SUBURBAN LAND AGENCY
FIRST GRANT CONTRACT – LAND READY
SCHEDULE

DATE OF THIS CONTRACT				
LEASE DETAILS				
LAND		Block	Section	Division/District
		See Land Schedule		**Whitlam**
OCCUPANCY		Vacant Possession		
CO-OWNERSHIP	Mark one *See clause 13*	☐ Tenants in common (*Show shares*)		☐ Joint Tenants
SELLER DETAILS				
SELLER	Full name ACN/ABN Address	**Suburban Land Agency** 27 105 505 367 480 Northbourne Avenue, Dickson ACT 2602		
SELLER'S SOLICITOR	Firm	MV Law		
	Ref	Christine Murray/Rebecca Rezuk		
	Phone	02 6279 4499		
	Fax	02 6279 4455		
	Address	GPO Box 764 Canberra City ACT 2601		
	Email	sla@mvlaw.com.au		
BUYER DETAILS				
BUYER	Full Name ACN/ABN Address			
BUYER'S SOLICITOR	Firm			
	Ref			
	Phone			
	Fax			
	DX/Address			
	Email			
PAYMENT DETAILS				
RESIDENTIAL WITHOLDING TAX	*See clause 39*	New Residential Premises?	☒ No	☐ Yes
		Potential Residential Premises?	☐ No	☒ Yes
		RW Amount required to be paid?	☐ No	☒ Yes
PRICE	Price Less Deposit Balance	$ $ $	(The Price is GST inclusive) (5% of Price)	
DATE FOR COMPLETION	*See clause 4*	On or before 42 days after the Date of this Contract		
ANNEXURES				
STANDARD ANNEXURES	Documents annexed to this Contract	Annexure A – Whitlam Housing Development Guidelines Annexure B – Specimen Crown Lease Annexure C – Clearance Certificate Annexure D – Deposited Plan Annexure E – Site Classification Certificates Annexure F – Special Conditions Annexure G – Landscaping, Driveway and Fencing Rebate Program Guide		
SPECIAL CONDITIONS	Indicate whether any special conditions apply	☒ Yes	☐ No	

READ THIS BEFORE SIGNING

Before signing this contract you should ensure that you understand your rights and obligations. You should get advice from your solicitor.

Authorised Delegate of the Suburban Land Agency signature:		Buyer signature:	
Delegate name:		Buyer name:	
Witness signature:		Buyer signature:	
Witness name:		Buyer name:	
		Witness signature:	
		Witness name:	

Signed by the Buyer in accordance with section 127 of the Corporations Act 2001:

If a company: Director signature:	
Director name:	
Director/secretary signature:	
Director/secretary name:	

RW AMOUNT

(Residential Withholding Payment) – Further Details

The supplier will frequently be the Seller. However, sometimes further information will be required as to which entity is liable for GST (eg if the Buyer is part of a GST group where the GST representative has the GST liability). If more than one supplier, provide details for each supplier.

Supplier	Name	**Suburban Land Agency**		
	ABN	27 105 505 367	Phone	**(02) 6205 0600**
	Business address	**480 Northbourne Avenue, Dickson ACT 2602**		
	Email	**suburbanlandaccounts@act.gov.au**		
Residential Withholding Tax	Supplier's portion of the RW Amount:			**100%**
	RW Percentage:			**7%**
	RW Amount (ie the amount that the Buyer is required to pay to the ATO):			**$**
	Is any of the consideration not expressed as an amount in money?			☐ Yes ☒ No
	If 'Yes', the GST inclusive market value of the non-monetary consideration:			**$**
	Other details (including those required by regulation or the ATO forms):			

LAND SCHEDULE

LOT			
BLOCK	**SECTION**	**DIVISION**	**BLOCK PRICE**
		Whitlam	$
		Whitlam	$
		Whitlam	$
		Whitlam	$
		TOTAL	$

1 GRANT OF THE LEASES

1.1 The Seller, as delegate of the Territory Planning Authority and on behalf of the Commonwealth of Australia will grant, or will procure the grant of, the Leases to the Buyer on Completion.

1.2 The Leases will be granted substantially upon the terms and conditions of the Specimen Crown Lease.

1.3 An individual Lease for each Block listed in the Land Schedule will be granted on Completion.

2 TERMS OF PAYMENT

2.1 On the Date of this Contract, the Buyer must pay the Deposit to the Seller by electronic funds transfer, credit card, EFTPOS, personal cheque or bank cheque made out to 'Suburban Land Agency'.

2.2 Subject to clause 2.6 the Deposit is released to the Seller and must be applied to the Price on Completion.

2.3 If the Deposit is:

(a) not paid on time; or

(b) paid by cheque and the cheque is not honoured on first presentation,

the Buyer is in default and the Seller may terminate this Contract immediately by written notice to the Buyer (without the notice otherwise necessary under clause 24) and clause 25 applies.

2.4 This clause 2 is for the benefit of the Seller and the obligations imposed on the Buyer by this clause 2 are essential. The obligations imposed on the Buyer by this clause 2 bind the Buyer notwithstanding any indulgence, waiver or extension of time by the Seller to the Buyer.

2.5 Any money payable to the Seller by the Buyer must be paid to the Seller or as the Seller's Solicitor directs in writing, and payment in accordance with that direction will be sufficient discharge to the person paying.

2.6 If the Contract is:

(a) rescinded; or

(b) terminated due to the default of the Seller,

and the Buyer is entitled to a refund of the Deposit, then the Seller must refund the Deposit, or part thereof, within 15 Working Days.

2.7 The Seller is not liable to pay interest on any refunded Deposit provided that the Deposit is refunded to the Buyer in accordance with clause 2.6.

2.8 The payment of the Deposit by the Buyer to the Seller does not create a charge over the Land to the value of the Deposit or any other amount.

2.9 On Completion the Buyer must pay to the Seller in Canberra the Balance of the Price, together with any other money payable under this Contract, by unendorsed bank cheque.

3 NOT USED

4 DATE FOR COMPLETION

4.1 Completion must take place in Canberra on the Date for Completion or as otherwise determined by the Contract and if not specified or determined, within a reasonable time.

4.2 For the avoidance of any doubt, the Seller shall not be liable to the Buyer for any damage or loss caused to the Land after Completion, including building waste, save where caused by the negligent or deliberate action or omission of the Seller, its employees, agents or contractors.

5 SIGNING OF LEASES

5.1 The Buyer must, no later than 10 Working Days from the date the Seller serves the Leases on the Buyer:

(a) sign each copy of the Leases; and

(b) return to the Seller's Solicitor the signed original Leases in duplicate.

5.2 The Buyer undertakes to register the Leases following Completion.

6 WHITLAM HOUSING DEVELOPMENT GUIDELINES

6.1 The Whitlam Housing Development Guidelines are annexed to this Contract for information only. If there is any variation to the Whitlam Housing Development Guidelines prior to Completion, the Seller may, but is not required to, notify the Buyer and provide:

(a) a copy of the final form of the amended document; or

(b) the variations,

to the Buyer prior to Completion.

6.2 The Buyer cannot make a claim or objection or rescind or terminate or make a claim for compensation under clause 23 of this Contract in respect of any matter set out in the Whitlam Housing Development Guidelines.

6.3 The Buyer acknowledges that the Land is ready and available for inspection.

6.4 The Buyers enters into this Contract in reliance upon the Deposited Plan annexed to this Contract and on the Buyer's own enquiries.

6.5 In the event that there is an inconsistency between the Whitlam Housing Development Guidelines and the Deposited Plan, the Deposited Plan prevails.

7 VARIATIONS

7.1 The Buyer acknowledges that the Specimen Crown Lease, the Whitlam Housing Development Guidelines, the Block Details Plan, the Deposited Plan and any other plans in relation to the Land may be affected by one or more of the following:

(a) the requirements of legislation;

(b) variations to the Territory Plan;

(c) the requirements of government authorities; or

(d) physical conditions affecting the Works;

and may result in one or more of the following:

(e) minor redefinition of the boundaries of the Land;

(f) minor road re-alignment or dedication; or

(g) minor variations of the easements relating to the provision of electricity, water, sewerage and stormwater services.

7.2 Any redefinition, road realignment or dedication or variation of easements will be deemed to be minor if it does not materially and detrimentally affect the use of the Land.

7.3 The Buyer cannot make a claim or objection or rescind or terminate or make a claim for compensation under clause 23 of this Contract in respect of any matter set out in clause 7.1.

8 PLANNING CONDITIONS

8.1 The Buyer acknowledges that the Territory Planning Authority is responsible for all development consents and approvals sought by or on behalf of the Buyer in relation to the Land and the Buyer therefore releases the Seller from any liability, cause of action or any other claim in relation to disturbance, loss or detriment caused by the Territory Planning Authority granting or denying any consent or approval in relation to the Land.

8.2 The Buyer acknowledges the obligation to make its own enquiries and satisfy itself as to the currency and accuracy of information contained in the Territory Plan.

8.3 The Buyer acknowledges that the Territory Planning Authority is responsible for the Territory Plan and the Buyer will make no claim against the Seller whatsoever in this regard.

8.4 The Buyer acknowledges that nothing in this Contract or the fact of Completion implies or means that any required approvals, consents or licences regarding planning, design, siting and any other matters relating to the Buyer's Development of the Land will be granted by the regulatory authorities or other agencies of the Australian Capital Territory with or without conditions.

9 PROPERTY ACT

9.1 The Property Act does not apply to this Contract as this Contract is not a sale of residential property and the grant of the Leases will be the first grant of a Crown Lease over the Land.

10 NON-CONFORMING TRANSFERS NOT TO BE USED

10.1 The Buyer will not be able to use the non-conforming transfer provisions of section 17(3) of the *Duties Act 1999* (ACT) in relation to the Contract, as the grant of the Leases will be the first grant of a Crown Lease over the Land.

11 ENTIRE AGREEMENT

11.1 The Buyer agrees that this Contract sets out the entire agreement of the Parties on the subject matter of this Contract and supersedes any prior agreement, advice, material supplied to the Buyer or understanding on anything connected with the subject matter of this Contract.

12 NO RELIANCE

12.1 Each Party has entered into this Contract without reliance upon any representation, statement or warranty (including sales and marketing material and preliminary artwork) except as set out in this Contract.

13 CO-OWNERSHIP

13.1 Where the Buyer consists of more than one person, as between themselves, they agree to buy the Land in the specified manner of Co-ownership in the Schedule or if one alternative is not marked, as joint tenants.

14 NON-MERGER

14.1 If any term of this Contract may be given effect to after Completion that term will not merge on Completion but will continue in force for as long as is necessary to give effect to it.

15 BUYER RELIES ON OWN ENQUIRIES

15.1 The Buyer acknowledges that it relies on its own enquiries in relation to the Land and warrants that in entering into this Contract the Buyer:

(a) has not relied on any express or implied statement, warranty or representation whether oral, written or otherwise made by or on behalf of the Seller to the Buyer in connection with the Land;

(b) has not relied on any documentation made available by or on behalf of the Seller to the Buyer in relation to the Land other than documentation forming part of this Contract; and

(c) is satisfied as to the nature, quality and condition of the Land and the purposes for which the Land may be used.

15.2 The Seller makes no warranty as to the accuracy or completeness of any document made available by or on behalf of the Seller to the Buyer in connection with the Land other than documentation forming part of this Contract.

16 PRIVACY

16.1 The Buyer acknowledges that they have received, read, and understood the Suburban Land Agency Information Privacy Policy and Suburban Land Agency Information Privacy Statement, and accepts that any information collected by the Seller pursuant to this Contract, or previously in relation to this Contract, is held and used in accordance with the Suburban Land Agency Information Privacy Policy and Suburban Land Agency Information Privacy Statement.

16.2 The Buyer consents to the Seller's use of any personal information provided by the Buyer to reasonably fulfil the purpose of this Contract and any of its functions, including disclosure of personal information to the ACT Revenue Office and other ACT and Commonwealth government agencies.

17 BUYER RIGHTS AND LIMITATIONS

17.1 The Buyer is not entitled to make any requisitions on the title to the Land.

17.2 The Buyer cannot make a claim or objection or rescind or terminate or make a claim for compensation under clause 23 of this Contract in respect of:

(a) a Utility Service for the Land being a joint service or passing through another property, or any Utility Service for another property passing through the Land;

(b) a promise, representation or statement about this Contract, the Land or the Leases, not made in this Contract;

(c) the size of any service ties for the supply of water on or to the Land;

(d) any matter contained in the Block Fill Plans or the existence of regrading, fill, contamination of any Substance or other disability of or upon the Land, whether caused by the Commonwealth of Australia, the Seller, previous occupants of the Land or otherwise;

(e) any soil classification in relation to the Land; and

(f) anything disclosed in this Contract (except an Affecting Interest).

17.3 The Buyer acknowledges, understands and accepts that the existence of regrading, fill, contamination of any Substance or other disability of or upon the Land may result in work for the construction of any building on the Land being more extensive and expensive than it may otherwise have been in the absence of such regrading, fill, contamination of any Substance or other disability.

17.4 The Buyer acknowledges that the Seller makes no warranty or representation as to the environmental condition or state of the soil, ground water, contamination or the existence or non-existence of any Substance on or affecting the Land.

18 SELLER WARRANTIES

18.1 The Seller warrants that at the Date of this Contract the Seller:

(a) will be able to complete at Completion;

(b) has no knowledge of any unsatisfied judgment, order or writ issued by a court or tribunal affecting the Land;

(c) has no knowledge of any current or threatened claims, notices or proceedings that may lead to a judgment, order or writ issued by a court or tribunal affecting the Land; and

(d) is not aware of any material change in the matters disclosed in the Whitlam Housing Development Guidelines.

18.2 The Seller warrants that on Completion:

(a) the Seller will have the capacity to complete;

(b) there will be no unsatisfied judgment, order or writ issued by a court or tribunal affecting the Land;

(c) the Seller has no knowledge of any current or threatened claims, notices or proceedings that may lead to a judgment, order or writ issued by a court or tribunal affecting the Land; and

(d) the Seller is not aware of any encroachments by or upon the Land except as disclosed. This warranty does not extend to the location of any dividing fence.

18.3 The Seller gives no warranties as to the present state of repair of any of the Improvements or condition of the Land, except as required by law.

19 ADJUSTMENTS

19.1 The Leases will be granted on Completion. As a result, there will be no adjustments of Income or Land Charges.

20 TERMS OF POSSESSION

20.1 The Seller must give the Buyer vacant possession of the Land on Completion unless otherwise marked in the Schedule.

21 INSPECTION OF LAND

21.1 The Buyer may on reasonable notice to the Seller inspect the Land during the period 10 Working Days prior to the Date for Completion.

22 ERRORS AND MISDESCRIPTIONS

22.1 The Buyer will be entitled to compensation on Completion (and the Price will be reduced accordingly) in full and final settlement if the Buyer suffers a loss as a result of an error of any kind or misdescription, and the Buyer makes a claim for compensation before Completion.

22.2 This clause 22 applies even if the Buyer did not take notice of or rely on anything in this Contract containing or giving rise to the error or misdescription.

22.3 The Buyer is not entitled to compensation to the extent the Buyer knew the true position before the Date of this Contract.

23 COMPENSATION CLAIMS BY BUYER

23.1 This clause 23 applies to claims for compensation arising out of this Contract made by the Buyer against the Seller including claims under clause 22.

23.2 To make a claim for compensation (including a claim under clause 22) the Buyer must give notice to the Seller before Completion specifying the amount claimed and:

(a) the Seller can rescind if in the case of a claim that is not a claim for delay:

(i) the total amount claimed exceeds 5% of the Price;

(ii) the Seller gives notice to the Buyer of an intention to rescind; and

(iii) the Buyer does not give notice to the Seller waiving the claim within 10 Working Days after receiving the notice;

(b) if the Seller does not rescind under clause 23.2(a) the Parties must complete and:

(i) the claim must be finalised (subject to clause 23.2(b)(ii)) either by agreement or, failing agreement, by an arbitrator appointed by the Parties or, if an appointment is not made within 20 Working Days of Completion, by an arbitrator appointed by the President of the Law Society of the Australian Capital Territory at the request of a Party;

(ii) the decision of the arbitrator is final, and binding save for:

A. manifest error by the arbitrator obvious on its face in the final determination by the arbitrator;

B. error in the application of law by the arbitrator in making his or her determination; or

C. improper or unlawful conduct by the arbitrator or either Party that affected or might reasonably be thought to affect the arbitrator's determination;

(iii) the costs of the arbitration must be shared equally by the Parties unless otherwise determined by the arbitrator;

(iv) the Buyer is not entitled, in respect of the claim, to more than the total amount claimed and the costs of the Buyer; and

(v) the claim lapses if the Parties do not appoint an arbitrator and neither Party asks the President of the Law Society of the Australian Capital Territory to appoint an arbitrator within 90 days after Completion.

24 NOTICE TO COMPLETE AND DEFAULT NOTICE

24.1 If Completion does not take place by the Date for Completion, either Party may, at any time after the Date for Completion, serve on the other Party a Notice to Complete.

24.2 A Notice to Complete must appoint a time during business hours and a date being not less than 10 Working Days after service of the Notice to Complete (excluding the date of service) by which, and a place in Canberra at which, to complete this Contract.

24.3 At the time the Notice to Complete is served the Party serving the Notice to Complete must:

(a) not be in default; and

(b) be ready, willing and able to complete but for some default or omission of the other Party.

24.4 Completion at the time, date and place specified in the Notice to Complete is an essential term.

24.5 Where one Party is in default (other than failing to complete) the other Party may at any time after the default serve the Party in default a Default Notice.

24.6 A Default Notice must:

(a) specify the default; and

(b) require the Party served with the Default Notice to rectify the default within 10 Working Days after service of the Default Notice (excluding the date of service).

24.7 At the time the Default Notice is served, the Party serving the Default Notice must not be in default.

24.8 The time specified in a Default Notice to rectify the specified default is an essential term.

24.9 Clauses 25 or 26 will apply as applicable where the Party served does not comply with the Notice to Complete or the Default Notice issued in accordance with this clause.

24.10 If the Party serving a notice under this clause varies the time referred to in the notice at the request of the other Party:

(a) the time agreed to in the variation remains an essential term; and

(b) the consent to the variation must be in writing and be served on the other Party.

24.11 The Parties agree that the time referred to in clauses 24.2 and 24.6(b) is fair and reasonable.

25 TERMINATION – BUYER'S DEFAULT

25.1 If:

(a) the Seller serves a notice on the Buyer in accordance with clause 2.3;

(b) the Buyer does not comply with a Notice to Complete or a Default Notice; or

(c) the Buyer is otherwise in breach of an essential term,

then the Seller may by notice served on the Buyer terminate this Contract and may then either:

(d) sue the Buyer for breach; or

(e) re-sell the Land and any deficiency arising on the resale and all expenses of and incidental to the resale or attempted resale and the Buyer's default are recoverable by the Seller from the Buyer as liquidated damages provided the Seller has entered into a contract for the resale of the Land within 12 months of termination.

25.2 Subject to clause 25.3, if this Contract is terminated by the Seller pursuant to clause 25.1, the Seller is not required to refund the Deposit to the Buyer and the Deposit is forfeited to the Seller without further notice to the Buyer.

25.3 The Seller must refund the portion of the Deposit which exceeds 5% of the Price (if any).

25.4 In addition to any money kept or recovered under clause 25.2, the Seller may retain on termination any other money paid by the Buyer as security for any damages awarded to the Seller arising from the Buyer's default provided that proceedings for the recovery of damages are commenced within 12 months of termination.

26 TERMINATION – SELLER'S DEFAULT

26.1 If the Seller does not comply with a Notice to Complete or a Default Notice or is otherwise in breach of an essential term the Buyer may by notice served on the Seller either:

(a) terminate and seek damages; or

(b) enforce without further notice any other rights and remedies available to the Buyer.

26.2 If this Contract is terminated by the Buyer pursuant to clause 26.1, the Deposit must be refunded to the Buyer within 15 Working Days without any further authority being necessary.

27 RESCISSION

27.1 If this Contract is rescinded, it is rescinded from the beginning, and unless the Parties otherwise agree:

(a) the Deposit and all other money paid by the Buyer must be refunded to the Buyer within 15 Working Days without any further authority being necessary; and

(b) neither Party is liable to pay the other any amount for damages, costs or expenses.

28 DAMAGES FOR DELAY IN COMPLETION

28.1 If Completion does not occur by the Date for Completion, due to the default of either Party, the Party who is at fault must pay the other Party as liquidated damages on Completion:

(a) interest on the Price at the rate of 10% per annum calculated on a daily basis from the date 7 days after the Date for Completion to Completion (inclusive); and

(b) the amount of $660.00 (including GST) to be applied towards any legal costs and disbursements incurred by the Party not at default if Completion occurs later than 7 days after the Date for Completion.

28.2 The Party at fault must pay the amount specified in clause 28.1 in addition to any other damages to which the Party not at fault is entitled both at law and under this Contract.

28.3 The Parties agree that:

(a) the amount of any damages payable under clause 28.1(a) to the Party not in default is a genuine and honest pre-estimate of loss to that Party for the delay in Completion; and

(b) the damages must be paid on Completion.

29 FOREIGN BUYER

29.1 The Buyer warrants the Commonwealth Treasurer cannot prohibit and has not prohibited the grant of the Leases under the *Foreign Acquisitions and Takeovers Act 1975* (Cth).

29.2 This clause is an essential term.

30 GST

30.1 The Buyer and the Seller agree that

(a) the Margin Scheme applies to the Supply of the Land to the Buyer under this Contract; and

(b) the Price is inclusive of any GST payable under the Margin Scheme.

30.2 The Seller warrants that it can use the Margin Scheme and promises that it will.

30.3 Other than in respect of the grant of the Lease, any supply made under this Contract and for which the consideration is not expressly stated to include GST, the recipient agrees to pay the supplier an additional amount equal to the GST payable at the same time that the consideration for the supply, or first part of the consideration for the supply (as the case may be), is to be provided, however:

(a) the recipient need not pay the additional amount until the supplier gives the recipient a tax invoice or an Adjustment Note; and

(b) if an Adjustment Event arises in respect of the supply, the additional amount must be adjusted to reflect the Adjustment Event and the recipient or the supplier (as the case may be) must make any payments necessary to reflect the adjustment.

30.4 If a party is required under this Contract to indemnify another party, or pay or reimburse costs of another party, that party agrees to pay the relevant amount less any Input Tax Credits to which the other party (or to which the representative member for a GST group of which the other party is a member) is entitled.

31 INSOLVENCY

31.1 If the Buyer suffers an Insolvency Event, the Buyer must immediately notify the Seller in writing.

31.2 If the Seller receives notice that the Buyer has suffered an Insolvency Event (either pursuant to clause 31.1 or by some other means), the Seller may terminate this Contract and clause 25 will apply.

32 POWER OF ATTORNEY

32.1 Any Party who signs this Contract or any document in connection with it under a power of attorney must, on request and without cost, provide the other Party with a true copy of the registered power of attorney.

33 NOTICES CLAIMS AND AUTHORITIES

33.1 Notices, claims and authorities required or authorised by this Contract must be in writing.

33.2 To serve a notice a Party must:

(a) leave it at; or

(b) send it by a method of post requiring acknowledgement of receipt by the addressee to,

the address of the person to be served as stated in the Schedule or as notified by that person to the other as that person's address for service under this Contract, or:

(c) serve it on that Party's solicitor in any of the above ways; or

(d) send it by email to an email address of that Party's solicitor specified on the Schedule, or otherwise as notified from time to time and, unless the

receiving Party indicates by immediate automatic response that the email address is unattended, the notice is taken to have been received at the time it was sent and if not sent before 5:00pm on a Working Day, on the next Working Day.

33.3 A Party's solicitor may give a notice, claim or authority on behalf of that Party.

33.4 If a notice is served in accordance with clause 33.2(a), the notice is taken to have been received on the day that it is delivered or, if not delivered before 5:00pm on a Working Day, on the next Working Day.

33.5 If a notice is served in accordance with clause 33.2(b), the notice is taken to have been received on the day 2 Working Days after it was posted.

34 BUSHFIRE PROTECTION

34.1 The Buyer acknowledges that the Land may be affected by legislation and regulations in connection with bushfire protection and that those requirements are subject to change.

35 CAT CONTAINMENT

35.1 The Buyer acknowledges that the Land will become part of an area which is declared to be a cat curfew area under the *Domestic Animals Act 2000* (ACT) and cats located within areas declared to be cat curfew areas must be confined to their keeper's or carer's premises at all times.

36 GEOTECHNICAL INFORMATION

36.1 The Seller will make available to the Buyer, prior to Completion, a site classification certificate with respect to the Land.

36.2 The Seller warrants that any fill placed on the Land arising out of undertaking the Works will be compacted to "Level 1 Controlled Fill" in accordance with Australian Standard AS3798-2007.

37 BLOCK DETAILS PLAN

37.1 The Buyer acknowledges that the area of the Land specified in the Block Details Plan is subject to final survey and is subject to change and in the event of inconsistency with the area in the Deposited Plan, the Deposited Plan prevails.

38 SERVICE PROVIDERS

38.1 The Buyer acknowledges and understands that the Seller is not a Utility Service provider and Works in the Contract for Sale do not include actual connections to services, substations or transformers that may be required for such connections.

38.2 The Buyer will be responsible for contacting all relevant service providers for Utility Services as soon as practicable to arrange servicing of the Land by those service providers to avoid delays to their Developments caused as a consequence of being unable, for example, to access water or power.

38.3 The Seller does not routinely provide and will not warrant the location of any future substations.

39 RESIDENTIAL WITHHOLDING TAX

Warning: The following clauses 39.1 to 39.14 are subject to the Withholding Law, and do not encompass all obligations under the Withholding Law.

39.1 In this clause 39 the following words have the following meanings:

ATO means the Australian Taxation Office, and includes the Commissioner for Taxation;

RW Amount means the amount which must be paid under section 14-250 of the Withholding Law;

RW Amount Information means the information set out in the table entitled "RW Amount (Residential Withholding Payment) — Further Details" set out in this Contract, and as provided or updated under this Contract;

RW Percentage means the percentage amount stated in section 14-250(6), (8) and (9) of the Withholding Law, as applicable to the supply of the Land from the Seller to the Buyer; and

Withholding Law means Subdivision 14 of Schedule 1 of the Taxation Administration Act 1953 (Cth) and associated provisions.

39.2 The Seller must provide the Buyer with the RW Amount Information no later than 28 days prior to the Date for Completion.

39.3 If the 'RW Amount required to be paid?' option on the Schedule is selected 'no' or if no selection is made, the Seller warrants to the Buyer that the Buyer is not required to make a payment under section 14-250 in relation to the supply of the Land from the Seller to the Buyer.

39.4 The following clauses 39.5 to 39.14 inclusive only apply if the 'RW Amount required to be paid ?' option on the Schedule is selected 'yes'.

39.5 Subject to any adjustments to the Price or non-monetary consideration that may arise after the date that the RW Amount Information is provided in accordance with clause 39.2 and which affect the RW Amount, the Seller warrants to the Buyer on the date that the RW Amount Information is provided to the Buyer that the Seller has provided the Buyer with the information required under section 14-255 of the Withholding Law in relation to the supply of the Land from the Seller to the Buyer, and that this information is true and correct to the Seller's knowledge.

39.6 The Buyer must provide the Seller with a copy of the 'GST property settlement withholding notification online form' confirmation email (or emails, if applicable) issued to the Buyer by the ATO at least 10 Working Days prior to the Date for Completion.

39.7 The Buyer must provide the Seller with evidence of submission by the Buyer to the ATO of the 'GST property settlement date confirmation online form', with such evidence to be provided prior to or on Completion.

39.8 The Seller irrevocably instructs the Buyer to draw as part of the Price, and the Buyer must draw and give to the Seller on Completion, an unendorsed bank cheque payable to the ATO for the RW Amount.

39.9 The Seller must forward the unendorsed bank cheque provided under clause 39.8 to the ATO within 5 Working Days following Completion and provide the Buyer with evidence of payment of the RW Amount to the ATO.

39.10 The Buyer and Seller must comply with all ATO requirements in relation to the Withholding Law and must also assist and co-operate with each other in order to ensure that those requirements are met. If necessary to give effect to this clause, the Buyer appoints the Seller as its agent for the purpose of completing any notification required to be given by the Buyer to the ATO.

39.11 The Seller may provide the Buyer with updated RW Amount Information at any time, and (if necessary) on more than one occasion, prior to Completion. If the Seller provides the Buyer with updated RW Amount Information in accordance with this clause, the Buyer must, within 3 Working Days of receipt of the RW Amount Information, provide the Seller with a copy of the 'GST property settlement withholding notification online form' confirmation email (or emails, if applicable) issued to the Buyer by the ATO including the updated RW Amount Information.

39.12 The Seller indemnifies the Buyer against the amount of any penalties or interest charges imposed by the ATO on the Buyer (or the relevant recipient of the supply) arising from any failure by the Seller to forward the unendorsed bank cheque required by clause 39.8 to the ATO.

Potential Residential Land

39.13 If the 'Potential Residential Premises?' option on the Schedule is selected 'yes' and the Buyer (or the relevant recipient for GST purposes) is:

(a) registered for GST purposes; and

(b) acquiring the Land for a creditable purpose;

the Buyer must provide the Seller with a statement to that effect on the earlier of:

(c) 10 Working Days before the Date for Completion; or

(d) 20 Working Days after the Date of this Contract.

39.14 Where the Buyer has provided the statement referred to in clause 39.13 the Buyer indemnifies the Seller against the amount of any penalties or interest charges imposed by the ATO on the Seller (or the relevant entity making the supply of the Land).

40 FOREIGN RESIDENT WITHHOLDING TAX

40.1 If a Clearance Certificate for the Seller is attached to this Contract or provided to the Buyer prior to Completion, the parties acknowledge that there are no obligations under the Withholding Law.

40.2 If clause 40.1 does not apply, then:

(a) the Seller must provide to the Buyer any information required to enable the Buyer to comply with clause 40.2(b)(i), within 5 days of written request from the Buyer;

(b) the Buyer must:

(i) lodge a purchaser payment notification form with the ATO; and

(ii) give evidence of compliance with clause 40.2(b)(i) to the Seller,

no later than 5 days before the Date for Completion;

(c) the Seller irrevocably instructs the Buyer to draw as part of the Price, and the Buyer must draw and retain on Completion, an unendorsed bank cheque payable to the ATO for the Withholding Amount; and

(d) the parties must both, on the date of Completion, attend the offices of an authorised collection agent of the ATO to deposit the bank cheque referred to in clause 40.2(c) in payment of the Withholding Amount following Completion.

40.3 If clause 40.2 applies and the parties do not comply with clause 40.2(d):

(a) the Buyer indemnifies the Seller for any loss or damage resulting from the Buyer's delay in remitting and/or failure to remit the Withholding Amount to the ATO; and

(b) the Buyer charges the Land (for the benefit of the Seller) with the Buyer's obligations under this clause 40.3.

40.4 Where the Seller gives the Buyer a Variation Certificate prior to Completion, the Withholding Amount is the amount stated in the Variation Certificate.

40.5 Where a Clearance Certificate is provided by the Seller to the Buyer, the Seller warrants to the Buyer that the Seller is the entity referred to in the Clearance Certificate and is the relevant taxpayer for capital gains tax payable on the sale of the CGT Assets sold under this Contract.

41 VERGE BOND

41.1 On Completion the Buyer must pay to the Seller the Verge Bond as security for the Buyer's obligations under this clause 41.

41.2 The Buyer acknowledges that on Completion the Verge and the Verge Assets are in good condition and repair.

41.3 During construction on the Land, the Buyer must protect the Verge Assets and remediate and make good any damage to the Verge Assets to the satisfaction of the Seller. Making good includes (but is not limited to) repairing Verge Assets and re-grassing or re-planting the Verge to the satisfaction of the Seller.

41.4 The Verge Bond for each Block will be repaid by the Seller to the Buyer if:

(a) the Buyer receives a Certificate of Occupancy for the relevant Block within 30 calendar months of Completion;

(b) the Buyer claims the Verge Bond within 180 days of receiving the Certificate of Occupancy for the relevant Block, using the form approved by the Seller; and

(c) following the issue of the Certificate of Occupancy for the Block, evidence is provided (to the satisfaction of the Seller) that the Verge and Verge Assets for the Block are in good repair and condition and the Verge of the Block is clean and free from building materials, refuse and rubbish. Satisfactory evidence includes, but is not limited to, photographs of the Block's Verge and the Verge Assets.

41.5 If the Buyer does not satisfy the conditions for repayment of the Verge Bond within the timeframes in clause 41.4, the Verge Bond is not repayable to the Buyer and the Verge Bond is forfeited to the Seller without further notice to the Buyer.

41.6 If the Buyer sells a Block or otherwise transfers a Crown Lease prior to satisfying the conditions of clause 41.4, the Buyer may request the Seller to agree to hold the Verge Bond for the Block for the benefit of the transferee on the same terms as this clause 41, and the Buyer will no longer be entitled to be repaid the Verge Bond for that Block.

42 ENERGY REBATE

42.1 If the Buyer:

(a) constructs a dwelling on a Block that satisfies all of the mandatory requirements contained in the Whitlam Housing Development Guidelines within 30 calendar months of Completion;

(b) constructs a dwelling on the Block that satisfies all of the Eligibility Requirements within 30 calendar months of Completion; and

(c) within 180 days of receiving the Certificate of Occupancy and Certificate of Compliance for the Block:

(i) lodges the completed Rebate Application; and

(ii) provides evidence, to the satisfaction of the Seller, that all of the Eligibility Requirements have been met for the Block,

the Seller, subject to clause 42.3, will pay the Energy Rebate for the Block to the Buyer.

42.2 If the Buyer does not satisfy the conditions of clause 42.1, the Energy Rebate will not be paid to the Buyer.

42.3 If the Buyer sells a Block or otherwise transfers a Crown Lease prior to satisfying the conditions of clause 42.1, the Buyer's transferee will not be eligible for the Energy Rebate unless:

(a) the Block is the subject of a building contract between the Buyer and the Buyer's transferee; and

(b) the Seller is provided with:

(i) a completed Right to Transfer Rebate Form; and

(ii) evidence that the Buyer's transferee is the Crown lessee of the Block and has entered into a building contract with the Buyer for the construction of a dwelling on the Block,

and the Buyer acknowledges that any subsequent transferee of the Block will not be eligible for the Energy Rebate.

42.4 In this clause 42, “Eligibility Requirements” means installation and commissioning of all of the following in the dwelling on the Block:

(a) a roof with a solar absorptance value of less than 0.5 (absorptance values as per the National Construction Code 2019 (NCC));

(b) a solar photovoltaic (PV) system with a grid-connected inverter that:

(i) is purchased from a Clean Energy Council (CEC) Approved Solar Retailer;

(ii) is installed on the roof of the dwelling located on the Block;

(iii) has a minimum total rated power output of 5 kilowatts (kW); and

(iv) is installed, commissioned, tested and certified by an ACT licensed tradesperson who is Clean Energy Council (CEC) accredited installer;

(c) an electric heat pump or electric boost solar hot water system;

(d) an electric oven and an electric cooktop in the kitchen;

(e) an electric heating and/or cooling system;

(f) an energy monitoring and/or management system; and

(g) an electric vehicle charge point in the garage or carport including:

(i) a dedicated 32 amp circuit with a 15 amp power point located on the wall of the car space or garage; and

(ii) with installation carried out by an ACT licensed electrician.

42.5 The Energy Rebate is not partially payable. Failure to meet all of the Eligibility Requirements for a Block means that no amount of the Energy Rebate will be paid for that Block.

43 COMMONWEALTH SANCTIONS

43.1 In this clause 43, the following definitions apply:

Consolidated List means the document maintained by the Commonwealth in accordance with section 22 of the *Autonomous Sanctions Regulations 2011 (Cth)* and/or section 40 of the *Charter of the United Nations (Dealing with Assets) Regulations 2008 (Cth);*

Designated Person or Entity means a person or entity who is a designated person or entity as defined in the *Autonomous Sanctions Regulations 2011 (Cth)* and/or who is a person or entity who is a designated person or entity as defined in the *Charter of the United Nations (Dealing with Assets) Regulations 2008 (Cth).*

43.2 The Buyer warrants at the time it enters into this Contract it is not a Designated Person or Entity, or named as a person or entity on the Consolidated List.

43.3 The Buyer must not, prior to Completion, become a Designated Person or Entity or be named as a person or entity on the Consolidated List.

43.4 The Buyer must immediately notify the Seller if it breaches clause 43.3.

43.5 Clauses 43.2 and 43.3 are essential terms.

43.6 If the Buyer breaches the warranty in clause 43.2 or breaches clause 43.3 then immediately and without the notice otherwise necessary under clause 24, clause 25 applies.

44 DEFINITIONS

44.1 Definitions appear in the Schedule and as follows:

ACT Revenue Office means the ACT Revenue Office of the Chief Minister, Treasury and Economic Development Directorate;

ActewAGL means a joint venture company that owns, operates and maintains the electricity, gas, water and sewage services on behalf of Icon Water Limited (ACN 069 381 960) or its successors and permitted assigns;

Affecting Interest means any mortgage, encumbrance, lease, lien, charge, notice, order, caveat, writ or other interest;

ATO means the Australian Taxation Office, and includes the Commissioner for Taxation;

Balance of the Price means the Price less the Deposit;

Block means each block comprising the Land and which is the subject of a Crown Lease;

Block Boundary means the boundary of the Block as shown on the Block Details Plan and does not include the Verge;

Block Details Plan means the plan described as such in the Whitlam Housing Development Guidelines;

Block Fill Plans means the plans described as such in the Whitlam Housing Development Guidelines;

Certificate of Compliance has the meaning in the *Planning Act*

Certificate of Occupancy means a "Certificate of Occupancy" as that term is defined in the *Building Act 2004* (ACT) for the dwelling on the Block;

CGT Asset has the meaning in the *Income Tax Assessment Act 1997* (Cth);

Clearance Certificate means a certificate issued under section 14-220 of the Withholding Law that covers the date of Completion;

Completion means the time at which this Contract is completed;

Contract means the Schedule, terms and conditions and any annexure, additional clauses and attachments forming part of this contract;

Crown Lease means a crown lease that will be granted in accordance with the Planning Act in a form similar to the Specimen Crown Lease;

Default Notice means a notice in accordance with clauses 24.5 and 24.6;

Deposit means the amount specified in the Schedule and which:

(a) must be paid by the Buyer to the Seller in accordance with clause 2 as applicable; and

(b) is to be held by the Seller as security for the performance of the Buyer's obligations under this Contract;

Deposited Plan means plan relating to the Land and registered under section 7 of the *Districts Act 2002* (ACT) attached at Annexure D of this Contract;

Development has the meaning in the Planning Act;

Energy Rebate means $10,000 (GST inclusive) per Block;

EvoEnergy means the energy networks division of ActewAGL that looks after poles and wires and gas infrastructure;

GST has the meaning ascribed to it under the GST Law and, where appropriate, includes voluntary and Notional GST. Expressions used in this Contract of Sale which are defined in the GST Law have the same meaning as given to them in the GST Law;

GST Law means the *A New Tax System (Goods and Services Tax) Act 1999* (Cth);

Improvements means the buildings, structures and fixtures erected on and forming part of the Land if any;

Income means the rents and profits derived from the Land;

Insolvency Event means the following:

(a) where the Buyer is a natural person and:

  (i) the Buyer authorises a registered trustee or solicitor to call a meeting of his or her creditors and enters into a deed of assignment or deed of arrangement or a composition with any of his or her creditors;

  (ii) a third party who holds a security interest in the assets of the Buyer enters into possession, or takes control of those assets, or attempts by any means to do the same; or

  (iii) the Buyer commits an act of bankruptcy; or

(b) where the Buyer is a body corporate and:

(i) the Buyer becomes, or attempts are made for the Buyer to become an externally administered body corporate in accordance with the *Corporations Act 2001* (Cth); or

(ii) a controller (as defined by the *Corporations Act 2001* (Cth)) is appointed, or attempts are made to have a controller appointed for any of the Buyer's assets;

Kerb Line means the kerb line of the Block as shown on the Block Details Plan;

Land means the land described in the Schedule and to be the subject of the Leases;

Land Charges means rates, land rent, land tax and other taxes and outgoings of a periodic nature in respect of the Land;

Land Schedule means the schedule of Blocks comprising the Land;

Lease means a Crown Lease granted in accordance with the Planning Act in a form similar to the Specimen Crown Lease as applicable to this Contract which may, where the Block is affected by an easement identified in the Whitlam Housing Development Guidelines, include an annexure or additional provisions detailing the terms of the easement;

Margin Scheme has the meaning in the GST Law;

Notice to Complete means a notice in accordance with clauses 24.1 and 24.2 requiring a Party to complete;

Notional GST means, where the supplier is the Commonwealth and an obligation exists to make voluntary or notional GST payments under section 177-1 of the GST Law, those voluntary or notional payments are made by or on behalf of the Commonwealth. For the avoidance of doubt Notional GST amounts will be calculated as if the GST Law applies to the relevant supplies;

Operational Acceptance means that the Works are complete to the satisfaction of the Australian Capital Territory, EvoEnergy and the Seller;

Party means a party to this Contract and **Parties** has the corresponding meaning;

Planning Act means the *Planning Act 2023* (ACT);

Property Act means the *Civil Law (Sale of Residential Property) Act 2003* (ACT);

Rebate Application Form means the application form available at https://suburbanland.act.gov.au/Whitlam version number 1 dated March 2020;

Right to Transfer Rebate Form means the form of that title available at https://suburbanland.act.gov.au/Whitlam version number 1 dated March 2020 pursuant to which a Buyer waives its right to receive the Energy Rebate and novates the rights and obligations of the Buyer under clauses 42.1 and 42.2 to the Buyer's transferee.

Relevant Percentage means the percentage amount stated in section 14-200(3)(a) and 14-205(4)(a) of the Withholding Law;

Schedule means the schedule to this Contract;

Site Classification Certificate means the Site Classification Certificate annexed to this Contract at Annexure E;

Specimen Crown Lease means the specimen crown lease at Annexure B;

Substance means any substance or thing which is or may be an emission to the environment or harmful to the environment or the health or safety of any person or may cause damage to property and includes:

(c) asbestos;

(d) polychlorinated biphenyls;

(e) heavy metals;

(f) chemicals;

(g) contaminants; and

(h) any other matter whether solid, liquid or gaseous form, or whether naturally occurring or man-made;

Suburban Land Agency means the agency established under section 37 of *the City Renewal Authority and Suburban Land Agency Act 2017* (ACT);

Suburban Land Agency Information Privacy Policy means the privacy policy provided by the Suburban Land Agency to the Buyer in accordance with the *Information Privacy Act 2014* (ACT) and which can be found at www.suburbanland.act.gov.au;

Suburban Land Agency Information Privacy Statement means the information privacy statement provided by the Suburban Land Agency to the Buyer in accordance with the *Information Privacy Act 2014* (ACT) and which can be found at www.suburbanland.act.gov.au;

Supply has the meaning in the GST Law;

TCCS means Transport Canberra and City Services or its successors;

Territory Plan means the *Territory Plan 2023* (ACT) as amended and varied from time to time;

Territory Planning Authority means the corporation of that name established in accordance with the Planning Act;

Utility Service includes drainage, electricity, garbage collection, sewerage, telecommunications or water;

Variation Certificate means a certificate issued under section 14-235 of the Withholding Law that covers the date of Completion;

Verge means the verge in front of the Block and includes the area between the Block Boundary and the Kerb Line, commonly known as the nature strip;

Verge Assets means all concrete footpaths, driveways, kerbs, gutters, light poles, mini pillars, street trees and grassing located on the Verge at Completion, or as varied by the Buyer with the written consent of TCCS;

Verge Bond means $1,000 (GST inclusive) per Block;

Whitlam Housing Development Guidelines means the Whitlam Housing Development Guidelines at Annexure A or as amended from time to time;

Withholding Amount means, subject to clause 40.4, the Relevant Percentage of the first element of the CGT Asset's cost base (for all CGT Assets sold under this Contract) as at the Date of this Contract;

Withholding Law means Subdivision 14-D of Schedule 1 of the *Taxation Administration Act 1953* (Cth) and associated provisions;

Working Days has the meaning given to it by the *Legislation Act 2001* (ACT); and

Works means the works that the Seller is required to undertake in order to comply with the development application in relation to and obtain Operational Acceptance for the Land.

45 INTERPRETATION

45.1 In this Contract:

(a) a reference to the Seller or to the Buyer includes the executors, administrators and permitted assigns of any of them, if an individual, and the successors or permitted assigns of any of them, if a corporation;

(b) the singular includes the plural, and the plural includes the singular;

(c) a reference to a person includes a body corporate;

(d) a term not otherwise defined has the meaning in the Legislation Act 2001 (ACT); and

(e) a reference to an Act includes a reference to any subordinate legislation made under it or any Act which replaces it.

45.2 Headings are inserted for convenience only and are not part of this Contract.

45.3 If the time for something to be done or to happen is not a Working Day, the time is extended to the next Working Day, except in the case of clause 2.1.

45.4 If there is more than one Buyer or more than one Seller the obligations which they undertake bind them jointly and individually.

ANNEXURE A –WHITLAM HOUSING DEVELOPMENT GUIDELINES

ACT Government | Suburban Land Agency

Whitlam Stage 3
Residential Estate

Housing Development Guide

January 2026

ACT Government | Suburban Land Agency

Housing Development Guide Whitlam

Stage 3 – January 2026

Contents

We acknowledge the Ngunnawal people, the Traditional Custodians of the lands and waters where we live and work, and pay our respects to the elders past, present and future.

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Version Control

Version	Date	Amendment Details
1.0	November 2024	Combined all of Stage 3 single dwellings in one document
2.0	January 2026	Link to Territory plan updated, reference to easements updated.

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Specific Requirements

1. Variations

The Suburban Land Agency reserves the right to vary this document from time to time. Variations will be issued via an addendum to affected buyers who have entered into a First Grant Contract for a Block.

2. Additional Requirements

Outlined below are additional requirements that apply to Stage 3 – January 2026 .

2.1. Verge Bond

The ACT Government, Suburban Land Agency has installed and established as part of the estate works in your new community, new street trees and grassing to the verge areas. The trees and grass provide a green streetscape and contribute to shading your new home from summer sun, as well as contributing to the creation of habitat for native fauna in the area.

The street trees are looked after by the ACT Government's land custodian, Transport Canberra and City Services, whilst the verge grassing is the responsibility of the lease holder of the block behind the verge.

As part of the construction of your new home, you are required to protect the verge assets during construction and make good any damage upon completion of your landscape works. The verge includes the area forward of your property boundary line to the kerb and gutter and can include ACT Government assets such as concrete footpaths, driveways, kerb and gutters, light poles, mini pillars, street trees and grassing.

This can include but is not limited to re-grassing the verge if areas fail due to construction related activities. If there is other damage, from construction related activities, such as damage to the new street tree, or concrete footpath you are required to notify the Suburban Land Agency, so an assessment can be made as to the best way to repair these assets. If there is damage to ACT Government assets, please contact the Suburban Land Agency Place Management team at SLAPlacemanagement@act.gov.au.

To ensure the verges are returned to their original state post construction, a $1000 bond will be required at the time of settlement. Within six months of receiving your certificate of occupancy and no later than 30 months after settlement of your block, and once the verge is returned back to its original and established condition, the bond paid at time of settlement (and as detailed in your sales contract), can be reimbursed to you.

If you would like to change the verge surface treatment from grass to something else, such as a garden, please contact Transport Canberra and City Services on 13 22 81.

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To claim your bond following the completion of your house, you will need to send apply via the website or email slamolonglo@act.gov.au with the following information:

- Certificate of occupancy
- Photos of the verge showing its current condition
- If relevant, written agreement from Transport Canberra and City Services to a change in the verge treatment

When assessing a claim for bond return, the Suburban Land Agency may conduct an inspection of the verge to verify that it has been returned to its original condition.

If the Suburban Land Agency is not satisfied that the verge is in an acceptable condition, at its sole discretion it may choose to not return the bond and instead use the funds to repair the verge to its original condition.

If you require the use of the verge during construction, please contact Access Canberra on *13 22 81.*

2.2. Home Energy Package Rebate

The Home Energy Package Rebate supports Buyers or Eligible First Transferees in designing an energy efficient home that will increase health and comfort and lower your running costs throughout the life of your home. The Buyer or First Transferee of an Eligible Block will be entitled to receive a Rebate amount of $10,000, where all the Eligibility Requirements have been fulfilled.

The Home Energy Package requires that Buyers or Eligible First Transferees of an Eligible Block include the following in the design and construction of their home:

1. **Energy**: Build an all-electric home that is not connected to the gas network; and
2. **Roof Colour**: Build a home that has a "light" coloured roof with a solar absorptance value of less than 0.5; and
3. **Hot Water System**: Install an electric heat pump or electric boost solar water heater; and
4. **Solar PV**: Install a Solar PV system with a minimum total rate output of 5kW; and
5. **Cooktop**: Install an electric oven and an electric cooktop in the kitchen; and
6. **Heating and Cooling**: Install an electric heating and/or cooling system; and
7. **Energy Monitoring**: Install an Energy Monitoring and/or Management system in the home; and
8. **EV Charging Point**: Install an electric vehicle charge point in the garage or carport.

For more information please refer to the ***"Home Energy Rebate Program Eligibility Guidelines"***.

2.3. Gas

Whitlam Stages 3 & 4 will not be connected to a gas network and gas will not be available to residents homes.

2.4. Solid Fuel Heating Systems

All residents within Whitlam are required to comply with the Solid Fuel Heating restriction in the Memorandum of Provisions incorporated into the Crown Lease. Buyers are not to install or use a solid fuel heating system on the premises without the prior written approval of CED.

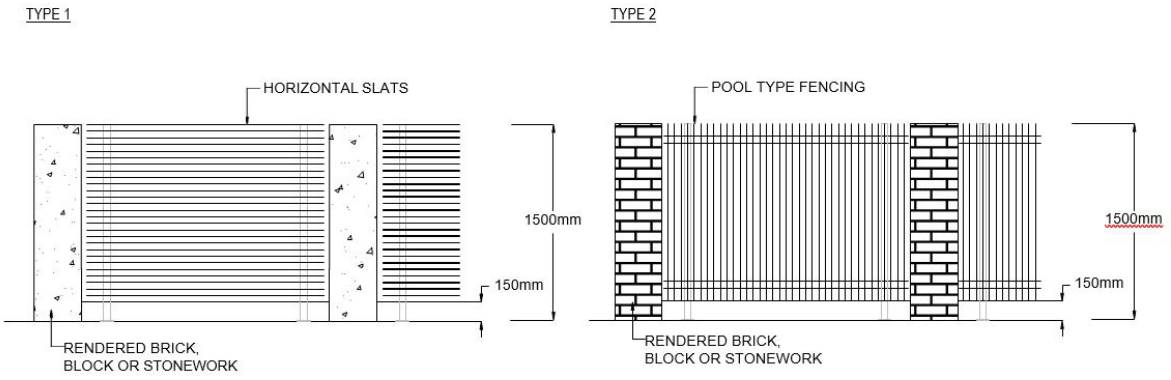
2.5. Acoustic Protection

Façades facing John Gorton Drive require acoustic protection measures to address external road noise. The blocks are identified on the Block Detail Plan in Section 4. These blocks will need to refer to the Whitlam Stage 3 Overarching Noise Management Plan for 'Noise Affected Blocks' by WSP (November 2020) in Annexure B for details of the acoustic protection measures.

Additionally, some blocks have been identified to have a minimum building height of 3 metres along the primary block frontages for acoustic protection.

2.6. Mandatory Courtyard Wall

A number of blocks require a courtyard wall to be built along one edge. This is generally where a block faces Sculthorpe Avenue or is adjoining an open space pedestrian link. The specific blocks are identified on the Block Details Plan.
The courtyard wall is to be 1.5m high and constructed of rendered brick or stonework in combination with feature panels. Acceptable examples are shown below. Where a wall is required along the front boundary, the wall is required to be setback 600mm from the front boundary to enable landscaping to be planted in front of the wall. (Refer to drawing Planning Control Plan 1, Detail-1, Type 1 & Type 2). Where a boundary wall is required on a side boundary, the courtyard wall should terminate 5m from the primary frontage.



DETAIL 1 - APPLIES TO ROAD 01, ROAD 39 AND OPEN SPACES

A number of blocks require a transparent or semitransparent fence with a gate to be built along one edge. Depending on the location and block, certain blocks will need to install a maximum 1.5m height fence, other blocks will only require a 3m building setback for the transparent fence. The fence is to be visually softened with planting grown as a hedge along the boundary. This planting is required to be located wholly within the property boundary when grown. This provides better visual amenity from the street frontage.

