TOOWOOMBA REGION

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Our Reference: MCUI/2019/3145/A
CS Portal Reference: N/A
Contact Officer: Jayden Forbes-Mitchell
Contact: (07) 4688 6662
Email: development@tr.qld.gov.au

RECEIVED
21/05/2026
TOOWOOMBA
REGIONAL COUNCIL

Decision Notice
CHANGE TO A DEVELOPMENT APPROVAL
Planning Act 2016 Section 83

Excavation Equipment Pty Ltd
C/- Property Projects Australia
PO Box 3686
TOOWOOMBA QLD 4350

Email: blake@propertyprojectsaustralia.com.au;
francisco@propertyprojectsaustralia.com.au

8 August 2023

Dear Sir/Madam

Development Approval:	**Material Change of Use – Impact – Dwelling House**
Location:	**1F Alderley Street, RANGEVILLE QLD 4350**
Property Description:	**Lot 62 CC555**
Relevant Planning Scheme:	***Toowoomba Regional Planning Scheme 2012***

I refer to your application received on 3 February 2023 for a change to the development approval for a Material Change of Use – Impact – Dwelling House approved on 5 November 2019.

The change application was assessed against the relevant assessment benchmarks as identified in the *Toowoomba Regional Planning Scheme 2012* for the development.

On the 7 August 2023, the change application was approved as per the attached Schedule. The changes are considered to be consistent with the relevant assessment benchmarks.

All deletions are identified by **bolded** strikethrough of text and all additions are identified by **bolded** text.

Rights of Appeal

Attached is an extract from the *Planning Act 2016* which details your appeal rights regarding this decision.

Yours faithfully

Krys den Hertog
Principal Planner, Development Services

TOOWOOMBA REGIONAL COUNCIL

A.B.N. 997 8830 5360

SCHEDULE

DEVELOPMENT PERMIT FOR MATERIAL CHANGE OF USE – IMPACT

APPLICATION NUMBER:	MCUI/2019/3145/A
APPLICANT:	Excavation Equipment Pty Ltd
LOCATION:	1F Alderley Street, RANGEVILLE QLD 4350
PROPERTY DESCRIPTION:	Lot 62 CC555
APPROVED USE:	Dwelling House
ZONING:	Limited Development (Constrained Land) Zone

A. ASSESSMENT MANAGER'S CONDITIONS

PLANNING

APPROVED USE

1. This Development Approval is for a material change of use for a Dwelling House.

CARRY OUT & MAINTAIN DEVELOPMENT

2. The development must comply with the provisions of Council's Local Laws, Planning Scheme Policies, Planning Scheme and Planning Scheme Codes to the extent they are not varied by this Development Approval.

3. Unless otherwise stated, all conditions must be complied with prior to the commencement of use and thereafter.

4. Complete all building work associated with this Development Approval, including work required by any of the conditions of this Development Approval prior to the commencement of use. Such building work is to be carried out generally in accordance with the Approved Plans and Documents and, where the building work is assessable development, in accordance with a current Building Works approval.

5. The development must be maintained generally in accordance with the Approved and Amended Plans and Documents subject to or modified by any conditions of this Development Approval.

APPROVED PLANS

6. The development must be carried out generally in accordance with the Approved Plans listed below, subject to the conditions of this Development Approval:

~~**Plan No: 190036 Sheet A.001 Rev 1**~~
~~**Description: Site Plan, prepared by Building Design Professionals and dated 29 April 2019**~~
~~**Amendments: Nil**~~

~~**Plan No: 190036 Sheet A.100 Rev 1**~~
~~**Description: Proposed Floor Plan – Basement Plan, prepared by Building Design Professionals and dated 29 April 2019**~~
~~**Amendments: Nil**~~

~~**Plan No: 190036 Sheet A.101 Rev 1**~~
~~**Description: Floor Plan, prepared by Building Design Professionals and dated 29 April 2019**~~
~~**Amendments: Nil**~~

~~**Plan No: 190036 Sheet A.200 Rev 1**~~
~~**Description: West and South Elevations, prepared by Building Design Professionals and dated 29 April 2019**~~
~~**Amendments: Nil**~~

~~**Plan No: 190036 Sheet A.201 Rev 1**~~
~~**Description: East and North Elevations, prepared by Building Design Professionals and dated 29 April 2019**~~
~~**Amendments: Nil**~~

Plan No: 1099.21035-001, Issue 5
Description: Site Plan, prepared by VHD Studio and dated 30 May 2023
Amendments: Nil

Plan No: 1099.21035-101, Issue 5
Description: Basement Floor Plan, prepared by VHD Studio and dated 30 May 2023
Amendments: Nil

Plan No: 1099.21035-102, Issue 8
Description: Ground Floor Plan, prepared by VHD Studio and dated 30 May 2023
Amendments: Nil

Plan No: 1099.21035-103, Issue 7
Description: Upper Floor Plan, prepared by VHD Studio and dated 30 May 2023
Amendments: Nil

Plan No: 1099.21035-401, Issue 5
Description: Building Elevations, prepared by VHD Studio and dated 30 May 2023
Amendments: Nil

APPROVED DOCUMENT

7. The development must be carried out generally in accordance with the Approved Document listed below, subject to the conditions of this Development Approval and the amendments listed below:

Document: Bushfire Management Report, Issue 3.
Description: Assessment of Bushfire Attack Levels and mitigation measures, prepared by Designconxion and dated 04/09/2019.
Amendment: Nil.

~~**Document: Landslide Risk Assessment – 1F Alderley Street Rangeville, Project 97226.00, R.001 Revision 0**~~
~~**Description: Geotechnical Report, prepared by Douglas Partners and dated 29 August 2019**~~
~~**Amendments: Amend in accordance with Conditions 8 and 9**~~

Document: Geotechnical Investigation, 1-24866, 2022-03-02, BR VER 1, Version 2
Description: Geotechnical Investigation – Proposed Residence, prepared by Soil Surveys Engineering Pty Limited and dated 10 May 2023
Amendments: Nil

8. ~~**Provide an updated Geotechnical Report prepared by an RPEQ which assesses land stability for the proposed development. The Geotechnical Report must address the requirements for Geotechnical Reports as outlined in Planning Scheme Policy SC6.1 PSP No. 1 – Development Application Requirements SC6.1.6 Additional Information Required by Development and Overlay Codes and includes the following information:**~~

   ~~**8.1 Conduct the further investigative drilling noted in section 4.3.1 of the submitted geotechnical report and include any findings and recommendations resulting from this investigation.**~~

   ~~**8.2 Provide an assessment of the proposed (or required) earthworks (excavation and filling) and retaining walls.**~~

   ~~**8.3 Provide an assessment of the stormwater impacts of the proposed development on slope stability, and of the proposed stormwater design in minimising the impact on slope stability.**~~

   ~~**8.4 Provide an assessment of the landscaping and/or erosion and sediment control measures proposed on site.**~~

   ~~**8.5 Provide an assessment of the impacts the proposed development would have on the stability of the site and adjacent land (this should also include an assessment of the future driveway crossover).**~~

   ~~**8.6 Detail any requirements that must be incorporated into the development to reduce the level of risk to people and property to an acceptable or tolerable level.**~~

   ~~**8.7 Include the registration number of the certifying RPEQ.**~~

9. ~~**Documents to be amended must only incorporate the amendments listed within this Development Approval and must be resubmitted to Council for approval prior to lodgement of an Operational Works application, the issue of any Building Works approval or Council's approval of plumbing and drainage works, or prior to the commencement of works on the subject land, whichever occurs first.**~~

COUNCIL APPROVAL OF PLANS, DOCUMENTS & WORKS (OPERATIONAL WORKS)

10. Prepare and submit applications to Council and obtain Operational Works approval for the following:

   10.1 Driveway Crossover;

   10.2 Bulk Earthworks (if required, refer to Conditions 14 and 38);

   10.3 Stormwater Infrastructure; ~~**and**~~

   10.4 Water Infrastructure~~.~~**; and**

   10.5 Land Stability Rectification Works.

AVAILABILITY OF APPROVED DOCUMENTATION DURING WORKS

11. A legible copy of the Development Approval, including the Approved and Amended Plans and Documents bearing Council's approved stamp must be available on the subject land for inspection at all times during earthworks and construction.

COMMENCEMENT OF USE

12. Submit to Council a Notice of Intention to Commence the approved use. The notice must be provided to the Manager, Development Services, as follows:

    12.1 Provide to the Manager, Development Services a minimum of ten (10) business days prior to commencement of the approved use;

    12.2 The notice must nominate the day the approved use is intended to commence; and

    12.3 The notice must include evidence (i.e. copies of decision notice(s), photographic proof, and statement(s) of compliance with the conditions of this approval from suitably qualified persons) which demonstrates that all conditions of this approval have been complied with.

DEDICATIONS, AGREEMENTS & CONTRIBUTIONS

EASEMENTS

13. Unless consistent with the terms of the easement and authorised under this Development Approval, any permanent works or structures must be kept clear of any existing or proposed easements on the subject land.

DEVELOPMENT CONSTRAINTS

LANDSLIDE MITIGATION

14. Unless otherwise approved by Council in an Operational Works approval for bulk earthworks, works involving filling or excavation within land identified as a landslide hazard area on the Landslide Hazard Overlay must not:

    14.1 Involve a total change in site levels of more than 1.5m relative to natural ground level at any point;

    14.2 Involve filling or excavation within 1.5m of any site boundary other than filling or excavation associated with access and services infrastructure serving the premises;

    14.3 Necessitate the construction of retaining walls exceeding 1.2m in height; or

    14.4 Exceed 50m^3 of cut, 50m^3 of fill or 50m^3 of cut and fill in total.

BUSHFIRE MANAGEMENT - GENERAL

15. The development must be carried out in accordance with Section 4, 5 and Appendix 2 of the Bushfire Management Report listed within this Development Approval.

16. A copy of the approved Bushfire Management Plan must be provided to the nearest fire authority.

BUSHFIRE MANAGEMENT - SUPPLY OF WATER

17. Where water storage is provided by way of rainwater tank, separate water storage for firefighting purposes must be provided either in a separate rainwater tank or a reserve section in the main water supply tank on which:

    17.1 The domestic take off from the tank is at or above the 10,000 litre point; and

    17.2 Standard rural fire brigade fittings (a 50mm male camlock coupling and ball valve) are fitted to the tank outlet for access by four wheel drive rural services vehicles.

18. The development must be provided with an auxiliary power supply such as a petrol driven fire fighter pump (or generator), together with a hose of sufficient length to easily reach around to all sides of the dwelling.

19. A hard stand area within 6m of the water storage reservoir must be provided to ensure accessibility for fire fighting vehicles.

BUSHFIRE MANAGEMENT - ASSET PROTECTION ZONE

20. The asset protection zones outlined in Section 5 and Appendix 2 of the Bushfire Management Report listed within this Development Approval must be prepared and maintained for the life of this development.

WORKS

ENGINEER'S CERTIFICATION AND SUPERVISION OF WORKS

21. Plans and specifications for all works associated with, stormwater drainage, water infrastructure, slope stability, earthworks, retaining walls, or any other works required on Council infrastructure, must be prepared and certified by a Registered Professional Engineer Queensland - Civil (RPEQ).

22. A RPEQ must submit to Council a copy of the:

    22.1 Design Certificate prior to commencement of the works; and

    22.2 Construction Supervision Certificate upon completion of the works certifying that works are in accordance with the approved plans and specifications.

23. Any works that have been certified by an RPEQ must be carried out under the supervision of an RPEQ with all executed works being detailed on a Construction Supervision Certificate.

24. Where any condition refers to, or requires, an Engineer to perform a task or function, the Engineer must hold professional indemnity insurance to the value of $2,000,000, A Certificate of Currency must be submitted to Council with any Design Certificate or Construction Supervision Certificate.

STORMWATER DRAINAGE

25. All stormwater infrastructure necessary to convey run-off from roof and developed surface areas, and any run-off onto the subject land from adjacent areas, must be provided in accordance with an Operational Works approval.

    Note: This condition is imposed pursuant to Section 145 of the Planning Act 2016.

26. Prior to the commencement of any works on the subject land, an Operational Works application must be submitted to and be approved by Council for the internal and any external stormwater infrastructure. The design and the construction of the works must be certified by a RPEQ – Civil.

27. As part of the Operational Works application submit to Council for approval, a Detailed Stormwater Management Plan prepared by a Registered Professional Engineer Queensland - Civil (RPEQ) in accordance with the relevant standards in *Planning Scheme Policy No. 2 - Engineering Standards – Roads and Drainage Infrastructure* (PSP No.2) demonstrating the following:

    27.1 Stormwater is conveyed to a lawful point of discharge in accordance with the stormwater discharge conditions of this Development Approval;

    27.2 That the post development peak flows do not exceed the capacity of downstream infrastructure;

    27.3 That stormwater from the proposed development will not have negative impacts on slope stability;

    27.4 That the stormwater impacts of the proposed internal driveway and driveway crossover have been appropriately considered; and

    27.5 That there is a "non-worsening" effect or actionable nuisance as a result of this development on upstream, downstream, or adjoining properties.

28. All land adjoining the development must be protected from ponding or nuisance from stormwater resulting from the development for the life of the development.

STORMWATER DISCHARGE

29. Stormwater from new roofed areas (including overflow pipes from rainwater tanks) is permitted to be discharged within the subject land, a minimum of 3 metres clear of any building foundations and any adjoining property boundary.

30. The act of on-site stormwater discharge must not cause erosion and scouring and must utilise appropriate control devices at outlets to prevent such erosion and scouring.

31. The act of on-site stormwater discharge must not compromise slope stability.

32. Stormwater must be dispersed as sheet flow.

33. Design and construction of all internal stormwater drainage works must comply with each applicable section of *Australian and New Zealand Standard AS/NZS 3500 - Plumbing and Drainage Code* and the *Queensland Urban Drainage Manual*.

GEOTECHNICAL STABILITY

34. ~~**The approved use must be carried in accordance with the Geotechnical Report, prepared by Douglas Partners and dated 29 August 2019 listed within this Development Approval, with the addition of the following:**~~

    ~~**34.1 The report must be amended in accordance with Condition A and submitted to Council for approval.**~~

    The design of earthworks, retaining walls, access driveway, platform to provide access to heavy machinery and vehicles to the site, stormwater drainage works, any other site works and the removal of identified uncontrolled fill must be in accordance with the Approved Geotechnical Investigation listed within this Development Approval.

35. ~~**The amended Geotechnical Report must be approved by Council prior to commencement of any site works or earthworks.**~~

36. The approved Geotechnical ~~**Report**~~ **Investigation listed within this Development Approval** must be implemented and **the** requirements met and maintained during **the design, ~~and~~** subsequent ~~**to**~~ site works or earthworks **and post construction phase**.

37. An RPEQ experienced in geotechnical engineering, or engineering geology, must supervise the construction of the development to ensure that the works are undertaken in accordance with the approved Geotechnical ~~**Report**~~ **Investigation listed within this Development Approval**.

    37.1 All executed works must be detailed by an RPEQ experienced in geotechnical engineering, on a Certificate of Supervision.

37A. Prior to the commencement of any works on the subject land, a Development Application for a Development Permit for Operational Work must be submitted to and be approved by Council for Land Stability Rectification Works. The design and the construction of the works must be certified by a RPEQ – Civil.

37B. As part of a Development Application for a Development Permit for Operational Work (Land Stability Rectification Works) submit to Council for approval, a design to rectify the failure to the west of the platform as identified in Section 3.5.2 of the approved Geotechnical Investigation listed within this Development Approval.

37C. Where required rectification works require entry onto land not forming part of this Development Approval, submit to Council as part of a Development Application for a Development Permit for Operational Work, the written consent of any impacted property owner.

37D. As part of a Development Application for a Development Permit for Operational Work (Land Stability Rectification Works) submit to Council an estimation of the volume of uncontrolled fill to be removed from the premises as recommended within the approved Geotechnical Investigation listed within this Development Approval.

37E. As part of a Development Application for a Development Permit for Operational Work (Land Stability Rectification Works) submit to Council plans/documents detailing the following:

37E.1 Proposed transport routes for the haulage of material from the uncontrolled fill at the subject site and a receiving site;

37E.2 Truck sizes for the carting of material; and

37E.3 Number of trips required to remove material from the site.

37F. Land Stability Rectification Works must be undertaken in accordance with a Development Permit for Operational Work.

BULK EARTHWORKS

38. Where earthworks are not assessed as part of a Building Works application, prior to the commencement of any earthworks on the subject land, an Operational Works application must be submitted to and be approved by Council.

EROSION & SEDIMENT CONTROL

39. Stockpiles of topsoil, sand, aggregate, spoil or other material capable of being moved by the action of wind or running water must be stored clear of drainage paths and not within the road reserve at any time.

40. Measures such as sediment fences, earth berms, temporary drainage, temporary sediment basins, dewatering or stormwater filtering devices to prevent eroded material, sediment or sediment laden water from being transported to adjoining properties, roads or stormwater drainage systems must be provided.

41. Where erosion and sediment control measures have been damaged, fail or are inadequate and erosion or the release of sediment or sediment laden stormwater has occurred from the subject land or associated works, any resultant property or environmental damage or interference caused must be repaired or cleaned up within 24 hours or upon the direction of Council, at no cost to the affected parties.

42. All disturbed areas must be mulched or turfed as soon as possible during construction.

43. Measures such as vehicle baths, wash-down and construction matting together with dust suppressants and wraps, exposed ground and stockpile sprinkling must be put in place to minimize site vehicles tracking sediment onto adjoining streets during the course of the construction period, and to prevent dust nuisance during construction and, where applicable the ensuing 'on-maintenance' period.

DAMAGE TO SERVICES & ASSETS

44. Protect Council and public utility services and assets during construction of the development.

45. Any damage caused to existing services and assets as a result of the development works must be repaired at no cost to the asset owner in accordance with the following timing:

    45.1 Where the damage would cause a hazard to pedestrian or vehicle safety or interrupts a service to the community, immediately; or

    45.2 Where otherwise, as soon as reasonably possible, but no later than completion of the works associated with the development or prior to the commencement of use, whichever is the earlier.

46. Any repair work which includes alteration to the alignment or the level of existing services and assets must first be referred to the relevant service authority for approval.

47. Construction, alterations and any repairs to Council infrastructure is undertaken in accordance with Council's relevant policies and requirements at no cost to Council.

    Note: Council must be notified of any damage to water and sewer immediately 131 872.

AIR QUALITY IMPACT MITIGATION

48. Odours or airborne contaminants which are noxious or offensive to public amenity or safety, likely to cause environmental harm or environmental nuisance or exceed the *Air Quality Objectives* listed in the *Environmental Protection (Air) Policy 2008* as measured at any sensitive place or commercial place must not be released to the atmosphere during building work and throughout the life of this development .

49. All reasonable and feasible avoidance and mitigation measures are employed so that dust emissions generated during building works do not exceed the following levels when measured at any sensitive place or commercial place:

    49.1 Dust deposition of 120 milligrams per square metre per day, averaged over 1 month, when monitored in accordance with the most recent version of *Australian Standard AS3580.10.1 Methods for sampling and analysis of ambient air - Determination of particulate matter - Deposited matter - Gravimetric method*.

CONSTRUCTION WASTE MANAGEMENT & STORAGE

50. Waste generated during demolition, excavation and construction must be managed in accordance with the waste management hierarchy as detailed in the *Waste Reduction and Recycling Act 2011*.

51. The on-site storage and disposal of demolition, excavation and construction waste (including the storage and disposal of night soil) must comply with the *Environmental Protection Regulation 2008*.

52. Fires are not to be lit to dispose of demolition or construction waste.

53. No demolition, excavation or construction waste is to be used as fill or buried on-site (with the exception of cut material recycled from the subject land and used on the subject land), or be used as fill or buried elsewhere, unless otherwise permitted:

    53.1 Elsewhere within this Development Approval;

    53.2 In accordance with an associated Operational Works approval;

    53.3 In association with and in accordance with an Environmental Authority issued under the *Environmental Protection Act 1994*;

    53.4 In accordance with either a general or specific approval of a resource for beneficial use (otherwise known as a beneficial use approval) issued under the *Waste Reduction and Recycling Act 2011*; or

    53.5 In accordance with a written approval issued by Council under the *Environmental Protection Regulation 2008* relating to the depositing or disposal of general waste from a premises not serviced by Council.

54. Demolition, excavation and construction waste (including night soil) must not be placed or stored within the road reserve at any time.

CONSTRUCTION NOISE IMPACT MITIGATION

55. Building work (as per the definition of the *Environmental Protection Act 1994*) that creates audible noise must be confined to the hours of 6:30am and 6:30pm Monday to Saturday (excluding Public Holidays) unless otherwise approved by Council in an endorsed Construction Environmental Management Plan.

SERVICES & UTILITIES

WASTEWATER INFRASTRUCTURE (GENERAL)

56. The development must be connected to Council's existing wastewater reticulation system {existing Council maintenance hole S2482M08 in western property boundary} in accordance with Council Waste Water Infrastructure Policy 2.04 at no cost to Council.

    Note: This condition is imposed pursuant to Section 145 of the Planning Act 2016.

    Note: Applicant is to investigate whether a compliant gravity connection could be achieved during detail design stage. Otherwise a private low pressure sewerage system must be provided.

57. Any compensation or costs associated with obtaining agreement from owners or trustees of properties affected by the construction of the works must be at no cost to Council.

58. Any connection to or modification of Council's live wastewater infrastructure must be undertaken by Council. A Private Works Quotation must be requested from Council, payment made for the works, and the works completed by Council.

