friable asbestos impacted soils identified in one location (TP604)	0.1-0.5m bgl	Bonded ACM
DRM AEC01c	Stockpile area ~270 m^2 area	0.7m	Bonded ACM
Waste Stockpiles	Waste stockpile, concrete and road base stockpile and waste stockpile with concrete, wires and metal pipes	To the ground surface	Waste materials

6.3.2. Central portion of OSO

The intrusive assessment conducted by DRM (2024a) with 193 test pits in the central OSO portion did not identify asbestos in areas outside of the asbestos remediation areas specified in the asbestos remediation plan (CS, 2021).

As such, the remediation extent for the central portion of OSO will be exactly as specified in ARP prepared by CS (2021a).

The remediation extents for Central OSO, as specified by CS (2021a) and confirmed by DRM, are shown on Figure 5.

The remediation extent shown on Table 7.1.1 of the asbestos remediation plan (CS, 2021a) is reproduced below for convenience.

Table 6.3.2-1 Remediation Extent in Central Portion (extracted from CS (2021a))

AEC ID	AEC Description	Indicative Quantities	Assumptions
AEC01a	Former stockpile area: bonded ACM impacted western portion	180m^3	~600m^2 area, nominal depth of 0.3m
AEC01b	Former stockpile area: bonded ACM impacted Eastern portion	300m^3	~3,000m^2, nominal depth of 0.1m
AEC01c	Former stockpile area: Friable impacted southern portion	140m^3	~700m^2, nominal depth of 0.2m
AEC01d	Former stockpile area: Friable impacted AEC01d:~900m^2, surface	180m^3	~900m^2, nominal depth of 0.2-0.4m
AEC02	Data gap: Disturbed soils, obscured by vegetation (~150m^2)		~150m^2
AEC03a	Site disturbed areas with ACM on surface	30m^3	~300m^2, nominal depth of 0.1m
AEC03b	Site disturbed areas with ACM on surface	20m^3	~200m^2, nominal depth of 0.1m
AEC03c	Site disturbed areas with ACM on surface	20m^3	~200m^2, nominal depth of 0.1m
AEC03d	Site disturbed areas with ACM on surface	125m^3	~500m^2, nominal depth of 0.25m
AEC04	Stockpile with Demolition waste	20m^3	7m long and 5m wide, 1m high and conversion bulking factor of 0.5

7. REMEDIAL OPTIONS

The preferred hierarchy of remedial options for site clean-up and/or management, as set out in s.6(6) Assessment of Site Contamination Policy Framework of Schedules A and B of NEPC (1999) is as follows:

- On-site treatment of contamination, so that it is destroyed, or the associated risk is reduced to an acceptable level;
- Off-site treatment of excavated soil so that the contamination is destroyed, or the associated risk is reduced to an acceptable level, after which the soil is returned to the site; or

if the above are not practicable;

- Consolidation and isolation of the soil by on-site containment with a properly designed barrier; and
- Removal of contaminated material to an approved site or facility, followed, where necessary, by replacement with appropriate material; or
- Where the assessment indicates remediation would have no net environmental benefit or would have a net adverse environmental effect, implementation of an appropriate management strategy.

7.1. Remediation Options Assessment

For the purpose of assessing remedial options, a selection of qualitative remedial option ranking criteria have been adopted. These criteria and the ranking system are presented in Table 7.1-1.

Table 7.1-1 Remedial Option Assessment Ranking Criteria

	Score				
Criteria	**0**	**1**	**2**	**3**	**4**
Applicability	Not applicable	◄----------		----------►	Widely available
Technical Feasibility	Unfeasible	◄----------		----------►	Feasible
Effectiveness	Limited effectiveness for intended purpose	◄----------		----------►	Highly effective for intended purpose
Stakeholder Acceptance	Unlikely acceptable to stakeholders (EPA, Council and community)	◄----------		----------►	Highly likely to be acceptable to stakeholders
Cost	Likely highest	◄----------		----------►	Likely lowest
Sustainability	Unsustainable	◄----------		----------►	Sustainable in terms of environmental management and corporate / social responsibility
Duration	Long term	◄----------		----------►	Short term

The options considered, along with a qualitative ranking, are presented in Table 7.1-2.

Table 7.1-2 Remedial Options

Criteria	Onsite Treatment	Containment	Excavation and Disposal	Comment
Applicability	2	2	4	Onsite treatment of bonded asbestos impacted soils is very effective, **depending on the dimension of the asbestos fragments present**. Onsite treatment of AF/FA (friable asbestos) impacted soils is not possible. Onsite containment, whilst applicable to asbestos impacted soil, is unlikely to be allowed by Council unless the containment is excised from residential lots. Excavation and offsite disposal removes the contamination altogether.
Technical Feasibility	3	3	3	All options feasible
Effectiveness	3	3	4	Onsite treatment of bonded asbestos impacted soils is effective if implemented correctly, though some soil may still require disposal offsite if it fails validation. The effectiveness also depends significantly on the cohesivity of soil and the **on the dimension of the asbestos fragments present.** Onsite treatment is not applicable for friable asbestos impacted soils. Containment is effective but it requires management in the long term. Excavation and offsite disposal is highly effective as potential unacceptable risks are removed from site.
Stakeholder Acceptance	3	1	4	*Views amongst stakeholders could vary. DRM has not canvased the views of various stakeholders. This score is conjecture only, based on our previous experience on contamination within residential sites.* Onsite treatment and Excavation and disposal would be deemed significantly more acceptable by Council and future land owners.
Cost	3	3	1	Offsite disposal is costly.
Sustainability	4	3	2	Onsite treatment is likely to be deemed more sustainable. Onsite containment will likely require more long term effort, and it is considered to be passing the issue to future generations. Offsite disposal requires effort and is considered transferring the issue to another location.
Duration	2	2	4	Onsite treatment would likely take the longest amount of time to complete. Offsite disposal would likely take less time.
Score	**20**	**17**	**22**	

7.2 Preferred Remedial Strategy

Based on the above assessment of applicable remediation options, discussions with the client and based on our experience, the preferred remedial strategy is:

- Offsite disposal of the waste stockpiles present in the NW portion;
- Onsite treatment of bonded asbestos impacted soils across the site; and
- Offsite disposal of friable asbestos impacted soils (AF/FA).

DRM notes that the effectiveness of onsite treatment of bonded asbestos depends on the dimensions of the asbestos fragments and the cohesivity of the soils being treated. If asbestos fragments are less than 20mm for example, they would be difficult to observe in cohesive soils present on site. Should this be the case, treated soil will likely fail validation and will either require re-treatment or offsite disposal.

8. ADDITIONAL ASSESSMENT

No additional assessment is required to execute the proposed remediation works across the site. However, DRM recommends that validation sampling be designed to ascertain the contamination status of soils underneath the waste material stockpile.

9. REMEDIATION STRATEGY

9.1 Schedule of Remediation

Based on the confirmed extent of remediation as specified in Section 6.3 above, the remedial works are expected to take up to four weeks to complete.

9.2 Approvals and Notifications

The proposed remedial works will likely class as Category 2 remediation under State Environmental Planning Policy (SEPP) Resilience & Hazards (2021). However, we note that this remediation works will be conducted as part of the proposed redevelopment of the site, and therefore will form part of the development consent for the redevelopment.

SafeWork NSW requires notification of the proposed remediation work, at least 7 days prior to commencing works. Details of the remediation contractor, license details, remediation strategy, and risk management measures must be included in the notification to SafeWork NSW.

Friable asbestos remediation will require class A licensed asbestos removal contractors. Alternatively, the works can be conducted by a class B licensed contractor, with supervision from a class R licensed contractor.

Bonded asbestos remediation should be conducted by a class B or class A licensed asbestos removal contractor.

Within 30 days of completion of remediation and validation works, a notice of completion of the remedial works and a validation report will be submitted to the relevant planning authority.

9.3 Stability of Structures

There are no structures on site. The proposed remediation works will not affect the stability of structures.

9.4 Demolition Works

There are no structures on site. The proposed remediation works will not require demolition of structures.

9.5 Remedial Works

The remediation works will be conducted as follows:

9.5.1 Responsibilities of the Remediation Contractor

The remediation contractor will be responsible for:

- Fencing off the work area and allocating appropriate remediation exclusion zones, decontamination zones etc.;
- Site establishment, including stabilising of site access entry/exit points and boundaries of remediation areas;
- Provision of worker amenities on site;
- Establishment of sediment and erosion controls;
- Establishing load out areas and routes for trucks to enter and exit the remediation works areas;
- Transport and disposal of wastes to appropriately licensed facilities;
- Retaining records of the transport and disposal of all wastes generated during remedial works (i.e. maintaining a truck register); and
- Backfilling excavations and restoring the site as required.

The contractor shall also prepare and implement an asbestos removal control plan (ARCP) during the remediation works.

9.5.2 Client's Responsibilities

The client will be responsible for the following:

- Engage contractors for the transport and disposal of wastes to appropriately licensed facilities;
- Ensuring that access to the site is managed appropriately to allow the proposed assessment and remediation works to be completed without disruption; and
- Retaining receipts for the disposal of all wastes generated during remedial works.

9.5.3 Preliminaries

- The contractor will establish environmental controls and work health and safety measures as required by the RAP;
- The contractor will establish environmental controls and work health and safety measures as required by the RAP and the ARCP;
- The assessment and remediation work area will be appropriately cordoned off to restrict access;
- The environmental consultant will review the adequacy of such measures for the proposed remediation works; and
- The contractor may set up a truck load out area to allow trucks to enter and exit the site without needing to undergo proper decontamination (other than potentially washing the tyres and wheels). This may involve laying of geo-fabric to allow trucks to travel into a well-defined area that is deemed outside of the contamination excavation area.

9.5.4. Air Monitoring and Asbestos Clearances

- Asbestos air monitoring will be conducted during the removal of friable asbestos impacted areas, by a licensed asbestos assessor;
- All asbestos clearance certificates for friable asbestos removal works will be issued by a licensed asbestos assessor;
- Asbestos clearance certificate for bonded asbestos removal will be issued by the environmental consultant.

9.5.5. Remediation of Friable Asbestos Impacted Soils

NW Portion

- Friable asbestos impacted soils in the NW portion (refer to Figure 4) will be excavated and stockpiled for further testing, given that the concentrations of friable asbestos reported (0.0003%)was well below the remediation acceptance criterion of 0.001%;
- The stockpiled soil will be tested for AF/FA through laboratory analysis, at a rate of 2 samples per 25m^3;
- If asbestos concentrations exceeding the remediation acceptance criteria are reported, this soil will be loaded on to trucks and disposed offsite by Class A Licensed asbestos removal contractors. All disposal will be in accordance with a waste classification report prepared by the environmental consultant;
- If unacceptable friable asbestos is not reported in the tested samples, the stockpiled soils will be treated for bonded asbestos as specified below.

Central Portion

- Friable asbestos impacted soils in the central portion (refer to Figure 5) will be excavated and stockpiled for further testing, given that the concentrations of friable asbestos reported by CS (2021a) was well below the remediation acceptance criterion of 0.001%;
- The stockpiled soil will be tested for AF/FA through laboratory analysis, at a rate of 2 samples per 25m^3;
- If asbestos concentrations exceeding the remediation acceptance criteria are reported, this soil will be loaded on to trucks and disposed offsite by Class A Licensed asbestos removal contractors. All disposal will be in accordance with a waste classification report prepared by the environmental consultant;
- If unacceptable friable asbestos is not reported in the tested samples, the stockpiled soils will be treated for bonded asbestos as specified below.

9.5.6. Onsite Treatment of Bonded Asbestos

The bonded asbestos treatment strategy below is adopted from CS (2021a) asbestos remediation plan.

Bonded ACM contaminated soils at depth of in stockpiles

- The identified asbestos impacted soils will be excavated to their respective nominated depth interval, and as guided by the environmental consultant, using an excavator.
- The excavated soil will be transferred to a designated asbestos treatment area, spread on a 'cleared pad' area, to a maximum thickness of 0.1m, and the soil will then be treated via raking, using an excavator fitted with a tooth bucket.
- Fragments of bonded ACM observed during raking will be hand- picked by the remediation contractor and removed for offsite disposal in accordance with the relevant waste classification.
- The contractor will undertake the works in a manner that avoids further damage or burial of the ACM by the process.
- A minimum of two passes of raking and picking will be undertaken, using a grid pattern, with a 90° direction change between each pass.
- This method is proposed, to accommodate the physical properties of the soil combined with the likely presence of anthropogenic materials, as hand raking of these soils is not considered practical.
- Validation of the residual excavation and treated soils will be in accordance with Section 10.
- The excavation will be backfilled (if required) with the validated soil.

Bonded ACM contaminated soils (nominal depth of 0.1m)

- The in situ surface area of asbestos impacted soils will be systematically visually inspected and fragments on the surface hand-picked by the remediation contractor.
- The lateral area of each respective AEC will then be treated via raking to a depth of 0.1m below ground level, using an excavator fitted with a tooth bucket.
- Fragments of bonded ACM observed during raking will be hand- picked and removed for offsite disposal in accordance with the relevant waste classification.
- A minimum of two passes of raking and picking will be undertaken, using a grid pattern, with a 90° direction change between each pass.
- The contractor will undertake the works in a manner that avoids further damage or burial of the ACM by the process.
- This method is proposed, to accommodate the physical properties of the soil combined with the likely presence of anthropogenic materials, as hand raking of these soils is not considered practical.

9.5.7. Removal of Waste Stockpiles

- All waste material stockpiles identified in NW portion will be excavated, segregated into various waste streams and disposed offsite;
- Where possible, recyclable materials (concrete, metal etc.) will be disposed to licensed recycling facilities;
- All disposal will be in accordance with a waste classification report prepared by the environmental consultant.

9.5.8 Validation Sampling

- The consultant will conduct validation works in accordance with the specifications below in Section 10. Laboratory analysis will be conducted on an urgent basis, with results to be received within one business days after sampling; and
- The consultant will review the analytical results and inform the contractor of the success of remediation works for specified portions of the remediation area.

9.5.9 Decontamination

- Following the completion of the remediation works, the equipment used for remediation should be appropriately decontaminated by washing with pressurised water;
- An asbestos clearance certificate should be obtained from a licensed asbestos assessor for all decontaminated tools and equipment, after completion of friable asbestos remediation works.

9.5.10 Site Reinstatement

- Following the completion of validation, the contractor will reinstate the remediation footprint as appropriate;
- Approved backfill material includes soil classified as virgin excavated natural material (VENM) or excavated natural material (ENM) in accordance with the definitions provided in the POEO Act and the NSW EPA Resource Recovery Orders;
- ENM or VENM proposed to be imported to the site must be generally consistent with the existing soil properties and should not be saline or aggressive beyond the acceptable limits for the proposed development;
- Material proposed for importing for backfilling will be compatible with existing soil characteristics for site drainage purposes. Nominating engineering properties (compaction, density, moisture content) is not within the scope of this RAP and will be specified by others;
- The environmental consultant shall validate each source of backfill material as specified in Section 10 below;
- The environmental consultant shall monitor the delivery and receipt of all approved backfill material to ensure consistency between the approved material and received materials;
- The remediation contractor will be responsible for:
  - Inspecting every load of imported material for consistency with the material described in the relevant certification, including that the material is free of anthropogenic materials, odours or staining;
  - Maintaining a record of inspection of each load;
  - Maintaining detailed records of all material imported to site, including details of the supplier/s, source of the material, quantity of the material, importing vehicle registration numbers, and dates/times the material is received on site;
  - The remediation contractor will be responsible for retaining records of the certification, importation and placement of all remedial excavation backfill materials;

9.5.11 Demobilisation

- Following the completion of all remediation and validation works, the contractor will demobilise from site, removing all equipment, sheds, offices and fencing.

9.6 Unexpected Finds and Contingency Plans

There is a degree of uncertainty inherent in site assessment and remediation works. Contingency plans and protocols to be implemented if such unexpected finds are encountered, are presented below.

Table 9.6-1 Contingency Plan

Scenario	Contingency Plan
Unexpected, buried contamination or underground structures encountered during remedial works (e.g. buried waste, underground storage tank, underground sump/pit).	Cease remedial works. Consider undertaking intrusive soil investigations into and around the unexpected find, to assess the potential nature and extent of the contamination / structure. Consider undertaking groundwater assessment works, if the potential nature and extent of the contamination / structures suggest a risk to groundwater. Prepare an amendment to the remediation and/or validation strategy in the RAP (if required), pending the outcomes and of the soil and/or groundwater assessment works. Remediate the unexpected contamination. Undertake validation of the remedial works.
Potential asbestos containing materials encountered beyond the inferred extent of remediation.	Cease remedial works. Consider undertaking intrusive soil investigations into and around the potential asbestos identified beyond the inferred remedial extent and assess whether the asbestos is bonded and/or friable. Prepare an amendment to the remediation and/or validation strategy in the RAP. Remediate the unexpected contamination. Undertake validation of the remedial works.
Bonded asbestos is not practical or feasible to be treated on site due to size or soil cohesivity	Consider adding gypsum to the soil to dehydrate it prior to re-sieving it and spreading it. Consider using a mechanical screen with smaller apertures, once the soil is dehydrated. If above if impractical, or unfeasible, consider offsite disposal
Inability to continue onsite treatment works due to excessive dust, asbestos identified in air monitoring or due to neighbour complaints	Better implementation of asbestos control measures and dust control measures Consider offsite disposal

10. REMEDIATION VALIDATION

All remediation work will be validated as shown below.

Table 10.1 Validation Strategy

Remediation Scenario	Validation Strategy
Excavation base	Visually assess excavation base. Collect 10L bulk samples at a rate of 1 sample per 25m^2 on the excavation base and screen for bonded asbestos as per NEPC (2013). ▲ If bonded asbestos results are <0.01%, the area is validated for bonded asbestos. Collect and analyse a 500ml sample for asbestos fines and fibrous asbestos (AF/FA) ▲ If bonded asbestos results are >0.01%, then the area requires further remediation as per the consultant's advice. If AF/FA is identified, then representative soils will require excavation and offsite disposal.
Excavation Walls	Visually assess excavation walls. Collect 10L bulk samples at a rate of 1 sample per 5 linear metres on the walls and screen for bonded asbestos as per NEPC (2013). ▲ If bonded asbestos results are <0.01%, the area is validated for bonded asbestos. Collect and analyse a 500ml sample for asbestos fines and fibrous asbestos (AF/FA) ▲ If bonded asbestos results are >0.01%, then the area requires further remediation as per the consultant's advice. If AF/FA is identified, then representative soils will require excavation and offsite disposal
Soils treated for bonded asbestos	Visually assess the spread and handpicked soils, while it remains spread. Collect 10L bulk samples (extending across the full depth of the spread) at a rate of 1 sample per 25m^2 on the tyned and handpicked spread surface, and screen for bonded asbestos as per NEPC (2013). ▲ If bonded asbestos results are >0.01%, then the area requires further remediation as per the consultant's advice. ▲ If bonded asbestos results are <0.01%, the area is validated for bonded asbestos. ▲ Such soils shall be scraped from the treatment pad and stockpiled into small stockpiles not exceeding 25m^3. ▲ Collect 2 samples from each small stockpile and analyse a 500ml samples for asbestos fines and fibrous asbestos (AF/FA) ▲ If AF/FA is identified, then implement the unexpected finds protocol specified in Section 9.6.
Footprints of friable asbestos stockpiles	Collect soil samples from the surface of the footprint at the rate of 1 sample per 100m^2 or part thereof and analyse at the laboratory for AF/FA. If AF/FA is identified, then implement the unexpected finds protocol specified in Section 9.6.
Footprints of Waste stockpiles in NW corner	Collect soil samples from the surface of the footprint at the rate of 1 sample per 100m^2 or part thereof and analyse at the laboratory for AF/FA and metals, TRH/BTEX, PAH and OCP. If AF/FA is identified, then implement the unexpected finds protocol specified in Section 9.6. If concentrations of chemical contaminants exceeding the HIL D investigation levels are reported, seek guidance from the environmental consultant.