2.7. Blocks over 550m2 – Side Setbacks

Blocks over 550m² are to have buildings setback a minimum 3m from the side property boundary 1 and 1.5m off the side boundary 2. Garages are also to be a minimum of 1.5m off the side boundary nominated, side boundary 2. There is to be no zero-side setback or no building right along the boundary. These setbacks provide for better visual amenity from the street frontage and between block. *Refer to D5 - Molonglo Valley District Specifications – Whitlam for required setbacks.*

2.8. Cut and Fill

Cut and fill requirements are required to minimize the effect of topography on the built form. This allows for better use of the sites and better outcomes of built homes.
Retaining walls along street frontages and adjacent to public open spaces are to be a maximum 1m height from the footpath level. We encourage the construction of buildings to incorporate any changes in levels within the design of the building. This will ensure the building will sit within the natural topography of the block. It will also ensure dwellings do not cut or fill more than the maximum 1.5m allowed within the ACT Territory Plan requirements. Any changes in the levels are to be softened through terraced landscaped areas of maximum 1m in height. This could be through terraced retaining walls with planting or grassing.

2.9. Mandatory Habitable Room Above Garage

Certain residential blocks with frontages to rear lanes are required to incorporate habitable rooms above garages. A habitable room means a room used for normal domestic activities i.e. bedroom, living room, study etc. This aims to provide better passive surveillance of rear lanes. *Refer to D5 - Molonglo Valley District Specifications – Whitlam for requirements.*

2.10. Minimum 1.5m setback to lower floor level fronting laneway

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Certain blocks addressing a laneway require a minimum 1.5m setback applicable to lower floor level. The purpose of this control is to ensure the homes are appropriately setback to the laneway and ensure a safe and inviting space through the laneway.

2.11. Bushfire Attack Level (BAL)

Your level of bush fire risk affects your development requirements – the higher the risk, the more protection you need. The term 'bush fire attack level', or BAL, is used to quantify this risk. Blocks identified will need to have buildings meet the Australian Standard Building requirements for Bushfire Attack Level (BAL) 12.5 (low), Bushfire Attack Level (BAL) 19 (Moderate) or Bushfire Attack Level (BAL) 29 (High) as specified on the Block Details Plan.

2.12. Easements

When there are services on or near your block, there may be easements or special requirements identified. You may not be allowed to build on these parts of your block. This is to protect the services from damage and give utility providers access for maintenance and repairs. Blocks containing an easement are identified on the Block Details Plan.

Icon Water has requirements which are in addition to any government planning restrictions that may apply to your property. Blocks that have an easement may have the need for an 'access passageway" that will enable Icon Water to access their assets in the event of maintenance or repair.

To find out more information on Icon Water's Requirements as to where you can build and when you need to provide an 'access passage", please talk to your builder or visit the following website:

Where can I build on my property? Icon Water

480 Northbourne Avenue, Dickson ACT 2602
GPO Box 158, Canberra ACT 2601
P 02 6205 0600 **F** 02 6207 5101
E suburbanland@act.gov.au
W suburbanland.act.gov.au
ABN 27 105 505 367

Annexure A - Estate Plan

Below is the Estate Plan for Stage 3.

480 Northbourne Avenue, Dickson ACT 2602
GPO Box 158, Canberra ACT 2601
P 02 6205 0600 **F** 02 6207 5101
E suburbanland@act.gov.au
W suburbanland.act.gov.au
ABN 27 105 505 367

ESTATE MAP

Annexure B - Block Details Table

Below are the Block Details Table for Stage 3

Sections 73, 74, 75, 76, 77, 78, 79, 80, 83, 84, 85, 86, 87, 88, 89, 91, 92, 93

480 Northbourne Avenue, Dickson ACT 2602
GPO Box 158, Canberra ACT 2601
P 02 6205 0600 **F** 02 6207 5101
E suburbanland@act.gov.au
W suburbanland.act.gov.au
ABN 27 105 505 367

Section	Block	Area (m2)	Substages	Zoning	Maximum dwelling(s)	Block Typology	Compact Block	Mid-Sized Block	Large Block	Blocks with mid-sized block provision between 500m2 and 550m2	Corner Block	Surveillance Block	Limited Development Potential Block	Bushfire Prone Area Requirements Apply	Noise Protection Requirements Apply	Requires Fencing to Public Areas	Services Easement	Requires Access for Utility Providers	Trees on Block	Mandatory Zero Side Setback	Block Detail Plan Number	Block Fill Plan Number
73	2	500	3B	RZ1	1	Mid-size		√		√											18	30
	3	500	3B	RZ1	1	Mid-size		√		√											18	30
	4	472	3B	RZ1	1	Mid-size		√													18	30
	5	583	3B	RZ1	1	Large			√												18	30
	6	246	3B	RZ1	1	Compact	√				√										18	30
	7	231	3B	RZ1	1	Compact	√														18	30
	8	230	3B	RZ1	1	Compact	√							√							18	30
	9	231	3B	RZ1	1	Compact	√							√							18	30
	10	246	3B	RZ1	1	Compact	√				√			√							18	30
	11	460	3B	RZ1	1	Mid-size		√						√							18	30
	12	439	3B	RZ1	1	Mid-size		√						√							18	30
	13	428	3B	RZ1	1	Mid-size		√						√							18	30
	14	428	3B	RZ1	1	Mid-size		√						√							18	30
	15	450	3B	RZ1	1	Mid-size		√						√							18	30
74	5	478	3B	RZ1	1	Mid-size		√									√	√			18	30
	6	482	3B	RZ1	1	Mid-size		√									√	√			18	30
	7	483	3B	RZ1	1	Mid-size		√									√	√			18	30
	8	460	3B	RZ1	1	Mid-size		√									√	√			18	30
	9	456	3B	RZ1	1	Mid-size		√									√	√			18	30
	10	455	3B	RZ1	1	Mid-size		√									√	√			18	30
	11	488	3B	RZ1	1	Mid-size		√									√	√			18	30
	12	449	3B	RZ1	1	Mid-size		√			√										18	30
	13	363	3B	RZ1	1	Mid-size		√									√	√			18	30
	14	420	3B	RZ1	1	Mid-size		√													18	30
	15	442	3B	RZ1	1	Mid-size		√			√						√	√			18	30
	16	465	3B	RZ1	1	Mid-size		√													18	30
	17	442	3B	RZ1	1	Mid-size		√													18	30
	18	445	3B	RZ1	1	Mid-size		√													18	30
	19	438	3B	RZ1	1	Mid-size		√													18	30
	20	498	3B	RZ1	1	Mid-size		√													18	30
	21	453	3B	RZ1	1	Mid-size		√						√							18	30
	22	453	3B	RZ1	1	Mid-size		√						√							18	30
	23	495	3B	RZ1	1	Mid-size		√						√			√	√			18	30
	1	486	3B	RZ1	1	Mid-size		√			√			√							18	30
	2	420	3B	RZ1	1	Mid-size		√						√							18	30
	3	420	3B	RZ1	1	Mid-size		√						√							18	30
	4	471	3B	RZ1	1	Mid-size		√			√										18	30
75	3	431	3B	RZ1	1	Mid-size		√													20	32
	4	430	3B	RZ1	1	Mid-size		√									√	√			20	32
	5	435	3B	RZ1	1	Mid-size		√									√	√			20	32
	6	484	3B	RZ1	1	Mid-size		√								√	√	√			20	32
	7	492	3B	RZ1	1	Mid-size		√								√	√	√			20	32
	8	480	3B	RZ1	1	Mid-size		√									√	√			20	32
	9	474	3B	RZ1	1	Mid-size		√									√	√			19	31
	10	447	3B	RZ1	1	Mid-size		√									√	√			19	31
	11	437	3B	RZ1	1	Mid-size		√									√	√			19	31
	12	480	3B	RZ1	1	Mid-size		√									√	√			19	31
	13	488	3B	RZ1	1	Mid-size		√									√	√			19	31
	14	468	3B	RZ1	1	Mid-size		√			√										19	31
	15	416	3B	RZ1	1	Mid-size		√									√	√			19	31
	16	387	3B	RZ1	1	Mid-size		√													19	31
	17	488	3B	RZ1	1	Mid-size		√			√						√	√			19	31
	18	474	3B	RZ1	1	Mid-size		√													19	31
	19	481	3B	RZ1	1	Mid-size		√													19	31
	20	448	3B	RZ1	1	Mid-size		√													19	31
	21	443	3B	RZ1	1	Mid-size		√													19	31
	22	490	3B	RZ1	1	Mid-size		√													19	31
	23	429	3B	RZ1	1	Mid-size		√													19	31
	24	437	3B	RZ1	1	Mid-size		√													20	32
	25	483	3B	RZ1	1	Mid-size		√								√					20	32
	26	546	3B	RZ1	1	Large			√	√						√					20	32
	27	442	3B	RZ1	1	Mid-size		√													20	32
	28	435	3B	RZ1	1	Mid-size		√													20	32
	29	432	3B	RZ1	1	Mid-size		√													20	32
	30	433	3B	RZ1	1	Mid-size		√													20	32
	31	458	3B	RZ1	1	Mid-size		√													20	32
	1	512	3B	RZ1	1	Large			√	√	√		√			√					20	32
76	1	369	3B	RZ1	1	Mid-size		√			√									√	20	32
	2	157	3B	RZ1	1	Compact	√														20	32
	3	163	3B	RZ1	1	Compact	√														20	32
	4	157	3B	RZ1	1	Compact	√														20	32
	5	207	3B	RZ1	1	Compact	√														20	32
	6	192	3B	RZ1	1	Compact	√														20	32
	7	180	3B	RZ1	1	Compact	√														20	32
	8	168	3B	RZ1	1	Compact	√														20	32
	9	245	3B	RZ1	1	Compact	√				√	√				√					20	32
77	1	314	3B	RZ1	1	Mid-size		√			√									√	20	32
	2	126	3B	RZ1	1	Compact	√														20	32
	3	126	3B	RZ1	1	Compact	√														20	32
	4	196	3B	RZ1	1	Compact	√														20	32
	5	196	3B	RZ1	1	Compact	√														20	32
	6	196	3B	RZ1	1	Compact	√														20	32
	7	196	3B	RZ1	1	Compact	√														20	32
	8	196	3B	RZ1	1	Compact	√														20	32
	9	243	3B	RZ1	1	Compact	√				√					√					20	32

Section	Block	Area (m2)	Substages	Zoning	Maximum dwelling(s)	Block Typology	Compact Block	Mid-Sized Block	Large Block	Blocks with mid-sized block provision between 500m2 and 550m2	Corner Block	Surveillance Block	Limited Development Potential Block	Bushfire Prone Area Requirements Appl	Noise Protection Requirements Appl y	Requires Fencing to Public Areas	Services Easement	Requires Access for Utility Providers	Trees on Block	Mandatory Zero Side Setback	Block Detail Plan Number	Block Fill Plan Number
78	5	429	3B	RZ1	1	Mid-size		√													19	31
	6	436	3B	RZ1	1	Mid-size		√													19	31
	7	429	3B	RZ1	1	Mid-size		√													19	31
	8	456	3B	RZ1	1	Mid-size		√								√					19	31
	9	474	3B	RZ1	1	Mid-size		√								√					19	31
	10	499	3B	RZ1	1	Mid-size		√								√					19	31
	11	477	3B	RZ1	1	Mid-size		√								√					19	31
	12	541	3B	RZ1	1	Large			√	√											19	31
	13	452	3B	RZ1	1	Mid-size		√													19	31
	14	442	3B	RZ1	1	Mid-size		√													19	31
	1	552	3B	RZ1	1	Large			√		√		√								19	31
	2	454	3B	RZ1	1	Mid-size		√													19	31
	3	411	3B	RZ1	1	Mid-size		√													19	31
	4	488	3B	RZ1	1	Mid-size		√			√										19	31
79	2	546	3B	RZ1	1	Large			√	√	√		√			√	√	√			20	32
	3	447	3B	RZ1	1	Mid-size		√									√	√			20	32
	4	440	3B	RZ1	1	Mid-size		√									√	√			20	32
	5	446	3B	RZ1	1	Mid-size		√									√	√			20	32
	6	368	3B	RZ1	1	Mid-size		√									√	√			19	31
	7	374	3B	RZ1	1	Mid-size		√									√	√			19	31
	8	361	3B	RZ1	1	Mid-size		√					√				√	√			19	31
	9	430	3B	RZ1	1	Mid-size		√									√	√			19	31
	10	385	3B	RZ1	1	Mid-size		√			√		√								19	31
	11	336	3B	RZ1	1	Mid-size		√									√	√			19	31
	12	403	3B	RZ1	1	Mid-size		√									√	√			19	31
	13	442	3B	RZ1	1	Mid-size		√			√						√	√			19	31
	14	572	3B	RZ1	1	Large			√												19	31
	13	442	3B	RZ1	1	Mid-size		√			√						√	√			19	31
	14	572	3B	RZ1	1	Large			√												19	31
	15	398	3B	RZ1	1	Mid-size		√													19	31
	16	410	3B	RZ1	1	Mid-size		√													19	31
	17	403	3B	RZ1	1	Mid-size		√													19	31
	18	488	3B	RZ1	1	Mid-size		√													20	32
	19	493	3B	RZ1	1	Mid-size		√													20	32
	20	487	3B	RZ1	1	Mid-size		√													20	32
	1	586	3B	RZ1	1	Large			√		√					√					20	32
80	1	424	3A	RZ1	1	Mid-size		√			√					√					21	33
	2	444	3A	RZ1	1	Mid-size		√								√					21	33
	3	485	3A	RZ1	1	Mid-size		√								√					21	33
	4	396	3A	RZ1	1	Mid-size		√			√		√			√					21	33
	5	442	3A	RZ1	1	Mid-size		√													21	33
	6	418	3A	RZ1	1	Mid-size		√													21	33
	7	466	3A	RZ1	1	Mid-size		√													21	33
	8	347	3A	RZ1	1	Mid-size		√			√		√								21	33
	9	319	3A	RZ1	1	Mid-size		√					√								21	33
	10	373	3A	RZ1	1	Mid-size		√									√	√			21	33
	11	478	3A	RZ1	1	Mid-size		√			√						√	√			21	33
	12	459	3A	RZ1	1	Mid-size		√													21	33
	13	455	3A	RZ1	1	Mid-size		√													21	33
	14	382	3A	RZ1	1	Mid-size		√													21	33
	15	467	3A	RZ1	1	Mid-size		√													21	33
89	5	501	3A	RZ1	1	Large			√	√							√	√			22	34
	6	497	3A	RZ1	1	Mid-size		√									√	√			22	34
	7	502	3A	RZ1	1	Large			√	√							√	√			22	34
	8	501	3A	RZ1	1	Large			√	√							√	√			22	34
	9	364	3A	RZ1	1	Mid-size		√			√		√								22	34
	10	366	3A	RZ1	1	Mid-size		√									√	√			22	34
	11	408	3A	RZ1	1	Mid-size		√									√	√			22	34
	12	499	3A	RZ1	1	Mid-size		√			√			√			√	√			22	34
	13	501	3C	RZ1	1	Large			√	√											23	35
	14	502	3C	RZ1	1	Large			√	√											23	35
	15	552	3C	RZ1	1	Large			√												23	35
	16	553	3C	RZ1	1	Large			√								√	√			23	35
	1	492	3C	RZ1	1	Mid-size		√			√										23	35
	2	347	3C	RZ1	1	Mid-size		√													23	35
	3	364	3A	RZ1	1	Mid-size		√									√	√			22	34
	4	421	3A	RZ1	1	Mid-size		√			√										22	34
88	6	500	3C	RZ1	1	Mid-size		√		√											23	35
	7	555	3C	RZ1	1	Large			√								√	√			23	35
	8	501	3C	RZ1	1	Large			√	√							√	√			23	35
	9	501	3C	RZ1	1	Large			√	√							√	√			23	35
	10	501	3C	RZ1	1	Large			√	√							√	√			23	35
	11	480	3C	RZ1	1	Mid-size		√									√	√			23	35
	12	403	3C	RZ1	1	Mid-size		√			√			√							23	35
	13	402	3C	RZ1	1	Mid-size		√						**√**			√	√			23	35
	14	444	3C	RZ1	1	Mid-size		√						√			√	√			23	35
	15	553	3C	RZ1	1	Large			√		√			√			√	√			23	35
	16	480	3C	RZ1	1	Mid-size		√													23	35
	17	501	3C	RZ1	1	Large			√	√											23	35
	18	501	3C	RZ1	1	Large			√	√											23	35
	19	501	3C	RZ1	1	Large			√	√											23	35
	20	600	3C	RZ1	1	Large			√												23	35
	21	614	3C	RZ1	1	Large			√												23	35
	1	249	3C	RZ1	1	Compact	√				√										23	35
	2	232	3C	RZ1	1	Compact	√														23	35
	3	232	3C	RZ1	1	Compact	√														23	35
	4	232	3C	RZ1	1	Compact	√														23	35
	5	248	3C	RZ1	1	Compact	√				√										23	35
87	6	580	3C	RZ1	1	Large			√												23	35
	7	456	3C	RZ1	1	Mid-size		√													23	35
	8	420	3C	RZ1	1	Mid-size		√													23	35
	9	427	3C	RZ1	1	Mid-size		√													23	35
	10	427	3C	RZ1	1	Mid-size		√													23	35
	11	420	3C	RZ1	1	Mid-size		√													23	35
	12	420	3C	RZ1	1	Mid-size		√													23	35
	13	420	3C	RZ1	1	Mid-size		√													23	35
	14	420	3C	RZ1	1	Mid-size		√													23	35
	15	397	3C	RZ1	1	Mid-size		√			√		√	√			√	√			23	35
	16	378	3C	RZ1	1	Mid-size		√						√			√	√			23	35

Section	Block	Area (m2)	Substages	Zoning	Maximum dwelling(s)	Block Typology	Compact Block	Mid-Sized Block	Large Block	Blocks with mid-sized block provision between 500m2 and 550m2	Corner Block	Surveillance Block	Limited Development Potential Block	Bushfire Prone Area Requirements Apply	Noise Protection Requirements Apply	Requires Fencing to Public Areas	Services Easement	Requires Access for Utility Providers	Trees on Block	Mandatory Zero Side Setback	Block Detail Plan Number	Block Fill Plan Number
87	17	369	3C	RZ1	1	Mid-size		√						√							23	35
	18	492	3C	RZ1	1	Mid-size		√			√			√							23	35
	19	480	3C	RZ1	1	Mid-size		√									√	√			23	35
	20	480	3C	RZ1	1	Mid-size		√									√	√			23	35
	21	480	3C	RZ1	1	Mid-size		√									√	√			23	35
	22	480	3C	RZ1	1	Mid-size		√									√	√			23	35
	23	423	3C	RZ1	1	Mid-size		√									√	√			23	35
	24	423	3C	RZ1	1	Mid-size		√									√	√			23	35
	25	423	3C	RZ1	1	Mid-size		√									√	√			23	35
	26	573	3C	RZ1	1	Large			√								√	√			23	35
	27	493	3C	RZ1	1	Mid-size		√													23	35
	1	248	3C	RZ1	1	Compact	√				√										23	35
	2	232	3C	RZ1	1	Compact	√														23	35
	3	232	3C	RZ1	1	Compact	√														23	35
	4	232	3C	RZ1	1	Compact	√														23	35
	5	248	3C	RZ1	1	Compact	√				√										23	35
86	5	587	3C	RZ1	1	Large			√								√				23	35
	6	572	3C	RZ1	1	Large			√								√	√			23	35
	7	501	3C	RZ1	1	Large			√	√							√	√			23	35
	8	501	3C	RZ1	1	Large			√	√							√	√			23	35
	9	501	3C	RZ1	1	Large			√	√							√	√			23	35
	10	501	3C	RZ1	1	Large			√	√											23	35
	11	495	3C	RZ1	1	Mid-size		√													23	35
	12	480	3C	RZ1	1	Mid-size		√													23	35
	13	480	3C	RZ1	1	Mid-size		√													23	35
	14	410	3C	RZ1	1	Mid-size		√			√			√							25	37
	15	401	3C	RZ1	1	Mid-size		√						√							25	37
	16	416	3C	RZ1	1	Mid-size		√						√							25	37
	17	467	3C	RZ1	1	Mid-size		√			√			√							25	37
	18	480	3C	RZ1	1	Mid-size		√													25	37
	19	480	3C	RZ1	1	Mid-size		√													23	35
	20	495	3C	RZ1	1	Mid-size		√													23	35
	21	501	3C	RZ1	1	Large			√	√											23	35
	22	501	3C	RZ1	1	Large			√	√							√	√			23	35
	23	423	3C	RZ1	1	Mid-size		√													23	35
	24	423	3C	RZ1	1	Mid-size		√													23	35
	25	493	3C	RZ1	1	Mid-size		√													23	35
	26	422	3C	RZ1	1	Mid-size		√													23	35
	27	430	3C	RZ1	1	Mid-size		√													23	35
	1	428	3C	RZ1	1	Mid-size		√								√					23	35
	2	500	3C	RZ1	1	Mid-size		√		√						√					23	35
	3	489	3C	RZ1	1	Mid-size		√								√					23	35
	4	425	3C	RZ1	1	Mid-size		√								√					23	35
85	4	607	3C	RZ1	1	Large			√												24	36
	5	420	3C	RZ1	1	Mid-size		√													24	36
	6	494	3C	RZ1	1	Mid-size		√													24	36
	7	450	3C	RZ1	1	Mid-size		√													24	36
	8	495	3C	RZ1	1	Mid-size		√													24	36
	9	495	3C	RZ1	1	Mid-size		√													24	36
	10	450	3C	RZ1	1	Mid-size		√													24	36
	11	499	3C	RZ1	1	Mid-size		√													24	36
	12	499	3C	RZ1	1	Mid-size		√													24	37
	13	499	3C	RZ1	1	Mid-size		√													25	37
	14	469	3C	RZ1	1	Mid-size		√			√			√							25	37
	15	420	3C	RZ1	1	Mid-size		√						√							25	37
	16	420	3C	RZ1	1	Mid-size		√						√							25	37
	17	469	3C	RZ1	1	Mid-size		√			√			√							25	37
	18	499	3C	RZ1	1	Mid-size		√													25	37
	19	499	3C	RZ1	1	Mid-size		√													25	37
	20	499	3C	RZ1	1	Mid-size		√													24	36
	21	450	3C	RZ1	1	Mid-size		√													24	36
	22	495	3C	RZ1	1	Mid-size		√													24	36
	23	450	3C	RZ1	1	Mid-size		√													24	36
	24	420	3C	RZ1	1	Mid-size		√													24	36
	25	420	3C	RZ1	1	Mid-size		√													24	36
	26	420	3C	RZ1	1	Mid-size		√													24	36
	27	419	3C	RZ1	1	Mid-size		√													24	36
	28	485	3C	RZ1	1	Mid-size		√													24	36
	1	587	3C	RZ1	1	Large			√		√										24	36
	2	538	3C	RZ1	1	Large			√	√											24	36
	3	656	3C	RZ1	1	Large			√		√										24	36
84	4	561	3C	RZ1	1	Large			√												24	36
	5	446	3C	RZ1	1	Mid-size		√													24	36
	6	468	3C	RZ1	1	Mid-size		√													24	36
	7	450	3C	RZ1	1	Mid-size		√													24	36
	8	450	3C	RZ1	1	Mid-size		√													24	36
	9	495	3C	RZ1	1	Mid-size		√													24	36
	10	495	3C	RZ1	1	Mid-size		√													24	36
	11	450	3C	RZ1	1	Mid-size		√													24	36
	12	450	3C	RZ1	1	Mid-size		√													25	37
	13	525	3C	RZ1	1	Large			√	√											25	37
	14	525	3C	RZ1	1	Large			√	√											25	37
	15	469	3C	RZ1	1	Mid-size		√			√			√							25	37
	16	420	3C	RZ1	1	Mid-size		√						√							25	37
	17	420	3C	RZ1	1	Mid-size		√						√							25	37
	18	469	3C	RZ1	1	Mid-size		√			√			√							25	37
	19	525	3C	RZ1	1	Large			√	√											25	37
	20	525	3C	RZ1	1	Large			√	√											25	37
	21	450	3C	RZ1	1	Mid-size		√													25	37
	22	450	3C	RZ1	1	Mid-size		√													25	37
	23	495	3C	RZ1	1	Mid-size		√													24	36
	24	450	3C	RZ1	1	Mid-size		√													24	36
	25	420	3C	RZ1	1	Mid-size		√													24	36
	26	420	3C	RZ1	1	Mid-size		√													24	36
	27	420	3C	RZ1	1	Mid-size		√													24	36
	28	436	3C	RZ1	1	Mid-size		√													24	36
	29	445	3C	RZ1	1	Mid-size		√													24	36
	30	453	3C	RZ1	1	Mid-size		√													24	36
	1	594	3C	RZ1	1	Large			√		√										24	36
	2	598	3C	RZ1	1	Large			√												24	36
	3	599	3C	RZ1	1	Large			√		√										24	36

Section	Block	Area (m2)	Substages	Zoning	Maximum dwelling(s)	Block Typology	Compact Block	Mid-Sized Block	Large Block	Blocks with mid-sized block provision between 500m2 and 550m2	Corner Block	Surveillance Block	Limited Development Potential Block	Bushfire Prone Area Requirements Apply	Noise Protection Requirements Apply	Requires Fencing to Public Areas	Services Easement	Requires Access for Utility Providers	Trees on Block	Mandatory Zero Side Setback	Block Detail Plan Number	Block Fill Plan Number
	5	441	3C	RZ1	1	Mid-size		√									√	√			24	36
	6	494	3C	RZ1	1	Mid-size		√									√	√			24	36
	7	495	3C	RZ1	1	Mid-size		√									√	√			24	36
	8	494	3C	RZ1	1	Mid-size		√									√	√			24	36
	9	495	3C	RZ1	1	Mid-size		√									√	√			24	36
	10	510	3C	RZ1	1	Large			√	√							√	√			24	36
	11	495	3C	RZ1	1	Mid-size		√									√				24	36
	12	495	3C	RZ1	1	Mid-size		√													25	37
	13	450	3C	RZ1	1	Mid-size		√													25	37
	14	450	3C	RZ1	1	Mid-size		√													25	37
	15	450	3C	RZ1	1	Mid-size		√													25	37
	16	450	3C	RZ1	1	Mid-size		√													25	37
	17	604	3C	RZ1	1	Large			√		√			√							25	37
	18	558	3C	RZ1	1	Large			√					√							25	37
	19	614	3C	RZ1	1	Large			√		√			√							25	37
83	20	449	3C	RZ1	1	Mid-size		√						√							25	37
	21	450	3C	RZ1	1	Mid-size		√						√							25	37
	22	450	3C	RZ1	1	Mid-size		√						√							25	37
	23	450	3C	RZ1	1	Mid-size		√						√							25	37
	24	495	3C	RZ1	1	Mid-size		√						√							25	37
	25	495	3C	RZ1	1	Mid-size		√						√							25	37
	26	510	3C	RZ1	1	Large			√	√				√							24	36
	27	499	3C	RZ1	1	Mid-size		√						√							24	36
	28	499	3C	RZ1	1	Mid-size		√						√							24	36
	29	497	3C	RZ1	1	Mid-size		√						√							24	36
	30	584	3C	RZ1	1	Large			√					√							24	36
	31	586	3C	RZ1	1	Large			√					√			√	√			24	36
	1	499	3C	RZ1	1	Mid-size		√			√			√							24	36
	2	410	3C	RZ1	1	Mid-size		√						√							24	36
	3	376	3C	RZ1	1	Mid-size		√													24	36
	4	443	3C	RZ1	1	Mid-size		√			√										24	36
	1	483	3A	RZ1	1	Mid-size		√									√	√			26	38
	2	481	3A	RZ1	1	Mid-size		√									√	√			26	38
	3	495	3A	RZ1	1	Mid-size		√					√				√	√			26	38
	4	475	3A	RZ1	1	Mid-size		√					√				√	√			26	38
	5	492	3A	RZ1	1	Mid-size		√									√	√			26	38
	6	445	3A	RZ1	1	Mid-size		√			√										26	38
	7	465	3A	RZ1	1	Mid-size		√									√	√			26	38
	8	450	3A	RZ1	1	Mid-size		√									√	√			26	38
	9	450	3A	RZ1	1	Mid-size		√									√	√			26	38
	10	450	3A	RZ1	1	Mid-size		√									√	√			26	38
	11	450	3A	RZ1	1	Mid-size		√									√	√			26	38
	12	450	3A	RZ1	1	Mid-size		√									√	√			26	38
	13	450	3A	RZ1	1	Mid-size		√							√		√	√			26	38
	14	447	3A	RZ1	1	Mid-size		√			√				√						26	38
93	15	425	3A	RZ1	1	Mid-size		√						√	√		√	√			26	38
	16	425	3A	RZ1	1	Mid-size		√						√	√		√	√			26	38
	17	447	3A	RZ1	1	Mid-size		√			√			√	√		√				26	38
	18	392	3A	RZ1	1	Mid-size		√						√	√						26	38
	19	392	3A	RZ1	1	Mid-size		√						√	√						26	38
	20	392	3A	RZ1	1	Mid-size		√						√	√						26	38
	21	444	3A	RZ1	1	Mid-size		√						√	√						26	38
	22	437	3A	RZ1	1	Mid-size		√						√	√						26	38
	24	497	3A	RZ1	1	Mid-size		√						√	√						26	38
	25	481	3A	RZ1	1	Mid-size		√						√	√						26	38
	26	496	3A	RZ1	1	Mid-size		√						√	√						26	38
	27	423	3A	RZ1	1	Mid-size		√			√			√	√						26	38
	28	389	3A	RZ1	1	Mid-size		√						√							26	38
	29	403	3A	RZ1	1	Mid-size		√						√			√	√			26	38
	30	437	3A	RZ1	1	Mid-size		√			√			√			√				26	38
	1	627	3A	RZ1	1	Large			√		√		√	√			√	√			22	34
	2	566	3A	RZ1	1	Large			√								√	√			22	34
	4	446	3A	RZ1	1	Mid-size		√			√		√								22	34
	5	378	3A	RZ1	1	Mid-size		√					√								22	34
91	6	375	3A	RZ1	1	Mid-size		√					√								22	34
	7	378	3A	RZ1	1	Mid-size		√					√								22	34
	8	385	3A	RZ1	1	Mid-size		√					√								22	34
	9	383	3A	RZ1	1	Mid-size		√						√							22	34
	10	456	3A	RZ1	1	Mid-size		√			√			√							22	34
	2	709	3A	RZ1	1	Large			√								√				27	39
	3	666	3A	RZ1	1	Large			√								√				27	39
	4	641	3A	RZ1	1	Large			√								√				27	39
	5	636	3A	RZ1	1	Large			√								√				27	39
	6	648	3A	RZ1	1	Large			√								√				27	39
	7	671	3A	RZ1	1	Large			√								√				27	39
	8	694	3A	RZ1	1	Large			√								√				27	39
	9	717	3A	RZ1	1	Large			√						√		√				27	39
	10	493	3A	RZ1	1	Mid-size		√			√			√	√	√					27	39
	11	489	3A	RZ1	1	Mid-size		√						√	√						27	39
92	12	489	3A	RZ1	1	Mid-size		√						√	√						27	39
	13	525	3A	RZ1	1	Large			√	√	√			√	√						27	39
	14	450	3A	RZ1	1	Mid-size		√							√	√	√				27	39
	15	450	3A	RZ1	1	Mid-size		√								√	√				27	39
	16	450	3A	RZ1	1	Mid-size		√								√	√				27	39
	17	450	3A	RZ1	1	Mid-size		√								√	√				27	39
	18	450	3A	RZ1	1	Mid-size		√								√	√				27	39
	19	450	3A	RZ1	1	Mid-size		√								√	√				27	39
	20	450	3A	RZ1	1	Mid-size		√								√	√				27	39
	21	449	3A	RZ1	1	Mid-size		√								√	√				27	39

Annexure C - Block Details Plans

Below are the Block Details Plans for Stage 3

Sections 73, 74, 75, 76, 77, 78, 79, 80, 83, 84, 85, 86, 87, 88, 89, 91, 92, 93

* Please note that:

The following Block Details Plans contain references to recently superseded Single Dwelling Housing Development Code.

The requirements shown in the Block Detail Plans still apply. Refer to the DS5 - Molonglo Valley District Specifications - https://www.legislation.act.gov.au/DownloadFile/ni/2023-540/copy/178550/PDF/2023-540.PDF for more detail about these requirements.

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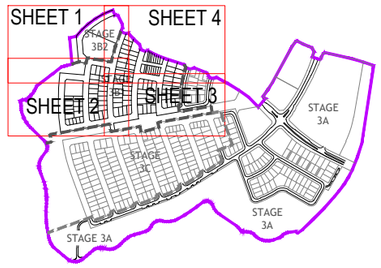

KEY PLAN

NOTES

1. PRELIMINARY ENGINEERING WORKS SHOWN ON THESE DRAWINGS ARE FOR SITE CONTEXT ONLY AND ARE INDICATIVE. SUBJECT TO CHANGE.
2. CONTOUR INTERVAL IS 1m. CONTOURS REPRESENTS PRELIMINARY DESIGN CONTOURS AND MAY BE SUBJECT TO CHANGE, LEVELS SHOULD BE VERIFIED BY LESSEES
3. PLAN SUBJECT TO SURVEY- FINAL DIMENSIONS, AREAS & BLOCK NUMBERS TO BE OBTAINED FROM DEPOSITED PLANS.
4. REFER TO HOUSING DEVELOPMENT GUIDELINES FOR DETAILS OF;
   - MAXIMUM RETAINING WALL HEIGHT ALONG STREET FRONTAGES AND ADJACENT TO PUBLIC OPEN SPACES
   - CHANGES IN LEVELS ARE INCORPORATED WITHIN THE TO BE 1m FROM THE FOOTPATH LEVEL DESIGN OF THE BUILDING TO ENSURE THE MAXIMUM
   - TERRITORY PLAN 1.5m CUT AND FILL AS PER THE THE CHANGES IN THE LEVELS ARE BEING MITIGATED REQUIREMENTS AS WELL AS TO SIT WITH THE THROUGH TERRACED LANDSCAPED AREAS OF NATURAL TOPOGRAPHY MAXIMUM 1m IN HEIGHT

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3B-2001

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3B-2004

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3B-2003

ROAD 72
ROAD 70
ROAD 67
ROAD 74
STAGE 3B1
STAGE 3B1
STAGE 3B1
71
73
1 3139m²
MU (13 to 14)
1 486m²
2 420m²
3 420m²
4 471m²
23 495m²
5 478m²
22 453m²
6 482m²
21 453m²
7 483m²
20 498m²
74 460m²
19 438m²
9 456m²
18 445m²
10 455m²
17 442m²
11 488m²
16 465m²
15 450m²
2 500m²
14 428m²
3 500m²
13 428m²
4 472m²
12 439m²
5 583m²
11 460m²
15 442m²
14 420m²
13 363m²
12 449m²
10 246m²
9 231m²
8 230m²
7 231m²
6 246m²
ROAD 67
ROAD 67

N

LEGEND

- 1 — BLOCK IDENTIFIER
- 3 — SECTION IDENTIFIER
- 30.0m — BLOCK DIMENSIONS (m)
- 500m² — BLOCK AREA (m²)
- * — MANDATORY HABITABLE ROOM ABOVE GARAGE (R62 OF ESTATE DEVELOPMENT CODE)
- # — FACADES FACING JOHN GORTON DRIVE REQUIRE ACOUSTIC PROTECTION MEASURES TO ADDRESS EXTERNAL ROAD NOISE.
  - REFER TO WHITLAM STAGE 3 - OVERARCHING NOISE MANAGEMENT PLAN FOR 'NOISE AFFECTED' BLOCKS BY WSP (NOVEMBER 2020)
- ◀ — MANDATORY ZERO SETBACK (NOMINATED AS SIDE BOUNDARY 2 FOR THE PURPOSE OF R15 OF SINGLE DWELLING HOUSING DEVELOPMENT CODE)
- (M) — MID SIZED BLOCK CONTROLS (500m²-<550m²) APPLY TO THESE BLOCKS (FOR THE PURPOSE OF R21 OF THE SINGLE HOUSING DEVELOPMENT CODE)
- (Z) — BLOCKS OVER 550m² - SIDE SETBACK REQUIREMENTS FOR LOWER FLOOR LEVEL IN THE TABLE 5 AND TABLE 6B UNDER SINGLE DWELLING HOUSING DEVELOPMENT DO NOT APPLY. SETBACKS REQUIRED ARE:
  - A MINIMUM 3.0m FROM SIDE BOUNDARY 1;
  - A MINIMUM 1.5m FROM SIDE BOUNDARY 2; AND
  - A GARAGE MUST BE SETBACK A MINIMUM OF 1.5m FROM SIDE BOUNDARY 2, SO AS TO ALIGN WITH THE VERGE CROSSING LOCATION
- BUS STOP PAD
- DRIVEWAY LOCATION
- C — STREET LIGHT
- UTILITY MAINTENANCE ACCESS PASSAGE 1.8m WIDE
- STORMWATER AND SEWER EASEMENT (3.5m WIDE UNLESS NOTED OTHERWISE)
- AREA SUBJECT TO APZ REQUIREMENT
- LIMITED DEVELOPMENT POTENTIAL BLOCK (R.49 OF ESTATE DEVELOPMENT CODE)
- FOOTPATH
- RETAINING WALL BUILT BY DEVELOPER
- MANDATORY COURTYARD WALL TO MAX HEIGHT OF 1.5m
  - CONSTRUCTED OF RENDERED BRICK, BLOCK OR STONEWORK IN COMBINATION WITH FEATURE PANELS, AND SETBACK 600mm FROM THE FRONT BOUNDARY TO INCORPORATE LANDSCAPING. REFER TO DRAWING PCP4, DETAIL-1, TYPE 1 & TYPE 2;
  - COURTYARD WALL ALONG SECONDARY FRONTAGE TO TERMINATE AT 5m FROM PRIMARY FRONTAGE.
- NO VEHICLE ACCESS TO THIS SECTION OF BOUNDARY
- 3m SETBACK TO RZ1 BLOCKS
- APZ
- ESTATE BOUNDARY
- STAGE BOUNDARY
- OPEN SPACE
- INTEGRATED HOUSING DEVELOPMENT
- BUILDINGS TO COMPLY WITH AS 3959:2018 - BUSHFIRE ATTACK LEVEL (BAL) - 19 (MODERATE)
- BUILDINGS TO COMPLY WITH AS 3959:2018 - BUSHFIRE ATTACK LEVEL (BAL) - 12.5 (LOW)
- 567.0 — DESIGN CONTOUR (@ INTERVAL 1m)
- INDICATIVE TREE LOCATIONS
- SUBSTATION
- INDICATIVE MULTI UNIT DRIVEWAY LOCATION

DISCLAIMER

PLAN IS SUBJECT TO DA APPROVAL.
THE SUBURBAN LAND AGENCY MAKES NO WARRANTY REGARDING THE ACCURACY OR COMPLETENESS OF INFORMATION ON THIS PUBLICATION AND RECOMMENDS OBTAINING INDEPENDENT LEGAL ADVICE BEFORE CONSIDERING PURCHASING LAND OR MAKING AN OFFER TO PURCHASE LAND.

FIRST ISSUE	DESIGN	DRAWN	CHECK	APPROVED	DATE
AMENDMENTS	MJ	EH	[illegible]		24/06/2022

AMENDMENT DETAILS

HDG

Authorised for Issue:
BY:
SIGN: DATE:

0 5 10 15 20 25 30 35 40
SCALE 1:500 (A1) SCALE 1:1000 (A3)

WAE No. ---

ACT Government | Suburban Land Agency

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SPACELAB CREATING TIMELESS PLACES

WHITLAM ESTATE - STAGE 3B

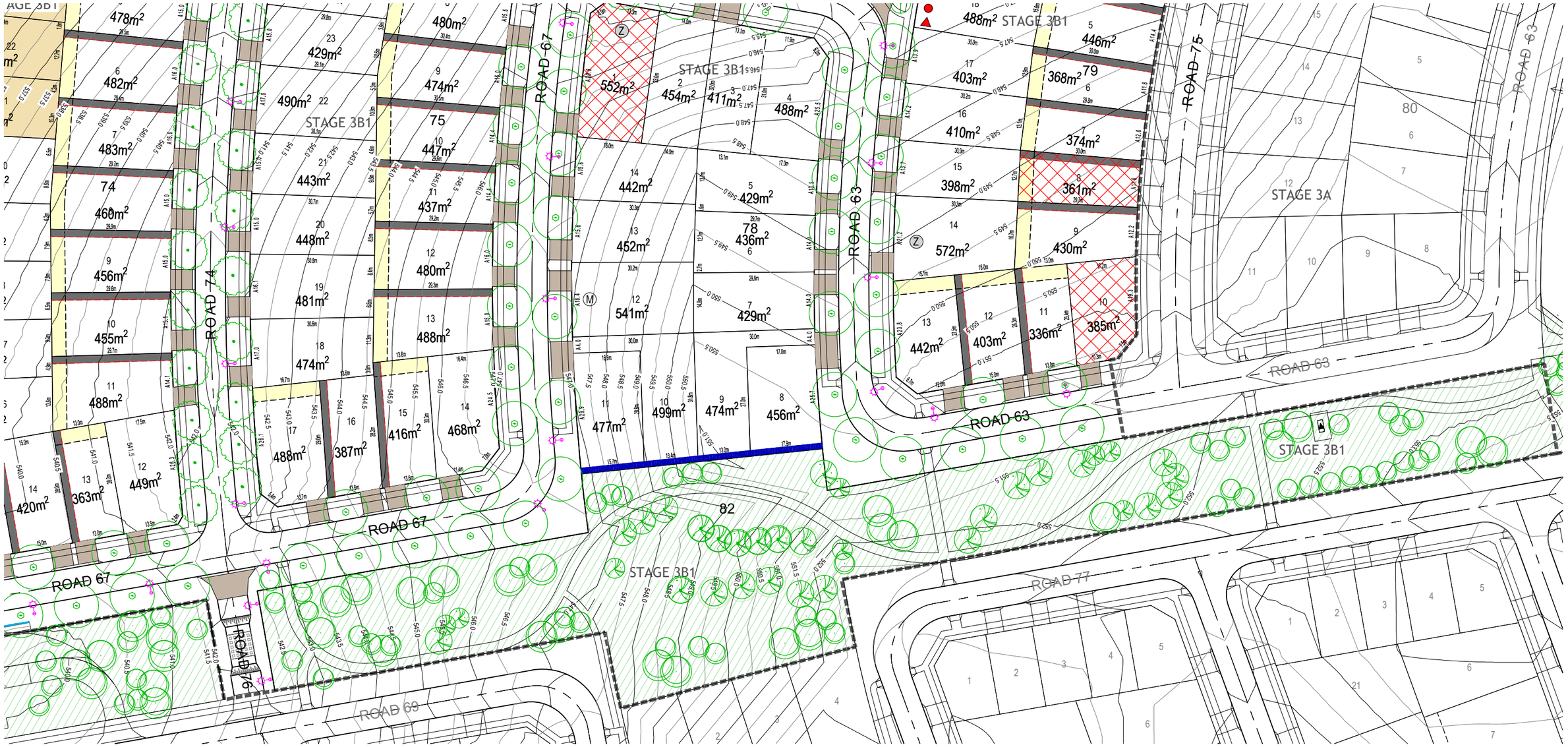
DISCLAIMER
ALL DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY, DO NOT SCALE. NOT FOR CONSTRUCTION UNLESS STAMPED BY CERTIFYING AUTHORITY

BLOCK DETAILS PLAN - SHEET 2
Page 18

18-001248.3B 2002 ---

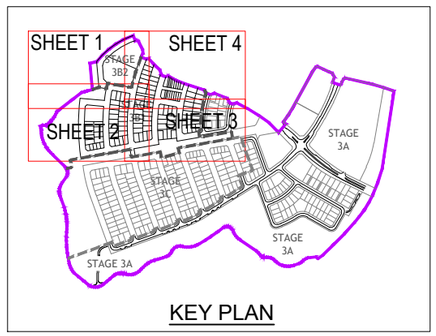
FOR CONTINUATION REFER TO DRAWING No. 18-001248.3B-2004

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3B-2002



LEGEND

- 1 — BLOCK IDENTIFIER
- 3 — SECTION IDENTIFIER
- 33.0m — BLOCK DIMENSIONS (m)
- 500m² — BLOCK AREA (m²)
- * — MANDATORY HABITABLE ROOM ABOVE GARAGE (R62 OF ESTATE DEVELOPMENT CODE)
- # — FACADES FACING JOHN GORTON DRIVE REQUIRE ACOUSTIC PROTECTION MEASURES TO ADDRESS EXTERNAL ROAD NOISE.
  - REFER TO WHITLAM STAGE 3 - OVERARCHING NOISE MANAGEMENT PLAN FOR 'NOISE AFFECTED' BLOCKS BY WSP (NOVEMBER 2020)
- MANDATORY ZERO SETBACK (NOMINATED AS SIDE BOUNDARY 2 FOR THE PURPOSE OF R15 OF SINGLE DWELLING HOUSING DEVELOPMENT CODE)
- STREET LIGHT
- THE EXCEPTIONS TO MINIMUM FRONT BOUNDARY SETBACKS IDENTIFIED IN *TABLES 2C* AND *3C* OF THE *SINGLE DWELLING HOUSING DEVELOPMENT CODE* DO NOT APPLY TO THESE BLOCKS
- THE MAXIMUM TOTAL WIDTH OF GARAGE DOORS AND EXTERNAL WIDTH OF CARPORTS IS THE LESSER OF THE FOLLOWING:
  - 6m
  - 50% of the facade of the dwelling
- (M) MID SIZED BLOCK CONTROLS (500m²-<550m²) APPLY TO THESE BLOCKS (FOR THE PURPOSE OF R21 OF THE SINGLE HOUSING DEVELOPMENT CODE)
- (Z) BLOCKS OVER 550m² - SIDE SETBACK REQUIREMENTS FOR LOWER FLOOR LEVEL IN THE TABLE 5 AND TABLE 6B UNDER SINGLE DWELLING HOUSING DEVELOPMENT DO NOT APPLY. SETBACKS REQUIRED ARE:
  - A MINIMUM 3.0m FROM SIDE BOUNDARY 1;
  - A MINIMUM 1.5m FROM SIDE BOUNDARY 2; AND
  - A GARAGE MUST BE SETBACK A MINIMUM OF 1.5m FROM SIDE BOUNDARY 2, SO AS TO ALIGN WITH THE VERGE CROSSING LOCATION
- BUS STOP PAD
- DRIVEWAY LOCATION
- UTILITY MAINTENANCE ACCESS PASSAGE 1.8m WIDE
- STORMWATER AND SEWER EASEMENT (3.5m WIDE UNLESS NOTED OTHERWISE)
- LIMITED DEVELOPMENT POTENTIAL BLOCK (R.49 OF ESTATE DEVELOPMENT CODE)
- FOOTPATH
- RETAINING WALL BUILT BY DEVELOPER
- MANDATORY COURTYARD WALL TO MAX HEIGHT OF 1.5m
  - CONSTRUCTED OF RENDERED BRICK, BLOCK OR STONEWORK IN COMBINATION WITH FEATURE PANELS, AND SETBACK 600mm FROM THE FRONT BOUNDARY TO INCORPORATE LANDSCAPING. REFER TO DRAWING PCP4, DETAIL-1, TYPE 1 & TYPE 2;
  - COURTYARD WALL ALONG SECONDARY FRONTAGE TO TERMINATE AT 5m FROM PRIMARY FRONTAGE.
- ACOUSTIC CONTOUR - L15, HOUR 60DBA FOR DAYTIME
- NO VEHICLE ACCESS TO THIS SECTION OF BOUNDARY
- 3m SETBACK TO RZ1 BLOCKS
- APZ
- ESTATE BOUNDARY
- STAGE BOUNDARY
- OPEN SPACE
- BUILDINGS TO COMPLY WITH AS 3959:2018 - BUSHFIRE ATTACK LEVEL (BAL) - 12.5 (LOW)
- 567.0 — DESIGN CONTOUR (@ INTERVAL 1m)
- INDICATIVE TREE LOCATIONS
- SUBSTATION
- INDICATIVE MULTI UNIT DRIVEWAY LOCATION



NOTES

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3. PLAN SUBJECT TO SURVEY- FINAL DIMENSIONS, AREAS & BLOCK NUMBERS TO BE OBTAINED FROM DEPOSITED PLANS.
4. REFER TO HOUSING DEVELOPMENT GUIDELINES FOR DETAILS OF;
   - MAXIMUM RETAINING WALL HEIGHT ALONG STREET FRONTAGES AND ADJACENT TO PUBLIC OPEN SPACES
   - CHANGES IN LEVELS ARE INCORPORATED WITHIN THE TO BE 1m FROM THE FOOTPATH LEVEL DESIGN OF THE BUILDING TO ENSURE THE MAXIMUM
   - TERRITORY PLAN 1.5m CUT AND FILL AS PER THE THE CHANGES IN THE LEVELS ARE BEING MITIGATED REQUIREMENTS AS WELL AS TO SIT WITH THE THROUGH TERRACED LANDSCAPED AREAS OF NATURAL TOPOGRAPHY MAXIMUM 1m IN HEIGHT

FIRST ISSUE	DESIGN	DRAWN	CHECK	APPROVED	DATE
	MJ	EH	[illegible]		24/06/2022

AMENDMENTS — AMENDMENT DETAILS

HDG

Authorised for Issue:

BY:

SIGN: DATE:

0 5 10 15 20 25 30 35 40

SCALE 1:500 (A1) SCALE 1:1000 (A3)

WAE No. ---

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SPACELAB CREATING TIMELESS PLACES

WHITLAM ESTATE - STAGE 3B

DISCLAIMER
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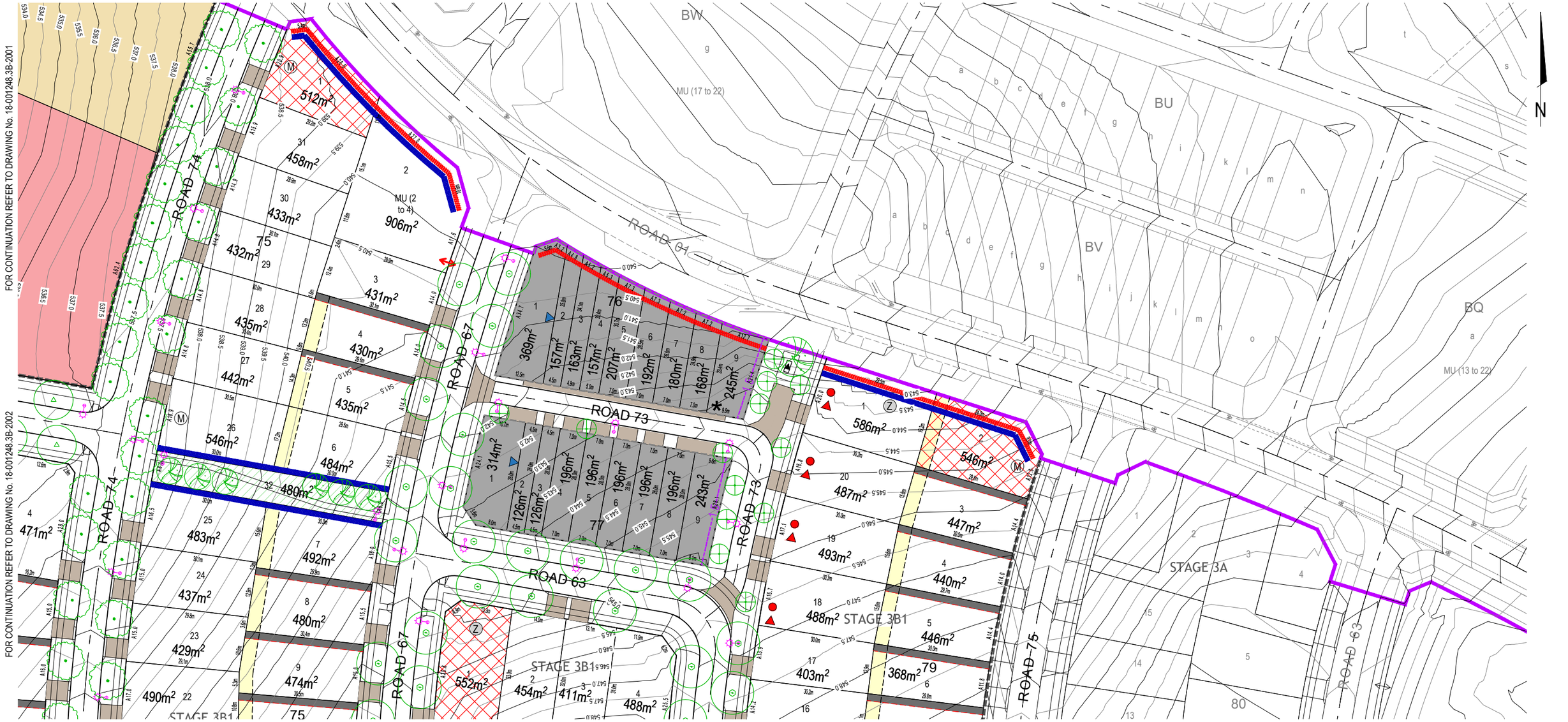
BLOCK DETAILS PLAN - SHEET 3

