Geotechnical Investigation

Job No: J493947

INGWE Helena Valley Pty Ltd

Lots 253 and 254 Helena Valley Road, Helena Valley, WA

Friday 17 October 2025

Table of Contents

1. Project Details

1.1 Introduction

At the request of INGWE Helena Valley Pty Ltd, Structerre Consulting (Structerre) have conducted a Geotechnical Investigation at Lots 253 and 254 Helena Valley Road, Helena Valley, WA. The purpose of the investigation was to provide the following for the proposed development:

- Desk top study including a summary of geology, groundwater, site history (obtained from historical photographs)
- Summary of encountered ground and groundwater conditions, including borehole logs and indicative mapping of sand resources
- Site Classification in accordance with AS2870-2011 Residential slabs and footings
- Recommendations for stormwater drainage design, including in-situ soil permeability
- Earthquake site factor in accordance with AS1170.4
- Site preparation requirements (earthworks), including site traffic, excavation, reuse of materials and batter slopes, compaction requirements, expected shrinkage and bulking factors, and sub-surface settlement of fill during compaction
- Recommendations on earthworks and site preparation requirements including use of existing materials as fill or for use in public open space, recommendations on imported materials, compaction methods, testing, expected shrinkage and bulking factors, plasticity, sub-surface settlement during compaction of fill and future settlement, dewatering requirement, if necessary
- Preliminary pavement design parameter, indicative California Bearing Ratio (CBR) values determined from penetrometer results and ground conditions encountered
- Earth pressure coefficients for granular backfill for retaining wall design.
- Wind Classification in accordance with AS 4055-2012 Wind Loads for Housing,

Structerre were provided with a site plan prepared by TBB Planning showing surface contours, the proposed development, dimensions of the proposed lots and the location in relation to the site boundaries.

This report details the scope of the geotechnical investigation, present and interpretation of ground conditions and material properties across the site, provides geotechnical design parameters for the design of the proposed infrastructure, and evaluates the suitability of materials for use in earthworks. Interpretation of site conditions is based on the subsurface lithology revealed during the investigation programme, visual assessment of the in-situ materials and the results of in situ field tests.

Terms of reference for this investigation were presented in a Structerre Consulting proposal reference Q115652 (dated 2 September 2025), which was submitted to and accepted by the client.

1.2 Site Description

The site is located at Lot 253 and 254 Helena Valley Road, Helena Valley, Shire of Mundaring. Lot 253 is bounded by Helena Valley Road to the northeast and rural properties to the southeast, southwest and northwest. Lot 254 is bounded by Helena Valley Road to the southwest and rural properties to the northwest, northeast and southeast.

The site is sloping down towards the northeastern boundary. At the time of the field investigation an existing house and sheds occupied the site (Lot 253). The site was covered in vegetation with small to medium sized trees (Lot 253). Trees partially covered Lot 254 mainly the northeastern section the remainder of the Lot was covered in vegetation. Helena River is also located in close proximity to the northeastern section of the of Lot 254.

1.3 Field Investigation – Scope of Works

The field investigation was carried out on 26 September 2025 and comprised:

- Nine (9) Sample Retrieval Probes (SRP) to a depth of 2.5m over the site for material assessment and soil profiling,
- Six (6) In situ percolation tests to determine the permeability of the materials within the upper 1.0m; and
- Nine (9) Perth Sand Penetrometer (PSP) tests in accordance with AS 1289.6.3.3-1997 to a depth of 1.0m for evaluation of relative densities of the upper layers.

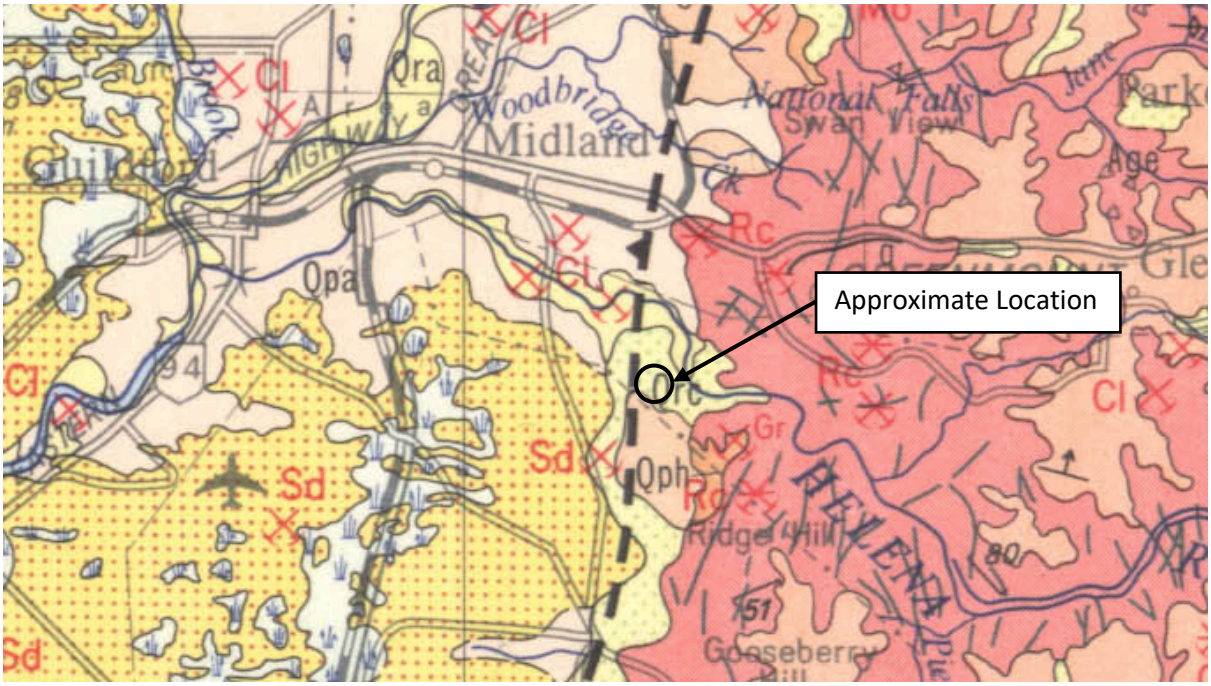
The locations are shown on the attached site plan in Appendix A.

A geotechnical representative from Structerre supervised the fieldwork, interpretated and described the materials encountered in this report. They are in accordance with the guidelines presented in AS1726-2017, “Geotechnical Site Investigations”.