Note: Please note any new connection or reconnection to a Council wastewater system requires a Form 1 Plumbing approval prior to house drainage being installed.

Note: To arrange for a private works quotation for the required works contact Council's Water & Wastewater Department on Ph 131 872.

58A. Maintenance hole (MH) lids located in driveways must be upgraded to a heavy duty trafficable system. This may include replacement of the MH (or part of) structure. Any such works must be undertaken by Council at no cost to Council.

58B. Maintenance Holes (MH) are to be fully protected during the full construction period of the development. Protection must include spanning slabs or beams and mattressing to ensure direct loads from all heavy plant during construction are not transmitted onto the MH structure.

58C. Structural protection for Council's wastewater infrastructure and clearance around maintenance holes must be incorporated for all designs in accordance with *the Queensland Development Code, Mandatory Policy 1.4 - Building Over or Near Relevant Infrastructure*.

Note: A Development Application for a Development Permit for Building Work will require referral to Council as a Concurrence Agency under the Planning Regulation 2017. RPEQ certified design plans for the structural protection for the wastewater system must be submitted to Council for approval as part of a Building Over or Near Water/Sewer/Stormwater Services application prior to the commencement of works for the development.

58D. Any alterations or adjustments required to wastewater maintenance holes to comply with the finished levels for the development must be carried out by Council. A Private Works Quotation must be requested from Council, payment made for the works, and the works completed by Council.

WATER SUPPLY

59. The development must be connected to Council's reticulated water supply in accordance with Council's *Water Infrastructure Policy 2.03* at no cost to Council.

Note: This condition is imposed pursuant to Section 145 of the Planning Act 2016.

60. Council's existing reticulation main must be extended in accordance with the following at no cost to Council:

60.1 A DN100 water main extension must be constructed from the existing water main in Alderley Street up to the south-western property boundary of development site in accordance with Council Water Infrastructure Policy 2.03.

Note: This condition is imposed pursuant to Section 145 of the Planning Act 2016.

61. Prior to the commencement of any works on the subject land an Operational Works application must be submitted and be approved by Council for water reticulation works in accordance with the approved plans and documents of this Development Approval.

62. All water main fittings, services and meters must be located 1m clear of the proposed driveway footpath crossover. Any relocation of fittings clear of driveways must be undertaken by Council.

63. Any works on Council's 'live' water supply must be carried out by Council. A Private Works Quotation must be requested from Council, payment made for the works, and the works completed by Council.

TRANSPORT, VEHICULAR ACCESS & PARKING

ROADWORKS SIGNAGE AND PEDESTRIAN SAFETY

64. All works carried out on or near roadways must be adequately signed in accordance with the *Manual for Uniform Traffic Control Devices – Part 3, Works on Roads*.

Note: Road or lane closures require approval from Council's Principal Engineer Road Operations, and all conditions of that approval complied with during construction of the works.

65. Safe pedestrian access along Council's footpaths must be maintained at all times.

Note: Should access to footpaths need to be restricted, a separate 'Temporary road or footpath closure' must be obtained from Council's Principal Engineer Road Operations, prior to the commencement of the works.

REMOVAL OR MODIFICATION OF COUNCIL TRAFFIC SIGNS OR PARKING BAYS

66. Obtain the written approval of Council's Coordinator Traffic Management for any works involving the removal or modification of existing Council traffic signs or parking bays prior to the works commencing. Where approved by Council such works are to be undertaken at no cost to Council.

67. The installation or modification of any street signs or line marking must be in accordance with the Manual of Uniform Traffic Control Device (MUTCD).

PROVISION OF VEHICULAR ACCESS

68. The vehicle access from the subject land to Alderley Street must be sealed from the kerb and channel to the property boundary. The access must be designed by a Registered Professional Engineer Queensland (RPEQ) – Civil and must include the provision of adequate access width and flares to suit the proposed entry and exit manoeuvres. Such works must be constructed as required below:

68.1 The vehicle access must be located as shown on the Approved Plans listed within this Development Approval;

68.2 The vehicle access (crossing the verge) must be constructed generally in accordance with the Institute of Public Works Engineering Australasia *Drawings RS-049 Residential Driveways Plan 1 of 2 and RS-050 Residential Driveways Plan 2 of 2,* and in accordance with *Australian Standard AS 2890 – Parking Facilities (Part 1 and as relevant Part 2)*;

68.3 The vehicle access (crossing of the verge) must align neatly on both sides with the pedestrian footpath and verge with a maximum cross fall of 2.5%. Where there is an existing pedestrian path, the existing footpath in the vicinity of the driveway must be saw cut, removed and replaced by the driveway crossover. The driveway is to be graded at not steeper than 2.5% for the width of the footpath;

68.4 The vehicle access (crossing of the verge) must be located a minimum 1 metre clear of existing maintenance holes, fire hydrants, power poles, streetlights, or signage (unless otherwise approved herein);

68.5 Undertake any necessary relocation of all existing services clear of the access (crossing of the verge) that will serve the subject land and contact all relevant service authorities and comply with their requirements in relation to these works; and

68.6 The vehicle access must be constructed to a minimum width of 3.0 metres extending into the subject land generally in accordance with the Approved Plans listed within this Development Approval.

Note: This condition is imposed pursuant to Section 145 of the Planning Act 2016.

ENVIRONMENT & WASTE

WASTE MANAGEMENT (GENERAL)

69. All waste generated on the subject land must be managed in accordance with the waste management hierarchy as detailed in the *Waste Reduction and Recycling Act 2011*.

WASTE MANAGEMENT (BIN PROVISION & STORAGE)

70. Refuse storage facilities must be provided generally in accordance with the Approved Plans listed within this Development Approval and the following:

70.1 Provision of 1 x 240L wheelie bin for general waste and 1 x 240L wheelie bin for recyclable waste for the dwelling;

70.2 Provision of a hardstand impervious area within the curtilage of each dwelling for the permanent storage location of wheelie bins, having minimum dimensions of 0.36 m^2 (600mm x 600mm) per wheelie bin and located no closer than 2m to any fresh air intake of a habitable room;

70.3 Refuse storage facilities must be screened from public vantage points with a minimum 1.5m high built enclosure or solid screen fencing;

70.4 Wheelie bin carting routes must allow bins to be easily maneuvered, devoid of steps and steep rises and not extend through any habitable room or other room of a building other than a garage; and

70.5 Bins must be kept in a clean state and in good repair and fitted with tight-fitting lid assemblies designed to prevent ingress of pests and water.

WASTE MANAGEMENT (REMOVAL)

71. Unless otherwise endorsed by Council in a waste management plan, arrangements for waste removal are provided in accordance with the following requirements:

71.1 Collection by a refuse vehicle from the kerbside;

71.2 Provision of a level area at the kerbside for the temporary storage of wheelie bins on collection days having minimum dimensions of 1m^2 (1,000mm x 1,000mm) per wheelie bin;

71.3 Bins must be located in a manner that allows the refuse vehicle to pick them up automatically without the driver having to relocate them; and

71.4 The waste collection method must ensure that waste is adequately managed to prevent escape of contamination.

B. ADVICES:

~~**RESUBMISSION OF DOCUMENTS REQUIRING AMENDMENT**~~

1) ~~**The conditions of this Development Approval require resubmission of doucments to Council with amendments. Please address the amended plans and documents to Council's Development Services Branch with the Reference No. MCUC/2018/3560, and send to development@tr.qld.gov.au.**~~

INFRASTRUCTURE CHARGES

2) Infrastructure charges are now levied by way of an infrastructure charges notice, issued pursuant to section 119 of the *Planning Act 2016*.

OTHER LAWS & REQUIREMENTS

3) This Development Approval relates to development requiring approval under the *Planning Act 2016* only. It is the approval holder's responsibility to obtain any other necessary approvals, licenses or permits required under State and Federal legislation or Council local law, prior to carrying out the development. Information with respect to other Council approvals, licenses or permits may be found on the Toowoomba Regional Council website. For information about State and Federal requirements please consult with these agencies directly.

4) Any works impacting outside the property boundary will require a permit under Subordinate Local Law 1.15 (Carrying Out Works on a Road or Interfering with a Road or its Operation) 2011. Please contact Council's Road Operations Branch through our Customer Service Centre on 131 872. The application can be found on Council's website at www.tr.qld.gov.au.

5) The development has only been assessed in accordance with the provisions of the *Toowoomba Regional Planning Scheme*. No assessment has been made in respect of the provisions of the *Building Code of Australia* and/or the *Queensland Development Code*.

WHEN APPROVAL STARTS TO HAVE EFFECT

6) This Development Approval starts to have effect in accordance with the provisions of Section 71 of *the Planning Act 2016*.

WHEN APPROVAL LAPSES

7) This Development Approval will lapse in accordance with the provisions contained in Sections 85 and 88 of the *Planning Act 2016*, unless otherwise stated elsewhere within this Development Approval.

STREET TREE DISTURBANCE & REMOVAL APPROVAL

8) This Development Approval does not infer or give approval to the owners or occupiers of the subject land to disturb or remove street trees. A separate Street Tree Disturbance or Removal Approval is required where a street tree is expected to be disturbed or removed. Please contact Council's Parks and Recreation Branch via Council's Customer Service Centre for further information in respect of street trees.

FIRE ANTS

9) The State of Queensland has been declared a quarantine area for the Red Imported Fire Ant. Should this approval involve the movement of restricted items from areas of known infestation the provisions of the *Plant Protection Act 1989* apply, compliance with statutory provisions must be achieved.

EXCAVATION & FILLING

10) The *Toowoomba Regional Planning Scheme* (TRPS) declares excavation and filling activity involving less than 50m^3 of material and excavation and filling activity to a depth or height lower than 1m to be accepted development. Any combination of excavation or filling where 50m^3 or more of fill is deposited on, or 50m^3 or more of excavated material is removed from the premises and excavation or filling is not associated with 'Building Work' as defined under the *Planning Act 2016*, must obtain an Operational Works approval from Council before commencing site works.

WATER POLLUTION

11) In accordance with the *Environmental Protection Act 1994*, all sand, silt, mud, paint, cement, concrete, construction material and demolition material, and other such waste material must not be deposited or placed where it could reasonably be expected to travel into a roadside gutter, stormwater drain or watercourse. On the spot fines apply for such offences.

BUILDING APPROVAL REQUIRED FOR CERTAIN FENCES & RETAINING WALLS

12) A Development Approval for Building Works is required for the following:

12.1 Fences where:
- The fence is part of a pool fence; or
- The fence is over 2m in height (from natural ground level); or
- The fence is attached to a retaining wall and the combined mean height is over 2.4m in height from natural ground level;

12.2 Retaining walls where:
- The wall is retaining fill having a height greater than 1m in height above the wall's natural ground surface; or
- The wall is located within 1.5m of a building or another retaining wall; or
- There is a load or surcharge imposed above the retaining wall (i.e. driveway, batter, building or the like); and

12.3 Retaining walls and/or fences are sited within 1.5m of a property boundary line and the combined height of the structures exceeds 2m (including where the retaining wall is less than 1m).

13) A siting discretion may be required from Council where a fence is proposed to be built atop the retaining wall and the combined height of the structure exceeds 2 m above natural ground level.

BUILDING OVER, OR NEAR, COUNCIL INFRASTUCTURE

14) Any construction carried out near or over existing Council services should be in accordance with Council's adopted Policy (Queensland Development Code NMP 1.4 – Excavation and Piling Near Sewers, Stormwater Drains and Water Mains) and Council's Planning Scheme Policy SC4.4 PSP No. 4 – Development Near Utility Services. A Concurrence Agency referral of the Building Works Application to Council's Water and Waste Water Services Branch may be required.

C. ATTACHMENTS:

- Approved Development Plans
- Approved Documents
- Appeal provisions pursuant to the *Planning Act 2016*.

Chapter 6, Part 1 of the Planning Act 2016 Appeal rights

229 Appeals to tribunal or P&E Court

(1) Schedule 1 states—
- (a) matters that may be appealed to—
  - (i) either a tribunal or the P&E Court; or
  - (ii) only a tribunal; or
  - (iii) only the P&E Court; and
- (b) the person—
  - (i) who may appeal a matter (the appellant); and
  - (ii) who is a respondent in an appeal of the matter; and
  - (iii) who is a co-respondent in an appeal of the matter; and
  - (iv) who may elect to be a co-respondent in an appeal of the matter.

(2) An appellant may start an appeal within the appeal period.

(3) The appeal period is—
- (a) for an appeal by a building advisory agency—10 business days after a decision notice for the decision is given to the agency; or
- (b) for an appeal against a deemed refusal—at any time after the deemed refusal happens; or
- (c) for an appeal against a decision of the Minister, under chapter 7, part 4, to register premises or to renew the registration of premises—20 business days after a notice is published under section 269(3)(a) or (4); or
- (d) for an appeal against an infrastructure charges notice—20 business days after the infrastructure charges notice is given to the person; or
- (e) for an appeal about a deemed approval of a development application for which a decision notice has not been given—30 business days after the applicant gives the deemed approval notice to the assessment manager; or
- (f) for an appeal relating to the Plumbing and Drainage Act 2018—
  - (i) for an appeal against an enforcement notice given because of a belief mentioned in the Plumbing and Drainage Act 2018, section 143(2)(a)(i), (b) or (c)—5 business days after the day the notice is given; or
  - (ii) for an appeal against a decision of a local government or an inspector to give an action notice under the Plumbing and Drainage Act 2018—5 business days after the notice is given; or
  - (iii) otherwise—20 business days after the day the notice is given; or
- (g) for any other appeal—20 business days after a notice of the decision for the matter, including an enforcement notice, is given to the person.

Note— See the P&E Court Act for the court's power to extend the appeal period.

(4) Each respondent and co-respondent for an appeal may be heard in the appeal.

(5) If an appeal is only about a referral agency's response, the assessment manager may apply to the tribunal or P&E Court to withdraw from the appeal.

(6) To remove any doubt, it is declared that an appeal against an infrastructure charges notice must not be about—
- (a) the adopted charge itself; or
- (b) for a decision about an offset or refund—
  - (i) the establishment cost of trunk infrastructure identified in a LGIP; or
  - (ii) the cost of infrastructure decided using the method included in the local government's charges resolution.

230 Notice of appeal

(1) An appellant starts an appeal by lodging, with the registrar of the tribunal or P&E Court, a notice of appeal that—
- (a) is in the approved form; and
- (b) succinctly states the grounds of the appeal.

(2) The notice of appeal must be accompanied by the required fee.

(3) The appellant or, for an appeal to a tribunal, the registrar must, within the service period, give a copy of the notice of appeal to—
- (a) the respondent for the appeal; and
- (b) each co-respondent for the appeal; and
- (c) for an appeal about a development application under schedule 1, section 1, table 1, item 1—each principal submitter for the application whose submission has not been withdrawn; and
- (d) for an appeal about a change application under schedule 1, section 1, table 1, item 2—each principal submitter for the application whose submission has not been withdrawn; and
- (e) each person who may elect to be a co-respondent for the appeal other than an eligible submitter for a development application or change application the subject of the appeal; and
- (f) for an appeal to the P&E Court—the chief executive; and
- (g) for an appeal to a tribunal under another Act—any other person who the registrar considers appropriate.

(4) The service period is—
- (a) if a submitter or advice agency started the appeal in the P&E Court—2 business days after the appeal is started; or
- (b) otherwise—10 business days after the appeal is started.

(5) A notice of appeal given to a person who may elect to be a co-respondent must state the effect of subsection (6).

(6) A person elects to be a co-respondent to an appeal by filing a notice of election in the approved form—
- (a) if a copy of the notice of appeal is given to the person—within 10 business days after the copy is given to the person; or
- (b) otherwise—within 15 business days after the notice of appeal is lodged with the registrar of the tribunal or the P&E Court.

(7) Despite any other Act or rules of court to the contrary, a copy of a notice of appeal may be given to the chief executive by emailing the copy to the chief executive at the email address stated on the department's website for this purpose.

231 Non-appealable decisions and matters

(1) Subject to this chapter, section 316(2) schedule 1 and the P&E Court Act, unless the Supreme Court decides a decision or other matter under this Act is affected by jurisdictional error, the decision or matter is non-appealable.

(2) The *Judicial Review Act 1991*, part 5 applies to the decision or matter to the extent it is affected by jurisdictional error.

(3) A person who, but for subsection (1) could have made an application under the *Judicial Review Act 1991* in relation to the decision or matter, may apply under part 4 of that Act for a statement of reasons in relation to the decision or matter.

(4) In this section—

decision includes—
- (a) conduct engaged in for the purpose of making a decision; and
- (b) other conduct that relates to the making of a decision; and
- (c) the making of a decision or the failure to make a decision; and
- (d) a purported decision; and
- (e) a deemed refusal.

non-appealable, for a decision or matter, means the decision or matter—
- (a) is final and conclusive; and
- (b) may not be challenged, appealed against, reviewed, quashed, set aside or called into question in any other way under the Judicial Review Act 1991 or otherwise, whether by the Supreme Court, another court, any tribunal or another entity; and
- (c) is not subject to any declaratory, injunctive or other order of the Supreme Court, another court, any tribunal or another entity on any ground.

232 Rules of the P&E Court

(1) A person who is appealing to the P&E Court must comply with the rules of the court that apply to the appeal.

(2) However, the P&E Court may hear and decide an appeal even if the person has not complied with rules of the P&E Court.

TOOWOOMBA REGION

Rich traditions. Bold ambitions.

Our Reference: MCUI/2019/3145/A
Contact Officer: Alison Clark
Contact: (07) 4688 6285
Email: development@tr.qld.gov.au

GENERALLY IN ACCORDANCE

Excavation Equipment Pty Ltd
C/- Bryant Building Contractors
Suite 3, 213 Margaret Street
TOOWOOMBA QLD 4350

Email: jlambert@bryantbc.com.au

9 April 2025

Dear Sir/Madam

Approval: **Material Change of Use for Dwelling**
Location: **1F Alderley Street Rangeville**
Property Description: **Lot 62 CC555**

Reference is made to your email dated 7 April 2025 requesting that Council determine amended plans to be generally in accordance with the current Approved Plans for the abovementioned Development Approval.

It has been determined that the following plan is generally in accordance with the current Approved Plans of the Development Approval:

Plan No: 1319.24047, Issue 4
Description: Site Plan, prepared by VHD Studio and dated 17 December 2024
Amendments: Nil

Plan No: 1319.24047, Issue 6
Description: Ground Floor Plan, prepared by VHD Studio and dated 17 December 2024
Amendments: Nil

Plan No: 1319.24047, Issue 6
Description: Upper Floor Plan, prepared by VHD Studio and dated 17 December 2024
Amendments: Nil

Plan No: 1319.24047, Issue 6
Description: Building Elevations, prepared by VHD Studio and dated 17 December 2024
Amendments: Nil

A copy of the above plans are attached to this letter. If you have any other questions or queries, please contact Council's Senior Planner, Alison Clark on the above telephone number.

Yours faithfully

Sophie Spencer
Lead Senior Planner Planning Branch

TOOWOOMBA REGION

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Our Reference: MCUI/2019/3145/A
Officer: Maria Escaño
Contact: 131 872
Email: development@tr.qld.gov.au

AMENDED INFRASTRUCTURE CHARGES NOTICE

Planning Act 2016 Section 119

Excavation Equipment Pty Ltd
C/- Property Projects Australia
PO Box 3686
TOOWOOMBA QLD 4350

Email: blake@propertyprojectsaustralia.com.au
francisco@propertyprojectsaustralia.com.au

11 August 2023

Dear Sir

Approved Development: Material Change of Use - Impact – Dwelling House
Location: 1F Alderley Street, RANGEVILLE QLD 4350
Property Description: Lot 62 CC555
Relevant Planning Scheme: *Toowoomba Regional Planning Scheme 2012*

I wish to advise that the attached Infrastructure Charges Notice for the above approved development has been issued by Council.

Rights of Appeal

Attached is an extract from Part 1 of Chapter 6 of the *Planning Act 2016* which details your appeal rights regarding the issue of this Notice.

The *Planning Act 2016* is available via:

https://www.legislation.qld.gov.au/.

Yours faithfully

Shokhida Safarova
Acting Coordinator Infrastructure Charges
Development Engineering & Plumbing Services

ABN 997 8830 5360

PO Box 3021 Toowoomba QLD 4350

TOOWOOMBA REGION

Rich traditions. Bold ambitions.

Amended Infrastructure Charges Notice

To: Excavation Equipment Pty Ltd

Date of Issue: 11 June 2023

Application Number: MCUI/2019/3145/A

Type of Approval: Material Change of Use - Impact - Request to Change Approval Dwelling

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This Infrastructure Charges Notice is levied by the Toowoomba Regional Council.

The charge levied under this Infrastructure Charges Notice has been worked out by applying the Charges Resolution No. 5 (which took effect on 1 March 2022). The charge was calculated as follows:

Charge Area Information:	**Toowoomba Regional Council Charge Area:**	Urban
	Number of networks servicing development:	Five networks
	Network items impacted by the development:	Water, Wastewater, Stormwater, Transport and Parks

Notes on calculation of levied charge

In accordance with section 5(d)(iii) of Toowoomba Regional Council's Charges Resolution No. 5, a credit for the premises cannot exceed the adopted charge for the development.

Rounding may have been applied to the numbers stated on this notice.

Notes on the measurement of demand

Council measures demand for residential development, based on a per Bedroom, or per suite basis, subject to the terms of Charges Resolution No. 5.