Page 19

18-001248.3B 2003 ----



LEGEND

- 1 — BLOCK IDENTIFIER
- 3 — SECTION IDENTIFIER
- 30.0m — BLOCK DIMENSIONS (m)
- 500m² — BLOCK AREA (m²)
- * — MANDATORY HABITABLE ROOM ABOVE GARAGE (R62 OF ESTATE DEVELOPMENT CODE)
- # — FACADES FACING JOHN GORTON DRIVE REQUIRE ACOUSTIC PROTECTION MEASURES TO ADDRESS EXTERNAL ROAD NOISE.
  - REFER TO WHITLAM STAGE 3 - OVERARCHING NOISE MANAGEMENT PLAN FOR 'NOISE AFFECTED' BLOCKS BY WSP (NOVEMBER 2020)
- ◀ — MANDATORY ZERO SETBACK (NOMINATED AS SIDE BOUNDARY 2 FOR THE PURPOSE OF R15 OF SINGLE DWELLING HOUSING DEVELOPMENT CODE)
- C — STREET LIGHT

- ● — THE EXCEPTIONS TO MINIMUM FRONT BOUNDARY SETBACKS IDENTIFIED IN *TABLES 2C* AND *3C* OF THE *SINGLE DWELLING HOUSING DEVELOPMENT CODE* DO NOT APPLY TO THESE BLOCKS
- ▲ — THE MAXIMUM TOTAL WIDTH OF GARAGE DOORS AND EXTERNAL WIDTH OF CARPORTS IS THE LESSER OF THE FOLLOWING:
  - 6m
  - 50% of the facade of the dwelling
- Ⓜ — MID SIZED BLOCK CONTROLS (500m²-<550m²) APPLY TO THESE BLOCKS (FOR THE PURPOSE OF R21 OF THE SINGLE HOUSING DEVELOPMENT CODE)
- Ⓩ — BLOCKS OVER 550m² - SIDE SETBACK REQUIREMENTS FOR LOWER FLOOR LEVEL IN THE TABLE 5 AND TABLE 6B UNDER SINGLE DWELLING HOUSING DEVELOPMENT DO NOT APPLY. SETBACKS REQUIRED ARE:
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- DRIVEWAY LOCATION

- UTILITY MAINTENANCE ACCESS PASSAGE 1.8m WIDE
- STORMWATER AND SEWER EASEMENT (3.5m WIDE UNLESS NOTED OTHERWISE)
- AREA SUBJECT TO APZ REQUIREMENT
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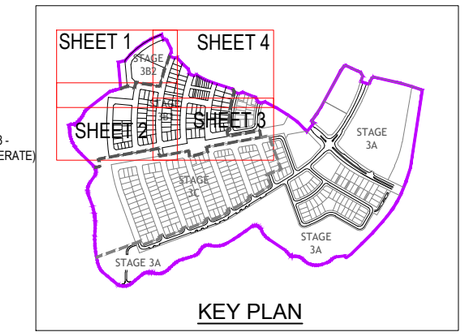
- 3m SETBACK TO RZ1 BLOCKS

- 1.5 — MINIMUM 1.5m SIDE SETBACK. APPLICABLE TO LOWER FLOOR LEVEL
- APZ
- ESTATE BOUNDARY
- STAGE BOUNDARY
- OPEN SPACE
- INTEGRATED HOUSING DEVELOPMENT
- BUILDINGS TO COMPLY WITH AS 3959:2018 - BUSHFIRE ATTACK LEVEL (BAL) - 19 (MODERATE)
- BUILDINGS TO COMPLY WITH AS 3959:2018 - BUSHFIRE ATTACK LEVEL (BAL) - 12.5 (LOW)
- 567.0 — DESIGN CONTOUR (@ INTERVAL 1m)
- INDICATIVE TREE LOCATIONS
- SUBSTATION
- INDICATIVE MULTI UNIT DRIVEWAY LOCATION



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DISCLAIMER

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AMENDMENTS	DESIGN	DRAWN	CHECK	APPROVED	DATE
FIRST ISSUE	MJ	EH			24/06/2022

AMENDMENT DETAILS

HDG

Authorised for Issue:
BY:
SIGN: DATE:

0 5 10 15 20 25 30 35 40
SCALE 1:500 (A1) SCALE 1:1000 (A3)

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SPACELAB CREATING TIMELESS PLACES

WHITLAM ESTATE - STAGE 3B

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BLOCK DETAILS PLAN - SHEET 4

SHEET 4 OF 4

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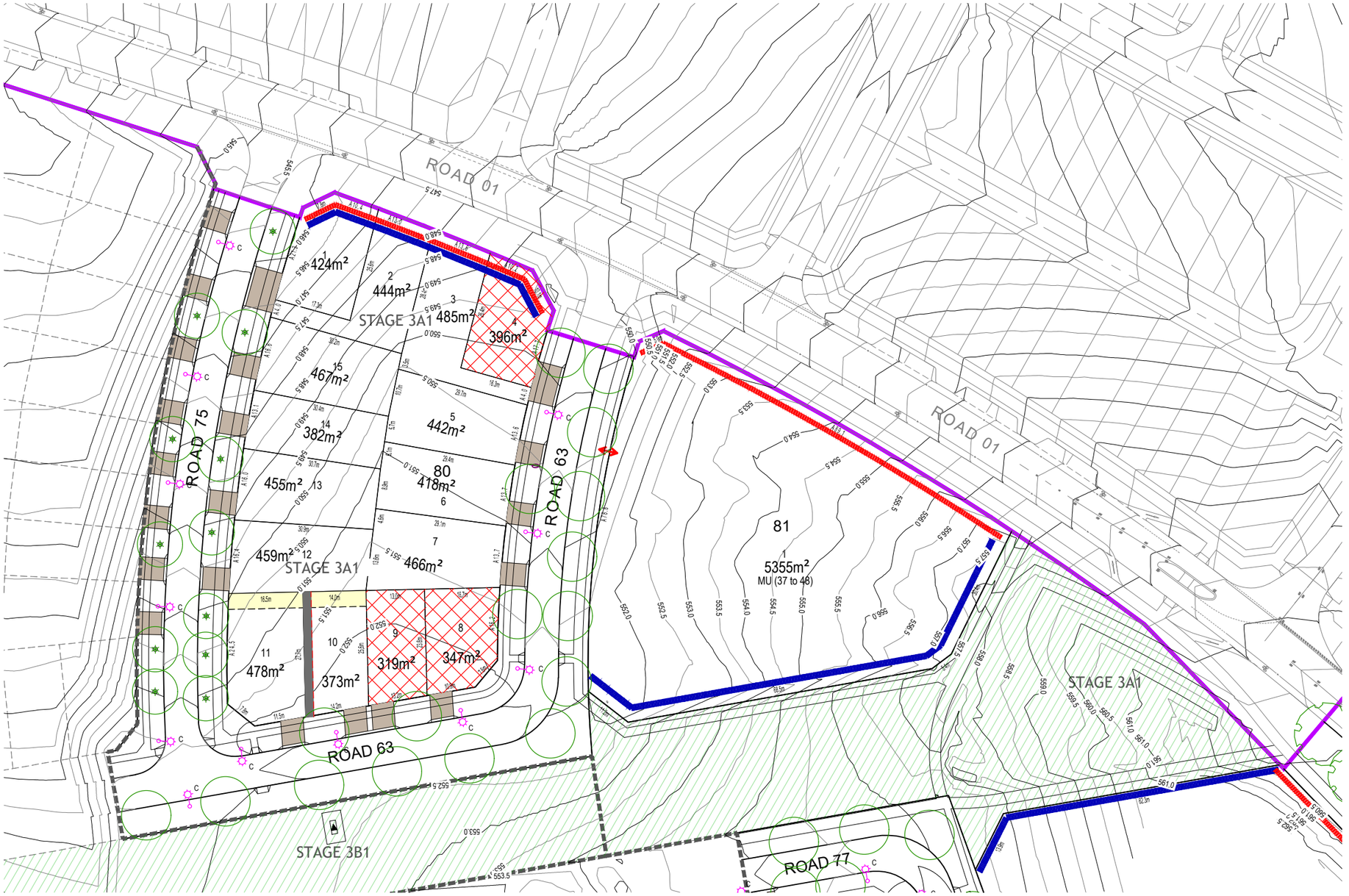
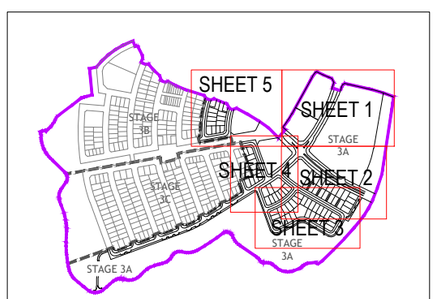
18-001248.3B 2004 ----



FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1004



KEY PLAN

LEGEND

- 1 — BLOCK IDENTIFIER
- 3 — SECTION IDENTIFIER
- 30.0m — BLOCK DIMENSIONS (m)
- 500m² — BLOCK AREA (m)
- * — MANDATORY HABITABLE ROOM ABOVE GARAGE (R62 OF ESTATE DEVELOPMENT CODE)
- * — FINISHED FLOOR LEVEL (FFL) OF ANY DWELLING ENTRANCE ACCESSIBLE FROM THE FRONT BOUNDARY MUST BE NO LOWER THAN THE FRONT BOUNDARY RL WHERE THE PATHWAY FROM THAT ENTRANCE CONNECTS TO THE FRONT BOUNDARY
- # — FACADES FACING JOHN GORTON DRIVE REQUIRE ACOUSTIC PROTECTION MEASURES TO ADDRESS EXTERNAL ROAD NOISE.
  - REFER TO WHITLAM STAGE 3 - OVERARCHING NOISE MANAGEMENT PLAN FOR NOISE AFFECTED BLOCKS BY WSP (NOVEMBER 2020)
- MANDATORY ERO SETBACK (NOMINATED AS SIDE BOUNDARY 2 FOR THE PURPOSE OF R15 OF SINGLE DWELLING HOUSING DEVELOPMENT CODE)
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- (M) — MID SI ED BLOCK CONTROLS (500m²- 550m) APPLY TO THESE BLOCKS (FOR THE PURPOSE OF R21 OF THE SINGLE HOUSING DEVELOPMENT CODE)
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- BUS STOP PAD
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- 3m SETBACK TO R 1 BLOCKS
- AP
- ESTATE BOUNDARY
- STAGE BOUNDARY
- OPEN SPACE
- BUILDINGS TO COMPLY WITH AS 3959:2018 - BUSHFIRE ATTACK LEVEL (BAL) - 12.5 (LOW)
- 567.0 — DESIGN CONTOUR (@ INTERVAL 1m)
- INDICATIVE TREE LOCATIONS
- SUBSTATION
- INDICATIVE MULTI UNIT DRIVEWAY LOCATION

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		DESIGN	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
FIRST ISSUE		AM	EH			19/11/2021	
AMENDMENTS							
	A	MJ	EH			21/02/2022	SECTION CI UPDATED
	B	MJ	EH			10/06/2022	BLOCK & SECTION NO. UPDATED
	C	MJ	EH			20/06/2022	BLOCK AND SECTION NO. UPDATED FOR LEGEND

DETAIL DESIGN

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0 5 10 15 20 25 30 35 40
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SPACELAB CREATING TIMELESS PLACES

WHITLAM ESTATE - STAGE 3A

DISCLAIMER
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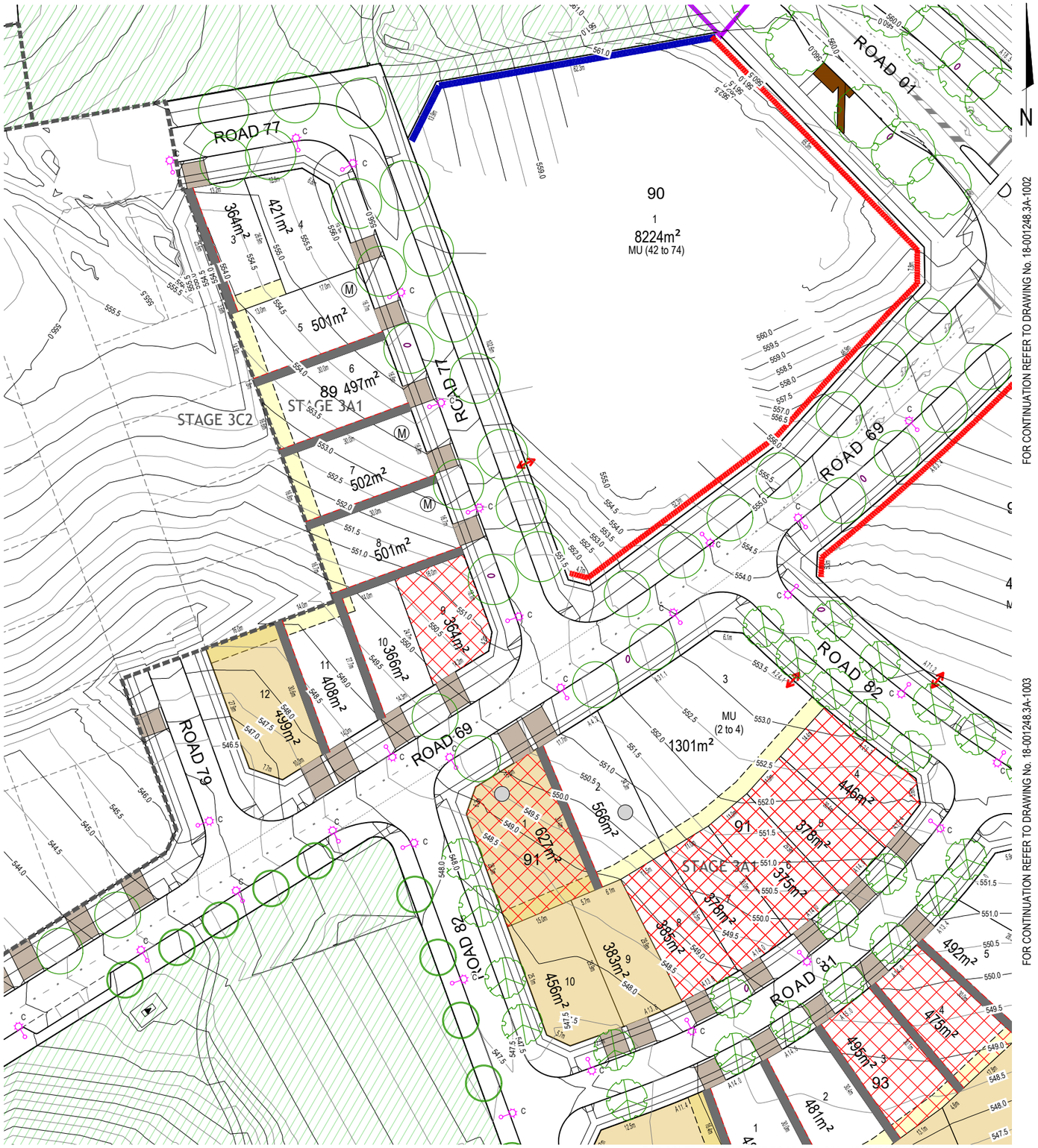
BLOCK DETAILS PLAN - SHEET 5

SHEET 5 OF 5 **Page 21**

18-001248.3A 2005 . C

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1005



FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1002

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1003

LEGEND

- 1 — BLOCK IDENTIFIER
- 3 — SECTION IDENTIFIER
- 30.0m — BLOCK DIMENSIONS (m)
- 500m² — BLOCK AREA (m)
- * — MANDATORY HABITABLE ROOM ABOVE GARAGE (R62 OF ESTATE DEVELOPMENT CODE)
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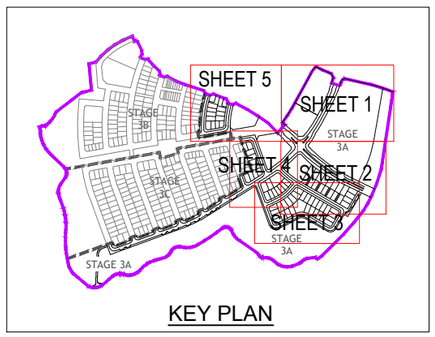

KEY PLAN

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FIRST ISSUE		AM	EH			19/11/2021	
AMENDMENTS							
	A	MJ	EH			10/06/2022	BLOCK & SECTION NO. UPDATED
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DETAIL DESIGN

Authorised for Issue:
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SIGN: DATE:

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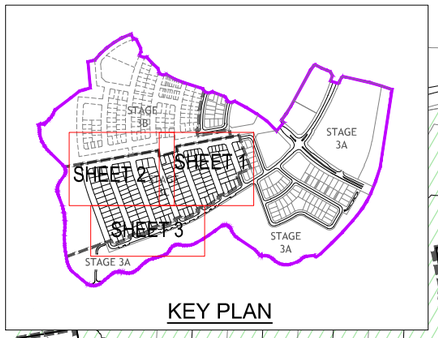
WHITLAM ESTATE - STAGE 3A

BLOCK DETAILS PLAN - SHEET 4

SHEET 4 OF 5 Page 22

18-001248.3A 2004 . B



KEY PLAN

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3C-2002

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3C-2003

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- DRIVEWAY LOCATION
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- UTILITY MAINTENANCE ACCESS PASSAGE 1.8m WIDE
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- WM — WATER METER TO BE INSTALLED WITHIN COURTYARD WALL TO MEET ICON WATER REQUIREMENTS. REFER DRAWING 18-001248.3C-2004 FOR DETAILS
- ACOUSTIC CONTOUR - L15, HOUR 60DBA FOR DAYTIME
- NO VEHICLE ACCESS TO THIS SECTION OF BOUNDARY
- 3m SETBACK TO RZ1 BLOCKS
- APZ
- ESTATE BOUNDARY
- STAGE BOUNDARY
- OPEN SPACE
- BUILDINGS TO COMPLY WITH AS 3959:2018 - BUSHFIRE ATTACK LEVEL (BAL) - 12.5 (LOW)
- 567.0 — DESIGN CONTOUR (@ INTERVAL 1m)
- INDICATIVE TREE LOCATIONS
- SUBSTATION
- INDICATIVE MULTI UNIT DRIVEWAY LOCATION

NOTES

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2. CONTOUR INTERVAL IS 1m. CONTOURS REPRESENTS PRELIMINARY DESIGN CONTOURS AND MAY BE SUBJECT TO CHANGE, LEVELS SHOULD BE VERIFIED BY LESSEES
3. PLAN SUBJECT TO SURVEY- FINAL DIMENSIONS, AREAS & BLOCK NUMBERS TO BE OBTAINED FROM DEPOSITED PLANS.
4. REFER TO HOUSING DEVELOPMENT GUIDELINES FOR DETAILS OF;
   - MAXIMUM RETAINING WALL HEIGHT ALONG STREET FRONTAGES AND ADJACENT TO PUBLIC OPEN SPACES
   - CHANGES IN LEVELS ARE INCORPORATED WITHIN THE TO BE 1m FROM THE FOOTPATH LEVEL DESIGN OF THE BUILDING TO ENSURE THE MAXIMUM
   - TERRITORY PLAN 1.5m CUT AND FILL AS PER THE THE CHANGES IN THE LEVELS ARE BEING MITIGATED REQUIREMENTS AS WELL AS TO SIT WITH THE THROUGH TERRACED LANDSCAPED AREAS OF NATURAL TOPOGRAPHY MAXIMUM 1m IN HEIGHT

		DESIGN	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
FIRST ISSUE		AM	EH			19/11/2021	
AMENDMENTS	A	MJ	EH			22/02/2022	SECTION CO AND CN UPDATED
	B	MJ	EH			15/03/2022	STREET LIGHTS ADDED
	C	MJ	EH			10/06/2022	BLOCK & SECTION NO. UPDATED
	D	MJ	EH			20/06/2022	BLOCK AND SECTION NO. UPDATED FOR LEGEND
	E	MJ	EH			12/07/2022	COURTYARD WALL OFFSET ADDED FOR BLOCK 2 & 3, SECTION 86
	F	MJ	EH	YL	YL	23/11/2022	CONTOURS OUTPUT FIXED

HDG

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BY:

SIGN: DATE:

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SPACELAB CREATING TIMELESS PLACES

WHITLAM ESTATE - STAGE 3C

DISCLAIMER
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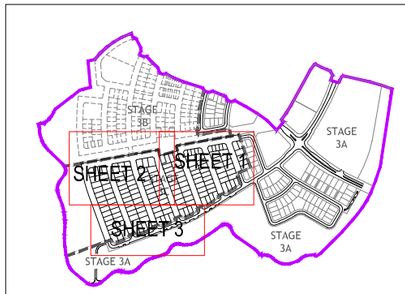
BLOCK DETAILS PLAN - SHEET 1

SHEET 1 OF 4

Page 23

18-001248.3C 2001 . F



KEY PLAN

NOTES

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FOR CONTINUATION REFER TO DRAWING No. 18-001248.3C-2003

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3C-2001

LEGEND

1	BLOCK IDENTIFIER
3	SECTION IDENTIFIER
30.0m	BLOCK DIMENSIONS (m)
500m²	BLOCK AREA (m²)
*	MANDATORY HABITABLE ROOM ABOVE GARAGE (R62 OF ESTATE DEVELOPMENT CODE)
*	FINISHED FLOOR LEVEL (FFL) OF ANY DWELLING ENTRANCE ACCESSIBLE FROM THE FRONT BOUNDARY MUST BE NO LOWER THAN THE FRONT BOUNDARY RL WHERE THE PATHWAY FROM THAT ENTRANCE CONNECTS TO THE FRONT BOUNDARY
#	FACADES FACING JOHN GORTON DRIVE REQUIRE ACOUSTIC PROTECTION MEASURES TO ADDRESS EXTERNAL ROAD NOISE. • REFER TO WHITLAM STAGE 3 - OVERARCHING NOISE MANAGEMENT PLAN FOR 'NOISE AFFECTED' BLOCKS BY WSP (NOVEMBER 2020)
◀	MANDATORY ZERO SETBACK (NOMINATED AS SIDE BOUNDARY 2 FOR THE PURPOSE OF R15 OF SINGLE DWELLING HOUSING DEVELOPMENT CODE)
3.0	MINIMUM BUILDING HEIGHT (IN METRES) ALONG THE PRIMARY BLOCK FRONTAGES FOR ACOUSTIC PROTECTION.
M	MID SIZED BLOCK CONTROLS (500m²-<550m²) APPLY TO THESE BLOCKS (FOR THE PURPOSE OF R21 OF THE SINGLE HOUSING DEVELOPMENT CODE)
Z	BLOCKS OVER 550m² - SIDE SETBACK REQUIREMENTS FOR LOWER FLOOR LEVEL IN THE TABLE 5 AND TABLE 6B UNDER SINGLE DWELLING HOUSING DEVELOPMENT DO NOT APPLY. SETBACKS REQUIRED ARE: • A MINIMUM 3.0m FROM SIDE BOUNDARY 1; • A MINIMUM 1.5m FROM SIDE BOUNDARY 2; AND • A GARAGE MUST BE SETBACK A MINIMUM OF 1.5m FROM SIDE BOUNDARY 2, SO AS TO ALIGN WITH THE VERGE CROSSING LOCATION
	BUS STOP PAD
	DRIVEWAY LOCATION
c	STREET LIGHT
	UTILITY MAINTENANCE ACCESS PASSAGE 1.8m WIDE
	STORMWATER AND SEWER EASEMENT (3.5m WIDE UNLESS NOTED OTHERWISE)
	LIMITED DEVELOPMENT POTENTIAL BLOCK (R.49 OF ESTATE DEVELOPMENT CODE)
	FOOTPATH
	RETAINING WALL BUILT BY DEVELOPER
	MANDATORY COURTYARD WALL TO MAX HEIGHT OF 1.5m • CONSTRUCTED OF RENDERED BRICK, BLOCK OR STONEWORK IN COMBINATION WITH FEATURE PANELS, AND SETBACK 600mm FROM THE FRONT BOUNDARY TO INCORPORATE LANDSCAPING. REFER TO DRAWING PCP4, DETAIL-1, TYPE 1 & TYPE 2; • COURTYARD WALL ALONG SECONDARY FRONTAGE TO TERMINATE AT 5m FROM PRIMARY FRONTAGE.
WM	WATER METER TO BE INSTALLED WITHIN COURTYARD WALL TO MEET ICON WATER REQUIREMENTS. REFER DRAWING 18-001248.3C-2004 FOR DETAILS
	ACOUSTIC CONTOUR - L15, HOUR 60DBA FOR DAYTIME
	NO VEHICLE ACCESS TO THIS SECTION OF BOUNDARY
	3m SETBACK TO RZ1 BLOCKS
	APZ
	ESTATE BOUNDARY
	STAGE BOUNDARY
	OPEN SPACE
	BUILDINGS TO COMPLY WITH AS 3959:2018 - BUSHFIRE ATTACK LEVEL (BAL) - 12.5 (LOW)
567.0	DESIGN CONTOUR (@ INTERVAL 1m)
	INDICATIVE TREE LOCATIONS
	SUBSTATION
	INDICATIVE MULTI UNIT DRIVEWAY LOCATION

DISCLAIMER

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		DESIGN	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
FIRST ISSUE		AM	EH			19/11/2021	
AMENDMENTS	B	MJ	EH			08/03/2022	SECTION CS BLOCKS f AND g EASEMENT ACCESS REVISED
	C	MJ	EH			11/03/2022	SECTION CS BLOCK g EASEMENT ACCESS UPDATED
	D	MJ	EH			15/03/2022	STREET LIGHTS ADDED
	E	MJ	EH			10/06/2022	BLOCK & SECTION NO. UPDATED
	F	MJ	EH			20/06/2022	BLOCK AND SECTION NO. UPDATED FOR LEGEND
	G	MJ	EH			12/07/2022	COURTYARD WALL OFFSET ADDED FOR BLOCK 2 & 3, SECTION 86
	H	MJ	EH	JL	JL	23/11/2022	CONTOURS OUTPUT FIXED

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SPACELAB CREATING TIMELESS PLACES

WHITLAM ESTATE - STAGE 3C

DISCLAIMER
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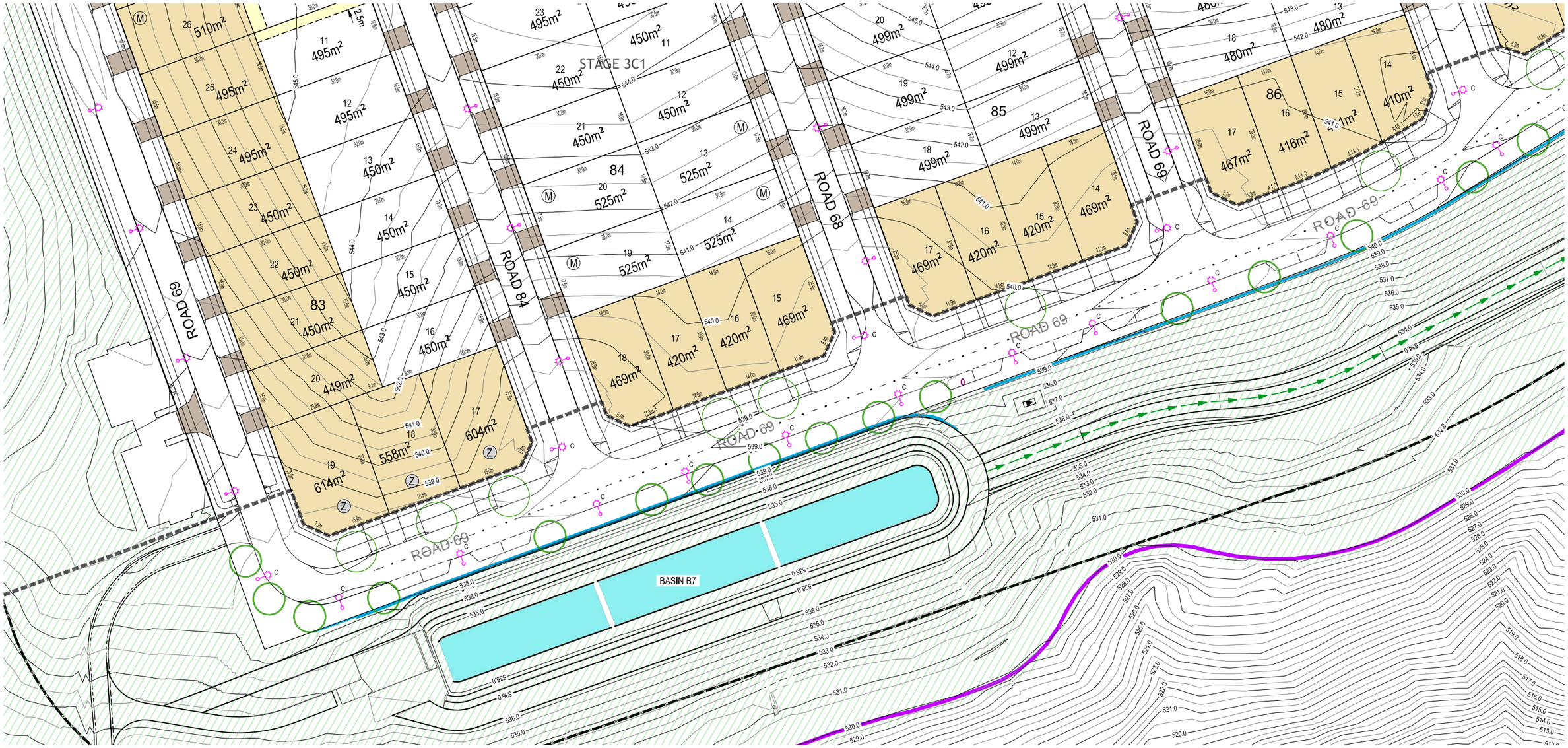
BLOCK DETAILS PLAN - SHEET 2

SHEET 2 OF 4 **Page 24**

18-001248.3C 2002 . H

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3C-2002

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3C-2001



LEGEND

- 1 — BLOCK IDENTIFIER
- 3 — SECTION IDENTIFIER
- 30.0m — BLOCK DIMENSIONS (m)
- 500m² — BLOCK AREA (m²)
- * — MANDATORY HABITABLE ROOM ABOVE GARAGE (R62 OF ESTATE DEVELOPMENT CODE)
- ✱ — FINISHED FLOOR LEVEL (FFL) OF ANY DWELLING ENTRANCE ACCESSIBLE FROM THE FRONT BOUNDARY MUST BE NO LOWER THAN THE FRONT BOUNDARY RL WHERE THE PATHWAY FROM THAT ENTRANCE CONNECTS TO THE FRONT BOUNDARY
- # — FACADES FACING JOHN GORTON DRIVE REQUIRE ACOUSTIC PROTECTION MEASURES TO ADDRESS EXTERNAL ROAD NOISE.
  - REFER TO WHITLAM STAGE 3 - OVERARCHING NOISE MANAGEMENT PLAN FOR 'NOISE AFFECTED' BLOCKS BY WSP (NOVEMBER 2020)
- ◀ — MANDATORY ZERO SETBACK (NOMINATED AS SIDE BOUNDARY 2 FOR THE PURPOSE OF R15 OF SINGLE DWELLING HOUSING DEVELOPMENT CODE)
- 3.0 — MINIMUM BUILDING HEIGHT (IN METRES) ALONG THE PRIMARY BLOCK FRONTAGES FOR ACOUSTIC PROTECTION.
- Ⓜ — MID SIZED BLOCK CONTROLS (500m²-<550m²) APPLY TO THESE BLOCKS (FOR THE PURPOSE OF R21 OF THE SINGLE HOUSING DEVELOPMENT CODE)
- Ⓩ — BLOCKS OVER 550m² - SIDE SETBACK REQUIREMENTS FOR LOWER FLOOR LEVEL IN THE TABLE 5 AND TABLE 6B UNDER SINGLE DWELLING HOUSING DEVELOPMENT DO NOT APPLY. SETBACKS REQUIRED ARE:
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- BUS STOP PAD
- DRIVEWAY LOCATION
- C — STREET LIGHT
- UTILITY MAINTENANCE ACCESS PASSAGE 1.8m WIDE
- STORMWATER AND SEWER EASEMENT (3.5m WIDE UNLESS NOTED OTHERWISE)
- LIMITED DEVELOPMENT POTENTIAL BLOCK (R.49 OF ESTATE DEVELOPMENT CODE)
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- RETAINING WALL BUILT BY DEVELOPER
- MANDATORY COURTYARD WALL TO MAX HEIGHT OF 1.5m
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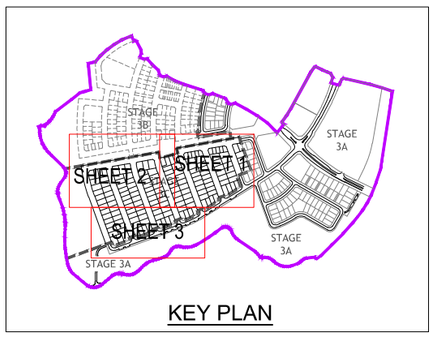
  - COURTYARD WALL ALONG SECONDARY FRONTAGE TO TERMINATE AT 5m FROM PRIMARY FRONTAGE.
- ACOUSTIC CONTOUR - L15, HOUR 60DBA FOR DAYTIME
- NO VEHICLE ACCESS TO THIS SECTION OF BOUNDARY
- 3m SETBACK TO RZ1 BLOCKS
- APZ
- ESTATE BOUNDARY
- STAGE BOUNDARY
- OPEN SPACE
- BUILDINGS TO COMPLY WITH AS 3959:2018 - BUSHFIRE ATTACK LEVEL (BAL) - 12.5 (LOW)
- 567.0 — DESIGN CONTOUR (@ INTERVAL 1m)
- INDICATIVE TREE LOCATIONS
- SUBSTATION
- INDICATIVE MULTI UNIT DRIVEWAY LOCATION



KEY PLAN

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		DESIGN	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
FIRST ISSUE		AM	EH			19/11/2021	
AMENDMENTS	A	MJ	EH			22/02/2022	BASIN B2 UPDATED
	B	MJ	EH			08/03/2022	SECTION CS BLOCKS f AND g EASEMENT ACCESS REVISED
	C	MJ	EH			11/03/2022	SECTION CS BLOCK g EASEMENT ACCESS UPDATED
	D	MJ	EH			15/03/2022	STREET LIGHTS ADDED
	E	MJ	EH			10/06/2022	BLOCK & SECTION NO. UPDATED
	F	MJ	EH			20/06/2022	BLOCK AND SECTION NO. UPDATED FOR LEGEND
	G	MJ	EH	JL	JL	23/11/2022	CONTOURS OUTPUT FIXED

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SPACELAB CREATING TIMELESS PLACES

WHITLAM ESTATE - STAGE 3C

DISCLAIMER
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BLOCK DETAILS PLAN - SHEET 3

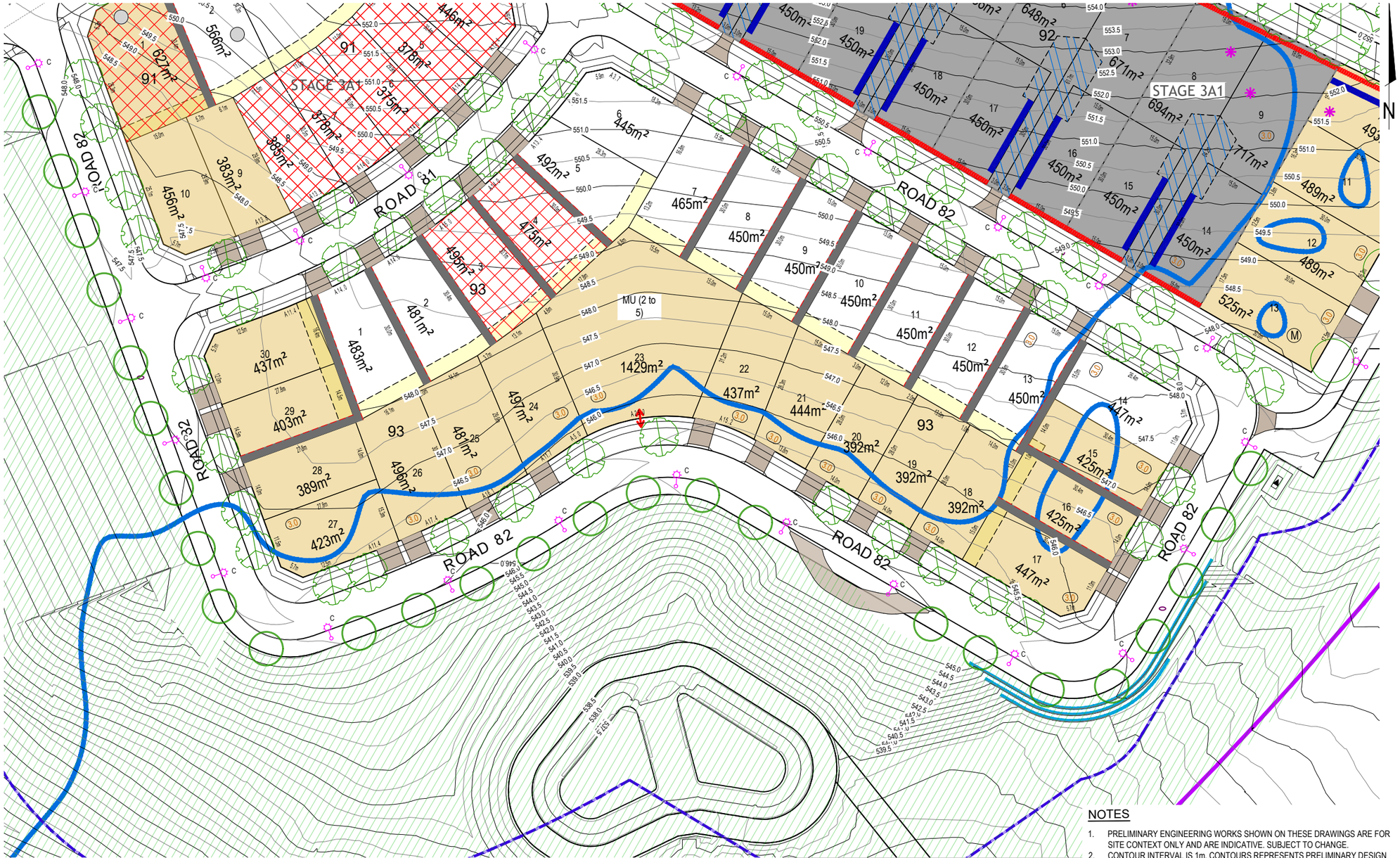
SHEET 3 OF 4

18-001248.3C 2003 . G

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1004

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1002

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1004



LEGEND

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- 30.0m — BLOCK DIMENSIONS (m)
- 500m² — BLOCK AREA (m)
- * — MANDATORY HABITABLE ROOM ABOVE GARAGE (R62 OF ESTATE DEVELOPMENT CODE)
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- STORMWATER AND SEWER EASEMENT (3.5m WIDE UNLESS NOTED OTHERWISE)
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- FOOTPATH
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- NO VEHICLE ACCESS TO THIS SECTION OF BOUNDARY
- 3m SETBACK TO R 1 BLOCKS
- AP
- ESTATE BOUNDARY
- STAGE BOUNDARY
- OPEN SPACE
- BUILDINGS TO COMPLY WITH AS 3959:2018 - BUSHFIRE ATTACK LEVEL (BAL) - 12.5 (LOW)
- INTEGRATED HOUSING DEVELOPMENT
- RIGHT OF ACCESS AND SERVICES EASEMENT
  - INTERNAL DRIVEWAY MUST BE OF A UNIFORM PERMEABLE DESIGN
- 567.0 — DESIGN CONTOUR (@ INTERVAL 1m)
- INDICATIVE TREE LOCATIONS
- SUBSTATION
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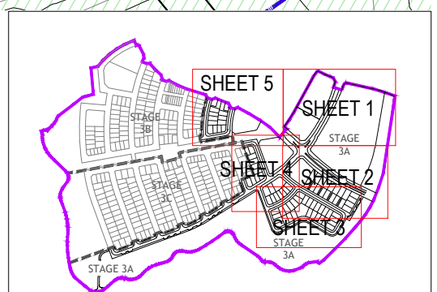

KEY PLAN

AMENDMENTS		DESIGN	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
FIRST ISSUE		AM	EH			19/11/2021	
	A	MJ	EH			21/02/2022	LEGEND AND CONTOURS UPDATED
	B	MJ	EH			22/02/2022	SPACELAB COMMENTS ADDRESSED
	C	MJ	EH			10/06/2022	BLOCK & SECTION NO. UPDATED
	D	MJ	EH			20/06/2022	BLOCK AND SECTION NO. UPDATED FOR LEGEND

DETAIL DESIGN

Authorised for Issue:

BY:

SIGN: DATE:

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SCALE 1:500 (A1) SCALE 1:1000 (A3)

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SPACELAB CREATING TIMELESS PLACES

WHITLAM ESTATE - STAGE 3A

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BLOCK DETAILS PLAN - SHEET 3

Page 26

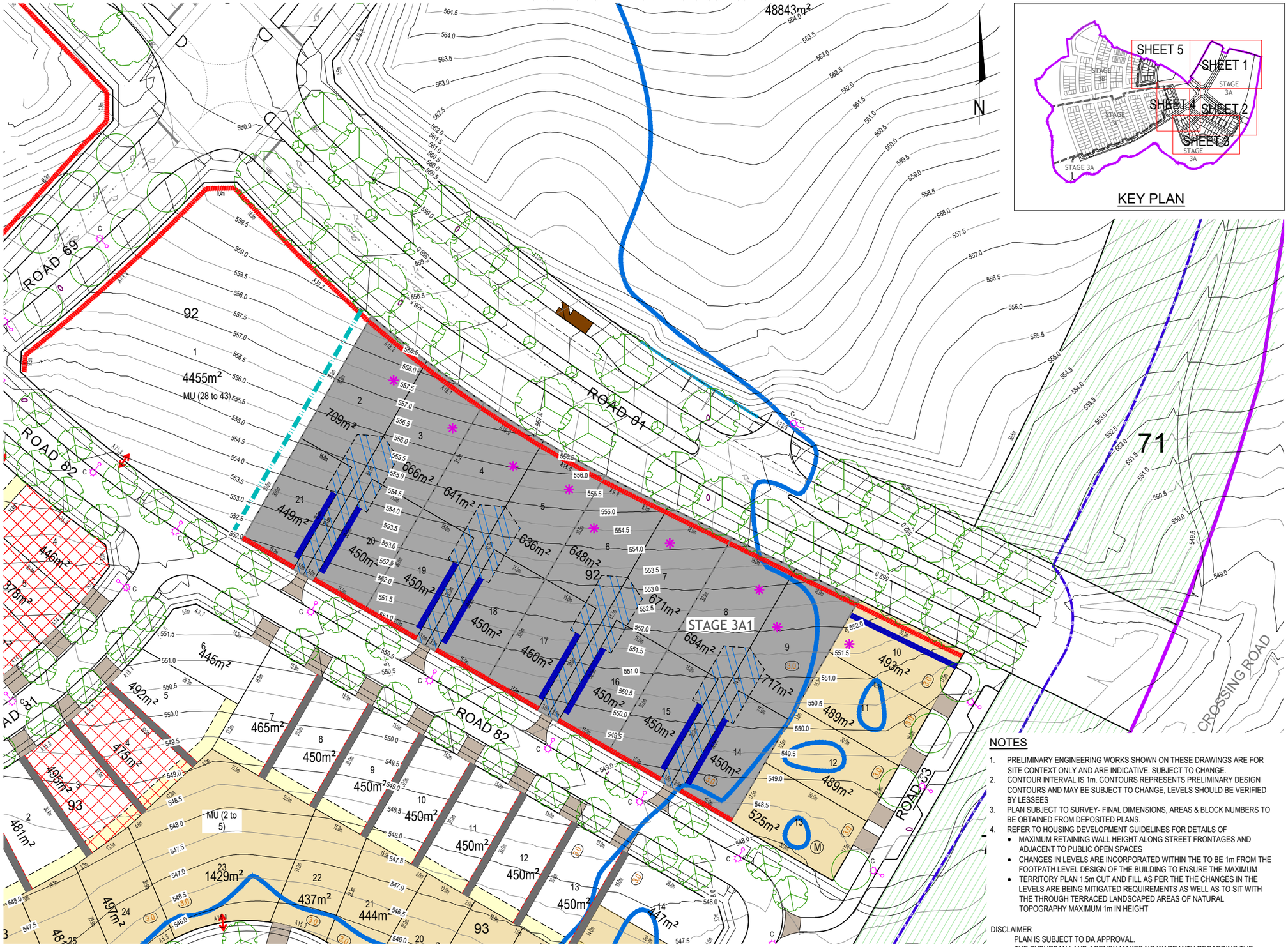
SHEET 3 OF 5

18-001248.3A 2003 . D

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1001

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1005

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1003



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- MANDATORY COURTYARD WALL TO MAX HEIGHT OF 1.5m
  - CONSTRUCTED OF RENDERED BRICK, BLOCK OR STONEWORK IN COMBINATION WITH FEATURE PANELS, AND SETBACK 600mm FROM THE FRONT BOUNDARY TO INCORPORATE LANDSCAPING. REFER TO DRAWING PCP4, DETAIL-1, TYPE 1 & TYPE 2
  - COURTYARD WALL ALONG SECONDARY FRONTAGE TO TERMINATE AT 5m FROM PRIMARY FRONTAGE.
- ACOUSTIC CONTOUR - L15, HOUR 60DBA FOR DAYTIME
- NO VEHICLE ACCESS TO THIS SECTION OF BOUNDARY
- 3m SETBACK TO R 1 BLOCKS
- AP
- ESTATE BOUNDARY
- STAGE BOUNDARY
- OPEN SPACE
- BUILDINGS TO COMPLY WITH AS 3959:2018 - BUSHFIRE ATTACK LEVEL (BAL) - 12.5 (LOW)
- INTEGRATED HOUSING DEVELOPMENT
- RIGHT OF ACCESS AND SERVICES EASEMENT
  - INTERNAL DRIVEWAY MUST BE OF A UNIFORM PERMEABLE DESIGN
- 567.0 — DESIGN CONTOUR (@ INTERVAL 1m)
- INDICATIVE TREE LOCATIONS
- SUBSTATION
- INDICATIVE MULTI UNIT DRIVEWAY LOCATION

NOTES

1. PRELIMINARY ENGINEERING WORKS SHOWN ON THESE DRAWINGS ARE FOR SITE CONTEXT ONLY AND ARE INDICATIVE. SUBJECT TO CHANGE.
2. CONTOUR INTERVAL IS 1m. CONTOURS REPRESENTS PRELIMINARY DESIGN CONTOURS AND MAY BE SUBJECT TO CHANGE, LEVELS SHOULD BE VERIFIED BY LESSEES
3. PLAN SUBJECT TO SURVEY- FINAL DIMENSIONS, AREAS & BLOCK NUMBERS TO BE OBTAINED FROM DEPOSITED PLANS.
4. REFER TO HOUSING DEVELOPMENT GUIDELINES FOR DETAILS OF
   - MAXIMUM RETAINING WALL HEIGHT ALONG STREET FRONTAGES AND ADJACENT TO PUBLIC OPEN SPACES
   - CHANGES IN LEVELS ARE INCORPORATED WITHIN THE TO BE 1m FROM THE FOOTPATH LEVEL DESIGN OF THE BUILDING TO ENSURE THE MAXIMUM
   - TERRITORY PLAN 1.5m CUT AND FILL AS PER THE THE CHANGES IN THE LEVELS ARE BEING MITIGATED REQUIREMENTS AS WELL AS TO SIT WITH THE THROUGH TERRACED LANDSCAPED AREAS OF NATURAL TOPOGRAPHY MAXIMUM 1m IN HEIGHT

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FIRST ISSUE		AM	EH			19/11/2021	
AMENDMENTS	A	MJ	EH			21/02/2022	LEGEND UPDATED
	B	MJ	EH			22/02/2022	SPACELAB COMMENTS ADDRESSED
	C	MJ	EH			10/06/2022	BLOCK & SECTION NO. UPDATED
	D	MJ	EH			20/06/2022	BLOC KAND SECTION NO. UPDATED FOR LEGEND

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SPACELAB CREATING TIMELESS PLACES

WHITLAM ESTATE - STAGE 3A

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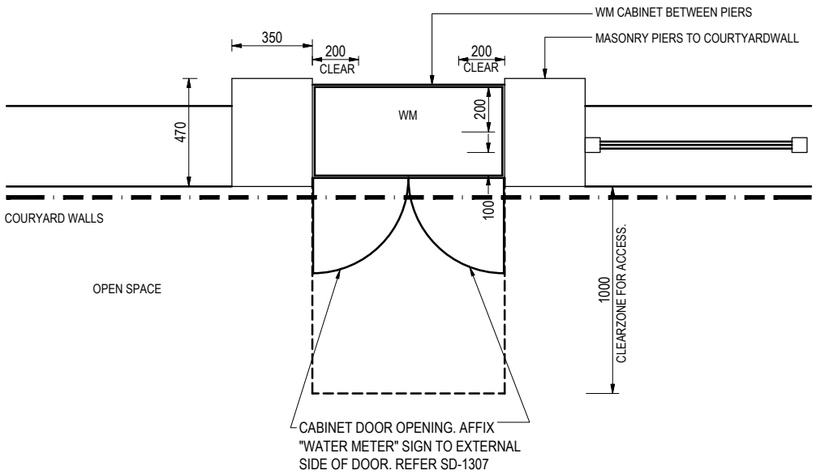
BLOCK DETAILS PLAN - SHEET 2

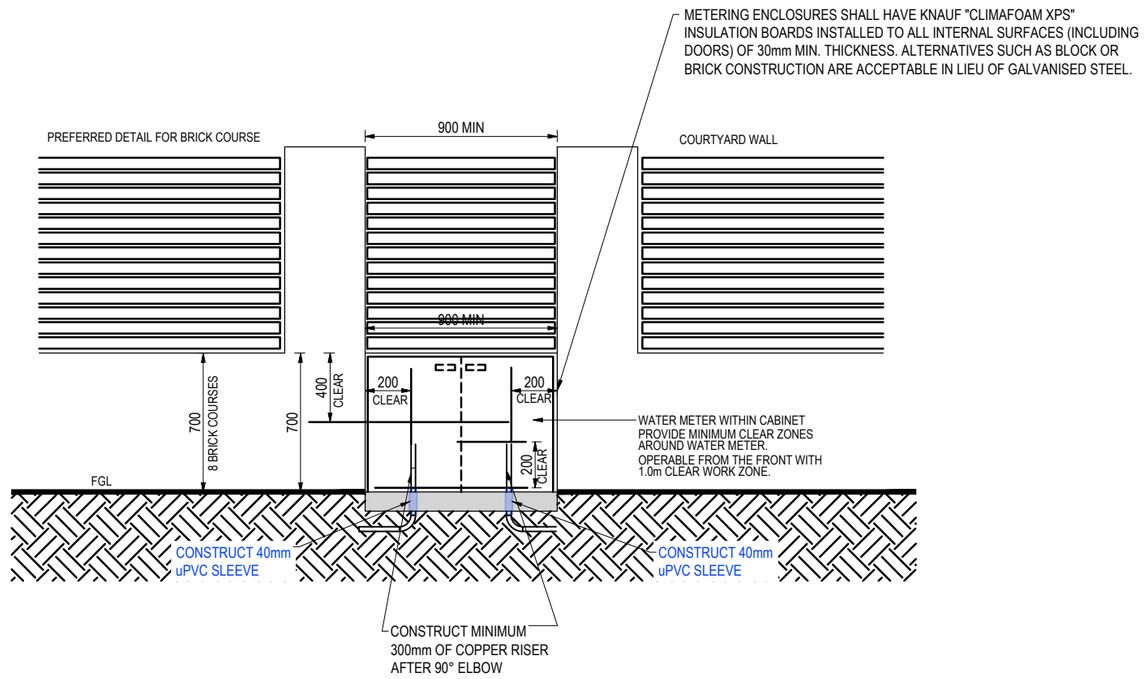
SHEET 2 OF 5 Page 27

18-001248.3A 2002 . D



PLAN - WATER METER WITHIN COURTYARD WALL CLEARANCES

N.T.S



SECTION - WATER METER WITHIN COURTYARD WALL CLEARANCES

N.T.S

FIRST ISSUE	DESIGN	DRAWN	CHECK	APPROVED	DATE
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SPACELAB CREATING TIMELESS PLACES

WHITLAM ESTATE - STAGE 3C

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BLOCK DETAILS - SHEET 4

SHEET 4 OF 4

Page 28

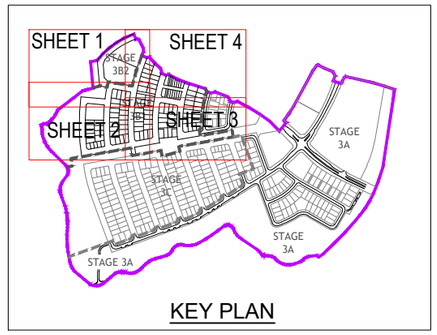
18-001248.3C 2004 .