2. Desk Study

2.1 Geological Setting

The Perth sheet 1: 50,000 Environmental Geology Series (Sheet 2034 II, Part of 2034 III and 2134 III, 1986) prepared by the Geological Survey of Western Australia indicates that the following geological layers underlie the site:



- Guildford Clay: alluvium (clay, loam, sand and gravel)

2.2 Ground Surface and Groundwater Level

The Perth Groundwater Atlas (Waters & Rivers Commission) indicates the ground surface level at this site was approximately 20.0m Australian Height Datum (AHD).

The 2019 groundwater level at the site was approximately 16.0m AHD and the historical maximum was indicated to be approximately 18.0m AHD. It should be noted that the groundwater levels can vary significantly due to seasonal variation and the data from the recorded maximum levels should be used only as a guide.

2.3 Earthquake Coefficient

In accordance with AS 1170.4-2007 Structural Design Actions the site is located within an area with an earthquake acceleration coefficient of 0.10.

2.4 Wind Classification

In accordance with AS 4055-2012 Wind Loads for Housing, wind classification of this site falls within the non-cyclonic “N2-N3” category.

2.5 Site History

Historical aerial photographs dating back to 1953 are publicly available through Landgate Map Viewer were assessed and a summary is presented in Table 1.

Table 1 - Historical Site Information

Date	Description
1953	The site is farmland
1985	Helena valley Road constructed
2008	Buildings constructed on the southeastern corner of Lot 253
2022	New residential development started to the southeast of Lot 253
2025	Site remains relatively unchanged to the current day

3. Results of the Investigation

3.1 Subsurface Soil Profile

The subsurface soil profile presented below was determined from the ground conditions encountered within the boreholes and through the interpretation of the PSP test results:

Table 2- Subsurface Soil Profile

Depth to Base of Strata (m)	Geological Setting	Material Description
0.1 – 0.2	SURFICIAL	TOPSOIL
0.4	FILL	Clayey SAND: fine to medium grained, low plasticity, loose – BH2 only
2.5	NATURAL	Sandy CLAY: fine to medium grained, low plasticity, soft – BH3 only
Not Penetrated (>2.5)	NATURAL	SAND: fine to medium grained, with clay, very loose to dense

The soils encountered are consistent with the expected site conditions as predicted from the Environmental Geology Map. It is important to note that there may be pockets of fill on site that are deeper than that encountered by the investigation boreholes. The subsurface soil conditions encountered are presented in the bore logs, within Appendix C.

3.2 Groundwater

Groundwater was encountered in the following boreholes during or immediately after drilling:

Table 3 - Groundwater

Location ID	Depth (m)
BH1	2.0
BH2	1.5
BH3	1.5
BH4	1.5
BH5	2.0
BH6	2.0
BH7	2.0
BH8	2.0

3.3 Percolation Testing

Percolation testing of the in-situ soils was undertaken in six locations. Results of the testing are summarised below:

Table 4 - In Situ Percolation Test Results

Test Location	Testing Depth (m)	Soil Type	Permeability (m/day)
BH1	0.65 – 0.9	SAND	8.7
BH3	0.65 – 0.9	Clayey SAND to SAND	7.4
BH5	0.65 – 0.9	SAND	5.4
BH7	0.65 – 0.9	SAND	10.0
BH9	0.65 – 0.9	SAND	2.8

3.4 Laboratory Test Results

Samples were tested by Structerre's in-house NATA accredited laboratory for Particle Size Distribution as per AS1289.3.6.1, Plasticity Index / Linear Shrinkage as per AS1289.3.1.2 – 3.4.1.

Table 5 - Atterberg Limit Test Results

Sample Identification	BH3 @ 1.9m – 2.5m
Liquid Limit (%)	30
Plastic Limit (%)	14
Plasticity Index (%)	16
Linear Shrinkage (%)	5.5
Material Passing 0.075mm (%)	36

Test results indicate that the natural sandy CLAY has low shrink swell capacity or degree of expansion.

4. Geotechnical Construction Considerations

4.1 Site Classification

AS 2870-2011 Residential Slabs and Footings provides guidance on site classification for residential slabs and footing design based on the expected ground surface movement and depth of expected moisture changes.

The site in its current (undeveloped) condition is classified as Class "P" due to the general topsoils/organic materials and loose sand materials encountered across the site.

Based on results of this investigation the site can be classified as a Class "A" provided that all unsuitable materials are removed and replaced with engineer-controlled sand fill materials in accordance with earthwork recommendations outlined in Section 4.3 in this report.

4.2 Drainage

The site is suitable for on-site disposal of stormwater runoff subject to the proposed development. For on-site disposal of stormwater runoff, soak wells of sufficient sizes are required, and should be positioned a minimum of 1.2m or the depth of soak well (whichever is greater) from any proposed or existing foundations (including those beyond the boundaries of the site) to reduce the risk of differential settlement.

To aid with the design of on-site stormwater drainage, groundwater levels and field permeability results are presented in Section 3.3 of this report.

4.3 Earthworks

All earthworks shall be undertaken in accordance with AS 3798-2007 Guidelines on Earthworks for Commercial and Residential Developments and are to include but not limited to the following:

4.3.1 Earthworks Equipment

It is considered that standard sized earthmoving equipment would be appropriate for the proposed development.

The ground surface was generally competent and should not pose significant issues to either excavation or site traffic movements. Near surface materials may become loose during the drier months of the year, which may impede site movements.

4.3.2 Clearing and Topsoil Stripping

All surface vegetation (i.e. grass and bushes) to be stripped and removed off site. Trees should be grubbed, stockpiled and mulched for use in landscaping areas within the proposed subdivision. Loose ground resulting from the removal of vegetation (i.e. trees) should be profiled, compacted and in filled with suitably compacted fill.

Based on the investigation the topsoil is approximately 0.2m thick. The encountered topsoil may be used as is in landscape areas but is not suitable for use as structural fill.

Alternatively, screening and blending of topsoil may provide suitable structural fill provided vegetation, roots and stumps are removed. Should this be engaged, it is recommended to blend topsoil with clean sand in ratio to provide an organic content of <2% by mass. Typically, a suitable blended material is achieved by blend ratio (clean sand/topsoil) of 1:1. Any blended material should not be placed in the upper 0.6m fill profile, however where drainage is a consideration placement should be at depth. Additionally, it is recommended monitoring of the screening and blending process be conducted by an Engineer experienced in earthworks, which would include the following:

- Sampling of the topsoil sources to determine organic content
- Site visit, supervision and testing to determine the appropriate blending process
- Ongoing monitoring and testing of the blending process at a frequency of 1 visit per 2000m^3.