Otherwise, for non-residential development:

In accordance with Charges Resolution No. 5, Council measures the demand placed upon the transport, water supply and sewerage networks for non-residential development via the application of a per metre squared of GFA approach – based on the material provided by the applicant and assessed, interrogated and approved as part of the development application. The units of measure for these networks is metres squared of GFA.

For the stormwater network, Council measures demand via the application of a per metre squared of impervious area approach – based on the material provided by the applicant and assessed, interrogated and approved as part of the development application. The unit of measure for this network is metres squared of impervious area.

Notes on working out the extra demand

Levied charges may only be for extra demand placed on trunk infrastructure that the development will generate. Council has worked out the extra demand in the manner shown below in the 'calculation of adopted charges for proposed development' table.

Calculation of Adopted Charges for proposed development - Land use					
Development type	**Units of Measure**	**No. of Units**	**Charge Rate**	**Amount**	**Stage**
Residential	3 or more bedroom dwelling	1	$30,677.65	$30,677.65	N/A

TOTAL ADOPTED LAND USE CHARGES FOR PROPOSED DEVELOPMENT	**$30,677.65**

Calculation of Applicable Credits - Land use					
Development type	**Units of Measure**	**No. of Units**	**Credit Unit Rate**	**Amount**	**Stage**
Residential	3 or more bedroom dwelling	1	$30,677.65	$30,677.65	N/A

TOTAL APPLICABLE LAND USE CREDITS	**$30,677.65**

Current Amount of the Total Levied Charge	**$0.00**

Notes on calculation of the current amount of the total levied charge
In Accordance with the Toowoomba Regional Council's Charges Resolution No. 5 (which took effect on 1 March 2022), the current amount of the total levied charge has been worked out by subtracting the applicable credits from the adopted charges determined per the tables above.

Enquiries regarding this Infrastructure Charges Notice can be made by contacting Council's Coordinator Infrastructure Charges on 131 TRC (872).

Premises to which the levied charge applies	**Site Address**	Lot 62 CC555 1F Alderley Street, RANGEVILLE QLD 4350
	Real Property Description	Lot 97 CC505 & Lot 62 CC555

Automatic increase provision	The amount of the levied charge is subject to automatic increases and will be escalated by the Producer Price Index from the date of the notice to the payment date in accordance with the Toowoomba Regional Council's Charges Resolution No. 5 (which took effect on 1 March 2022).

Payment date pursuant to section 122 of the *Planning Act* 2016	The levied charge here applies for Material change of use. As such, the levied charge becomes payable when the change happens.

Offset/Refund	No applicable offset/refund.

Rights of Appeal

Attached is an extract from Chapter 6, Part 1, and Schedule 1 of the *Planning Act 2016* which details your appeal rights regarding the issue of this Notice. The *Planning Act 2016* is available via:

https://www.legislation.qld.gov.au/.

Extract from Chapter 6, Part 1 of the Planning Act 2016 Appeal rights

229 Appeals to tribunal or P&E Court

(1) Schedule 1 states—
- (a) matters that may be appealed to—
  - (i) either a tribunal or the P&E Court; or
  - (ii) only a tribunal; or
  - (iii) only the P&E Court; and
- (b) the person—
  - (i) who may appeal a matter (the appellant); and
  - (ii) who is a respondent in an appeal of the matter; and
  - (iii) who is a co-respondent in an appeal of the matter; and
  - (iv) who may elect to be a co-respondent in an appeal of the matter.

(2) An appellant may start an appeal within the appeal period.

(3) The appeal period is—
- (a) for an appeal by a building advisory agency—10business days after a decision notice for the decision is given to the agency; or
- (b) for an appeal against a deemed refusal—at any time after the deemed refusal happens; or
- (c) for an appeal against a decision of the Minister, under chapter 7, part 4, to register premises or to renew the registration of premises—20 business days after a notice is published under section 269(3)(a) or (4); or
- (d) for an appeal against an infrastructure charges notice—20 business days after the infrastructure charges notice is given to the person; or
- (e) for an appeal about a deemed approval of a development application for which a decision notice has not been given—30 business days after the applicant gives the deemed approval notice to the assessment manager; or
- (f) for an appeal relating to the *Plumbing and Drainage Act 2018* —
  - (i) for an appeal against an enforcement notice given because of a belief mentioned in the Plumbing and Drainage Act 2018, section 143(2)(a)(i), (b) or (c) - 5 business days after the day the notice is given; or
  - (ii) for an appeal against a decision of a local government or an inspector to give an action notice under the *Plumbing and Drainage Act 2018* – 5 business days after the notice is given; or
  - (iii) otherwise – 20 business days after the day the notice is given; or
- (g) for any other appeal—20 business days after a notice of the decision for the matter, including an enforcement notice, is given to the person.

Note— See the P&E Court Act for the court's power to extend the appeal period.

(4) Each respondent and co-respondent for an appeal may be heard in the appeal.

(5) If an appeal is only about a referral agency's response, the assessment manager may apply to the tribunal or P&E Court to withdraw from the appeal.

(6) To remove any doubt, it is declared that an appeal against an infrastructure charges notice must not be about—
- (a) the adopted charge itself; or
- (b) for a decision about an offset or refund—
  - (i) the establishment cost of trunk infrastructure identified in a LGIP; or
  - (ii) the cost of infrastructure decided using the method included in the local government's charges resolution.

230 Notice of appeal

(1) An appellant starts an appeal by lodging, with the registrar of the tribunal or P&E Court, a notice of appeal that—
- (a) is in the approved form; and
- (b) succinctly states the grounds of the appeal.

(2) The notice of appeal must be accompanied by the required fee.

(3) The appellant or, for an appeal to a tribunal, the registrar must, within the service period, give a copy of the notice of appeal to—
- (a) the respondent for the appeal; and
- (b) each co-respondent for the appeal; and
- (c) for an appeal about a development application under schedule 1, table 1, item 1—each principal submitter for the development application whose submission has not been withdrawn; and
- (d) for an appeal about a change application under schedule 1, table 1, item 2—each principal submitter for the application whose submission has not been withdrawn; and
- (e) each person who may elect to become a co-respondent for the appeal, other than an eligible submitter for a development application or change application the subject of the appeal; and
- (f) for an appeal to the P&E Court—the chief executive; and
- (g) for an appeal to a tribunal under another Act—any other person who the registrar considers appropriate.

(4) The service period is—
- (a) if a submitter or advice agency started the appeal in the P&E Court—2 business days after the appeal is started; or
- (b) otherwise—10 business days after the appeal is started.

(5) A notice of appeal given to a person who may elect to be a co-respondent must state the effect of subsection (6).

(6) A person elects to be a co-respondent by filing a notice of election, in the approved form-
- (a) if a copy of the notice of appeal is given to the person – within 10 business days after the copy is given to the person; or
- (b) otherwise – within 15 business days after the notice of appeal is lodged with the registrar of the tribunal or the P&E Court.

(7) Despite any other Act or rules of court to the contrary, a copy of a notice of appeal may be given to the chief executive by emailing the copy to the chief executive at the email address stated on the department's website for this purpose.

231 Non-appealable decisions and matters

(1) Subject to this chapter, schedule 1 and the P&E Court Act, unless the Supreme Court decides a decision or other matter under this Act is affected by jurisdictional error, the decision or matter is non-appealable.

(2) The *Judicial Review Act 1991*, part 5 applies to the decision or matter to the extent it is affected by jurisdictional error.

(3) A person who, but for subsection (1) could have made an application under the *Judicial Review Act 1991* in relation to the decision or matter, may apply under part 4 of that Act for a statement of reasons in relation to the decision or matter.

(4) In this section— decision includes—
- (a) conduct engaged in for the purpose of making a decision; and
- (b) other conduct that relates to the making of a decision; and
- (c) the making of a decision or the failure to make a decision; and
- (d) a purported decision; and
- (e) a deemed refusal.

non-appealable, for a decision or matter, means the decision or matter—

- (a) is final and conclusive; and
- (b) may not be challenged, appealed against, reviewed, quashed, set aside or called into question in any other way under the *Judicial Review Act 1991* or otherwise, whether by the Supreme Court, another court, any tribunal or another entity; and
- (c) is not subject to any declaratory, injunctive or other order of the Supreme Court, another court, any tribunal or another entity on any ground.

232 Rules of the P&E Court

(1) A person who is appealing to the P&E Court must comply with the rules of the court that apply to the appeal.

(2) However, the P&E Court may hear and decide an appeal even if the person has not complied with rules of the P&E Court.

Extract from Schedule 1 of the Planning Act 2016 (Appeals)

1 Appeal rights and parties to appeals

(1) Table 1 states the matters that may be appealed to—
- (a) the P&E court; or
- (b) a tribunal.

(2) However, table 1 applies to a tribunal only if the matter involves—
- (a) the refusal, or deemed refusal of a development application, for—
  - (i) a material change of use for a classified building; or
  - (ii) operational work associated with building work, a retaining wall, or a tennis court; or
- (b) a provision of a development approval for—
  - (i) a material change of use for a classified building; or
  - (ii) operational work associated with building work, a retaining wall, or a tennis court; or
- (c) if a development permit was applied for—the decision to give a preliminary approval for—
  - (i) a material change of use for a classified building; or
  - (ii) operational work associated with building work, a retaining wall, or a tennis court; or
- (d) a development condition if—
  - (i) the development approval is only for a material change of use that involves the use of a building classified under the Building Code as a class 2 building; and
  - (ii) the building is, or is proposed to be, not more than 3 storeys; and
  - (iii) the proposed development is for not more than 60 sole-occupancy units; or
- (e) a decision for, or a deemed refusal of, an extension application for a development approval that is only for a material change of use of a classified building; or
- (f) a decision for, or a deemed refusal of, a change application for a development approval that is only for a material change of use of a classified building; or
- (g) a matter under this Act, to the extent the matter relates to the Building Act, other than a matter under that Act that may or must be decided by the Queensland Building and Construction Commission; or
- (h) a decision to give an enforcement notice—
  - (i) in relation to a matter under paragraphs (a) to (g); or
  - (ii) under the *Plumbing and Drainage Act 2018*; or
- (i) an infrastructure charges notice; or
- (j) the refusal, or deemed refusal, of a conversion application; or
- (k) a matter prescribed by regulation.

(3) Also, table 1 does not apply to a tribunal if the matter involves—
- (a) for a matter in subsection (2)(a) to (d)—
  - (i) a development approval for which the development application required impact assessment; and
  - (ii) a development approval in relation to which the assessment manager received a properly made submission for the development application; or
- (b) a provision of a development approval about the identification or inclusion, under a variation approval, of a matter for the development.

(4) Table 2 states the matters that may be appealed only to the P&E Court.

(5) Table 3 states the matters that may be appealed only to the tribunal.

(6) In each table—
- (a) column 1 states the appellant in the appeal; and
- (b) column 2 states the respondent in the appeal; and
- (c) column 3 states the co-respondent (if any) in the appeal; and
- (d) column 4 states the co-respondents by election (if any) in the appeal.

(7) If the chief executive receives a notice of appeal under section 230(3)(f), the chief executive may elect to be a co- respondent in the appeal.

(8) In this section—
storey see the Building Code, part A1.1.

Table 1
Appeals to the P&E Court and, for certain matters, to a tribunal

4, Infrastructure charges notices

An appeal may be made against an infrastructure charges notice on 1 or more of the following grounds-

(a) The notice involved an error relating to –
  (i) The application of the relevant adopted charge; or
  Examples of errors in applying an adopted charge –
  -The incorrect application of gross floor area for a non-residential development
  -Applying an incorrect 'use category', under a regulation, to the development
  (ii) The working out of extra demand, for section 120; or
  (iii) An offset or refund; or
(b) There was no decision about an offset or refund; or
(c) If the infrastructure charges notice states a refund will be given – the timing for giving the refund; or
(d) For an appeal to the P&E court – the amount of the charge is so unreasonable that no reasonable relevant local government could have imposed the amount.

Column 1 Appellant	Column 2 Respondent	Column 3 Co-respondent (if any)	Column 4 Co-respondent by election (if any)
The person given the infrastructure charges notices	The local government that gave the infrastructure charges notice		

REAL PROPERTY DESCRIPTION:
- LOCAL GOVERNMENT - TOOWOOMBA REGIONAL
- LOT 62 ON CC555
- PARISH: DRAYTON
- COUNTY: AUBIGNY
- SITE AREA: 19805m2

PLANNING REQUIREMENTS:
DESIGNATION - LIMITED DEVELOPMENT (CONSTRAINED LAND)
PRECINCT - NO PRECINCT
OVERLAYS - AIRPORT ENVIRONS OVERLAY
- ENVIRONMENTAL SIGNIFICANCE OVERLAY
- BUSHFIRE HAZARD - HIGH FIRE RISK
- BUSHFIRE HAZARD - MEDIUM FIRE RISK
- HIGH LANDSLIDE HAZARD

SITE LEGEND:
- DWELLING
- EXTERNAL PAVING
- DRIVEWAY
- LANDSCAPING
- GRASS

SITE PREPARATION NOTES:
- BUILDER IS TO REMOVE EVERYTHING ON OR ABOVE THE SITE SURFACE, INCLUDING RUBBISH, SCRAP, GRASS, VEGETABLE MATTER AND ORGANIC DEBRIS, SCRUB, TREES, TIMBER, STUMPS, BOULDERS AND RUBBLE.
- REMOVE GRASS TO A DEPTH JUST SUFFICIENT TO INCLUDE THE ROOT ZONE.
- REMOVE THE TOPSOIL LAYER OF THE NATURAL GROUND WHICH CONTAINS SUBSTANTIAL ORGANIC MATTER OVER THE AREAS TO BE OCCUPIED BY CONSTRUCTION AND PAVING.
- STOCKPILE SITE TOPSOIL REQUIRED FOR RE-USE. PROTECT STOCKPILES FROM CONTAMINATION BY OTHER EXCAVATED MATERIAL, WEEDS AND BUILDING DEBRIS

ENERGY EFFICIENCY NOTES:
- REFER TO ENERGY RATINGS REPORT FOR COMPLIANCE WITH THE BCA DTS REQUIREMENTS.
- HOT WATER SYSTEM TO COMPLY WITH THE QUEENSLAND PLUMBING & WASTEWATER CODE
- SINGLE-PHASE OR 3-PHASE AIR-CONDITIONERS OF THE VAPOUR COMPRESSION TYPE FOR WHICH A MINIMUM ENERGY PERFORMANCE STANDARD IS STATED UNDER AS/NZS 3823.2 ARE TO HAVE AN EER OF AT LEAST 2.9.
- BULK AND REFLECTIVE FOIL BASED INSULATION TO COMPLY WITH AS/NZS 4859.1 2005
- REFLECTIVE FOIL INSULATION FIXED TO EXTERNAL WALLS TO EFFECTIVELY FINISH WITH THE TOP OF THE TOP PLATE
- BULK INSULATION TO BE INSTALLED IN ACCORDANCE WITH AS 3999
- CEILING INSULATION TO BE PERMANENTLY FIXED TO TOP OF CEILING ACCESS COVER

GENERAL NOTES:

- PLANS TO BE READ IN CONJUNCTION WITH BUILDING CODE OF AUSTRALIA AND ALL STANDARDS OR TECHNICAL NOTES REFERENCE THEREIN AND LOCAL AUTHORITY BY LAWS AND CONDITIONS OF APPROVAL.
- LOCATION OF BUILDING TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION.
- SURVEY INFORMATION TO BE CONFIRMED BY LICENSED SURVEYOR PRIOR TO CONSTRUCTION.
- BUILDER IS TO PROVIDE APPROPRIATE TEMPORARY & PERMANENT FENCING TO THE SITE IN ACCORDANCE WITH ALL RELEVANT AUSTRALIAN STANDARDS & LOCAL AUTHORITY REQUIREMENTS
- BUILDER TO ENSURE SITE ACCESS, TRAFFIC MANAGEMENT, WATER STORAGE AREA & SEDIMENT CONTROL COMPLY WITH THE BCA, ALL RELEVANT AUSTRALIAN STANDARDS & LOCAL AUTHORITY REQUIREMENTS
-IF ANY DISCREPANCIES IN THE DOCUMENTATION ARE IDENTIFIED THE BUILDER IS TO SEEK CLARIFICATION FROM THE DESIGNER.
- ACCURATELY LOCATE ALL SERVICES ABOVE AND BELOW GROUND PRIOR TO COMMENCING EXCAVATION. OBTAIN ALL NECESSARY APPROVALS AND PERMISSION BEFORE COMMENCING WORK ON OR NEAR SERVICES.
- IN ACCORDANCE WITH A.S. 3660 A SYSTEM AND DEGREE OF PROTECTION FROM INFESTATION BY SUBTERRANEAN TERMITES SHALL BE APPROVED BY THE PROPRIETOR PRIOR TO THE COMMENCEMENT OF WORKS. ENSURE THAT ALL MATERIALS, APPLIED FINISHES, SERVICE PENETRATIONS AND CONNECTION DETAILS ARE COMPATIBLE WITH THE NOMINATED TERMITE PROTECTION SYSTEM.
- COORDINATE ALL CONSULTANTS DOCUMENTATION AND BRING TO ATTENTION OF RELEVANT CONSULTANT ANY PERCEIVED DISCREPANCY PRIOR TO COMMENCEMENT OF WORKS.
- CHECK ALL DIMENSIONS OF SITE AND BUILDINGS SET OUT PLAN AGAINST SURVEYORS SITE SET OUT. CLARIFY ANY DISCREPANCY TO NOTED DIMENSIONS PRIOR TO COMMENCEMENT OF ANY WORK. ENSURE SURVEYORS WORK RELATES TO MOST RECENT ISSUE OF PLANS AND / OR SPECIFICATION.
- CHECK ALL OPENINGS ON SITE PRIOR TO FABRICATION OF DOORS WINDOWS AND ANY OTHER FIXTURES. GIVEN SIZES ARE NOMINAL FOR QUOTATION PURPOSES.
- ALL SPECIALIST TRADE WORK TO BE CARRIED OUT BY SUITABLY QUALIFIED PERSONS HOLDING APPROPRIATE LICENSES AND INSURANCES.
- THE BUILDER IS RESPONSIBLE TO ENSURE THE WATER TIGHTNESS OF THE WORKS AND SHALL PROVIDE ALL FLASHING, DAMP PROOF COURSES AND MEMBRANES NECESSARY TO PREVENT THE ENTRY OF MOISTURE.
- ALL PROPRIETARY ITEMS ARE TO BE HANDLED, STORED, INSTALLED OR ERECTED STRICTLY IN ACCORDANCE WITH MANUFACTURERS INSTRUCTIONS.
- ALL MATERIALS USED IN CONSTRUCTION SHALL BE SELECTED GIVING DUE REGARD FOR HAZARDS WHICH WOULD BE EXPECTED TO BE ENCOUNTERED WHEN IN SERVICE. PARTICULARLY EXPOSURE TO WEATHER AND CONTACT WITH OTHER MATERIALS.
- CROSSOVER TO COMPLY WITH LOCAL AUTHORITY REQUIREMENTS.
- KERB AND CHANNEL TO BE AS INDICATED ON ENGINEERING DOCUMENTATION.
- ONLY THE VEGETATION WITHIN THE AREA REQUIRED TO CONSTRUCT THE PAD PLATFORM IS TO BE REMOVED
- REFER TO ENGINEER'S DRAWINGS FOR EXACT LOCATION OF ANY RETAINING WALLS
- EXTENT OF SITE EARTHWORKS TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION.
- SOP DENOTES SET OUT POINTS FOR BUILDING SETOUT.
- GROUND SURFACE DRAINAGE PIPE LOCATIONS & CONFIGURATIONS TO DETAIL BY OTHERS.
- IN A SERVICE AREA FOR A RETAIL WATER SERVICE UNDER THE WATER ACT 2000, THE WATER SUPPLIED TO A NEW CLASS 1 BUILDING DOES NOT EXCEED PRESSURE LEVELS SET OUT IN AS/NZS 3500.1:2003; AND IF MAINS WATER PRESSURE EXCEEDS OR COULD EXCEED 500 KPA, A WATER PRESSURE LIMITING DEVICE IS INSTALLED TO ENSURE THAT THE MAXIMUM OPERATING PRESSURE AT ANY OUTLET WITHIN THE BOUNDARIES OF THE PROPERTY DOES NOT EXCEED 500 KPA.
- ROOF STORMWATER IS TO DISCHARGE TO LOCAL GOVERNMENT REQUIREMENTS AND APPROVAL. TANK/S OVERFLOW AND DOWNPIPES NOT CONNECTED TO RAINWATER TANK/S TO DISCHARGE TO STREET CHANNEL SYSTEM. UPVC SURFACE DRAIN PIPES WITH A MIN. 1:100 FALL TO COMPLY WITH AS/NZS 3500:2003. A PHYSICAL AIR BREAK OR NON-RETURN VALUE IS TO BE PROVIDED AT THE TANK/S OVERFLOW BEFORE CONNECTING TO THE STORMWATER DRAINAGE SYSTEM. REFER TO SHEET 110 FOR ROOF DRAINAGE LAYOUT AND CALCULATIONS.