Annexure D - Block Fill Plans

Below are the Block Fill Plans for Stage 3 – November 2024

Sections 73, 74, 75, 76, 77, 78, 79, 80, 83, 84, 85, 86, 87, 88, 89, 91, 92, 93

480 Northbourne Avenue, Dickson ACT 2602
GPO Box 158, Canberra ACT 2601
P 02 6205 0600 **F** 02 6207 5101
E suburbanland@act.gov.au
W suburbanland.act.gov.au
ABN 27 105 505 367



KEY PLAN

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3B-1001

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3B-1004

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3B-1003

LEGEND

1	BLOCK IDENTIFIER
3	SECTION IDENTIFIER
	AREA OF KNOWN FILL (DEPTH IN METRES)
567.0	DESIGN CONTOUR (@ INTERVAL 0.5m)
	STAGE BOUNDARY
	ESTATE BOUNDARY
×0.3	FILL DEPTHS (IN METRES)
↔	INDICATIVE MULTI UNIT DRIVEWAY LOCATION

WARNING

PLAN IS SUBJECT TO DA APPROVAL. THIS PLAN ONLY INDICATES AREAS OF FILL OF WHICH THE DEVELOPER AND THEIR AGENTS ARE AWARE. IT HAS NOT BEEN CHECKED BY THE TERRITORY, AND THE TERRITORY DOES NOT GUARANTEE ITS ACCURACY. IN NO WAY SHOULD THIS PLAN BE READ AS A CONCLUSIVE STATEMENT OF THE FULL EXTENT OF THE FILL THAT MAY BE FOUND ON THE WHOLE LAND DEPICTED. LESSEES AND PURCHASERS SHOULD MAKE THEIR OWN INQUIRIES IN REGARD TO THE EXACT DRAINAGE, GEOTECHNICAL AND FILL CONDITIONS AFFECTING THEIR BLOCKS.

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FILL ON BLOCKS PLAN - SHEET 2

SHEET 2 OF 4

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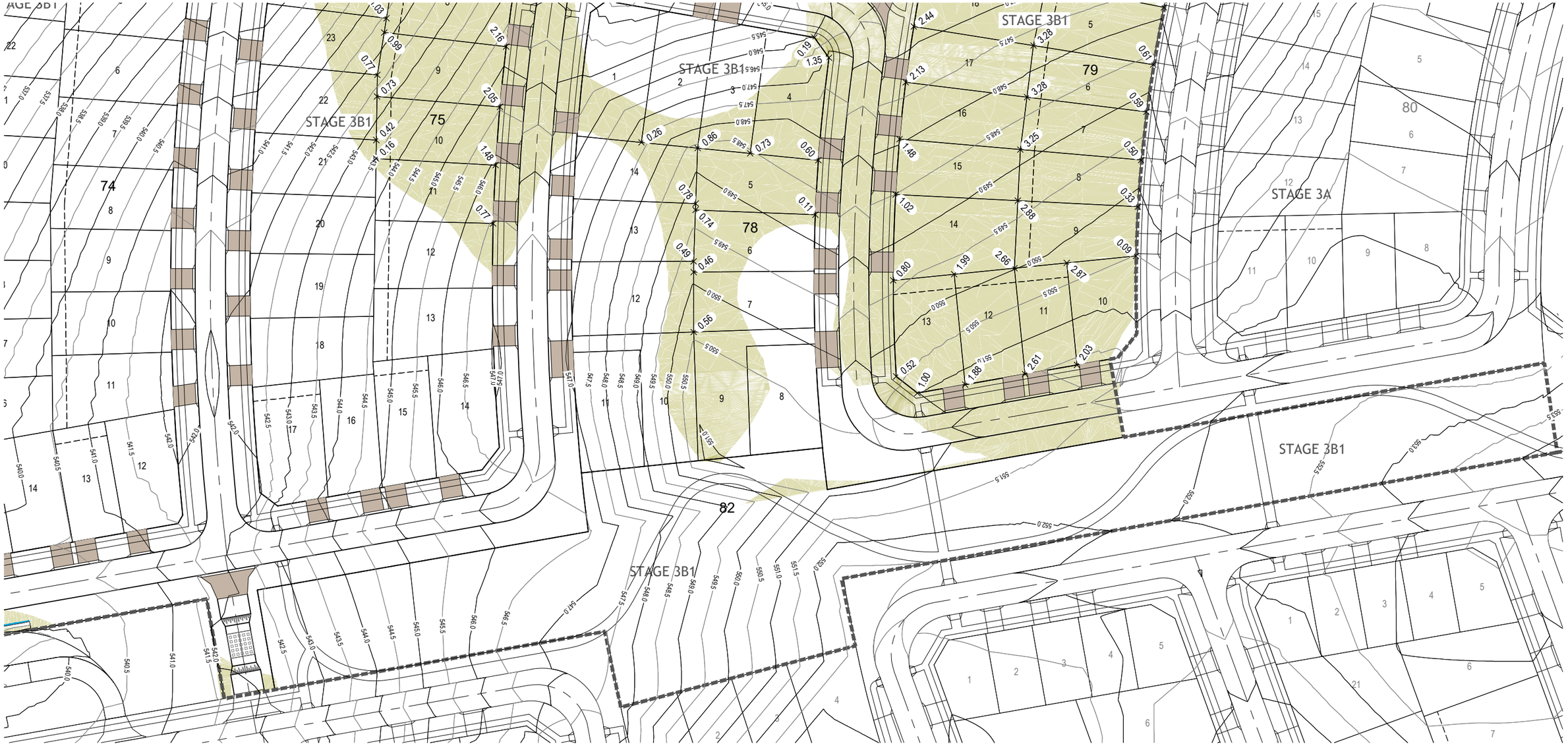
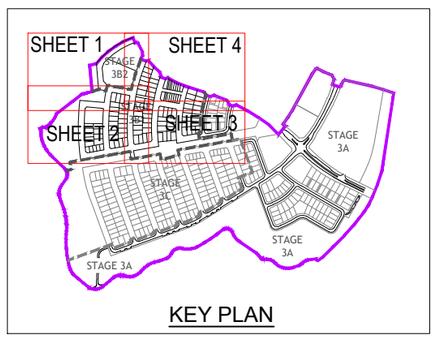
18-001248.3B 1002 ---

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3B-1004

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3B-1002





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LEGEND

1	BLOCK IDENTIFIER
3	SECTION IDENTIFIER
	AREA OF KNOWN FILL (DEPTH IN METRES)
567.0	DESIGN CONTOUR (@ INTERVAL 0.5m)
	STAGE BOUNDARY
	ESTATE BOUNDARY
×0.3	FILL DEPTHS (IN METRES)
	INDICATIVE MULTI UNIT DRIVEWAY LOCATION

AMENDMENTS	DESIGN	DRAWN	CHECK	APPROVED	DATE
FIRST ISSUE	MJ	EH			24/06/2022

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FILL ON BLOCKS PLAN - SHEET 3

SHEET 3 OF 4

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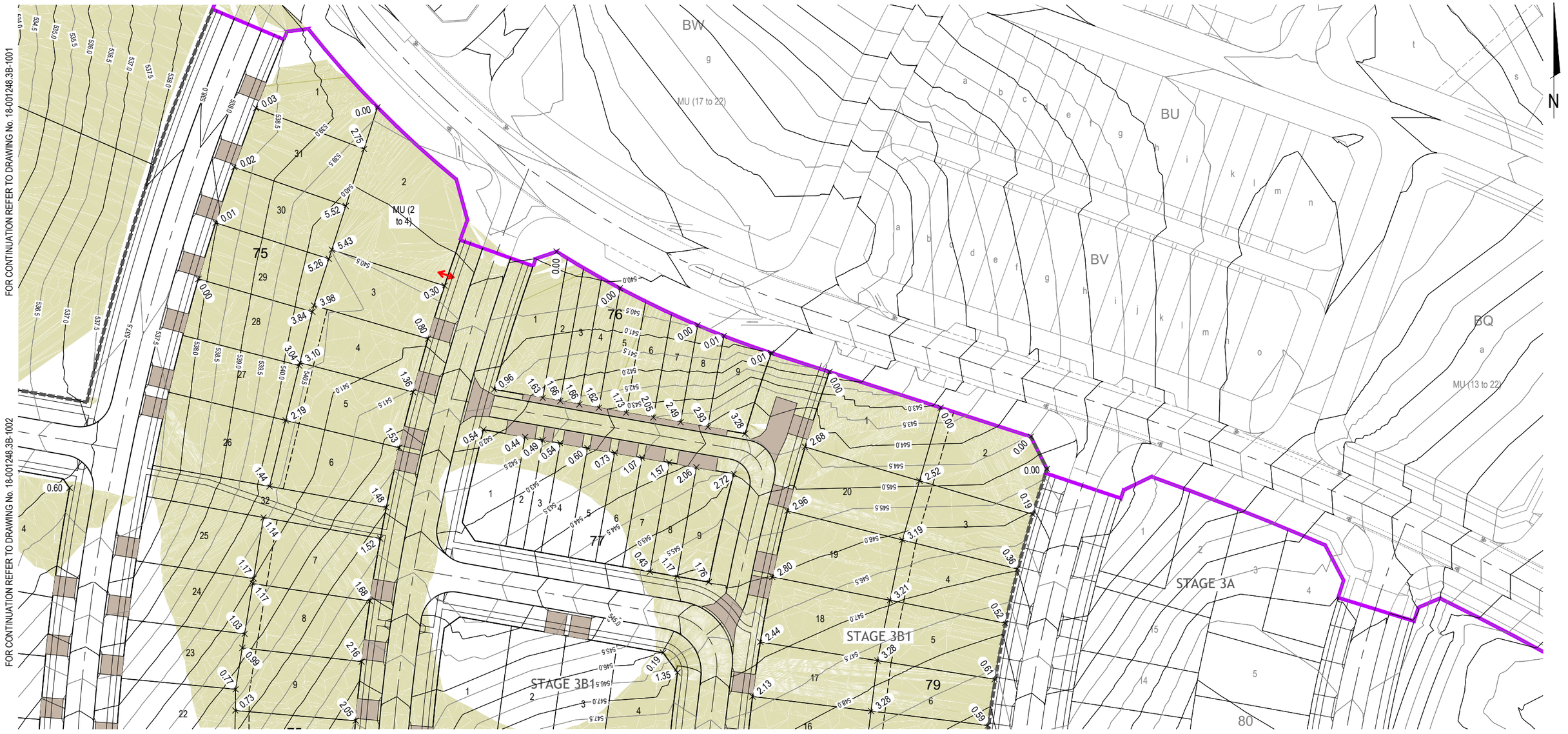
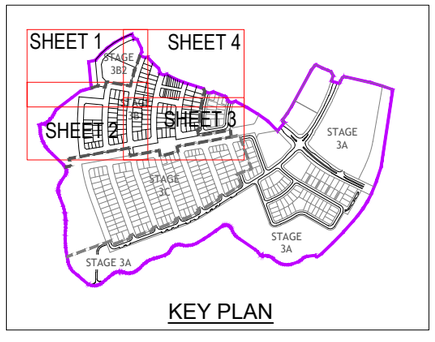
18-001248.3B 1003 ---

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3B-1001

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3B-1002

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3B-1003





KEY PLAN

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LEGEND

1	BLOCK IDENTIFIER
3	SECTION IDENTIFIER
	AREA OF KNOWN FILL (DEPTH IN METRES)
567.0	DESIGN CONTOUR (@ INTERVAL 0.5m)
	STAGE BOUNDARY
	ESTATE BOUNDARY
×0.3	FILL DEPTHS (IN METRES)
↔	INDICATIVE MULTI UNIT DRIVEWAY LOCATION

FIRST ISSUE	DESIGN	DRAWN	CHECK	APPROVED	DATE
	MJ	EH			24/06/2022

AMENDMENTS

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FILL ON BLOCKS PLAN - SHEET 4

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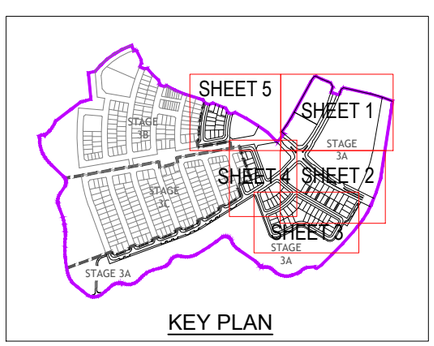
SHEET 4 OF 4

18-001248.3B 1004 ---



LEGEND

1	BLOCK IDENTIFIER
3	SECTION IDENTIFIER
	AREA OF KNOWN FILL (DEPTH IN METRES)
567.0	DESIGN CONTOUR (@ INTERVAL 0.5m)
	STAGE BOUNDARY
	ESTATE BOUNDARY
× 0.3	FILL DEPTHS (IN METRES)
	INDICATIVE MULTI UNIT DRIVEWAY LOCATION

WARNING

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FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1004

AMENDMENTS		DESIGN	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
FIRST ISSUE		AM	EH			19/11/2021	
	A	MJ	EH			10/06/2022	SECTION 80 GRADING UPDATED, BLOCK & SECTION NO. UPDATED
	B	MJ	EH			20/06/2022	BLOCK AND SECTION NO. UPDATED FOR LEGEND

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WHITLAM ESTATE - STAGE 3A

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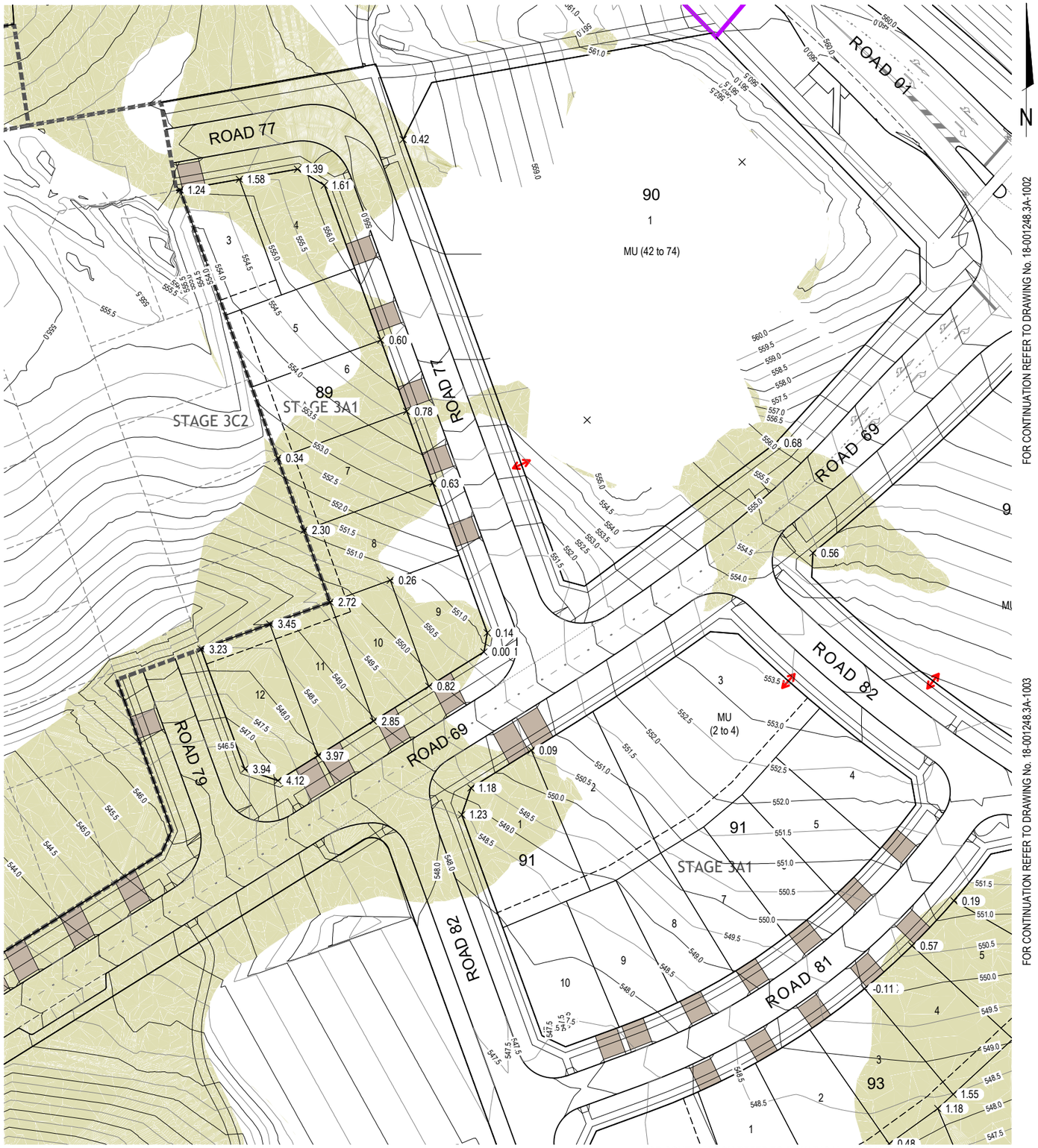
FILL ON BLOCKS PLAN - SHEET 5

SHEET 5 OF 5

Page 33

18-001248.3A 1005 . B

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1005



FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1002

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1003

LEGEND

1	BLOCK IDENTIFIER
3	SECTION IDENTIFIER
	AREA OF KNOWN FILL (DEPTH IN METRES)
567.0	DESIGN CONTOUR (@ INTERVAL 0.5m)
	STAGE BOUNDARY
	ESTATE BOUNDARY
×0.3	FILL DEPTHS (IN METRES)
↔	INDICATIVE MULTI UNIT DRIVEWAY LOCATION

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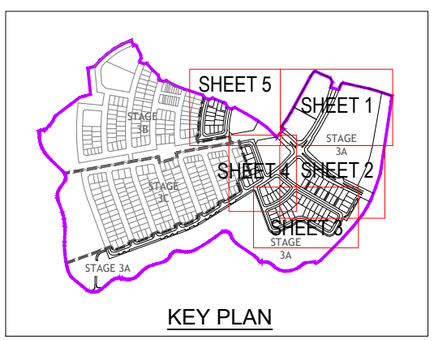

KEY PLAN

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AMENDMENTS		DESIGN	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
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	A	MJ	EH			10/06/2022	BLOCK & SECTION NO. UPDATED
	B	MJ	EH			20/06/2022	BLOCK AND SECTION NO. UPDATED FOR LEGEND

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SPACELAB CREATING TIMELESS PLACES

WHITLAM ESTATE - STAGE 3A

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FILL ON BLOCKS PLAN - SHEET 4

SHEET 4 OF 5 **Page 34**

18-001248.3A 1004 . B

LEGEND

1	BLOCK IDENTIFIER
3	SECTION IDENTIFIER
	AREA OF KNOWN FILL (DEPTH IN METRES)
567.0	DESIGN CONTOUR (@ INTERVAL 0.5m)
	STAGE BOUNDARY
	ESTATE BOUNDARY
×0.3	FILL DEPTHS (IN METRES)
↔	INDICATIVE MULTI UNIT DRIVEWAY LOCATION

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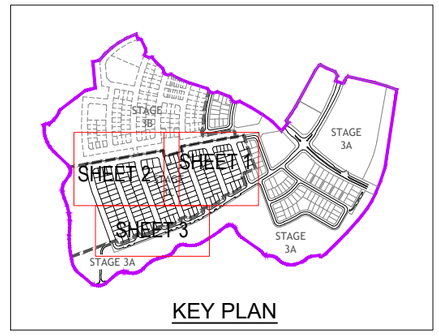

KEY PLAN

FIRST ISSUE	DESIGN	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
	AM	EH			19/11/2021	
A	MJ	EH			08/03/2022	SECTION CO AND CN UPDATED
B	MJ	EH			10/06/2022	BLOCK & SECTION NO. UPDATED
C	MJ	EH			20/06/2022	BLOCK AND SECTION NO. UPDATED FOR LEGEND

DETAIL DESIGN

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SPACELAB CREATING TIMELESS PLACES

WHITLAM ESTATE - STAGE 3C

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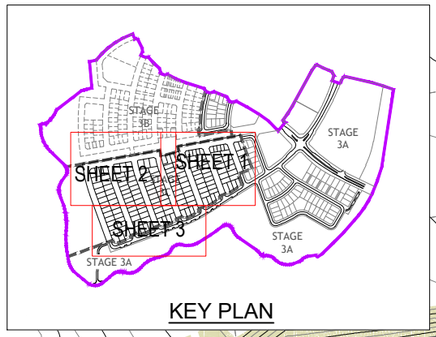
FILL ON BLOCKS PLAN - SHEET 1

Page 35

SHEET 1 OF 3

18-001248.3C 1001 . C



KEY PLAN

STAGE 3B1

STAGE 3B1

ROAD 69

ROAD 69

ROAD 69

ROAD 84

ROAD 68

ROAD 69

STAGE 3C1

STAGE 3C1

STAGE 3C1

LEGEND

1	BLOCK IDENTIFIER
3	SECTION IDENTIFIER
	AREA OF KNOWN FILL (DEPTH IN METRES)
567.0	DESIGN CONTOUR (@ INTERVAL 0.5m)
	STAGE BOUNDARY
	ESTATE BOUNDARY
× 0.3	FILL DEPTHS (IN METRES)
↔	INDICATIVE MULTI UNIT DRIVEWAY LOCATION

N

WARNING

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FOR CONTINUATION REFER TO DRAWING No. 18-001248.3C-1003

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3C-1001

	DESIGN	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
FIRST ISSUE	AM	EH			19/11/2021	
A	MJ	EH			08/03/2022	CONTOURS UPDATED
B	MJ	EH			10/06/2022	BLOCK & SECTION NO. UPDATED
C	MJ	EH			20/06/2022	BLOCK AND SECTION NO. UPDATED FOR LEGEND

DETAIL DESIGN

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WHITLAM ESTATE - STAGE 3C

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FILL ON BLOCKS PLAN - SHEET 2

SHEET 2 OF 3

Page 36

18-001248.3C 1002 . C

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3C-1002

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3C-1001

STAGE 3C1

ROAD 68

ROAD 69

ROAD 84

ROAD 69

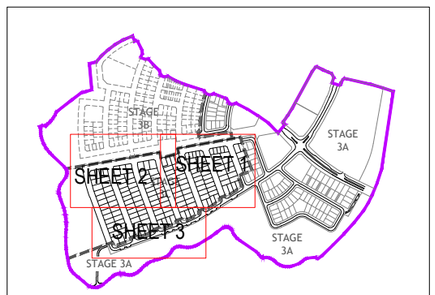
ROAD 69

ROAD 69

N

LEGEND

1	BLOCK IDENTIFIER
3	SECTION IDENTIFIER
	AREA OF KNOWN FILL (DEPTH IN METRES)
567.0	DESIGN CONTOUR (@ INTERVAL 0.5m)
	STAGE BOUNDARY
	ESTATE BOUNDARY
×0.3	FILL DEPTHS (IN METRES)
	INDICATIVE MULTI UNIT DRIVEWAY LOCATION



KEY PLAN

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		DESIGN	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
FIRST ISSUE		AM	EH			19/11/2021	
AMENDMENTS	A	MJ	EH			08/03/2022	CONTOURS UPDATED
	B	MJ	EH			10/06/2022	BLOCK & SECTION NO. UPDATED
	C	MJ	EH			20/06/2022	BLOCK AND SECTION NO. UPDATED FOR LEGEND

DETAIL DESIGN

Authorised for Issue:

BY:

SIGN: DATE:

0 5 10 15 20 25 30 35 40

SCALE 1:500 (A1) SCALE 1:1000 (A3)

WAE No. .

ACT Government | Suburban Land Agency

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SPACELAB CREATING TIMELESS PLACES

WHITLAM ESTATE - STAGE 3C

DISCLAIMER
ALL DIMENSIONS TO BE CHECKED ON SITE BY CONTRACTOR PRIOR TO CONSTRUCTION. USE WRITTEN DIMENSIONS ONLY, DO NOT SCALE. NOT FOR CONSTRUCTION UNLESS STAMPED BY CERTIFYING AUTHORITY

FILL ON BLOCKS PLAN - SHEET 3

SHEET 3 OF 3

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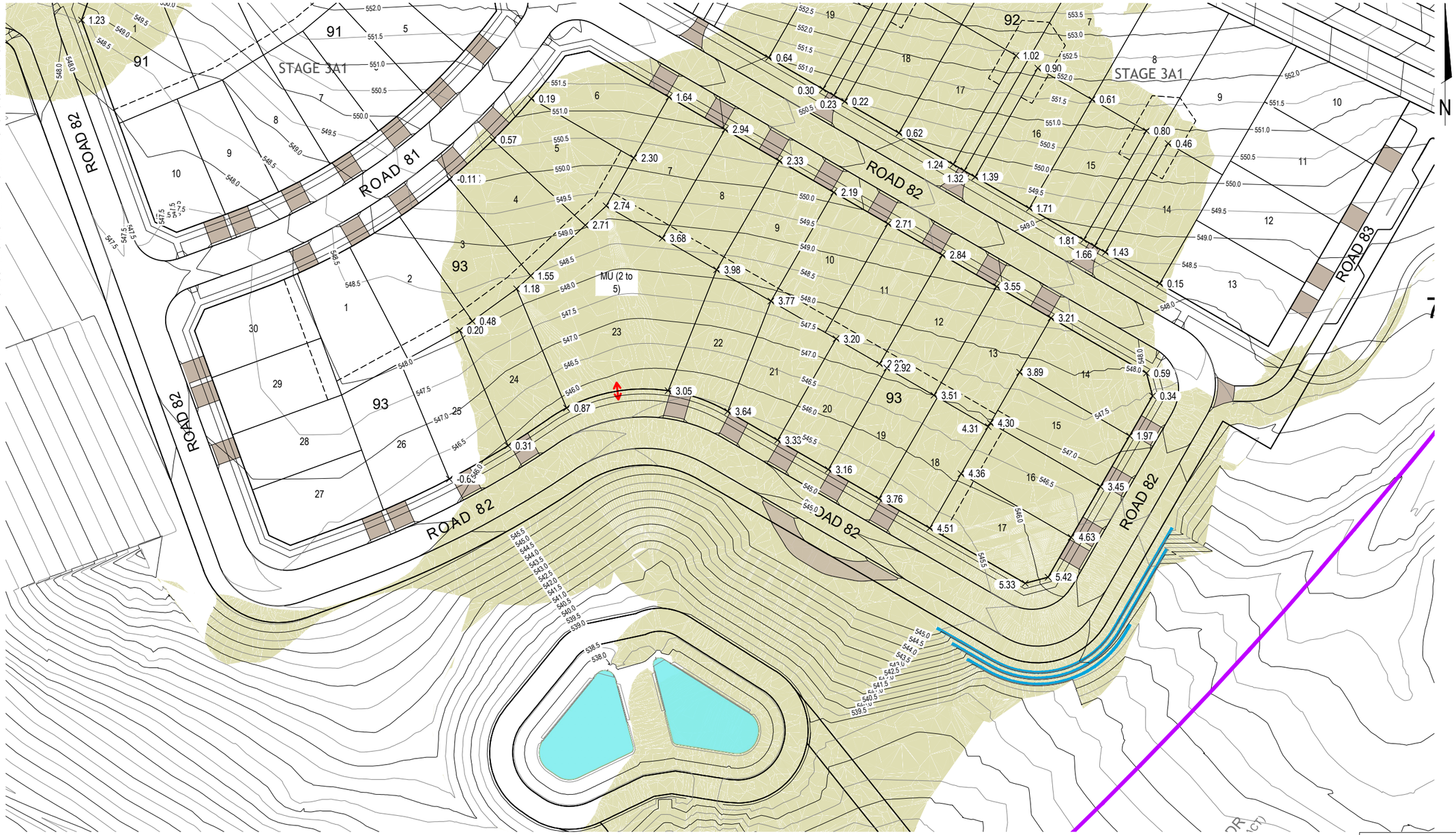
18-001248.3C 1003 . C

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1004

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1002

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1004

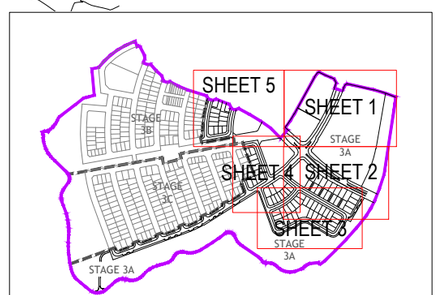


LEGEND

1	BLOCK IDENTIFIER
3	SECTION IDENTIFIER
	AREA OF KNOWN FILL (DEPTH IN METRES)
567.0	DESIGN CONTOUR (@ INTERVAL 0.5m)
	STAGE BOUNDARY
	ESTATE BOUNDARY
×0.3	FILL DEPTHS (IN METRES)
↔	INDICATIVE MULTI UNIT DRIVEWAY LOCATION

WARNING

PLAN IS SUBJECT TO DA APPROVAL. THIS PLAN ONLY INDICATES AREAS OF FILL OF WHICH THE DEVELOPER AND THEIR AGENTS ARE AWARE. IT HAS NOT BEEN CHECKED BY THE TERRITORY, AND THE TERRITORY DOES NOT GUARANTEE ITS ACCURACY. IN NO WAY SHOULD THIS PLAN BE READ AS A CONCLUSIVE STATEMENT OF THE FULL EXTENT OF THE FILL THAT MAY BE FOUND ON THE WHOLE LAND DEPICTED. LESSEES AND PURCHASERS SHOULD MAKE THEIR OWN INQUIRIES IN REGARD TO THE EXACT DRAINAGE, GEOTECHNICAL AND FILL CONDITIONS AFFECTING THEIR BLOCKS.



KEY PLAN

AMENDMENTS		DESIGN	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
FIRST ISSUE		AM	EH			19/11/2021	
	A	MJ	EH			10/06/2022	BLOCK & SECTION NO. UPDATED
	B	MJ	EH			20/06/2022	BLOCK AND SECTION NO. UPDATED FOR LEGEND

DETAIL DESIGN

Authorised for Issue:

BY:

SIGN: DATE:

0 5 10 15 20 25 30 35 40

SCALE 1:500 (A1) SCALE 1:1000 (A3)

WAE No. .

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SPACELAB CREATING TIMELESS PLACES

WHITLAM ESTATE - STAGE 3A

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FILL ON BLOCKS PLAN - SHEET 3

SHEET 3 OF 5

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18-001248.3A 1003 . B

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1001

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1005

FOR CONTINUATION REFER TO DRAWING No. 18-001248.3A-1003

ROAD 69
ROAD 81
ROAD 82
ROAD 83
ROAD 01
STAGE 3A1
COPPINS CROSSING ROAD
MU (28 to 32)
MU (2 to 5)
92
93
71

LEGEND

- 1 — BLOCK IDENTIFIER
- 3 — SECTION IDENTIFIER
- AREA OF KNOWN FILL (DEPTH IN METRES)
- 567.0 — DESIGN CONTOUR (@ INTERVAL 0.5m)
- STAGE BOUNDARY
- ESTATE BOUNDARY
- ×0.3 — FILL DEPTHS (IN METRES)
- INDICATIVE MULTI UNIT DRIVEWAY LOCATION

N

WARNING

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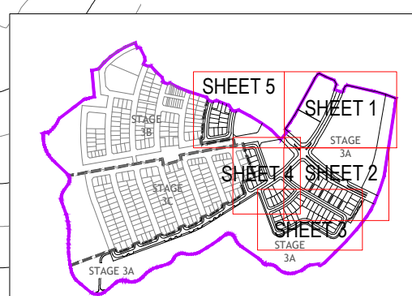

KEY PLAN

AMENDMENTS	DESIGN	DRAWN	CHECK	APPROVED	DATE	AMENDMENT DETAILS
FIRST ISSUE	AM	EH			19/11/2021	
A	MJ	EH			10/06/2022	BLOCK & SECTION NO. UPDATED
B	MJ	EH			20/06/2022	BLOCK AND SECTION NO. UPDATED FOR LEGEND

DETAIL DESIGN

Authorised for Issue:

BY:

SIGN: DATE:

0 5 10 15 20 25 30 35 40
SCALE 1:500 (A1) SCALE 1:1000 (A3)

WAE No. .

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SPACELAB CREATING TIMELESS PLACES

WHITLAM ESTATE - STAGE 3A

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FILL ON BLOCKS PLAN - SHEET 2

SHEET 2 OF 5

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18-001248.3A 1002 . B

Annexure E – Whitlam Verge Bond Refund Form

Application form for the Whitlam Verge Bond Refund

480 Northbourne Avenue, Dickson ACT 2602
GPO Box 158, Canberra ACT 2601
P 02 6205 0600 **F** 02 6207 5101
E suburbanland@act.gov.au
W suburbanland.act.gov.au
ABN 27 105 505 367

ACT Government | Suburban Land Agency

APPLICATION

For the Whitlam Verge Bond Refund

OCTOBER 2021

APPLICATION

For the Whitlam Verge Bond Refund

As part of the construction of your new home, you are required to protect the verge assets during construction and make good any damage upon completion of your landscape works. The verge includes the area forward of your property boundary line to the kerb and gutter and can include ACT Government assets such as concrete footpaths, driveways, kerb and gutters, light poles, mini pillars, street trees and grassing.

During construction on the Land, the Buyer must protect the Verge Assets and remediate and make good any damage to the Verge Assets to the satisfaction of the Seller. Making good includes (but is not limited to) repairing Verge Assets and re-grassing or re-planting the Verge to the satisfaction of the Suburban Land Agency.

To ensure the verges are returned to their original state post construction, a $1000 bond was required at the time of settlement. Within six months of receiving your certificate of occupancy and no later than 30 months after settlement of your block, and once the verge is returned back to its original and established condition, the bond paid at time of settlement (and as detailed in your sales contract), can be reimbursed to you via this application form.

Important

- [x] This Application Form must be read in conjunction with the Whitlam Housing Development Guide's relevant to your stage.
- [x] This Application Form must be fully completed by the Buyer or the Eligible Transferee.
- [x] The Declaration in Section 2 of this Application Form must be signed by each person who is the Buyer or Transferee of the Block.
- [x] The documents set out in Section 3 of this Application Form must be submitted to the Agency with this Application Form.
- [x] Application Forms which are not complete or signed, or which are not accompanied by the required supporting documents, may not be considered by the Agency.

SECTION 1: APPLICATION DETAILS

Buyer/Eligible Transferee Name

☐ Buyer who is the current Crown Lessee; or

☐ Eligible Transferee who is the current Crown Lessee

First Name _____ Last Name _____

First Name _____ Last Name _____

Company Name (if any) _____

Block Details

Description of Block on First Grant Contract Block _____ Section _____ Suburb _____

Street Address of Block _____

_____

Buyer or Eligible Transferee's Contact Details

Postal Address _____

Phone Number _____

Email Address _____

SECTION 2: DECLARATION

Buyer/Eligible Transferee Name

☐ I am:

- The Buyer listed in the First Grant Contract and the current Crown Lessee; or
- An Eligible Transferee and have notified the Suburban Land Agency and am the current Crown Lessee.

☐ I certify that this Application Form is submitted within six months of receiving a certificate of occupancy and no later than 30 months after settlement of the block.

☐ I certify that any Verges adjacent to the Block and effected works on the Block have been restored as they were prior to Settlement or been accepted by Transport Canberra City Services (TCCS).

☐ I certify that I have remediated and made good any damage to the Verge Assets to the satisfaction of the Suburban Land Agency. Making good includes (but is not limited to) repairing Verge Assets and re-grassing or re-planting the Verge to the satisfaction of the Seller.

☐ I certify that all Verges adjacent to the Block are clean and free from building materials, refuse or rubbish.

☐ I certify that documents provided with this Application Form are true and complete copies of the relevant documents.

☐ I certify that the information contained in this Application form is true and complete in all respects.

☐ I as the Buyer or Eligible Transferee give permission of the Agency to inspect the Block and take photos as necessary.

Signature of the Buyer/Eligible Transferee /Application 1 _____ Date ____/____/____

Signature of the Buyer/Eligible Transferee /Application 1 _____ Date ____/____/____

SECTION 3: SUPPORTING DOCUMENTS

I attached copies of the following documents:

☐ Photos of the current verge condition

☐ Certificate of Occupancy and Use

☐ A letter of approval from TCCS for any work conducted in the Verge (if required)

☐ Email confirmation of transfer of block (if required)

SECTION 4: PAYMENT DETAILS

FOR REFUND OF THE VERGE BOND

The refund is to be paid to the Buyer/Eligible Transferee's bank account, details below.

(The bank must be an Australian Bank).

Bank Name _____

Bank Branch _____

Account Name _____

BSB No. _____ Account Number _____

Submitting your application form

Completed Application Forms should be sent via email with the required supporting documentation to **suburbanland@act.gov.au** or **slamolongolo@act.gov.au**

or send it by post:

Whitlam Verge Bond Refund
Suburban Land Agency
GPO Box 158, Canberra ACT 2601

ACT Government | Suburban Land Agency

Annexure F - Whitlam Stage 3 Noise Management Plan

Whitlam Stage 3 Road Noise Impact Assessment and Overarching Noise Management Plan by WSP (November 2020)

480 Northbourne Avenue, Dickson ACT 2602
GPO Box 158, Canberra ACT 2601
P 02 6205 0600 **F** 02 6207 5101
E suburbanland@act.gov.au
W suburbanland.act.gov.au
ABN 27 105 505 367

CALIBRE CONSULTING (ACT)

WHITLAM STAGE 3

OVERARCHING NOISE MANAGEMENT PLAN FOR 'NOISE AFFECTED' BLOCKS

NOVEMBER 2020

Question today
Imagine tomorrow
Create for the future

Whitlam Stage 3
Overarching Noise Management Plan for 'noise affected' blocks

Calibre Consulting (ACT)

WSP
Level 1, 121 Marcus Clarke Street
Canberra ACT 2601
PO Box 1551
Canberra ACT 2600

Tel: +61 2 6201 9600
Fax: +61 2 6201 9666
wsp.com

REV	DATE	DETAILS
3	02/11/2020	Revised issue to reflect change in assumed dwelling height
4	18/11/2020	Revised issue to clarify modelled building heights and address minor comments

	NAME	DATE	SIGNATURE
Prepared by:	Linnea Eriksson	18/11/2020	
Reviewed by:	Zhang Lai	18/11/2020	
Approved by:	Zhang Lai	18/11/2020	

TABLE OF CONTENTS

EXECUTIVE SUMMARY

WSP Australia Pty Ltd has prepared an overarching Noise Management Plan (NMP) suitable for inclusion in the Development Application (DA) of the 'noise affected' residential blocks located adjacent to the arterial road within Stage 3 of the Whitlam development.

The assessment has been prepared in reference to the planning requirements of the Single Dwelling Housing Development Code and Multi Unit Housing Development Code.

The purpose of this report is to provide information for land purchasers to guide the selection of façade glazing with respect to meeting the road traffic noise intrusion requirements of these codes. Following this guidance does not guarantee Development Application Approval, and further detailed assessment may be required on a site-by-site basis especially if the proposed construction departs from the recommendations contained in this report. Information is provided for costing and selection purposes only.

Accepting that external road noise planning guidelines at certain future residential blocks will be exceeded, the primary objectives of this NMP are to:

- Predict and assess the likely road traffic noise levels impacting on the future building façade of developments on the 'noise affected' blocks in Whitlam Stage 3.
- Provide indicative acoustic building envelope construction requirements that respond to these road traffic noise levels.

It is noted that a residential land block is considered 'noise affected' if the predicted external road noise levels exceed the planning guidelines for external road noise per the Roads ACT Noise Management Guidelines.

Three dimensional computer noise modelling has been undertaken based on the appropriate input parameters, which resulted in prediction of the likely future road traffic noise levels impacting on the façade of the future dwellings adjacent to the arterial road.

Indicative building envelope construction requirements have been recommended in order to meet the internal noise level goals as discussed in Section 5.1.

Implementation of the suggested construction (subject to detailed design) is expected to allow the proposed development at the residential blocks adjacent to the arterial road to meet the current planning requirements.

Recommended minimum façade glazing requirements for all 'noise affected' blocks are tabulated on a block-by-block basis in Appendix A.

1 INTRODUCTION

WSP Australia Pty Ltd has been commissioned by Calibre Consulting to prepare an overarching Noise Management Plan for Whitlam Stage 3.

In accordance to the Single Dwelling Housing Development Code (SDHDC) and the Multi Unit Housing Development Code (MUHDC), a NMP and noise assessment is required to be prepared for any land blocks located adjacent to an arterial road carrying road traffic of 12,000 vehicles per day and above.

The proposed development location is presented in Figure 1.1. Road noise assessments were previously conducted as part of the preparation of the Estate Development Plan (WSP report reference *PS115022-190827-TJG-Whitlam 3 Noise Rev1* dated 2 October 2019 and *PS115022-200423-Whitlam 2 Noise MEM01-Rev01* dated 29 April 2020). A revised version of the 3-dimensional road noise model used for the EDP studies will serve as the basis of the assessment for this NMP.

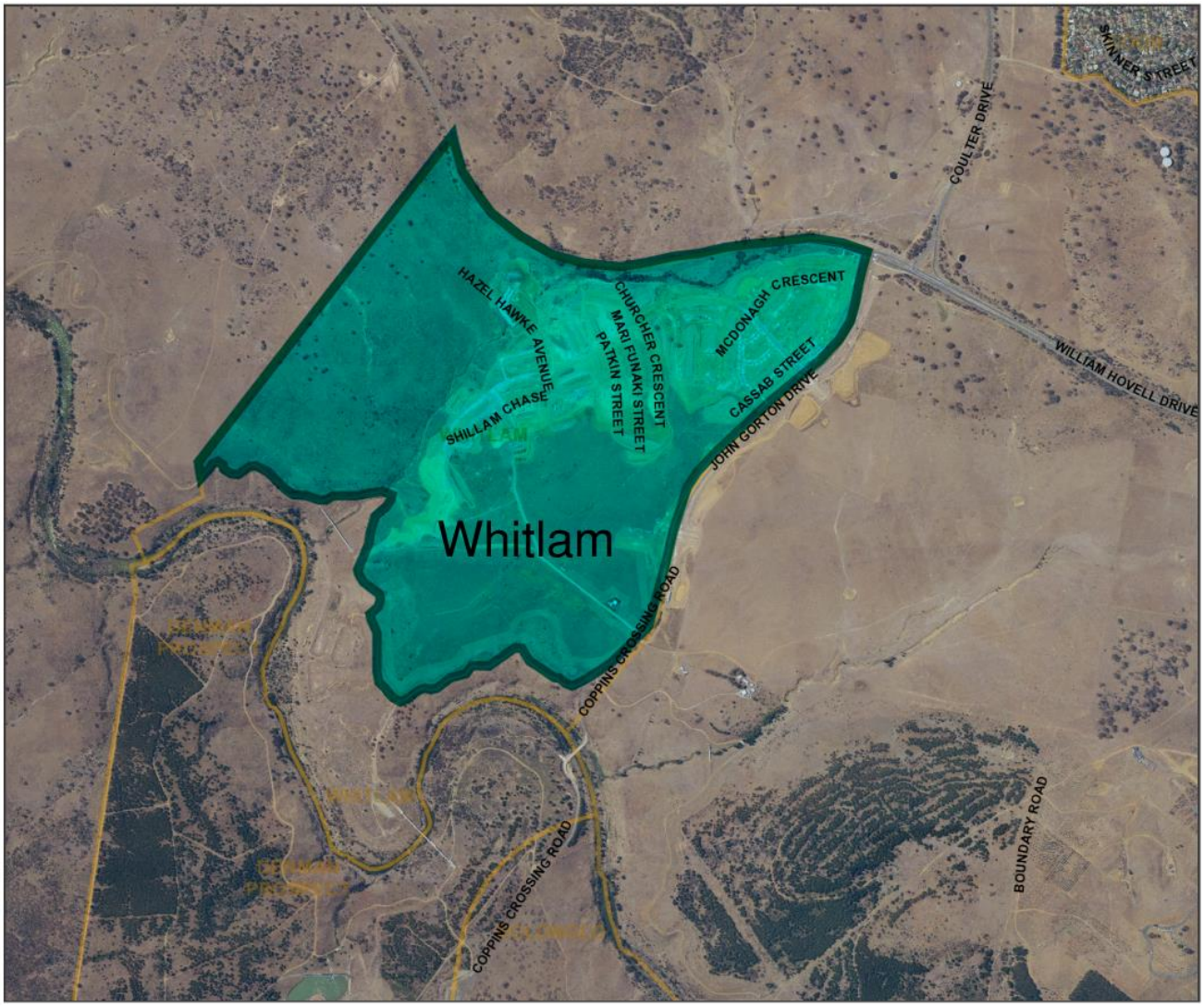
The primary objectives of this NMP are to:

- Predict and assess the likely road traffic noise levels impacting on the future building façade of developments on the 'noise affected' blocks in Whitlam Stage 3
- Provide indicative acoustic building envelope construction requirements that respond to these road traffic noise levels.

It should be noted that predicted results in this report for Stage 3 supersedes results presented in *PS115022-190827-TJG-Whitlam 3 Noise Rev1* dated 2 October 2019.

It is noted that a residential land block is considered 'noise affected' if the predicted external road noise levels exceed the planning guidelines for external road noise per the Roads ACT Noise Management Guidelines.

The purpose of this report is to provide information for developers to guide the selection of façade glazing with respect to meeting the road traffic noise intrusion requirements of these codes. Following this guidance does not guarantee Development Application Approval, and further detailed assessment may be required on a site-by-site basis. Information is provided for costing and selection purposes only.



Source: ACTmapi, accessed 28 May 2020

Figure 1.1 Aerial photograph of the project site

2 PREVIOUS NOISE ASSESSMENT

During EDP process of Whitlam Stage 3, a road noise modelling and assessment has been undertaken to predict the likely road noise impact on future residential blocks. A summary of that EDP road noise assessment is as follow:

- Assessment conducted per the current Roads ACT Noise Management Guidelines (NMG, 2018), which is discussed in Section 3.2.
- Without specific noise mitigation measures, several land blocks with direct line of sight to John Gorton Drive were predicted to exceed the external noise planning guideline levels per the NMG.
- The NMG requires that either the external noise planning guidelines or the internal noise levels per Australian Standard AS 2107 should be met at residential dwellings.

Due to predicted exceedances of the external noise planning guidelines the EDP study investigated possible road noise mitigation measures. A summary of the mitigation assessment undertaken is presented in Table 2.1.

Table 2.1 Contextualised mitigation investigation – Whitlam Stage 3

MITIGATION OPTION	METHOD/S	DISCUSSION
Land planning	Provision of appropriate setback distances	The provision of greater setback distances would reduce expected noise levels at the proposed residential receivers through distance attenuation; However, increasing the setback distance will significantly reduce the development yield of the proposed subdivision, likely to a degree that the development is not feasible.
At the source	Quieter road pavement or reduced speed limit	The implementation of quieter road pavement along John Gorton Drive is desirable from an Acoustic engineering aspect (can reduce up to 2dB) and desirable from an urban design and estate amenity aspect; However, the high upfront cost to re-construct or overlay the existing WHD road pavement as well as the already partially constructed John Gorton Drive makes this option undesirable; This option has been rejected by TCCS due to requirement to maintain the pavement surface in future maintenance
Along the noise transfer path	Noise barriers etc, height required up to 4.5 metres high Utilising residential building heights along first row of houses most exposed to arterial road traffic noise to act as barriers for subsequent rows.	The installation of noise barriers would be desirable from an acoustic engineering aspect, reducing the expected noise levels at the proposed residential receivers; However, this option is undesirable from an urban design and estate amenity aspect. Installing very large and intrusive barriers well in excess of the surrounding domestic dwellings will be over bearing on the adjacent estate. It is also undesirable from biodiversity aspect as barriers don't permit movement of animals. This option would also require significant upfront infrastructure costs. Locating the noise barrier at source of noise where it is effective (ie edge of road John Gorton Drive carriageway) is not possible due to space constraints as a result of other already constructed features as part of John Gorton Drive 3a and 3b..

MITIGATION OPTION	METHOD/S	DISCUSSION
At the receiver	Planning of the urban design and built form to provide suitable acoustic amenity.	Accepting that external road noise levels are higher than planning guidelines and achieving an acceptable internal noise level using appropriate building envelope construction.

Upon detailed assessment of the options, it was resolved that providing mitigation at the receivers through suitable building design represents the most feasible outcome. This is also an acceptable mitigation measure per the current NMG to be discussed in Section 3.2 below.

3 PLANNING REQUIREMENTS

The relevant noise criteria applicable to the project site have been established in accordance with the following documents:

- Single Dwelling Housing Development Code (SDHDC)
- Multi Unit Housing Development Code (MUHDC)
- Roads ACT Noise Management Guidelines (2018)

3.1 ACT HOUSING DEVELOPMENT CODES

With regard to potential noise intrusion to the proposed residential units, Rule 67 of the MUHDC and Rule 42 of the SDHDC states that:

> *Where a block has one or more of the following characteristics:*
>
> **i)** *identified in a precinct code as being potentially affected by noise from external sources*
>
> **ii)** ***adjacent to a road carrying or forecast to carry traffic volumes greater than 12,000 vehicles per day***
>
> **iii)** *located in a commercial zone*
>
> **iv)** *adjacent to a commercial or industrial zone*
>
> *dwellings should be constructed to comply with the relevant sections of all of the following:*
>
> *a) AS/NZS 2107:2000 – Acoustics – Recommended design sound levels and reverberation times for building interiors (the relevant satisfactory recommended interior design sound level)*
>
> *b) AS/NZS 3671 – Acoustics – Road Traffic Noise Intrusion Building Siting and Design*
>
> *For other than road traffic noise, compliance with this rule is demonstrated by a noise management plan prepared by a member of the Australian Acoustical Society with experience in the assessment of noise, and endorsed by the EPA. For other than road traffic noise, the noise level immediately adjacent to the dwelling is assumed to be the relevant noise zone standard specified in the ACT Environment Protection Regulation 2005.*
>
> *For road traffic noise, compliance with this rule is demonstrated by an acoustic assessment and noise management plan, prepared by a member of the Australian Acoustical Society with experience in the assessment of road traffic noise, and endorsed by the ACT Government entity responsible for Transport Planning.*

As emboldened in the quotation above, the proposed development triggers Rule 67 by being identified as being located adjacent to a road carrying traffic volumes greater than 12,000 vehicles per day. Details of the predicted vehicle count on the arterial roads around the Whitlam developments are presented in Section 4.

It should be noted that AS2107:2000 currently referenced in the SDHDC and MUHDC has been superseded by a revised issue dated 2016. The older version was however referenced in this NMP as per required by the SDHDC and MUHDC.

3.2 ROADS ACT NOISE MANAGEMENT GUIDELINES

Proposed noise sensitive developments located adjacent to arterial or major collector roads in the ACT are to be planned, designed, and constructed in line with the Roads ACT Noise Management Guidelines (NMG, 2018).

The NMG provides road traffic noise planning guideline levels for new developments based on the land / building usage. Based on our interpretation of the NMG, the proposed project is classified as 'New Developments on Existing Roads' and the noise planning guidelines applicable are as follows:

- External noise levels for proposed noise sensitive residential developments located adjacent to arterial or major collector roads (based on existing conditions at the receiver):
  - 60 dBA daytime $L_{eq,\ 15\text{-}hour}$. from 7am to 10pm (1 metre from façade).
  - 55 dBA $Leq_{,\ 9\text{-}hour}$ from 10pm to 7am (1 metre from façade).

  OR
- Internal noise levels that meet the Australian Standard AS 2107

Internal noise levels provided in AS 2107:2000 relevant to the Whitlam development are outlined in Table 3.1

Table 3.1 AS2107:2016 relevant internal noise levels

OCCUPANCY TYPES	AS2107 SATISFACTORY DESIGN SOUND LEVEL		PROPOSED PROJECT ASSESSMENT LEVEL
	RECOMMENDED	MAXIMUM	
Sleeping areas[1]	30 dBA	40 dBA	≤35 dB $L_{Aeq\text{-}9h}$ (night-time)
Living areas[1]	35 dBA	45 dBA	≤40 dB $L_{Aeq\text{-}15h}$ (daytime)

(1) Based on recommended design targets for the category of *Houses and apartments near major road.*

AS2107 uses the L_{Aeq} descriptor, which describes a steady state sound level of equivalent energy to the time varying noise level over a given period. The time period used for assessment purposes should be representative of the time period that the building will be in use. This assessment will be based on the predicted $L_{Aeq\text{-}15min}$ for daytime (7 am to 10 pm) and night time (10 pm to 7 am) as the basis for assessing living areas and bedrooms respectively.

The sound transmission loss performance of the façade of the development shall be designed to achieve the recommended internal noise levels shown in Table 3.1.

3.3 ROAD TRAFFIC NOISE INTRUSION

AS 3671:1989 *Acoustics – Road traffic noise intrusion – Building siting and construction* (AS3671) is concerned with road traffic noise intrusion to buildings near to major roads. AS3671 provides guidelines for determining necessary building envelope constructions to achieve the internal noise levels recommended in AS2107.