The organic content of the underlying soils (i.e. <2%), is typical of poorer sub-soils. Subject to inspection and testing, it is considered that these materials can be left in situ and blended with the initial layer of clean sand fill.

4.3.3 Uncontrolled Fill

Uncontrolled fill was encountered during the investigation at the location of BH02 (Clayey SAND). It is recommended that this fill is chased out and removed from within the building envelopes.

4.3.4 Proof Compaction

The near surface sand materials can be proof compacted by utilising the following methodology:

- Apply a minimum of 4 passes with a self-propelled, smooth drum vibratory roller (operating in high amplitude mode) allowing a minimum of 20% overlap. The surface should then be given an additional minimum of 4 passes with the vibrating roller operating in low amplitude. Areas that deform excessively under rolling should be removed and replaced with clean sand. On completion of vibratory rolling, the roller should be operated in static mode, applying a minimum of 2 passes over the site.

After excavation / stripping and proof compaction, it is recommended the base is to be inspected and approved by a representative from this office prior to backfilling. At this stage it can be assessed whether any further materials need to be removed or whether further compaction of the base is required.

The compaction requirements are set out below, as per AS3798:2007

Table 6 - Compaction Requirements

Item	Application	Minimum relative compaction %	
		Minimum density ratio (Standard Compaction Effort) (Cohesive soils)	Minimum density index (Cohesionless soils)
1	Residential - lot, fill, house, sites	95	70
2	Fill to support pavements General Fill Subgrade (to a depth of 0.3m)	 95 98	 70 75

4.3.5 Cohesionless Sand Structural Fill

The SAND encountered on site is deemed to have suitable geotechnical engineering properties and can be utilised as structural fill.

However, it should be noted that the in-situ sand materials have a variable silt content at depth (ranging from SAND trace fines to SAND with silt), which may reduce the permeability characteristics when placed and compacted as engineered fill. Therefore, it is recommended that any silty SAND exposed be blended with clean SAND and the permeability characteristics verified during the earthworks. Alternatively, these materials can be used within landscaping areas or as deep fill (i.e. >1.5m).

Within fill areas, the ground level should be built up to design levels. Generally, the sand materials should be placed in layers not exceeding 300mm loose thickness and compacted to achieve the criteria stated in Table 7.

It is recommended that a Perth Sand Penetrometer (PSP) / Density correlation be undertaken to confirm the PSP requirements. However, the following criteria can be used as a guide:

- A minimum of 7 PSP blows over the interval 150 – 450mm, 9 PSP blows over the interval 450 – 750mm and 11 PSP blows over the interval 750 – 1050mm.

4.4 Temporary and Permanent Slopes

The following temporary and permanent excavation batters are considered suitable for non-surcharged (i.e. no surcharge within 4.0 m of crest), dry, cohesionless sand slopes of less than 2.0m in height, in accordance with the Building Code of Australia (BCA) Table 3.1.1.1.

Table 7 - Slope Gradients

	Temporary	Permanent
Cut	1V : 2H	1V : 2.5H
Fill	1V : 2H	1V : 2.5H

Slopes greater than 2.0m or if steeper slopes are required should be analysed on a case-by-case basis.

4.5 Indicative California Bearing Ration (CBR)

The indicative California Bearing Ratio (CBR) value of the subgrade material (following earthworks) can be estimated from the site investigation results and would be appropriate for preliminary design purposes. The indicative value is shown in the below table:

Table 8 - Indicative CBR Values

Material	Indicative CBR (%)	Compaction
SAND (In-situ or Imported Fill)	12	95% of MMDD*

* Implies the maximum dry density ratio using Modified compaction in accordance with AS 1289 5.2.1-2003. For detailed design of the pavements, it is recommended that the CBR values be verified with laboratory Soaked CBR testing on the anticipated subgrade material.

4.6 Retaining Walls

Retaining walls proposed to be installed at the site will likely support sandy soils. Where imported granular backfill is to be used in conjunction with retaining walls, the geotechnical properties will vary depending upon the nature of the granular materials imported.

For cohesion-less free draining sand, the following parameters can be used as a guide for design purposes:

- Angle of internal friction, Ø = 33^0
- Coefficient of active earth pressure Ka = 0.29
- Coefficient of passive earth pressure Kp = 3.39
- At rest coefficient of earth pressure K0 = 0.46
- Bulk density 18 kN/m^3

Retaining structures should be designed in accordance with AS 4678-2002 Earth Retaining Structures. Where significant eccentric and/or horizontal loading is applied, further assessment will be required. Additionally, handheld compaction equipment is utilised within 2.0m of the walls, to reduce the potential increase in lateral pressure on the retaining wall.

Retaining wall design should ensure adequate drainage to the rear of the wall. It is recommended that the drainage comprises free draining sand and weepholes that are interconnected with a suitable sized perforated drainage pipe.

Experience indicates that excavation immediately in front of retaining walls (i.e. due to service installation) may cause movement to the wall to occur. This can lead to cracking of adjoining structures and needs to be accounted for in the design and construction sequencing of the new works.

5. Conclusions

A site investigation has been carried out at the site of the proposed residential development to assess the geotechnical conditions. Parameter and design recommendations are incorporated in the body of the report. The following conclusions have been drawn from the site investigation:

- The site is considered suitable for the proposed subdivisional development.
- The average subsurface soil profile encountered comprised topsoil to 0.2m, clayey sand FILL to 0.4m (BH2), sandy clay (BH3) and underlain by SAND with clay to the investigated depth of 2.5m.
- Groundwater or perched water was encountered during and after drilling from 1.5m – 2.0m below the existing ground level, refer to Table 3 of the report
- It is considered that the site is suitable for on-site drainage.
- The site can be classified as Class “A” in accordance with AS 2870-2011 provided that the recommended earthworks are undertaken.
- In general, small to medium sized earthworks equipment are considered suitable for the proposed development.
- Site movement and excavations should not pose a significant issue.
- Recommended earthworks include stripping of topsoil and any unsuitable materials, proof compaction of the base, excavation of loose materials (where necessary), placement fill and compaction of final level.
- The underlying sand materials are considered structural suitable for reuse as structural fill.
- A CBR value is 12% is recommended for the existing subgrade and imported sand fill.

6. Limitation of Field Investigations

This report has been prepared in accordance with general accepted consulting practice for INGWE Helena Valley Pty Ltd using information supplied at the time and for the project specific requirements as understood by Structerre. To the best of our knowledge the information contained in this report is accurate at the date of issue, however it should be emphasised that any changes to ground conditions and/or the proposed structures may invalidate the recommendations given herein.