Remediation Scenario	Validation Strategy
Imported VENM for backfilling	Only fill material that has been approved by the consultant (either based on the review of reports provided or by assessments conducted by the consultant) should imported to the site. Material imported to the site will be validated as follows: ▲ Collect 1 sample per 100m^3 or minimum of 3 samples for volumes up to 500m^3 from a single source. The testing rate may be revised by the environmental consultant for greater volumes from the same source site, based on the initial results and the risk for contamination to be present. ▲ Laboratory analysis of all samples for TRH, BTEX, PAH, OCP, PCB, metals and asbestos. ▲ Material will be deemed acceptable for use if: ▲ No asbestos is reported; ▲ Concentrations of hydrocarbons and pesticides are less than laboratory limit of reporting; and ▲ Concentrations of metals are within background concentrations.
Imported ENM for backfilling	Material classified as ENM will need to meet the requirements specified in the NSW EPA (2014) Excavated Natural Material Exemption and the Order.

11. SITE VALIDATION REPORT

At the completion of remedial works, a site validation report will be prepared with reference to the relevant sections of NSW EPA (2020) reporting guidelines. The site validation report will include:

- An executive summary;
- The scope of reporting work undertaken;
- Site identification details;
- A summary of geology and hydrogeology;
- A summary of site condition and the surrounding environment;
- Information on supplementary contamination assessment works undertaken (if any);
- Summary of the remedial action plan;
- Remediation and validation activities undertaken;
- Information on waste management;
- Information on the remedial works undertaken;
- Information on imported material;
- An assessment of field and laboratory quality assurance / quality control data;
- Validation results and discussion;
- A post remediation conceptual site model;
- Conclusions; and
- Recommendations.

12. SITE MANAGEMENT DURING REMEDIATION

This section provides general guidance for management of the site during remediation works. Where there are inconsistencies between this RAP and the development consent conditions, the consent conditions shall take precedence.

12.1 Hours of Operation, Signage and Security

The hours of operation at the site will be limited to:

- Days and times set out in the relevant development consent conditions (if available); or
- Monday to Friday between 7:00am and 5:00pm, and Saturday between 8:00am and 1:00pm.

The 24-hour contact details of the remediation contractor will be put on a sign, and posted on the site boundary, adjacent to the site access point. The sign will be maintained by the remediation contractor until completion of remedial works.

Security of the site will be maintained for the duration of the remedial works, with appropriate boundary fencing/barricades and access point locks.

12.2 Workplace Health and Safety

12.2.1 Safe Work Method Statement

All parties intending to undertake tasks in the remediation area/s will prepare a safe work method statement (SWMS) that documents:

- The task/s to be undertaken;
- Hazards associated with undertaking those task/s;
- A risk assessment of each hazard, considering consequence and likelihood;
- Control measures to be implemented to mitigate identified risks; and
- A re-assessment of each hazard, assuming control measure implementation, and showing a demonstrable decrease to the risk.

12.2.2 Personal Protective Equipment

The following personal protective equipment (PPE) will be worn (as a minimum) by all persons working on, or visiting, the remediation work area/s:

- Respiratory protection for friable asbestos remediation works;
- Long sleeves and long pants;
- A high visibility vest (or clothing);
- Hard hat;
- Protective foot wear (e.g. safety boots);
- Eye protection (e.g. safety glasses or goggles); and
- Cut resistant gloves.

Additional PPE or respiratory protective equipment (RPE) may also be required, subject to the control measures set out in the SWMS for the task.

12.2.3 Decontamination

The following decontamination procedure will apply to all persons existing the remediation work area/s:

- Cleaning of protective footwear, including removal of potentially contaminated material from the soles of the footwear;
- Washing of hands (including prior to eating, drinking or smoking);

- All machinery exiting the remediation zones will need to be appropriately decontaminated.

The contractor may set up a truck load out area to allow trucks to enter and exit the site without needing to undergo proper decontamination (other than potentially washing the tyres and wheels). This may involve laying of geo-fabric to allow trucks to travel into a well-defined area that is deemed outside of the remediation excavation area.

12.2.4 Occupational Hygiene

Not applicable.

12.2.5 Biological Risks

Not applicable.

12.3 Waste Management

Wastes generated during remedial works will be removed from site for recycling / disposal, with reference to the Protection of the Environment Operations Act 1997.

The remediation contractor will maintain detailed records of each load of waste materials generated during remedial works, including:

- The location the waste was generated from;
- The classification of the waste;
- The date and time the waste was removed from the site;
- The vehicle registration number of the waste transport vehicle;
- The quantity of the load of waste removed from site;
- Waste receipt docket from the waste receiving facility; and
- Weighbridge docket from the waste receiving facility.

12.4 Stormwater and Soil Management

12.4.1 Access and Egress

Vehicle and plant site access/egress will be managed to prevent soils being tracked onto roads and pathways external to the site (e.g. gravels, gabions, cattle grids). Soil will be broomed or washed off tyres/tracks prior to the vehicle or plant leaving the remediation work area. Broomed/washed soil will be managed onsite, depending on its likely contamination status. In the event soils are tracked onto roads or pathways external to the site, these soils will be removed by sweeping and/or shovelling.

A sediment and erosion control plan will be prepared by the remediation contractor, to suit the nature and staging of the remedial works. Control measures will be operated and maintained by the remediation contractor, until completion of the remedial works. Surface stormwater generated from (or travelling through) the remediation works area, will be managed using relevant measures set out in the Blue Book[8].

12.4.2 Excavation Pump Out and Groundwater

Should excavations require water to be pumped out, the water will be sampled and analysed by a suitably experienced environmental consultant, for total suspended solids (TSS), pH, metals (8) and petroleum hydrocarbons.

[8] Landform 2004, 'Managing Urban Stormwater – Soils and Construction'

If the laboratory analytical results are less than the relevant[9] aquatic ecosystem groundwater investigation levels (GILs) set out in ANZG (2018) or MHSPE (2000)[10] for petroleum hydrocarbon, then the excavation water may be discharged to the local stormwater system.

If the laboratory analytical results are greater than the relevant[11] aquatic ecosystem groundwater investigation levels (GILs) set out in ANZG (2018) or MHSPE (2000), then other options for the excavation water will be considered, including:

- Assessment of proposed receiving waters, in the context of the contaminant concentrations found in the excavation water;
- Removal and offsite disposal by a liquid waste contractor; and
- Discharge to sewer under an approval obtained from the relevant sewerage infrastructure operator.

In the event the site requires dewatering, development consent from the relevant planning authority and/or approvals from the state water authority, will be obtained (if required).

12.4.3 Stockpiles

Stockpiles of material generated during remedial works will be:

- generally constructed as low elongated mounds on level surfaces;
- stored in secure areas and covered if remaining on site for more than 24 hours;
- placed away from stormwater pits, drainage lines and gutters;
- kept damp if containing (or suspected of containing) asbestos;
- not located on footpaths or nature strips, unless approved by the local planning authority.

12.4.4 Rehabilitation

Not applicable. Refer to Section 9.5.10.

12.5 Noise and Vibration Control

Plant and equipment being utilised for remedial works, will be fitted with noise attenuation devices (e.g. exhaust mufflers). Where possible, selection and use of reversing alarms will avoid standard tonal pulse alarms.

Vehicle access roads will be designed to mitigate the need for vehicles and mobile plant to reverse during travel (e.g. creation of turning circles in the immediate vicinity of remediation work area/s).

'Offensive noise,' as defined under the Protection of the Environment Operations Act 1997, will not be emitted beyond the site boundary, during remedial works.

Vibrations generated during remedial works will be managed to mitigate risk of damage to structural assets and risk of amenity loss to adjacent land occupiers. Advice from geotechnical, structural or vibration consultants will be sought, if required.

12.6 Dust Control

Consideration will be given to the following control measures, to mitigate risk of dust emissions migrating beyond the boundary of the remediation work area/s:

- Maintaining site access / egress stabilisation methods;
- Covering loads during site access / egressing;
- Covering stockpiles of contaminated soil that remain on site for greater than 24 hours;

[9] Freshwater
[10] Dutch Ministry of Housing, Spatial Planning and Environment (MHSPE) 2000, 'Circular on Target Values and Intervention Values for Soil Remediation'
[11] Freshwater

- Use of water sprays in areas prone to dust generation, including excavation surfaces and fill material (during offloading and spreading);
- Use boundary water spray systems;
- Establishing screens around the perimeter of remediation work area/s (e.g. application of shade cloth to fencing);
- Minimising soil excavation and/or handling during windy days; and
- Sweeping of accumulated soil on hardstand areas.

12.7 Odour Control

Should odours be detected at the site boundary during remediation works, monitoring of those odours may be undertaken, using methods[12] suited to the odour type, based on recommendations from a suitably experienced odour consultant (if required).

12.8 Atmospheric Monitoring

The contractor will monitor the generation of dust during remediation works and take measures to avoid the generation of dust. Surfaces will be kept moist with water spray, and water spray will be aimed at the excavation face and trucks being loaded to manage dust generation.

asbestos air monitoring is required for the removal of friable asbestos.

12.9 Traffic

The remediation contractor will:

- Utilise suitable experienced and qualified traffic controllers (as required);
- Ensure vehicles exit the site in a forward direction; and
- Arrange for receipt and dispatch of materials during approved remedial working hours (refer Section 12.1).
- Traffic and haulage routes will be selected based on:
- Preference for state-controlled roads (as opposed to local roads);
- Compliance with traffic road rules; and
- Opportunities to mitigate noise, vibration, dust and odour impacts to properties/occupants adjacent to the site.

12.10 Emergency Preparedness and Response

An emergency assembly point will be established at an appropriate location, and this location communicated to workers and visitors during the site induction process. In the event an emergency situation arises, workers and visitors will assemble at this location (if safe to do so) and await further instructions from the site supervisor, project manager or emergency services.

Spill control kits and fire extinguishers will be located at appropriate locations at the site.

12.11 Community Relations

The area of proposed asbestos remediation works is located within a low and medium density residential area. As such, DRM considers that notification of occupants in the neighbouring properties is warranted. DRM notes that the nearby residents observing the remediation works could contact Council or SafeWork NSW to discuss their concerns, and as such, the client and the contractor should be prepared for inspections by Council or SafeWork NSW.

[12] Methods could include instrumental, chemical analysis, electronic, sensory tests or olfactometry.

13. CONCLUSIONS AND RECOMMENDATIONS

DRM considers that the remedial goal can be achieved and that the site can be made suitable for ongoing industrial land use, if the measures specified in this remedial action plan are implemented.

DRM considers that the remedial goal can be achieved, and **the site can be made suitable for the proposed industrial land use, if the measures specified in this remedial action plan are implemented**. The proposed remediation strategy (excavation and offsite disposal) is a proven strategy that removes identified contamination and can be conducted safely and effectively.

A validation report will be prepared to document the remediation and validation works undertaken, and to demonstrate that the remediation goal has been achieved.

This report must be read in conjunction with the ***Limitations and General Information*** at the front of this report.

14. REFERENCES

CS, 2021. "Asbestos in Soil Assessment, 221-227 Luddenham Rd, Orchard Hills, NSW, PART LOT 1, IN DP 1099147" (ref: 10791EV.P.68-R05 dated 15 February 2021)

CS, 2021a. "Asbestos Remedial Plan, 221-227 Luddenham Rd, Orchard Hills, NSW, 'Portion of Lot 1, IN DP 1099147' " (ref: 10791EV.P.68-R08 dated 17 February 2021)

DRM, 2024. "Final Validation Report, 221-227 & 289-311 Luddenham Rd, Orchard Hills, NSW" (ref: DRM P23.1039-R05r1 dated 23 August 2024)

DRM, 2024a. "Stage 2 Detailed Site Investigation, Central & NW Portions Of Outer Sydney Orbital 221-227 And 289-311 Luddenham Road, Orchard Hills, NSW" (ref: DRM P23.1039.V12-R01 dated 27 September 2024)

DUAP 1998, 'Managing Land Contamination Planning Guidelines SEPP55 – Remediation of Land', dated April 1999, ref: 98/65.

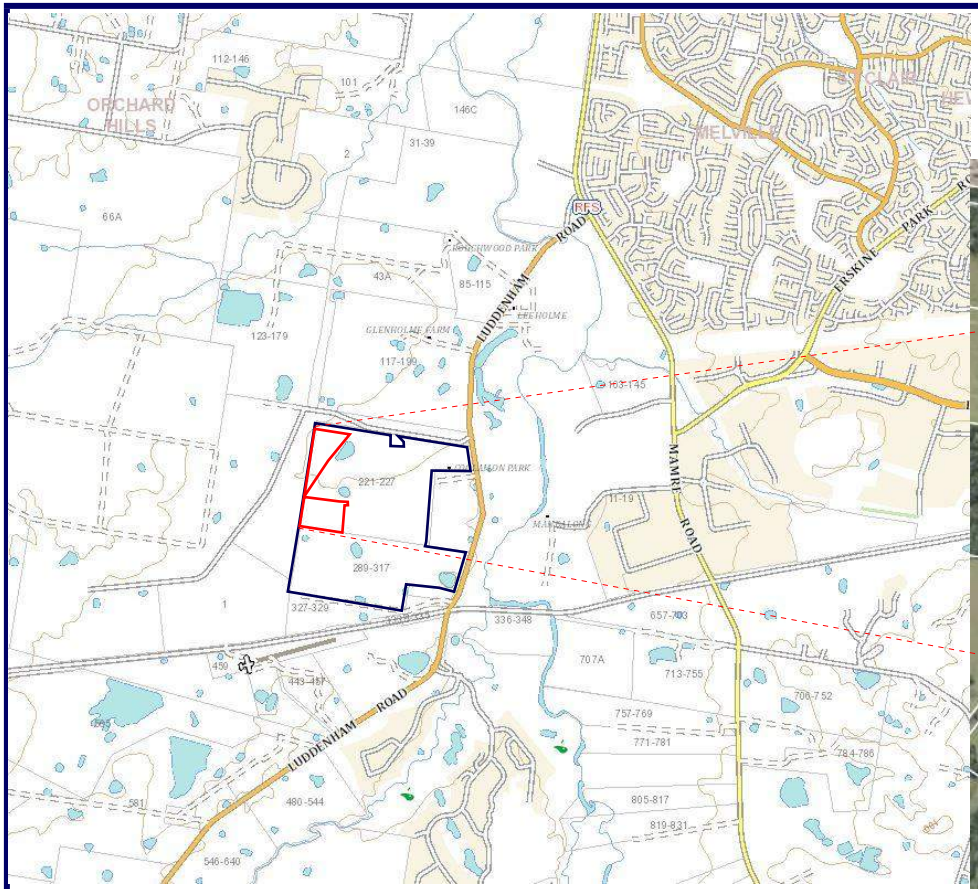
National Environment Protection Council (NEPC) 2013a, 'Schedule B(1) Guideline on Investigation Levels for Soil and Groundwater', National Environment Protection (Assessment of Site Contamination) Measure (NEPM) as amended in May 2013.

National Environment Protection Council (NEPC) 2013b, 'Schedule B(2) Guideline on Site Characterisation', National Environment Protection (Assessment of Site Contamination) Measure (NEPM) as amended in May 2013.

NSW EPA 2020b, 'Contaminated Land Guidelines: Consultants reporting on contaminated land' dated May 2020, ref: EPA2020P2233.

WA DOH 2021, 'Guidelines for the Assessment, Remediation and Management of Asbestos Contaminated Sites in Western Australia', dated August 2021.

FIGURES



Legend

Approximate Site Extent

N

Development Risk Management Pty Ltd

Scale: 500 m

Date: 27 September 2024

Drawn By: DP

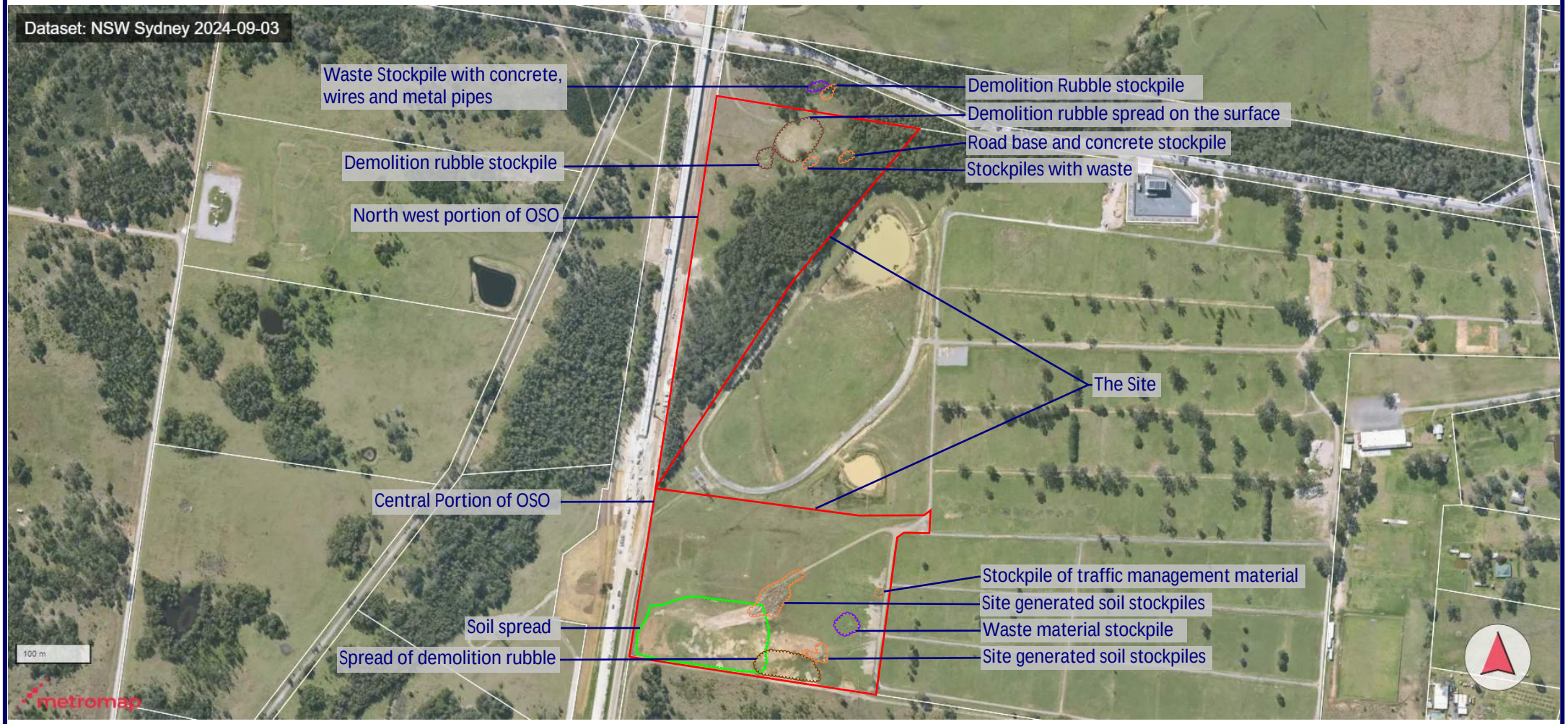
Drawing Number: P23.1039.V12-R02.F1

Client: HBB Property Pty Ltd

Project: Stage 2 Detailed Site Investigations

Location: 221-227 and 289-311 Luddenham Road, Orchard Hills

Title: Figure 1 - Site Location Plan



Legend

- Approximate Site Extent
- Stockpiles
- Demolition rubble spread
- Waste material stockpiles
- Soil spread