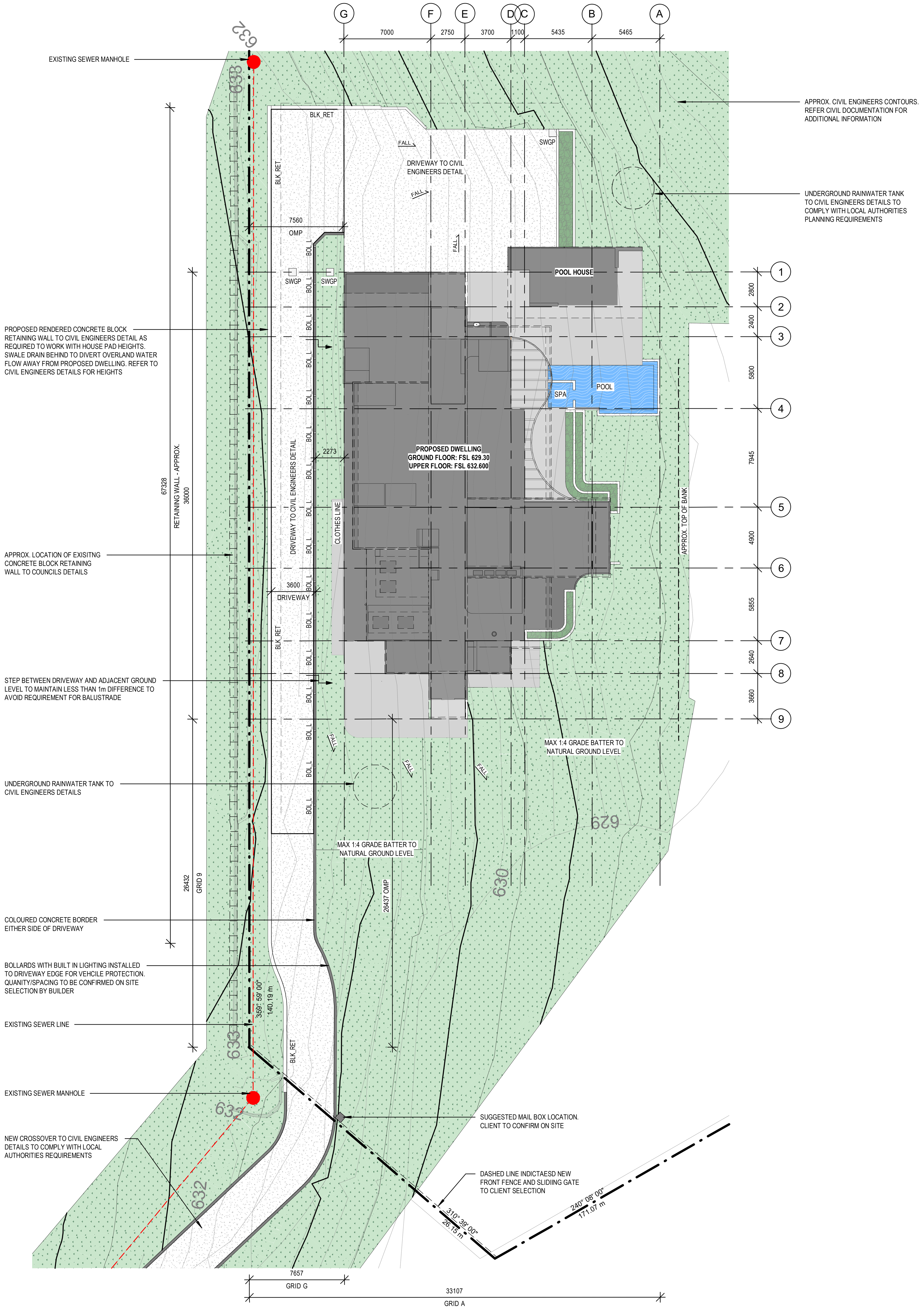
OPENABLE WINDOWS - BEDROOMS -
1 - A WINDOW OPENING IN A BEDROOM MUST BE PROVIDED WITH PROTECTION, WHERE THE FLOOR BELOW THE WINDOW IS 2 M OR MORE ABOVE THE SURFACE BENEATH.
2 - WHERE THE LOWEST LEVEL OF THE WINDOW OPENING COVERED BY (1) IS LESS THAN 1.7 M ABOVE THE FLOOR, THE WINDOW OPENING MUST COMPLY WITH THE FOLLOWING: (A)THE OPENABLE PORTION OF THE WINDOW MUST BE PROTECTED WITH— (I)A DEVICE CAPABLE OF RESTRICTING THE WINDOW OPENING; OR
(II)A SCREEN WITH SECURE FITTINGS.
(B)A DEVICE OR SCREEN REQUIRED BY (A) MUST— (I)NOT PERMIT A 125 MM SPHERE TO PASS THROUGH THE WINDOW OPENING OR SCREEN; AND
(II)RESIST AN OUTWARD HORIZONTAL ACTION OF 250 N AGAINST THE— (A)WINDOW RESTRAINED BY A DEVICE; OR
(B)SCREEN PROTECTING THE OPENING; AND
(III)HAVE A CHILD RESISTANT RELEASE MECHANISM IF THE SCREEN OR DEVICE IS ABLE TO BE REMOVED, UNLOCKED OR OVERRIDDEN.
OPENABLE WINDOWS – ROOMS OTHER THAN BEDROOMS
(1)A WINDOW OPENING IN A ROOM OTHER THAN A BEDROOM MUST BE PROVIDED WITH PROTECTION WHERE THE FLOOR BELOW THE WINDOW IS 4 M OR MORE ABOVE THE SURFACE BENEATH.
(2)THE OPENABLE PART OF THE WINDOW COVERED BY (1) MUST BE PROTECTED WITH A BARRIER WITH A HEIGHT OF NOT LESS THAN 865 MM ABOVE THE FLOOR.
(3)A BARRIER REQUIRED BY (2) MUST NOT— (A)PERMIT A 125 MM SPHERE TO PASS THROUGH IT; AND
(B)HAVE ANY HORIZONTAL OR NEAR HORIZONTAL ELEMENTS BETWEEN 150 MM AND 760 MM ABOVE THE FLOOR THAT FACILITATE CLIMBING.

GENERAL NOTES CONT.:

QUEENSLAND DEVELOPMENT CODE MP 4.1
- IN A NEW OR RENOVATED CLASS 1 BUILDING PROVIDE SHOWER ROSES THAT HAVE AN AAA RATING WHEN ASSESSED AGAINST AS/NZS 6400:2004 OR A THREE STAR RATING UNDER THE WATER EFFICIENCY LABELING SCHEME (WELS).
- IN A NEW OR RENOVATED CLASS 1 BUILDING PROVIDE TAPWARE THAT HAVE A THREE STAR RATING UNDER THE WATER EFFICIENCY LABELING SCHEME (WELS).
- IN A NEW OR RENOVATED CLASS 1 BUILDING TOILET CISTERNS MUST HAVE DUAL FLUSH CAPACITY AND BE MINIMUM 4 STAR.
- IN A NEW CLASS 1 BUILDING ENERGY EFFICIENT LIGHTING IS USED IN AT LEAST 80% OF THE TOTAL INTERNAL FLOOR AREA.

QUEENSLAND DEVELOPMENT CODE MP 4.2
- RAINWATER TANK/S WITH A MINIMUM CAPACITY OF 5000 LITRES TO BE PROVIDED OR AS SPECIFIED BY LOCAL GOVERNMENT PLANNING REQUIREMENTS. LOCATION OF TANK/S TO BE CONFIRMED ON SITE PRIOR TO CONSTRUCTION. DOWNPIPES CONNECTED TO RAINWATER TANK/S VIA UNDERGROUND SURFACE DRAIN PIPES TO BE FITTED WITH VERMIN PROOF RAINWATER HEADS. RAINWATER TANK/S TO BE CONNECTED FOR INTERNAL AND EXTERNAL USE AS SPECIFIED IN PART MP 4.2 OF THE QDC. ALL WORK TO CONFORM TO PART MP 4.2 OF THE QUEENSLAND DEVELOPMENT CODE (WATER SAVING TARGETS).

Keynote Legend	
Key Value	Keynote Text
BLK_RET	CONCRETE BLOCK RETAINING WALL TO ENGINEERS DETAILS
BOL_L	FEATURE BOLLARD WITH LIGHTING INSTALLED TO MANUFACTURERS SPECIFICATION
SWGP	STORMWATER GULLY PIT - TO ENGINEER'S DETAIL



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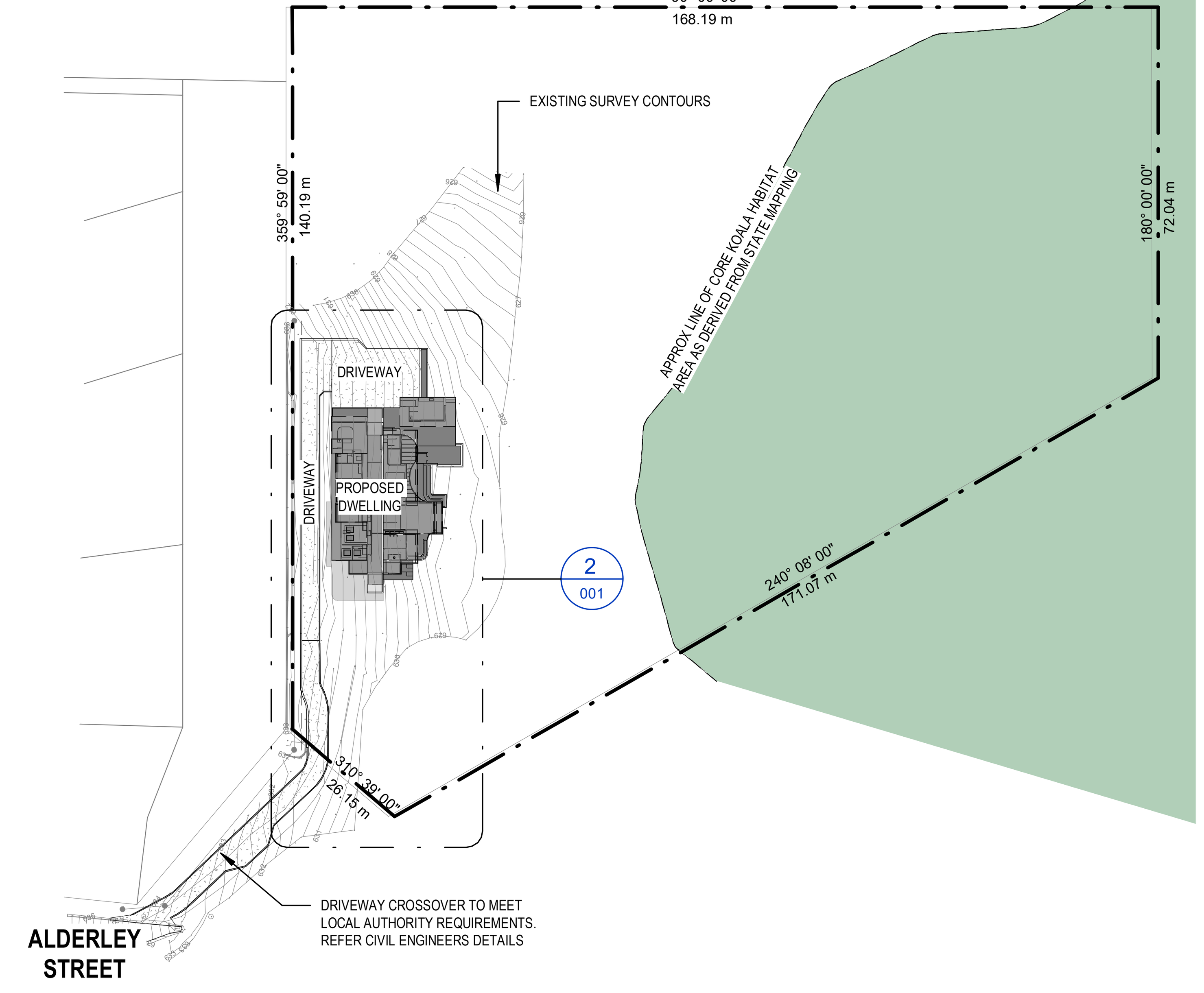
ENLARGED SITE PLAN
1 : 200



OVERALL SITE PLAN
1 : 1000

RECEIVED
07/04/2025
TOOWOOMBA REGIONAL COUNCIL

TOOWOOMBA REGIONAL COUNCIL
APPROVED PLAN
referred to in Council's "Generally in Accordance" letter dated
9 April 2025
This plan is subject to conditions of Approval Number
MCUI/2019/3145/A
Assessment Manager

BUSHFIRE OVERLAY REQUIREMENTS - REFER TO BUSFIRE REPORT PREPARED BY AQUILA NRM
BUSHFIRE REPORT RECOMMENDATIONS
1. AS NOTED AT THE BEGINNING OF THE REPORT THIS IS A BAL–19. THE CONTENTS OF THIS REPORT SHOULD BE IMPLEMENTED AND THE ATTACHED APPENDICES HEEDED IN ORDER TO ENSURE THAT THE HIGHEST LEVEL OF PROTECTION CAN BE ACHIEVED FOR THE RESIDENTS AND THEIR PROPERTY.
2. THE FIRE REPORT HAS BEEN PREPARED ON THE BASIS THAT A MINIMUM HORIZONTAL SEPARATION DISTANCE OF 24 METRES CAN BE ACHIEVED AND MAINTAINED BETWEEN DOWNSLOPE HAZARDOUS UNDERSTOREY VEGETATION AND THE DWELLING. FAILURE TO ACHIEVE AND MAINTAIN THIS SEPARATION DISTANCES WILL RESULT IN A HIGHER BUSHFIRE ATTACK LEVEL (BAL) BEING APPLIED TO THE BUILDING.

SUBFLOOR SUPPORTS:
THE STANDARD DOES NOT PROVIDE CONSTRUCTION REQUIREMENTS FOR SUB-FLOOR SUPPORTS WHERE THE SUB-FLOOR IS ENCLOSED IN ACCORDANCE WITH WALL THAT CONFORMS TO THE REQUIREMENTS FOR WALLS LISTED BELOW OR IS ENCLOSED WITH CORROSION RESISTANT STEEL, BRONZE OR ALUMINIUM MESH WITH A MAXIMUM APERTURE OF 2 MM.

FLOORS:
THE STANDARD DOES NOT PROVIDE CONSTRUCTION REQUIREMENTS FOR CONCRETE SLABS ON THE GROUND.

UNENCLOSED SUBFLOOR SPACE:
THE STANDARD DOES NOT PROVIDE CONSTRUCTION REQUIREMENTS FOR BEARERS, JOISTS AND FLOORS THAT ARE GREATER THAN 400MM ABOVE FINISHED GROUND LEVEL

EXTERNAL WALLS:
EXTERNAL WALLS THAT ARE LESS THAN 400MM FROM THE GROUND, DECKS, CARPORT ROOFS AND SIMILAR ELEMENTS SHOULD BE:
(A) MADE OF NON-COMBUSTIBLE MATERIALS (E.G. FULL MASONRY, BRICK VENEER ETC.) WITH A MINIMUM THICKNESS OF 90 MM,
(B) TIMBER LOGS WITH A DENSITY OF 680 KG/M3 AND A MINIMUM NOMINAL THICKNESS OF 90MM; OR
(C) CLADDING THAT IS FIXED EXTERNALLY TO A TIMBER OR METAL FRAME AND IS:
(I) NON-COMBUSTIBLE; OR
(II) FIBRE CEMENT A MINIMUM OF 6MM THICK; OR
(III) BUSHFIRE-RESISTING TIMBER.

JOINTS:
ALL JOINTS IN THE EXTERNAL SURFACE MATERIAL OF WALLS SHALL BE COVERED, SEALED, OVERLAPPED, BACKED OR BUTT-JOINTED.

VENTS AND WEEPHOLES:
VENTS AND WEEPHOLES IN EXTERNAL WALLS ARE TO BE SCREENED WITH CORROSION-RESISTANT STEEL, BRONZE OR ALUMINIUM MESH WITH A MAXIMUM APERTURE OF 2 MM.

EXTERNAL GLAZED ELEMENTS, ASSEMBLIES AND DOORS:
SCREENS FOR WINDOWS AND DOORS
WHERE FITTED, SCREENS FOR WINDOWS AND DOORS SHALL HAVE MESH OR PERFORATED SHEET MADE OF CORROSION-RESISTANT STEEL, BRONZE OR ALUMINIUM WITH A MAXIMUM APERTURE OF 2 MM.

WINDOWS:
FRAME MATERIAL FOR WINDOWS LESS THAN 400 MM FROM THE GROUND, DECKS, CARPORT ROOFS AND AWNINGS, WINDOW FRAMES ARE TO BE MADE FROM BUSHFIRE-RESISTING TIMBER, METAL OR METAL-REINFORCED UPVC. WHERE GLAZING IS LESS THAN 400 MM FROM THE GROUND, DECKS, CARPORT ROOFS AND AWNINGS, GLAZING SHALL BE TOUGHENED GLASS WITH A MINIMUM THICKNESS OF 5 MM.

THE OPENABLE PORTIONS OF WINDOWS SHALL BE SCREENED WITH A MESH WITH A MAX APERTURE OF 2 MM MADE OF CORROSION RESISTANT STEEL, BRONZE OR ALUMINIUM.

DOORS - SIDE HUNG EXTERNAL DOORS, PANEL FOLD & SLIDING DOORS:
DOORS- SHALL BE COMPLETELY PROTECTED EXTERNALLY BY A SCREEN WITH A MESH WITH A MAX APERTURE OF 2MM MADE OF CORROSION RESISTANT STEEL, BRONZE OR ALUMINIUM, OR
DOOR PANEL MATERIAL SHALL BE:
(A) NON-COMBUSTIBLE; OR
(B) SOLID TIMBER, LAMINATED TIMBER OR RECONSTITUTED TIMBER, HAVING A MINIMUM THICKNESS OF 35 MM FOR THE FIRST 400 MM ABOVE THE THRESHOLD; OR
(C) HOLLOW CORE, SOLID TIMBER, LAMINATED TIMBER OR RECONSTITUTED TIMBER WITH A NON-COMBUSTIBLE KICKPLATE ON THE OUTSIDE FOR THE FIRST 400 MM ABOVE THE THRESHOLD; OR
(D) FULLY FRAMED GLAZED DOOR PANELS WITH FRAMING MADE FROM METAL OR BUSHFIRE RESISTING TIMBER.
THERE IS NO REQUIREMENT TO SCREEN THE OPENABLE PART OF A DOOR AT THIS LEVEL.

GARAGE DOORS:
THE LOWER PORTION (WITHIN 400 MM OF THE GROUND) OF VEHICLE ACCESS DOORS SHALL BE MADE FROM:
(I) NON-COMBUSTIBLE MATERIAL; OR
(II) BUSHFIRE-RESISTING TIMBER; OR
(III) FIBRE-CEMENT SHEET, A MINIMUM OF 6 MM IN THICKNESS; OR
(IV) A COMBINATION OF ANY OF ITEMS (I), (II) OR (III) ABOVE.
ALL VEHICLE ACCESS DOORS TO BE PROTECTED WITH SUITABLE WEATHER STRIPS, DRAUGHT EXCLUDERS, DRAUGHT SEALS OR BRUSHES.

ROOFS:
THE FOLLOWING APPLY TO ALL TYPES OF ROOFS AND ROOFING SYSTEMS:
(A) ROOF TILES, ROOF SHEETS AND ROOF COVERING ACCESSORIES SHALL BE NON-COMBUSTIBLE,
(B) THE ROOF/WALL AND ROOF/ROOF JUNCTION SHALL BE SEALED, OR OTHERWISE PROTECTED TO PREVENT OPENINGS GREATER THAN 2MM,
(C) ROOF VENTILATION OPENINGS, SUCH AS GABLE AND ROOF VENTS, SHALL BE FITTED WITH EMBER GUARDS MADE OF NON-COMBUSTIBLE MATERIAL OR A MESH OR PERFORATED SHEET WITH A MAX APERTURE OF 2MM MADE OF CORROSION RESISTANT STEEL, BRONZE OR ALUMINIUM.
TILED ROOFS SHALL BE FULLY SARKED.
SHEET ROOFS SHALL:
(A) BE FULLY SARKED WITH SARKING, EXCEPT THAT FOIL BACKED INSULATION BLANKETS MAY BE INSTALLED OVER BATTENS; OR
(B) HAVE ANY GAPS SEALED AT THE FASCIA, OR WALL LINE, HIPS AND RIDGES BY:
(I) A MESH OR PERFORATED SHEET WITH A MAXIMUM APERTURE OF 2 MM, MADE OF CORROSION-RESISTANT STEEL, BRONZE OR ALUMINIUM, OR
(II) MINERAL WOOL, OR
(III) OTHER NON-COMBUSTIBLE MATERIAL, OR
(IV) -A COMBINATION OF ANY OF THE ABOVE.

ROOF PENETRATIONS:
THE FOLLOWING APPLY TO ROOF PENETRATIONS:
(A) ROOF PENETRATIONS, INCLUDING ROOF LIGHTS, ROOF VENTILATORS, ROOF-MOUNTED EVAPORATIVE COOLING UNITS, AERIALS, VENT PIPES AND SUPPORTS FOR SOLAR COLLECTORS, SHALL BE ADEQUATELY SEALED AT THE ROOF TO PREVENT GAPS GREATER THAN 3 MM.
(B) OPENINGS IN VENTED ROOF LIGHTS, ROOF VENTILATORS OR VENT PIPES SHALL BE FITTED WITH EMBER GUARDS MADE FROM A MESH OR PERFORATED SHEET WITH A MAXIMUM APERTURE OF 2 MM, MADE OF CORROSION-RESISTANT STEEL, BRONZE OR ALUMINIUM.
(C) GLAZED ELEMENTS IN ROOF LIGHTS AND SKYLIGHTS MAY BE OF POLYMER PROVIDED A GRADE SAFETY GLASS DIFFUSER, COMPLYING WITH AS 1288, IS INSTALLED UNDER THE GLAZING.