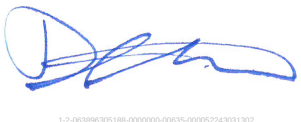
The conclusions and recommendations in this report are based on the site conditions revealed through selective point sampling, representing the conditions of the site in total, although the area investigated represents only a small portion of the site. The actual characteristics may vary significantly between successive test locations and sample intervals other than where observations, explorations and investigations have been made.

The materials and their geotechnical properties presented in this report may not represent the full range of materials and strengths that exist on site and the recommendations should be regarded as preliminary in nature. Allowances should be made for variability in ground conditions and any consequent impact on the development. Structerre accepts no responsibility and shall not be liable for any consequence of variations in ground conditions.

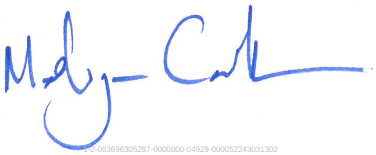
If ground conditions encountered during construction are different to that described in this report, this office should be notified immediately.

Should you require further information or clarification of any of the recommendations provided within this report, please contact the undersigned.

For and on behalf of Structerre Consulting.



Signature
David Harding
Geotechnical Supervisor



Signature
Mel Castle
Geotechnical Manager

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17 October 2025

Job #	Revision	Authored	Checked	Authorised
J493947	0	DH	MEC	MEC

7. References

Department of Water – Perth Groundwater Atlas

Geological Survey of Western Australia 1:50,000 Environmental Geology Series

AS 1170.4-2007 Structural design actions – Earthquake actions in Australia

AS 1289.3.1.2-2009 Methods of testing soils for engineering purposes – Soil classification tests – Determination of the liquid limit of a soil

AS 1289.3.2.1-2009 Methods of testing soils for engineering purposes – Soil classification tests – Determination of the plastic limit of a soil

AS 1289.3.3.1-2009 Methods of testing soils for engineering purposes – Soil classification tests – Calculation of the plasticity index of a soil

AS 1289.3.4.1-2009 Methods of testing soils for engineering purposes – Soil classification tests – Determination of the linear shrinkage of a soil

AS 1289.6.3.3-1997 Methods of testing soils for engineering purposes – Soil strength and consolidation tests – Determination of the penetration resistance of a soil – Perth sand penetrometer test

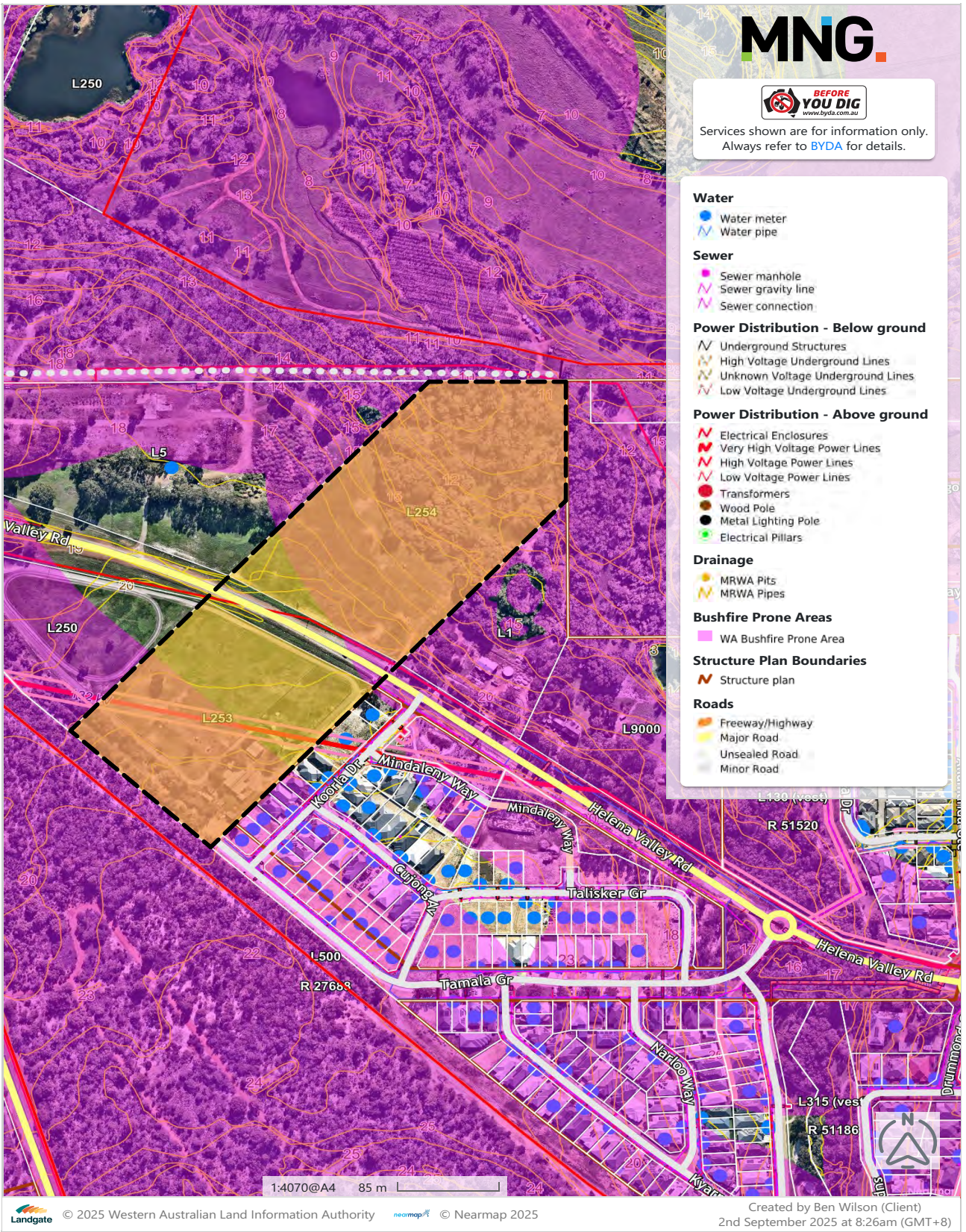
AS 1726-2017 Geotechnical Site Investigation

AS 2870-2011 Residential Slabs and Footings

AS 3798-2007 Guidelines on Earthworks for Commercial and Residential Developments