Development Risk Management Pty Ltd

Scale: 350 m

Date: 20 September 2024

Drawn By: DP

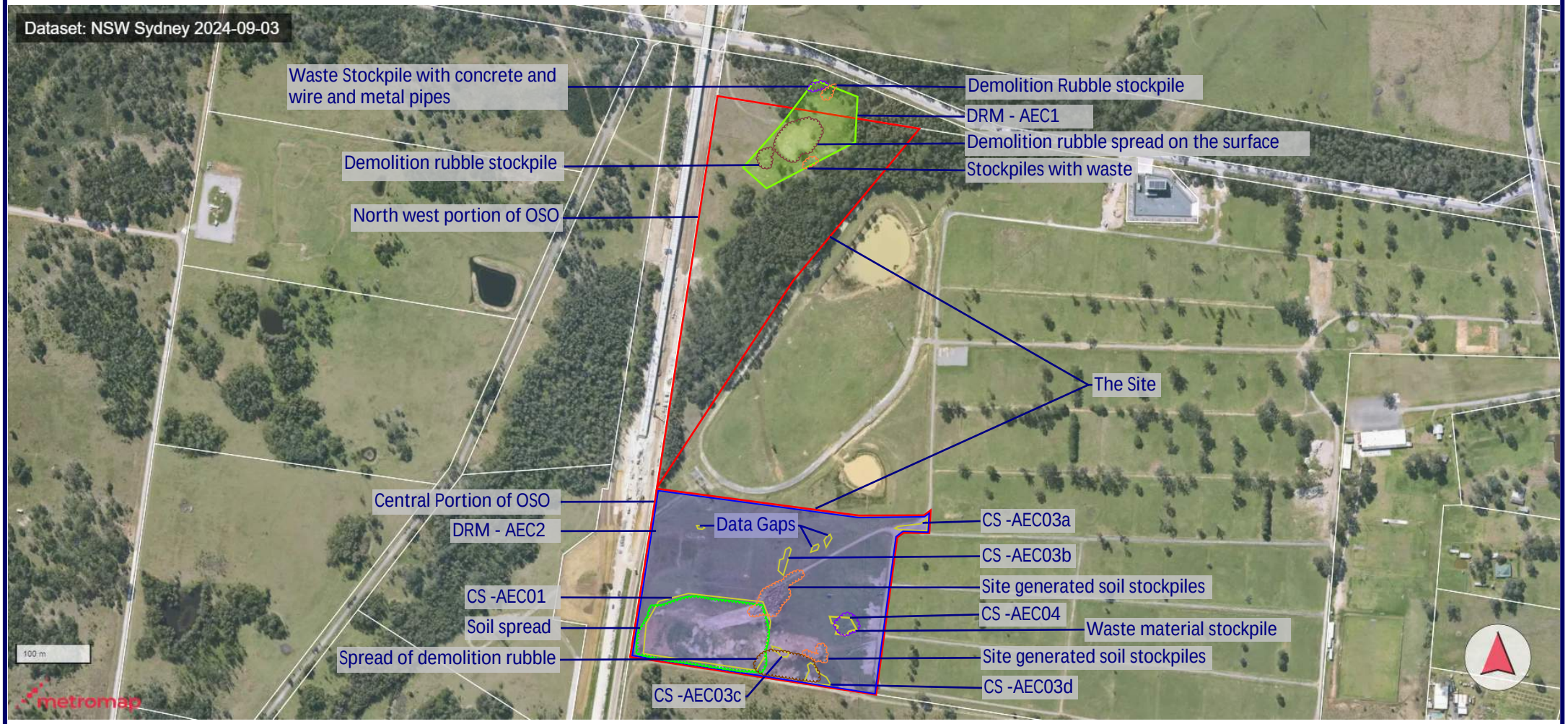
Drawing Number: P23.1039.V12-R02.F2

Client: HBB Property Pty Ltd

Project: Stage 2 Detailed Site Investigation

Location: 221-227 and 289-311 Luddenham Road, Orchard Hills

Title: Figure 2 - Site Layout Plan



Legend

- Approximate Site Extent
- DRM AEC1
- DRM AEC2
- CS Areas of concern
- Stockpiles
- Demolition rubble spread
- Waste material stockpiles

Development Risk Management Pty Ltd

Scale: 350 m

Date: 30 September 2024

Drawn By: DP

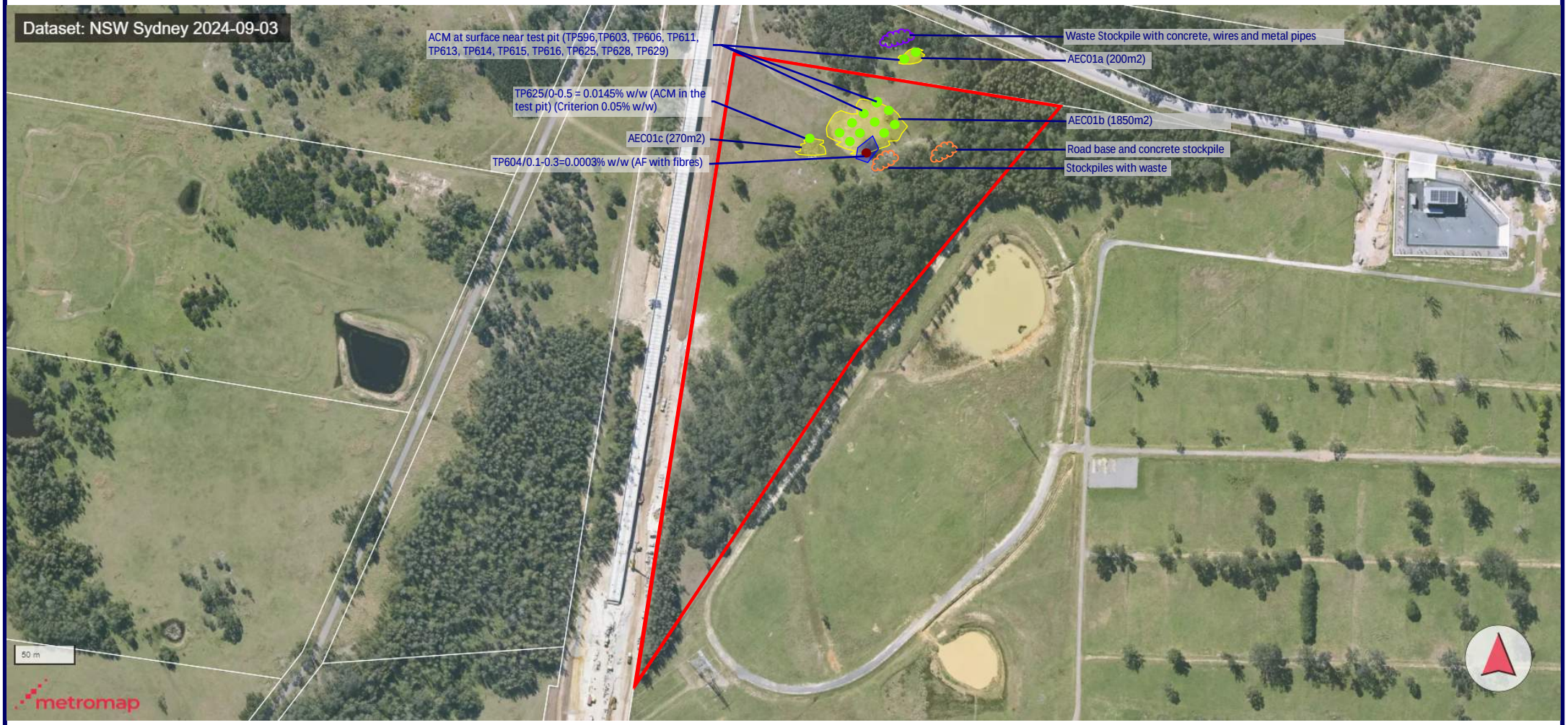
Drawing Number: P23.1039.V12-R02.F3

Client: HBB Property Pty Ltd

Project: Stage 2 Detailed Site Investigation

Location: 221-227 and 289-311 Luddenham Road, Orchard Hills

Title: Figure 3 - Areas of Concern



Legend

- Approximate Site Extent
- Bonded ACM Infered remediation extent
- AF/FA Infered remediation extent
- AF/FA
- Bonded ACM

Development Risk Management Pty Ltd

Scale: 180 m

Date: 25 September 2024

Drawn By: DP

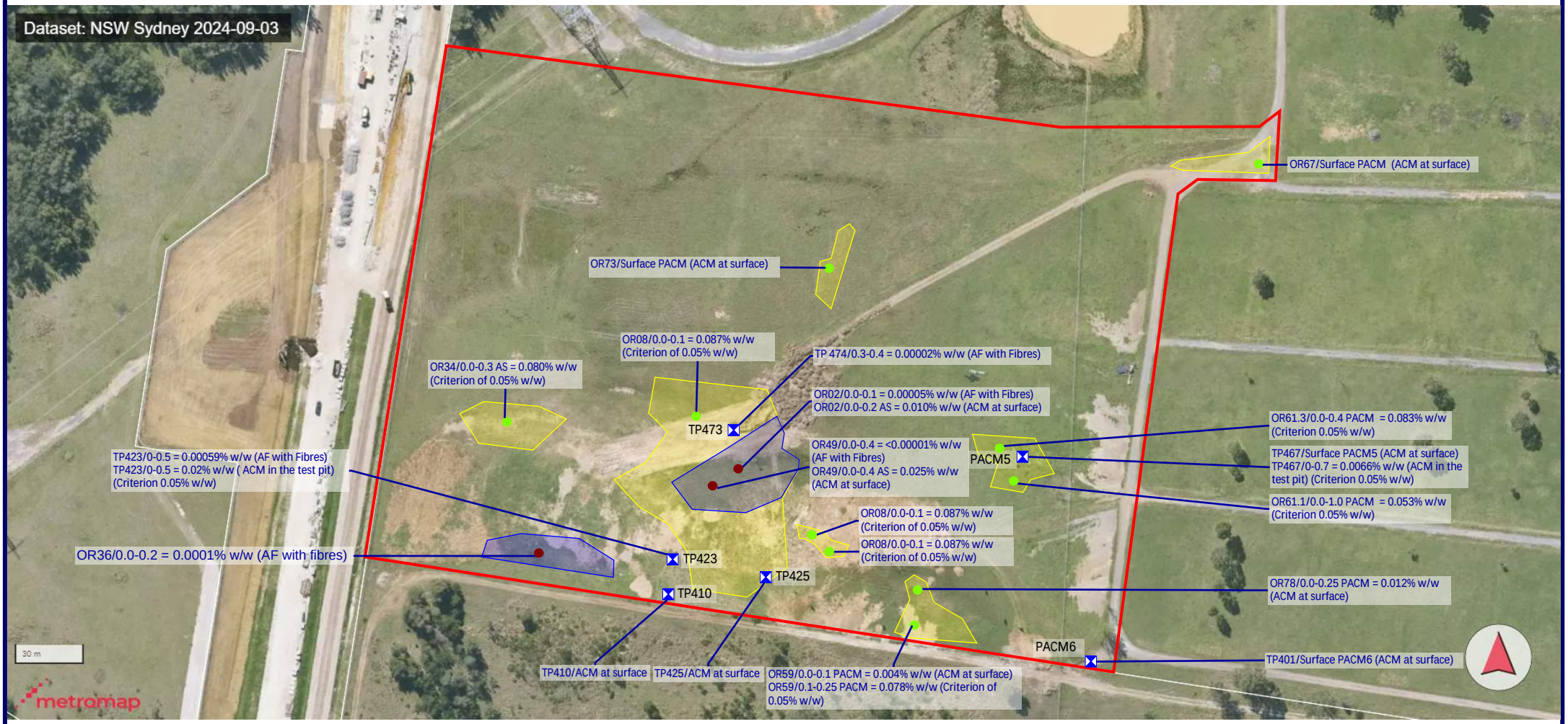
Drawing Number: P23.1039.V12-R02.F4

Client: HBB Property Pty Ltd

Project: Stage 2 Detailed Site Investigation

Location: 221-227 and 289-311 Luddenham Road, Orchard Hills

Title: Figure 4 - Inferred Remediation Extents North western Portion



Legend

- Approximate Site Extent
- CS - AF/FA Infered remediation extent
- CS - Bonded ACM Infered remediation extent
- DRM -Approximate test pit location
- CS -Exceeds AF/FA Site Criteria
- CS -Exceeds Bonded ACM Site Criteria

Development Risk Management Pty Ltd

Scale: 100 m

Date: 25 September 2024

Drawn By: DP

Drawing Number: P23.1039.V12-R01.F5

Client: HBB Property Pty Ltd

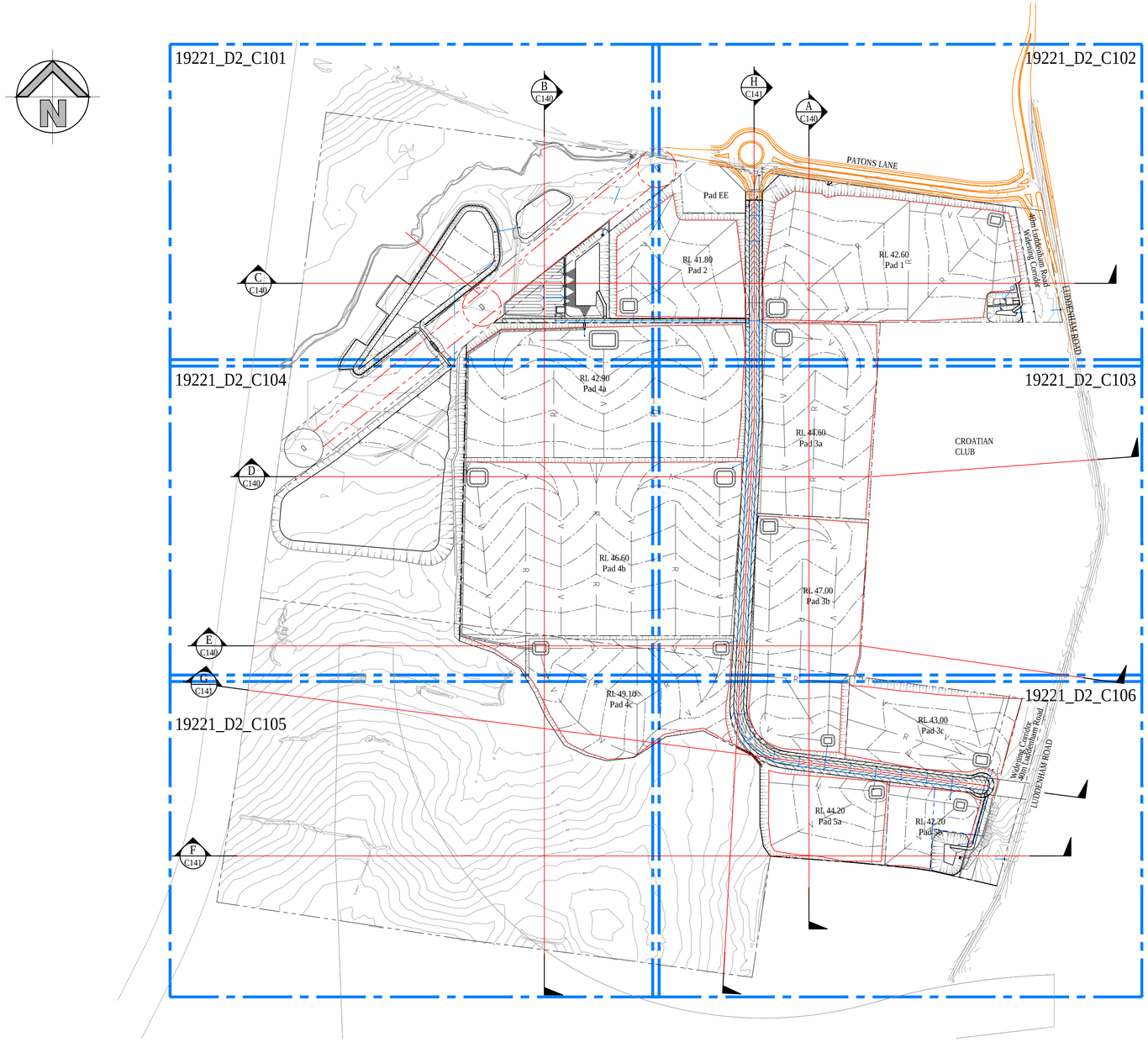
Project: Stage 2 Detailed Site Investigation

Location: 221-227 and 289-311 Luddenham Road, Orchard Hills

Title: Figure 5 - Inferred Remediation Extents Central Portion of OSO

Appendix A

Survey and Proposed Development Plans



GENERAL ARRANGEMENT PLAN

SCALE: 1:4000

NOTE:
LEVELS AND SITE GRADING SHOWN ARE PRELIMINARY ONLY AND ARE SUBJECT TO CHANGE DURING THE DESIGN DEVELOPMENT PHASE.