Table 3.2 outlines the recommended building construction categories required to achieve satisfactory internal noise levels for a residential building, as per AS2107 (see Table 3.1). This is a guideline only, and the actual reduction afforded will depend upon the frequency content of the noise. Where significant low frequency noise is evident, the guidelines in AS3671 may not be sufficient.

Table 3.2 AS3671 residential building construction categories

BUILDING TYPE	RESIDENTIAL BUILDING CONSTRUCTION CATEGORY			
	Category 1	Category 2	Category 3	Category 4
External road traffic noise level, dB L_{Aeq}	≤45	>45 ≤60	>60 ≤75	>75
Most onerous proposed project assessment level, dB L_{Aeq}	Sleeping areas ≤35	Sleeping areas ≤35	Sleeping areas ≤35	Sleeping areas ≤35
Resulting necessary Traffic Noise Reduction (TNR)	≤10	>10 ≤25	>25 ≤35	>40

According to AS3671, the categories referenced in Table 3.2 are:

- Category 1 – Standard construction: openings including open windows may comprise up to 10% of the exposed façade.
- Category 2 – Standard construction except for lightweight elements or all glass facades (both of which require acoustic advice). Windows, doors and other openings should be closed.
- Category 3 – Special construction as advised in the Standard. Windows, doors and other openings should be closed.
- Category 4 – Special acoustic advice should be sought.

Following noise predictions for this project, all of the development blocks assessed (see Appendix A) were found to be either **Category 2 or 3**, requiring closable windows and a degree of acoustic consultancy support in final glazing selections.

4 ROAD NOISE MODELLING APPROACH

Road noise modelling has been conducted using the SoundPLAN (version 7.4) suite of acoustic prediction software, using the Calculation of Road Traffic Noise (CoRTN) algorithm (UK Department of Environment Welsh Office 1988). Details of these noise assessments are presented in *PS115022-190827-TJG-Whitlam 3 Noise Rev1* (2 October 2019) and *PS115022-200423-Whitlam 2 Noise MEM01-Rev01* (29 April 2020).

4.1 TRAFFIC FORECAST

Traffic forecast figures have been provided in the AM peak format to assist with the modelling of the future scenario. These figures were converted to 18-hour traffic volumes to suit the relevant noise assessment time period.

Based on traffic counts obtained by WSP in 2016 and presented Table 4.1, the ratio of the 18-hour volume over the AM peak volume was determined to be 9.5 for William Hovell Drive. For noise assessment purposes, a conservative conversion factor of 9.7 has been applied to the 2031 forecasted AM peak values for all road sections to obtain the 18-hour volumes (Table 4.2) to inform the modelling and assessment of the future scenario. Heavy vehicle percentages have been adopted from the existing traffic counts.

Table 4.1 Traffic count results

ROAD	DIRECTION	SPEED LIMIT, KM/H	18-HOUR		15 HOUR		9 HOUR	
			LV	HV	LV	HV	LV	HV
William Hovell Drive	Eastbound	90	8,526	319	7625	289	1254	48
	Westbound		7,915	355	7505	336	552	25

(2) Results from traffic counting in 2016 obtained by WSP for Calibre Consulting

Table 4.2 2031 forecast traffic flow volumes

ROAD SECTION	MODELLED VEHICLE SPEED	2031 AM PEAK	2031 18-HR VOLUME	% HEAVY VEHICLES
William Hovel Drive, west of Coulter Drive	90 km/hr	2,680	25,996	7.6%
William Hovell Drive, east of Coulter Drive	80 km/hr	2,307	22,378	7.6%
Coulter Drive	80 km/hr	1,920	18,624	6.2%
John Gorton Drive, between William Hovell Drive and the new access intersection	80 km/hr	2,947	28,586	6.5%
John Gorton Drive, south of the new access intersection	80 km/hr	3,289	31,903	6.5%
New access road, west of John Gorton Drive	50 km/hr	294	2,852	6.5%
New access road, east of John Gorton Drive	50 km/hr	341	3,308	6.5%

4.2 NOISE MONITORING

To gain an understanding of the road traffic noise levels generated by the existing section of William Hovell Drive adjacent to Whitlam, environmental noise monitoring was performed in 2017 as part of the Whitlam Stages 1 and 2 Road

Noise Impact Assessment (2270809B, dated 20th July 2018). Noise monitoring was conducted at two representative locations within the project area. In addition, traffic counts were conducted concurrently with the noise monitoring. This information served as the basis for calibration of the noise model. This calibrated model is used as the bases for the Stage 3 assessment. The noise and traffic monitoring locations are presented in Figure 4.1. The noise monitoring locations were selected such that there is a clear line of sight to the traffic flow along William Hovell Drive at both extents of the project site.

Source: ACTmapi, accessed 10 August 2017

Figure 4.1 Aerial photograph of the project site including approximate locations of noise monitoring and traffic counts

Unattended noise monitoring was conducted using an ARL type EL-316 noise logger (S/N 16-306-008) and a Norsonic Nor140 sound level meter (S/N 1406503). The instruments' signal chain calibration was checked at the commencement and conclusion of the noise monitoring, with the variation in recorded calibrated levels not exceeding ±0.5 dB.

All unattended noise monitoring equipment was programmed to continuously record statistical noise level indices in 15 minute intervals including L_{Amax}, L_{A1}, L_{A10}, L_{A50}, L_{A90}, L_{A99}, L_{Amin} and L_{Aeq}.

All traffic counters were programmed to record continuously in one hour intervals including a breakdown of all 13 vehicle classifications according to AustRoads94 scheme.

The noise monitoring results collected at the selected representative locations are summarised in Table 4.3. These results have been used collectively as part of the model calibration process. All noise monitoring and traffic results are presented as the average of all 18-hour, 15-hour, and 9-hour periods during the overall monitoring period for assessment.

Table 4.3 Noise monitoring dates and results

LOCATION (REFER TO FIGURE 4.1)	DESCRIPTION AND DATES	NOISE LEVEL, dBA		
		$L_{10,\ 18\text{-hour}}$	$L_{eq,\ 15\text{-hour}}$	$L_{eq,\ 9\text{-hour}}$
William Hovell Drive (west)	Existing greenfield site Saturday 3 June to Friday 9 June 2017 (inclusive)	69	66 2.7 dB lower than $L_{10,\ 18\text{-hour}}$	60 8.7 dB lower than $L_{10,\ 18\text{-hour}}$
William Hovell Drive (east)	Existing greenfield site Saturday 3 June to Friday 9 June 2017 (inclusive)	64	62 2.6 dB lower than $L_{10,\ 18\text{-hour}}$	56 8.1 dB lower than $L_{10,\ 18\text{-hour}}$

4.3 NOISE MODEL VALIDATION

The noise modelling has been conducted using the SoundPLAN (version 7.4) suite of acoustic prediction software, using the Calculation of Road Traffic Noise (CoRTN) algorithm (UK Department of Environment Welsh Office 1988).

The noise monitoring and traffic count results presented in Table 4.1 and Table 4.3 were used to perform a noise model calibration process for existing traffic levels. For the purpose of this assessment noise and traffic survey data collected in 2017 are considered suitable for use as they provide a reliable mean to allow appropriate calibration of the computer noise model. The traffic count results were input to the noise model, and the predicted noise levels output by the model were compared against the measured noise levels. The results of the calibration process are provided in Table 4.4.

Table 4.4 Model validation results

LOCATION (REFER TO FIGURE 4.1)	MEASURED NOISE LEVEL, DBA $L_{10,\ 18\text{-HOUR}}$	PREDICTED NOISE LEVEL, DBA $L_{10,\ 18\text{-HOUR}}$	DIFFERENCE, DB
William Hovell Drive (west)	69	66	-3
William Hovell Drive (east)	64	65	+1

According to the NSW Environment Noise Management Manual (ENMM) released by the NSW Roads and Maritime Services (RMS, previously Roads and Traffic Authority, RTA), it was noted that "*it should be recognised that noise prediction modelling has some accuracy limitations and will commonly produce acceptable errors of around 2 dBA"*. This approach to validation has generally been accepted in the ACT and various other interstate jurisdictions.

Considering that the difference between the measured and predicted noise levels at the selected representative receivers is an average of ±2 dB, it can be concluded that the noise model provides results which enable a reliable assessment of the project. A +1 dB correction factor has been provided to all model results as a conservative approach.

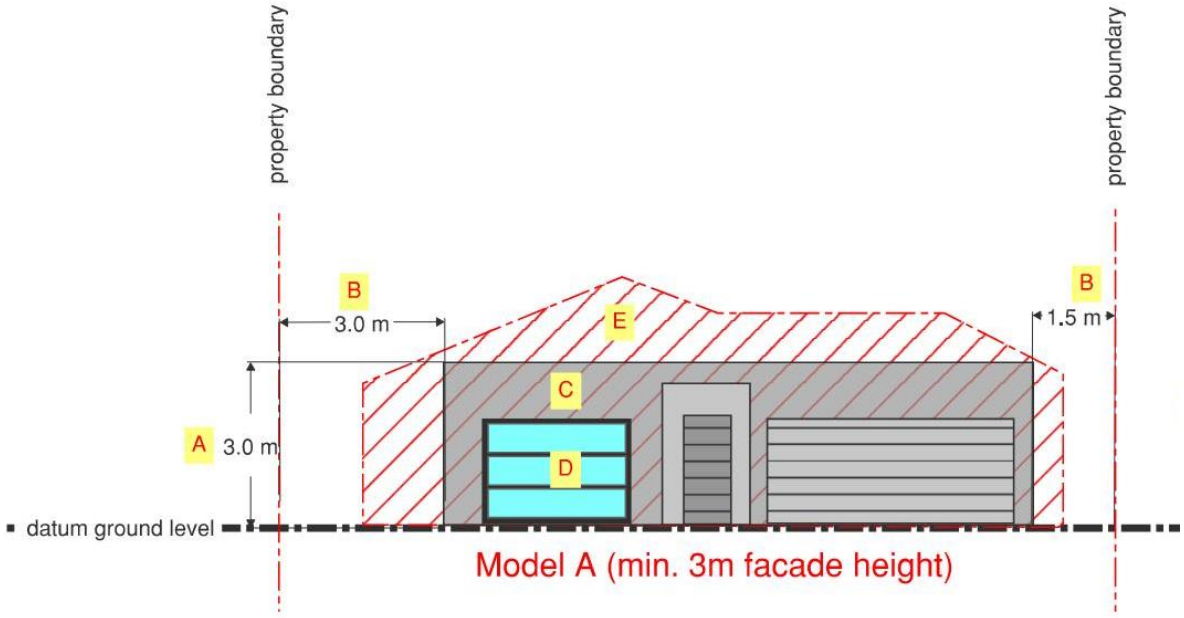
Modelling of both existing and future scenarios has been performed assuming Dense Graded Asphalt (DGA) for all road pavement surfaces.

5 FAÇADE CONSTRUCTION ASSESSMENT

Based on the modelling parameters presented above, the predicted road traffic noise levels are presented in Table A.1 in Appendix A. For the purpose of this assessment, single storey buildings with direct frontage to John Gorton Drive are assumed to be 3 metres in height (as illustrated in Figure 5.1).

Corresponding façade wall and glazing recommendations are described in Section 5.1. As the minimum glazing requirements vary from block to block these are also tabulated in Table A.1 for clarity.

A graphical representation of the identified "noise affected" blocks are also presented in Appendix B. It should be noted that only the daytime L_{eq} noise contours are presented as this represented the most onerous scenario of noise impact.



(A: minimum overall building height; B: minimum setback from side boundaries; C: building façade construction, Section 5.1.2; D: glazing minimum requirements, Section 5.1.1; E: example of building that meets minimum required height and width as modelled.)

Figure 5.1 Modelled dwelling for Whitlam Stage 3

5.1 RECOMMENDED MINIMUM CONSTRUCTIONS

5.1.1 GLAZING

The following recommendations for glazing are applicable for façades that have direct and partial frontage to the arterial road. This means that an occupant inside the space would have direct line of sight to the road. For façades that face away from the arterial road, standard glazing constructions without specific sound insulation requirements would be suitable. This means that for each final block configuration, the actual position of side and rear windows would need to be reviewed. This will be particularly important for corner blocks or end terraces. The following construction recommendations are provided to suit the predicted external noise levels:

- **Type A:** Glazing meeting ≥36 dB R_w (≥34 dB R_w+ C_{tr})
  - ≥12.38 mm laminated glass, or;
  - A double-glazed system of ≥6 mm float glass | ≥12 mm air gap | ≥10.38 mm laminated glass

- **Type B:** Glazing meeting ≥34 dB R_w (≥32 dB R_w+ C_{tr})
  - ≥10.38 mm laminated glass, or;
  - A double-glazed system of ≥6 mm float glass | ≥12 mm air gap | ≥10 mm float glass
- **Type C:** Glazing meeting ≥32 dB R_w (≥30 dB R_w+ C_{tr})
  - ≥6.38 mm laminated glass, or;
  - A double-glazed system of ≥6 mm float glass | ≥12 mm air gap | ≥6 mm float glass

It should be noted that glazing types used in this assessment are based on WSP's understanding of glazing types that are likely to be considered 'standard' in the industry that typically do not require special custom orders. This however can change between different suppliers/ manufacturers and is subject to change. Table 5.1 presents the glazing type for each assessed receiver location and associated maximal area of the façade that can be glazed while still achieving the planning requirements for internal noise levels for each enclosed internal room.

Table 5.1 Glazing type and associated maximal glazed area recommended at façade

GLAZING TYPE	MAXIMUM GLAZED FACADE AREA FOR EACH ENCLOSED ROOM
Type A	≤5.4 m^2
Type B	≤6.0 m^2
Type C	≤6.6 m^2

Note: for assessment purposes, a bedroom was assumed for be approximately 3.5 metres x 3.5 metres, while a living room is assumed to be 5.5 metres by 5.5 metres.

It should be noted that the glazing types and adopted glazing areas above represent one possible construction combination. Other combinations are possible and can be capable of meeting the planning requirements. To change the required R_w value of a glazing by 2 dB, this will correlate with a change of the prescribed maximum glazed façade area by 60%. For example, if a 'noise affected' block is assigned Type A glazing in Appendix A, this will be accompanied by a maximum glazing for each enclosed room of ≤5.4 m^2. If a developer decides to use a Type B glazing instead, the originally prescribed maximum glazing area for a room should be reduced to 60% i.e. from ≤5.4 m^2 down to ≤3.2 m^2.

In addition to the above, it should be noted that the selected glazing frame system must not degrade the overall sound insulation performance of the glazing pane.

5.1.2 WALLS

In general, a well-mortared brick veneer or any masonry construction is acoustically suitable on this development without further recommendations.

If lightweight cladding is used on the façade with direct and partial frontage to the arterial road the following typical minimum constructions would provide adequate façade sound insulation to meet the internal noise levels given in Table 3.1:

- External cladding
  - ≥ 9 mm compressed fibre cement board (or boards of total surface mass ≥13 kg/m^2), or
- Insulated cavity
  - ≥ 90 mm frame fully filled with fibrous acoustic insulation (≥14 kg/m^3)
- Internal cladding
  - ≥ 2 layers of 13 mm standard core plasterboard (or other boards of surface mass ≥8.5 kg/m^2 each layer)

For other areas, a similar lightweight construction as above is suitable but with a single layer of plasterboard for the internal lining.

It should be noted that there are a wide range of equivalent lightweight constructions that would provide similar façade sound insulation. Any proposed design that does not meet the nominated facade requirements for glazing, height and materials as detailed above should be reviewed by an acoustic consultant as design progresses.

5.1.3 VENTILATION

It is assumed that openable windows will be the principal form of ventilation for these sites. All noise assessment has been undertaken assuming that windows can be closed by the occupant.

If permanently open in-wall passive ventilation is pursued for these buildings, the associated reduction in overall composite façade sound insulation performance should be reviewed by an acoustic consultant at the design stage.

6 CONCLUSIONS

WSP Australia has prepared an overarching Noise Management Plan suitable for inclusion in the Development Application of the ‘noise affected’ residential blocks in Whitlam Stage 3.

The assessment has been prepared in reference to the planning requirements of the Single Dwelling Housing Development Code and Multi Unit Housing Development Code in regard to building envelope sound insulation performance.

The primary objectives of this NMP are to:

- Predict and assess the likely road traffic noise levels impacting on the future building façade of developments on the ‘noise affected’ blocks in Whitlam Stage 3.
- Provide indicative acoustic building envelope construction requirements that respond to these road traffic noise levels.

Three-dimensional computer noise modelling has been undertaken based on the appropriate input parameters, which resulted in prediction of the likely future road traffic noise levels impacting on the façade of the future dwellings adjacent to the arterial road.

Indicative building envelope construction requirements have been recommended in order to meet the internal noise level goals as discussed in Section 5.1. Implementation of the suggested constructions (subject to detailed design) are expected to allow the proposed development at the residential blocks adjacent to the arterial road to meet the current planning requirements.

Recommended façade glazing requirements are tabulated on a block-by-block basis in Appendix A. A graphical representation of the identified “noise affected” blocks are also presented in Appendix B. It should be noted that only the daytime L_{eq} noise contours are presented as this represented the most onerous scenario of noise impact.

The intent of the indicative building envelope when assessed with the minimum standards proposed for facade wall construction and glazing is to clarify that a dwelling that meets or exceeds these recommendations therefore meets the assessed criteria of this NMP. These are intended to achieve the current planning requirements for noise affected residential blocks covered within this report.

APPENDIX A

PREDICTED ROAD TRAFFIC NOISE LEVELS AND ASSOCIATED GLAZING PERFORMANCES

A1 PREDICTED ROAD TRAFFIC NOISE LEVELS AND ASSOCIATED GLAZING PERFORMANCES

Table A.1 summarises the predicted facade sound pressure level for each development block during the day and night time periods, and gives associated minimum glazing performance requirements. Note that all modelled buildings are single storey.

Table A.1 Predicted external façade road noise levels for 'noise affected' blocks

RECEIVER/ BLOCK	DAY TIME $L_{EQ,\ 15\text{-}HOUR}$DBA	NIGHT TIME $L_{eq,\ 9\text{-}hour}$dBA	GLAZING TYPE (SEE SECTION 5.1.1)
	GROUND	GROUND	GROUND
W3 R55 CV - i	67	61	Type A
W3 R56 CV - j	67	61	Type A
W3 R57 CV - k	67	61	Type A
W3 R66 CV - l	67	61	Type A
W3 R67 CV - m	67	61	Type A
W3 R79 CT - m	67	61	Type A
W3 R80 CT - n	64	58	Type B
W3 R81 CT - o	65	60	Type A
W3 R81 CT - p	65	60	Type A
W3 R82 CT - q	66	60	Type A
W3 R93 CT - r	62	57	Type B
W3 R92 CT - s	62	56	Type B
W3 R91 CT - t	61	56	Type C
W3 R90 CT - u	61	55	Type C
W3 R90 CT - v	61	55	Type C
W3 R90 CT - w	61	55	Type C
W3 R90 CT - x	61	55	Type C
W3 R109 CT - y	61	55	Type C
W3 R107 CT - z	61	55	Type C
W3 R106 CT - aa	61	55	Type C

APPENDIX B

NOISE CONTOUR MAP AND IDENTIFICATION OF ‘NOISE AFFECTED’ BLOCKS

Date: 10/19/2020	Prediction Algorithm:
Appendix:	Prediction Height: 1.5m
Map Number: 1	Coordinate System: ACT Stromlo Grid
Client: Calibre Consulting	Author: TJG

N

PS115022 - Whitlam Subdivision-3metres dwelling heigh
Daytime $L_{Aeq, 15-hour}$, 1.5 meters above ground including +2.5 dB facade r

Suburban Land Agency
480 Northbourne Avenue
Dckson ACT 2602

GPO Box 158 Canberra City ACT 2601

Telephone (02) 6205 0600 (General)
Telephone 1800 777 952 (Sales)

Email suburbanland@act.gov.au
Web www.suburbanland@act.gov.au

ANNEXURE B –SPECIMEN CROWN LEASE

This is a market value lease -
S263(2)(a)(ii) *Planning Act 2023*

Section 370 of the *Planning Act 2023* **applies**

Entered in Register Book Vol.....Folio.....

AUSTRALIAN CAPITAL TERRITORY
Planning Act 2023

Australian Capital Territory (Planning and Land Management) Act 1988 (C'th) ss 29, 30 & 31

LEASE GRANTED pursuant to the *Planning Act 2023* and the Regulations made under that Act on the day of Two thousand and twenty five WHEREBY THE PLANNING AND LAND AUTHORITY ("the Authority") ON BEHALF OF THE COMMONWEALTH OF AUSTRALIA ("the Commonwealth") in exercising its functions grants to of in the Australian Capital Territory number of shares/tenants in common/joint tenants ("the Lessee") ALL THAT piece or parcel of land situate in the Australian Capital Territory containing an area of **square metres** or thereabouts and being **Block Section Division of Whitlam** as delineated on **Deposited Plan Number** in the Registrar-General's Office at Canberra in the said Territory ("the land") RESERVING unto the Territory all minerals and the right to the use, flow and control of ground water under the surface of the land TO HOLD unto the Lessee for the term of 99 years commencing on the day of Two thousand and twenty five ("the date of the commencement of the lease") to be used by the Lessee for the purpose set out in Clause 2(f) of this lease only YIELDING AND PAYING THEREFOR during the said term rent at the rate of five cents per annum if and when demanded and UPON AND SUBJECT TO the covenants conditions and agreements contained in this lease.

1. IN THIS LEASE unless the contrary intention appears:

   (a) "Authority" means the Territory Planning Authority established by section 16 of the *Planning Act 2023*;

   (b) "building" means any building or structure constructed or partially constructed or to be constructed, as the context permits or requires, on or under the land;

   (c) "dwelling" has the same meaning as in the *Planning (General) Regulation 2023*;

   (d) "Lessee" shall:

      (i) where the Lessee consists of one person be deemed to include the Lessee and the executors administrators and assigns of the Lessee;

      (ii) where the Lessee consists of two or more persons be deemed to include in the case of a tenancy in common the said persons and each of them and their and each of their executors administrators and assigns and in the case of a joint tenancy be deemed to include the said persons and each of them and their and each of their assigns and the executors administrators and assigns of the survivor of them; and

      (iii) where the Lessee is a corporation be deemed to include such corporation and its successors and assigns;

   (e) "premises" means the land and any building or other improvements on the land;

   (f) "single dwelling housing" means the use of land for residential purposes for a single dwelling only;

(g) "Territory" means:

(i) when used in a geographical sense the Australian Capital Territory; and

(ii) when used in any other sense the body politic established by section 7 of the *Australian Capital Territory (Self-Government) Act 1988* (C'th);

(h) words in the singular include the plural and vice versa;

(i) words importing one gender include the other genders;

(j) a reference in this lease to any statute or statutory provision shall include a reference to any statute or statutory provision that amends, extends, consolidates or replaces the statute or statutory provision and to any other regulation, instrument or other subordinate legislation made under the statute.

2. THE LESSEE COVENANTS WITH THE COMMONWEALTH as follows:

(a) That the Lessee shall pay to the Authority at Canberra the rent hereinbefore reserved within one month of the date of any demand made by the Authority relating thereto and served on the Lessee;

(b) That the Lessee shall within twenty four (24) months from the date of the commencement of the lease or within such further time as may be approved in writing by the Authority complete the erection of a dwelling (with necessary and usual outbuildings and fences) on the land at a cost not less than the sum of one hundred and eighty thousand dollars ($180,000) and in accordance with plans and specifications prepared by the Lessee and previously submitted to and approved in writing by the Authority and in accordance with every Statute Ordinance or Regulation applicable to such development;

(c) That the Lessee shall provide facilities on the land to a standard acceptable to the Authority to enable electrical and telephone cables and wires to be installed underground;

(d) That the Lessee shall at all times during the said term maintain repair and keep in repair the premises to the satisfaction of the Authority;

(e) That the Lessee shall not without the previous approval in writing of the Authority, except where exempt by law, erect any building, or make any structural alterations to any building, on the land;

(f) To use the land for the purpose of single dwelling housing;

(g) That the Lessee shall not install or use a solid fuel heating system on the premises without the prior written approval of the Authority;

(h) That the Lessee shall at all times permit the Lessees of Block * Section * Division of Whitlam, Block * Section * Division of Whitlam & Block * Section * Division of Whitlam their employees, contractors, sub-lessees or occupiers, visitors and invitees to pass and repass from time to time with or without vehicles across, over and along that part of the land described as a "proposed access easement 3 wide & var width" on the Deposited Plan AND RESERVING unto the Lessee its employees, contractors, sub-lessees or occupiers, visitors and invitees at all times during the continuance of this lease and for all purposes the full right and liberty to pass and repass from time to time with or without vehicles across, over and along that part of Block * Section * Division of Whitlam, Block * Section * Division of Whitlam & Block * Section * Division of Whitlam described as a "proposed access easement 3 wide & var width " on the Deposited Plan;

(i) That the Lessee shall not, without the previous consent in writing of the Territory, remove any tree:

(i) that has been identified in a development approval for retention during the period allowed for construction of the building; or

(ii) to which the *Urban Forest Act 2023*, applies;

(j) If and whenever the Lessee is in breach of the Lessee's obligations to maintain repair and keep in repair the premises the Authority may by notice in writing to the Lessee specifying the repairs and maintenance needed require the Lessee to effect the necessary work in accordance with the notice. If the Authority is of the opinion that a building or some other improvement on the land is beyond reasonable repair the Authority may by notice in writing to the Lessee require the Lessee to remove the building or improvement and may require the Lessee to construct a new building or improvement in place of that removed within the time specified in the notice. If the Lessee does not carry out the required work within the time specified by the Authority any person or persons duly authorised by the Authority with such equipment as is necessary may enter the premises and carry out the necessary work and all costs and expenses incurred by the Authority in carrying out the work shall be paid by the Lessee to the Authority on demand and from the date of such demand until paid shall for all purposes of this lease be a debt due and payable to the Authority by the Lessee;

(k) Subject to the provisions of the *Planning Act 2023* to permit any person or persons authorised by the Authority to enter and inspect the premises at all reasonable times and in any reasonable manner;

(l) To pay all rates and charges and other statutory outgoings assessed levied or payable in respect of the premises as and when they are due for payment.

3. IT IS MUTUALLY COVENANTED AND AGREED as follows:

(a) That if:

(i) a dwelling in accordance with Clause 2(b) of this lease is not completed within the period specified in the said Clause; or

(ii) services in accordance with Clause 2(c) of this lease are not completed within the period specified in the said Clause; or

(iii) after completion of a dwelling as aforesaid the said land is at any time not used for a period of one year for the purpose for which this lease is granted; or

(iv) the Lessee shall fail to observe or perform any other of the covenants contained in this lease on the part of the Lessee to be observed or performed and shall have failed to remedy such breach within a period of six months from the date of service on the Lessee of a notice in writing from the Authority specifying the nature of such breach

the Authority on behalf of the Commonwealth may terminate this lease but without prejudice to any claim which the Authority or the Commonwealth may have against the Lessee in respect of any breach of the covenants on the part of the Lessee to be observed or performed;

(b) That acceptance of rent or other moneys by the Authority during or after any period referred to in Clauses 3(a) (i), (ii), (iii) or (iv) of this lease shall not prevent or impede the exercise by the Authority of the powers conferred upon it by the said Clauses;

(c) Subject to the Lessee paying all money required to be paid under the provisions of the *Planning Act 2023* the Lessee shall be entitled to a further lease of the land for such further term and at such rent and subject to such conditions as may then be provided or permitted by Statute Ordinance or Regulation;

(d) That any notice requirement demand consent or other communication to be given to or served upon the Lessee under this lease shall be deemed to have been duly given or served if signed by or on behalf of the Authority and delivered to or sent in a prepaid letter addressed to the Lessee at the land or at the usual or last-known address of the Lessee or affixed in a conspicuous position on the premises;

(e) Any and every right, power or remedy conferred on the Commonwealth or Territory in this lease, by law or implied by law may be exercised on behalf of the Commonwealth or the Territory or as the case may be by:

(i) the Authority;

(ii) an authority or person for the time being authorised by the Authority or by law to exercise those powers or functions of the Commonwealth or Territory; or

(iii) an authority or person to whom the Authority has delegated all its powers or functions under the *Planning Act 2023*.

IN WITNESS whereof the Authority on behalf of the Commonwealth and the Lessee have executed this lease.

Signed by)
a delegate authorised to execute this lease) …….
on behalf of the Commonwealth in the) Delegate
presence of:)

…….
Witness

SIGNED SEALED AND DELIVERED)
by) …….
in the presence of:) Lessee

.....
Name of Witness

.....
Signature of Witness

SIGNED SEALED AND DELIVERED)
by) …….
in the presence of:) Lessee

.....
Name of Witness

.....
Signature of Witness

ANNEXURE C – CLEARANCE CERTIFICATE

Australian Government
Australian Taxation Office

SUBURBAN LAND AGENCY
C/o MATHILDE CASTELLA
480 NORTHBOURNE AVENUE
DICKSON ACT 2602

Our reference: 2410894950853
Phone: 13 28 66

15 January 2024

Your foreign resident capital gains withholding clearance certificate

› Purchasers are not required to withhold and pay an amount
› Provide a copy to the purchaser and retain a copy for your records

Hello

We have decided that purchasers are not required to withhold and pay an amount. Your certificate is below.

Reference number	2410894950853
Vendor name	SUBURBAN LAND AGENCY
Vendor address	480 NORTHBOURNE AVENUE DICKSON ACT 2602
Clearance certificate period	11 January 2024 to 13 January 2029

The Commissioner may withdraw this clearance certificate at any time if we obtain further information indicating you are a foreign resident.

Yours sincerely

John Ford
Deputy Commissioner of Taxation

NEED HELP?

You can find out more about foreign resident capital gains withholding on our website at ato.gov.au/FRCGW

CONTACT US

If you have any questions, contact us between 8:00am and 5:00pm Australian Eastern Standard Time, Monday to Friday on:

› **13 28 66** if located in Australia, or
› **+61 2 6216 1111** if located outside Australia and ask for **13 28 66**.

ANNEXURE D – DEPOSITED PLAN

FORM: DP1

DEPOSITED PLAN

15836/1

TITLE INFORMATION

AMENDS	N/A
X PLAN	X22626

PLAN OF

BLOCKS 1-15 SECTION 80
BLOCK 1 SECTION 81
BLOCKS 3-12 SECTION 89
BLOCK 1 SECTION 90
BLOCKS 1-10 SECTION 91
BLOCKS 1-21 SECTION 92
BLOCKS 1-30 SECTION 93

DIVISION : WHITLAM

DISTRICT : MOLONGLO VALLEY

AUSTRALIAN CAPITAL TERRITORY

SCALE 1 : 2500

0 25 50 100 150 200 METRES

I, Matthew Dean Stevenson of Lonergan Surveying Pty Ltd a surveyor registered under the Surveyors Act 2007 hereby certify that the survey represented on this plan is accurate and has been made in accordance with the Surveyors Practice Directions and was completed on 28/03/2023

27/04/2023

SURVEYORS REFERENCE 22202_3A1

I certify that this plan has been examined in accordance with the Districts Act 2002

27/4/2023

Surveyor-General of the ACT — Date

LEGEND AND NOTES

Subject Boundary
Adjoining Boundary
Easement
Division Boundary

(S&D) PROPOSED SEWERAGE & DRAINAGE SERVICE EASEMENT 3.5 WIDE

(S&D*) PROPOSED SEWERAGE & DRAINAGE EASEMENT 3.5 WIDE

(A*) PROPOSED ACCESS EASEMENT VAR WIDTH

(A) PROPOSED ACCESS EASEMENT 3 WIDE

All Easements are 2.5 metres wide (except as otherwise shown)

Deposited in the office of the Registrar of Titles at Canberra

In the Australian Capital Territory at

12:10 pm, 01/05/2023

Approved

David Pryce
Registrar-General

Registrar of Titles

FORM: DP2

DEPOSITED PLAN

15836/2

TITLE INFORMATION

X PLAN X22626

TERRITORY LAND

TERRITORY LAND

SCULTHORPE AVENUE

STROMLO CRESCENT

PAT LOVELL CRESCENT

THANCOUPIE STREET

SKYRING PAT LOVELL CRESCENT

TERRITORY LAND

SEE SHEET

SEE SHEET

TERRITORY LAND

SCALE 1:600

0 10 20 30 40 METRES

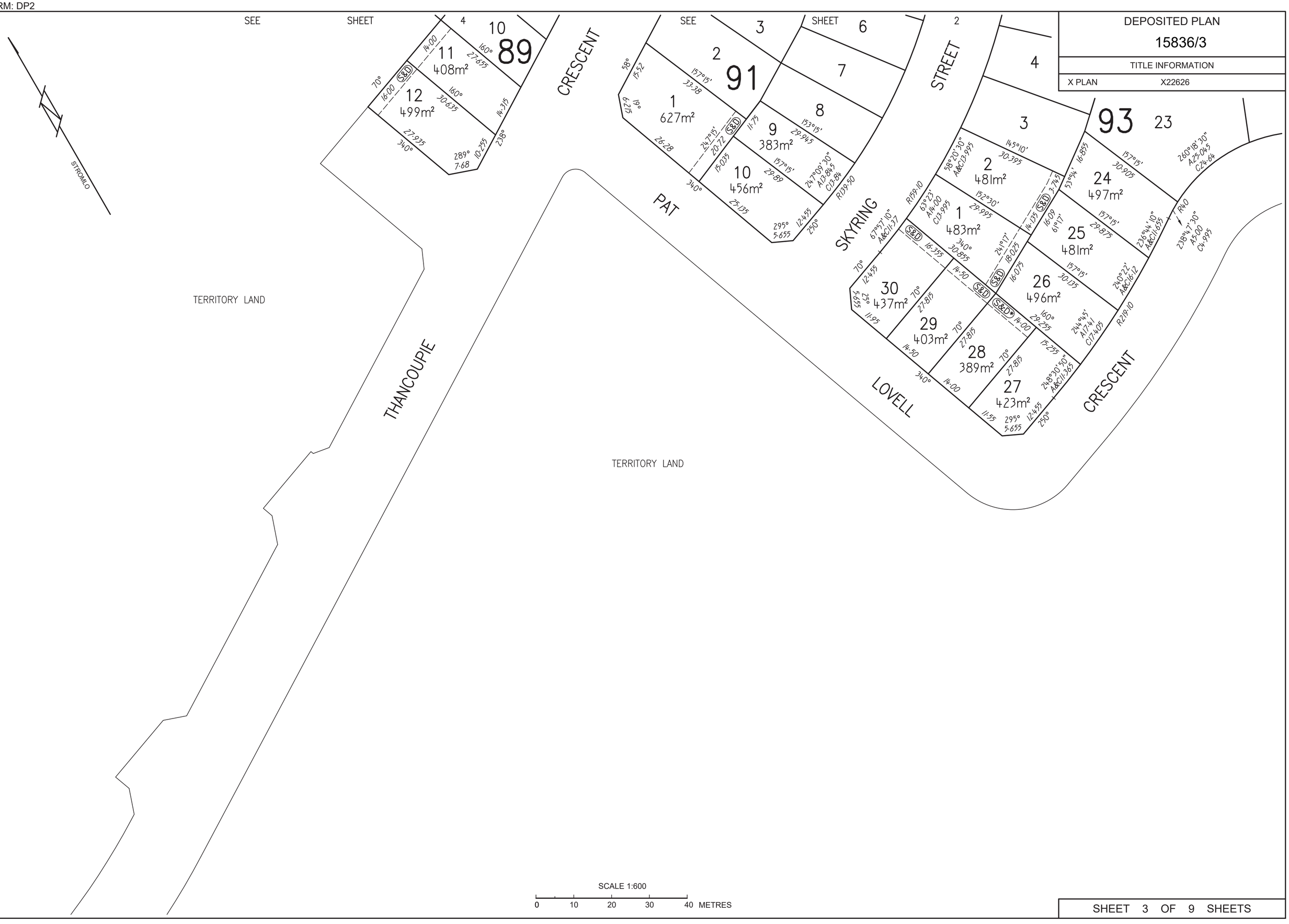
SHEET 2 OF 9 SHEETS

FORM: DP2

DEPOSITED PLAN
15836/3

TITLE INFORMATION

X PLAN X22626



SCALE 1:600

0 10 20 30 40 METRES

FORM: DP2

DEPOSITED PLAN

15836/4

TITLE INFORMATION

X PLAN X22626

60

63

66

SCULTHORPE AVENUE

ARGONAUT STREET

KER WILSON WAY

INGE KING CRESCENT

THANCOUPIE CRESCENT

STROMLO

R684·65 119°51'40" A89·145 C89·08

67°15' 5·94

206°13' 30·40

8°14'40" A78·79 R231·60 C78·45

233°06'30" 5·35

68·47 260°

307°42' 11·17

136°02'20" 65·265

179°07'10" 7·815

80° 62·28

26°36'30" 13·925

46·94 222°12'

102·61 340°

52·255 233°09'

4·715 285°

TERRITORY LAND

TERRITORY LAND

1 81 5355m²

1 90 8224m²

R684·65 64°13' 7·77 109°56' A&C10·43 110°54'50" A&C13·015 112°01'40" A&C13·62 113°01'30" A&C10·185 152°21' 10·06 196°07' A&C17·74

1 424m² 2 444m² 3 485m² 4 396m²

16°59' A&C21·205 285°34' 17·29 25·63 114°23' 28·42 114°23' 26·395 114°23' 285°34' 16·27

193°38'30" A&C4·00

3·515 192° 10·67 114·185 105°34' 30·24 105°34' 29·68 191°38'20" A&C13·605

14°39'30" A&C4·00 12°45'50" A&C16·60 101° 30·41 5·715 100°12' 29·38 188°32' A13·665 C13·66 R271·70

15 467m² 5 443m² 14 382m² 6 418m²

11·84 188°34' 6·125 97°37' 29·11 185°25'30" A&C13·66 10°02' A&C13·12 98°35' 30·72 8·86 6°50' 13·495 R311·70

13 455m² 7 466m² 80

7°21'20" A16·01 C16·005 93°55' 30·89 88°41' 29·745 16·745 182°01'10" A16·245 C16·24 18·27 6°50' 13·635

12 459m² 8 347m² 9 319m²

4°22'30" A16·40 C16·395 88°41' 30·455 14·00 178°40' 25·595 13·00 178°40' 23·61 7·64 219°48'

S&D 16·455 0°37'10" A24·48 C24·475 27·735 178°40' 10 373m² 13·15 10·895

11 478m² 14·16 260° 7·755 11·50 308°55'

STREET WILSON WAY KER

80° 12·895 121° 6·835 4 421m² 19·33

3 364m² 13·20 160° 26·98 29·175 17·00 16·70

S&D 13·00 30·00 70° 5 501m² 70° 30·00 89 16·57 160°

16·70 6 497m² 70° 30·00 7 502m² 16·75

340° 16·57 S&D 16·75 30·00 8 501m² 250° 30·00 16·70

16·70 9 364m² 16·00 18·075 190° 4·215

14·00 160° 10 366m² 24·68 14·20

S&D 27·655 340° 14·315 238°

11 12 SEE

SHEET 3

1 2 3 SEE SHEET

91

SCALE 1:600

0 10 20 30 40 METRES

SHEET 4 OF 9 SHEETS

FORM: DP3

DEPOSITED PLAN

15836/5

SURVEY INFORMATION	
AMENDS	N/A
X PLAN	X22626

PLAN OF

BLOCKS 1-15 SECTION 80
BLOCK 1 SECTION 81
BLOCKS 3-12 SECTION 89
BLOCK 1 SECTION 90
BLOCKS 1-10 SECTION 91
BLOCKS 1-21 SECTION 92
BLOCKS 1-30 SECTION 93

DIVISION : WHITLAM

DISTRICT : MOLONGLO VALLEY

AUSTRALIAN CAPITAL TERRITORY

SCALE 1 : 2500

0 25 50 100 150 200 METRES

I, Matthew Dean Stevenson of Lonergan Surveying Pty Ltd a surveyor registered under the Surveyors Act 2007 hereby certify that the survey represented on this plan is accurate and has been made in accordance with the Surveyors Practice Directions and was completed on 28/03/2023

27/04/2023

SURVEYORS REFERENCE 22202_3A1

I certify that this plan has been examined in accordance with the Surveyors Practice Directions and Surveyor-General Guideline No. 6.

27/4/2023

Surveyor-General of the ACT Date

LEGEND AND NOTES

ALL PEGS GONE UNLESS OTHERWISE SHOWN

Orientation Datum Line A - B 79°29'56" SCMR
All Easements are 2.5 metres wide (except as otherwise shown)

PLANS USED

DP15265, DP15296 & DP15309

FORM: DP4

DEPOSITED PLAN

15836/6

SURVEY INFORMATION	
X PLAN	X22626

SCALE 1:800

0 10 20 40 60 METRES

JACKONIA STREET

50

DANAHER STREET

48

AVENUE

HAWKE

HAZEL

64

STREET

15071 FD

124°18'50" 105.075 DP15296

15072 FD

170°46'20" 27.142 DP15296

71°31'40" 4.245

R383.85 115°38'20" A22.835 C22.83

113°56'10" 19.035

R263.85 112°36'20" A&C12.26

153°46' 14.185

123°18'30" 29.42

124°36' 9.925

57° R31.65 C11.30 6.18

27°30'30" A11.36

102°54' 90.59

109°13'50" 139.79 DP15296

106°11'50" A39.37 C39.35

R342.15

(110°24'20" A&C10.895)

112°31'20" A36.19 C36.17

66°34" 13.60 DP15296

ST123A FD GIP IN CONC

JOHN

DISTRICT OF MOLONGLO VALLEY

GORTON

STROMLO

R72.15 35°56'10" A17.97 C17.925

R312.35 A53.095 C53.03

33°40'10"

32°55'40" 109.15 DP15309

27°14'40" 74.704 DP15309

28°48' 138.38

39°35'40" 174.115 DP15265

189°50' 183.975

188°42'10" 254.46

TERRITORY LAND

MAGGIE SCOTT TERRACE

15095 FD

121°50'05" 206.09 DP15309

ST124 FD GIP IN CONC

65

LANE

67

BOUSLOFF

COE

KELVIN

66

R312.35 A53.095 C53.03

32°55'40" 109.15 DP15309

51.16 310°36'

311°44' A&C18.45

R466.85

227°30'50" A7.605 C7.59

267° 14.645

29.885 307°37'40"

61°44'40" A11.43 C11.37

R31.65

38°53' A&C3.305

R515.85 37°38'50" A&C18.955

35°20'20" 5.203

134°57'10" 36.59

133°13'50" A&C5.96

135°54'50" A&C4.015

309°48'40" 132.08 DP15309 TO CRM15096

55°29' 24.765

SR1842 FD

SCULTHORPE

VAR WIDTH

AVENUE

137°11'40" 111.545 TO CRM15168

308°21'30"

A137.645 R537.265 C137.265

298°28'10" A22.265 C22.26 R250

40.02

7

295°55'

57.42

295°55'

166°38'20" 197.955 TO SR1857

197°52'30" A81.46 R290.20 C81.195

205°55' 50.525

198°44'50" A67.255 R610.41 C67.22

TERRITORY LAND

90 1 SEE SHEET

SHEET 6 OF 9 SHEETS

FORM: DP4

DEPOSITED PLAN

15836/7

SURVEY INFORMATION

X PLAN X22626

SEE SHEET 6

TERRITORY LAND

TERRITORY LAND

SCULTHORPE AVENUE

VAR WIDTH

STROMLO CRESCENT

VAR WIDTH

THANCOUPIE CRESCENT

PAT LOVELL CRESCENT 12.7 WIDE

PAT LOVELL CRESCENT 17.55 WIDE

PAT LOVELL CRESCENT 20.1 WIDE

SKYRING STREET 19.6 WIDE

15168 15169 SR1857 15166 15164 15163 15162 15167 15165 15161 15160

1 90 | 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 | 92 | 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 | 91 | 1 2 3 4 5 6 7 8 9 10 | 93

SCALE 1:600

0 10 20 30 40 METRES

SHEET 7 OF 9 SHEETS

FORM: DP4

DEPOSITED PLAN

15836/8

SURVEY INFORMATION

X PLAN X22626

SEE SHEET 9

SEE SHEET 6

SEE SHEET 7

TERRITORY LAND

TERRITORY LAND

TERRITORY LAND

STROMLO

CRESCENT

20.85 WIDE

THANCOUPIE

PAT

SKYRING

19.6 WIDE

STREET

15165

LOVELL

17.55 WIDE

CRESCENT

VAR WIDTH

VAR WIDTH

SR1861

15155

15156

15157

15158

15159

15160

89

91

93

SCALE 1:600

0 10 20 30 40 METRES

SHEET 8 OF 9 SHEETS

FORM: DP4

DEPOSITED PLAN
15836/9
SURVEY INFORMATION
X PLAN X22626

SCULTHORPE AVENUE 26.7 WIDE
SR1842 FD
15092 FD
15096 FD
15097 FD
15093 FD
15196
15194
15195
15183
15167
15166
15158
SEE DIAGRAM B SHEET 5
ARGONAUT STREET 20.1 WIDE
KER WILSON WAY 20.1 WIDE
WILSON WAY 19.6 WIDE
INGE KING CRESCENT 19.6 WIDE
THANCOUPIE CRESCENT VAR WIDTH
STROMLO 7
TERRITORY LAND
1 81
1 90
91 3
2
SEE SHEET 1
SEE SHEET 8
SCALE 1:600
0 10 20 30 40 METRES
SHEET 9 OF 9 SHEETS

ANNEXURE E – SITE CLASSIFICATION CERTIFICATES

SITE CLASSIFICATION REPORT SUMMARY

BLOCK:	**4**	**SECTION:**	**92**	**SUBURB:**	**Whitlam**
JOB No:	**88556.17**			**DATE:**	**May 2023**
CLIENT:	**Calibre Professional Services Pty Ltd**			**REV:**	**0**

Classification Procedures:

Existing Subsurface Conditions: Refer attached test pit log(s) – Pit(s) 32,33 and Drawing 1.

Bulk Earthworks: Controlled fill within the block was placed under Level 1 control as defined in AS 3798:2007.

Laboratory Results: Previous laboratory testing results indicated liquid limit ranging from 50-77%, plasticity index ranging from 35-61%, linear shrinkage ranging from 10-19% and shrink/swell index ranging from 0.01-3.50%.

Site Classification: Site classification in accordance with AS2870:2011 provides guidance on the patterns and magnitude of moisture related seasonal ground movements that must be considered in design. Based on the worst case current soil profile / state, on limited subsurface information, soil reactivity and allowing for variation in the subsoil profile, the site would be equivalent to worst case Class M* (moderately reactive/filled) conditions. It must be noted that part of the block would be equivalent to Class S* (slightly reactive/filled) conditions. Therefore the classification must be reassessed should the soil profile change either by adding fill or removing soil from the block and/or if the presence of service trenches or retaining walls are within the zone of influence of the block. Reference must be made to the comments provided below.

Footing Systems: Reference must be made to AS2870:2011 which indicates footing systems that are appropriate for each site classification. All footings must found within a uniform bearing stratum of suitable strength/material, below the zone of influence of any service trenches, backfill zones, retaining walls or underground structures. Masonry walls should be articulated in accordance with current best practice. Dwelling design must ensure suitable drainage and uniform moisture conditions are maintained in the vicinity of footings. Footing systems must be confirmed by a structural engineer taking into consideration any onsite or offsite constraints.

Maintenance Guidelines: Reference should be made to the attached CSIRO Sheet BTF 18 'Foundation Maintenance & Footing Performance' to comments about gardens, landscaping and trees on the performance of foundation soils and in particular in respect to maintaining good surface drainage. It notes that minor cracking in most structures is inevitable, and it describes site maintenance practices aimed at minimising foundation movements that can lead to cracking damage.

Comments/ Limitations:

The successful purchaser must make their own interpretations, deductions and conclusions from the information made available and will need to accept full responsibility for such interpretations, deductions and conclusions.

Development specific geotechnical investigations must be undertaken.

Additional topsoils / fill may have been spread subsequent to the investigation.

Site preparation prior to the construction should include removal of all vegetation, topsoil and any uncontrolled fill.

All new fill must be placed under controlled conditions (AS 3798:2007), otherwise Class P conditions would be warranted in those fill areas.

Some variability in subsurface conditions must be anticipated.

Moisture condition of site soils and/or the presence of groundwater may vary considerably from time of investigation compared to at the time of construction. Groundwater seepages are highly likely after heavy or prolonged rain.

Hard rock excavation must be anticipated. It is recommended that excavation depths be minimal to reduce potential site costs.

The above site classification is provided on the basis that all building materials/waste and stockpiles are removed from site and have not been spread across the site.

It is recommended that footing excavations be inspected by a geotechnical engineer.

This report must be read in conjunction with the attached "Limitations" and notes "About this Report".

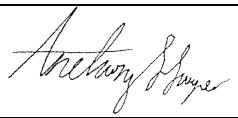
References:

AS 2870:2011, Residential Slabs and Footings, Standards Australia.

AS 3798:2007, Guidelines on Earthworks for Commercial and Residential Developments, Standards Australia.

Attachments:

Limitations & About this Report
Explanatory Notes
Test Pit Log(s) Pit(s) 32,33
Drawing 1



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Geotechnics / Environment / Groundwater

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Limitations

Douglas Partners (DP) has prepared this report for the project at Whitlam Stage 3A in accordance with DP's proposal dated 26 November 2021 and acceptance received from Evan Langham dated 15 March 2023. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Calibre Professional Services Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the geotechnical components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Sampling Methods

Douglas Partners

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Soil Descriptions

Douglas Partners

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with 'Mix of Soil and Cobbles/Boulders' with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).

Rock Strength

Rock strength is defined by the Unconfined Compressive Strength and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $Is_{(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Abbreviation	Unconfined Compressive Strength MPa	Point Load Index * $Is_{(50)}$ MPa
Very low	VL	0.6 - 2	0.03 - 0.1
Low	L	2 - 6	0.1 - 0.3
Medium	M	6 - 20	0.3 - 1.0
High	H	20 - 60	1 - 3
Very high	VH	60 - 200	3 - 10
Extremely high	EH	>200	>10

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Residual Soil	RS	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely weathered	XW	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible
Highly weathered	HW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately weathered	MW	The whole of the rock material is discoloured , usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly weathered	SW	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh	FR	No signs of decomposition or staining.
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores.

Rock Descriptions

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections > 100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

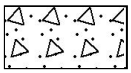
Symbols & Abbreviations

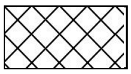
Graphic Symbols for Soil and Rock

General

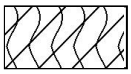

Asphalt

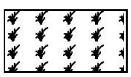

Road base

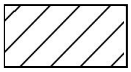

Concrete

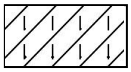

Filling

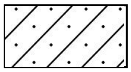
Soils


Topsoil

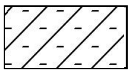

Peat

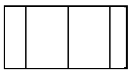

Clay

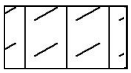

Silty clay

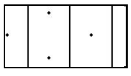

Sandy clay

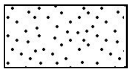

Gravelly clay

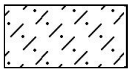

Shaly clay

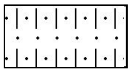

Silt


Clayey silt


Sandy silt

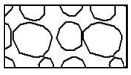

Sand

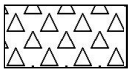

Clayey sand


Silty sand


Gravel

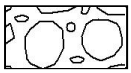

Sandy gravel


Cobbles, boulders

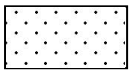

Talus

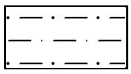
Sedimentary Rocks

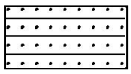

Boulder conglomerate

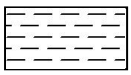

Conglomerate


Conglomeratic sandstone

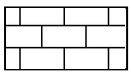

Sandstone


Siltstone

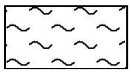

Laminite

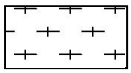

Mudstone, claystone, shale

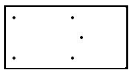

Coal


Limestone

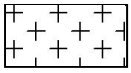
Metamorphic Rocks

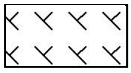

Slate, phyllite, schist

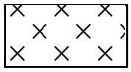

Gneiss

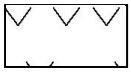

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

FOUNDATION MAINTENANCE AND FOOTING PERFORMANCE

Understanding and preventing soil-related building movement

This Building Technology Resource is designed to identify causes of soil-related building movement, and to suggest methods of prevention of resultant cracking.

Buildings can and often do move. This movement can be up, down, lateral or rotational. The fundamental cause of movement in buildings can usually be related to one or more problems in the foundation soil. It is important for the home owner to identify the soil type in order to ascertain the measures that should be put in place in order to ensure that problems in the foundation soil can be prevented, thus protecting against building movement.