AS 4055-2012 Wind Loads for Housing

Appendix A – Site Plan



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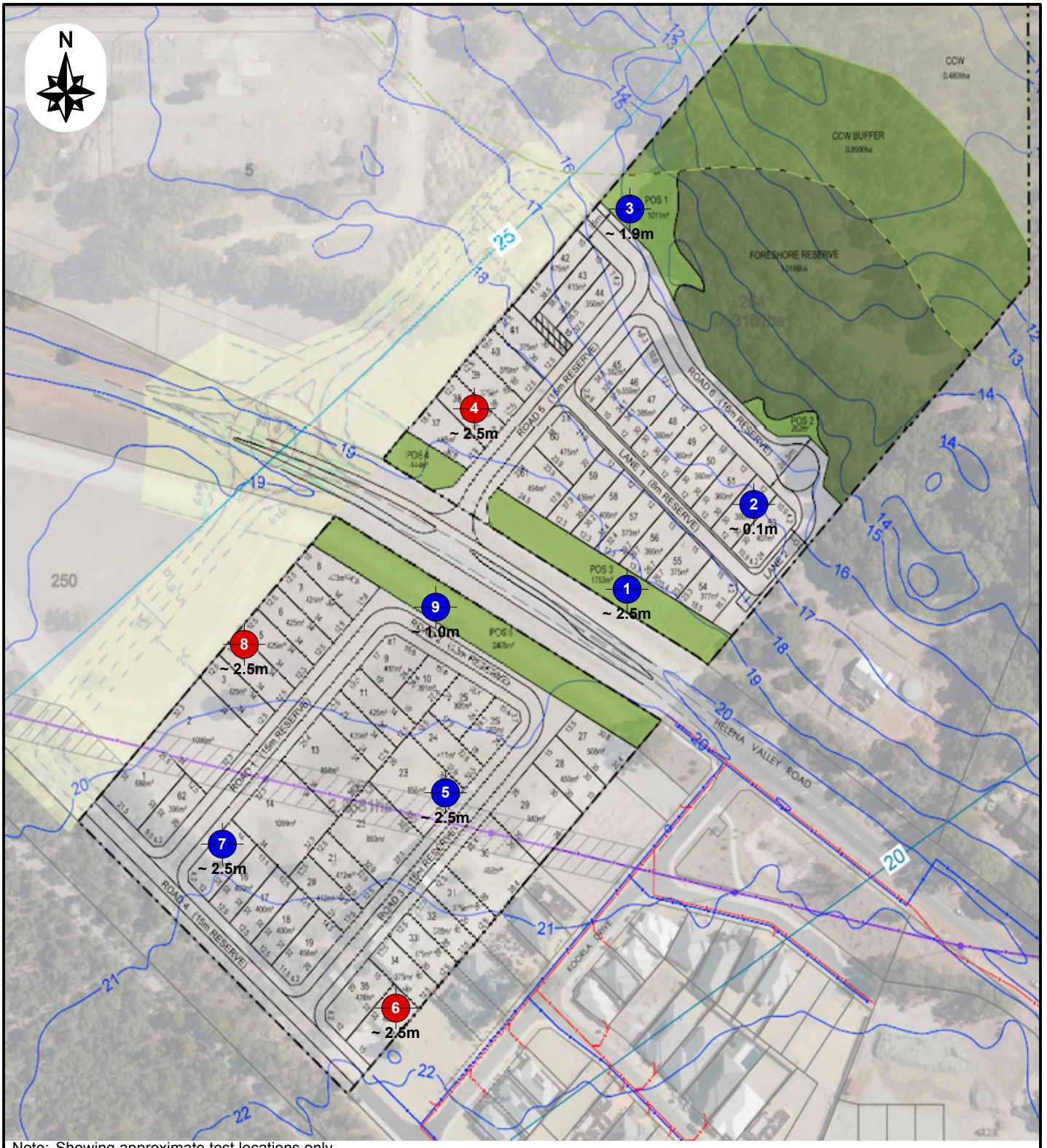
PROJECT:	Subdivision Concept Plan - Lot 253 and 254 Helena Valley Road, Helena Vallety
PROJECT #:	D371902
JOB #:	J493947
CLIENT:	**INGWE Helena Valley Pty Ltd**
SCALE:	NTS
TITLE:	Geotechnical - Bushfire Prone Areas
DATE:	26 Sep '25
DRAWN BY:	MM
CHECKED BY:	DH

DOC: GE:3.001



Note: Showing approximate test locations only

LEGEND

- Borehole and Percolation Test
- Borehole
- ~ m Depths to Non-Reactive Material

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PROJECT:	Subdivision Concept Plan - Lot 253 and 254 Helena Valley Road, Helena Valley
PROJECT #:	D371902
JOB #:	J493947
CLIENT:	**INGWE Helena Valley Pty Ltd**
SCALE:	NTS
TITLE:	Geotechnical Investigation Site Plan
DATE:	26 Sep '25
DRAWN BY:	MM
CHECKED BY:	DH

DOC: GE:3.001

Appendix B – Site Photos

PHOTO 1 - Facing northeast from BH4 location

PHOTO 2 - Facing northwest from BH6 location

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PROJECT:	Subdivision Concept Plan - Lot 253 and 254 Helena Valley Road, Helena Vallety
PROJECT #:	D371902
JOB #:	J493947
CLIENT:	**INGWE Helena Valley Pty Ltd**
SCALE:	NTS
TITLE:	Site Photographs
DATE:	26 Sep '25
DRAWN BY:	MM
CHECKED BY:	DH

PHOTO 3 - Facing east from BH8 location

PHOTO 4 - Facing southeast from BH9 location

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PROJECT:	Subdivision Concept Plan - Lot 253 and 254 Helena Valley Road, Helena Valley
PROJECT #:	D371902
JOB #:	J493947
CLIENT:	**INGWE Helena Valley Pty Ltd**
SCALE:	NTS
TITLE:	Site Photographs
DATE:	26 Sep '25
DRAWN BY:	MM
CHECKED BY:	DH