0 80 160 240 320 400m
80 60 40 20
SCALE 1:4000

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
04	ISSUED FOR DA ONLY	AFe	NH	13.03.2024
03	ISSUED FOR DA ONLY	AFe	NH	01.03.2024
02	ISSUED FOR DA ONLY	AFe	NH	02.10.2023
01	ISSUED FOR PRELIMINARY	MP	NH	24.08.2023

Client
HB & B PROPERTY PTY LTD

Architect
NETTLETONTRIBE

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Email email@hhconsult.com.au
Web www.henryandhymas.com.au

DRAWING TO BE PRINTED IN COLOUR

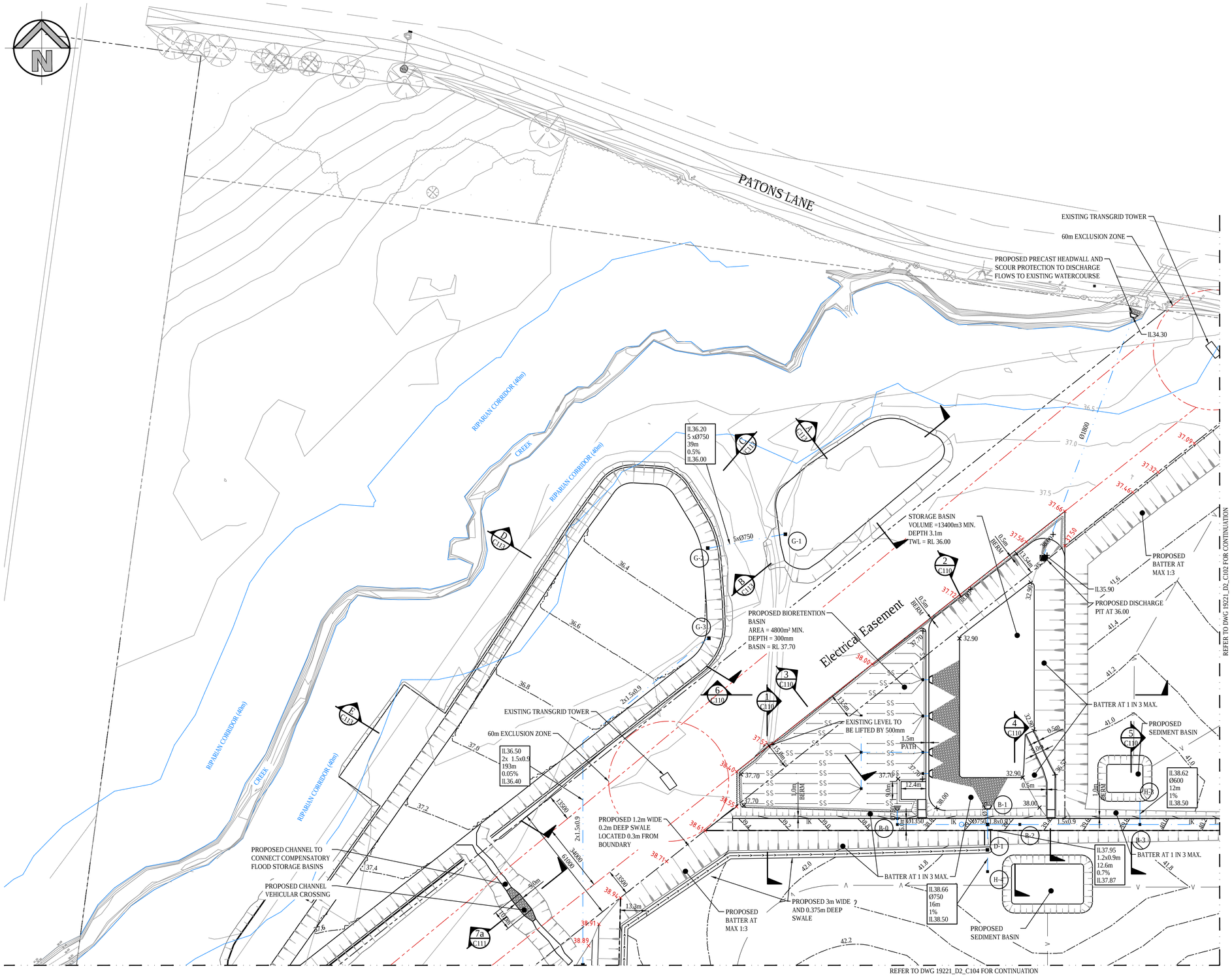
henry&hymas

Project
PROPOSED INDUSTRIAL BUSINESS PARK
221-227 & 289-317 LUDDENHAM ROAD ORCHARD HIILS

Title
GENERAL ARRANGEMENT PLAN

Drawn	Designed	Date
M.Pereira	N.Heazlewod	MARCH 2019
Checked	Approved	Scale @A1
N.Heazlewod	A.Francis	1:4000

Drawing number: 19221_D2_C100
Revision: 04



LEGEND

- PROPOSED STORMWATER PIPE
- PROPOSED BOUNDARY
- TRANSGRID EXCLUSION ZONE
- 47.00 — PROPOSED CONTOURS
- 47.0 — EXISTING CONTOURS
- PROPOSED LINTEL ONGRADE & SAG PITS
- 37.50 — PROPOSED SPOT LEVEL "BY OTHERS"
- 36.55 — EXISTING SPOT LEVEL
- SS — PROPOSED SUBSOIL LINE
- IL97.19 / Ø300 / 30m / 1% / IL96.89 — STORMWATER UPSTREAM INVERT RL. / STORMWATER PIPE DIAMETER & CLASS / STORMWATER PIPE LENGTH / STORMWATER PIPE GRADE / STORMWATER DOWNSTREAM INVERT RL.
- PROPOSED SURFACE INLET PITS
- PROPOSED JUNCTION PITS
- A-1 — LINE LETTER / PIT NUMBER — PROPOSED PIT TAG
- PROPOSED BATTER LINE

DETAIL PLAN

SCALE: 1:1000

0 20 40 60 80 100m

20 15 10 5

SCALE 1:1000

NOTE:

LEVELS AND SITE GRADING SHOWN ARE PRELIMINARY ONLY AND ARE SUBJECT TO CHANGE DURING THE DESIGN DEVELOPMENT PHASE.

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
07	ISSUED FOR DA ONLY	LC	NH	01.03.2024
06	ISSUED FOR DA ONLY	AFe	NH	12.10.2023
05	ISSUED FOR PRELIMINARY	LC	NH	06.09.2023
04	ISSUED FOR PRELIMINARY	MP	NH	24.08.2023
03	ISSUED FOR REVIEW	NH	NH	19.04.2023
02	ISSUED FOR REVIEW	NH	NH	06.04.2023
01	ISSUED FOR REVIEW	NH	NH	27.03.2023
08	ISSUED FOR DA ONLY	AFe	NH	15.03.2024

Client: HB & B PROPERTY PTY LTD

Architect: NETTLETONTRIBE

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Email email@hhconsult.com.au
Web www.henryandhymas.com.au

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henry&hymas

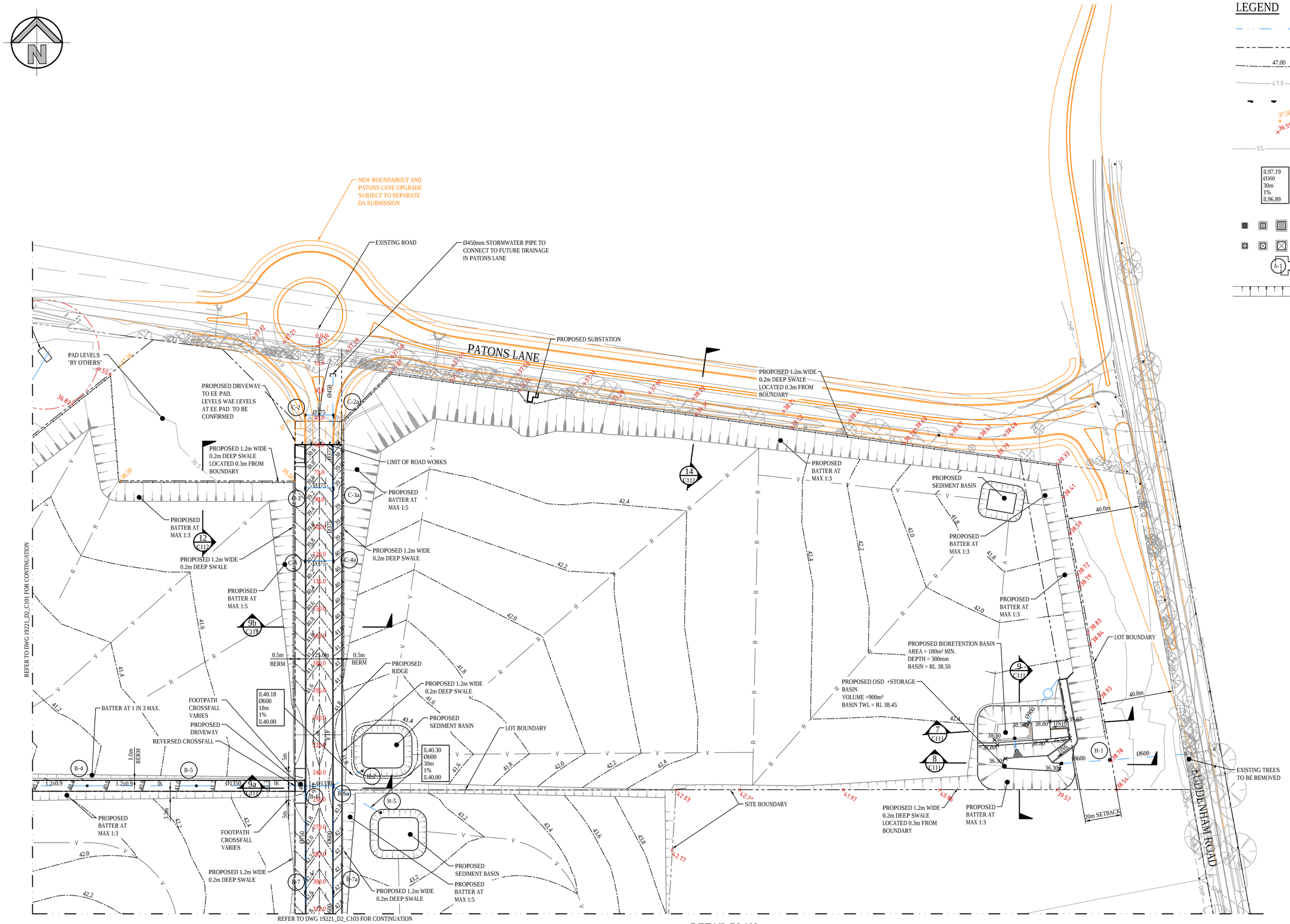
Project: PROPOSED INDUSTRIAL BUSINESS PARK
221-227 & 289-317 LUDDENHAM ROAD ORCHARD HIILS

Title: DETAIL PLAN
SHEET 1 OF 6

Drawn	Designed	Date
I.Khachab	N.Heazlewod	MARCH 2019
Checked	Approved	Scale @A1
N.Heazlewod	A.Francis	1:1000

Drawing number: 19221_D2_C101

Revision: 08



LEGEND

- PROPOSED STORMWATER PIPE
- PROPOSED BOUNDARY
- PROPOSED CONTOURS
- EXISTING CONTOURS
- PROPOSED LINTEL ONGRADE & SAG PITS
- PROPOSED SPOT LEVEL "BY OTHERS"
- EXISTING SPOT LEVEL
- PROPOSED SUBSOIL LINE
- IL97.19 / Ø300 / 30m / 1% / IL96.89 — STORMWATER UPSTREAM INVERT RL. / STORMWATER PIPE DIAMETER & CLASS / STORMWATER PIPE LENGTH / STORMWATER PIPE GRADE / STORMWATER DOWNSTREAM INVERT RL.
- PROPOSED SURFACE INLET PITS
- PROPOSED JUNCTION PITS
- A-1 — LINE LETTER / PIT NUMBER
- PROPOSED PIT TAG
- PROPOSED BATTER LINE

NOTE:
LEVELS AND SITE GRADING SHOWN ARE PRELIMINARY ONLY AND ARE SUBJECT TO CHANGE DURING THE DESIGN DEVELOPMENT PHASE.

DETAIL PLAN

SCALE: 1:1000

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
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04	ISSUED FOR PRELIMINARY	MP	NH	24.08.2023
03	ISSUED FOR REVIEW	NH	NH	06.04.2023
02	ISSUED FOR REVIEW	NH	NH	27.03.2023
01	ISSUED FOR REVIEW	NH	NH	27.03.2023
08	ISSUED FOR DA ONLY	AFe	NH	15.03.2024

Client: HB & B PROPERTY PTY LTD
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Web www.henryandhymas.com.au

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henry&hymas

Project: PROPOSED INDUSTRIAL BUSINESS PARK
221-227 & 289-317 LUDDENHAM ROAD ORCHARD HIILS

Title: DETAIL PLAN
SHEET 2 OF 6

Drawn	Designed	Date
I.Khachab	N.Heazlewod	MARCH 2019
Checked	Approved	Scale @A1
N.Heazlewod	A.Francis	1:1000

Drawing number: 19221_D2_C102
Revision: 08

REFER TO DWG 19221_D2_C102 FOR CONTINUATION

REFER TO DWG 19221_D2_C104 FOR CONTINUATION

REFER TO DWG 19221_D2_C106 FOR CONTINUATION

0.2m DEEP SWALE MAX 1:5

PROPOSED BATTER AT MAX 1:5

PROPOSED 1.2m WIDE 0.2m DEEP SWALE

0.5m BERM — 25.6m — 0.5m BERM

PROPOSED BATTER AT MAX 1:3

IL43.24 Ø600 24m 1% IL43.00

H-6

PROPOSED SEDIMENT BASIN

PROPOSED BATTER AT MAX 1:5

PROPOSED 1.2m WIDE 0.2m DEEP SWALE

IL44.20 Ø600 20m 1% IL44.00

H-7

PROPOSED BATTER AT MAX 1:3

PROPOSED 1.2m WIDE 0.2m DEEP SWALE

PROPOSED SEDIMENT BASIN

IL46.20 Ø450 20m 1% IL46.00

PROPOSED SEDIMENT BASIN

H-8

PROPOSED 1.2m WIDE 0.2m DEEP SWALE

SITE BOUNDARY

PROPOSED BATTER AT MAX 1:3

PROPOSED BATTER AT MAX 1:5

SITE BOUNDARY

SITE BOUNDARY

0 20 40 60 80 100m

20 15 10 5

SCALE 1:1000

DETAIL PLAN

SCALE: 1:1000

LEGEND

- PROPOSED STORMWATER PIPE
- PROPOSED BOUNDARY
- PROPOSED CONTOURS (47.00)
- EXISTING CONTOURS (47.0)
- PROPOSED LINTEL ONGRADE & SAG PITS
- PROPOSED SPOT LEVEL "BY OTHERS" (37.50)
- EXISTING SPOT LEVEL (36.55)
- PROPOSED SUBSOIL LINE (SS)
- IL97.19 / Ø300 / 30m / 1% / IL96.89 — STORMWATER UPSTREAM INVERT RL. / STORMWATER PIPE DIAMETER & CLASS / STORMWATER PIPE LENGTH / STORMWATER PIPE GRADE / STORMWATER DOWNSTREAM INVERT RL.
- PROPOSED SURFACE INLET PITS
- PROPOSED JUNCTION PITS
- A-1 — LINE LETTER / PIT NUMBER — PROPOSED PIT TAG
- PROPOSED BATTER LINE

NOTE:

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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
05	ISSUED FOR DA ONLY	MB	NH	01.03.2024
04	ISSUED FOR DA ONLY	AFe	NH	12.10.2023
03	ISSUED FOR PRELIMINARY	MP	NH	24.08.2023
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01	ISSUED FOR REVIEW	NH	NH	27.03.2023

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Project: PROPOSED INDUSTRIAL BUSINESS PARK
221-227 & 289-317 LUDDENHAM ROAD ORCHARD HIILS

Title: DETAIL PLAN
SHEET 3 OF 6

Drawn	Designed	Date
I.Khachab	N.Heazlewod	MARCH 2019
Checked	Approved	Scale @A1
N.Heazlewod	A.Francis	1:1000

Drawing number: 19221_D2_C103

Revision: 05

REFER TO DWG 19221_D2_C101 FOR CONTINUATION

EXISTING TRANSGRID TOWER

60m EXCLUSION ZONE

PROPOSED BATTER AT MAX 1:3

PROPOSED 3m WIDE AND 0.375m DEEP SWALE

PROPOSED BATTER AT MAX 1:3

PROPOSED SEDIMENT BASIN

SITE BOUNDARY

PROPOSED 3m WIDE AND 0.375m DEEP SWALE

PROPOSED SEDIMENT BASIN

PROPOSED BATTER AT MAX 1:3

SITE BOUNDARY

PROPOSED BATTER AT MAX 1:3

PROPOSED BATTER AT MAX 1:3

REFER TO DWG 19221_D2_C105 FOR CONTINUATION

REFER TO DWG 19221_D2_C103 FOR CONTINUATION

LEGEND

- PROPOSED STORMWATER PIPE
- PROPOSED BOUNDARY
- 47.00 PROPOSED CONTOURS
- 47.0 EXISTING CONTOURS
- PROPOSED LINTEL ONGRADE & SAG PITS
- 37.50 PROPOSED SPOT LEVEL "BY OTHERS"
- 36.55 EXISTING SPOT LEVEL
- SS SS PROPOSED SUBSOIL LINE
- Il97.19 / Ø300 / 30m / 1% / Il96.89 — STORMWATER UPSTREAM INVERT RL. / STORMWATER PIPE DIAMETER & CLASS / STORMWATER PIPE LENGTH / STORMWATER PIPE GRADE / STORMWATER DOWNSTREAM INVERT RL.
- PROPOSED SURFACE INLET PITS
- PROPOSED JUNCTION PITS
- A-1 LINE LETTER / PIT NUMBER — PROPOSED PIT TAG
- PROPOSED BATTER LINE

0 20 40 60 80 100m

20 15 10 5

SCALE 1:1000

DETAIL PLAN

SCALE: 1:1000

NOTE:

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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
07	ISSUED FOR DA ONLY	MB	NH	01.03.2024
06	ISSUED FOR DA ONLY	AFe	NH	12.10.2023
05	ISSUED FOR PRELIMINARY	LC	NH	02.10.2023
04	ISSUED FOR PRELIMINARY	LC	NH	06.09.2023
03	ISSUED FOR PRELIMINARY	MP	NH	24.08.2023
02	ISSUED FOR REVIEW	NH	NH	06.04.2023
01	ISSUED FOR REVIEW	NH	NH	27.03.2023

Client: HB & B PROPERTY PTY LTD

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henry&hymas

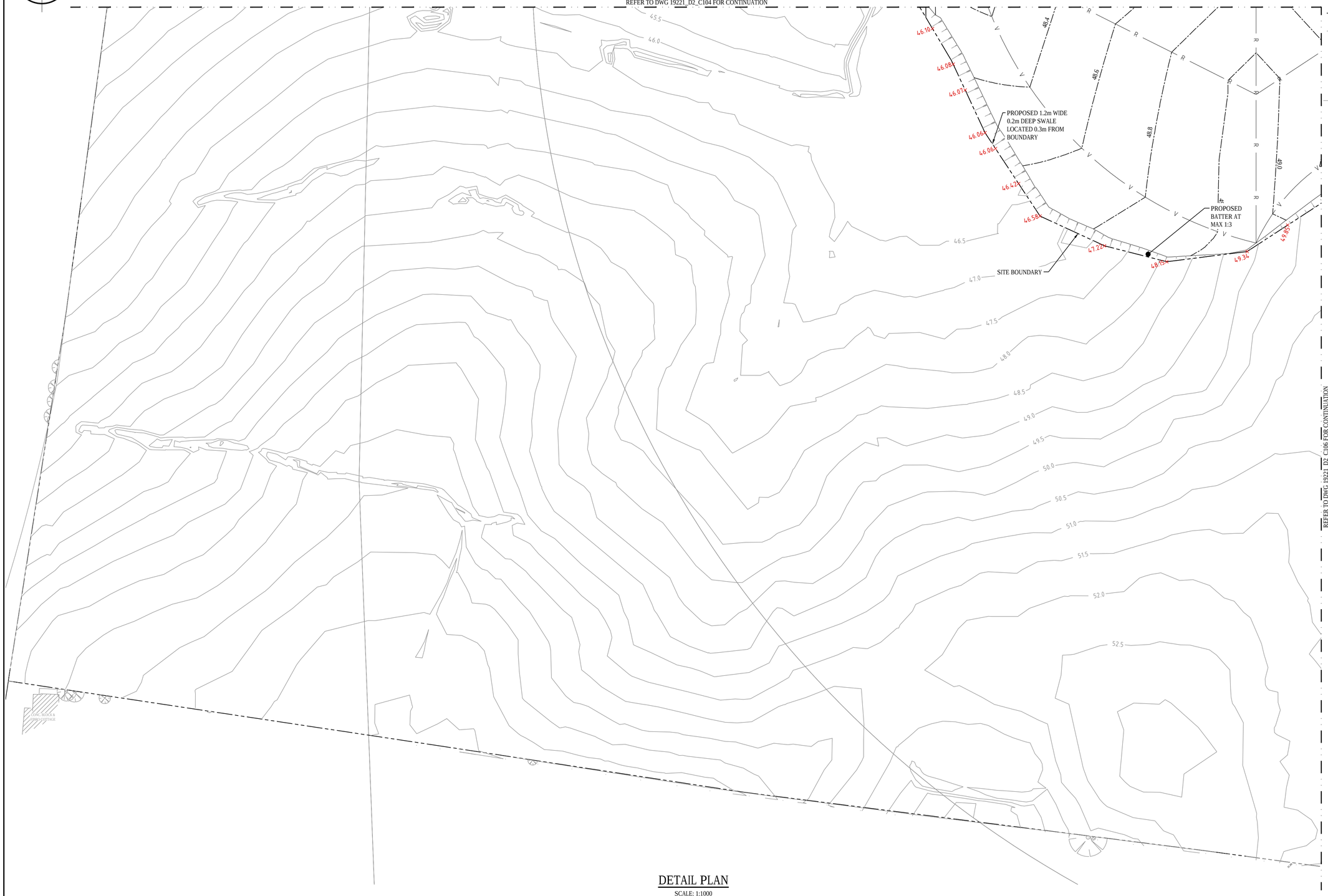
Project: PROPOSED INDUSTRIAL BUSINESS PARK
221-227 & 289-317 LUDDENHAM ROAD ORCHARD HIILS