SOIL TYPES

The types of soils usually present under the topsoil in land zoned for residential buildings can be split into two approximate groups – granular and clay. Quite often, foundation soil is a mixture of both types. The general problems associated with soils having granular content are usually caused by erosion. Clay soils are subject to saturation and swell/shrink problems.

Classifications for a given area can generally be obtained by application to the local authority, but these are sometimes unreliable and if there is doubt, a geotechnical report should be commissioned. As most buildings suffering movement problems are founded on clay soils, there is an emphasis on classification of soils according to the amount of swell and shrinkage they experience with variations of water content. Table 1 below is a reproduction of Table 2.1 from Australian Standard AS 2870-2011, Residential slabs and footings.

CAUSES OF MOVEMENT

SETTLEMENT DUE TO CONSTRUCTION

There are two types of settlement that occur as a result of construction:

- Immediate settlement occurs when a building is first placed on its foundation soil, as a result of compaction of the soil under the weight of the structure. The cohesive quality of clay soil mitigates against this, but granular (particularly sandy) soil is susceptible.
- Consolidation settlement is a feature of clay soil and may take place because of the expulsion of moisture from the soil or because of the soil's lack of resistance to local compressive or shear stresses. This will usually take place during the first few months after construction but has been known to take many years in exceptional cases.

These problems may be the province of the builder and should be taken into consideration as part of the preparation of the site for construction.

EROSION

All soils are prone to erosion, but sandy soil is particularly susceptible to being washed away. Even clay with a sand component of say 10% or more can suffer from erosion.

SATURATION

This is particularly a problem in clay soils. Saturation creates a bog-like suspension of the soil that causes it to lose virtually all of its bearing capacity. To a lesser degree, sand is affected by saturation because saturated sand may undergo a reduction in volume, particularly imported sand fill for bedding and blinding layers. However, this usually occurs as immediate settlement and should normally be the province of the builder.

SEASONAL SWELLING AND SHRINKAGE OF SOIL

All clays react to the presence of water by slowly absorbing it, making the soil increase in volume (see table below, from AS 2870). The degree of increase varies considerably between different clays, as does the degree of decrease during the subsequent drying out caused by fair weather periods. Because of the low absorption and expulsion rate, this phenomenon will not usually be noticeable unless there are prolonged rainy or dry periods, usually of weeks or months, depending on the land and soil characteristics.

The swelling of soil creates an upward force on the footings of the building, and shrinkage creates subsidence that takes away the support needed by the footing to retain equilibrium.

SHEAR FAILURE

This phenomenon occurs when the foundation soil does not have sufficient strength to support the weight of the footing. There are two major post-construction causes:

- Significant load increase.
- Reduction of lateral support of the soil under the footing due to erosion or excavation.

In clay soil, shear failure can be caused by saturation of the soil adjacent to or under the footing.

TREE ROOT GROWTH

Trees and shrubs that are allowed to grow in the vicinity of footings can cause foundation soil movement in two ways:

- Roots that grow under footings may increase in cross-sectional size, exerting upward pressure on footings.

TABLE 1. GENERAL DEFINITIONS OF SITE CLASSES.

Class	Foundation
A	Most sand and rock sites with little or no ground movement from moisture changes
S	Slightly reactive clay sites, which may experience only slight ground movement from moisture changes
M	Moderately reactive clay or silt sites, which may experience moderate ground movement from moisture changes
H1	Highly reactive clay sites, which may experience high ground movement from moisture changes
H2	Highly reactive clay sites, which may experience very high ground movement from moisture changes
F	Extremely reactive sites, which may experience extreme ground movement from moisture changes

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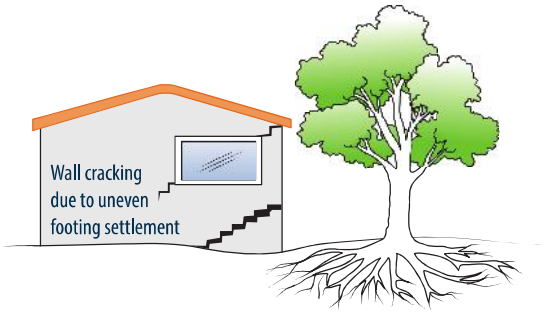

FIGURE 1 Trees can cause shrinkage and damage.

- Roots in the vicinity of footings will absorb much of the moisture in the foundation soil, causing shrinkage or subsidence.

UNEVENNESS OF MOVEMENT

The types of ground movement described above usually occur unevenly throughout the building's foundation soil. Settlement due to construction tends to be uneven because of:

- Differing compaction of foundation soil prior to construction.
- Differing moisture content of foundation soil prior to construction.

Movement due to non-construction causes is usually more uneven still. Erosion can undermine a footing that traverses the flow or can create the conditions for shear failure by eroding soil adjacent to a footing that runs in the same direction as the flow.

Saturation of clay foundation soil may occur where subfloor walls create a dam that makes water pond. It can also occur wherever there is a source of water near footings in clay soil. This leads to a severe reduction in the strength of the soil which may create local shear failure.

Seasonal swelling and shrinkage of clay soil affects the perimeter of the building first, then gradually spreads to the interior through absorption. The swelling process will usually begin at the uphill extreme of the building, or on the weather side where the land is flat. Shrinkage usually begins on the side of the building where the sun's heat is greatest.

EFFECTS OF UNEVEN SOIL MOVEMENT ON STRUCTURES

EROSION AND SATURATION

Erosion removes the support from under footings, tending to create subsidence of the part of the structure under which it occurs. Brickwork walls will resist the stress created by this removal of support by bridging the gap or cantilevering until the bricks or the mortar bedding fail. Older masonry has little resistance. Evidence of failure varies according to circumstances and symptoms may include:

- Step cracking in the mortar beds in the body of the wall or above/below openings such as doors or windows.
- Vertical cracking in the bricks (usually but not necessarily in line with the vertical beds or perpends).

Isolated piers affected by erosion or saturation of foundations will eventually lose contact with the bearers they support and may tilt or fall over. The floors that have lost this support will become bouncy, sometimes rattling ornaments etc.

SEASONAL SWELLING/SHRINKAGE IN CLAY

Swelling foundation soil due to rainy periods first lifts the most exposed extremities of the footing system, then the remainder of the perimeter footings while gradually permeating inside the building footprint to lift internal footings. This swelling first tends to create a dish effect, because the external footings are pushed higher than the internal ones.

The first noticeable symptom may be that the floor appears slightly dished. This is often accompanied by some doors binding on the floor or the door head, together with some cracking of cornice mitres. In buildings with timber flooring supported by bearers and joists, the floor can be bouncy. Externally there may be visible dishing of the hip or ridge lines.

As the moisture absorption process completes its journey to the innermost areas of the building, the internal footings will rise. If the spread of moisture is roughly even, it may be that the symptoms will temporarily disappear, but it is more likely that swelling will be uneven, creating a difference rather than a disappearance in symptoms. In buildings with timber flooring supported by bearers and joists, the isolated piers will rise more easily than the strip footings or piers under walls, creating noticeable doming of flooring.

As the weather pattern changes and the soil begins to dry out, the external footings will be first affected, beginning with the locations where the sun's effect is strongest. This has the effect of lowering the external footings. The doming is accentuated, and cracking reduces or disappears where it occurred because of dishing, but other cracks open up. The roof lines may become convex.

Doming and dishing are also affected by weather in other ways. In areas where warm, wet summers and cooler dry winters prevail, water migration tends to be toward the interior and doming will be accentuated, whereas where summers are dry, and winters are cold and wet, migration tends to be toward the exterior and the underlying propensity is toward dishing.

MOVEMENT CAUSED BY TREE ROOTS

In general, growing roots will exert an upward pressure on footings, whereas soil subject to drying because of tree or shrub roots will tend to remove support from under footings by inducing shrinkage.

COMPLICATIONS CAUSED BY THE STRUCTURE ITSELF

Most forces that the soil causes to be exerted on structures are vertical – i.e. either up or down. However, because these forces are seldom spread evenly around the footings, and because the building resists uneven movement because of its rigidity, forces are exerted from one part of the building to another. The net result of all these forces is usually rotational. This resultant force often complicates the diagnosis because the visible symptoms do not simply reflect the original cause. A common symptom is binding of doors on the vertical member of the frame.

EFFECTS ON FULL MASONRY STRUCTURES

Brickwork will resist cracking where it can. It will attempt to span areas that lose support because of subsided foundations or raised points. It is therefore usual to see cracking at weak points, such as openings for windows or doors.

In the event of construction settlement, cracking will usually remain unchanged after the process of settlement has ceased.

With local shear or erosion, cracking will usually continue to develop until the original cause has been remedied, or until the subsidence has completely neutralised the affected portion of footing and the structure has stabilised on other footings that remain effective.

In the case of swell/shrink effects, the brickwork will in some cases return to its original position after completion of a cycle, however it is more likely that the rotational effect will not be exactly reversed, and it is also usual that brickwork will settle in its new position and will resist the forces trying to return it to its original position. This means that in a case where swelling takes place after construction and cracking occurs, the cracking is likely to at least partly remain after the shrink segment of the cycle is complete. Thus, each time the cycle is repeated, the likelihood is that the cracking will become wider until the sections of brickwork become virtually independent.

With repeated cycles, once the cracking is established, if there is no other complication, it is normal for the incidence of cracking to stabilise, as the building has the articulation it needs to cope with the problem. This is by no means always the case, however, and monitoring of cracks in walls and floors should always be treated seriously.

Upheaval caused by growth of tree roots under footings is not a simple vertical shear stress. There is a tendency for the root to also

exert lateral forces that attempt to separate sections of brickwork after initial cracking has occurred.

The normal structural arrangement is that the inner leaf of brickwork in the external walls and at least some of the internal walls (depending on the roof type) comprise the load-bearing structure on which any upper floors, ceilings and the roof are supported. In these cases, it is internally visible cracking that should be the main focus of attention, however there are a few examples of dwellings whose external leaf of masonry plays some supporting role, so this should be checked if there is any doubt. In any case, externally visible cracking is important as a guide to stresses on the structure generally, and it should also be remembered that the external walls must be capable of supporting themselves.

EFFECTS ON FRAMED STRUCTURES

Timber or steel framed buildings are less likely to exhibit cracking due to swell/shrink than masonry buildings because of their flexibility. Also, the doming/dishing effects tend to be lower because of the lighter weight of walls. The main risks to framed buildings are encountered because of the isolated pier footings used under walls. Where erosion or saturation causes a footing to fall away, this can double the span which a wall must bridge. This additional stress can create cracking in wall linings, particularly where there is a weak point in the structure caused by a door or window opening. It is, however, unlikely that framed structures will be so stressed as to suffer serious damage without first exhibiting some or all of the above symptoms for a considerable period. The same warning period should apply in the case of upheaval. It should be noted, however, that where framed buildings are supported by strip footings there is only one leaf of brickwork and therefore the externally visible walls are the supporting structure for the building. In this case, the subfloor masonry walls can be expected to behave as full brickwork walls.

EFFECTS ON BRICK VENEER STRUCTURES

Because the load-bearing structure of a brick veneer building is the frame that makes up the interior leaf of the external walls plus perhaps the internal walls, depending on the type of roof, the building can be expected to behave as a framed structure, except that the external masonry will behave in a similar way to the external leaf of a full masonry structure.

WATER SERVICE AND DRAINAGE

Where a water service pipe, a sewer or stormwater drainage pipe is in the vicinity of a building, a water leak can cause erosion, swelling or saturation of susceptible soil. Even a minuscule leak can be enough to saturate a clay foundation. A leaking tap near a building can have the same effect. In addition, trenches containing pipes can become watercourses even though backfilled, particularly where broken rubble is used as fill. Water that runs along these trenches can be responsible for serious erosion, interstrata seepage into subfloor areas and saturation.

Pipe leakage and trench water flows also encourage tree and shrub roots to the source of water, complicating and exacerbating the problem. Poor roof plumbing can result in large volumes of rainwater being concentrated in a small area of soil:

- Incorrect falls in roof guttering may result in overflows, as may gutters blocked with leaves etc.
- Corroded guttering or downpipes can spill water to ground.
- Downpipes not positively connected to a proper stormwater collection system will direct a concentration of water to soil that is directly adjacent to footings, sometimes causing large-scale problems such as erosion, saturation and migration of water under the building.

SERIOUSNESS OF CRACKING

In general, most cracking found in masonry walls is a cosmetic nuisance only and can be kept in repair or even ignored. Table 2 below is a reproduction of Table C1 of AS 2870-2011.

AS 2870-2011 also publishes figures relating to cracking in concrete floors, however because wall cracking will usually reach the critical point significantly earlier than cracking in slabs, this table is not reproduced here.

PREVENTION AND CURE

PLUMBING

Where building movement is caused by water service, roof plumbing, sewer or stormwater failure, the remedy is to repair the problem. It is prudent, however, to consider also rerouting pipes away from the building where possible and relocating taps to positions where any leakage will not direct water to the building vicinity. Even where gully traps are present, there is sometimes sufficient spill to create erosion or saturation, particularly in modern installations using smaller diameter PVC fixtures. Indeed, some gully traps are not situated directly under the taps that are installed to charge them, with the result that water from the tap may enter the backfilled trench that houses the sewer piping. If the trench has been poorly backfilled, the water will either pond or flow along the bottom of the trench. As these trenches usually run alongside the footings and can be at a similar depth, it is not hard to see how any water that is thus directed into a trench can easily affect the foundation's ability to support footings or even gain entry to the subfloor area.

GROUND DRAINAGE

In all soils there is the capacity for water to travel on the surface and below it. Surface water flows can be established by inspection during and after heavy or prolonged rain. If necessary, a grated drain system connected to the stormwater collection system is usually an easy solution.

It is, however, sometimes necessary when attempting to prevent water migration that testing be carried out to establish watertable height and subsoil water flows. This subject may be regarded as an area for an expert consultant.

PROTECTION OF THE BUILDING PERIMETER

It is essential to remember that the soil that affects footings extends well beyond the actual building line. Watering of garden plants, shrubs and trees causes some of the most serious water problems.

For this reason, particularly where problems exist or are likely to occur, it is recommended that an apron of paving be installed around as much of the building perimeter as necessary. This paving should extend outwards a minimum of 900 mm (more in highly reactive soil) and should have a minimum fall away from the building of 1:60. The finished paving should be no less than 100 mm below brick vent bases.

It is prudent to relocate drainage pipes away from this paving, if possible, to avoid complications from future leakage. If this is not practical, earthenware pipes should be replaced by PVC and backfilling should be of the same soil type as the surrounding soil and compacted to the same density.

Except in areas where freezing of water is an issue, it is wise to remove taps in the building area and relocate them well away from the building – preferably not uphill.

It may be desirable to install a grated drain at the outside edge of the paving on the uphill side of the building. If subsoil drainage is needed this can be installed under the surface drain.

CONDENSATION

In buildings with a subfloor void, such as where bearers and joists support flooring, insufficient ventilation creates ideal conditions for condensation, particularly where there is little clearance between the floor and the ground. Condensation adds to the moisture already present in the subfloor and significantly slows the process of drying out. Installation of an adequate subfloor ventilation system, either natural or mechanical, is desirable.

TABLE 2. CLASSIFICATION OF DAMAGE WITH REFERENCE TO WALLS.

Description of typical damage and required repair	Approximate crack width limit	Damage category
Hairline cracks	<0.1 mm	0 – Negligible
Fine cracks which do not need repair	<1 mm	1 – Very Slight
Cracks noticeable but easily filled. Doors and windows stick slightly.	<5 mm	2 – Slight
Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weathertightness often impaired.	5–15 mm (or a number of cracks 3 mm or more in one group)	3 – Moderate
Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distort. Walls lean or bulge noticeably, some loss of bearing in beams. Service pipes disrupted.	15–25 mm but also depends on number of cracks	4 – Severe

Warning: Although this Building Technology Resource deals with cracking in buildings, it should be said that subfloor moisture can result in the development of other problems, notably:

- Water that is transmitted into masonry, metal or timber building elements causes damage and/or decay to those elements.
- High subfloor humidity and moisture content create an ideal environment for various pests, including termites and spiders, and mould.
- Where high moisture levels are transmitted to the flooring and walls, an increase in the dust mite count can ensue within the living areas. Dust mites, as well as dampness in general, can be a health hazard to inhabitants, particularly those who are abnormally susceptible to respiratory ailments.

THE GARDEN

The ideal vegetation layout is to have lawn or plants that require only light watering immediately adjacent to the drainage or paving edge, then more demanding plants, shrubs and trees spread out in that order.

Overwatering due to misuse of automatic watering systems is a common cause of saturation and water migration under footings. If it is necessary to use these systems, it is important to remove garden beds to a completely safe distance from buildings.

EXISTING TREES

Where a tree is causing a problem of soil drying or there is the existence or threat of upheaval of footings, if the offending roots are subsidiary and their removal will not significantly damage the tree, they should be severed and a concrete or metal barrier placed vertically in the soil to prevent future root growth in the direction of the building. If it is not possible to remove the relevant roots without damage to the tree, an application to remove the tree should be made to the local authority. A prudent plan is to transplant likely offenders before they become a problem.

INFORMATION ON TREES, PLANTS AND SHRUBS

State departments overseeing agriculture can give information regarding root patterns, volume of water needed and safe distance from buildings of most species. Botanic gardens are also sources of information.

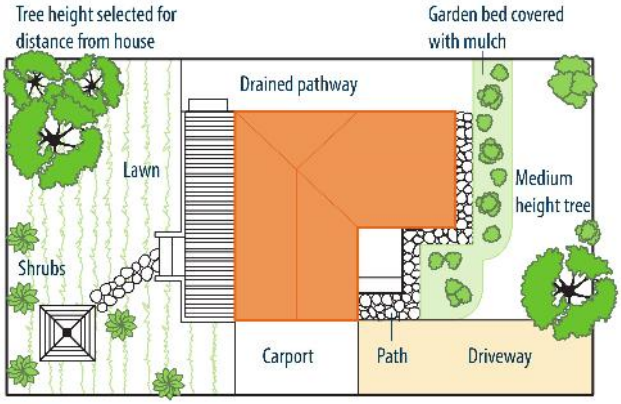

FIGURE 2 Gardens for a reactive site.

EXCAVATION

Excavation around footings must be properly engineered. Soil supporting footings can only be safely excavated at an angle that allows the soil under the footing to remain stable. This angle is called the angle of repose (or friction) and varies significantly between soil types and conditions. Removal of soil within the angle of repose will cause subsidence.

REMEDIATION

Where erosion has occurred that has washed away soil adjacent to footings, soil of the same classification should be introduced and compacted to the same density. Where footings have been undermined, augmentation or other specialist work may be required. Remediation of footings and foundations is generally the realm of a specialist consultant.

Where isolated footings rise and fall because of swell/shrink effect, the home owner may be tempted to alleviate floor bounce by filling the gap that has appeared between the bearer and the pier with blocking. The danger here is that when the next swell segment of the cycle occurs, the extra blocking will push the floor up into an accentuated dome and may also cause local shear failure in the soil. If it is necessary to use blocking, it should be by a pair of fine wedges and monitoring should be carried out fortnightly.

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For information about CSIRO testing services visit www.csiro.au/en/work-with-us/services
ISBN 9781486312962 (print)/9781486312979 (digital) © CSIRO 2021
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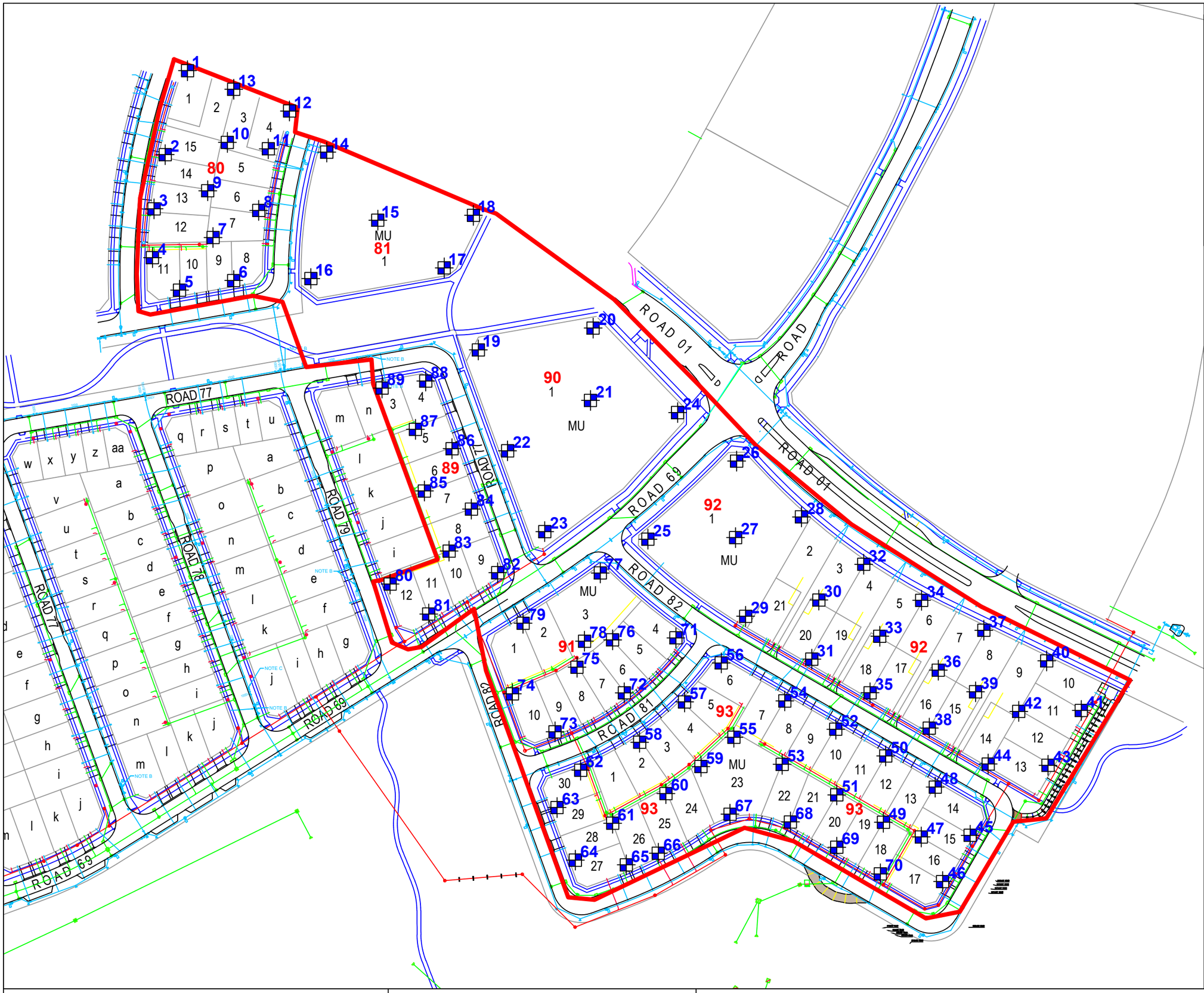

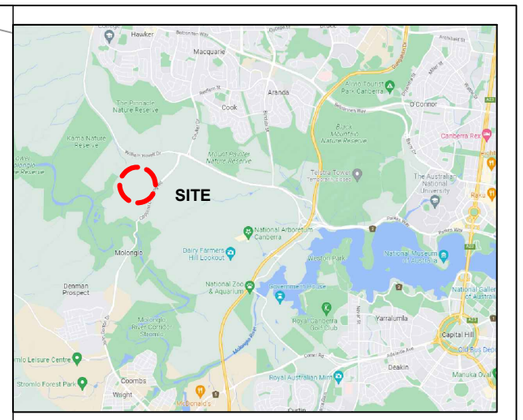

Locality Plan

LEGEND

- Approximate Test Pit Location
- Approximate Stage Boundary

NOTE: Base drawing from Group One, dated 15 March 2023

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Calibre Professional Services Pty Ltd		TITLE: **Test Location Plan**
OFFICE: Canberra	DRAWN BY: JH	**Proposed Residential Subdivision**
SCALE: As Shown	DATE: 3.05.2023	**Stage 3A, Whitlam Estate, Whitlam**

PROJECT No: 88556.17
DRAWING No: 1
REVISION: 0

TEST PIT LOG

CLIENT: Calibre Professional Services Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: Stage 3A, Whitlam

SURFACE LEVEL: D.S.L
EASTING: 202728
NORTHING: 603869

PIT No: 32
PROJECT No: 88556.17
DATE: 27/4/2023
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		Sandy CLAY (CI): medium plasticity, yellow brown, fine to coarse grained sand, trace ironstone nodules, w<PL, estimated stiff to very stiff, extremely weathered material							
	0.3	DACITE: fine to coarse grained, yellow brown, dry to moist, low to medium strength, highly weathered, fractured		D	0.5				
	0.6	Pit discontinued at 0.6m -Refusal							
	1								1

RIG: CAT 306 CR fitted with a 450mm wide toothed bucket

LOGGED: JH

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Design surface levels not provided. Coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Calibre Professional Services Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: Stage 3A, Whitlam

SURFACE LEVEL: D.S.L
EASTING: 202737
NORTHING: 603831

PIT No: 33
PROJECT No: 88556.17
DATE: 27/4/2023
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILL/Silty Sandy CLAY (CI): medium plasticity, brown, fine to coarse grained sand, trace gravel, trace cobbles, w<PL, FILL		D	0.5				
1	1.0	Sandy CLAY (CI): medium plasticity, yellow brown, fine to coarse grained sand, trace ironstone nodules, w<PL, estimated stiff to very stiff, extremely weathered material							1
	1.2	DACITE: fine to coarse grained, yellow brown, dry to moist, very low to low strength, highly weathered, fractured - from 1.3m, low to medium strength		D	1.4				
	1.5	Pit discontinued at 1.5m -Refusal							

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: CAT 306 CR fitted with a 450mm wide toothed bucket

LOGGED: JH

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Design surface levels not provided. Coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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SITE CLASSIFICATION REPORT SUMMARY

BLOCK:	**5**	**SECTION:**	**92**	**SUBURB:**	**Whitlam**
JOB No:	**88556.17**			**DATE:**	**May 2023**
CLIENT:	**Calibre Professional Services Pty Ltd**			**REV:**	**0**

Classification Procedures:

Existing Subsurface Conditions: Refer attached test pit log(s) – Pit(s) 33,34 and Drawing 1.

Bulk Earthworks: Controlled fill within the block was placed under Level 1 control as defined in AS 3798:2007.

Laboratory Results: Previous laboratory testing results indicated liquid limit ranging from 50-77%, plasticity index ranging from 35-61%, linear shrinkage ranging from 10-19% and shrink/swell index ranging from 0.01-3.50%.

Site Classification: Site classification in accordance with AS2870:2011 provides guidance on the patterns and magnitude of moisture related seasonal ground movements that must be considered in design. Based on the current soil profile / state, on limited subsurface information, soil reactivity and allowing for variation in the subsoil profile, the soil profile would be equivalent to Class M* (moderately reactive/filled) conditions. The site classification must be reassessed should the subsurface profile change by either cutting or filling and/or if the presence of service trenches, retaining walls or submerged structures are within the zone of influence of the proposed footings. Reference must be made to the comments provided below.

Footing Systems: Reference must be made to AS2870:2011 which indicates footing systems that are appropriate for each site classification. All footings must found within a uniform bearing stratum of suitable strength/material, below the zone of influence of any service trenches, backfill zones, retaining walls or underground structures. Masonry walls should be articulated in accordance with current best practice. Dwelling design must ensure suitable drainage and uniform moisture conditions are maintained in the vicinity of footings. Footing systems must be confirmed by a structural engineer taking into consideration any onsite or offsite constraints.

Maintenance Guidelines: Reference should be made to the attached CSIRO Sheet BTF 18 'Foundation Maintenance & Footing Performance' to comments about gardens, landscaping and trees on the performance of foundation soils and in particular in respect to maintaining good surface drainage. It notes that minor cracking in most structures is inevitable, and it describes site maintenance practices aimed at minimising foundation movements that can lead to cracking damage.

Comments/ Limitations:

The successful purchaser must make their own interpretations, deductions and conclusions from the information made available and will need to accept full responsibility for such interpretations, deductions and conclusions.

Development specific geotechnical investigations must be undertaken.

Additional topsoils / fill may have been spread subsequent to the investigation.

Site preparation prior to the construction should include removal of all vegetation, topsoil and any uncontrolled fill.

All new fill must be placed under controlled conditions (AS 3798:2007), otherwise Class P conditions would be warranted in those fill areas.

Some variability in subsurface conditions must be anticipated.

Moisture condition of site soils and/or the presence of groundwater may vary considerably from time of investigation compared to at the time of construction. Groundwater seepages are highly likely after heavy or prolonged rain.

Hard rock excavation must be anticipated across parts of the site. It is recommended that excavation depths be minimal to reduce potential site costs.

The above site classification is provided on the basis that all building materials/waste and stockpiles are removed from site and have not been spread across the site.

It is recommended that footing excavations be inspected by a geotechnical engineer.

This report must be read in conjunction with the attached "Limitations" and notes "About this Report".

References:

AS 2870:2011, Residential Slabs and Footings, Standards Australia.

AS 3798:2007, Guidelines on Earthworks for Commercial and Residential Developments, Standards Australia.

Attachments:

Limitations & About this Report
Explanatory Notes
Test Pit Log(s) Pit(s) 33,34
Drawing 1

Douglas Partners
Geotechnics / Environment / Groundwater

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Limitations

Douglas Partners (DP) has prepared this report for the project at Whitlam Stage 3A in accordance with DP's proposal dated 26 November 2021 and acceptance received from Evan Langham dated 15 March 2023. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Calibre Professional Services Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the geotechnical components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Sampling Methods

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Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Soil Descriptions

Douglas Partners

Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with 'Mix of Soil and Cobbles/Boulders' with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).

Rock Strength

Rock strength is defined by the Unconfined Compressive Strength and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $Is_{(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Abbreviation	Unconfined Compressive Strength MPa	Point Load Index * $Is_{(50)}$ MPa
Very low	VL	0.6 - 2	0.03 - 0.1
Low	L	2 - 6	0.1 - 0.3
Medium	M	6 - 20	0.3 - 1.0
High	H	20 - 60	1 - 3
Very high	VH	60 - 200	3 - 10
Extremely high	EH	>200	>10

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Residual Soil	RS	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely weathered	XW	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible
Highly weathered	HW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately weathered	MW	The whole of the rock material is discoloured , usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly weathered	SW	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh	FR	No signs of decomposition or staining.
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores.

Rock Descriptions

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections > 100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

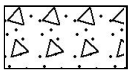
Symbols & Abbreviations

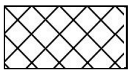
Graphic Symbols for Soil and Rock

General

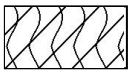

Asphalt

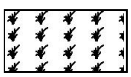

Road base

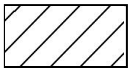

Concrete

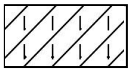

Filling

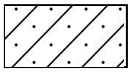
Soils


Topsoil

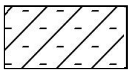

Peat

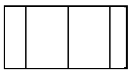

Clay

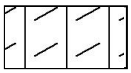

Silty clay

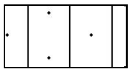

Sandy clay

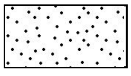

Gravelly clay

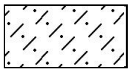

Shaly clay

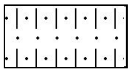

Silt


Clayey silt


Sandy silt

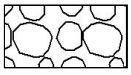

Sand

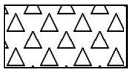

Clayey sand


Silty sand


Gravel

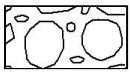

Sandy gravel


Cobbles, boulders

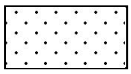

Talus

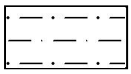
Sedimentary Rocks

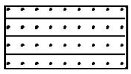

Boulder conglomerate

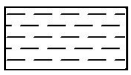

Conglomerate


Conglomeratic sandstone

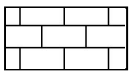

Sandstone


Siltstone

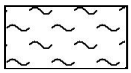

Laminite

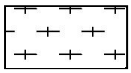

Mudstone, claystone, shale

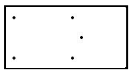

Coal


Limestone

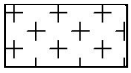
Metamorphic Rocks

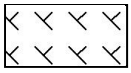

Slate, phyllite, schist

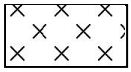

Gneiss

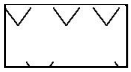

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

FOUNDATION MAINTENANCE AND FOOTING PERFORMANCE

Understanding and preventing soil-related building movement

This Building Technology Resource is designed to identify causes of soil-related building movement, and to suggest methods of prevention of resultant cracking.

Buildings can and often do move. This movement can be up, down, lateral or rotational. The fundamental cause of movement in buildings can usually be related to one or more problems in the foundation soil. It is important for the home owner to identify the soil type in order to ascertain the measures that should be put in place in order to ensure that problems in the foundation soil can be prevented, thus protecting against building movement.

SOIL TYPES

The types of soils usually present under the topsoil in land zoned for residential buildings can be split into two approximate groups – granular and clay. Quite often, foundation soil is a mixture of both types. The general problems associated with soils having granular content are usually caused by erosion. Clay soils are subject to saturation and swell/shrink problems.

Classifications for a given area can generally be obtained by application to the local authority, but these are sometimes unreliable and if there is doubt, a geotechnical report should be commissioned. As most buildings suffering movement problems are founded on clay soils, there is an emphasis on classification of soils according to the amount of swell and shrinkage they experience with variations of water content. Table 1 below is a reproduction of Table 2.1 from Australian Standard AS 2870-2011, Residential slabs and footings.

CAUSES OF MOVEMENT

SETTLEMENT DUE TO CONSTRUCTION

There are two types of settlement that occur as a result of construction:

- Immediate settlement occurs when a building is first placed on its foundation soil, as a result of compaction of the soil under the weight of the structure. The cohesive quality of clay soil mitigates against this, but granular (particularly sandy) soil is susceptible.
- Consolidation settlement is a feature of clay soil and may take place because of the expulsion of moisture from the soil or because of the soil's lack of resistance to local compressive or shear stresses. This will usually take place during the first few months after construction but has been known to take many years in exceptional cases.

These problems may be the province of the builder and should be taken into consideration as part of the preparation of the site for construction.

EROSION

All soils are prone to erosion, but sandy soil is particularly susceptible to being washed away. Even clay with a sand component of say 10% or more can suffer from erosion.

SATURATION

This is particularly a problem in clay soils. Saturation creates a bog-like suspension of the soil that causes it to lose virtually all of its bearing capacity. To a lesser degree, sand is affected by saturation because saturated sand may undergo a reduction in volume, particularly imported sand fill for bedding and blinding layers. However, this usually occurs as immediate settlement and should normally be the province of the builder.

SEASONAL SWELLING AND SHRINKAGE OF SOIL

All clays react to the presence of water by slowly absorbing it, making the soil increase in volume (see table below, from AS 2870). The degree of increase varies considerably between different clays, as does the degree of decrease during the subsequent drying out caused by fair weather periods. Because of the low absorption and expulsion rate, this phenomenon will not usually be noticeable unless there are prolonged rainy or dry periods, usually of weeks or months, depending on the land and soil characteristics.

The swelling of soil creates an upward force on the footings of the building, and shrinkage creates subsidence that takes away the support needed by the footing to retain equilibrium.

SHEAR FAILURE

This phenomenon occurs when the foundation soil does not have sufficient strength to support the weight of the footing. There are two major post-construction causes:

- Significant load increase.
- Reduction of lateral support of the soil under the footing due to erosion or excavation.

In clay soil, shear failure can be caused by saturation of the soil adjacent to or under the footing.

TREE ROOT GROWTH

Trees and shrubs that are allowed to grow in the vicinity of footings can cause foundation soil movement in two ways:

- Roots that grow under footings may increase in cross-sectional size, exerting upward pressure on footings.

TABLE 1. GENERAL DEFINITIONS OF SITE CLASSES.

Class	Foundation
A	Most sand and rock sites with little or no ground movement from moisture changes
S	Slightly reactive clay sites, which may experience only slight ground movement from moisture changes
M	Moderately reactive clay or silt sites, which may experience moderate ground movement from moisture changes
H1	Highly reactive clay sites, which may experience high ground movement from moisture changes
H2	Highly reactive clay sites, which may experience very high ground movement from moisture changes
F	Extremely reactive sites, which may experience extreme ground movement from moisture changes

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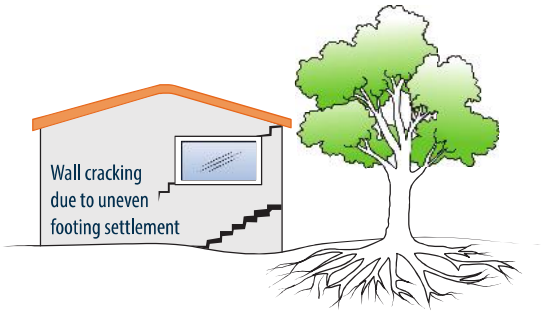

FIGURE 1 Trees can cause shrinkage and damage.

- Roots in the vicinity of footings will absorb much of the moisture in the foundation soil, causing shrinkage or subsidence.

UNEVENNESS OF MOVEMENT

The types of ground movement described above usually occur unevenly throughout the building's foundation soil. Settlement due to construction tends to be uneven because of:

- Differing compaction of foundation soil prior to construction.
- Differing moisture content of foundation soil prior to construction.

Movement due to non-construction causes is usually more uneven still. Erosion can undermine a footing that traverses the flow or can create the conditions for shear failure by eroding soil adjacent to a footing that runs in the same direction as the flow.

Saturation of clay foundation soil may occur where subfloor walls create a dam that makes water pond. It can also occur wherever there is a source of water near footings in clay soil. This leads to a severe reduction in the strength of the soil which may create local shear failure.

Seasonal swelling and shrinkage of clay soil affects the perimeter of the building first, then gradually spreads to the interior through absorption. The swelling process will usually begin at the uphill extreme of the building, or on the weather side where the land is flat. Shrinkage usually begins on the side of the building where the sun's heat is greatest.

EFFECTS OF UNEVEN SOIL MOVEMENT ON STRUCTURES

EROSION AND SATURATION

Erosion removes the support from under footings, tending to create subsidence of the part of the structure under which it occurs. Brickwork walls will resist the stress created by this removal of support by bridging the gap or cantilevering until the bricks or the mortar bedding fail. Older masonry has little resistance. Evidence of failure varies according to circumstances and symptoms may include:

- Step cracking in the mortar beds in the body of the wall or above/below openings such as doors or windows.
- Vertical cracking in the bricks (usually but not necessarily in line with the vertical beds or perpends).

Isolated piers affected by erosion or saturation of foundations will eventually lose contact with the bearers they support and may tilt or fall over. The floors that have lost this support will become bouncy, sometimes rattling ornaments etc.

SEASONAL SWELLING/SHRINKAGE IN CLAY

Swelling foundation soil due to rainy periods first lifts the most exposed extremities of the footing system, then the remainder of the perimeter footings while gradually permeating inside the building footprint to lift internal footings. This swelling first tends to create a dish effect, because the external footings are pushed higher than the internal ones.

The first noticeable symptom may be that the floor appears slightly dished. This is often accompanied by some doors binding on the floor or the door head, together with some cracking of cornice mitres. In buildings with timber flooring supported by bearers and joists, the floor can be bouncy. Externally there may be visible dishing of the hip or ridge lines.

As the moisture absorption process completes its journey to the innermost areas of the building, the internal footings will rise. If the spread of moisture is roughly even, it may be that the symptoms will temporarily disappear, but it is more likely that swelling will be uneven, creating a difference rather than a disappearance in symptoms. In buildings with timber flooring supported by bearers and joists, the isolated piers will rise more easily than the strip footings or piers under walls, creating noticeable doming of flooring.

As the weather pattern changes and the soil begins to dry out, the external footings will be first affected, beginning with the locations where the sun's effect is strongest. This has the effect of lowering the external footings. The doming is accentuated, and cracking reduces or disappears where it occurred because of dishing, but other cracks open up. The roof lines may become convex.

Doming and dishing are also affected by weather in other ways. In areas where warm, wet summers and cooler dry winters prevail, water migration tends to be toward the interior and doming will be accentuated, whereas where summers are dry, and winters are cold and wet, migration tends to be toward the exterior and the underlying propensity is toward dishing.

MOVEMENT CAUSED BY TREE ROOTS

In general, growing roots will exert an upward pressure on footings, whereas soil subject to drying because of tree or shrub roots will tend to remove support from under footings by inducing shrinkage.

COMPLICATIONS CAUSED BY THE STRUCTURE ITSELF

Most forces that the soil causes to be exerted on structures are vertical – i.e. either up or down. However, because these forces are seldom spread evenly around the footings, and because the building resists uneven movement because of its rigidity, forces are exerted from one part of the building to another. The net result of all these forces is usually rotational. This resultant force often complicates the diagnosis because the visible symptoms do not simply reflect the original cause. A common symptom is binding of doors on the vertical member of the frame.

EFFECTS ON FULL MASONRY STRUCTURES

Brickwork will resist cracking where it can. It will attempt to span areas that lose support because of subsided foundations or raised points. It is therefore usual to see cracking at weak points, such as openings for windows or doors.

In the event of construction settlement, cracking will usually remain unchanged after the process of settlement has ceased.

With local shear or erosion, cracking will usually continue to develop until the original cause has been remedied, or until the subsidence has completely neutralised the affected portion of footing and the structure has stabilised on other footings that remain effective.

In the case of swell/shrink effects, the brickwork will in some cases return to its original position after completion of a cycle, however it is more likely that the rotational effect will not be exactly reversed, and it is also usual that brickwork will settle in its new position and will resist the forces trying to return it to its original position. This means that in a case where swelling takes place after construction and cracking occurs, the cracking is likely to at least partly remain after the shrink segment of the cycle is complete. Thus, each time the cycle is repeated, the likelihood is that the cracking will become wider until the sections of brickwork become virtually independent.

With repeated cycles, once the cracking is established, if there is no other complication, it is normal for the incidence of cracking to stabilise, as the building has the articulation it needs to cope with the problem. This is by no means always the case, however, and monitoring of cracks in walls and floors should always be treated seriously.

Upheaval caused by growth of tree roots under footings is not a simple vertical shear stress. There is a tendency for the root to also

exert lateral forces that attempt to separate sections of brickwork after initial cracking has occurred.

The normal structural arrangement is that the inner leaf of brickwork in the external walls and at least some of the internal walls (depending on the roof type) comprise the load-bearing structure on which any upper floors, ceilings and the roof are supported. In these cases, it is internally visible cracking that should be the main focus of attention, however there are a few examples of dwellings whose external leaf of masonry plays some supporting role, so this should be checked if there is any doubt. In any case, externally visible cracking is important as a guide to stresses on the structure generally, and it should also be remembered that the external walls must be capable of supporting themselves.

EFFECTS ON FRAMED STRUCTURES

Timber or steel framed buildings are less likely to exhibit cracking due to swell/shrink than masonry buildings because of their flexibility. Also, the doming/dishing effects tend to be lower because of the lighter weight of walls. The main risks to framed buildings are encountered because of the isolated pier footings used under walls. Where erosion or saturation causes a footing to fall away, this can double the span which a wall must bridge. This additional stress can create cracking in wall linings, particularly where there is a weak point in the structure caused by a door or window opening. It is, however, unlikely that framed structures will be so stressed as to suffer serious damage without first exhibiting some or all of the above symptoms for a considerable period. The same warning period should apply in the case of upheaval. It should be noted, however, that where framed buildings are supported by strip footings there is only one leaf of brickwork and therefore the externally visible walls are the supporting structure for the building. In this case, the subfloor masonry walls can be expected to behave as full brickwork walls.

EFFECTS ON BRICK VENEER STRUCTURES

Because the load-bearing structure of a brick veneer building is the frame that makes up the interior leaf of the external walls plus perhaps the internal walls, depending on the type of roof, the building can be expected to behave as a framed structure, except that the external masonry will behave in a similar way to the external leaf of a full masonry structure.

WATER SERVICE AND DRAINAGE

Where a water service pipe, a sewer or stormwater drainage pipe is in the vicinity of a building, a water leak can cause erosion, swelling or saturation of susceptible soil. Even a minuscule leak can be enough to saturate a clay foundation. A leaking tap near a building can have the same effect. In addition, trenches containing pipes can become watercourses even though backfilled, particularly where broken rubble is used as fill. Water that runs along these trenches can be responsible for serious erosion, interstrata seepage into subfloor areas and saturation.

Pipe leakage and trench water flows also encourage tree and shrub roots to the source of water, complicating and exacerbating the problem. Poor roof plumbing can result in large volumes of rainwater being concentrated in a small area of soil:

- Incorrect falls in roof guttering may result in overflows, as may gutters blocked with leaves etc.
- Corroded guttering or downpipes can spill water to ground.
- Downpipes not positively connected to a proper stormwater collection system will direct a concentration of water to soil that is directly adjacent to footings, sometimes causing large-scale problems such as erosion, saturation and migration of water under the building.

SERIOUSNESS OF CRACKING

In general, most cracking found in masonry walls is a cosmetic nuisance only and can be kept in repair or even ignored. Table 2 below is a reproduction of Table C1 of AS 2870-2011.

AS 2870-2011 also publishes figures relating to cracking in concrete floors, however because wall cracking will usually reach the critical point significantly earlier than cracking in slabs, this table is not reproduced here.

PREVENTION AND CURE

PLUMBING

Where building movement is caused by water service, roof plumbing, sewer or stormwater failure, the remedy is to repair the problem. It is prudent, however, to consider also rerouting pipes away from the building where possible and relocating taps to positions where any leakage will not direct water to the building vicinity. Even where gully traps are present, there is sometimes sufficient spill to create erosion or saturation, particularly in modern installations using smaller diameter PVC fixtures. Indeed, some gully traps are not situated directly under the taps that are installed to charge them, with the result that water from the tap may enter the backfilled trench that houses the sewer piping. If the trench has been poorly backfilled, the water will either pond or flow along the bottom of the trench. As these trenches usually run alongside the footings and can be at a similar depth, it is not hard to see how any water that is thus directed into a trench can easily affect the foundation's ability to support footings or even gain entry to the subfloor area.

GROUND DRAINAGE

In all soils there is the capacity for water to travel on the surface and below it. Surface water flows can be established by inspection during and after heavy or prolonged rain. If necessary, a grated drain system connected to the stormwater collection system is usually an easy solution.

It is, however, sometimes necessary when attempting to prevent water migration that testing be carried out to establish watertable height and subsoil water flows. This subject may be regarded as an area for an expert consultant.

PROTECTION OF THE BUILDING PERIMETER

It is essential to remember that the soil that affects footings extends well beyond the actual building line. Watering of garden plants, shrubs and trees causes some of the most serious water problems.

For this reason, particularly where problems exist or are likely to occur, it is recommended that an apron of paving be installed around as much of the building perimeter as necessary. This paving should extend outwards a minimum of 900 mm (more in highly reactive soil) and should have a minimum fall away from the building of 1:60. The finished paving should be no less than 100 mm below brick vent bases.

It is prudent to relocate drainage pipes away from this paving, if possible, to avoid complications from future leakage. If this is not practical, earthenware pipes should be replaced by PVC and backfilling should be of the same soil type as the surrounding soil and compacted to the same density.

Except in areas where freezing of water is an issue, it is wise to remove taps in the building area and relocate them well away from the building – preferably not uphill.

It may be desirable to install a grated drain at the outside edge of the paving on the uphill side of the building. If subsoil drainage is needed this can be installed under the surface drain.

CONDENSATION

In buildings with a subfloor void, such as where bearers and joists support flooring, insufficient ventilation creates ideal conditions for condensation, particularly where there is little clearance between the floor and the ground. Condensation adds to the moisture already present in the subfloor and significantly slows the process of drying out. Installation of an adequate subfloor ventilation system, either natural or mechanical, is desirable.

TABLE 2. CLASSIFICATION OF DAMAGE WITH REFERENCE TO WALLS.

Description of typical damage and required repair	Approximate crack width limit	Damage category
Hairline cracks	<0.1 mm	0 – Negligible
Fine cracks which do not need repair	<1 mm	1 – Very Slight
Cracks noticeable but easily filled. Doors and windows stick slightly.	<5 mm	2 – Slight
Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weathertightness often impaired.	5–15 mm (or a number of cracks 3 mm or more in one group)	3 – Moderate
Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distort. Walls lean or bulge noticeably, some loss of bearing in beams. Service pipes disrupted.	15–25 mm but also depends on number of cracks	4 – Severe

Warning: Although this Building Technology Resource deals with cracking in buildings, it should be said that subfloor moisture can result in the development of other problems, notably:

- Water that is transmitted into masonry, metal or timber building elements causes damage and/or decay to those elements.
- High subfloor humidity and moisture content create an ideal environment for various pests, including termites and spiders, and mould.
- Where high moisture levels are transmitted to the flooring and walls, an increase in the dust mite count can ensue within the living areas. Dust mites, as well as dampness in general, can be a health hazard to inhabitants, particularly those who are abnormally susceptible to respiratory ailments.

THE GARDEN

The ideal vegetation layout is to have lawn or plants that require only light watering immediately adjacent to the drainage or paving edge, then more demanding plants, shrubs and trees spread out in that order.

Overwatering due to misuse of automatic watering systems is a common cause of saturation and water migration under footings. If it is necessary to use these systems, it is important to remove garden beds to a completely safe distance from buildings.

EXISTING TREES

Where a tree is causing a problem of soil drying or there is the existence or threat of upheaval of footings, if the offending roots are subsidiary and their removal will not significantly damage the tree, they should be severed and a concrete or metal barrier placed vertically in the soil to prevent future root growth in the direction of the building. If it is not possible to remove the relevant roots without damage to the tree, an application to remove the tree should be made to the local authority. A prudent plan is to transplant likely offenders before they become a problem.

INFORMATION ON TREES, PLANTS AND SHRUBS

State departments overseeing agriculture can give information regarding root patterns, volume of water needed and safe distance from buildings of most species. Botanic gardens are also sources of information.

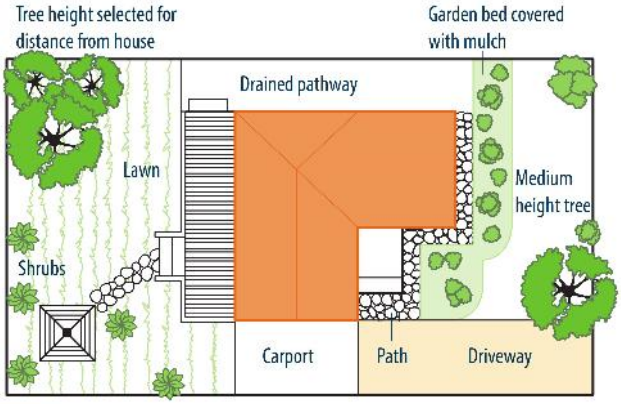

FIGURE 2 Gardens for a reactive site.

EXCAVATION

Excavation around footings must be properly engineered. Soil supporting footings can only be safely excavated at an angle that allows the soil under the footing to remain stable. This angle is called the angle of repose (or friction) and varies significantly between soil types and conditions. Removal of soil within the angle of repose will cause subsidence.

REMEDIATION

Where erosion has occurred that has washed away soil adjacent to footings, soil of the same classification should be introduced and compacted to the same density. Where footings have been undermined, augmentation or other specialist work may be required. Remediation of footings and foundations is generally the realm of a specialist consultant.

Where isolated footings rise and fall because of swell/shrink effect, the home owner may be tempted to alleviate floor bounce by filling the gap that has appeared between the bearer and the pier with blocking. The danger here is that when the next swell segment of the cycle occurs, the extra blocking will push the floor up into an accentuated dome and may also cause local shear failure in the soil. If it is necessary to use blocking, it should be by a pair of fine wedges and monitoring should be carried out fortnightly.