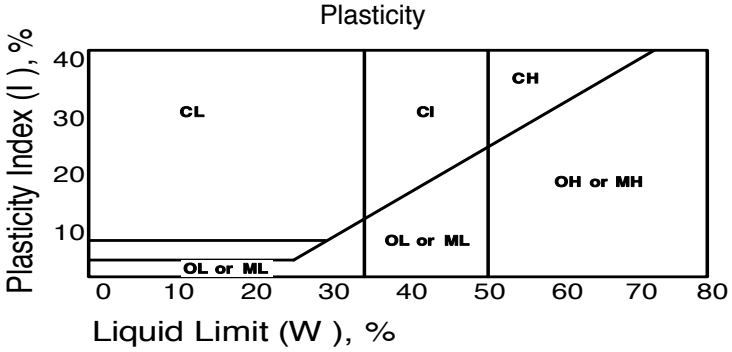
Appendix C – Borelogs & Terminology

BORELOG TERMINOLOGY

Particle Size Distribution

Major Division	Subdivision	Size
Boulders		>200mm
Cobbles		200 - 63mm
Gravel	Coarse	63 - 20mm
	Medium	20- 6mm
	Fine	6 - 2.36mm
Sand	Coarse	2.36 - 0.6mm
	Medium	0.6 - 0.2mm
	Fine	0.2 - 0.075mm

Plasticity



Consistency of Cohesive Soils

Term	Undrained Strength Su (kPa)	Field Guide
Very Soft	< 12	Exudes between the fingers when squeezed in hand
Soft	12 - 25	Can be moulded by light finger pressure
Firm	25 - 50	Can be moulded by strong finger pressure
Stiff	50 - 100	Cannot be moulded by Fingers. Can be indented by thumb.
Very Stiff	100 - 200	Can be indented by thumb nail
Hard	> 200	Can be indented with difficulty by thumb nail.
Friable	-	Crumbles or powders when scraped by thumbnail

Consistency/Density of Non-Cohesive Soils

Term	Density Index (%)	SPT "N" Value Comparison
Very Loose	< 15	0 - 4
Loose	15 - 35	4 - 10
Medium Dense	35 - 65	10 - 30
Dense	65 - 85	30 - 50
Very Dense	> 85	> 50

Moisture Content

D	Dry
M	Moist
W	Wet
S	Saturated

Minor Components

Term	Assessment Guide	Proportion of Minor Component In:
Trace	Presence just detectable by feel or eye, but soil properties little or no different to general properties of primary component	Coarse grained soils: < 5 % Fine grained soils: <15%
With	Presence easily detected by feel or eye, soil properties little different to general properties of primary component	Coarse grained soils: 5 - 12 % Fine grained soils: 15 - 30%

Soil Legend

FILL	CLAY	GRAVEL	CONCRETE
TOPSOIL	SILT	LIMESTONE	COMBINATIONS
PEAT	SAND	BEDROCK	eg: Clay, Silty, Sandy

USCS

GW	Well graded gravel	SC	Clayey sand	OL	Organic low plasticity silt	CL	Low plasticity clay
GP	Poorly graded gravel	SM	Silty sand	ML	Low plasticity silt	CI	Intermediate plasticity clay
SW	Well graded sand			MH	High plasticity silt	CH	High plasticity clay
SP	Poorly graded sand			OH	Organic high plasticity silt	PT	Peat

DOC:GE:3.003

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ABN 71 349 772 837 Zemla Pty Ltd ACN 008 966 283 as trustee for the Young Purich and Higham Unit Trust trading as Structerre Consulting Engineers

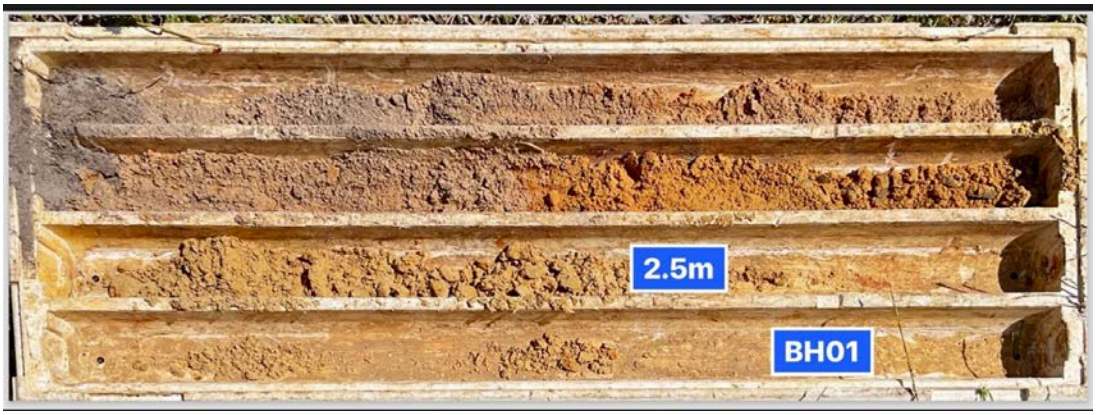
Borehole Record: BH01

Project: Subdivision Concept Plan
Location: Lot 253, 254 Helena Valley Rd, Helena Valley WA 6056, Australia
Loc Comment:
Job No: D371902 J493947

Position: Easting: 407374.98
Northing: 6468915.04
Elevation: Not Surveyed
Inclination:

Date Drilled: 26/09/2025
Drill Rig SRP - 1GDZ
Drill Supplier Structerre Consulting
Logged/Checked: Tony Broadway/Tony Broadway

Water	Depth (m)	Soil Origin	Graphic Log	USCS	Material Description	Moisture	Consistency	PSP (0 5 10 15 20 25 30)	Percolation (m/day)	Samples
		Non-soil		TS	Topsoil.					
		Natural		SP	Sand (SP): very loose to loose, poorly graded, fine to medium grained, grey, moist.	M	VL-L	2, 1, 2, 3, 3, 3	8.7	
GWL	1.0 2.0			SP	Sand (SP): medium dense, poorly graded, fine to medium grained, brown, trace clay, moist to wet.	W-M	MD			
					BH01 Terminated at 2.5 m (Target Depth)					



Depth: 2.5 m

This report must be read in conjunction with accompanying notes and abbreviations. It has been prepared for geotechnical purposes only, without attempt to assess possible contamination. Any references to potential contamination are for information only and do not necessarily indicate the presence or absence of soil or groundwater contamination.