Title: DETAIL PLAN
SHEET 4 OF 6

Drawn	Designed	Date
I.Khachab	N.Heazlewod	MARCH 2019
Checked	Approved	Scale @A1
N.Heazlewod	A.Francis	1:1000

Drawing number: 19221_D2_C104

Revision: 07



LEGEND

- PROPOSED STORMWATER PIPE
- PROPOSED BOUNDARY
- PROPOSED CONTOURS (47.00)
- EXISTING CONTOURS (47.0)
- PROPOSED LINTEL ONGRADE & SAG PITS
- PROPOSED SPOT LEVEL "BY OTHERS" (37.50)
- EXISTING SPOT LEVEL (+36.55)
- PROPOSED SUBSOIL LINE (SS)
- STORMWATER UPSTREAM INVERT RL. (IL97.19)
- STORMWATER PIPE DIAMETER & CLASS (Ø300)
- STORMWATER PIPE LENGTH (30m)
- STORMWATER PIPE GRADE (1%)
- STORMWATER DOWNSTREAM INVERT RL. (IL96.89)
- PROPOSED SURFACE INLET PITS
- PROPOSED JUNCTION PITS
- PROPOSED PIT TAG (A-1: LINE LETTER, PIT NUMBER)
- PROPOSED BATTER LINE

DETAIL PLAN

SCALE: 1:1000

0 20 40 60 80 100m

20 15 10 5

SCALE 1:1000

NOTE:

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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
05	ISSUED FOR DA ONLY	MB	NH	01.03.2024
04	ISSUED FOR DA ONLY	AFe	NH	12.10.2023
03	ISSUED FOR PRELIMINARY	MP	NH	24.08.2023
02	ISSUED FOR REVIEW	NH	NH	06.04.2023
01	ISSUED FOR REVIEW	NH	NH	27.03.2023

Client: HB & B PROPERTY PTY LTD

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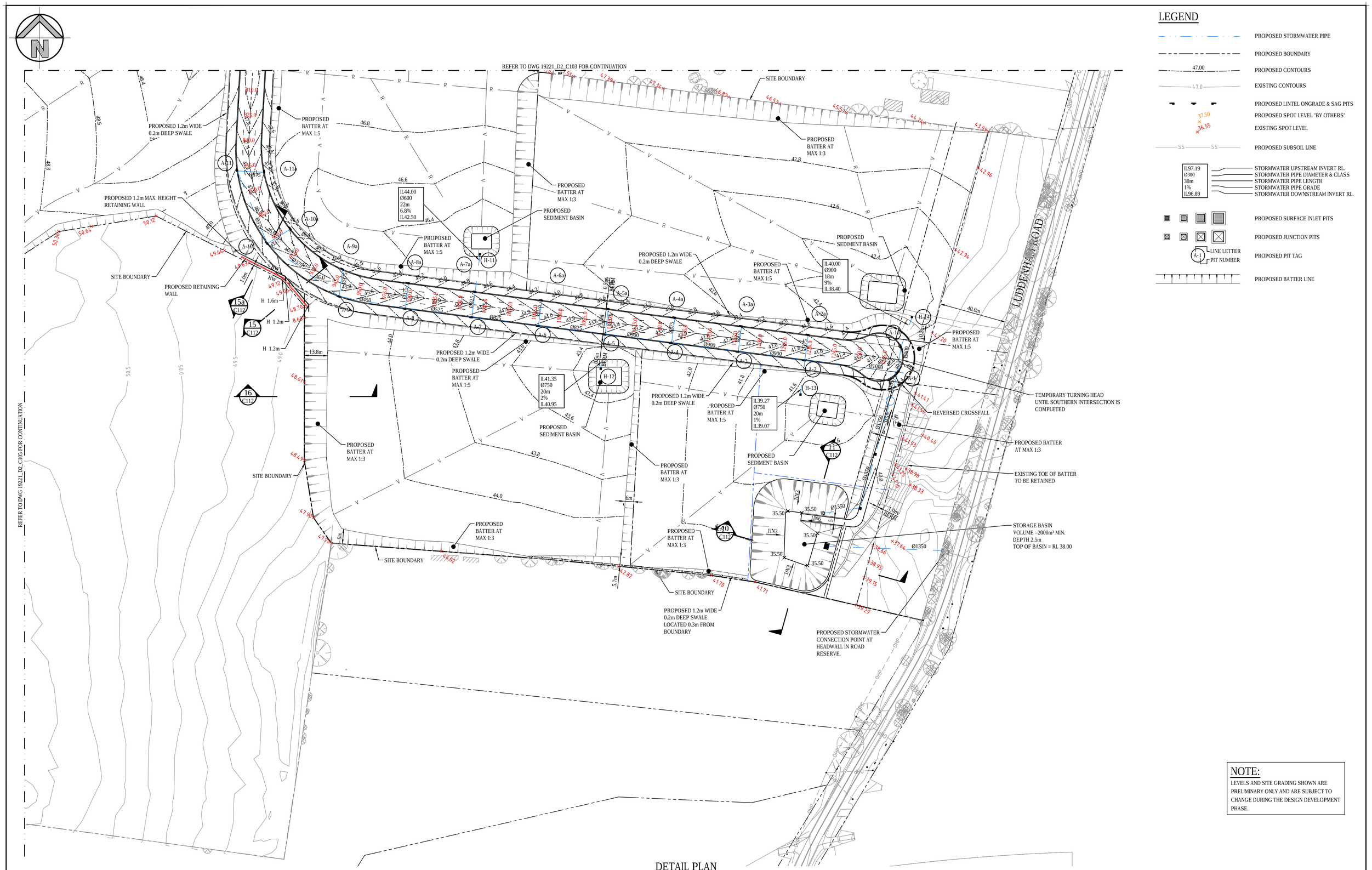
Project: PROPOSED INDUSTRIAL BUSINESS PARK
221-227 & 289-317 LUDDENHAM ROAD ORCHARD HIILS

Title: DETAIL PLAN
SHEET 5 OF 6

Drawn	Designed	Date
I.Khachab	N.Heazlewod	MARCH 2019
Checked	**Approved**	**Scale @A1**
N.Heazlewod	A.Francis	1:1000

Drawing number: 19221_D2_C105

Revision: 05



LEGEND

- PROPOSED STORMWATER PIPE
- PROPOSED BOUNDARY
- PROPOSED CONTOURS (47.00)
- EXISTING CONTOURS (47.0)
- PROPOSED LINTEL ONGRADE & SAG PITS
- PROPOSED SPOT LEVEL "BY OTHERS" (37.50)
- EXISTING SPOT LEVEL (36.55)
- PROPOSED SUBSOIL LINE (SS)
- IL97.19 / Ø300 / 30m / 1% / IL96.89 — STORMWATER UPSTREAM INVERT RL. / STORMWATER PIPE DIAMETER & CLASS / STORMWATER PIPE LENGTH / STORMWATER PIPE GRADE / STORMWATER DOWNSTREAM INVERT RL.
- PROPOSED SURFACE INLET PITS
- PROPOSED JUNCTION PITS
- A-1 — LINE LETTER / PIT NUMBER — PROPOSED PIT TAG
- PROPOSED BATTER LINE

DETAIL PLAN

SCALE: 1:1000

NOTE:

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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
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06	ISSUED FOR DA ONLY	AFe	NH	01.03.2024
05	ISSUED FOR DA ONLY	AFe	NH	12.10.2023
04	ISSUED FOR PRELIMINARY	LC	NH	06.09.2023
03	ISSUED FOR PRELIMINARY	MP	NH	24.08.2023
02	ISSUED FOR REVIEW	NH	NH	06.04.2023
01	ISSUED FOR REVIEW	NH	NH	27.03.2023

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Architect: NETTLETONTRIBE

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henry&hymas

Project: PROPOSED INDUSTRIAL BUSINESS PARK
221-227 & 289-317 LUDDENHAM ROAD ORCHARD HIILS

Title: DETAIL PLAN
SHEET 6 OF 6

Drawn	Designed	Date
I.Khachab	N.Heazlewod	MARCH 2019
Checked	**Approved**	**Scale @A1**
N.Heazlewod	A.Francis	1:1000

Drawing number: 19221_D2_C106
Revision: 07

MGA

TN

APPROX. 1°00'

LEGEND

BENCH MARK	▲
COMMS PIT	COM
TELSTRA PIT	TEL
ELECTRIC LIGHT POLE	ELP
ELECTRICITY BOX	EL
POWER POLE	PP
LETTERBOX	LBOX
STREET SIGN	SS
BOLLARD	BOL
ROADS & MARITIME SERVICES	RMS
GRATED INLET PIT	GIP
SEWER INSPECTION POINT	SIP
WATER METER	WM
GATE	
GAS (DBYD)	G
COMMUNICATION (DBYD)	C
ELECTRICITY (OVERHEAD)	P

NOTES

1. THE BOUNDARIES HAVE NOT BEEN MARKED
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 PM10811 R.L. 100.000 (A.H.D.) BY WATER PIPELINE, OFF LUDDENHAM ROAD
4. CONTOUR INTERVAL 1.0 m
5. CONTOURS ARE INDICATIVE ONLY. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION
6. KERB LEVELS ARE TO THE TOP OF KERB UNLESS SHOWN OTHERWISE
7. FLOOR LEVELS SHOWN ARE THRESHOLD LEVELS. NO INVESTIGATION OF INTERNAL FLOOR LEVELS HAS BEEN UNDERTAKEN
8. 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
9. 8/.4/7 DENOTES TREE SPREAD OF 8m, TRUNK DIAMETER OF 0.4m & APPROX HEIGHT OF 7m
10. SHOWS APPROXIMATE POSITION OF ROAD LINEMARKING AND IS INDICATIVE ONLY
11. BEARINGS SHOWN ARE MGA (MAP GRID OF AUSTRALIA) ADD APPROX. 1°00' FOR TRUE NORTH

(A) EASEMENT FOR TRANSMISSION LINE 60.96 WIDE (VIDE L671350)

DIAL BEFORE YOU DIG www.1100.com.au

REFER TO NOTES AND LEGEND

GDA2020

0 30 60 90 120 180 240 300

SCALE 1: 3000 @ A1

Revision	Date	Description	Reference
L	00/00/00	–	00
K	00/00/00	–	00
J	00/00/00	–	00
I	00/00/00	–	00
H	00/00/00	–	00
G	00/00/00	–	00
F	00/00/00	–	00
E	00/00/00	–	00
D	00/00/00	–	00
C	29/10/20	TREE LINE ON SHEET 3 ADDED	003
B	21/10/20	CREEK DETAIL & LEVELS ADDED SHEETS 2 & 3	003
A	06/10/20	CREEK DETAIL & LEVELS ADDED SHEETS 2, 3, 5 & 9	002

LTS CONFIDENCE TOGETHER

www.ltsl.com.au | P 1300 587 000

THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:

.....

Registered Surveyor NSW

Client HB & B PROPERTY PTY LTD

Drawing title

PLAN OF DETAIL AND LEVELS OVER LOT 242 DP 1088931 AND LOT 1 DP 1099147 KNOWN AS No 221-227 & No 289-317 LUDDENHAM ROAD, ORCHARD HILLS

datum AHD

site Area 125.3 ha

LGA PENRITH

reference number 51007 001DT

scale 1:3000 @A1

date of survey 29-04-2020

SHEET OF 32 | 1

PATONS

LANE

MGA

TN

APPROX

1

DP 242968

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GDA2020

REFER TO NOTES AND LEGEND ON SHEET 1

SCALE 1: 400 @ A1

Revision	Date	Description	Reference
L	00/00/00	–	00
K	00/00/00	–	00
J	00/00/00	–	00
I	00/00/00	–	00
H	00/00/00	–	00
G	00/00/00	–	00
F	00/00/00	–	00
E	00/00/00	–	00
D	00/00/00	–	00
C	29/10/20	TREE LINE ON SHEET 3 ADDED	003
B	21/10/20	CREEK DETAIL & LEVELS ADDED SHEETS 2 & 3	003
A	06/10/20	CREEK DETAIL & LEVELS ADDED SHEETS 2, 3, 5 & 9	002

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THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:

.....

Registered Surveyor NSW

Client HB & B PROPERTY PTY LTD

Drawing title

PLAN OF DETAIL AND LEVELS OVER LOT 242 DP 1088991 AND LOT 1 DP 1099147 KNOWN AS No 221-227 & No 289-317 LUDDENHAM ROAD, ORCHARD HILLS

datum AHD

site Area 125.3 ha

LGA PENRITH

reference number 51007 001DT

scale 1:400 @A1

date of survey 29-04-2020

SHEET 2 OF 32

MGA

TN

1°00' APPROX.

PATONS

LANE

HEAD WALL

HEAD WALL

TRANSMISSION PYLON (A)

HORSE AGISTMENT PADDOCK

HORSE AGISTMENT PADDOCK

HORSE AGISTMENT PADDOCK

TRACK

TRACK

GRAVEL

GATE

MESH

DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

SCALE 1:400 @ A1

0 8 12 16 24 32 40

REFER TO NOTES AND LEGEND ON SHEET 1

Revision	Date	Description	Reference
L	00/00/00	–	00
K	00/00/00	–	00
J	00/00/00	–	00
I	00/00/00	–	00
H	00/00/00	–	00
G	00/00/00	–	00
F	00/00/00	–	00
E	00/00/00	–	00
D	00/00/00	–	00
C	29/10/20	TREE LINE ON SHEET 3 ADDED	003
B	21/10/20	CREEK DETAIL & LEVELS ADDED SHEETS 2 & 3	003
A	06/10/20	CREEK DETAIL & LEVELS ADDED SHEETS 2, 3, 5 & 9	002

LTS CONFIDENCE TOGETHER

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datum AHD

site Area 125.3 ha

LGA PENRITH

reference number 51007 001DT

scale 1:400 @A1

date of survey 29-04-2020

SHEET 3 OF 32

MGA

TN

1°00'

APPROX.

PATONS

LANE

HORSE AGISTMENT PADDOCK

HORSE AGISTMENT PADDOCK

HORSE AGISTMENT PADDOCK

DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

REFER TO NOTES AND LEGEND ON SHEET 1

SCALE 1: 400 @ A1

0 8 12 16 24 32 40

Revision	Date	Description	Reference
L	00/00/00	–	00
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datum AHD

site Area 125.3 ha

LGA PENRITH

reference number 51007 001DT

scale 1:400 @A1

date of survey 29-04-2020

SHEET 4 OF 32

MGA

TN

APPROX

1

DP 242968

REFER TO NOTES AND LEGEND ON SHEET 1

SCALE 1:400 @ A1

0 8 12 16 24 32 40

Revision	Date	Description	Reference
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K	00/00/00	–	00
J	00/00/00	–	00
I	00/00/00	–	00

Revision	Date	Description	Reference
H	00/00/00	–	00
G	00/00/00	–	00
F	00/00/00	–	00
E	00/00/00	–	00

Revision	Date	Description	Reference
D	00/00/00	–	00
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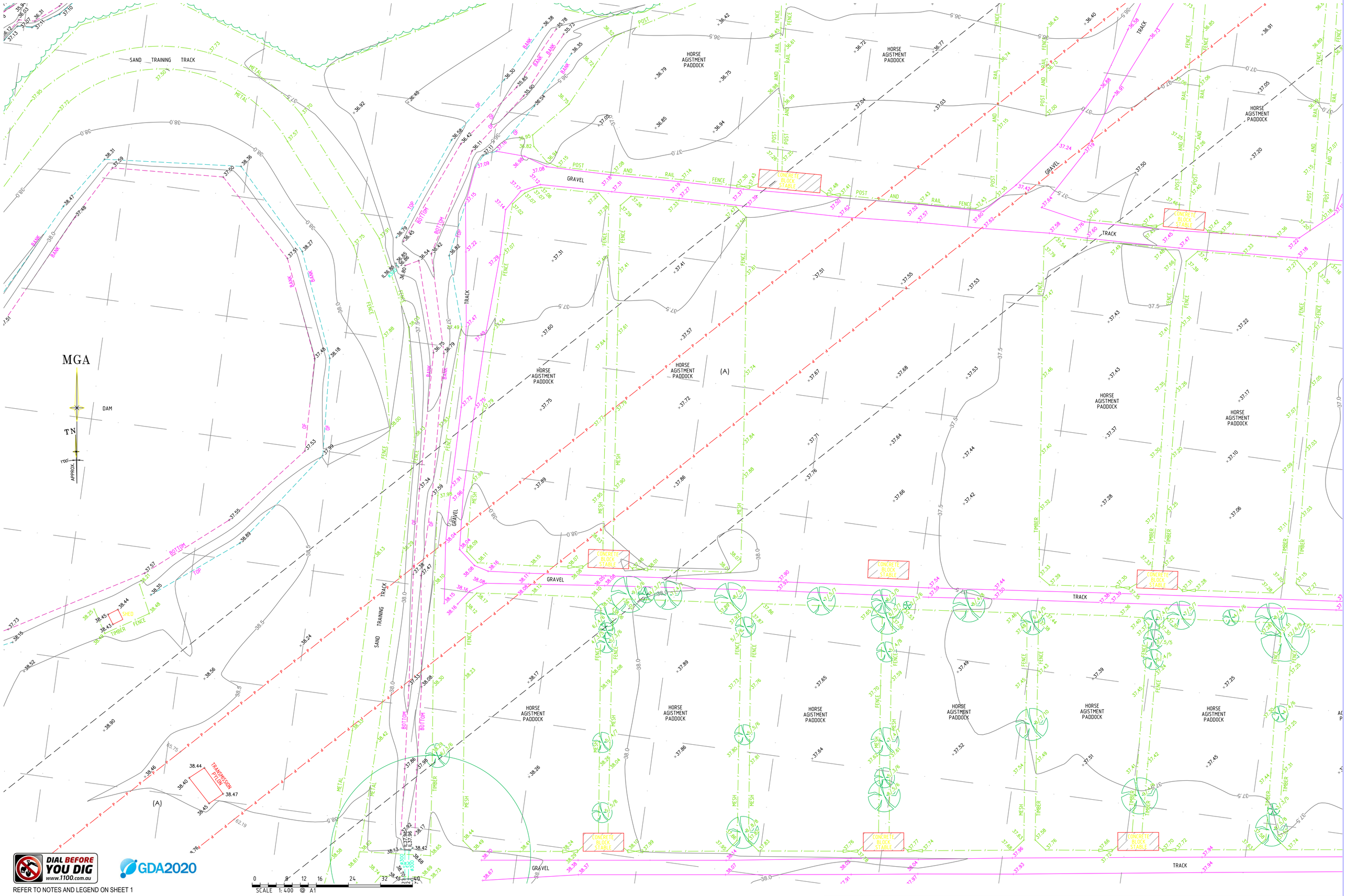
datum AHD
site Area 125.3 ha
LGA PENRITH

reference number 51007 001DT
scale 1:400 @A1
date of survey 29-04-2020
SHEET OF 32 | 5



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REFER TO NOTES AND LEGEND ON SHEET 1