EAVES LININGS, FASCIAS AND GABLES:
THE FOLLOWING APPLY TO EAVES LININGS, FASCIAS AND GABLES:
(A) GABLES SHALL COMPLY WITH REQUIREMENTS FOR WALLS.
(B) EAVES VENTILATION OPENINGS ARE TO BE FITTED WITH EMBER GUARDS AND BE MADE OF CORROSION RESISTANT STEEL, BRONZE OR ALUMINIUM.
THE STANDARD DOES NOT PROVIDE CONSTRUCTION REQUIREMENTS FOR FASCIAS, BARGEBOARDS AND EAVES LININGS.

GUTTERS AND DOWNPIPES
THE STANDARD DOES NOT PROVIDE MATERIAL REQUIREMENTS FOR GUTTERS AND DOWNPIPES, WITH THE EXCEPTION OF BOX GUTTERS.
BOX GUTTERS ARE TO BE NON-COMBUSTIBLE AND FLASHED AT THE ROOF JUNCTION WITH NON-COMBUSTIBLE MATERIAL.
IF INSTALLED, GUTTER AND VALLEY LEAF GUARDS ARE TO BE NON-COMBUSTIBLE.

VERANDAHS, DECKS, STEPS, RAMPS AND LANDINGS:
DECKING MAY BE SPACED. THERE IS NO REQUIREMENT TO ENCLOSE THE SUBFLOOR SPACES OF VERANDAS, DECKS, STEPS, RAMPS OR LANDINGS.
DECKING, STAIR TREADS AND TRAFFICABLE SURFACES OF RAMPS AND LANDINGS LESS THAN 300 MM (MEASURED HORIZONTALLY AT DECK LEVEL) FROM GLAZED ELEMENTS THAT ARE LESS THAN 400 MM (MEASURED VERTICALLY) FROM THE SURFACE OF THE DECK ARE TO BE MADE FROM:
(A) OF NON-COMBUSTIBLE MATERIAL; OR
(B) OF BUSHFIRE-RESISTING TIMBER; OR
(C) A COMBINATION OF ITEMS (A) AND (B) ABOVE.

WATER AND GAS SUPPLY PIPES:
ABOVE GROUND, EXPOSED WATER AND GAS SUPPLY PIPES SHALL BE METAL. THE METAL PIPE SHALL EXTEND A MINIMUM OF 400MM WITHIN THE BUILDING AND 100MM BELOW THE GROUND.

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JOB ADDRESS: 1F Alderley Street, Rangeville
CLIENT: Dash House Pty Ltd
PROJECT: PROPOSED RESIDENCE

REV	DATE	DESCRIPTION
1	14/08/24	FOR COORDINATION
2	20/08/24	FOR INFORMATION
3	27/09/24	ISSUE FOR CONSTRUCTION
4	17/12/24	ISSUE FOR CONSTRUCTION

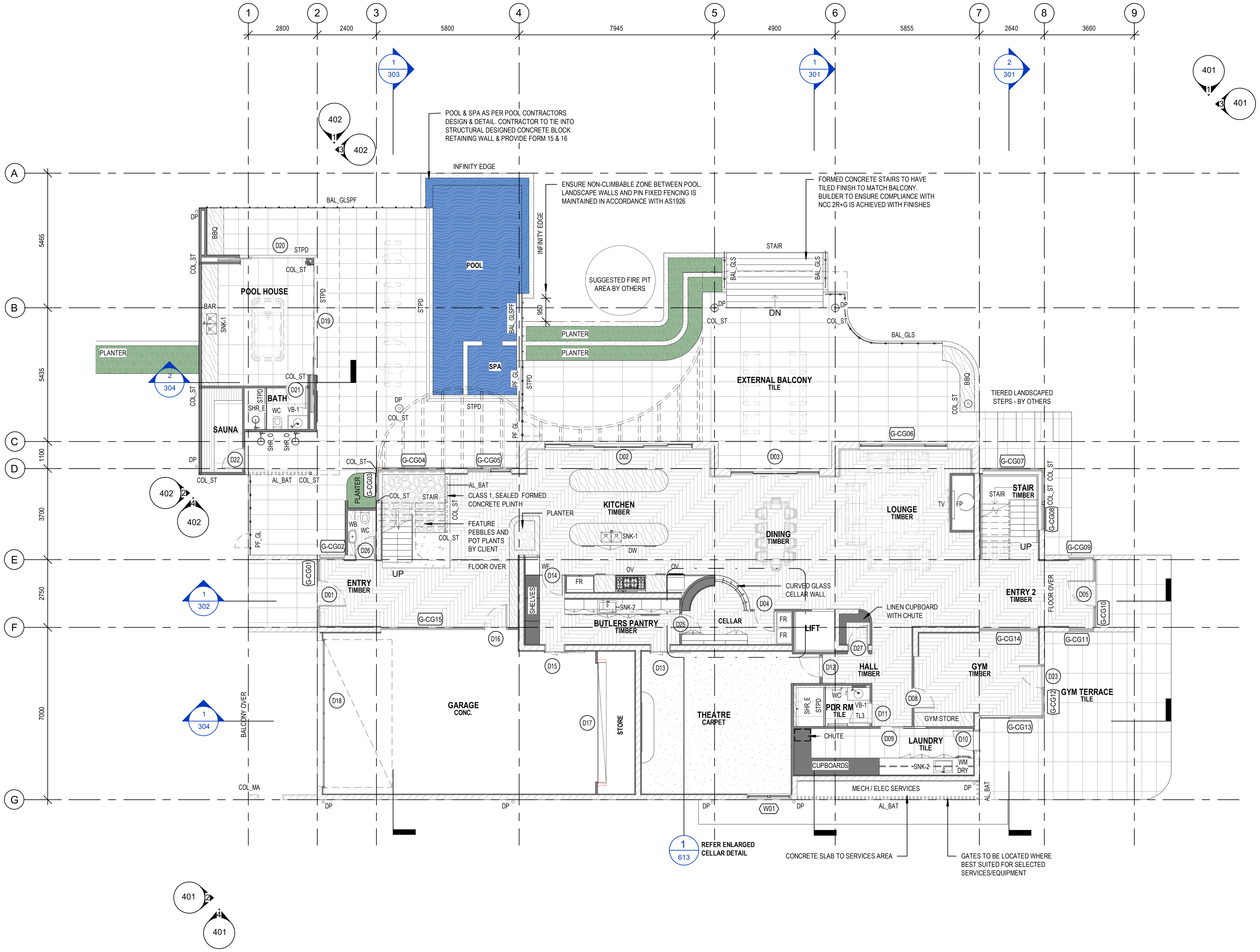
PROJECT NUMBER:	PHASE:	DWG No:	ISSUE:	SHEET NAME:
1319.24047	WD	001	4	SITE PLAN

DRAWN:	CHECKED:	STATUS:	SCALE:
JHW	ALM	FOR CONSTRUCTION	As indicated @ A1

N

Keynote Legend	
Key Value	Keynote Text
AL_BAT	ALUMINIUM BATTENS
BAL_GLS	GLASS BALUSTRADE WITH TOP RAIL TO MEET BCA REQ
BAL_GLSPF	GLASS BALUSTRADE, PIN FIXED TO EDGE OF SLAB AND TOP RAIL TO MEET BCA REQ
COL_MA	MASONRY COLUMN WITH RENDER AND PAINT FINISH
COL_ST	STRUCTURAL STEEL COLUMN TO ENGINEERS DETAILS
DP	DOWN PIPE
DRY	CLOTHES DRYER
DW	DISHWASHER
FP	FIREPLACE - PROPRIETRY FIREPLACE INSTALLED TO MANUFACTURERS SPECIFICATIONS
FR	FRIDGE
OV	OVEN
PF_GL	GLASS POOL FENCE TO COMPLY WITH THE NCC, AS1926.1 & AS1926.2
SHR_E	ENCLOSED SHOWER - WATERPROOFING TO COMPLY WITH NCC REQUIREMENTS
SHR_O	OUTDOOR SHOWER
SNK-1	SINK TYPE 1
SNK-2	SINK TYPE 2
STAIR	STAIR TO MEET BCA REQUIREMENTS
STPD	STRIP DRAIN
TL3	TILE TYPE 3
TV	TELEVISION
VB-1	VANITY BASIN 1
WB	WHITE BOARD- CUSTOM. REFER TO SCHEDULE FOR FURTHER SPECIFICATION
WC	WATER CLOSET
WF	WINE FRIDGE
WM	WASHING MACHINE

AREA SCHEDULE		
Name	Level	Area
GROUND FLOOR AREA	GROUND FLOOR	399 m²
GROUND FLOOR BALCONY/ POOL AREA	GROUND FLOOR	175 m²
GROUND FLOOR BALCONY	GROUND FLOOR	53 m²
POOL HOUSE	GROUND FLOOR	38 m²
SERVICES COURT	GROUND FLOOR	6 m²
		670 m²
UPPER FLOOR AREA	UPPER FLOOR	329 m²
UPPER FLOOR BALCONY	UPPER FLOOR	67 m²
UPPER FLOOR GUEST BALCONY	UPPER FLOOR	20 m²
		416 m²
		1086 m²



FLOOR PLAN - GROUND

1 : 100

TOOWOOMBA REGIONAL COUNCIL

APPROVED PLAN

referred to in Council's "Generally in Accordance" letter dated

9 April 2025

This plan is subject to conditions of Approval Number

MCUI/2019/3145/A

Assessment Manager

VHD Studio

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JOB ADDRESS: **1F Alderley Street, Rangeville**

CLIENT: **Dash House Pty Ltd**

PROJECT: **PROPOSED RESIDENCE**

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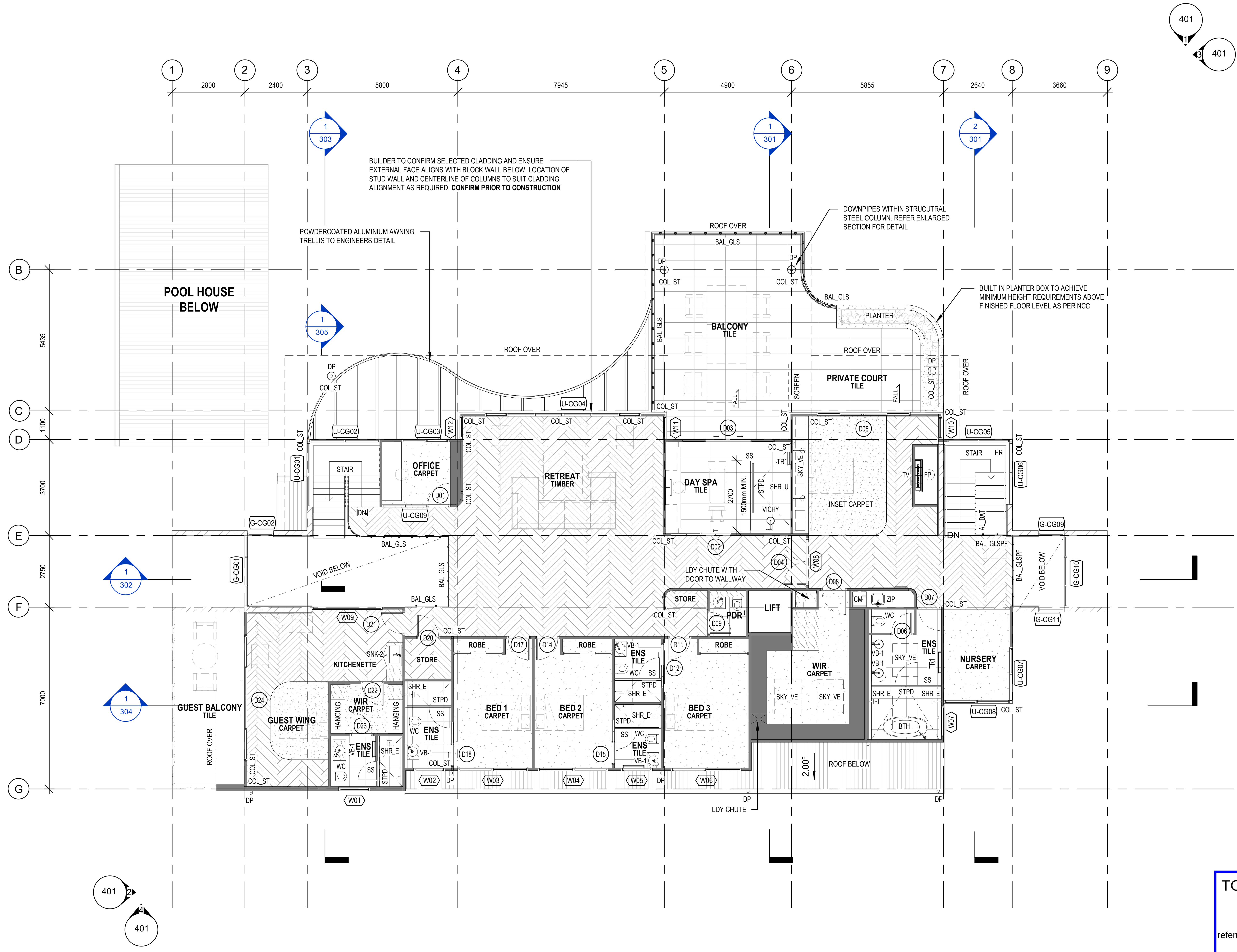
2	31/07/24	FOR COORDINATION
3	13/08/24	FOR COORDINATION
4	30/08/24	FOR INFORMATION
5	27/09/24	ISSUE FOR CONSTRUCTION
6	17/12/24	ISSUE FOR CONSTRUCTION

PROJECT NUMBER:	PHASE:	DWG No:	ISSUE:	SHEET NAME:
1319.24047	WD	102	6	GROUND FLOOR PLAN

DRAWN:	CHECKED:	STATUS:	SCALE:
JHW	ALM	FOR CONSTRUCTION	1 : 100 @ A1

Keynote Legend	
Key Value	Keynote Text
AL_BAT	ALUMINIUM BATTENS
BAL_GLS	GLASS BALUSTRADE WITH TOP RAIL TO MEET BCA REQ
BAL_GLSPF	GLASS BALUSTRADE, PIN FIXED TO EDGE OF SLAB AND TOP RAIL TO MEET BCA REQ
BTH	BATH
CM	COFFEE MACHINE
COL_ST	STRUCTURAL STEEL COLUMN TO ENGINEERS DETAILS
DP	DOWN PIPE
FP	FIREPLACE - PROPRIETRY FIREPLACE INSTALLED TO MANUFACTURERS SPECIFICATIONS
HR	HANDRAIL TO COMPLY WITH AS 1428.1 REQ
SHR_E	ENCLOSED SHOWER - WATERPROOFING TO COMPLY WITH NCC REQUIREMENTS
SHR_U	UNENCLOSED SHOWER
SKY_VE	VELUX SKYLIGHT OR APPROVED EQUAL
SNK-2	SINK TYPE 2
SS	SHOWER SCREEN
STAIR	STAIR TO MEET BCA REQUIREMENTS
STPD	STRIP DRAIN
TR1	TOWEL RAIL
TV	TELEVISION
VB-1	VANITY BASIN 1
VICHY	VICHY SHOWER
WC	WATER CLOSET
ZIP	ZIP TAP



FLOOR PLAN - UPPER

1 : 100

TOOWOOMBA REGIONAL COUNCIL

APPROVED PLAN

referred to in Council's "Generally in Accordance" letter dated

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PROJECT NUMBER:	PHASE:	DWG No:	ISSUE:	SHEET NAME:
1319.24047	WD	103	6	UPPER FLOOR PLAN

DRAWN:	CHECKED:	STATUS:	SCALE:
JHW	ALM	FOR CONSTRUCTION	1 : 100 @ A1

THIS DRAWING MAY ONLY BE ISSUED FOR APPROVALS OR CONSTRUCTION IF SIGNED BY APPROVED CHECKER - ALL DIMENSION TO BE USED OVER SCALED DIMENSIONS -CONTRACTOR TO CONFIRM DIMENSIONS ON SITE PRIOR TO COMMENCEMENT OF WORK

Keynote Legend	
Key Value	Keynote Text
AL_BAT	ALUMINIUM BATTENS
BAL_GLS	GLASS BALUSTRADE WITH TOP RAIL TO MEET BCA REQ
CC_VRC	VIROC COMPRESSED FIBRE CEMENT CLADDING WITH EXPRESSED JOINT
COL_ST	STRUCTURAL STEEL COLUMN TO ENGINEERS DETAILS
DP	DOWN PIPE
GUT_C	COLORBOND EAVES GUTTER AND FASCIA
RDR	RENDERED FINISH
RWH	RAINWATER HEAD
SKY_VE	VELUX SKYLIGHT OR APPROVED EQUAL
WC_ALU	MODINEX ALU SELEKTA CLADDING
WC_RFC	HARDIES FINE TEXTURE EXTERNAL CLADDING OR EQUAL - PAINT FINISH

TOOWOOMBA REGIONAL COUNCIL

APPROVED PLAN

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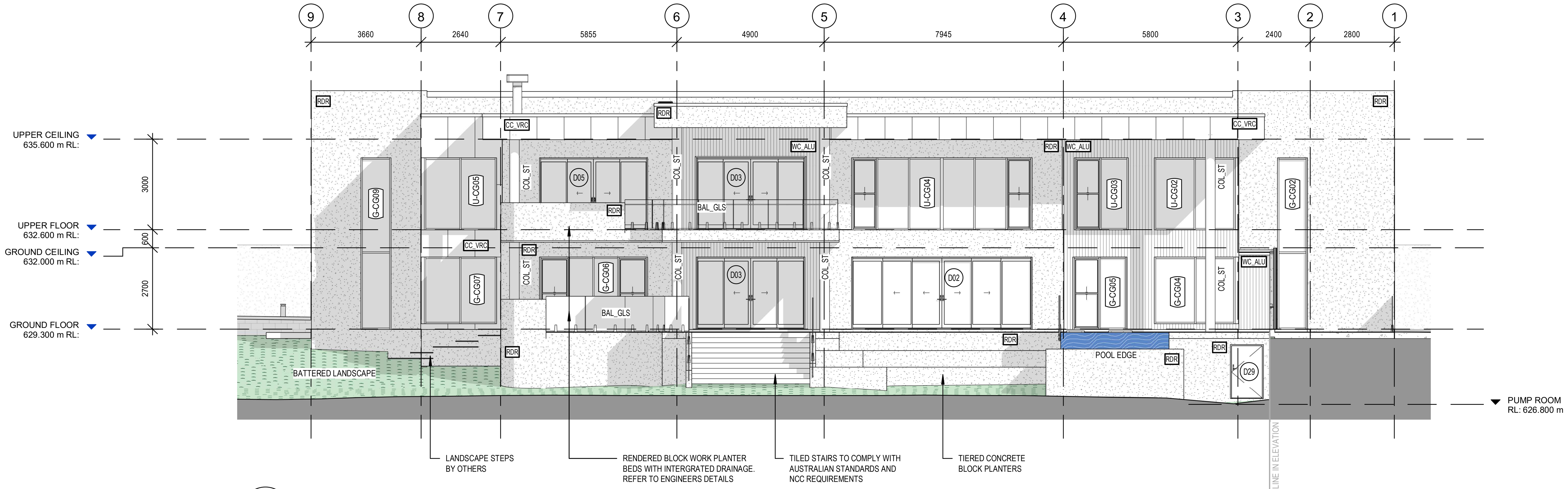
Assessment Manager



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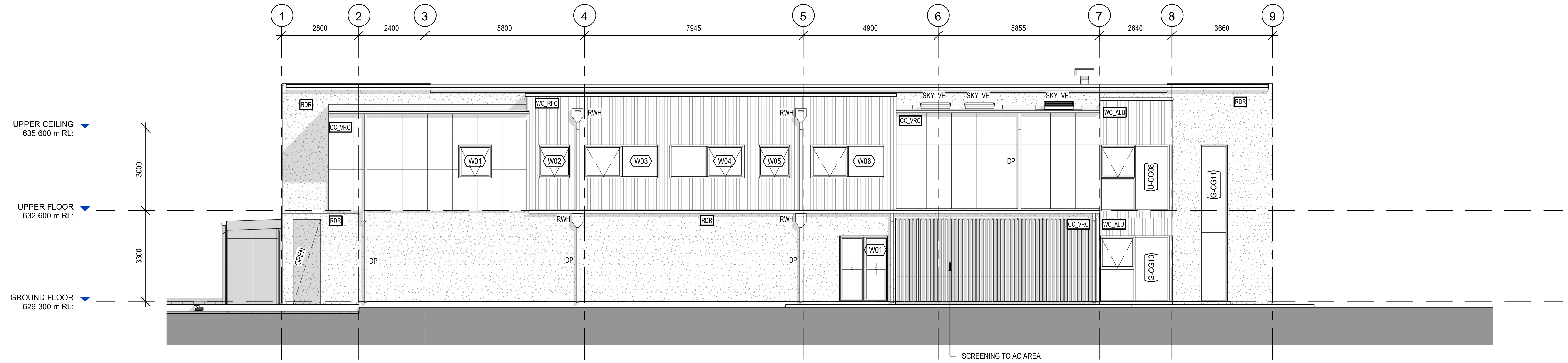
1 : 100