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For information about CSIRO testing services visit www.csiro.au/en/work-with-us/services
ISBN 9781486312962 (print)/9781486312979 (digital) © CSIRO 2021
(replaces Building Technology File 18, 18-2011 and Information Sheet 10/91)

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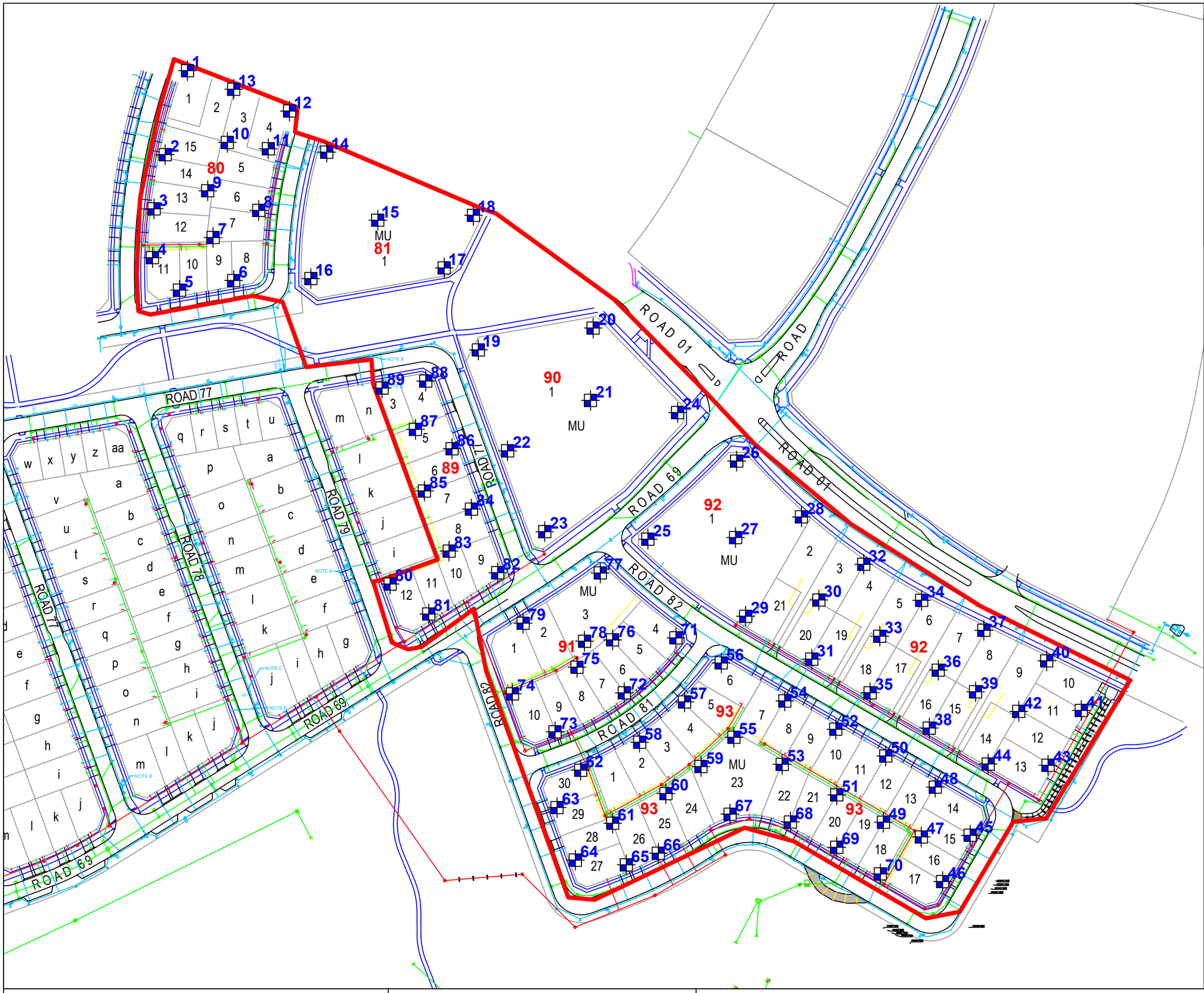

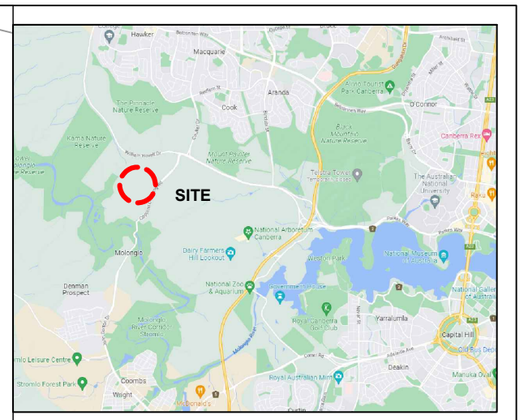

Locality Plan

LEGEND

- Approximate Test Pit Location
- Approximate Stage Boundary

NOTE: Base drawing from Group One, dated 15 March 2023

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Calibre Professional Services Pty Ltd		TITLE: **Test Location Plan**
OFFICE: Canberra	DRAWN BY: JH	**Proposed Residential Subdivision**
SCALE: As Shown	DATE: 3.05.2023	**Stage 3A, Whitlam Estate, Whitlam**

PROJECT No: 88556.17
DRAWING No: 1
REVISION: 0

TEST PIT LOG

CLIENT: Calibre Professional Services Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: Stage 3A, Whitlam

SURFACE LEVEL: D.S.L
EASTING: 202737
NORTHING: 603831

PIT No: 33
PROJECT No: 88556.17
DATE: 27/4/2023
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILL/Silty Sandy CLAY (CI): medium plasticity, brown, fine to coarse grained sand, trace gravel, trace cobbles, w<PL, FILL		D	0.5				
1	1.0	Sandy CLAY (CI): medium plasticity, yellow brown, fine to coarse grained sand, trace ironstone nodules, w<PL, estimated stiff to very stiff, extremely weathered material							1
	1.2	DACITE: fine to coarse grained, yellow brown, dry to moist, very low to low strength, highly weathered, fractured - from 1.3m, low to medium strength		D	1.4				
	1.5	Pit discontinued at 1.5m -Refusal							

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: CAT 306 CR fitted with a 450mm wide toothed bucket

LOGGED: JH

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Design surface levels not provided. Coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Calibre Professional Services Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: Stage 3A, Whitlam

SURFACE LEVEL: D.S.L
EASTING: 202758
NORTHING: 603851

PIT No: 34
PROJECT No: 88556.17
DATE: 27/4/2023
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILL/Silty Sandy CLAY (CI): medium plasticity, brown, fine to coarse grained sand, trace gravel, trace cobbles, w<PL, FILL		D	0.5				
	0.8	DACITE: fine to coarse grained, yellow brown, dry to moist, low to medium strength, highly weathered, fractured		D	1.0				1
	1.2	Pit discontinued at 1.2m -Limit of investigation							

RIG: CAT 306 CR fitted with a 450mm wide toothed bucket

LOGGED: JH

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Design surface levels not provided. Coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
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C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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SITE CLASSIFICATION REPORT SUMMARY

BLOCK:	**18**	**SECTION:**	**92**	**SUBURB:**	**Whitlam**
JOB No:	**88556.17**			**DATE:**	**May 2023**
CLIENT:	**Calibre Professional Services Pty Ltd**			**REV:**	**0**

Classification Procedures:

Existing Subsurface Conditions: Refer attached test pit log(s) – Pit(s) 33,35 and Drawing 1.

Bulk Earthworks: Controlled fill within the block was placed under Level 1 control as defined in AS 3798:2007.

Laboratory Results: Previous laboratory testing results indicated liquid limit ranging from 50-77%, plasticity index ranging from 35-61%, linear shrinkage ranging from 10-19% and shrink/swell index ranging from 0.01-3.50%.

Site Classification: Site classification in accordance with AS2870:2011 provides guidance on the patterns and magnitude of moisture related seasonal ground movements that must be considered in design. Based on the current soil profile / state, on limited subsurface information, soil reactivity and allowing for variation in the subsoil profile, the soil profile would be equivalent to Class H1* (highly reactive/filled) conditions. The site classification must be reassessed should the subsurface profile change by either cutting or filling and/or if the presence of service trenches, retaining walls or submerged structures are within the zone of influence of the proposed footings. Reference must be made to the comments provided below.

Footing Systems: Reference must be made to AS2870:2011 which indicates footing systems that are appropriate for each site classification. All footings must found within a uniform bearing stratum of suitable strength/material, below the zone of influence of any service trenches, backfill zones, retaining walls or underground structures. Masonry walls should be articulated in accordance with current best practice. Dwelling design must ensure suitable drainage and uniform moisture conditions are maintained in the vicinity of footings. Footing systems must be confirmed by a structural engineer taking into consideration any onsite or offsite constraints.

Maintenance Guidelines: Reference should be made to the attached CSIRO Sheet BTF 18 'Foundation Maintenance & Footing Performance' to comments about gardens, landscaping and trees on the performance of foundation soils and in particular in respect to maintaining good surface drainage. It notes that minor cracking in most structures is inevitable, and it describes site maintenance practices aimed at minimising foundation movements that can lead to cracking damage.

Comments/ Limitations:

The successful purchaser must make their own interpretations, deductions and conclusions from the information made available and will need to accept full responsibility for such interpretations, deductions and conclusions.

Development specific geotechnical investigations must be undertaken.

Additional topsoils / fill may have been spread subsequent to the investigation.

Site preparation prior to the construction should include removal of all vegetation, topsoil and any uncontrolled fill.

All new fill must be placed under controlled conditions (AS 3798:2007), otherwise Class P conditions would be warranted in those fill areas.

Some variability in subsurface conditions must be anticipated.

Moisture condition of site soils and/or the presence of groundwater may vary considerably from time of investigation compared to at the time of construction. Groundwater seepages are highly likely after heavy or prolonged rain.

Depending on the depth of site cut and trenches, hard rock excavation may be required.

The above site classification is provided on the basis that all building materials/waste and stockpiles are removed from site and have not been spread across the site.

It is recommended that footing excavations be inspected by a geotechnical engineer.

This report must be read in conjunction with the attached "Limitations" and notes "About this Report".

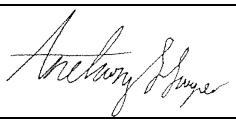
References:

AS 2870:2011, Residential Slabs and Footings, Standards Australia.

AS 3798:2007, Guidelines on Earthworks for Commercial and Residential Developments, Standards Australia.

Attachments:

Limitations & About this Report
Explanatory Notes
Test Pit Log(s) Pit(s) 33,35
Drawing 1



Douglas Partners
Geotechnics / Environment / Groundwater

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Limitations

Douglas Partners (DP) has prepared this report for the project at Whitlam Stage 3A in accordance with DP's proposal dated 26 November 2021 and acceptance received from Evan Langham dated 15 March 2023. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Calibre Professional Services Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the geotechnical components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

Copyright

Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Sampling Methods

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Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Soil Descriptions

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Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with 'Mix of Soil and Cobbles/Boulders' with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).

Rock Strength

Rock strength is defined by the Unconfined Compressive Strength and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $Is_{(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Abbreviation	Unconfined Compressive Strength MPa	Point Load Index * $Is_{(50)}$ MPa
Very low	VL	0.6 - 2	0.03 - 0.1
Low	L	2 - 6	0.1 - 0.3
Medium	M	6 - 20	0.3 - 1.0
High	H	20 - 60	1 - 3
Very high	VH	60 - 200	3 - 10
Extremely high	EH	>200	>10

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Residual Soil	RS	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely weathered	XW	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible
Highly weathered	HW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately weathered	MW	The whole of the rock material is discoloured , usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly weathered	SW	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh	FR	No signs of decomposition or staining.
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores.

Rock Descriptions

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections > 100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

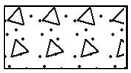
Symbols & Abbreviations

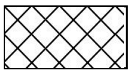
Graphic Symbols for Soil and Rock

General

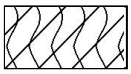

Asphalt


Road base


Concrete


Filling

Soils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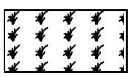
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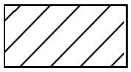
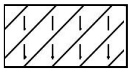
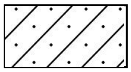
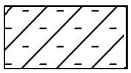
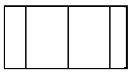

Clay

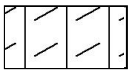

Silty clay

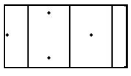

Sandy clay


Gravelly clay


Shaly clay


Silt


Clayey silt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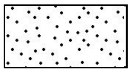
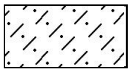

Sand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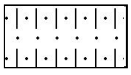
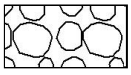
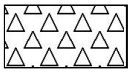

Silty sand


Gravel

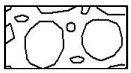

Sandy gravel


Cobbles, boulders

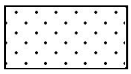

Talus

Sedimentary Rocks


Boulder conglomerate


Conglomerate


Conglomeratic sandstone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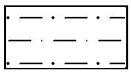
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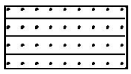
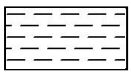
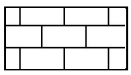
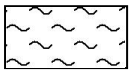

Laminite

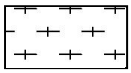

Mudstone, claystone, shale


Coal


Limestone

Metamorphic Rocks


Slate, phyllite, schist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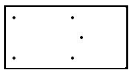
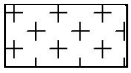
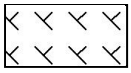
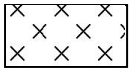
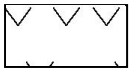

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

FOUNDATION MAINTENANCE AND FOOTING PERFORMANCE

Understanding and preventing soil-related building movement

This Building Technology Resource is designed to identify causes of soil-related building movement, and to suggest methods of prevention of resultant cracking.

Buildings can and often do move. This movement can be up, down, lateral or rotational. The fundamental cause of movement in buildings can usually be related to one or more problems in the foundation soil. It is important for the home owner to identify the soil type in order to ascertain the measures that should be put in place in order to ensure that problems in the foundation soil can be prevented, thus protecting against building movement.

SOIL TYPES

The types of soils usually present under the topsoil in land zoned for residential buildings can be split into two approximate groups – granular and clay. Quite often, foundation soil is a mixture of both types. The general problems associated with soils having granular content are usually caused by erosion. Clay soils are subject to saturation and swell/shrink problems.

Classifications for a given area can generally be obtained by application to the local authority, but these are sometimes unreliable and if there is doubt, a geotechnical report should be commissioned. As most buildings suffering movement problems are founded on clay soils, there is an emphasis on classification of soils according to the amount of swell and shrinkage they experience with variations of water content. Table 1 below is a reproduction of Table 2.1 from Australian Standard AS 2870-2011, Residential slabs and footings.

CAUSES OF MOVEMENT

SETTLEMENT DUE TO CONSTRUCTION

There are two types of settlement that occur as a result of construction:

- Immediate settlement occurs when a building is first placed on its foundation soil, as a result of compaction of the soil under the weight of the structure. The cohesive quality of clay soil mitigates against this, but granular (particularly sandy) soil is susceptible.
- Consolidation settlement is a feature of clay soil and may take place because of the expulsion of moisture from the soil or because of the soil's lack of resistance to local compressive or shear stresses. This will usually take place during the first few months after construction but has been known to take many years in exceptional cases.

These problems may be the province of the builder and should be taken into consideration as part of the preparation of the site for construction.

EROSION

All soils are prone to erosion, but sandy soil is particularly susceptible to being washed away. Even clay with a sand component of say 10% or more can suffer from erosion.

SATURATION

This is particularly a problem in clay soils. Saturation creates a bog-like suspension of the soil that causes it to lose virtually all of its bearing capacity. To a lesser degree, sand is affected by saturation because saturated sand may undergo a reduction in volume, particularly imported sand fill for bedding and blinding layers. However, this usually occurs as immediate settlement and should normally be the province of the builder.

SEASONAL SWELLING AND SHRINKAGE OF SOIL

All clays react to the presence of water by slowly absorbing it, making the soil increase in volume (see table below, from AS 2870). The degree of increase varies considerably between different clays, as does the degree of decrease during the subsequent drying out caused by fair weather periods. Because of the low absorption and expulsion rate, this phenomenon will not usually be noticeable unless there are prolonged rainy or dry periods, usually of weeks or months, depending on the land and soil characteristics.

The swelling of soil creates an upward force on the footings of the building, and shrinkage creates subsidence that takes away the support needed by the footing to retain equilibrium.

SHEAR FAILURE

This phenomenon occurs when the foundation soil does not have sufficient strength to support the weight of the footing. There are two major post-construction causes:

- Significant load increase.
- Reduction of lateral support of the soil under the footing due to erosion or excavation.

In clay soil, shear failure can be caused by saturation of the soil adjacent to or under the footing.

TREE ROOT GROWTH

Trees and shrubs that are allowed to grow in the vicinity of footings can cause foundation soil movement in two ways:

- Roots that grow under footings may increase in cross-sectional size, exerting upward pressure on footings.

TABLE 1. GENERAL DEFINITIONS OF SITE CLASSES.

Class	Foundation
A	Most sand and rock sites with little or no ground movement from moisture changes
S	Slightly reactive clay sites, which may experience only slight ground movement from moisture changes
M	Moderately reactive clay or silt sites, which may experience moderate ground movement from moisture changes
H1	Highly reactive clay sites, which may experience high ground movement from moisture changes
H2	Highly reactive clay sites, which may experience very high ground movement from moisture changes
F	Extremely reactive sites, which may experience extreme ground movement from moisture changes

Source: Reproduced with the permission of Standards Australia Limited © 2011. Copyright in AS 2870-2011 Residential slabs and footings vests in Standards Australia Limited.

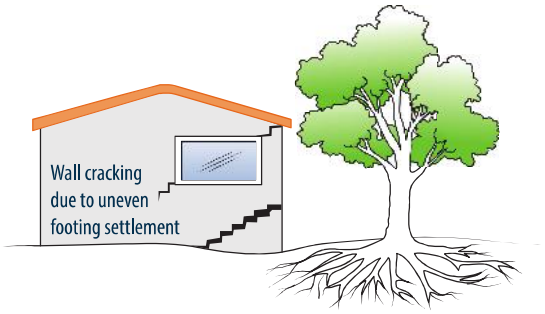


FIGURE 1 Trees can cause shrinkage and damage.

- Roots in the vicinity of footings will absorb much of the moisture in the foundation soil, causing shrinkage or subsidence.

UNEVENNESS OF MOVEMENT

The types of ground movement described above usually occur unevenly throughout the building's foundation soil. Settlement due to construction tends to be uneven because of:

- Differing compaction of foundation soil prior to construction.
- Differing moisture content of foundation soil prior to construction.

Movement due to non-construction causes is usually more uneven still. Erosion can undermine a footing that traverses the flow or can create the conditions for shear failure by eroding soil adjacent to a footing that runs in the same direction as the flow.

Saturation of clay foundation soil may occur where subfloor walls create a dam that makes water pond. It can also occur wherever there is a source of water near footings in clay soil. This leads to a severe reduction in the strength of the soil which may create local shear failure.

Seasonal swelling and shrinkage of clay soil affects the perimeter of the building first, then gradually spreads to the interior through absorption. The swelling process will usually begin at the uphill extreme of the building, or on the weather side where the land is flat. Shrinkage usually begins on the side of the building where the sun's heat is greatest.

EFFECTS OF UNEVEN SOIL MOVEMENT ON STRUCTURES

EROSION AND SATURATION

Erosion removes the support from under footings, tending to create subsidence of the part of the structure under which it occurs. Brickwork walls will resist the stress created by this removal of support by bridging the gap or cantilevering until the bricks or the mortar bedding fail. Older masonry has little resistance. Evidence of failure varies according to circumstances and symptoms may include:

- Step cracking in the mortar beds in the body of the wall or above/below openings such as doors or windows.
- Vertical cracking in the bricks (usually but not necessarily in line with the vertical beds or perpends).

Isolated piers affected by erosion or saturation of foundations will eventually lose contact with the bearers they support and may tilt or fall over. The floors that have lost this support will become bouncy, sometimes rattling ornaments etc.

SEASONAL SWELLING/SHRINKAGE IN CLAY

Swelling foundation soil due to rainy periods first lifts the most exposed extremities of the footing system, then the remainder of the perimeter footings while gradually permeating inside the building footprint to lift internal footings. This swelling first tends to create a dish effect, because the external footings are pushed higher than the internal ones.

The first noticeable symptom may be that the floor appears slightly dished. This is often accompanied by some doors binding on the floor or the door head, together with some cracking of cornice mitres. In buildings with timber flooring supported by bearers and joists, the floor can be bouncy. Externally there may be visible dishing of the hip or ridge lines.

As the moisture absorption process completes its journey to the innermost areas of the building, the internal footings will rise. If the spread of moisture is roughly even, it may be that the symptoms will temporarily disappear, but it is more likely that swelling will be uneven, creating a difference rather than a disappearance in symptoms. In buildings with timber flooring supported by bearers and joists, the isolated piers will rise more easily than the strip footings or piers under walls, creating noticeable doming of flooring.

As the weather pattern changes and the soil begins to dry out, the external footings will be first affected, beginning with the locations where the sun's effect is strongest. This has the effect of lowering the external footings. The doming is accentuated, and cracking reduces or disappears where it occurred because of dishing, but other cracks open up. The roof lines may become convex.

Doming and dishing are also affected by weather in other ways. In areas where warm, wet summers and cooler dry winters prevail, water migration tends to be toward the interior and doming will be accentuated, whereas where summers are dry, and winters are cold and wet, migration tends to be toward the exterior and the underlying propensity is toward dishing.

MOVEMENT CAUSED BY TREE ROOTS

In general, growing roots will exert an upward pressure on footings, whereas soil subject to drying because of tree or shrub roots will tend to remove support from under footings by inducing shrinkage.

COMPLICATIONS CAUSED BY THE STRUCTURE ITSELF

Most forces that the soil causes to be exerted on structures are vertical – i.e. either up or down. However, because these forces are seldom spread evenly around the footings, and because the building resists uneven movement because of its rigidity, forces are exerted from one part of the building to another. The net result of all these forces is usually rotational. This resultant force often complicates the diagnosis because the visible symptoms do not simply reflect the original cause. A common symptom is binding of doors on the vertical member of the frame.

EFFECTS ON FULL MASONRY STRUCTURES

Brickwork will resist cracking where it can. It will attempt to span areas that lose support because of subsided foundations or raised points. It is therefore usual to see cracking at weak points, such as openings for windows or doors.

In the event of construction settlement, cracking will usually remain unchanged after the process of settlement has ceased.

With local shear or erosion, cracking will usually continue to develop until the original cause has been remedied, or until the subsidence has completely neutralised the affected portion of footing and the structure has stabilised on other footings that remain effective.

In the case of swell/shrink effects, the brickwork will in some cases return to its original position after completion of a cycle, however it is more likely that the rotational effect will not be exactly reversed, and it is also usual that brickwork will settle in its new position and will resist the forces trying to return it to its original position. This means that in a case where swelling takes place after construction and cracking occurs, the cracking is likely to at least partly remain after the shrink segment of the cycle is complete. Thus, each time the cycle is repeated, the likelihood is that the cracking will become wider until the sections of brickwork become virtually independent.

With repeated cycles, once the cracking is established, if there is no other complication, it is normal for the incidence of cracking to stabilise, as the building has the articulation it needs to cope with the problem. This is by no means always the case, however, and monitoring of cracks in walls and floors should always be treated seriously.

Upheaval caused by growth of tree roots under footings is not a simple vertical shear stress. There is a tendency for the root to also

exert lateral forces that attempt to separate sections of brickwork after initial cracking has occurred.

The normal structural arrangement is that the inner leaf of brickwork in the external walls and at least some of the internal walls (depending on the roof type) comprise the load-bearing structure on which any upper floors, ceilings and the roof are supported. In these cases, it is internally visible cracking that should be the main focus of attention, however there are a few examples of dwellings whose external leaf of masonry plays some supporting role, so this should be checked if there is any doubt. In any case, externally visible cracking is important as a guide to stresses on the structure generally, and it should also be remembered that the external walls must be capable of supporting themselves.

EFFECTS ON FRAMED STRUCTURES

Timber or steel framed buildings are less likely to exhibit cracking due to swell/shrink than masonry buildings because of their flexibility. Also, the doming/dishing effects tend to be lower because of the lighter weight of walls. The main risks to framed buildings are encountered because of the isolated pier footings used under walls. Where erosion or saturation causes a footing to fall away, this can double the span which a wall must bridge. This additional stress can create cracking in wall linings, particularly where there is a weak point in the structure caused by a door or window opening. It is, however, unlikely that framed structures will be so stressed as to suffer serious damage without first exhibiting some or all of the above symptoms for a considerable period. The same warning period should apply in the case of upheaval. It should be noted, however, that where framed buildings are supported by strip footings there is only one leaf of brickwork and therefore the externally visible walls are the supporting structure for the building. In this case, the subfloor masonry walls can be expected to behave as full brickwork walls.

EFFECTS ON BRICK VENEER STRUCTURES

Because the load-bearing structure of a brick veneer building is the frame that makes up the interior leaf of the external walls plus perhaps the internal walls, depending on the type of roof, the building can be expected to behave as a framed structure, except that the external masonry will behave in a similar way to the external leaf of a full masonry structure.

WATER SERVICE AND DRAINAGE

Where a water service pipe, a sewer or stormwater drainage pipe is in the vicinity of a building, a water leak can cause erosion, swelling or saturation of susceptible soil. Even a minuscule leak can be enough to saturate a clay foundation. A leaking tap near a building can have the same effect. In addition, trenches containing pipes can become watercourses even though backfilled, particularly where broken rubble is used as fill. Water that runs along these trenches can be responsible for serious erosion, interstrata seepage into subfloor areas and saturation.

Pipe leakage and trench water flows also encourage tree and shrub roots to the source of water, complicating and exacerbating the problem. Poor roof plumbing can result in large volumes of rainwater being concentrated in a small area of soil:

- Incorrect falls in roof guttering may result in overflows, as may gutters blocked with leaves etc.
- Corroded guttering or downpipes can spill water to ground.
- Downpipes not positively connected to a proper stormwater collection system will direct a concentration of water to soil that is directly adjacent to footings, sometimes causing large-scale problems such as erosion, saturation and migration of water under the building.

SERIOUSNESS OF CRACKING

In general, most cracking found in masonry walls is a cosmetic nuisance only and can be kept in repair or even ignored. Table 2 below is a reproduction of Table C1 of AS 2870-2011.

AS 2870-2011 also publishes figures relating to cracking in concrete floors, however because wall cracking will usually reach the critical point significantly earlier than cracking in slabs, this table is not reproduced here.

PREVENTION AND CURE

PLUMBING

Where building movement is caused by water service, roof plumbing, sewer or stormwater failure, the remedy is to repair the problem. It is prudent, however, to consider also rerouting pipes away from the building where possible and relocating taps to positions where any leakage will not direct water to the building vicinity. Even where gully traps are present, there is sometimes sufficient spill to create erosion or saturation, particularly in modern installations using smaller diameter PVC fixtures. Indeed, some gully traps are not situated directly under the taps that are installed to charge them, with the result that water from the tap may enter the backfilled trench that houses the sewer piping. If the trench has been poorly backfilled, the water will either pond or flow along the bottom of the trench. As these trenches usually run alongside the footings and can be at a similar depth, it is not hard to see how any water that is thus directed into a trench can easily affect the foundation's ability to support footings or even gain entry to the subfloor area.

GROUND DRAINAGE

In all soils there is the capacity for water to travel on the surface and below it. Surface water flows can be established by inspection during and after heavy or prolonged rain. If necessary, a grated drain system connected to the stormwater collection system is usually an easy solution.

It is, however, sometimes necessary when attempting to prevent water migration that testing be carried out to establish watertable height and subsoil water flows. This subject may be regarded as an area for an expert consultant.

PROTECTION OF THE BUILDING PERIMETER

It is essential to remember that the soil that affects footings extends well beyond the actual building line. Watering of garden plants, shrubs and trees causes some of the most serious water problems.

For this reason, particularly where problems exist or are likely to occur, it is recommended that an apron of paving be installed around as much of the building perimeter as necessary. This paving should extend outwards a minimum of 900 mm (more in highly reactive soil) and should have a minimum fall away from the building of 1:60. The finished paving should be no less than 100 mm below brick vent bases.

It is prudent to relocate drainage pipes away from this paving, if possible, to avoid complications from future leakage. If this is not practical, earthenware pipes should be replaced by PVC and backfilling should be of the same soil type as the surrounding soil and compacted to the same density.

Except in areas where freezing of water is an issue, it is wise to remove taps in the building area and relocate them well away from the building – preferably not uphill.

It may be desirable to install a grated drain at the outside edge of the paving on the uphill side of the building. If subsoil drainage is needed this can be installed under the surface drain.

CONDENSATION

In buildings with a subfloor void, such as where bearers and joists support flooring, insufficient ventilation creates ideal conditions for condensation, particularly where there is little clearance between the floor and the ground. Condensation adds to the moisture already present in the subfloor and significantly slows the process of drying out. Installation of an adequate subfloor ventilation system, either natural or mechanical, is desirable.

TABLE 2. CLASSIFICATION OF DAMAGE WITH REFERENCE TO WALLS.

Description of typical damage and required repair	Approximate crack width limit	Damage category
Hairline cracks	<0.1 mm	0 – Negligible
Fine cracks which do not need repair	<1 mm	1 – Very Slight
Cracks noticeable but easily filled. Doors and windows stick slightly.	<5 mm	2 – Slight
Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weathertightness often impaired.	5–15 mm (or a number of cracks 3 mm or more in one group)	3 – Moderate
Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distort. Walls lean or bulge noticeably, some loss of bearing in beams. Service pipes disrupted.	15–25 mm but also depends on number of cracks	4 – Severe

Warning: Although this Building Technology Resource deals with cracking in buildings, it should be said that subfloor moisture can result in the development of other problems, notably:

- Water that is transmitted into masonry, metal or timber building elements causes damage and/or decay to those elements.
- High subfloor humidity and moisture content create an ideal environment for various pests, including termites and spiders, and mould.
- Where high moisture levels are transmitted to the flooring and walls, an increase in the dust mite count can ensue within the living areas. Dust mites, as well as dampness in general, can be a health hazard to inhabitants, particularly those who are abnormally susceptible to respiratory ailments.

THE GARDEN

The ideal vegetation layout is to have lawn or plants that require only light watering immediately adjacent to the drainage or paving edge, then more demanding plants, shrubs and trees spread out in that order.

Overwatering due to misuse of automatic watering systems is a common cause of saturation and water migration under footings. If it is necessary to use these systems, it is important to remove garden beds to a completely safe distance from buildings.

EXISTING TREES

Where a tree is causing a problem of soil drying or there is the existence or threat of upheaval of footings, if the offending roots are subsidiary and their removal will not significantly damage the tree, they should be severed and a concrete or metal barrier placed vertically in the soil to prevent future root growth in the direction of the building. If it is not possible to remove the relevant roots without damage to the tree, an application to remove the tree should be made to the local authority. A prudent plan is to transplant likely offenders before they become a problem.

INFORMATION ON TREES, PLANTS AND SHRUBS

State departments overseeing agriculture can give information regarding root patterns, volume of water needed and safe distance from buildings of most species. Botanic gardens are also sources of information.

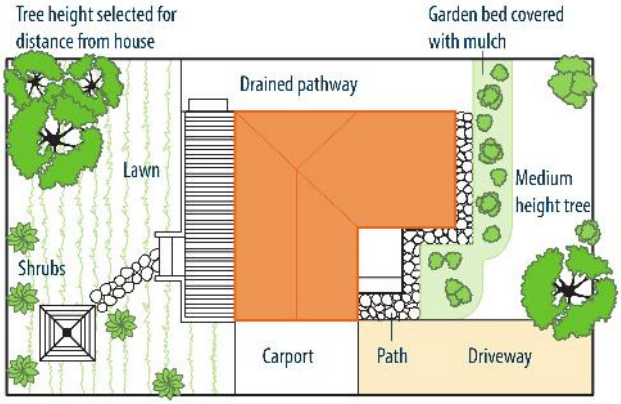


FIGURE 2 Gardens for a reactive site.

EXCAVATION

Excavation around footings must be properly engineered. Soil supporting footings can only be safely excavated at an angle that allows the soil under the footing to remain stable. This angle is called the angle of repose (or friction) and varies significantly between soil types and conditions. Removal of soil within the angle of repose will cause subsidence.

REMEDIATION

Where erosion has occurred that has washed away soil adjacent to footings, soil of the same classification should be introduced and compacted to the same density. Where footings have been undermined, augmentation or other specialist work may be required. Remediation of footings and foundations is generally the realm of a specialist consultant.

Where isolated footings rise and fall because of swell/shrink effect, the home owner may be tempted to alleviate floor bounce by filling the gap that has appeared between the bearer and the pier with blocking. The danger here is that when the next swell segment of the cycle occurs, the extra blocking will push the floor up into an accentuated dome and may also cause local shear failure in the soil. If it is necessary to use blocking, it should be by a pair of fine wedges and monitoring should be carried out fortnightly.

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For information about CSIRO testing services visit www.csiro.au/en/work-with-us/services
ISBN 9781486312962 (print)/9781486312979 (digital) © CSIRO 2021
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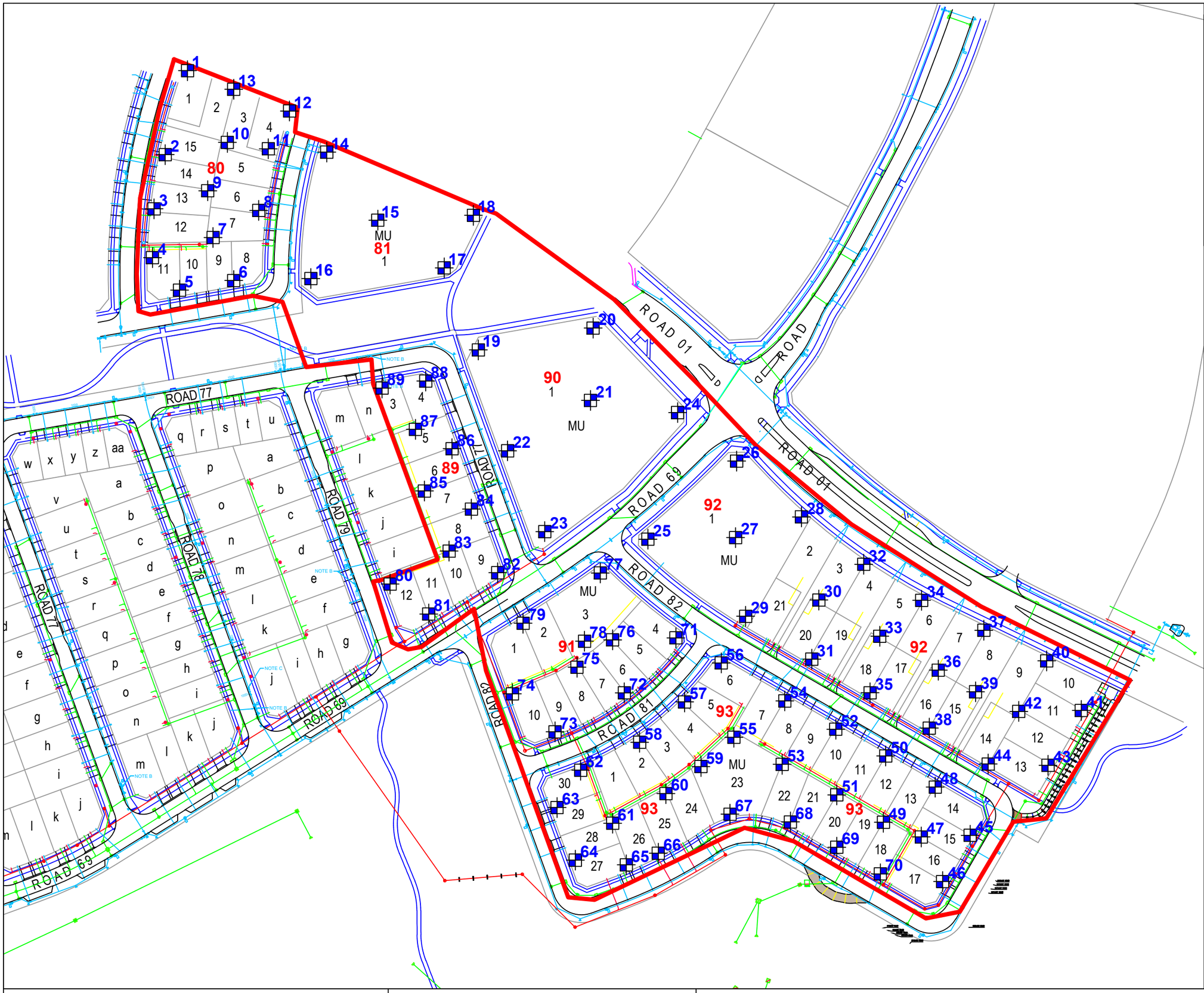

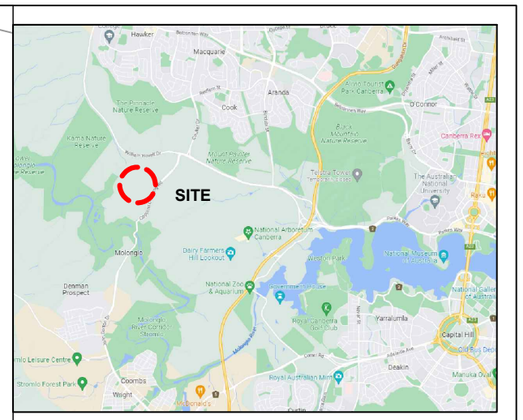

Locality Plan

LEGEND

- Approximate Test Pit Location
- Approximate Stage Boundary

NOTE: Base drawing from Group One, dated 15 March 2023

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Calibre Professional Services Pty Ltd		TITLE: **Test Location Plan**
OFFICE: Canberra	DRAWN BY: JH	**Proposed Residential Subdivision**
SCALE: As Shown	DATE: 3.05.2023	**Stage 3A, Whitlam Estate, Whitlam**

PROJECT No: 88556.17
DRAWING No: 1
REVISION: 0

TEST PIT LOG

CLIENT: Calibre Professional Services Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: Stage 3A, Whitlam

SURFACE LEVEL: D.S.L
EASTING: 202737
NORTHING: 603831

PIT No: 33
PROJECT No: 88556.17
DATE: 27/4/2023
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILL/Silty Sandy CLAY (CI): medium plasticity, brown, fine to coarse grained sand, trace gravel, trace cobbles, w<PL, FILL		D	0.5				
1	1.0	Sandy CLAY (CI): medium plasticity, yellow brown, fine to coarse grained sand, trace ironstone nodules, w<PL, estimated stiff to very stiff, extremely weathered material							1
	1.2	DACITE: fine to coarse grained, yellow brown, dry to moist, very low to low strength, highly weathered, fractured - from 1.3m, low to medium strength		D	1.4				
	1.5	Pit discontinued at 1.5m -Refusal							

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: CAT 306 CR fitted with a 450mm wide toothed bucket

LOGGED: JH

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Design surface levels not provided. Coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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TEST PIT LOG

CLIENT: Calibre Professional Services Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: Stage 3A, Whitlam

SURFACE LEVEL: D.S.L
EASTING: 202731
NORTHING: 603803

PIT No: 35
PROJECT No: 88556.17
DATE: 27/4/2023
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
	1	FILL/Silty Sandy CLAY (CI): medium plasticity, brown, fine to coarse grained sand, trace gravel, trace cobbles, w<PL, FILL		D	0.6				1
	1.2	Sandy CLAY (CI): medium plasticity, red brown, fine to coarse grained sand, trace ironstone nodules, w<PL, estimated stiff to very stiff, residual		D	1.3				
	1.4	Pit discontinued at 1.4m -Limit of investigation							

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: CAT 306 CR fitted with a 450mm wide toothed bucket

LOGGED: JH

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Design surface levels not provided. Coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

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SITE CLASSIFICATION REPORT SUMMARY

BLOCK:	**19**	**SECTION:**	**92**	**SUBURB:**	**Whitlam**
JOB No:	**88556.17**			**DATE:**	**May 2023**
CLIENT:	**Calibre Professional Services Pty Ltd**			**REV:**	**0**

Classification Procedures:

Existing Subsurface Conditions: Refer attached test pit log(s) – Pit(s) 33,31 and Drawing 1.

Bulk Earthworks: Controlled fill within the block was placed under Level 1 control as defined in AS 3798:2007.

Laboratory Results: Previous laboratory testing results indicated liquid limit ranging from 50-77%, plasticity index ranging from 35-61%, linear shrinkage ranging from 10-19% and shrink/swell index ranging from 0.01-3.50%.

Site Classification: Site classification in accordance with AS2870:2011 provides guidance on the patterns and magnitude of moisture related seasonal ground movements that must be considered in design. Based on the current soil profile / state, on limited subsurface information, soil reactivity and allowing for variation in the subsoil profile, the soil profile would be equivalent to Class H1* (highly reactive/filled) conditions. The site classification must be reassessed should the subsurface profile change by either cutting or filling and/or if the presence of service trenches, retaining walls or submerged structures are within the zone of influence of the proposed footings. Reference must be made to the comments provided below.

Footing Systems: Reference must be made to AS2870:2011 which indicates footing systems that are appropriate for each site classification. All footings must found within a uniform bearing stratum of suitable strength/material, below the zone of influence of any service trenches, backfill zones, retaining walls or underground structures. Masonry walls should be articulated in accordance with current best practice. Dwelling design must ensure suitable drainage and uniform moisture conditions are maintained in the vicinity of footings. Footing systems must be confirmed by a structural engineer taking into consideration any onsite or offsite constraints.

Maintenance Guidelines: Reference should be made to the attached CSIRO Sheet BTF 18 'Foundation Maintenance & Footing Performance' to comments about gardens, landscaping and trees on the performance of foundation soils and in particular in respect to maintaining good surface drainage. It notes that minor cracking in most structures is inevitable, and it describes site maintenance practices aimed at minimising foundation movements that can lead to cracking damage.

Comments/ Limitations:

The successful purchaser must make their own interpretations, deductions and conclusions from the information made available and will need to accept full responsibility for such interpretations, deductions and conclusions.

Development specific geotechnical investigations must be undertaken.

Additional topsoils / fill may have been spread subsequent to the investigation.

Site preparation prior to the construction should include removal of all vegetation, topsoil and any uncontrolled fill.

All new fill must be placed under controlled conditions (AS 3798:2007), otherwise Class P conditions would be warranted in those fill areas.

Some variability in subsurface conditions must be anticipated.

Moisture condition of site soils and/or the presence of groundwater may vary considerably from time of investigation compared to at the time of construction. Groundwater seepages are highly likely after heavy or prolonged rain.

Depending on the depth of site cut and trenches, hard rock excavation may be required.

The above site classification is provided on the basis that all building materials/waste and stockpiles are removed from site and have not been spread across the site.

It is recommended that footing excavations be inspected by a geotechnical engineer.

This report must be read in conjunction with the attached "Limitations" and notes "About this Report".

References:

AS 2870:2011, Residential Slabs and Footings, Standards Australia.

AS 3798:2007, Guidelines on Earthworks for Commercial and Residential Developments, Standards Australia.

Attachments:

Limitations & About this Report
Explanatory Notes
Test Pit Log(s) Pit(s) 33,31
Drawing 1

Douglas Partners
Geotechnics / Environment / Groundwater

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Limitations

Douglas Partners (DP) has prepared this report for the project at Whitlam Stage 3A in accordance with DP's proposal dated 26 November 2021 and acceptance received from Evan Langham dated 15 March 2023. The work was carried out under DP's Conditions of Engagement. This report is provided for the exclusive use of Calibre Professional Services Pty Ltd for this project only and for the purposes as described in the report. It should not be used by or relied upon for other projects or purposes on the same or other site or by a third party. Any party so relying upon this report beyond its exclusive use and purpose as stated above, and without the express written consent of DP, does so entirely at its own risk and without recourse to DP for any loss or damage. In preparing this report DP has necessarily relied upon information provided by the client and/or their agents.

The results provided in the report are indicative of the sub-surface conditions on the site only at the specific sampling and/or testing locations, and then only to the depths investigated and at the time the work was carried out. Sub-surface conditions can change abruptly due to variable geological processes and also as a result of human influences. Such changes may occur after DP's field testing has been completed.

DP's advice is based upon the conditions encountered during this investigation. The accuracy of the advice provided by DP in this report may be affected by undetected variations in ground conditions across the site between and beyond the sampling and/or testing locations. The advice may also be limited by budget constraints imposed by others or by site accessibility.

The assessment of atypical safety hazards arising from this advice is restricted to the geotechnical components set out in this report and based on known project conditions and stated design advice and assumptions. While some recommendations for safe controls may be provided, detailed 'safety in design' assessment is outside the current scope of this report and requires additional project data and assessment.

This report must be read in conjunction with all of the attached and should be kept in its entirety without separation of individual pages or sections. DP cannot be held responsible for interpretations or conclusions made by others unless they are supported by an expressed statement, interpretation, outcome or conclusion stated in this report.

This report, or sections from this report, should not be used as part of a specification for a project, without review and agreement by DP. This is because this report has been written as advice and opinion rather than instructions for construction.

About this Report

Douglas Partners

Introduction

These notes have been provided to amplify DP's report in regard to classification methods, field procedures and the comments section. Not all are necessarily relevant to all reports.

DP's reports are based on information gained from limited subsurface excavations and sampling, supplemented by knowledge of local geology and experience. For this reason, they must be regarded as interpretive rather than factual documents, limited to some extent by the scope of information on which they rely.

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Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation. Ideally, continuous undisturbed sampling or core drilling will provide the most reliable assessment, but this is not always practicable or possible to justify on economic grounds. In any case the boreholes and test pits represent only a very small sample of the total subsurface profile.

Interpretation of the information and its application to design and construction should therefore take into account the spacing of boreholes or pits, the frequency of sampling, and the possibility of other than 'straight line' variations between the test locations.

Groundwater

Where groundwater levels are measured in boreholes there are several potential problems, namely:

- In low permeability soils groundwater may enter the hole very slowly or perhaps not at all during the time the hole is left open;
- A localised, perched water table may lead to an erroneous indication of the true water table;
- Water table levels will vary from time to time with seasons or recent weather changes. They may not be the same at the time of construction as are indicated in the report; and
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be blown out of the hole and drilling mud must first be washed out of the hole if water measurements are to be made.

More reliable measurements can be made by installing standpipes which are read at intervals over several days, or perhaps weeks for low permeability soils. Piezometers, sealed in a particular stratum, may be advisable in low permeability soils or where there may be interference from a perched water table.

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis. Where the report has been prepared for a specific design proposal, the information and interpretation may not be relevant if the design proposal is changed. If this happens, DP will be pleased to review the report and the sufficiency of the investigation work.

Every care is taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical and environmental aspects, and recommendations or suggestions for design and construction. However, DP cannot always anticipate or assume responsibility for:

- Unexpected variations in ground conditions. The potential for this will depend partly on borehole or pit spacing and sampling frequency;
- Changes in policy or interpretations of policy by statutory authorities; or
- The actions of contractors responding to commercial pressures.

If these occur, DP will be pleased to assist with investigations or advice to resolve the matter.

About this Report

Site Anomalies

In the event that conditions encountered on site during construction appear to vary from those which were expected from the information contained in the report, DP requests that it be immediately notified. Most problems are much more readily resolved when conditions are exposed rather than at some later stage, well after the event.

Information for Contractual Purposes

Where information obtained from this report is provided for tendering purposes, it is recommended that all information, including the written report and discussion, be made available. In circumstances where the discussion or comments section is not relevant to the contractual situation, it may be appropriate to prepare a specially edited document. DP would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

Site Inspection

The company will always be pleased to provide engineering inspection services for geotechnical and environmental aspects of work to which this report is related. This could range from a site visit to confirm that conditions exposed are as expected, to full time engineering presence on site.

Sampling Methods

Douglas Partners

Sampling

Sampling is carried out during drilling or test pitting to allow engineering examination (and laboratory testing where required) of the soil or rock.

Disturbed samples taken during drilling provide information on colour, type, inclusions and, depending upon the degree of disturbance, some information on strength and structure.

Undisturbed samples are taken by pushing a thin-walled sample tube into the soil and withdrawing it to obtain a sample of the soil in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Test Pits

Test pits are usually excavated with a backhoe or an excavator, allowing close examination of the in-situ soil if it is safe to enter into the pit. The depth of excavation is limited to about 3 m for a backhoe and up to 6 m for a large excavator. A potential disadvantage of this investigation method is the larger area of disturbance to the site.

Large Diameter Augers

Boreholes can be drilled using a rotating plate or short spiral auger, generally 300 mm or larger in diameter commonly mounted on a standard piling rig. The cuttings are returned to the surface at intervals (generally not more than 0.5 m) and are disturbed but usually unchanged in moisture content. Identification of soil strata is generally much more reliable than with continuous spiral flight augers, and is usually supplemented by occasional undisturbed tube samples.

Continuous Spiral Flight Augers

The borehole is advanced using 90-115 mm diameter continuous spiral flight augers which are withdrawn at intervals to allow sampling or in-situ testing. This is a relatively economical means of drilling in clays and sands above the water table. Samples are returned to the surface, or may be collected after withdrawal of the auger flights, but they are disturbed and may be mixed with soils from the sides of the hole. Information from the drilling (as distinct from specific sampling by SPTs or undisturbed samples) is of relatively low reliability, due to the remoulding, possible mixing or softening of samples by groundwater.

Non-core Rotary Drilling

The borehole is advanced using a rotary bit, with water or drilling mud being pumped down the drill rods and returned up the annulus, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from the rate of penetration. Where drilling mud is used this can mask the cuttings and reliable identification is only possible from separate sampling such as SPTs.

Continuous Core Drilling

A continuous core sample can be obtained using a diamond tipped core barrel, usually with a 50 mm internal diameter. Provided full core recovery is achieved (which is not always possible in weak rocks and granular soils), this technique provides a very reliable method of investigation.

Standard Penetration Tests

Standard penetration tests (SPT) are used as a means of estimating the density or strength of soils and also of obtaining a relatively undisturbed sample. The test procedure is described in Australian Standard 1289, Methods of Testing Soils for Engineering Purposes - Test 6.3.1.

The test is carried out in a borehole by driving a 50 mm diameter split sample tube under the impact of a 63 kg hammer with a free fall of 760 mm. It is normal for the tube to be driven in three successive 150 mm increments and the 'N' value is taken as the number of blows for the last 300 mm. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form.

- In the case where full penetration is obtained with successive blow counts for each 150 mm of, say, 4, 6 and 7 as:

  4,6,7
  N=13

- In the case where the test is discontinued before the full penetration depth, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm as:

  15, 30/40 mm

The results of the SPT tests can be related empirically to the engineering properties of the soils.

Dynamic Cone Penetrometer Tests / Perth Sand Penetrometer Tests

Dynamic penetrometer tests (DCP or PSP) are carried out by driving a steel rod into the ground using a standard weight of hammer falling a specified distance. As the rod penetrates the soil the number of blows required to penetrate each successive 150 mm depth are recorded. Normally there is a depth limitation of 1.2 m, but this may be extended in certain conditions by the use of extension rods. Two types of penetrometer are commonly used.

- Perth sand penetrometer - a 16 mm diameter flat ended rod is driven using a 9 kg hammer dropping 600 mm (AS 1289, Test 6.3.3). This test was developed for testing the density of sands and is mainly used in granular soils and filling.
- Cone penetrometer - a 16 mm diameter rod with a 20 mm diameter cone end is driven using a 9 kg hammer dropping 510 mm (AS 1289, Test 6.3.2). This test was developed initially for pavement subgrade investigations, and correlations of the test results with California Bearing Ratio have been published by various road authorities.

Soil Descriptions

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Description and Classification Methods

The methods of description and classification of soils and rocks used in this report are generally based on Australian Standard AS1726:2017, Geotechnical Site Investigations. In general, the descriptions include strength or density, colour, structure, soil or rock type and inclusions.

Soil Types

Soil types are described according to the predominant particle size, qualified by the grading of other particles present:

Type	Particle size (mm)
Boulder	>200
Cobble	63 - 200
Gravel	2.36 - 63
Sand	0.075 - 2.36
Silt	0.002 - 0.075
Clay	<0.002

The sand and gravel sizes can be further subdivided as follows:

Type	Particle size (mm)
Coarse gravel	19 - 63
Medium gravel	6.7 - 19
Fine gravel	2.36 – 6.7
Coarse sand	0.6 - 2.36
Medium sand	0.21 - 0.6
Fine sand	0.075 - 0.21

Definitions of grading terms used are:

- Well graded - a good representation of all particle sizes
- Poorly graded - an excess or deficiency of particular sizes within the specified range
- Uniformly graded - an excess of a particular particle size
- Gap graded - a deficiency of a particular particle size with the range

The proportions of secondary constituents of soils are described as follows:

In fine grained soils (>35% fines)

Term	Proportion of sand or gravel	Example
And	Specify	Clay (60%) and Sand (40%)
Adjective	>30%	Sandy Clay
With	15 – 30%	Clay with sand
Trace	0 - 15%	Clay with trace sand

In coarse grained soils (>65% coarse)
- with clays or silts

Term	Proportion of fines	Example
And	Specify	Sand (70%) and Clay (30%)
Adjective	>12%	Clayey Sand
With	5 - 12%	Sand with clay
Trace	0 - 5%	Sand with trace clay

In coarse grained soils (>65% coarse)
- with coarser fraction

Term	Proportion of coarser fraction	Example
And	Specify	Sand (60%) and Gravel (40%)
Adjective	>30%	Gravelly Sand
With	15 - 30%	Sand with gravel
Trace	0 - 15%	Sand with trace gravel

The presence of cobbles and boulders shall be specifically noted by beginning the description with 'Mix of Soil and Cobbles/Boulders' with the word order indicating the dominant first and the proportion of cobbles and boulders described together.