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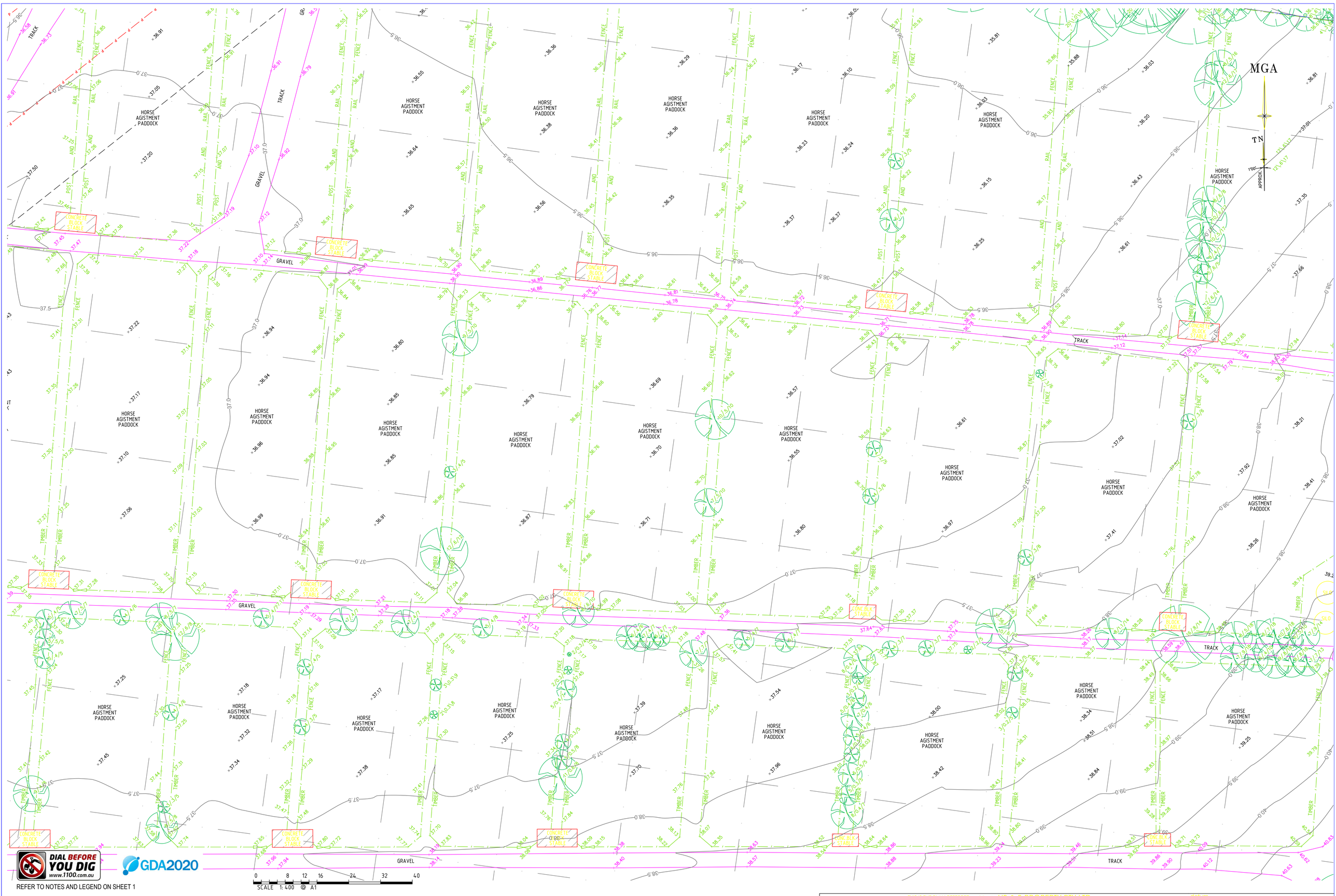
datum AHD
site Area 125.3 ha
QA PENRITH
reference number 51007 001DT
scale 1:400 @A1
date of survey 29-04-2020
SHEET 6 OF 32



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GDA2020

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datum	AHD
site Area	125.3 ha
LGA	PENRITH
reference number	51007 001DT
scale	1:400 @A1
date of survey	29-04-2020
SHEET OF	7 / 32

REFER TO NOTES AND LEGEND ON SHEET 1

SCALE 1: 400 @ A1

Revision	Date	Description	Reference	Revision	Date	Description	Reference	Revision	Date	Description	Reference
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datum AHD
site Area 125.3 ha
LGA PENRITH

reference number 51007 001DT
scale 1:400 @A1
date of survey 29-04-2020
SHEET 8 OF 32

GDA2020

REFER TO NOTES AND LEGEND ON SHEET 1

SCALE 1: 400 @ A1

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datum AHD
site Area 125.3 ha
LGA PENRITH
reference number 51007 001DT
scale 1:400 @A1
date of survey 29-04-2020
SHEET 9 OF 32

MGA

TN

APPROX 1°00'

1

DP 1099147

HORSE AGISTMENT PADDOCK

CONCRETE BLOCK STABLE

GRAVEL

TRACK

SAND TRAINING TRACK

FENCE

BANK

METAL

MESH

TIMBER

TOP

BOTTOM

DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

REFER TO NOTES AND LEGEND ON SHEET 1

0 8 12 16 24 32 40

SCALE 1: 400 @ A1

Revision	Date	Description	Reference
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datum AHD

site Area 125.3 ha

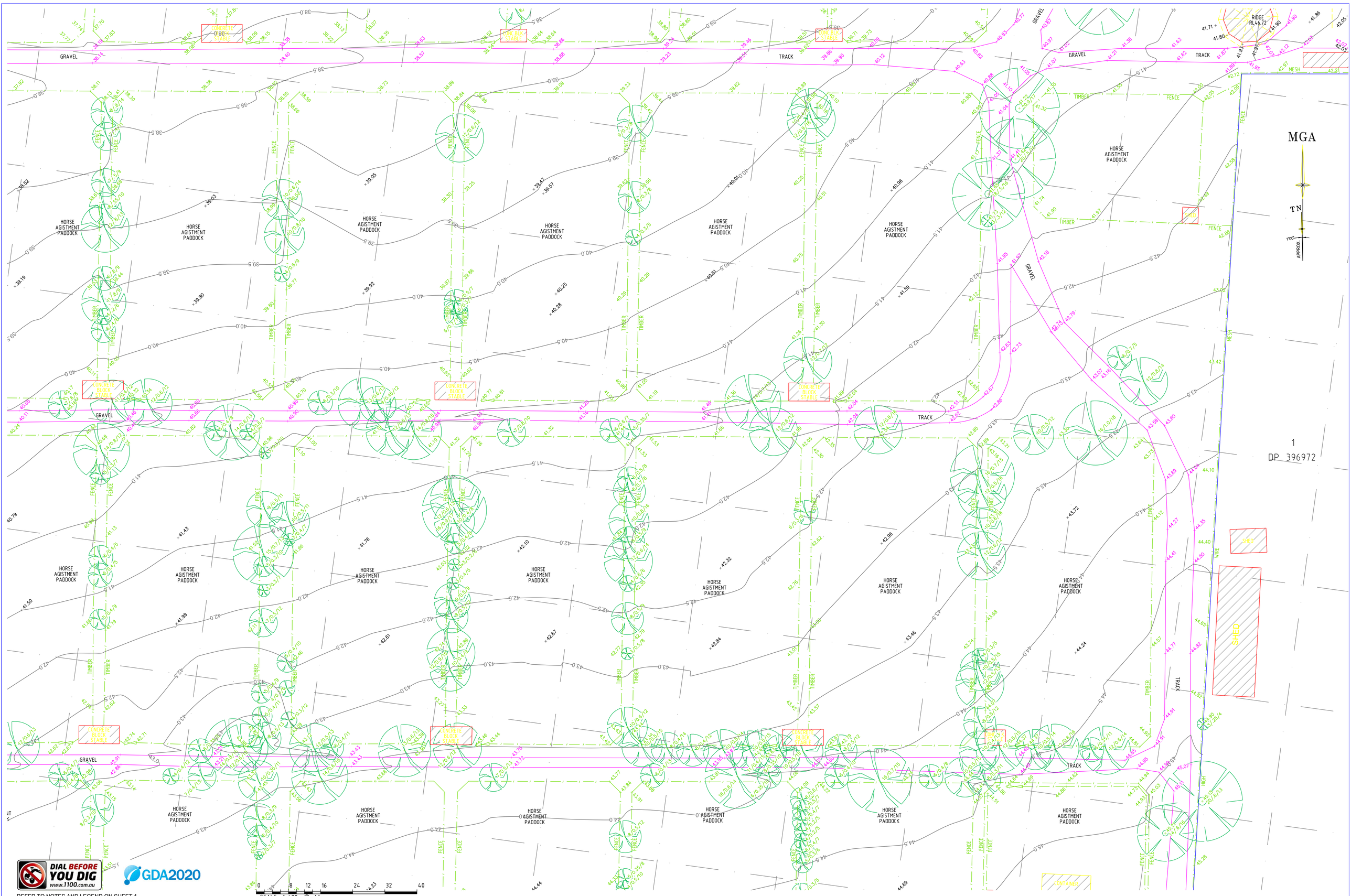
LGA PENRITH

reference number 51007 001DT

scale 1:400 @A1

date of survey 29-04-2020

SHEET 10 OF 32



DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

REFER TO NOTES AND LEGEND ON SHEET 1

1
DP 396972

Revision	Date	Description	Reference
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I	00/00/00	–	00
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datum	AHD
site Area	125.3 ha
LGA	PENRITH
reference number	51007 001DT
scale	1:400 @A1
date of survey	29-04-2020
SHEET	11
OF	32

MGA

TN

APPROX.

2

DP 242968

(A)

SAND TRAINING TRACK

DAM

STOCKPILE

STOCKPILE

STOCKPILE

METAL & BRICK SHED

METAL & BRICK SHED

FENCE

TIMBER

WIRE

MESH

HIGH

BANK

BOTTOM

TOP

OF

TRANSMISSION PYLON

DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

REFER TO NOTES AND LEGEND ON SHEET 1

0 8 12 16 24 32 40

SCALE 1: 400 @ A1

Revision	Date	Description	Reference
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K	00/00/00	–	00
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datum AHD

site Area 125.3 ha

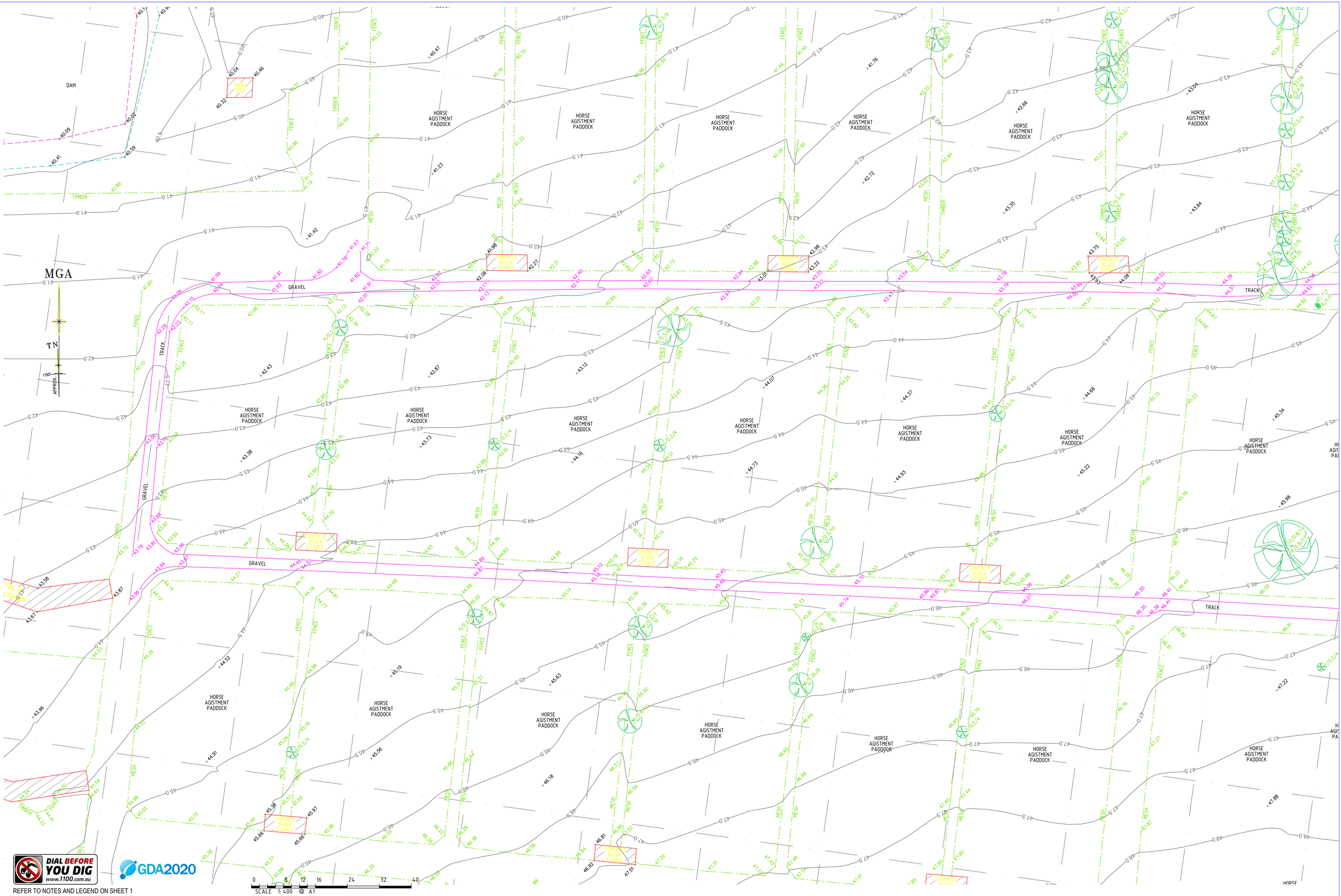
LGA PENRITH

reference number 51007 001DT

scale 1:400 @A1

date of survey 29-04-2020

SHEET OF 32 | 12



REFER TO NOTES AND LEGEND ON SHEET 1

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Revision	Date	Description	Reference
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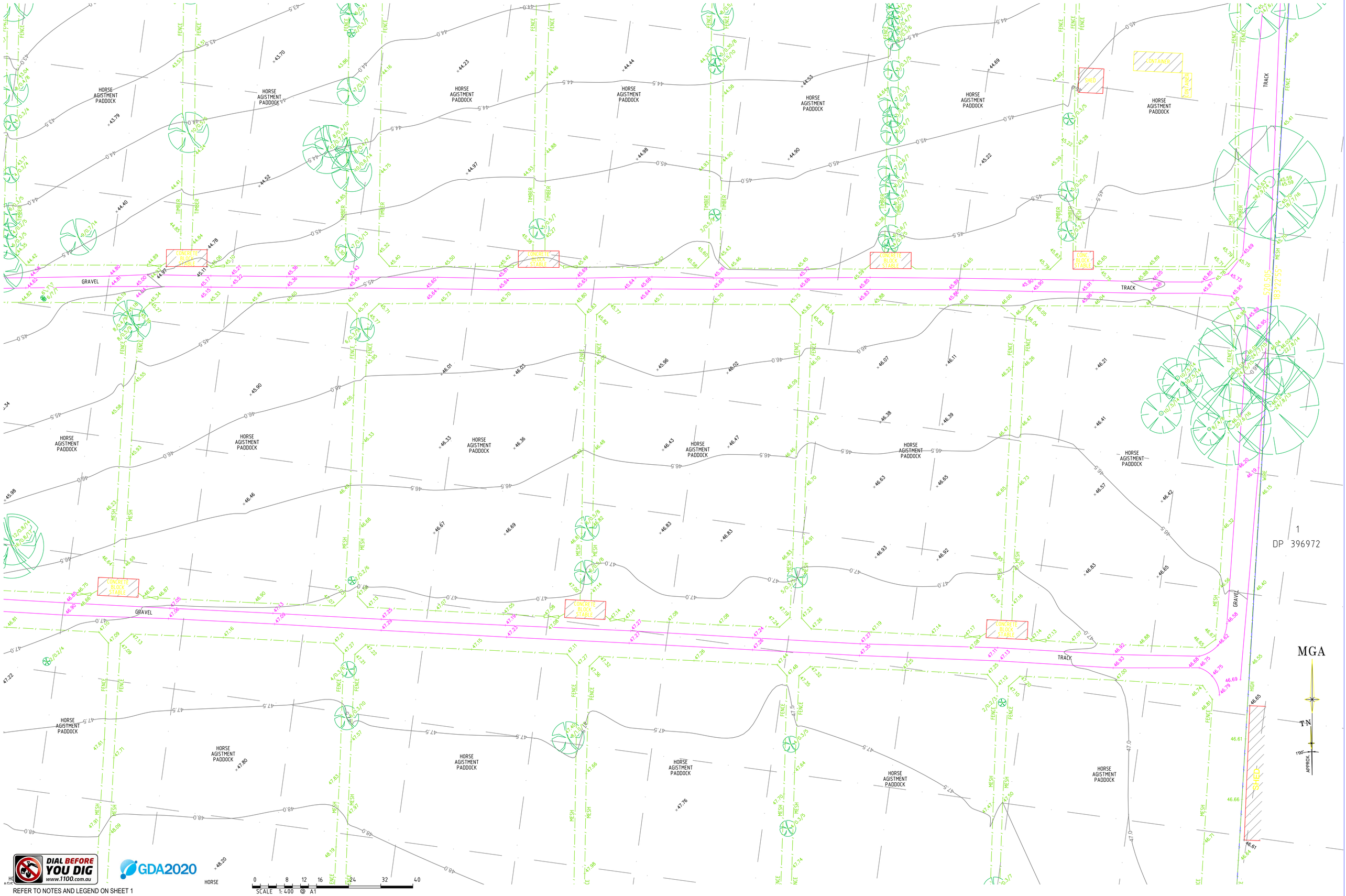
datum	AHD
site Area	125.3 ha
LGA	PENRITH
reference number	51007 001DT
scale	1:400 @A1
date of survey	29-04-2020
SHEET OF	13 / 32



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DP 396972

Revision	Date	Description	Reference
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datum AHD
site Area 125.3 ha
LGA PENRITH

reference number 51007 001DT
scale 1:400 @A1
date of survey 29-04-2020
SHEET 14 OF 32

MGA

TN

APPROX.