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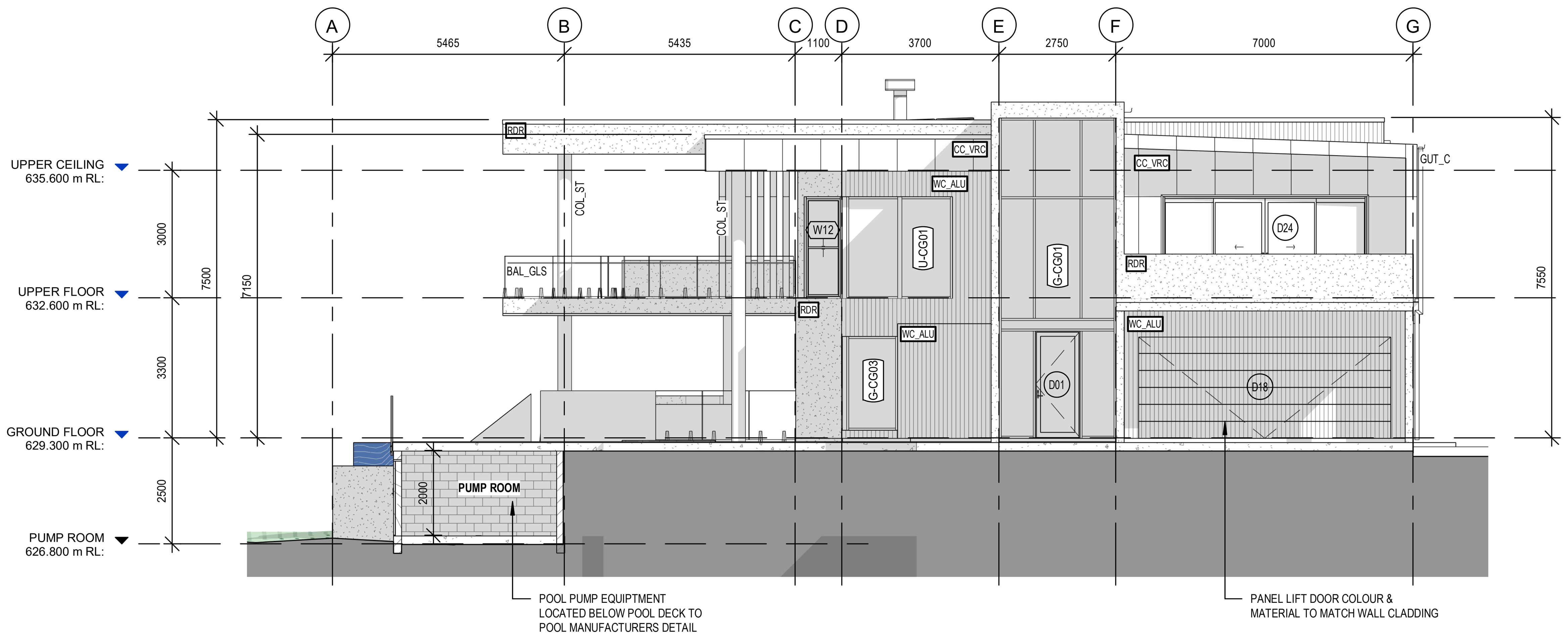

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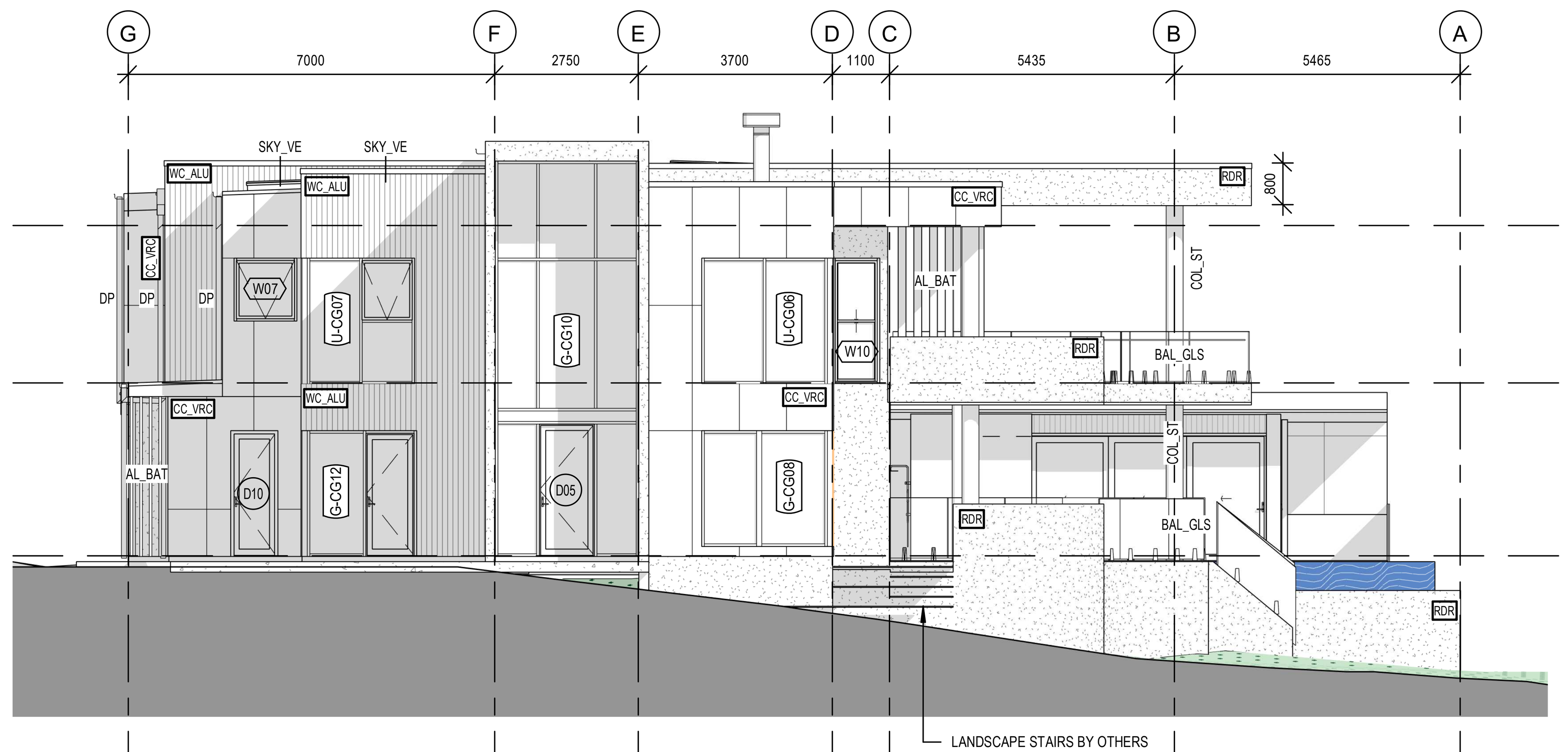

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JOB ADDRESS: 1F Alderley Street, Rangeville

CLIENT: Dash House Pty Ltd

PROJECT: PROPOSED RESIDENCE

REV	DATE	DESCRIPTION
1	31/07/24	FOR COORDINATION
2	13/08/24	FOR COORDINATION
3	27/09/24	ISSUE FOR CONSTRUCTION
4	17/12/24	ISSUE FOR CONSTRUCTION

PROJECT NUMBER:	PHASE:	DWG No:	ISSUE:	SHEET NAME:
1319.24047	WD	401	4	BUILDING ELEVATIONS

DRAWN:	CHECKED:	STATUS:	SCALE:
JHW	ALM	FOR CONSTRUCTION	1 : 100 @ A1

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Bushfire Management

REPORT

Valdal Projects

1F Alderley Street,
Rangeville, QLD 4350

Lot 62 CC555

Prepared by Designconxion
July 2019

TOOWOOMBA REGIONAL COUNCIL

APPROVED DOCUMENT

referred to in Council's Decision Notice dated

8 August 2023

This plan is subject to conditions of Approval Number

MCUI/2019/3145/A

Assessment Manager

RECEIVED
05.09.2019
TOOWOOMBA
REGIONAL COUNCIL

BMR No: 190213

DOCUMENT CONTROL RECORD

Title	Bushfire Management Report
Address	1F Alderley Street, Rangeville
Client	Valdal Projects

DOCUMENT ISSUE

Issue	Date	Prepared By
1	19 July 2019	Rick Galbraith
2	5 August 2019	Rick Galbraith
3	4 September 2019	Rick Galbraith

Disclaimer

This report has been prepared for Valdal Projects. Designconxion cannot accept responsibility for any use of or reliance upon the contents of this report by any third party.

It details a number of bushfire protection measures that when followed will increase the survival prospects of residents and built assets in the event of a bushfire. It must be borne in mind that the measures dealt with in this report cannot guarantee the survival of a building or other assets in a bushfire event. This is due mainly to the unpredictable nature and behaviour of fire, difficulties associated with extreme weather conditions and vegetation management on and surrounding the site subsequent to development.

It must also be stated that this report is based on site conditions prevailing at the time the inspection was undertaken. These conditions can and will change dependent on both weather conditions and the maintenance undertaken by property owners.

This fire report has been prepared on the basis that bushfire mitigation measures identified are implemented and maintained into the future. Failure to maintain these measures may contribute to the development being exposed to a higher level of bushfire threat and attack.

As site conditions can and will change over time this report is valid for a period of 24 months.

Bushfire Management Report prepared by

Rick Galbraith,
Dip Horticultural Science
EIANZ member
5th August 2019

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Table of Contents

This report is a site-specific assessment of the subject property that has been prepared in accordance with the Toowoomba Regional Council Planning Scheme (2012 Version 19) Bushfire hazard overlay code, the State Planning Policy (July 2017) and the Australian Standard Construction of buildings in bushfire-prone areas (AS3959-2018).

Executive summary

The proposal is to establish a dwelling on the subject land (hereafter referred to as 'the site') at 1F Alderley Street, Rangeville, and described as Lot 62 on CC555. The site is accessed via Alderley Street on the south-western boundary.

The site is located within an identified bushfire hazard area. A site specific bushfire assessment has been prepared in compliance with the Toowoomba Regional Council's 2012 Planning Scheme Bushfire overlay code, the *State Planning Policy* (July 2017) and Australian Standard *Construction of buildings in bushfire-prone areas* (AS3959-2018). The purpose of the Code, SPP and Australian Standard is to ensure the appropriate design and construction of a development in bushfire prone areas so as to minimise the exposure of people and assets to undue Bushfire Risk.

This report provides recommendations for a number of measures that will assist in ensuring the safety of life and property and mitigating the impacts of bushfire.

Bushfire mitigation

The site has been identified by the Toowoomba Regional Council Planning Scheme (2012) as being largely contained within an area of "*Medium*" Fire Risk with smaller areas of "*High*" Fire Risk present due to the location of native vegetation on and surrounding the site. The implementation of the following measures will assist in mitigating the bushfire threat to an acceptable level for future residents and assets on the site.

Construction of buildings

Careful design of new buildings should be undertaken; taking into consideration site characteristics and relevant building standards including the Australian Standard for Construction of buildings in bushfire-prone areas (AS3959-2018) and the Building Code of Australia.

Access and egress

Access to the site is via Alderley Street at the southwest of the site. Existing tracks provide 4 wheel drive vehicular access through the site.

Vegetation management

Vegetation on the development site comprises areas of native bushland open grassed areas that are currently maintained. The woody and highly flammable environmental woody weeds, Lantana and Broadleaf Privet are prevalent in the area but have been well controlled on the site. Areas of potentially hazardous vegetation are well separated from the proposed residence.

An Asset Protection Zones is to be created and maintained between new buildings and bushland areas comprising an Inner Protection Area of 30 metres width and an Outer Protection Area of 20 metres. Contrary to common belief, the area surrounding a building does not need to be totally devoid of vegetation, and in fact some trees in this area can serve a valuable role in trapping embers before they impact on the asset. It is important however that:

- There are substantial gaps (of at least 2 - 5m) between the canopies of any trees in this area.
- Surface and near surface fuels are kept to a minimum. This includes lawns to be kept short and removal of accumulated leaf and bark litter.
- Avoidance of flammable mulches on garden beds such as woodchip or straw within 10 metres of buildings.

- Plants with a higher tolerance to fire should be utilised closest to buildings and be maintained in a healthy and moist state throughout the fire season.

Fire trails

A number of internal tracks and trails are present of the site that are constructed to a standard suitable for use by Queensland Rural Fire Service vehicles in bushfire mitigation activities. The trails are also suitable for use when undertaking fuel reduction management activities on the site. No additional fire trails are proposed for the site.

Water supply

The Toowoomba Regional Council Planning Scheme (2012 Version 19) Bushfire hazard overlay code requires that an adequate water supply suitable for fire-fighting purposes should be available at all times. This can be achieved by connection to a reticulated water supply having sufficient pressure for fire-fighting purposes or a water tank, dam or swimming pool with a minimum available capacity of 10,000 litres.

Prepare, Act, Survive

It is critically important that residents are well prepared during times of high fire danger and have well made plans that can be readily enacted in a time of bushfire emergency. This includes having plans in place to guide actions on days of extreme and catastrophic, identifying safe refuge areas and planning to either 'stay' or 'go'. If the decision is made to go, then residents need to be prepared to evacuate early. The key message being; Prepare, Act and Survive.

Maintenance of bushfire mitigation measures

This fire report has been prepared on the basis that bushfire mitigation measures identified are implemented and maintained into the foreseeable future. Failure to maintain these measures may contribute to the development being exposed to a higher level of bushfire threat and attack.

1.0 Property details

1.1 Introduction

This report has been prepared in support of an application for a Material Change of Use for the establishment of a single dwelling on the site.

1.2 General site details

Address	1F Alderley Street, Rangeville
Lot on Plan	Lot 62 CC555
Area	19,754 square metres
Local Government Area	Toowoomba Regional Council
Planning Scheme / Local Plan	Toowoomba Regional Planning Scheme (2012)
Overlay Codes	Environmental Significance Overlay, Bushfire Hazard Overlay, Landslide Hazard Overlay
VMA 1999	Category B (Least concern RE 12.8.18 & 12.8.17) and Category X
Area Classification / Zone	Limited Development (Constrained Land)

The site is situated in the suburb of Rangeville on the edge of the Great Dividing Range approximately 5 kilometres southeast of the Toowoomba CBD. Access to the site is via Alderley Street to the southwest. A building location has been identified on the south western portion of the site which is relatively clear of woody vegetation. Open grassy woodland is present on the balance of the site.

Figure 1 provides an aerial view of the site and its context within the surrounding landscape, Figure 2 provides an aerial view of the property, the location of the proposed dwelling and presence of native vegetation with Figure 3 showing the topography.

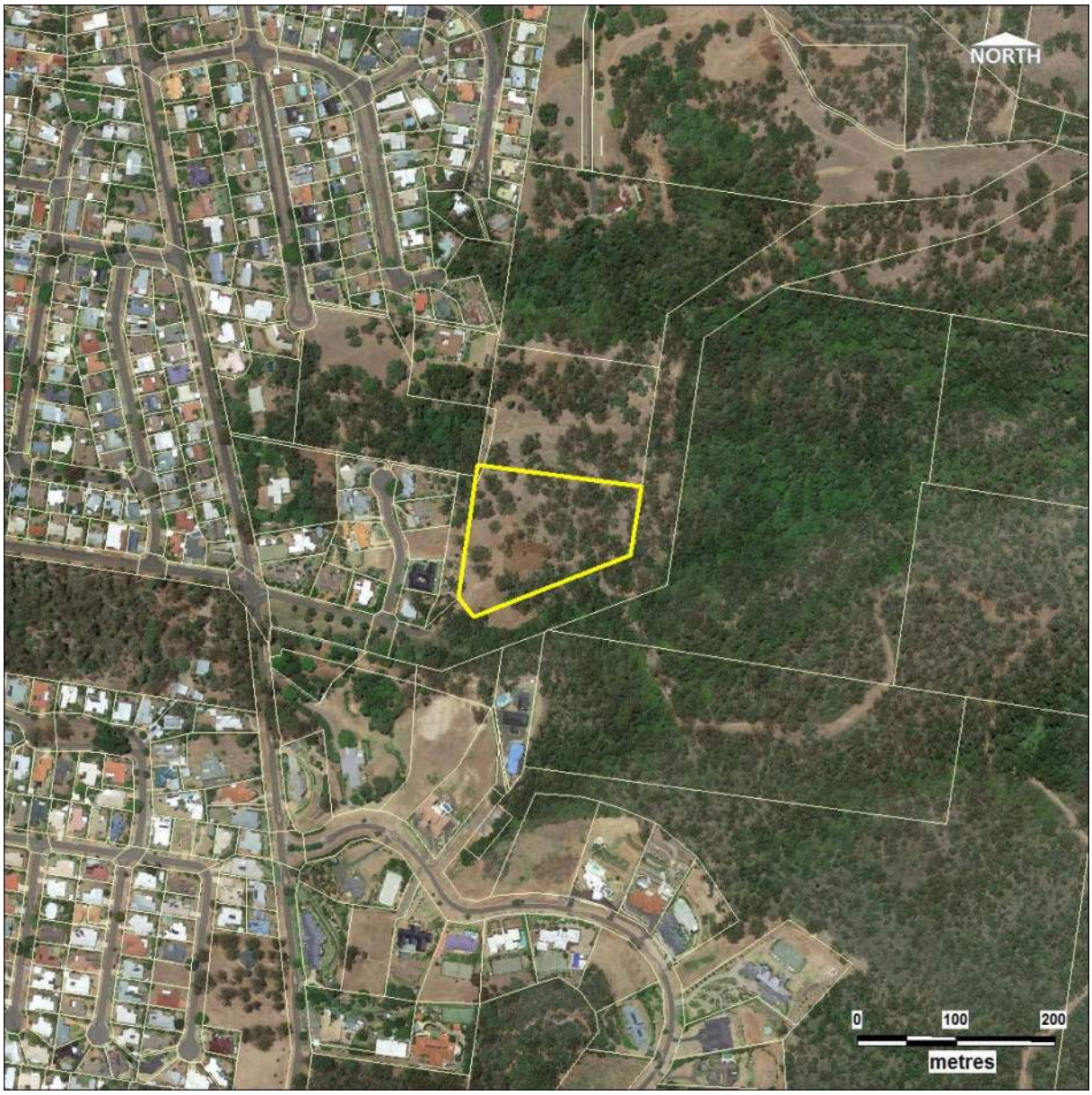

Figure 1: Aerial view providing landscape context for the site which is highlighted with a yellow border. Imagery sourced from Google Earth was captured on 27 January 2019.

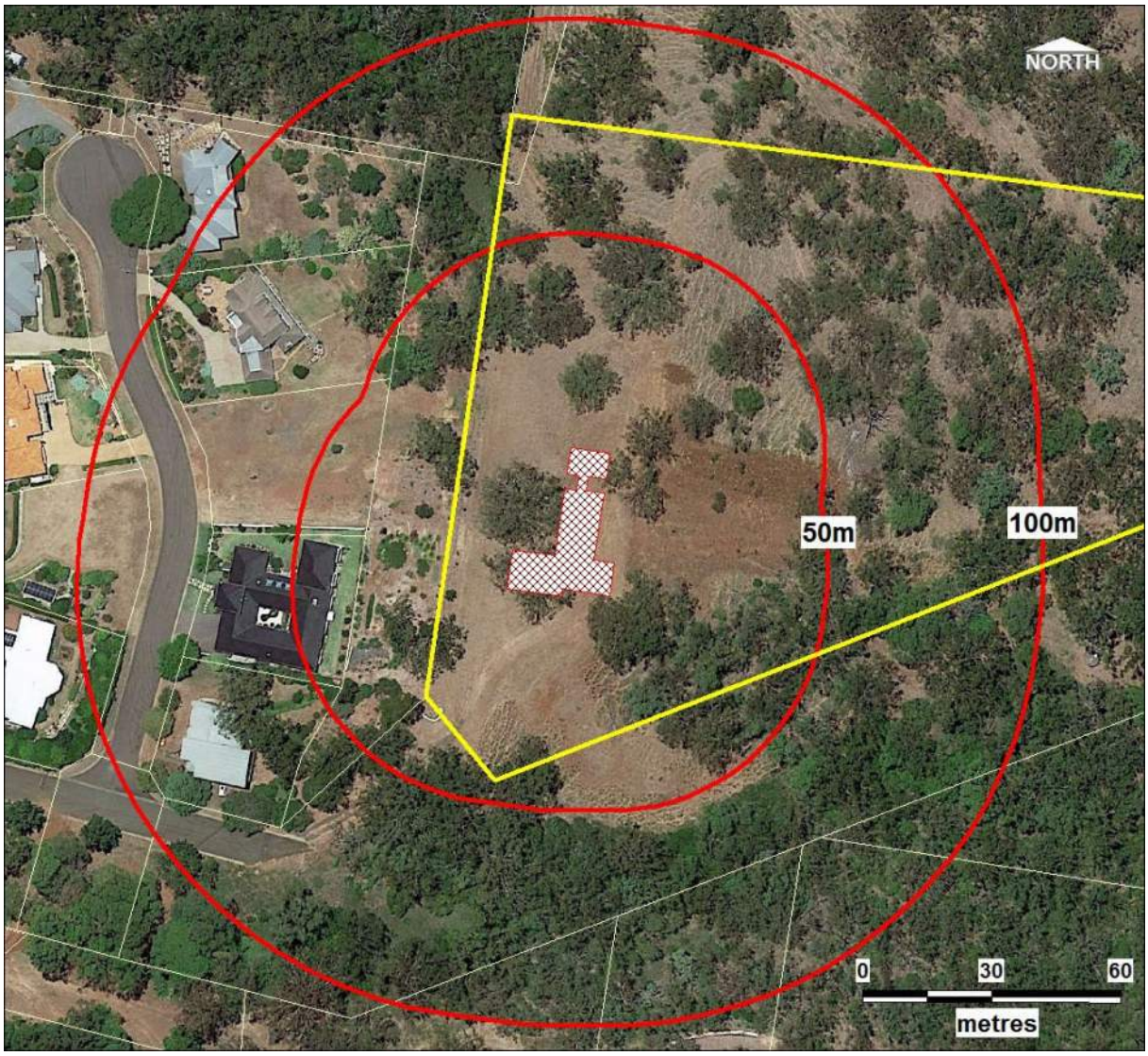

Figure 2: Aerial view of the proposed dwelling location. The red rings indicate radius' distance in metres from the dwelling which can be used to determine the applicable Bushfire Attack Level.