Soil Descriptions

Cohesive Soils

Cohesive soils, such as clays, are classified on the basis of undrained shear strength. The strength may be measured by laboratory testing, or estimated by field tests or engineering examination. The strength terms are defined as follows:

Description	Abbreviation	Undrained shear strength (kPa)
Very soft	VS	<12
Soft	S	12 - 25
Firm	F	25 - 50
Stiff	St	50 - 100
Very stiff	VSt	100 - 200
Hard	H	>200
Friable	Fr	-

Cohesionless Soils

Cohesionless soils, such as clean sands, are classified on the basis of relative density, generally from the results of standard penetration tests (SPT), cone penetration tests (CPT) or dynamic penetrometers (PSP). The relative density terms are given below:

Relative Density	Abbreviation	Density Index (%)
Very loose	VL	<15
Loose	L	15-35
Medium dense	MD	35-65
Dense	D	65-85
Very dense	VD	>85

Soil Origin

It is often difficult to accurately determine the origin of a soil. Soils can generally be classified as:

- Residual soil - derived from in-situ weathering of the underlying rock;
- Extremely weathered material – formed from in-situ weathering of geological formations. Has soil strength but retains the structure or fabric of the parent rock;
- Alluvial soil – deposited by streams and rivers;
- Estuarine soil – deposited in coastal estuaries;
- Marine soil – deposited in a marine environment;
- Lacustrine soil – deposited in freshwater lakes;
- Aeolian soil – carried and deposited by wind;
- Colluvial soil – soil and rock debris transported down slopes by gravity;
- Topsoil – mantle of surface soil, often with high levels of organic material.
- Fill – any material which has been moved by man.

Moisture Condition – Coarse Grained Soils

For coarse grained soils the moisture condition should be described by appearance and feel using the following terms:

- Dry (D) Non-cohesive and free-running.
- Moist (M) Soil feels cool, darkened in colour.
  Soil tends to stick together.
  Sand forms weak ball but breaks easily.
- Wet (W) Soil feels cool, darkened in colour.
  Soil tends to stick together, free water forms when handling.

Moisture Condition – Fine Grained Soils

For fine grained soils the assessment of moisture content is relative to their plastic limit or liquid limit, as follows:

- ‘Moist, dry of plastic limit’ or ‘w <PL’ (i.e. hard and friable or powdery).
- ‘Moist, near plastic limit’ or ‘w ≈ PL (i.e. soil can be moulded at moisture content approximately equal to the plastic limit).
- ‘Moist, wet of plastic limit’ or ‘w >PL’ (i.e. soils usually weakened and free water forms on the hands when handling).
- ‘Wet’ or ‘w ≈LL’ (i.e. near the liquid limit).
- ‘Wet’ or ‘w >LL’ (i.e. wet of the liquid limit).

Rock Strength

Rock strength is defined by the Unconfined Compressive Strength and it refers to the strength of the rock substance and not the strength of the overall rock mass, which may be considerably weaker due to defects.

The Point Load Strength Index $Is_{(50)}$ is commonly used to provide an estimate of the rock strength and site specific correlations should be developed to allow UCS values to be determined. The point load strength test procedure is described by Australian Standard AS4133.4.1-2007. The terms used to describe rock strength are as follows:

Strength Term	Abbreviation	Unconfined Compressive Strength MPa	Point Load Index * $Is_{(50)}$ MPa
Very low	VL	0.6 - 2	0.03 - 0.1
Low	L	2 - 6	0.1 - 0.3
Medium	M	6 - 20	0.3 - 1.0
High	H	20 - 60	1 - 3
Very high	VH	60 - 200	3 - 10
Extremely high	EH	>200	>10

* Assumes a ratio of 20:1 for UCS to $Is_{(50)}$. It should be noted that the UCS to $Is_{(50)}$ ratio varies significantly for different rock types and specific ratios should be determined for each site.

Degree of Weathering

The degree of weathering of rock is classified as follows:

Term	Abbreviation	Description
Residual Soil	RS	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are no longer visible, but the soil has not been significantly transported.
Extremely weathered	XW	Material is weathered to such an extent that it has soil properties. Mass structure and material texture and fabric of original rock are still visible
Highly weathered	HW	The whole of the rock material is discoloured, usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable. Rock strength is significantly changed by weathering. Some primary minerals have weathered to clay minerals. Porosity may be increased by leaching, or may be decreased due to deposition of weathering products in pores.
Moderately weathered	MW	The whole of the rock material is discoloured , usually by iron staining or bleaching to the extent that the colour of the original rock is not recognisable, but shows little or no change of strength from fresh rock.
Slightly weathered	SW	Rock is partially discoloured with staining or bleaching along joints but shows little or no change of strength from fresh rock.
Fresh	FR	No signs of decomposition or staining.
Note: If HW and MW cannot be differentiated use DW (see below)		
Distinctly weathered	DW	Rock strength usually changed by weathering. The rock may be highly discoloured, usually by iron staining. Porosity may be increased by leaching or may be decreased due to deposition of weathered products in pores.

Rock Descriptions

Degree of Fracturing

The following classification applies to the spacing of natural fractures in diamond drill cores. It includes bedding plane partings, joints and other defects, but excludes drilling breaks.

Term	Description
Fragmented	Fragments of <20 mm
Highly Fractured	Core lengths of 20-40 mm with occasional fragments
Fractured	Core lengths of 30-100 mm with occasional shorter and longer sections
Slightly Fractured	Core lengths of 300 mm or longer with occasional sections of 100-300 mm
Unbroken	Core contains very few fractures

Rock Quality Designation

The quality of the cored rock can be measured using the Rock Quality Designation (RQD) index, defined as:

$$\text{RQD \%} = \frac{\text{cumulative length of 'sound' core sections > 100 mm long}}{\text{total drilled length of section being assessed}}$$

where 'sound' rock is assessed to be rock of low strength or stronger. The RQD applies only to natural fractures. If the core is broken by drilling or handling (i.e. drilling breaks) then the broken pieces are fitted back together and are not included in the calculation of RQD.

Stratification Spacing

For sedimentary rocks the following terms may be used to describe the spacing of bedding partings:

Term	Separation of Stratification Planes
Thinly laminated	< 6 mm
Laminated	6 mm to 20 mm
Very thinly bedded	20 mm to 60 mm
Thinly bedded	60 mm to 0.2 m
Medium bedded	0.2 m to 0.6 m
Thickly bedded	0.6 m to 2 m
Very thickly bedded	> 2 m

Symbols & Abbreviations

Douglas Partners

Introduction

These notes summarise abbreviations commonly used on borehole logs and test pit reports.

Drilling or Excavation Methods

C	Core drilling
R	Rotary drilling
SFA	Spiral flight augers
NMLC	Diamond core - 52 mm dia
NQ	Diamond core - 47 mm dia
HQ	Diamond core - 63 mm dia
PQ	Diamond core - 81 mm dia

Water

▷	Water seep
▽	Water level

Sampling and Testing

A	Auger sample
B	Bulk sample
D	Disturbed sample
E	Environmental sample
U_{50}	Undisturbed tube sample (50mm)
W	Water sample
pp	Pocket penetrometer (kPa)
PID	Photo ionisation detector
PL	Point load strength Is(50) MPa
S	Standard Penetration Test
V	Shear vane (kPa)

Description of Defects in Rock

The abbreviated descriptions of the defects should be in the following order: Depth, Type, Orientation, Coating, Shape, Roughness and Other. Drilling and handling breaks are not usually included on the logs.

Defect Type

B	Bedding plane
Cs	Clay seam
Cv	Cleavage
Cz	Crushed zone
Ds	Decomposed seam
F	Fault
J	Joint
Lam	Lamination
Pt	Parting
Sz	Sheared Zone
V	Vein

Orientation

The inclination of defects is always measured from the perpendicular to the core axis.

h	horizontal
v	vertical
sh	sub-horizontal
sv	sub-vertical

Coating or Infilling Term

cln	clean
co	coating
he	healed
inf	infilled
stn	stained
ti	tight
vn	veneer

Coating Descriptor

ca	calcite
cbs	carbonaceous
cly	clay
fe	iron oxide
mn	manganese
slt	silty

Shape

cu	curved
ir	irregular
pl	planar
st	stepped
un	undulating

Roughness

po	polished
ro	rough
sl	slickensided
sm	smooth
vr	very rough

Other

fg	fragmented
bnd	band
qtz	quartz

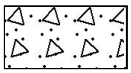
Symbols & Abbreviations

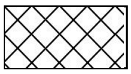
Graphic Symbols for Soil and Rock

General

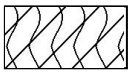

Asphalt

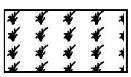

Road base

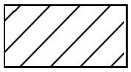

Concrete

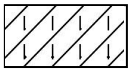

Filling

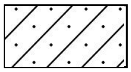
Soils


Topsoil

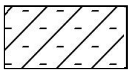

Peat

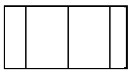

Clay

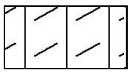

Silty clay

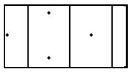

Sandy clay

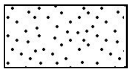

Gravelly clay

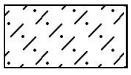

Shaly clay

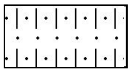

Silt


Clayey silt


Sandy silt

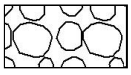

Sand

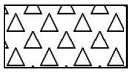

Clayey sand


Silty sand


Gravel

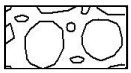

Sandy gravel


Cobbles, boulders

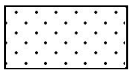

Talus

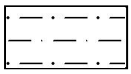
Sedimentary Rocks

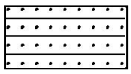

Boulder conglomerate

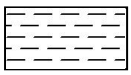

Conglomerate


Conglomeratic sandstone

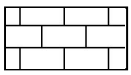

Sandstone


Siltstone

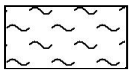

Laminite

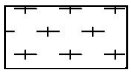

Mudstone, claystone, shale

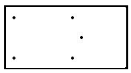

Coal


Limestone

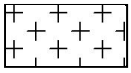
Metamorphic Rocks

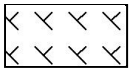

Slate, phyllite, schist

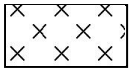

Gneiss

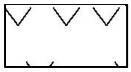

Quartzite

Igneous Rocks


Granite


Dolerite, basalt, andesite


Dacite, epidote


Tuff, breccia


Porphyry

FOUNDATION MAINTENANCE AND FOOTING PERFORMANCE

Understanding and preventing soil-related building movement

This Building Technology Resource is designed to identify causes of soil-related building movement, and to suggest methods of prevention of resultant cracking.

Buildings can and often do move. This movement can be up, down, lateral or rotational. The fundamental cause of movement in buildings can usually be related to one or more problems in the foundation soil. It is important for the home owner to identify the soil type in order to ascertain the measures that should be put in place in order to ensure that problems in the foundation soil can be prevented, thus protecting against building movement.

SOIL TYPES

The types of soils usually present under the topsoil in land zoned for residential buildings can be split into two approximate groups – granular and clay. Quite often, foundation soil is a mixture of both types. The general problems associated with soils having granular content are usually caused by erosion. Clay soils are subject to saturation and swell/shrink problems.

Classifications for a given area can generally be obtained by application to the local authority, but these are sometimes unreliable and if there is doubt, a geotechnical report should be commissioned. As most buildings suffering movement problems are founded on clay soils, there is an emphasis on classification of soils according to the amount of swell and shrinkage they experience with variations of water content. Table 1 below is a reproduction of Table 2.1 from Australian Standard AS 2870-2011, Residential slabs and footings.

CAUSES OF MOVEMENT

SETTLEMENT DUE TO CONSTRUCTION

There are two types of settlement that occur as a result of construction:

- Immediate settlement occurs when a building is first placed on its foundation soil, as a result of compaction of the soil under the weight of the structure. The cohesive quality of clay soil mitigates against this, but granular (particularly sandy) soil is susceptible.
- Consolidation settlement is a feature of clay soil and may take place because of the expulsion of moisture from the soil or because of the soil's lack of resistance to local compressive or shear stresses. This will usually take place during the first few months after construction but has been known to take many years in exceptional cases.

These problems may be the province of the builder and should be taken into consideration as part of the preparation of the site for construction.

EROSION

All soils are prone to erosion, but sandy soil is particularly susceptible to being washed away. Even clay with a sand component of say 10% or more can suffer from erosion.

SATURATION

This is particularly a problem in clay soils. Saturation creates a bog-like suspension of the soil that causes it to lose virtually all of its bearing capacity. To a lesser degree, sand is affected by saturation because saturated sand may undergo a reduction in volume, particularly imported sand fill for bedding and blinding layers. However, this usually occurs as immediate settlement and should normally be the province of the builder.

SEASONAL SWELLING AND SHRINKAGE OF SOIL

All clays react to the presence of water by slowly absorbing it, making the soil increase in volume (see table below, from AS 2870). The degree of increase varies considerably between different clays, as does the degree of decrease during the subsequent drying out caused by fair weather periods. Because of the low absorption and expulsion rate, this phenomenon will not usually be noticeable unless there are prolonged rainy or dry periods, usually of weeks or months, depending on the land and soil characteristics.

The swelling of soil creates an upward force on the footings of the building, and shrinkage creates subsidence that takes away the support needed by the footing to retain equilibrium.

SHEAR FAILURE

This phenomenon occurs when the foundation soil does not have sufficient strength to support the weight of the footing. There are two major post-construction causes:

- Significant load increase.
- Reduction of lateral support of the soil under the footing due to erosion or excavation.

In clay soil, shear failure can be caused by saturation of the soil adjacent to or under the footing.

TREE ROOT GROWTH

Trees and shrubs that are allowed to grow in the vicinity of footings can cause foundation soil movement in two ways:

- Roots that grow under footings may increase in cross-sectional size, exerting upward pressure on footings.

TABLE 1. GENERAL DEFINITIONS OF SITE CLASSES.

Class	Foundation
A	Most sand and rock sites with little or no ground movement from moisture changes
S	Slightly reactive clay sites, which may experience only slight ground movement from moisture changes
M	Moderately reactive clay or silt sites, which may experience moderate ground movement from moisture changes
H1	Highly reactive clay sites, which may experience high ground movement from moisture changes
H2	Highly reactive clay sites, which may experience very high ground movement from moisture changes
F	Extremely reactive sites, which may experience extreme ground movement from moisture changes

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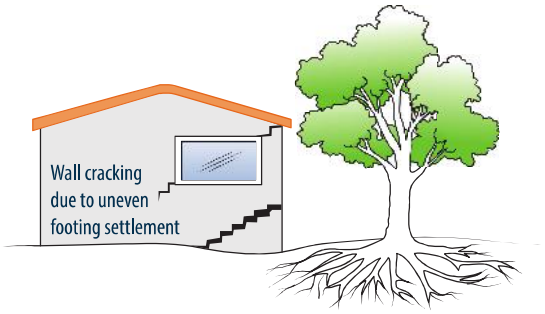

FIGURE 1 Trees can cause shrinkage and damage.

- Roots in the vicinity of footings will absorb much of the moisture in the foundation soil, causing shrinkage or subsidence.

UNEVENNESS OF MOVEMENT

The types of ground movement described above usually occur unevenly throughout the building's foundation soil. Settlement due to construction tends to be uneven because of:

- Differing compaction of foundation soil prior to construction.
- Differing moisture content of foundation soil prior to construction.

Movement due to non-construction causes is usually more uneven still. Erosion can undermine a footing that traverses the flow or can create the conditions for shear failure by eroding soil adjacent to a footing that runs in the same direction as the flow.

Saturation of clay foundation soil may occur where subfloor walls create a dam that makes water pond. It can also occur wherever there is a source of water near footings in clay soil. This leads to a severe reduction in the strength of the soil which may create local shear failure.

Seasonal swelling and shrinkage of clay soil affects the perimeter of the building first, then gradually spreads to the interior through absorption. The swelling process will usually begin at the uphill extreme of the building, or on the weather side where the land is flat. Shrinkage usually begins on the side of the building where the sun's heat is greatest.

EFFECTS OF UNEVEN SOIL MOVEMENT ON STRUCTURES

EROSION AND SATURATION

Erosion removes the support from under footings, tending to create subsidence of the part of the structure under which it occurs. Brickwork walls will resist the stress created by this removal of support by bridging the gap or cantilevering until the bricks or the mortar bedding fail. Older masonry has little resistance. Evidence of failure varies according to circumstances and symptoms may include:

- Step cracking in the mortar beds in the body of the wall or above/below openings such as doors or windows.
- Vertical cracking in the bricks (usually but not necessarily in line with the vertical beds or perpends).

Isolated piers affected by erosion or saturation of foundations will eventually lose contact with the bearers they support and may tilt or fall over. The floors that have lost this support will become bouncy, sometimes rattling ornaments etc.

SEASONAL SWELLING/SHRINKAGE IN CLAY

Swelling foundation soil due to rainy periods first lifts the most exposed extremities of the footing system, then the remainder of the perimeter footings while gradually permeating inside the building footprint to lift internal footings. This swelling first tends to create a dish effect, because the external footings are pushed higher than the internal ones.

The first noticeable symptom may be that the floor appears slightly dished. This is often accompanied by some doors binding on the floor or the door head, together with some cracking of cornice mitres. In buildings with timber flooring supported by bearers and joists, the floor can be bouncy. Externally there may be visible dishing of the hip or ridge lines.

As the moisture absorption process completes its journey to the innermost areas of the building, the internal footings will rise. If the spread of moisture is roughly even, it may be that the symptoms will temporarily disappear, but it is more likely that swelling will be uneven, creating a difference rather than a disappearance in symptoms. In buildings with timber flooring supported by bearers and joists, the isolated piers will rise more easily than the strip footings or piers under walls, creating noticeable doming of flooring.

As the weather pattern changes and the soil begins to dry out, the external footings will be first affected, beginning with the locations where the sun's effect is strongest. This has the effect of lowering the external footings. The doming is accentuated, and cracking reduces or disappears where it occurred because of dishing, but other cracks open up. The roof lines may become convex.

Doming and dishing are also affected by weather in other ways. In areas where warm, wet summers and cooler dry winters prevail, water migration tends to be toward the interior and doming will be accentuated, whereas where summers are dry, and winters are cold and wet, migration tends to be toward the exterior and the underlying propensity is toward dishing.

MOVEMENT CAUSED BY TREE ROOTS

In general, growing roots will exert an upward pressure on footings, whereas soil subject to drying because of tree or shrub roots will tend to remove support from under footings by inducing shrinkage.

COMPLICATIONS CAUSED BY THE STRUCTURE ITSELF

Most forces that the soil causes to be exerted on structures are vertical – i.e. either up or down. However, because these forces are seldom spread evenly around the footings, and because the building resists uneven movement because of its rigidity, forces are exerted from one part of the building to another. The net result of all these forces is usually rotational. This resultant force often complicates the diagnosis because the visible symptoms do not simply reflect the original cause. A common symptom is binding of doors on the vertical member of the frame.

EFFECTS ON FULL MASONRY STRUCTURES

Brickwork will resist cracking where it can. It will attempt to span areas that lose support because of subsided foundations or raised points. It is therefore usual to see cracking at weak points, such as openings for windows or doors.

In the event of construction settlement, cracking will usually remain unchanged after the process of settlement has ceased.

With local shear or erosion, cracking will usually continue to develop until the original cause has been remedied, or until the subsidence has completely neutralised the affected portion of footing and the structure has stabilised on other footings that remain effective.

In the case of swell/shrink effects, the brickwork will in some cases return to its original position after completion of a cycle, however it is more likely that the rotational effect will not be exactly reversed, and it is also usual that brickwork will settle in its new position and will resist the forces trying to return it to its original position. This means that in a case where swelling takes place after construction and cracking occurs, the cracking is likely to at least partly remain after the shrink segment of the cycle is complete. Thus, each time the cycle is repeated, the likelihood is that the cracking will become wider until the sections of brickwork become virtually independent.

With repeated cycles, once the cracking is established, if there is no other complication, it is normal for the incidence of cracking to stabilise, as the building has the articulation it needs to cope with the problem. This is by no means always the case, however, and monitoring of cracks in walls and floors should always be treated seriously.

Upheaval caused by growth of tree roots under footings is not a simple vertical shear stress. There is a tendency for the root to also

exert lateral forces that attempt to separate sections of brickwork after initial cracking has occurred.

The normal structural arrangement is that the inner leaf of brickwork in the external walls and at least some of the internal walls (depending on the roof type) comprise the load-bearing structure on which any upper floors, ceilings and the roof are supported. In these cases, it is internally visible cracking that should be the main focus of attention, however there are a few examples of dwellings whose external leaf of masonry plays some supporting role, so this should be checked if there is any doubt. In any case, externally visible cracking is important as a guide to stresses on the structure generally, and it should also be remembered that the external walls must be capable of supporting themselves.

EFFECTS ON FRAMED STRUCTURES

Timber or steel framed buildings are less likely to exhibit cracking due to swell/shrink than masonry buildings because of their flexibility. Also, the doming/dishing effects tend to be lower because of the lighter weight of walls. The main risks to framed buildings are encountered because of the isolated pier footings used under walls. Where erosion or saturation causes a footing to fall away, this can double the span which a wall must bridge. This additional stress can create cracking in wall linings, particularly where there is a weak point in the structure caused by a door or window opening. It is, however, unlikely that framed structures will be so stressed as to suffer serious damage without first exhibiting some or all of the above symptoms for a considerable period. The same warning period should apply in the case of upheaval. It should be noted, however, that where framed buildings are supported by strip footings there is only one leaf of brickwork and therefore the externally visible walls are the supporting structure for the building. In this case, the subfloor masonry walls can be expected to behave as full brickwork walls.

EFFECTS ON BRICK VENEER STRUCTURES

Because the load-bearing structure of a brick veneer building is the frame that makes up the interior leaf of the external walls plus perhaps the internal walls, depending on the type of roof, the building can be expected to behave as a framed structure, except that the external masonry will behave in a similar way to the external leaf of a full masonry structure.

WATER SERVICE AND DRAINAGE

Where a water service pipe, a sewer or stormwater drainage pipe is in the vicinity of a building, a water leak can cause erosion, swelling or saturation of susceptible soil. Even a minuscule leak can be enough to saturate a clay foundation. A leaking tap near a building can have the same effect. In addition, trenches containing pipes can become watercourses even though backfilled, particularly where broken rubble is used as fill. Water that runs along these trenches can be responsible for serious erosion, interstrata seepage into subfloor areas and saturation.

Pipe leakage and trench water flows also encourage tree and shrub roots to the source of water, complicating and exacerbating the problem. Poor roof plumbing can result in large volumes of rainwater being concentrated in a small area of soil:

- Incorrect falls in roof guttering may result in overflows, as may gutters blocked with leaves etc.
- Corroded guttering or downpipes can spill water to ground.
- Downpipes not positively connected to a proper stormwater collection system will direct a concentration of water to soil that is directly adjacent to footings, sometimes causing large-scale problems such as erosion, saturation and migration of water under the building.

SERIOUSNESS OF CRACKING

In general, most cracking found in masonry walls is a cosmetic nuisance only and can be kept in repair or even ignored. Table 2 below is a reproduction of Table C1 of AS 2870-2011.

AS 2870-2011 also publishes figures relating to cracking in concrete floors, however because wall cracking will usually reach the critical point significantly earlier than cracking in slabs, this table is not reproduced here.

PREVENTION AND CURE

PLUMBING

Where building movement is caused by water service, roof plumbing, sewer or stormwater failure, the remedy is to repair the problem. It is prudent, however, to consider also rerouting pipes away from the building where possible and relocating taps to positions where any leakage will not direct water to the building vicinity. Even where gully traps are present, there is sometimes sufficient spill to create erosion or saturation, particularly in modern installations using smaller diameter PVC fixtures. Indeed, some gully traps are not situated directly under the taps that are installed to charge them, with the result that water from the tap may enter the backfilled trench that houses the sewer piping. If the trench has been poorly backfilled, the water will either pond or flow along the bottom of the trench. As these trenches usually run alongside the footings and can be at a similar depth, it is not hard to see how any water that is thus directed into a trench can easily affect the foundation's ability to support footings or even gain entry to the subfloor area.

GROUND DRAINAGE

In all soils there is the capacity for water to travel on the surface and below it. Surface water flows can be established by inspection during and after heavy or prolonged rain. If necessary, a grated drain system connected to the stormwater collection system is usually an easy solution.

It is, however, sometimes necessary when attempting to prevent water migration that testing be carried out to establish watertable height and subsoil water flows. This subject may be regarded as an area for an expert consultant.

PROTECTION OF THE BUILDING PERIMETER

It is essential to remember that the soil that affects footings extends well beyond the actual building line. Watering of garden plants, shrubs and trees causes some of the most serious water problems.

For this reason, particularly where problems exist or are likely to occur, it is recommended that an apron of paving be installed around as much of the building perimeter as necessary. This paving should extend outwards a minimum of 900 mm (more in highly reactive soil) and should have a minimum fall away from the building of 1:60. The finished paving should be no less than 100 mm below brick vent bases.

It is prudent to relocate drainage pipes away from this paving, if possible, to avoid complications from future leakage. If this is not practical, earthenware pipes should be replaced by PVC and backfilling should be of the same soil type as the surrounding soil and compacted to the same density.

Except in areas where freezing of water is an issue, it is wise to remove taps in the building area and relocate them well away from the building – preferably not uphill.

It may be desirable to install a grated drain at the outside edge of the paving on the uphill side of the building. If subsoil drainage is needed this can be installed under the surface drain.

CONDENSATION

In buildings with a subfloor void, such as where bearers and joists support flooring, insufficient ventilation creates ideal conditions for condensation, particularly where there is little clearance between the floor and the ground. Condensation adds to the moisture already present in the subfloor and significantly slows the process of drying out. Installation of an adequate subfloor ventilation system, either natural or mechanical, is desirable.

TABLE 2. CLASSIFICATION OF DAMAGE WITH REFERENCE TO WALLS.

Description of typical damage and required repair	Approximate crack width limit	Damage category
Hairline cracks	<0.1 mm	0 – Negligible
Fine cracks which do not need repair	<1 mm	1 – Very Slight
Cracks noticeable but easily filled. Doors and windows stick slightly.	<5 mm	2 – Slight
Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weathertightness often impaired.	5–15 mm (or a number of cracks 3 mm or more in one group)	3 – Moderate
Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distort. Walls lean or bulge noticeably, some loss of bearing in beams. Service pipes disrupted.	15–25 mm but also depends on number of cracks	4 – Severe

Warning: Although this Building Technology Resource deals with cracking in buildings, it should be said that subfloor moisture can result in the development of other problems, notably:

- Water that is transmitted into masonry, metal or timber building elements causes damage and/or decay to those elements.
- High subfloor humidity and moisture content create an ideal environment for various pests, including termites and spiders, and mould.
- Where high moisture levels are transmitted to the flooring and walls, an increase in the dust mite count can ensue within the living areas. Dust mites, as well as dampness in general, can be a health hazard to inhabitants, particularly those who are abnormally susceptible to respiratory ailments.

THE GARDEN

The ideal vegetation layout is to have lawn or plants that require only light watering immediately adjacent to the drainage or paving edge, then more demanding plants, shrubs and trees spread out in that order.

Overwatering due to misuse of automatic watering systems is a common cause of saturation and water migration under footings. If it is necessary to use these systems, it is important to remove garden beds to a completely safe distance from buildings.

EXISTING TREES

Where a tree is causing a problem of soil drying or there is the existence or threat of upheaval of footings, if the offending roots are subsidiary and their removal will not significantly damage the tree, they should be severed and a concrete or metal barrier placed vertically in the soil to prevent future root growth in the direction of the building. If it is not possible to remove the relevant roots without damage to the tree, an application to remove the tree should be made to the local authority. A prudent plan is to transplant likely offenders before they become a problem.

INFORMATION ON TREES, PLANTS AND SHRUBS

State departments overseeing agriculture can give information regarding root patterns, volume of water needed and safe distance from buildings of most species. Botanic gardens are also sources of information.

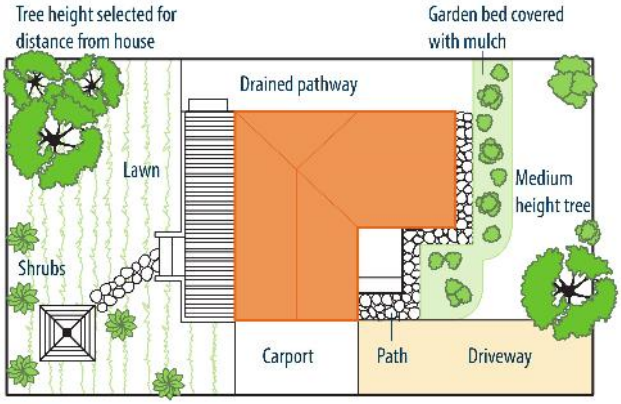

FIGURE 2 Gardens for a reactive site.

EXCAVATION

Excavation around footings must be properly engineered. Soil supporting footings can only be safely excavated at an angle that allows the soil under the footing to remain stable. This angle is called the angle of repose (or friction) and varies significantly between soil types and conditions. Removal of soil within the angle of repose will cause subsidence.

REMEDIATION

Where erosion has occurred that has washed away soil adjacent to footings, soil of the same classification should be introduced and compacted to the same density. Where footings have been undermined, augmentation or other specialist work may be required. Remediation of footings and foundations is generally the realm of a specialist consultant.

Where isolated footings rise and fall because of swell/shrink effect, the home owner may be tempted to alleviate floor bounce by filling the gap that has appeared between the bearer and the pier with blocking. The danger here is that when the next swell segment of the cycle occurs, the extra blocking will push the floor up into an accentuated dome and may also cause local shear failure in the soil. If it is necessary to use blocking, it should be by a pair of fine wedges and monitoring should be carried out fortnightly.

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ISBN 9781486312962 (print)/9781486312979 (digital) © CSIRO 2021
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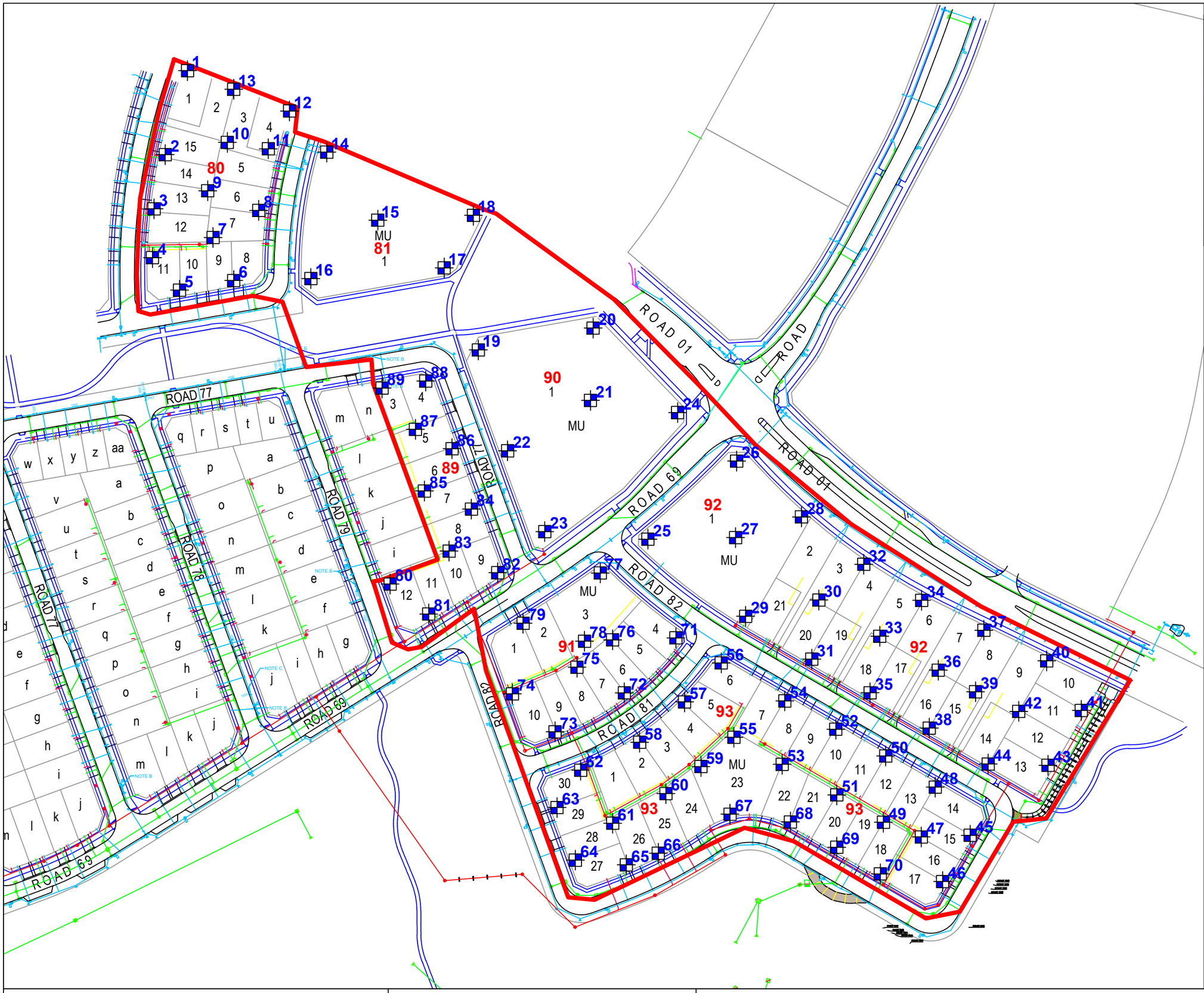
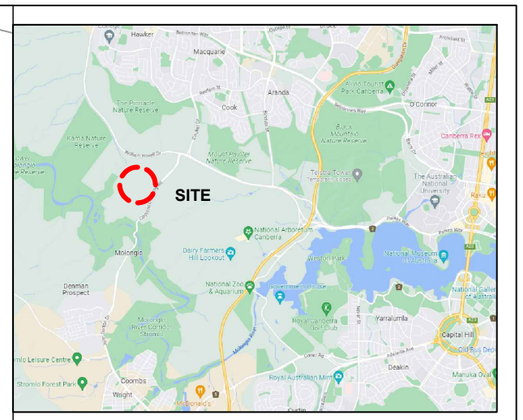




Locality Plan

LEGEND

- Approximate Test Pit Location
- Approximate Stage Boundary

NOTE: Base drawing from Group One, dated 15 March 2023

Douglas Partners
Geotechnics / Environment / Groundwater

CLIENT: Calibre Professional Services Pty Ltd		TITLE: **Test Location Plan**
OFFICE: Canberra	DRAWN BY: JH	**Proposed Residential Subdivision**
SCALE: As Shown	DATE: 3.05.2023	**Stage 3A, Whitlam Estate, Whitlam**

PROJECT No: 88556.17
DRAWING No: 1
REVISION: 0

TEST PIT LOG

CLIENT: Calibre Professional Services Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: Stage 3A, Whitlam

SURFACE LEVEL: D.S.L
EASTING: 202701
NORTHING: 603820

PIT No: 31
PROJECT No: 88556.17
DATE: 27/4/2023
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm) 5 10 15 20
		FILL/Silty Sandy CLAY (CI): medium plasticity, brown, fine to coarse grained sand, trace gravel, trace cobbles, w<PL, FILL							
	0.9	Sandy CLAY (CI): medium plasticity, red brown, fine to coarse grained sand, trace ironstone nodules, w<PL, estimated stiff to very stiff, residual		D	1.1				1
	1.2	Pit discontinued at 1.2m -Limit of investigation							

RIG: CAT 306 CR fitted with a 450mm wide toothed bucket

LOGGED: JH

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Design surface levels not provided. Coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

TEST PIT LOG

CLIENT: Calibre Professional Services Pty Ltd
PROJECT: Proposed Residential Subdivision
LOCATION: Stage 3A, Whitlam

SURFACE LEVEL: D.S.L
EASTING: 202737
NORTHING: 603831

PIT No: 33
PROJECT No: 88556.17
DATE: 27/4/2023
SHEET 1 OF 1

RL	Depth (m)	Description of Strata	Graphic Log	Sampling & In Situ Testing: Type	Depth	Sample	Results & Comments	Water	Dynamic Penetrometer Test (blows per mm)
		FILL/Silty Sandy CLAY (CI): medium plasticity, brown, fine to coarse grained sand, trace gravel, trace cobbles, w<PL, FILL		D	0.5				
1	1.0	Sandy CLAY (CI): medium plasticity, yellow brown, fine to coarse grained sand, trace ironstone nodules, w<PL, estimated stiff to very stiff, extremely weathered material							1
	1.2	DACITE: fine to coarse grained, yellow brown, dry to moist, very low to low strength, highly weathered, fractured - from 1.3m, low to medium strength		D	1.4				
	1.5	Pit discontinued at 1.5m -Refusal							

Dynamic Penetrometer Test (blows per mm): 5, 10, 15, 20

RIG: CAT 306 CR fitted with a 450mm wide toothed bucket

LOGGED: JH

SURVEY DATUM: MGA94 Zone 55

WATER OBSERVATIONS: No free groundwater observed

REMARKS: Design surface levels not provided. Coordinates are approximate only and must not be relied upon.

☐ Sand Penetrometer AS1289.6.3.3
☐ Cone Penetrometer AS1289.6.3.2

SAMPLING & IN SITU TESTING LEGEND

A	Auger sample	G	Gas sample	PID	Photo ionisation detector (ppm)
B	Bulk sample	P	Piston sample	PL(A)	Point load axial test Is(50) (MPa)
BLK	Block sample	U_x	Tube sample (x mm dia.)	PL(D)	Point load diametral test Is(50) (MPa)
C	Core drilling	W	Water sample	pp	Pocket penetrometer (kPa)
D	Disturbed sample	▷	Water seep	S	Standard penetration test
E	Environmental sample	▼	Water level	V	Shear vane (kPa)

Douglas Partners
Geotechnics / Environment / Groundwater

ANNEXURE F – SPECIAL CONDITIONS

SPECIAL CONDITIONS

46 LANDSCAPING, DRIVEWAY & FENCING REBATE

46.1 If the Buyer, within 3 years of the date of Completion:

(a) satisfies all of the mandatory requirements contained in the Whitlam Housing Development Guidelines and obtains a Certificate of Occupancy and Certificate of Compliance for all of the Blocks;

(b) satisfies all of the Landscaping, Driveway and Fencing Eligibility Requirements; and

(c) lodges the completed Application in accordance with the Landscaping, Driveway and Fencing Rebate Program Guide, and provides evidence, to the satisfaction of the Seller, that all of the requirements of clauses 46.1(a) and 46.1(b),

the Seller will pay the Landscaping, Driveway and Fencing Rebate to the Buyer.

46.2 If the Buyer does not fully satisfy the conditions of clause 46.1 within 3 years of the date of Completion, the Landscaping, Driveway and Fencing Rebate will not be paid to the Buyer.

46.3 The Landscaping, Driveway and Fencing Rebate is personal to the Buyer and cannot be claimed by a transferee, assignee or successor in title to the Buyer.

46.4 In this clause 46, the following words are defined:

(a) **Application** means the Landscaping, Driveway and Fencing Rebate Application attached to the Landscaping, Driveway and Fencing Rebate Program Guide.

(b) **Landscaping, Driveway and Fencing Eligibility Requirements** means the following requirements:

(i) (**gardening**) for each Block facing Sculthorpe Avenue, Whitlam:

A. planting (other than on the nature strip area) a minimum of three 45-litre pot size feature trees which will grow to at least 3 metres tall when mature;

B. planting a minimum of 40 plants (in addition to the trees required by clause 46.4(b)(i)A) of at least 5 different species;

C. mulching all garden beds; and

D. excluding the use of artificial plants or grass, black or dark gravel or colour-dyed mulch;

(ii) (**driveway**) for the Packaged Lot, installing a uniform Permeable driveway that services the proposed garage/carport areas for all residences in the Packaged Lot; and

(iii) (**landscaping**) for the Packaged Lot, install a courtyard wall along each side of the shared driveway in accordance with the Whitlam Housing Development Guidelines.

(c) **Landscaping, Driveway and Fencing Rebate** means $25,000 (GST inclusive) per Packaged Lot.

(d) **Landscaping, Driveway and Fencing Rebate Program Guide** means the guide attached to this Contract at Annexure G.

(e) **Packaged Lot** means all of the Blocks listed in the Land Schedule.

(f) **Permeable** means permeable treatments such as traditional brick pavers in open configuration, permeable brick pavers, or porous concrete.

46.5 The Landscaping, Driveway and Fencing Rebate is not partially payable. Failure to meet all of the Eligibility Requirements for all of the Blocks in the Packaged Lot means that no amount of the Landscaping, Driveway and Fencing Rebate will be paid for any of the Blocks.

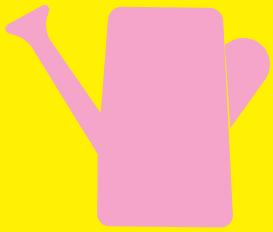
ANNEXURE G – LANDSCAPING, DRIVEWAY AND FENCING REBATE PROGRAM GUIDE

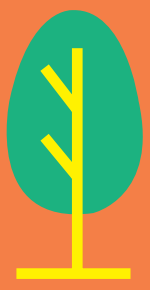
LANDSCAPING, DRIVEWAY & FENCING REBATE PROGRAM

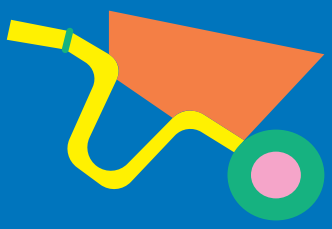
REBATE OF $25,000 FOR PACKAGED LOTS

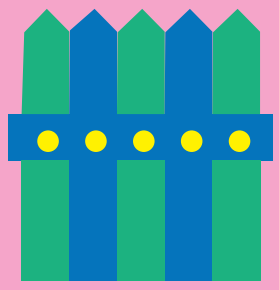
SECTION 92 PACKAGED LOTS ONLY FROM 06 MAY 2025

ELIGIBILITY GUIDELINES









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Whitlam

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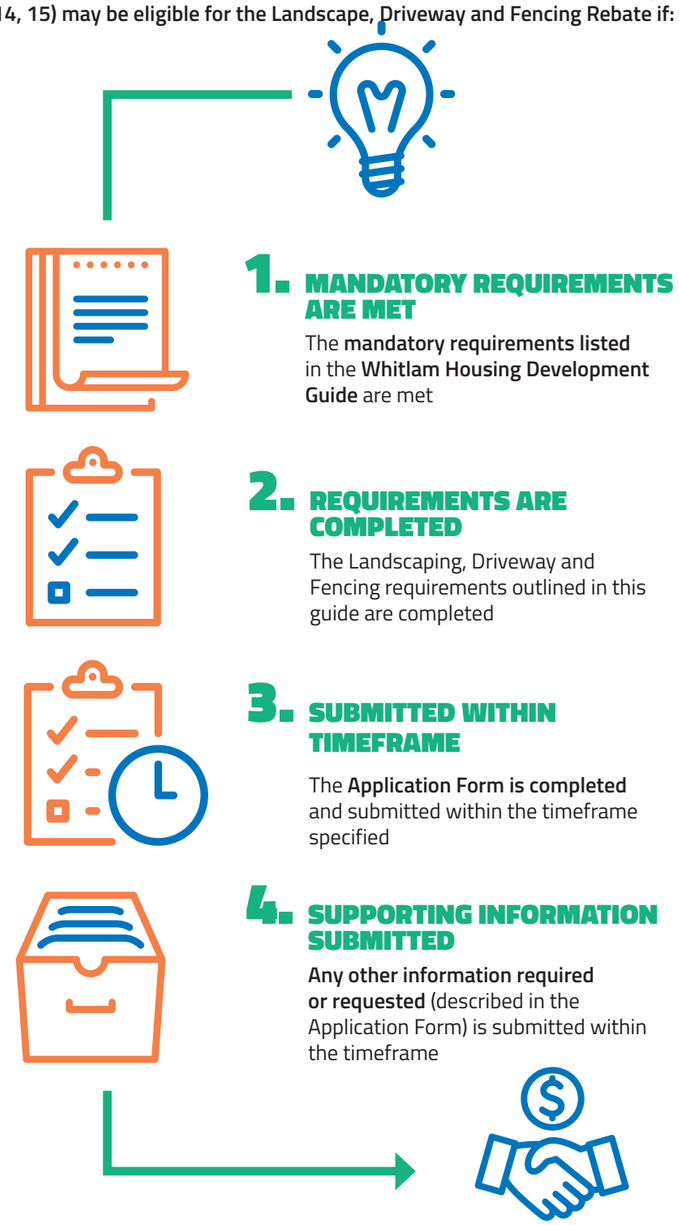
Information correct as at March 2025 – Version 2.

WHO IS ELIGIBLE

Buyers who purchase from SLA Section 92 Whitlam Packaged Lot 1 (Blocks 4, 5, 18, 19); Section 92 Whitlam Packaged Lot 2 (Blocks 6, 7, 16, 17); or Section 92 Whitlam Packaged Lot 3 (Blocks 8, 9, 14, 15) may be eligible for the Landscape, Driveway and Fencing Rebate if:



1. MANDATORY REQUIREMENTS ARE MET

The **mandatory requirements listed** in the **Whitlam Housing Development Guide** are met

2. REQUIREMENTS ARE COMPLETED

The Landscaping, Driveway and Fencing requirements outlined in this guide are completed

3. SUBMITTED WITHIN TIMEFRAME

The **Application Form is completed** and submitted within the timeframe specified

4. SUPPORTING INFORMATION SUBMITTED

Any other information required or requested (described in the Application Form) is submitted within the timeframe

The fine print

The Buyer of the Packaged Lots will be eligible to receive the Rebate amount of $25,000, when all requirements have been fulfilled. A total rebate of $25,000 is offered per package lot and only 1 claim per packaged lot can be made. Blocks are packaged as follows: Blocks 4, 5, 18 and 19, Section 92 Whitlam. Blocks 6, 7, 16 and 17, Section 92 Whitlam. Blocks 8, 9, 14 and 15, Section 92, Whitlam.

The homes must comply with **all** the requirements. Partial Rebates will not be considered for complying with some of the requirements.

GET STARTED CHECKLIST

To be eligible to receive the $25,000 Landscape, Driveway and Fencing Rebate per package you must comply with the following requirements:

Tick (✓)	These are the requirements	
	Landscaping Requirement *Front yard of blocks facing Sculthorpe Avenue must include*	**Evidence to collect**
☐	**A minimum of 3 feature trees planted, of at least 45 litre pot size when planted. When mature, species must grow to a height of at least 3 meters tall**	Photos of 3 trees planted in the garden
☐	**Plant at least 40 plants, choosing a diversity of species from at least 5 different species.**	Photos of all garden beds, showing the plants
☐	**Mulch all garden beds**	Photos of garden beds showing the mulch layer around the tree and plants

(×) Non-compliant

No artificial plants or grass, black or dark gravel or colour-dyed mulch are allowed.

Note that the 'street tree' planted on the nature strip must remain. If this tree is damaged during construction and needs to be replaced, the replacement tree cannot be included in the rebate application. The trees for the rebate application cannot be planted in the nature strip area.

Tick (✓)	Fencing Requirement	Evidence to collect
☐	**Mandatory Courtyard Wall along each side of the shared driveway: Rendered brick, block or stonework in combination with feature panels.** **See Whitlam Stage 3 - Housing Development Guide for details:** ▪ pages 7 and 8 for construction details of the courtyard wall, and ▪ page 27 for the required location of the courtyard wall	Photos of the courtyard wall along each side of the shared driveway

Tick (✓)	Driveway Requirement	Evidence to collect	Details
☐	**Shared Driveway: A uniform permeable design for the driveway that services the proposed garage/carport areas for all residences** **Permeable treatment may include:** ▪ Traditional brick pavers in open configuration ▪ Permeable brick pavers ▪ Porous concrete	Photos of the completed shared driveway. Documentary evidence of the specification of driveway treatment and materials	As per pages 26 + 27 of the Whitlam Housing Development Guide

HOW TO CLAIM YOUR REBATE

Submit your claim

The Application Form and required evidence can be submitted via:

suburbanland@act.gov.au

Landscaping, Driveway and Fencing Rebate, Suburban Land Agency

GPO Box 158, Canberra ACT 2601

Required timeframe

To be eligible, within 3 years of the date of settlement of the First Grant Contract the Buyer must:

- **Obtain the Certificate of Occupancy and Use for all four dwellings of the Packaged Lot**
- **Obtain the Certificate of Compliance for all four crown leases of the Packaged Lot**
- **Complete the Landscaping Driveway and Fencing Requirements and**
- **Submit the Application Form and required evidence to the SLA.**

There will be no extensions of time.

Find out more

Contact us if you require additional information:

(02) 6205 0600

suburbanland@act.gov.au

For more information visit: suburbanland.act.gov.au

If you have purchased a new residential block of land in Canberra, you can also apply for an allocation of free plants from Yarralumla Nursery. Scan here to find out more.

ANNEXURE 1: APPLICATION FOR LANDSCAPING DRIVEWAY AND FENCING REBATE

- This Application Form must be read in conjunction with the **Housing Development Guide**
- This Application Form must be fully completed by the Buyer
- The Declaration in **Section 2** of this Application Form must be signed by each person who is the Buyer of the Packaged Lot
- The documents set out in **Annexure 2** of this Application Form must be submitted to the Agency with this Application Form
- Application Forms which are not complete or signed, or which are not accompanied by the required supporting documents, may not be considered by the Agency

Please complete all required fields in Block LETTERS.

SECTION 1: APPLICANT DETAILS

Buyer (list all persons who are the Buyer of the Packaged Lot)

☐ Buyer who purchased the packaged lot from SLA

First Name:	Last Name:
First Name:	Last Name:

Company Name (If Company):

BLOCK DETAILS

Description of Blocks on First Grant Contract	Blocks:	Section:	Suburb:
Street Address of Block:			

BUYER CONTACT DETAILS

Postal Address:

Phone Number:

Email Address:

Information correct as at March 2025 – Version 2.

SECTION 2: DECLARATION

- ☐ I certify that the Landscaping Driveway and Fencing Requirements have been completed within:
  - 3 years from the date of Settlement of the First Grant Contract of the packaged lot.
- ☐ I am:
  - The Buyer listed in the First Grant Contract
- ☐ I certify that the mandatory requirements listed in the Whitlam Housing Development Guide have been met
- ☐ I certify that documents provided with this Application Form are true and complete copies of the relevant original documents
- ☐ I certify that the information contained in this Application Form is true and complete in all respects
- ☐ I as Buyer give permission for the Agency to inspect all four Blocks of the packaged lot and take photos as necessary

Signature of Buyer/Applicant 1:

Date: / /

Signature of Buyer/Applicant 2:

Date: / /

I attach copies of the following documents:

- ☐ Certificates of Occupancy and Use and Certificate of Compliance for all four dwellings
- ☐ All forms and documents in accordance with **Annexure 2**

SECTION 3: PAYMENT DETAILS – FOR REBATE

The rebate is to be paid to the Buyer's bank account, detailed below.
(The bank must be an Australian Bank).

Bank Name:

Bank Branch:

Account Name:

BSB Number:

Account Number:

SUBMITTING YOUR APPLICATION FORM

Completed Application Forms should be sent via email with the required supporting documents to: **suburbanland@act.gov.au** or sent by post: **Whitlam Landscaping Driveway and Fencing Rebate, Suburban Land Agency, GPO Box 158, Canberra ACT 2601**

ANNEXURE 2: CHECK LIST

APPLICANT(S) DETAILS

First Name:

Last Name:

First Name:

Last Name:

Company Name (If company):

BLOCK DETAILS

Description of the packaged lots on First Grant Contract:

Block:	Section:

Suburb:

DOCUMENTATION

- ☐ I have attached **all documents listed** in the following table for my Rebate application to be assessed.

ITEM	EVIDENCE	TICK ALL THAT APPLY
FEATURE TREES 	1. I have signed the declaration in Annexure 1 (section 2) of these guidelines 2. A minimum of 3 feature trees planted, of at least 45 litre pot size when planted. When mature, species must grow to a height of at least 3 meters tall	☐ Declaration Signed ☐ Photos Provided
PLANTS 	3. Plant at least 40 plants, choosing a diversity of species from at least 5 different species.	☐ Photos Provided
MULCH 	4. Mulch all garden beds	☐ Photos Provided
DRIVEWAY 	5. Shared Driveway: A uniform permeable design for the driveway that services the proposed garage/carport areas for all residences	☐ Photos provided and documentary evidence of the specification of driveway treatment and materials
FENCING 	6. Mandatory Courtyard Wall (along each side of the shared driveway): Rendered brick, block or stonework in combination with feature panels.	☐ Photos Provided

* Photos are to be taken from ground level and can be combined. Hard copy photos must identify the Block and Section on the reverse side.

Documentary evidence must include the address of the dwelling where the item is installed and all relevant details. Evidence can be provided by a retailer, builder or the installer. A tax invoice OR a letter on a company letterhead are acceptable forms of evidence.

Where a letter is provided from the builder or retailer the items can be combined.

NOTES

Whitlam

ACT Government | Suburban Land Agency

suburbanland.act.gov.au

1800 777 952