STOCKPILE

STOCKPILE

BARBED

WIRE

FENCE

271°

2

DP 242968

7°38'55"

28.182

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GDA2020

REFER TO NOTES AND LEGEND ON SHEET 1

0 8 12 16 24 32 40

SCALE 1: 400 @ A1

Revision	Date	Description	Reference
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datum AHD

Site Area 125.3 ha

LGA PENRITH

reference number 51007 001DT

scale 1:400 @A1

date of survey 29-04-2020

SHEET 15 OF 32

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GDA2020

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datum AHD

site Area 125.3 ha

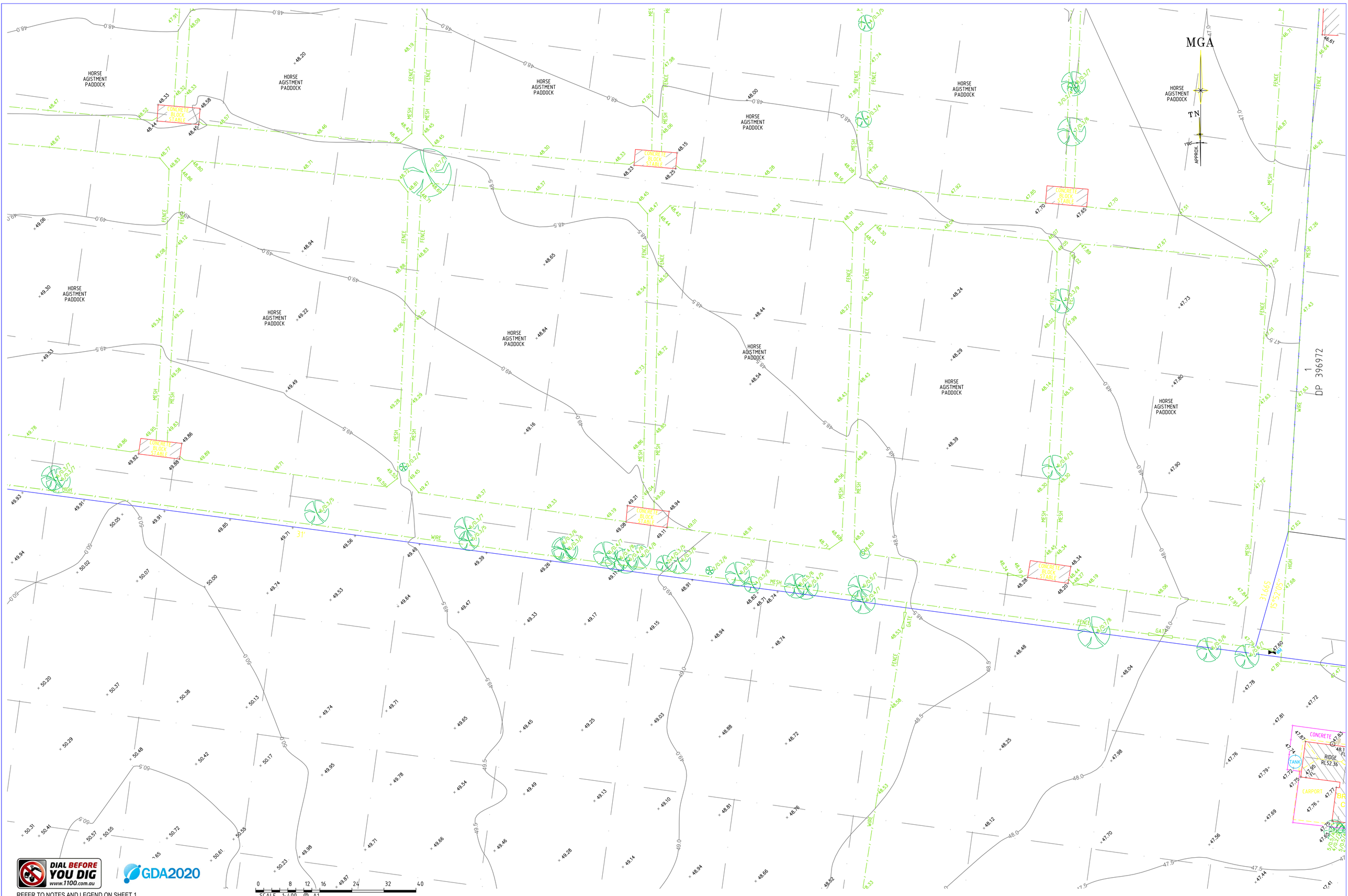
LGA PENRITH

reference number 51007 001DT

scale 1:400 @A1

date of survey 29-04-2020

SHEET 16 OF 32



DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

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SCALE 1:400 @ A1

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datum AHD

reference number 51007 001DT

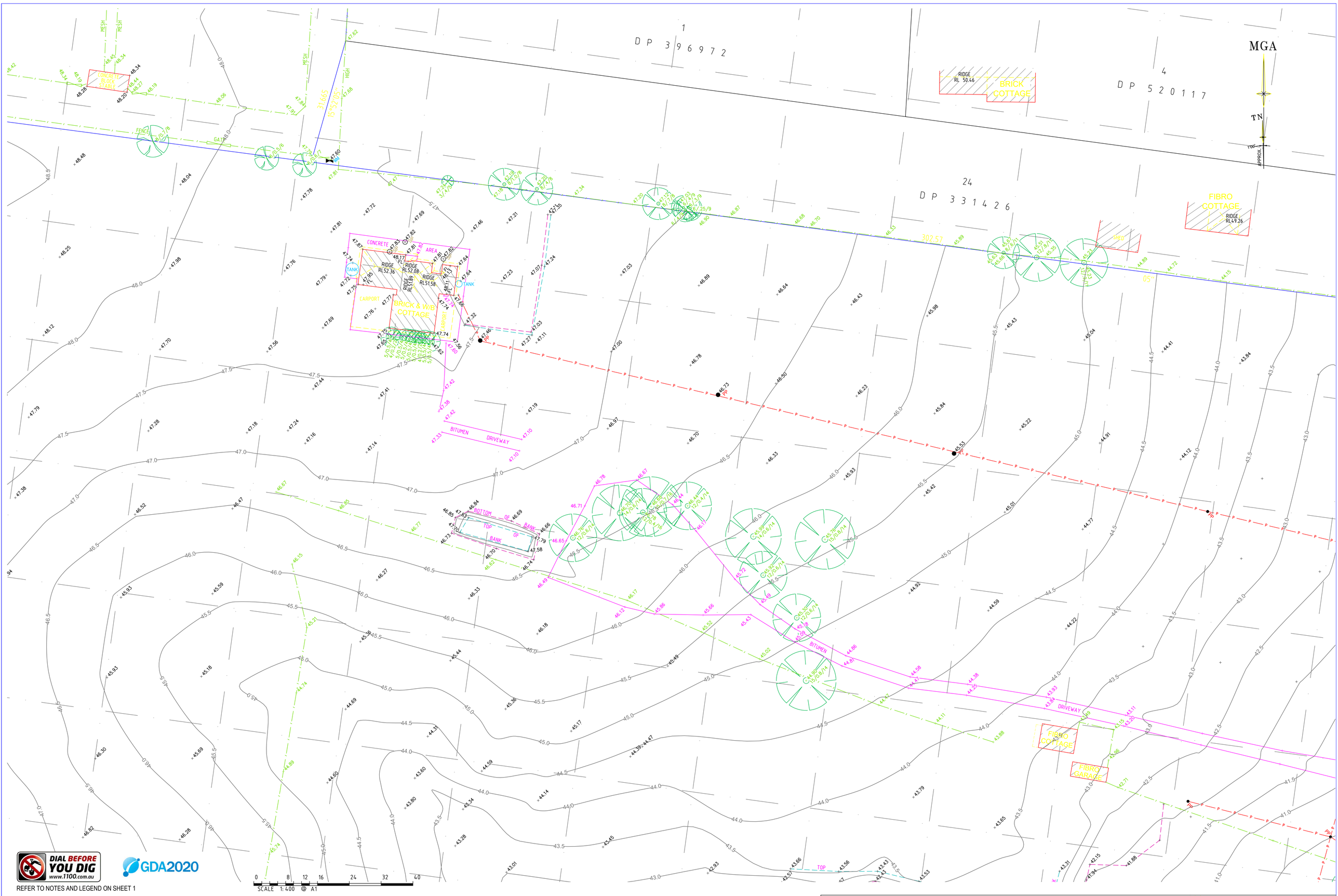
Site Area 125.3 ha

scale 1:400 @A1

date of survey 29-04-2020

LGA PENRITH

SHEET 17 OF 32



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E	00/00/00	–	00
D	00/00/00	–	00
C	29/10/20	TREE LINE ON SHEET 3 ADDED	003
B	21/10/20	CREEK DETAIL & LEVELS ADDED SHEETS 2 & 3	003
A	06/10/20	CREEK DETAIL & LEVELS ADDED SHEETS 2, 3, 5 & 9	002

LTS CONFIDENCE TOGETHER
www.ltsl.com.au | P 1300 587 000

THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:

.....
Registered Surveyor NSW.

Client: HB & B PROPERTY PTY LTD

Drawing title:
PLAN OF DETAIL AND LEVELS OVER LOT 242 DP 1088991 AND LOT 1 DP 1099147 KNOWN AS No 221-227 & No 289-317 LUDDENHAM ROAD, ORCHARD HILLS

datum	AHD
site Area	125.3 ha
LGA	PENRITH
reference number	51007 001DT
scale	1:400 @A1
date of survey	29-04-2020
SHEET	18 OF 32

MGA

TN

APPROX.

3

DP 242968

DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

REFER TO NOTES AND LEGEND ON SHEET 1

SCALE 1:400 @ A1

Revision	Date	Description	Reference
L	00/00/00	–	00
K	00/00/00	–	00
J	00/00/00	–	00
I	00/00/00	–	00
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LTS CONFIDENCE TOGETHER

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Registered Surveyor NSW

Client HB & B PROPERTY PTY LTD

Drawing title

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datum AHD

site Area 125.3 ha

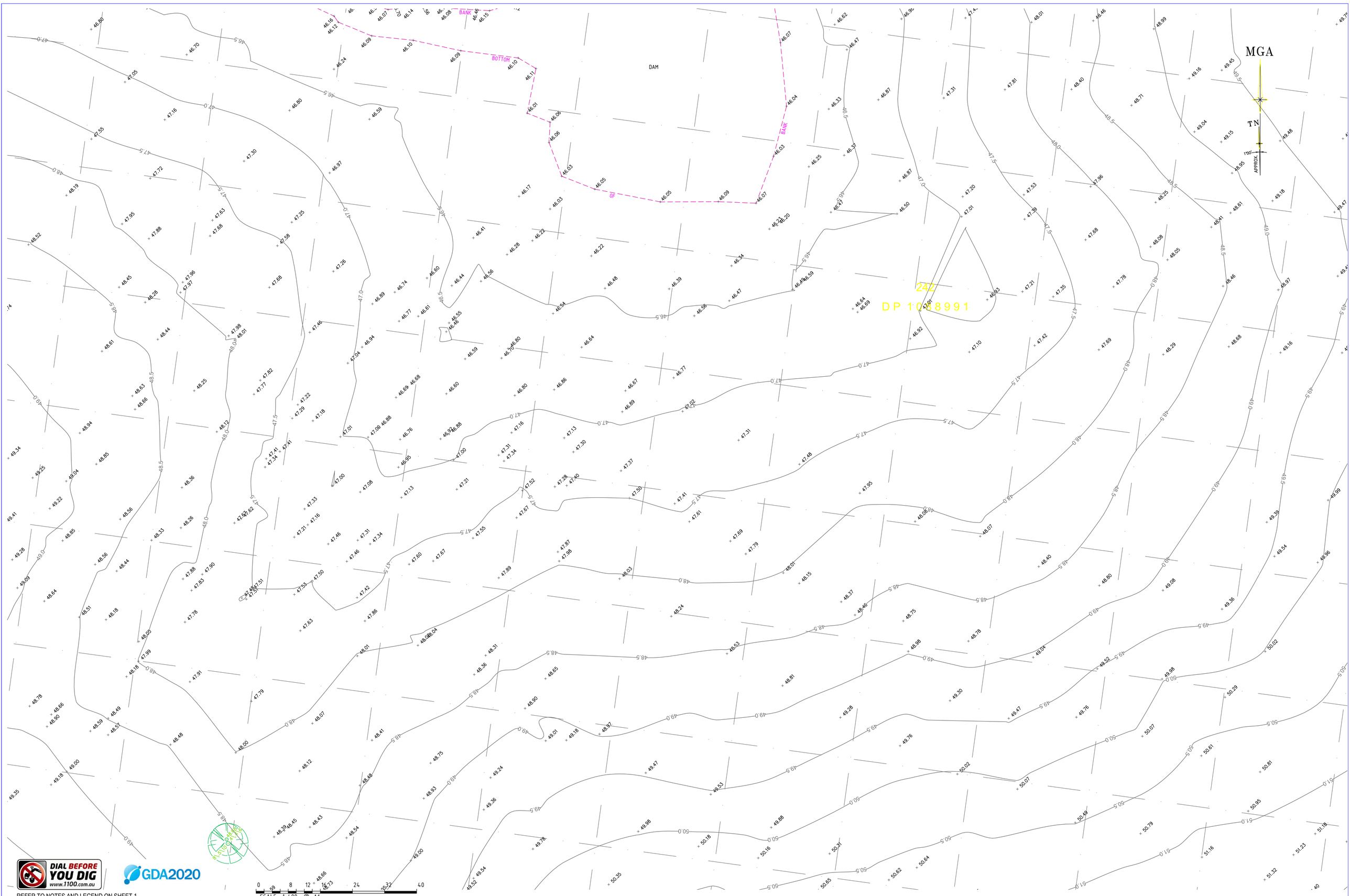
LGA PENRITH

reference number 51007 001DT

scale 1:400 @A1

date of survey 29-04-2020

SHEET OF 32 | 19



Revision	Date	Description	Reference
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K	00/00/00	–	00
J	00/00/00	–	00
I	00/00/00	–	00

Revision	Date	Description	Reference
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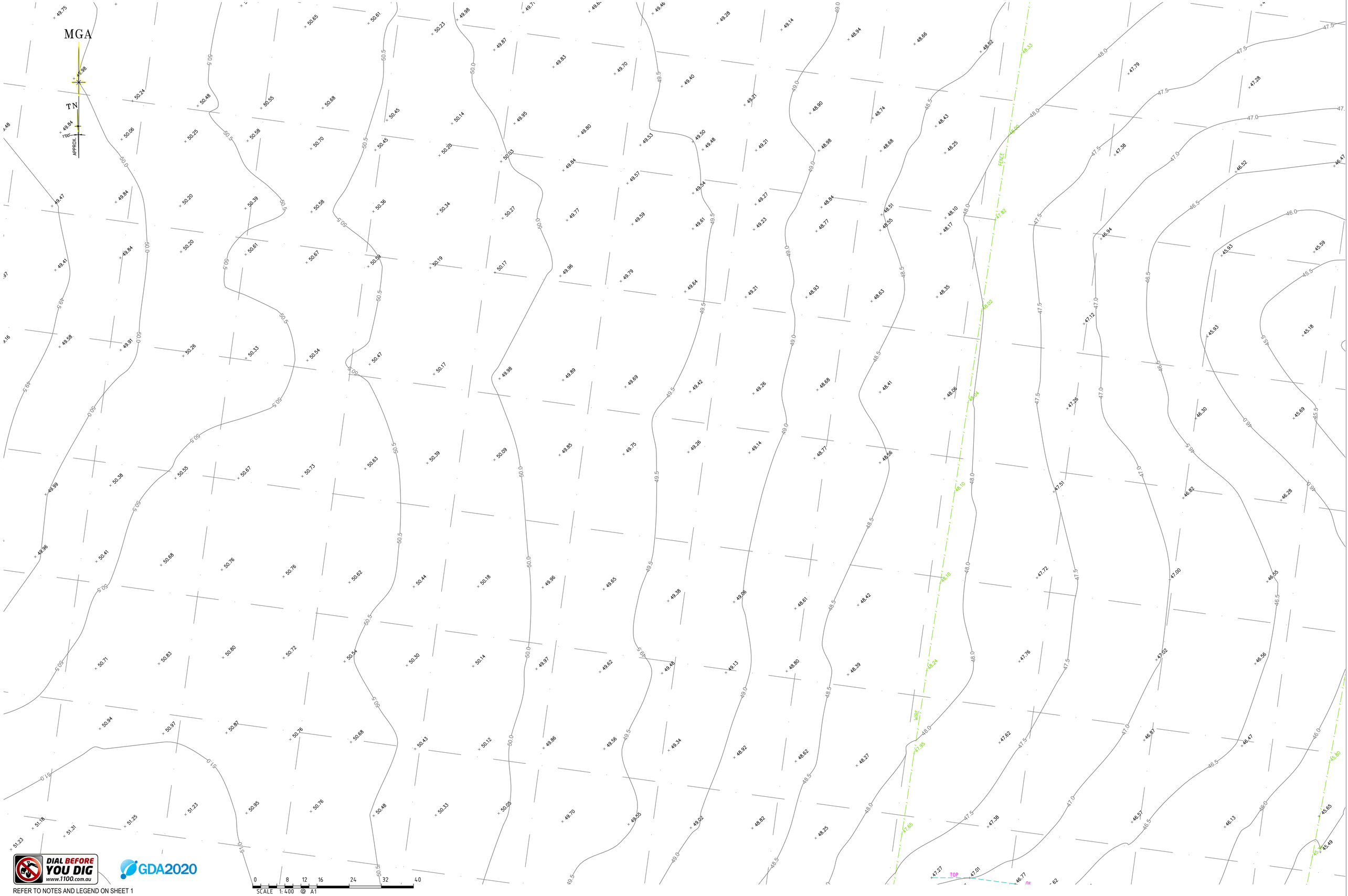
datum AHD
site Area 125.3 ha
LGA PENRITH

reference number 51007 001DT
scale 1:400 @A1
date of survey 29-04-2020
SHEET OF 32 | 20



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GDA2020

REFER TO NOTES AND LEGEND ON SHEET 1

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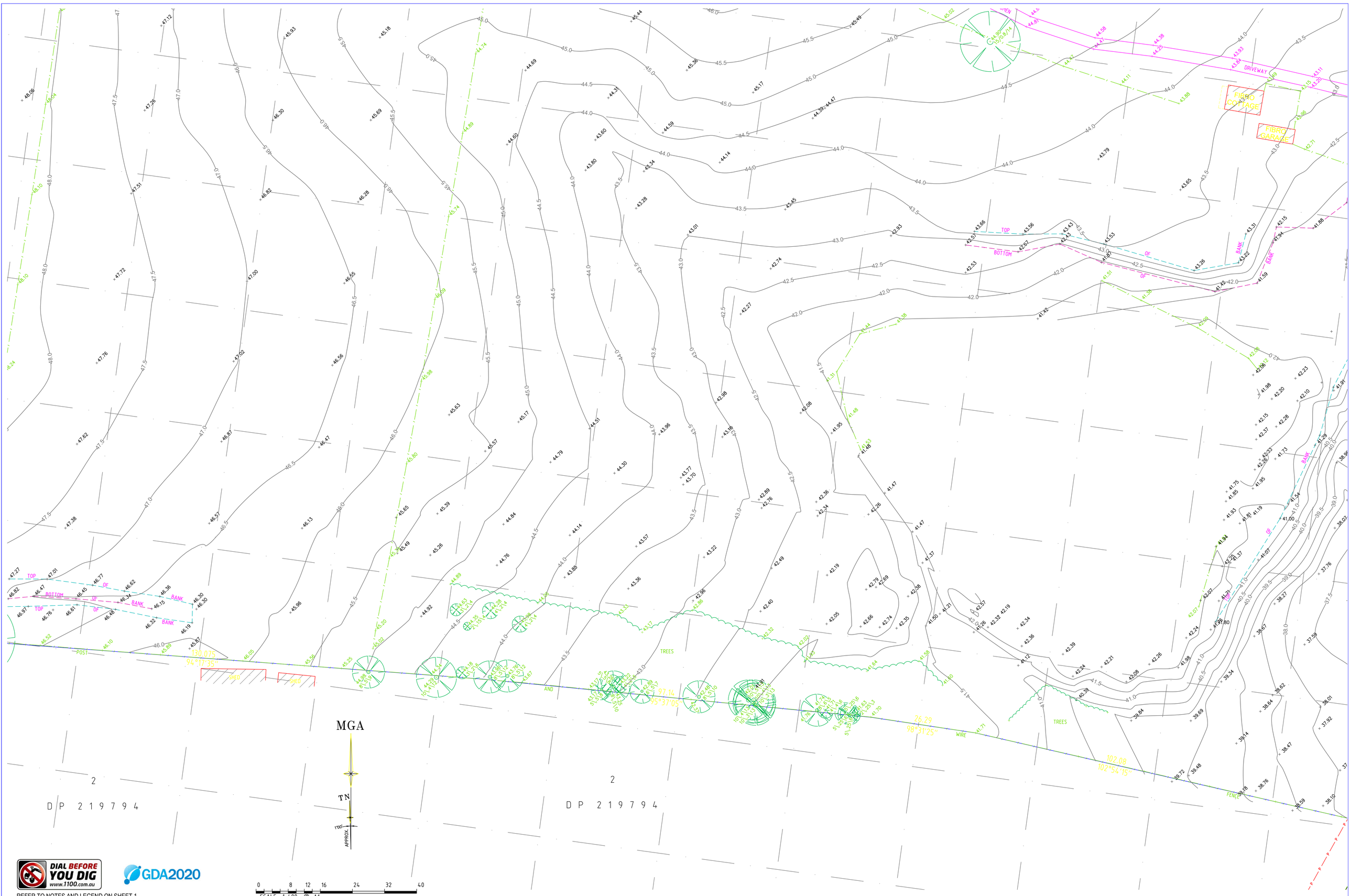
datum AHD
Site Area 125.3 ha
LGA PENRITH

reference number 51007 001DT
scale 1:400 @A1
date of survey 29-04-2020
SHEET 21 OF 32