Borehole Record: BH02

Project: Subdivision Concept Plan
Location: Lot 253, 254 Helena Valley Rd, Helena Valley WA 6056, Australia
Loc Comment:
Job No: D371902 J493947

Position: Easting: 407458.48
Northing: 6468936.99
Elevation: Not Surveyed
Inclination:

Date Drilled: 26/09/2025
Drill Rig SRP - 1GDZ
Drill Supplier Structerre Consulting
Logged/Checked: Tony Broadway/Tony Broadway

Water	Depth (m)	Soil Origin	Graphic Log	USCS	Material Description	Moisture	Consistency	PSP (0 5 10 15 20 25 30)	Percolation (m/day)	Samples
		Non-soil		TS	Topsoil.					
		Fill		SC	Clayey Sand (SC): loose, poorly graded, fine to medium grained, brown, moist.	M	L	4, 4, 6, 6, 12, 13		
		Natural		SP	Sand (SP): loose to dense, poorly graded, fine to medium grained, grey, moist.	M	L-D		8.7	
GWL	1.0									
				SP	Sand (SP): medium dense, poorly graded, fine to medium grained, brown, trace clay, moist to wet.	W-M	MD			
	2.0									
					BH02 Terminated at 2.5 m (Target Depth)					

Depth: 2.5 m

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Borehole Record: BH03

Project: Subdivision Concept Plan	**Position:** Easting: 407384.98	**Date Drilled:** 26/09/2025
Location: Lot 253, 254 Helena Valley Rd, Helena Valley WA 6056, Australia	Northing: 6469043.85	**Drill Rig** SRP - 1GDZ
Loc Comment:	**Elevation:** Not Surveyed	**Drill Supplier** Structerre Consulting
Job No: D371902 J493947	**Inclination:**	**Logged/Checked:** Tony Broadway/Tony Broadway

Water	Depth (m)	Soil Origin	Graphic Log	USCS	Material Description	Moisture	Consistency	PSP (0 5 10 15 20 25 30)	Percolation (m/day)	Samples
		Non-soil		TS	Topsoil.					
		Natural		SP	Sand (SP): very loose to loose, poorly graded, fine to medium grained, grey, moist.	M	VL-L	2, 2, 2, 3, 5, 6	7.4	
	1.0			SP	Sand (SP): medium dense, poorly graded, fine to medium grained, brown, trace clay, moist to wet.	W-M	MD			
GWL										
	2.0			CL	Sandy Clay (CL): soft, low plasticity, dark brown.		S			
					BH03 Terminated at 2.5 m (Target Depth)					

Depth: 2.5 m

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Borehole Record: BH04

Project: Subdivision Concept Plan
Location: Lot 253, 254 Helena Valley Rd, Helena Valley WA 6056, Australia
Loc Comment:
Job No: D371902 J493947

Position: Easting: 407349.49
Northing: 6468985.48
Elevation: Not Surveyed
Inclination:

Date Drilled: 26/09/2025
Drill Rig SRP - 1GDZ
Drill Supplier Structerre Consulting
Logged/Checked: Tony Broadway/Tony Broadway

Water	Depth (m)	Soil Origin	Graphic Log	USCS	Material Description	Moisture	Consistency	PSP (0 5 10 15 20 25 30)	Percolation (m/day)	Samples
		Non-soil		TS	Topsoil.					
		Natural		SP	Sand (SP): very loose to loose, poorly graded, fine to medium grained, grey, moist.	M	VL-L	2, 3, 2, 2, 2, 2		
GWL	1.0			SP	Sand (SP): medium dense, poorly graded, fine to medium grained, brown, with clay, moist to wet.	W-M	MD			
	2.0				BH04 Terminated at 2.5 m (Target Depth)					

Depth: 2.5 m

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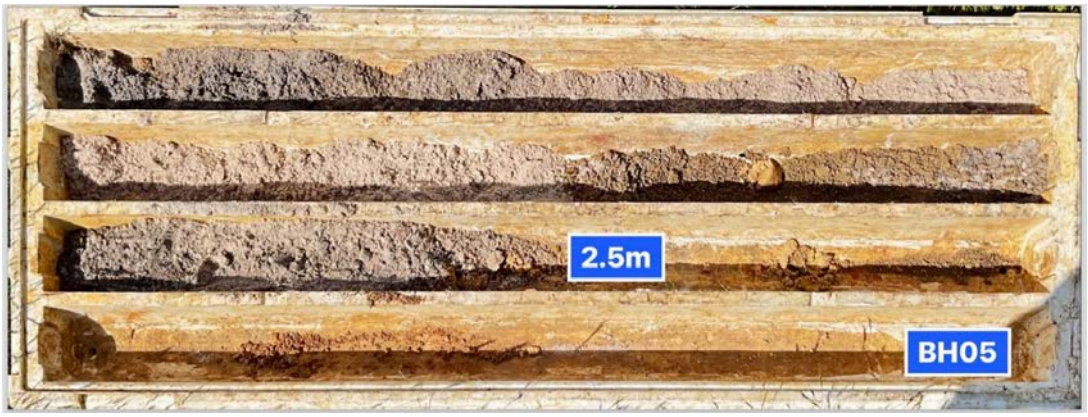
Borehole Record: BH05

Project: Subdivision Concept Plan
Location: Lot 253, 254 Helena Valley Rd, Helena Valley WA 6056, Australia
Loc Comment:
Job No: D371902 J493947

Position: Easting: 407356.88
Northing: 6468841.68
Elevation: Not Surveyed
Inclination:

Date Drilled: 26/09/2025
Drill Rig SRP - 1GDZ
Drill Supplier Structerre Consulting
Logged/Checked: Tony Broadway/Tony Broadway

Water	Depth (m)	Soil Origin	Graphic Log	USCS	Material Description	Moisture	Consistency	PSP (0 5 10 15 20 25 30)	Percolation (m/day)	Samples
		Non-soil		TS	Topsoil.					
		Natural		SP	Sand (SP): loose, poorly graded, fine to medium grained, grey, moist.	M	L	3, 3, 4, 4, 4, 4	5.4	
GWL	1.0 2.0			SP	Sand (SP): medium dense, poorly graded, fine to medium grained, brown, moist to wet.	W-M	MD			
					BH05 Terminated at 2.5 m (Target Depth)					



Depth: 2.5 m

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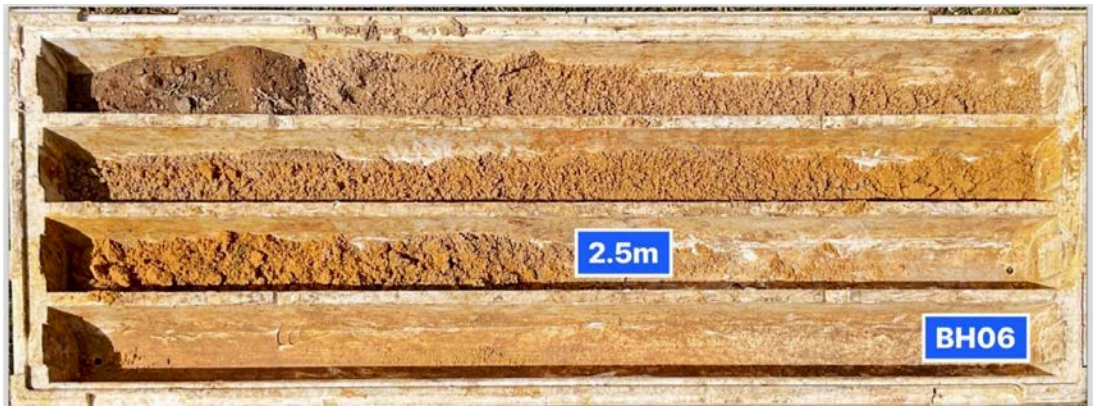
Borehole Record: BH06