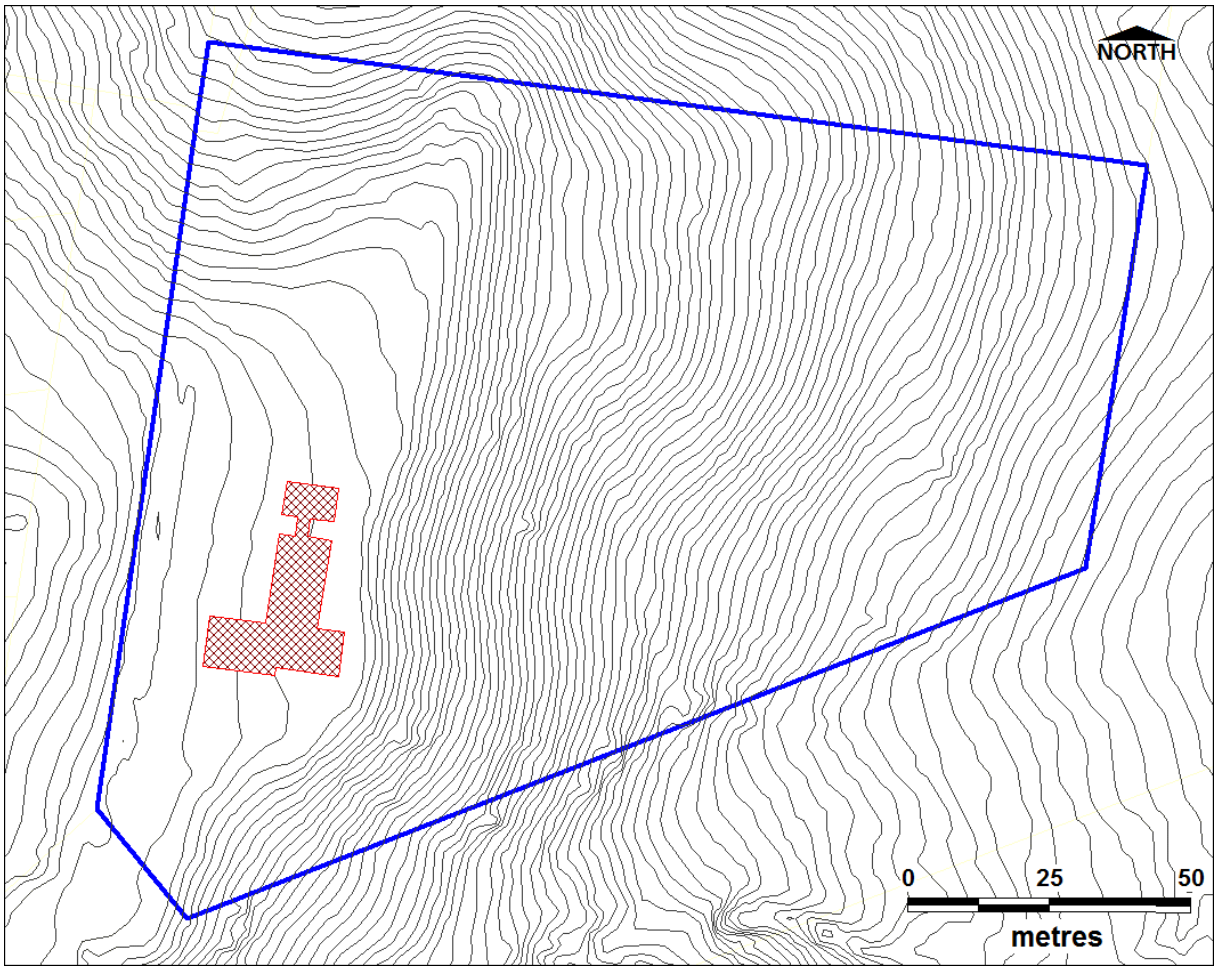

Figure 3: Topography of the site. Contour intervals are 1 metre. Topography information sourced from http://qldspatial.information.qld.gov.au/

1.3 Site description

The site is accessed via Alderley Street to the southwest of the property. The house site is located on a level site with the land rising to the west with slopes in the order of 29% or 16 degrees and falling to the east and southeast with underlying slopes of up to 61% or 31 degrees.

A building location has been identified on the south western portion of the site which is relatively clear of woody vegetation. Open grassy woodland is present on the balance of the site. Extensive areas of native vegetation are located further to the north, east and southeast of the site. This vegetation comprises eucalypt woodland and forest with an open grassy to shrubby understorey. The woody environmental weeds *Ligustrum lucidum* (Broadleaf Privet) and *Lantana camara* (Lantana) are prevalent in the area but have been controlled on the site. Landuse in the area consists of urban residential living to the west and southwest with rural lands to the north and east.

The following photographs provide a visual representation of the site and vegetation present.

Photo 1: View to the west over the site of proposed dwelling.

Photo 2: View to the north from the proposed house site.

Photo 3: View to the east from the proposed house site.

Photo 4: View to the south from the proposed house site.

Photo 5: View to the west from the proposed house site.

Photo 6: View to the northwest across the site from the southeast corner showing grassy woodland vegetation on the site.

1.4 Vegetation

The current Vegetation Management Supporting Map identifies that the property contains areas of mapped remnant vegetation. Remnant vegetation present is identified as Category B vegetation comprising Regional Ecosystems 12.8.14 and 12.8.17 which cover approximately 40% of the site. The extent of mapped remnant vegetation in the area and its conservation status is shown in Figure 4. Table 1 contains a description of these Regional Ecosystems and their conservation status.

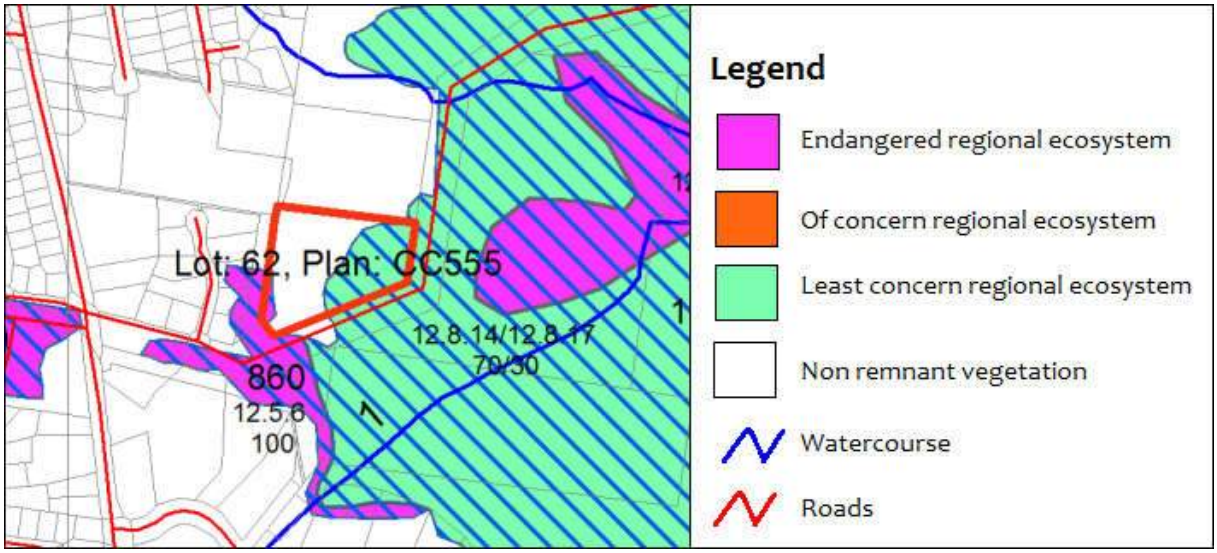

Figure 4: Extent of mapped remnant vegetation on Lot 62 CC555 as identified by the Vegetation Management Supporting Map accessed on 3 July 2019 from the Queensland Department of Natural Resources and Mines website.

Table 1: Regional Ecosystem Vegetation Descriptions

Regional ecosystem:	**12.8.14**	**Conservation status**	**Least concern**
Description	*Eucalyptus eugenioides* (Thin-leaved Stringybark), *E. biturbinata* (Grey Gum), *E. melliodora* (Yellow Box) +/- *E. tereticornis* (Forest Red Gum), *Corymbia intermedia* (Pink Bloodwood), *E. crebra* (Narrow-leaf Ironbark) woodland. *Allocasuarina torulosa* (Forest Sheoke) is a common understorey species. Localised occurrences of *Eucalyptus laevopinea* (Silvertop Stringybark) *and E. banksii* (Tenterfield Woollybutt) may occur. Occurs on Cainozoic igneous rocks, especially basalt.		
Regional ecosystem:	**12.8.17**	**Conservation status**	**Least concern**
Description	Eucalyptus melanophloia (Silver-leaved Ironbark) +/- E. crebra (Narrow-leaved Ironbark), E. tereticornis (Forest Red Gum), Corymbia tessellaris (Moreton Bay Ash), C. intermedia (Pink Bloodwood) and/or C. clarksoniana (Clarkson's Bloodwood), E. melliodora (Yellow Box), Angophora subvelutina (Broad-leaf Apple) grassy woodland. Occurs on Cainozoic igneous rocks, especially basalt.		

The information above was sourced from the Queensland Herbarium (2019) Regional Ecosystem Description Database (REDD). Version 11.1 (April 2019) (DES: Brisbane)

Native trees species present included *Eucalyptus tereticornis* (Forest Red Gum), *E. biturbinata* (Grey Gum), *E. melliodora* (Yellow Box) and *C. intermedia* (Pink Bloodwood). Mature trees in the vicinity of the proposed dwelling have a height range of 22 to 28 metres.

1.5 Bushfire

The site has been identified by the Toowoomba Regional Council Planning Scheme (2012) as being largely contained within an area of "*Medium*" Fire Risk with smaller areas of "*High*" Fire Risk present. The bushfire risk category for the site and the surrounding area is shown in Figure 5.

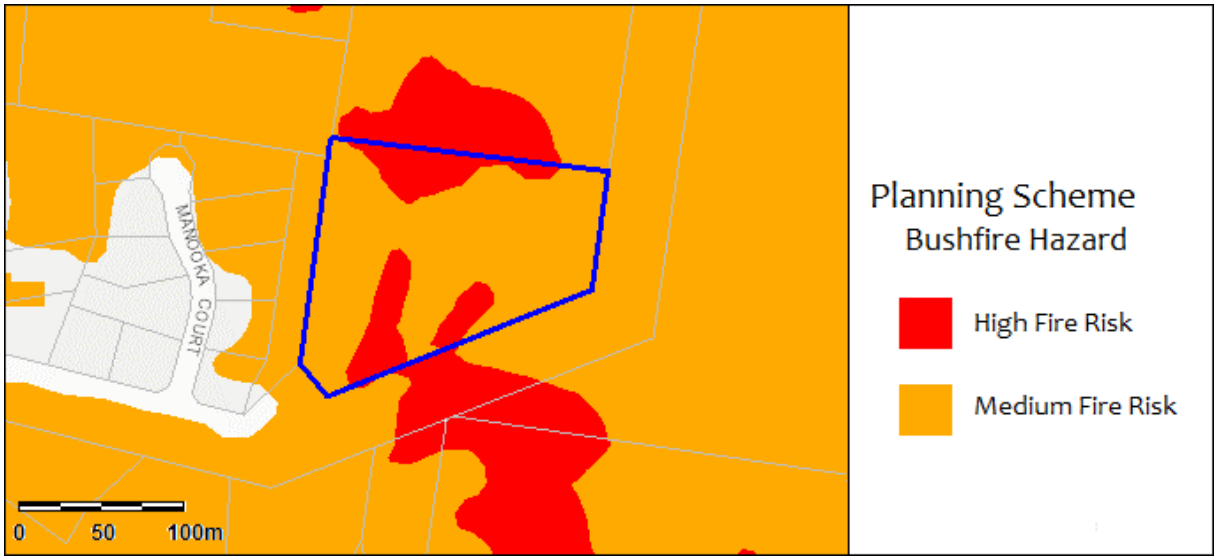

Figure 5: Bushfire Hazard as identified by the Toowoomba Regional Council Planning Scheme (2012).

The most likely direction for bushfire attack is from the east, however under adverse conditions, a bushfire could potentially approach from the north or south. Severe fire weather conditions are typically associated with hot strong westerly to northerly winds. Bushfires in the area have the potential to generate quantities of embers that could impact on a building even though the fire does not necessarily reach it.

1.6 Fire brigade

The development site is contained within the Queensland Fire and Rescue Service Toowoomba Urban Fire Brigade district. The closest fire brigade equipped to fight structural fires is the East Toowoomba Fire Station located at Kitchener Street, Toowoomba, approximately 2.5 kilometres by road to the northwest of the site (i.e. less than 5 minutes away). This is a professional, fully manned urban brigade. The Withcott Rural Fire Brigade district is located to the east of the site.

1.7 Fire run

The length of fire run influences the area in which a fire has to develop and reach its potential maximum intensity for the conditions prevailing at the time. It is important to assess the length of fire run to determine the potential scale and intensity of fires that may occur in the area. Fire runs less than 1 kilometre in length are generally considered to pose a lesser risk than those with a longer run. Fire runs may be modified by natural features such as creeks, rock formation and vegetation types and be influenced by weather and fuel conditions.

The main fire run in the area is from the east and is greater than 1 kilometre. The most likely scenario for a fire approaching from the east would be for it to move up the gullies located to the north and south of the site. Continuity of hazardous vegetation and associated fuel loads have been reduced to an extent by historical and current land management practices. A Council maintained fire trail contained within a 40 metre wide fuel reduced zone is located on the eastern boundary of the site. Figure 6 shows the location of potential fire runs in relation to site.

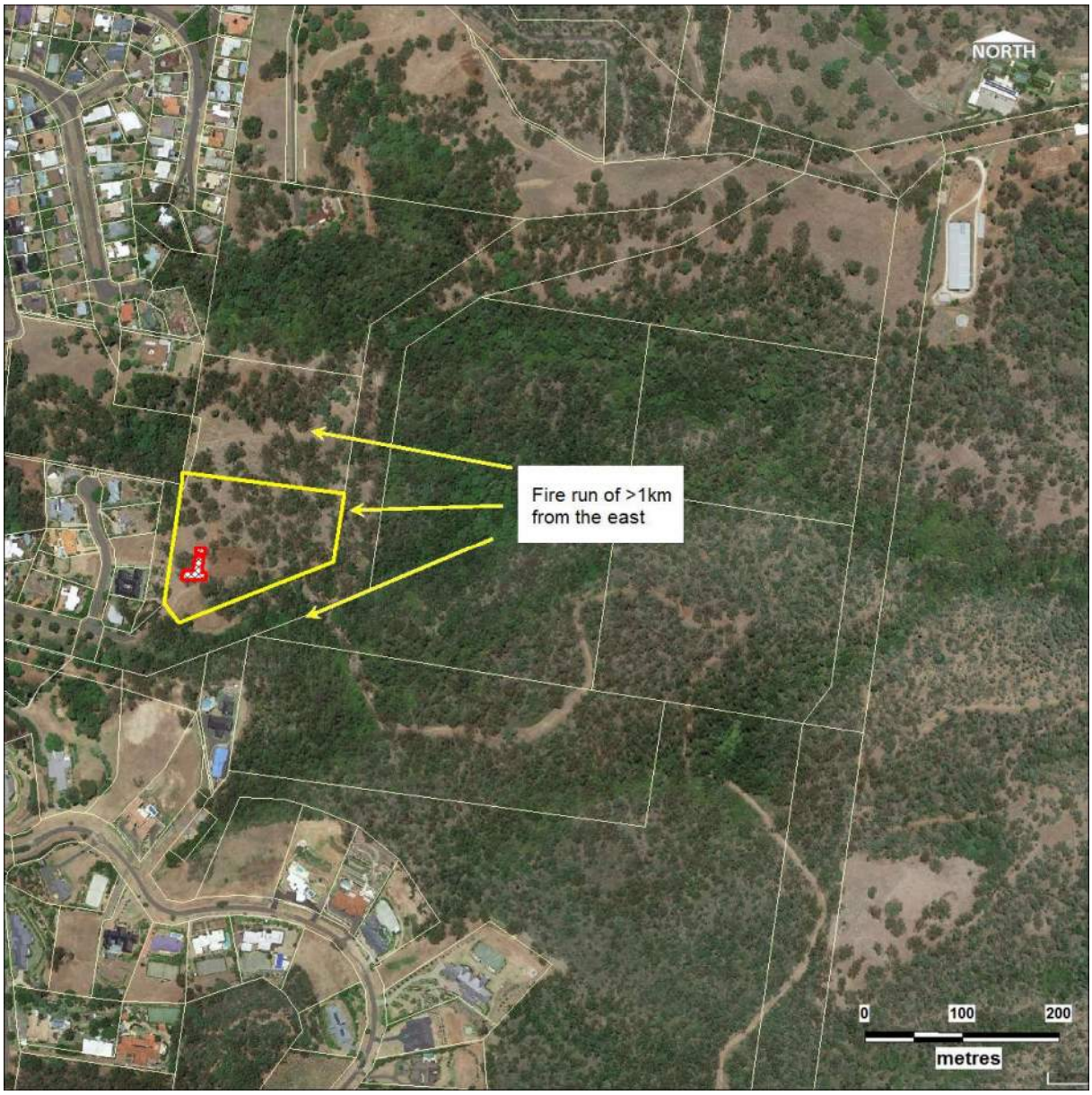

Figure 6: Direction of potential fire run and associated threat for bushfire and ember attack on the site.

2.0 Mitigating potential bushfire impact

A number of actions should be undertaken to mitigate the potential impacts of bushfire to the development. This suite of bushfire mitigation measures, when implemented in an integrated manner can achieve a better outcome for the site than when used individually and in isolation from other measures. This suite of potential measures is illustrated in Figure 7.

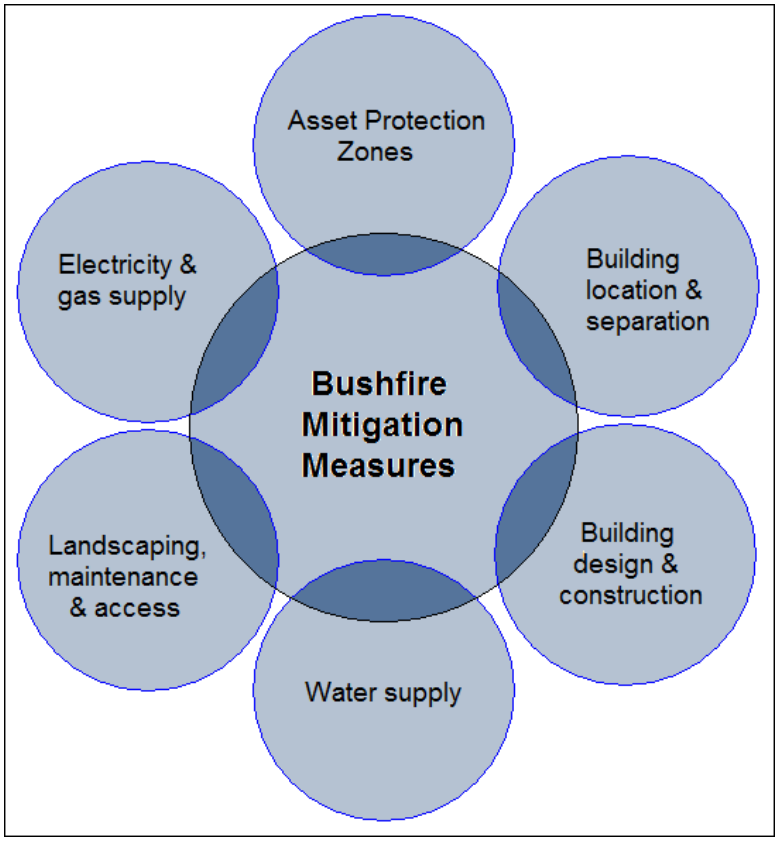

Figure 7: Bushfire mitigation measures in combination. (Redrawn from Guideline for Building in Bushfire Prone Areas. Emergency Management Victoria 2016).

2.1 Building location and asset protection zones (APZ)

The location of buildings and their relationship with vegetation in the immediate surrounding area is critical for ensuring their survival in the event of a bushfire. The proposed dwelling is to be located within an area of low fuel loads that is well separated from areas of high potential bushfire hazard. The establishment of an asset protection zone (APZ) is an effective mechanism for reducing bushfire hazards. An APZ is a fuel-reduced area surrounding a built asset or structure.