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GDA2020

REFER TO NOTES AND LEGEND ON SHEET 1

Revision	Date	Description	Reference
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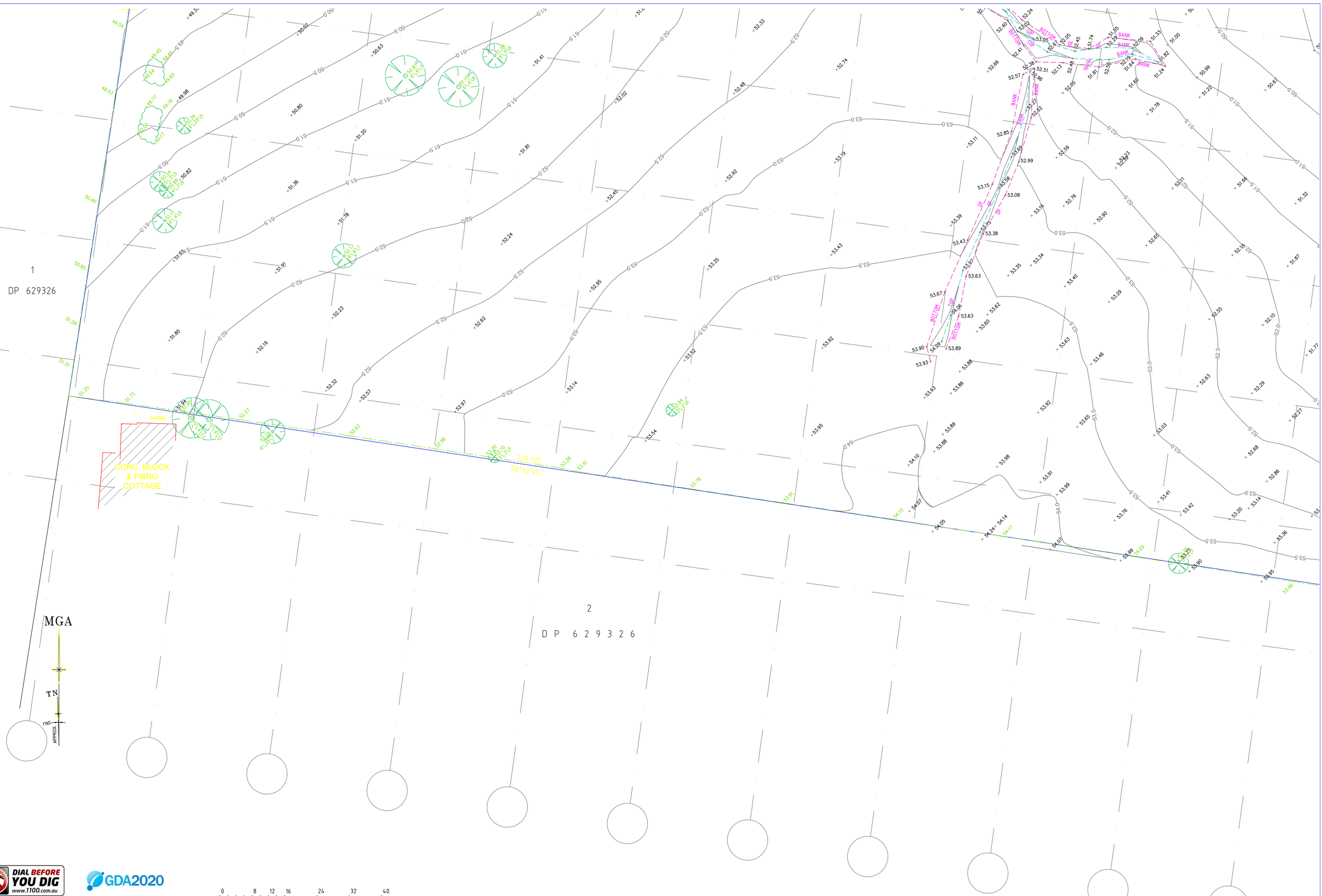
Drawing title: PLAN OF DETAIL AND LEVELS OVER LOT 242 DP 1088991 AND LOT 1 DP 1099147 KNOWN AS No 221-227 & No 289-317 LUDDENHAM ROAD, ORCHARD HILLS

datum: AHD
site Area: 125.3 ha
QA: PENRITH

reference number: 51007 001DT
scale: 1:400 @A1
date of survey: 29-04-2020
SHEET 22 OF 32



DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

REFER TO NOTES AND LEGEND ON SHEET 1

0 8 12 16 24 32 40
SCALE 1: 400 @ A1

Revision	Date	Description	Reference
L	00/00/00	–	00
K	00/00/00	–	00
J	00/00/00	–	00
I	00/00/00	–	00

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datum AHD
site Area 125.3 ha
LGA PENRITH

reference number 51007 001DT
scale 1:400 @A1
date of survey 29-04-2020
SHEET 32 OF 23

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GDA2020

REFER TO NOTES AND LEGEND ON SHEET 1

Revision	Date	Description	Reference
L	00/00/00	–	00
K	00/00/00	–	00
J	00/00/00	–	00
I	00/00/00	–	00

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datum AHD

site Area 125.3 ha

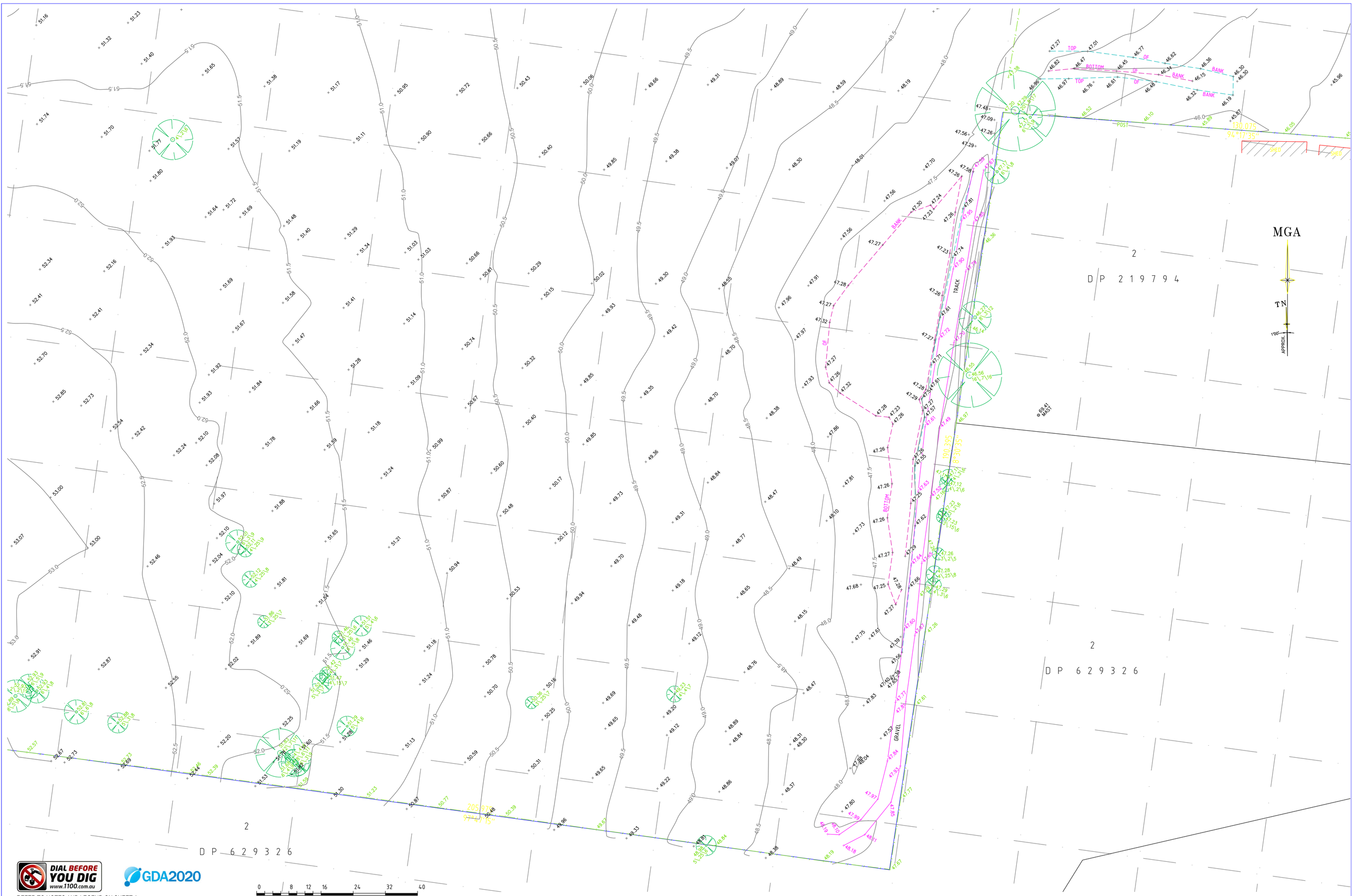
LGA PENRITH

reference number 51007 001DT

scale 1:400 @A1

date of survey 29-04-2020

SHEET 24 OF 32



DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

REFER TO NOTES AND LEGEND ON SHEET 1

0 8 12 16 24 32 40

SCALE 1: 400 @ A1

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datum	AHD
site Area	125.3 ha
LGA	PENRITH
reference number	51007 001DT
scale	1:400 @A1
date of survey	29-04-2020
SHEET OF	25 / 32

MGA

TN

APPROX.

LUDDENHAM ROAD

PATONS LANE

INACCESSIBLE
(NOT SURVEYED)

REFER TO NOTES AND LEGEND ON SHEET 1

SCALE 1:250 @ A1

0 5 10 15 20 25

Revision	Date	Description	Reference
L	00/00/00	–	00
K	00/00/00	–	00
J	00/00/00	–	00
I	00/00/00	–	00
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Client HB & B PROPERTY PTY LTD

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datum AHD
site Area 125.3 ha
LGA PENRITH

reference number 51007 001DT
scale 1:250 @A1
date of survey 29-04-2020
SHEET 26 OF 32

DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

REFER TO NOTES AND LEGEND ON SHEET 1

Revision	Date	Description	Reference
L	00/00/00	–	00
K	00/00/00	–	00
J	00/00/00	–	00
I	00/00/00	–	00

Revision	Date	Description	Reference
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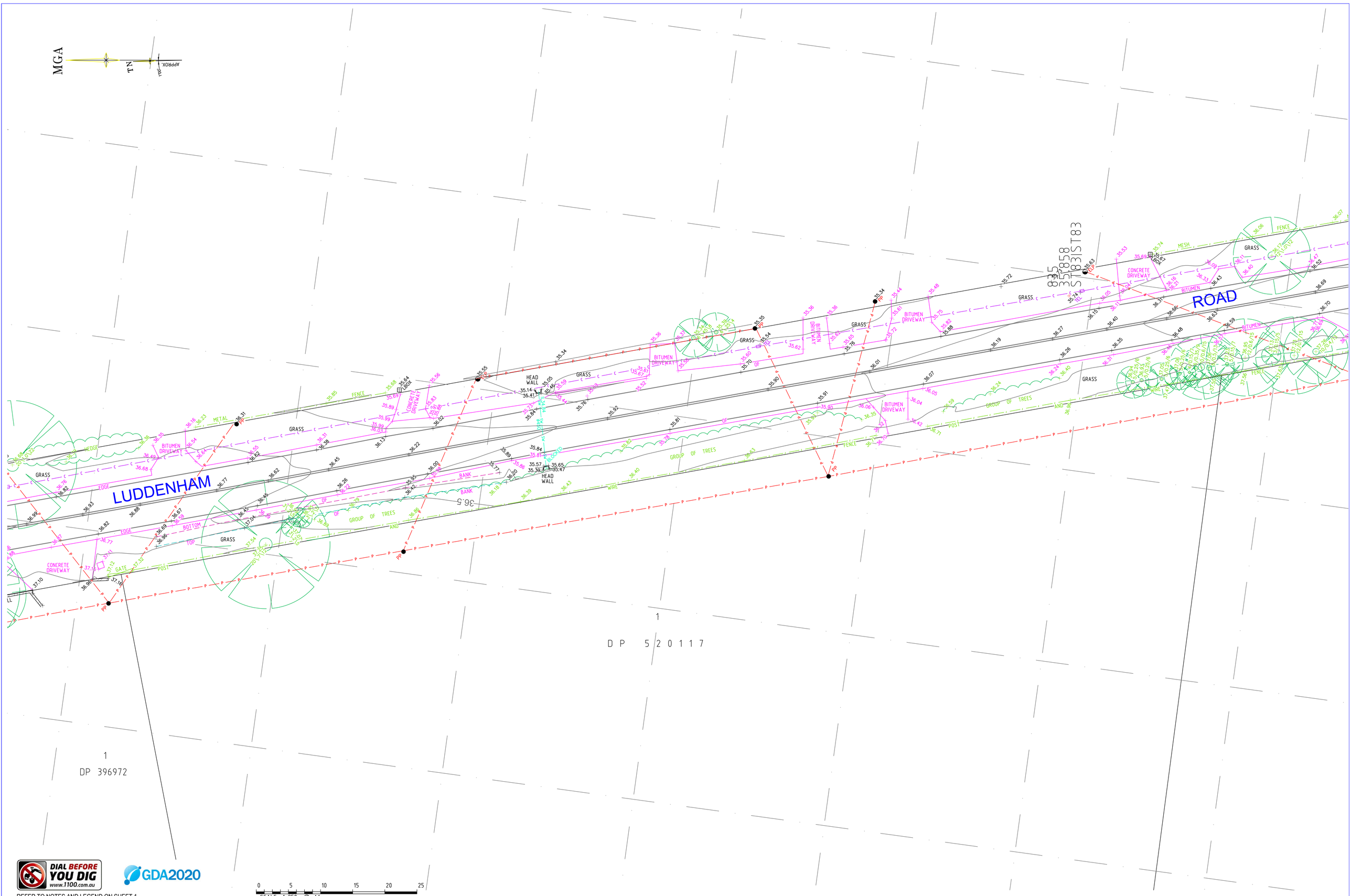
datum AHD
site Area 125.3 ha
LGA PENRITH

reference number 51007 001DT
scale 1:250 @A1
date of survey 29-04-2020
SHEET 27 OF 32



DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

0 5 10 15 20 25
SCALE 1: 250 @ A1

REFER TO NOTES AND LEGEND ON SHEET 1

Revision	Date	Description	Reference
L	00/00/00	–	00
K	00/00/00	–	00
J	00/00/00	–	00
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datum AHD
site Area 125.3 ha
LGA PENRITH

reference number 51007 001DT
scale 1:250 @A1
date of survey 29-04-2020

SHEET 28 OF 32

MGA

TN

APPROX.

LUDDENHAM

ROAD

2

DP 520117

3

DP 520117

REFER TO NOTES AND LEGEND ON SHEET 1

SCALE 1:250 @ A1

0 5 10 15 20 25

DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

Revision	Date	Description	Reference
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datum AHD

site Area 125.3 ha

LGA PENRITH

reference number 51007 001DT

scale 1:250 @A1

date of survey 29-04-2020

SHEET 29 OF 32

MGA

TN

APPROX

LUDDENHAM ROAD

4

DP 520117

24

DP 331426

REFER TO NOTES AND LEGEND ON SHEET 1

SCALE 1: 250 @ A1

Revision	Date	Description	Reference
L	00/00/00	–	00
K	00/00/00	–	00
J	00/00/00	–	00
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Drawing title

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datum AHD

site Area 125.3 ha

LGA PENRITH

reference number 51007 001DT

scale 1:250 @A1

date of survey 29-04-2020

SHEET 30 OF 32

DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

REFER TO NOTES AND LEGEND ON SHEET 1

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datum AHD

site Area 125.3 ha

LGA PENRITH

reference number 51007 001DT

scale 1:250 @A1

date of survey 29-04-2020

SHEET 31 OF 32

DIAL BEFORE YOU DIG www.1100.com.au

GDA2020

REFER TO NOTES AND LEGEND ON SHEET 1

0 5 10 15 20 25
SCALE 1: 250 @ A1

Revision	Date	Description	Reference
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datum AHD
site Area 125.3 ha
LGA PENRITH
reference number 51007 001DT
scale 1:250 @A1
date of survey 29-04-2020
SHEET 32 OF 32

MGA

TN

APPROX. 1°00'

LEGEND

BENCH MARK	▲
COMMS PIT	COM
TELSTRA PIT	TEL
ELECTRIC LIGHT POLE	ELP
ELECTRICITY BOX	EL
POWER POLE	PP
LETTERBOX	LBOX
STREET SIGN	SS
BOLLARD	BOL
ROADS & MARITIME SERVICES	RMS
GRATED INLET PIT	GIP
SEWER INSPECTION POINT	SIP
WATER METER	WM
GATE	
GAS (DBYD)	G
COMMUNICATION (DBYD)	C
ELECTRICITY (OVERHEAD)	P

NOTES

1. THE BOUNDARIES HAVE NOT BEEN MARKED
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 PM10811 R.L. 100.000 (A.H.D.) BY WATER PIPELINE, OFF LUDDENHAM ROAD
4. CONTOUR INTERVAL 1.0 m
5. CONTOURS ARE INDICATIVE ONLY. ONLY SPOT LEVELS SHOULD BE USED FOR CALCULATIONS OF QUANTITIES WITH CAUTION
6. KERB LEVELS ARE TO THE TOP OF KERB UNLESS SHOWN OTHERWISE
7. FLOOR LEVELS SHOWN ARE THRESHOLD LEVELS. NO INVESTIGATION OF INTERNAL FLOOR LEVELS HAS BEEN UNDERTAKEN
8. 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
9. 8/.4/7 DENOTES TREE SPREAD OF 8m, TRUNK DIAMETER OF 0.4m & APPROX HEIGHT OF 7m
10. SHOWS APPROXIMATE POSITION OF ROAD LINEMARKING AND IS INDICATIVE ONLY
11. BEARINGS SHOWN ARE MGA (MAP GRID OF AUSTRALIA) ADD APPROX. 1°00' FOR TRUE NORTH

(A) EASEMENT FOR TRANSMISSION LINE 60.96 WIDE (VIDE L671350)

DIAL BEFORE YOU DIG www.1100.com.au

REFER TO NOTES AND LEGEND

GDA2020

0 60 90 120 180 240 300

SCALE 1: 3000 @ A1

Revision	Date	Description	Reference
L	00/00/00	–	00
K	00/00/00	–	00
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C	29/10/20	TREE LINE ON SHEET 3 ADDED	003
B	21/10/20	CREEK DETAIL & LEVELS ADDED SHEETS 2 & 3	003
A	06/10/20	CREEK DETAIL & LEVELS ADDED SHEETS 2, 3, 5 & 9	002

LTS CONFIDENCE TOGETHER

www.ltsl.com.au | P 1300 587 000

THIS IS THE PLAN REFERRED TO IN MY LETTER DATED:

.....

Registered Surveyor NSW

Client HB & B PROPERTY PTY LTD

Drawing title

PLAN OF DETAIL AND LEVELS OVER LOT 242 DP 1088991 AND LOT 1 DP 1099147 KNOWN AS No 221-227 & No 289-317 LUDDENHAM ROAD, ORCHARD HILLS

datum AHD

site Area 125.3 ha

LGA PENRITH

reference number 51007 001DT

scale 1:3000 @A1

date of survey 29-04-2020

SHEET 32 OF 1A

Development Risk Management Pty Ltd

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