Project: Subdivision Concept Plan
Location: Lot 253, 254 Helena Valley Rd, Helena Valley WA 6056, Australia
Loc Comment:
Job No: D371902 J493947

Position: Easting: 407298.92
Northing: 6468744.74
Elevation: Not Surveyed
Inclination:

Date Drilled: 26/09/2025
Drill Rig SRP - 1GDZ
Drill Supplier Structerre Consulting
Logged/Checked: Tony Broadway/Tony Broadway

Water	Depth (m)	Soil Origin	Graphic Log	USCS	Material Description	Moisture	Consistency	PSP (0 5 10 15 20 25 30)	Percolation (m/day)	Samples
		Non-soil		TS	Topsoil.					
		Natural		SP	Sand (SP): loose, poorly graded, fine to medium grained, grey, moist.	M	L	6, 6, 5, 5, 5, 5		
	1.0			SP	Sand (SP): medium dense, poorly graded, fine to medium grained, brown, moist to wet.	W-M	MD			
GWL	2.0									
					BH06 Terminated at 2.5 m (Target Depth)					



Depth: 2.5 m

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Borehole Record: BH07

Project: Subdivision Concept Plan
Location: Lot 253, 254 Helena Valley Rd, Helena Valley WA 6056, Australia
Loc Comment:
Job No: D371902 J493947

Position: Easting: 407211.46
Northing: 6468823.70
Elevation: Not Surveyed
Inclination:

Date Drilled: 26/09/2025
Drill Rig SRP - 1GDZ
Drill Supplier Structerre Consulting
Logged/Checked: Tony Broadway/Tony Broadway

Water	Depth (m)	Soil Origin	Graphic Log	USCS	Material Description	Moisture	Consistency	PSP (0 5 10 15 20 25 30)	Percolation (m/day)	Samples
		Non-soil		TS	Topsoil.					
		Natural		SP	Sand (SP): loose, poorly graded, fine to medium grained, grey, moist.	M	L	3, 4, 3, 4, 4, 5	10.0	
GWL	1.0 2.0			SP	Sand (SP): medium dense, poorly graded, fine to medium grained, brown, trace clay, moist to wet.	W-M	MD			
					BH07 Terminated at 2.5 m (Target Depth)					

Depth: 2.5 m

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Borehole Record: BH08

Project: Subdivision Concept Plan
Location: Lot 253, 254 Helena Valley Rd, Helena Valley WA 6056, Australia
Loc Comment:
Job No: D371902 J493947

Position: Easting: 407237.66
Northing: 6468899.16
Elevation: Not Surveyed
Inclination:

Date Drilled: 26/09/2025
Drill Rig SRP - 1GDZ
Drill Supplier Structerre Consulting
Logged/Checked: Tony Broadway/Tony Broadway

Water	Depth (m)	Soil Origin	Graphic Log	USCS	Material Description	Moisture	Consistency	PSP (0 5 10 15 20 25 30)	Percolation (m/day)	Samples
		Non-soil		TS	Topsoil.					
		Natural		SP	Sand (SP): very loose to loose, poorly graded, fine to medium grained, grey, moist.	M	VL-L	2, 2, 3, 3, 4, 4		
GWL	1.0 2.0			SP	Sand (SP): medium dense, poorly graded, fine to medium grained, brown, trace clay, moist to wet.	W-M	MD			
					BH08 Terminated at 2.5 m (Target Depth)					

Depth: 2.5 m

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Borehole Record: BH09

Project: Subdivision Concept Plan
Location: Lot 253, 254 Helena Valley Rd, Helena Valley WA 6056, Australia
Loc Comment:
Job No: D371902 J493947

Position: Easting: 407310.75
Northing: 6468894.26
Elevation: Not Surveyed
Inclination:

Date Drilled: 26/09/2025
Drill Rig SRP - 1GDZ
Drill Supplier Structerre Consulting
Logged/Checked: Tony Broadway/Tony Broadway

Water	Depth (m)	Soil Origin	Graphic Log	USCS	Material Description	Moisture	Consistency	PSP (0 5 10 15 20 25 30)	Percolation (m/day)	Samples
		Non-soil		TS	Topsoil.					
		Natural		SP	Sand (SP): loose, poorly graded, fine to medium grained, grey, moist.	M	L	6 6 6 6 6 6	2.8	
					BH09 Terminated at 1 m (Target Depth)					

Depth: 1.0 m

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Appendix D – Laboratory Test Results

Sample No.	**41093**	**Client**	Geotechnical
Job No.	J493947	**Project**	Lot 253/254 HELENA VALLEY RD, HELENA VALLEY

Laboratory testing carried out at Malaga Laboratory 44 Crocker Dr Malaga WA 6090

SAMPLE DETAILS

BH No. / Depth	BH3 1.9-2.5m	Sampling Method	Client
Sample History	50°C Oven Dried	Sample Preparation	AS 1289 1.1

ATTERBERG LIMITS

Description	Method	Result (%)
Liquid Limit	AS 1289.3.1.2	30
Plastic Limit	AS 1289.3.2.1	14
Plasticity Index	AS 1289.3.3.1	16
Linear Shrinkage	AS 1289.3.4.1	5.5
Nature of Shrinkage		Flat

PARTICLE SIZE DISTRIBUTION

Method: AS 1289.3.6.1
Description: Particle size distribution by sieve analysis

Sieve Size (mm)	% Passing
19.0	100
2.36	100
0.425	82
0.075	36

AS 1726:2017 Clause 6.1
Material Description: Sandy CLAY
AS Group Symbol: CL or OL

NATA WORLD RECOGNISED ACCREDITATION

Accreditation Number 18742

Jonty Sargent
Authorized Signatory

Laboratory Supervisor

Date: 06-Oct-25

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