Potential bushfire fuels should be minimised within an APZ. This is so that the vegetation within the APZ does not provide a path for the transfer of fire to the asset either from the ground level or through the tree canopy. An APZ, if designed correctly and maintained regularly, will reduce the risk of:

- direct flame contact on the asset;
- damage to the built asset from intense radiant heat; and
- ember attack.

The APZ should be located between the asset and the bushfire hazard. An APZ comprising an Inner Protection Area of 30 metres width and an Outer Protection Area of 20 metres is proposed for the

dwelling. Figure 8 provides a visual representation of the dwelling and required separation distances from areas of potentially hazardous vegetation.

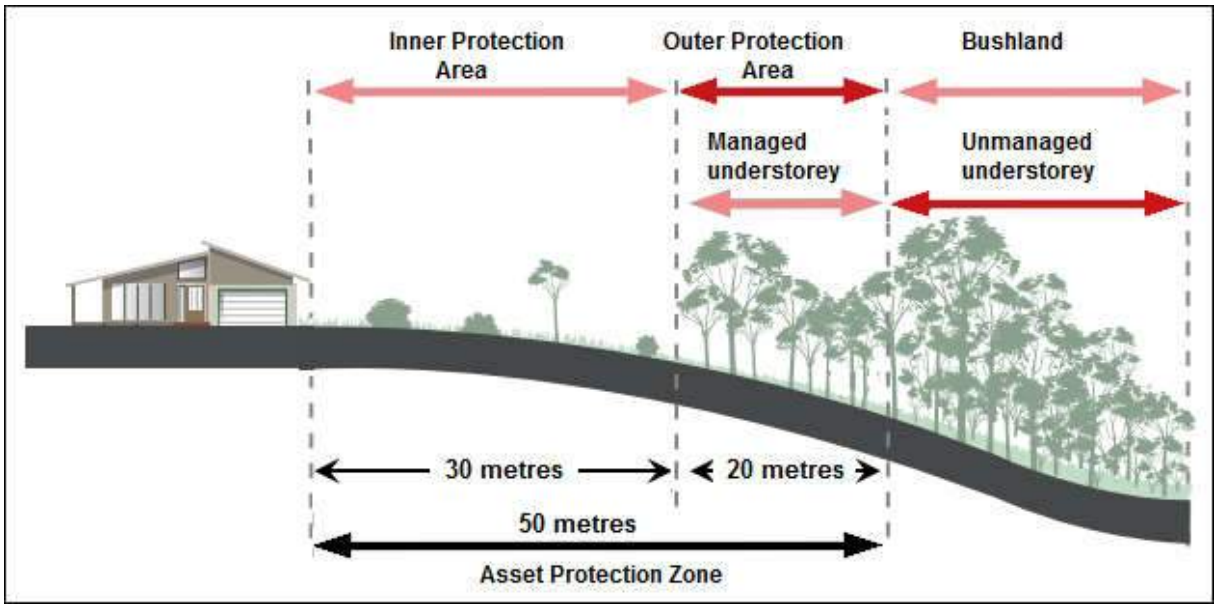

Figure 8: Dimensions of the Asset Protection Zone to be established at time of construction of the dwelling. (Adapted from Planning for Bushfire Protection 2017)

2.2 Building design and construction

Careful design of new buildings in areas of mapped bushfire hazard needs to be undertaken; which includes consideration of site characteristics. The dwelling is to be designed and constructed in accordance with the requirements of the relevant building standards and Council bylaws prevailing at the time and to take into account the prevailing site conditions. This includes the Building Code of Australia (BCA) and the Australian Standard for "Construction of buildings in bushfire-prone areas (AS3959 – 2018).

A Bushfire Attack Level (BAL) of BAL-29 is applicable for buildings identified in this development application.

Appendix 3 Calculation of bushfire hazard contains information on the potential Bushfire Attack Levels that could be experienced on the site, Appendix 4 provides a summary of construction requirements from AS3959-2018 with Appendix 5 providing an explanation of BAL's.

2.3 Access and egress

Unhindered access and egress is required to the site to enable ready access by emergency services in a time of need and to facilitate the orderly evacuation of residents if necessary. Access to the proposed development site is to be provided by a driveway of all-weather construction. It is to connect with Alderley Street to the southwest which is of sealed, all-weather construction and provides good ingress and egress to the site.

2.4 Vegetation management

Vegetation on the site currently comprises areas of open eucalypt woodland with a grassy understorey and open maintained grassed areas. Maintenance of vegetation on the site including, the ongoing control of woody environmental weeds (e.g. Lantana) will assist in the management of fuel loads and keep associated bushfire risks to an acceptable level. Contrary to common belief, the area surrounding buildings does not need to be totally devoid of vegetation, and in fact some

trees in this area can serve a valuable role in trapping embers before they impact on the asset. It is important however that:

- There are substantial gaps (of at least 2 - 5m) between the canopies of any trees in this area.
- Surface and near surface fuels are kept to a minimum. This includes lawns to be kept short and removal of accumulated leaf and bark litter.
- Avoidance of flammable mulches on garden beds such as woodchip or straw within 10 metres of the dwelling.
- Use of non-flammable mulches such as river pebbles or stones on garden beds near dwellings and buildings.
- Plants with a higher tolerance to fire should be utilised closest to the house and be maintained in a healthy and moist state throughout the fire season.

2.5 Fire trails

The site contains access tracks that are suitable for use by 4 wheel drive light and medium attack Queensland Fire and Emergency Service Rural Fire Brigade vehicles. These tracks can be utilized for undertaking fuel management activities including hazard reduction burns if required. The tracks can readily be linked to a Council maintained firebreak that is approximately 40 metres wide on the eastern perimeter of the site. The firebreak contains a fire trail that can be readily accessed by Council and Emergency Service vehicles. No new trails are proposed for the site. Appendix 2: Bushfire Management Plan, shows the location of existing trails suitable for use by rural fire brigade vehicles.

Photo 7: Fire trail located on eastern boundary of property. A Council maintained fire break and trail is located to the immediate east of the property.

2.6 Water supply

The Toowoomba Regional Council Planning Scheme (2012) requires that an adequate water supply suitable for fire-fighting purposes should be available at all times. This can be achieved by:

- The premises are connected to a reticulated water supply having sufficient pressure for fire-fighting purposes in times of bushfire emergency (minimum pressure and flow of 10 litres per second at 200 kPa); **or**
- The premises having a water tank fitted for connection to standard fire-fighting appliance fittings, dam or swimming pool, with a minimum capacity of 10,000 litres for fire-fighting

purposes in times of bushfire emergency. Any tanks that are designated for fire-fighting purposes should be fitted for connection to standard rural fire fighting appliance fittings.

2.7 Prepare, Act, Survive

It is critically important that residents are well prepared during times of high fire danger and have well made plans that can be readily enacted in a time of bushfire emergency. This includes having plans in place to guide actions on days of extreme and catastrophic, identifying safe refuge areas and planning to either 'stay' or 'go'. If the decision is made to go, then residents need to be prepared to evacuate early. The key message being; Prepare, Act and Survive. The Queensland Fire and Emergency Services have information readily available to assist people living in bushfire prone areas to develop their own plans. Details can be downloaded from:

www.ruralfire.qld.gov.au/Publications/Documents/PAS-BushfireSurvivalPlan.pdf

2.8 Maintenance of bushfire mitigation measures

This fire report has been prepared on the basis that bushfire mitigation measures identified are implemented and maintained into the foreseeable future. Failure to maintain these measures may contribute to the development being exposed to a higher level of bushfire threat and attack.

3.0 Planning Requirements

3.1 State Planning Policy - Bushfire

The State Planning Policy (July 2017) provides a comprehensive set of principles which underpin Queensland's planning system to guide local government and the state government in land use planning and development assessment. The State's interest in relation to natural hazards is: "*The risks associated with natural hazards are avoided or mitigated to protect people and property and enhance the community's resilience to natural hazards*". The State Planning Policy (July 2017) development assessment requirements have been addressed in Table 2.

Table 2: State Planning Policy development assessment requirements

Development assessment requirement	**Proposed solution**
A development application for a material change of use, reconfiguration of a lot or operational works on premises in any of the following: (1) bushfire prone areas (2) flood hazard areas (3) landslide hazard areas (4) storm tide inundation areas (5) erosion prone area.	The proposal involves the establishment of a new dwelling in an identified bushfire hazard area.
Bushfire, flood, landslide, storm tide inundation, and erosion prone areas outside the coastal management district: **(1)** Development other than that assessed against (1) above, avoids natural hazard areas, or where it is not possible to avoid the natural hazard area, development mitigates the risks to people and property to an acceptable or tolerable level.	PS1. The development is located in an area of mapped bushfire hazard. The new dwelling is to be constructed in an area well separated from patches of potentially hazardous vegetation. A site specific hazard assessment was undertaken and a Bushfire Management Plan prepared that identifies measures to mitigate the risks to people and property to an acceptable level. Mitigation measures identified include: ▪ Establishment of an Asset Protection Zone at the time of constructing the new dwelling; ▪ Building to comply with relevant standards of building construction including the Building Code of Australia (BCA) and the Australian Standard Construction of buildings in bushfire-prone areas AS3959-2018. A BAL of 29 has been identified for the site; ▪ Provision of an adequate water supply that can be readily accessed for fire-fighting purposes; and ▪ Constructed ingress and egress be maintained to the site. Provided the measures identified in the bushfire management plan are implemented and maintained, the bushfire risk to people, property and infrastructure can be kept to an acceptable level.
All natural hazard areas: (2) Development supports and does not hinder disaster management response or recovery capacity and capabilities.	PS2. Development comprises the establishment of a new dwelling in a mapped area of bushfire hazard. The development actively assists and supports disaster management capacity and capabilities by: ▪ Providing ready access to a water supply suitable for fire-fighting purposes. This will be provided by:

Development assessment requirement	Proposed solution
	i. Connection to a mains reticulated water supply; ii. a stored and readily accessible water supply; or iii. a combination of i and ii. ▪ Provision of constructed clear and unobstructed access to the dwelling enabling safe ingress and egress; and ▪ Maintenance of existing fire trails on the site to enable bushfire mitigation activities to be undertaken and to provide access during an emergency event.
(3) Development directly, indirectly and cumulatively avoids an increase in the severity of the natural hazard and the potential for damage on the site or to other properties	PS3. The development takes into consideration topography, location of existing vegetation and potential natural hazards. The dwelling is to be sited in an open grassed area well separated from potentially hazardous downslope. Mitigation measures identified include: ▪ Establishment of an Asset Protection Zone around the dwelling at the time of construction; ▪ Effective and ongoing management of woody environmental and highly flammable weeds on the site such as Lantana and Broadleaf Privet; ▪ Landscaping to consist of plants that have low flammability; and ▪ Monitoring and management of fuel loads to prevent hazardous levels accumulating.
(4) Risks to public safety and the environment from the location of hazardous materials and the release of these materials as a result of a natural hazard are avoided.	PS4. Development comprises the establishment of a domestic residence. No hazardous materials are proposed to be stored on the site.
(5) The natural processes and the protective function of landforms and the vegetation that can mitigate risks associated with the natural hazard are maintained or enhanced.	PS5. The development seeks to maintain and enhance the protective function of landforms and vegetation present on the site by: ▪ Ongoing and effective management of environmental weeds on the site, ▪ Retaining the natural landform, i.e. minimising the extent of major earthworks, and ▪ Ensuring that any landscape plantings are compatible with the natural environment and do not contribute to an elevated bushfire hazard. Incorporation of these measures in the development will enable natural processes and functions to continue and aid in the mitigation of risks associated with potential natural hazards.

3.2 Toowoomba Regional Council Planning Scheme – Bushfire

The Toowoomba Regional Council Planning Scheme (2012 Version 19) contains a Bushfire hazard overlay code.

(1) The purpose of this code is to protect the safety of people and property in bushfire risk areas.

(2) The purpose of the code will be achieved through the following overall outcomes:

- (a) development does not increase the exposure of people and property to an unacceptable bushfire hazard risk;
- (b) development located in a bushfire risk area is designed to mitigate the bushfire risk through siting, design and management measures;
- (c) development provides access and evacuation routes for both private and emergency service vehicles which are appropriate to the nature of the development and the level of bushfire risk;
- (d) development for essential community infrastructure is able to function effectively during and immediately after a bushfire event;
- (e) public health and safety and the environment are not put at risk by development involving the manufacture and/or storage of hazardous goods in a bushfire hazard area;
- (f) the reconfiguration of land appropriately responds to bushfire hazard having regard to the appropriate siting of future development and access for evacuation; and
- (g) development provides access to an adequate water supply for fire fighting purposes.

This code identifies Performance outcomes and Acceptable outcomes. Where appropriate, this Code has been applied to the development and outcomes proposed to comply with the accepted development and assessment benchmarks. Table 3 details the response to the relevant portions of the Bushfire hazard overlay code.

Table 3: Bushfire hazard overlay code – requirements for accepted development and assessment benchmarks for assessable development

Performance outcomes	Acceptable outcome	Proposed outcome
PO1 Development is provided with an adequate water supply for fire-fighting purposes that is safely located and freely accessible.	**AO1.1** Development within a water supply area involving the creation of a new lot/s or involving proposed and existing buildings with a combined gross floor area greater than 50m², is connected to Council's reticulated water supply system It will be readily available at all time for fire fighting vehicles and a water supply outlet located within the road reserve is within 40m of the following: (a) All of the land; or	**PO1.1** Development is located within Council's water supply area. A reticulated water supply main and hydrant is located in Alderley Street to the southwest of the proposed house site. The requirements of the Code can be met by: (i) Extending the water supply main to within 40 metres of the house site; or (ii) Provision of a water storage system that permanently holds a minimum of 10,000 litres.

Performance outcomes	Acceptable outcome	Proposed outcome
	(b) A building envelope designated on each lot; or (c) The centre of each lot, excluding access handles (where no building envelope is designated); and (d) All existing and proposed buildings And Fire hydrants are designed and installed in accordance with Queensland Fire and Emergency Services Fire Hydrant and Vehicle Access Guidelines, Unless otherwise specified by the relevant water entity	
	AO1.2 Development outside a water supply area involving proposed or existing buildings with a combined gross floor area greater than 50m², are provided with a dedicated on site water storage system that permanently holds a minimum of 10,000 litres (e.g. dam, swimming pool or water tank) for fire fighting purposes.	**PO1.2** In the event that the dwelling is not provided with a connection to Council's reticulated water supply, then a dedicated water storage system is to be provided that holds a minimum of 10,000 litres.
	AO1.3 A water tank is provided within 10m of each building (other than a class 10 building) which: (a) Is either below ground level or of non-flammable construction; (b) Has a take-off connection at a level that allows the following dedicated, static water supply to be left available for access by fire fighters: i 10,000 litres for residential buildings; ii For industrial, commercial; and other buildings, a volume specified in AS2304- 2011 (c) Includes shielding of tanks and pumps in accordance with AS2304-2011	**PO1.3** In the event that a dedicated water supply for fire-fighting purposes is provided, then the following measures are to be implemented: (a) Water tanks to be provided within 10 metres of each building; (b) A minimum capacity of 10,000 litres is to be available; (c) No requirement - AS2304- 2011 Water storage tanks for fire protection systems, provides details on tank construction but does not specify requirements for shielding of pumps. (d) A hardstand area is to be provided within 6m of the tanks designated to hold fire-fighting water supplies.

Performance outcomes	Acceptable outcome	Proposed outcome
	(d) Includes a hardstand area allowing medium rigid vehicle (15 tonne fire appliance) access within 6m of the tank; (e) Is provided with rural fire brigade tank fittings if serviced by a rural fire brigade (i.e. 50mm ball valve and male camlock coupling and, if underground, an access hole of 200mm (minimum) to accommodate suction lines); and (f) Is clearly identified by directional signage at the street frontage	(e) Any such tanks are be provided with fittings to enable fire brigades to access water supplies (i.e. 50mm ball valve and male camlock coupling). (f) Tanks holding designated fire-fighting water supplies to be clearly identified.
PO2 Development provides for the safety of people and people by avoiding areas of High or Medium bushfire risk.	**AO2.1** Development is located on land that is not subject to High or Medium bushfire hazard. OR **AO2.2** Where development is located in a High or Medium bushfire hazard area (except for single dwellings on existing lots), it complies with a Bushfire Management Plan for the premises.	**PO2.1** Site is mapped by Council as largely comprising 'Medium' bushfire hazard with lesser areas of 'High' bushfire hazard. The bushfire hazard for site was assessed and the Bushfire Attack Level identified using Method 1 and Method 2 of AS3959-2018. A Bushfire Attack Level of 29 was identified for the site **PO2.2** A bushfire Management Plan has been prepared for the site which identifies standard of building required, emergency fire-fighting water supplies and ingress and egress requirements. The dwelling is to comply with current relevant building standards. This includes the Building Code of Australia (Parts 1 and 2) and the Australian Standard for Building in bushfire-prone areas (AS3959-2018).
PO3 Development provides for the safety of people and property by mitigating the bushfire risk through the siting of buildings.	**AO3.1** Buildings and structures: (a) are sited in locations of lowest hazard within the lot; and (b) achieve setbacks from hazardous vegetation of 1.5 times the predominant mature canopy tree height or 10 metres, whichever is the greater; and	**PO3.1** a) Building is located in an area of lowest hazard well separated from potentially hazardous downslope vegetation with good access to Alderley Street; b) Setbacks from hazardous vegetation are in general at least 1.5 times the predominant mature canopy tree height are achieved. Vegetation in nearby areas has a mature height

Performance outcomes	Acceptable outcome	Proposed outcome
	(c) are 10 metres from any retained vegetation strips or small areas of vegetation; and (d) are sited so that elements of the development least susceptible to fire are sited closest to the bushfire hazard.	range of 22 to 28 metres. Setbacks in the order of 50 metres are achieved from areas of potentially hazardous vegetation; c) Separation distances from retained vegetation strips or small areas of hazardous vegetation exceed 10 metres; d) Elements least susceptible to fire such as open grassed and maintained areas are sited closest to the bushfire hazard. Appendix 3 provides additional information on the level of bushfire hazard posed to buildings and the methodology used to calculate it

Table 4: Bushfire hazard overlay code – assessment benchmarks for assessable development

Performance outcomes	Acceptable outcome	Proposed outcome
For all developments		
PO1 Community infrastructure is only located in a bushfire medium and high risk area where the function and role of the infrastructure necessitates its location in the area and there are no suitable alternative sites.	No acceptable outcome is nominated.	**Not applicable –** no community infrastructure proposed.

Performance outcomes	Acceptable outcome	Proposed outcome
For all developments		
PO2 Community infrastructure is able to function effectively during and immediately after bushfire events.	**AO2.1** The community infrastructure is located on land that is not subject to High or Medium bushfire hazard; or **AO2.2** The community infrastructure will not involve any new building work other than a minor extension (<20 m² gross floor area) to an existing building; or **AO2.**3 The community infrastructure development is located within a bushfire hazard area (as identified in the Bushfire Hazard Overlay Maps) but is designed to function effectively during and immediately after bushfire events.	**Not applicable –** no community infrastructure proposed.
Water Supply		
PO3 Development is provided with an adequate water supply for fire-fighting purposes that is safely located and freely accessible	**AO3.1** Development within a water supply area involving the creation of a new lot/s or involving proposed and existing buildings with a combined gross floor area greater than 50m², is connected to Council's reticulated water supply system. It will be readily available at all time for fire fighting vehicles and a water supply outlet located within the road reserve is within 40m² of the following: (a) All of the land; or (b) A building envelope designated on each lot; or (c) The centre of each lot, excluding access handles (where no building envelope is designated); and (d) All existing and proposed buildings And	**PO3.1** Development is located within Council's water supply area. A reticulated water supply main and hydrant is located in Alderley Street to the southwest of the proposed house site. The requirements of the Code can be met by: (i) Extending the water supply main from Alderley Street to within 40 metres of the house site; **OR** (ii) Provision of a water storage system that permanently holds a minimum of 10,000 litres.

Performance outcomes	Acceptable outcome	Proposed outcome
	Fire hydrants are designed and installed in accordance with Queensland Fire and Emergency Services' Fire Hydrant and Vehicle Access Guidelines, Unless otherwise specified by the relevant water entity. **AO3.**2 Development outside a water supply area involving proposed or existing buildings with a combined gross floor area greater than 50m², are provided with a dedicated on site water storage system that permanently holds a minimum of 10,000 litres (e.g. dam, swimming pool or water tank) for fire fighting purposes. **AO3.3** A water tank is provided within 10m of each building (other than a class 10 building) which: (a) Is either below ground level or of non-flammable construction; (b) Has a take-off connection at a level that allows the following dedicated, static water supply to be left available for access by fire fighters: i 10,00 litres for residential buildings; ii For industrial, commercial; and other buildings, a volume specified in AS2304-2011 (c) Includes shielding of tanks and pumps in accordance with AS2304-2011 (d) Includes a hardstand area allowing medium rigid vehicle (15 tonne fire appliance) access within 6m of the tank, (e) Is provided with rural fire brigade tank fittings if serviced by a rural fire brigade (i.e. 50mm ball valve and male camlock coupling and, if underground, an access hole of 200mm (minimum) to accommodate suction lines); and (f) Is clearly identified by directional signage at the street frontage.	**PO3.2** In the event that the dwelling is not provided with a connection to Council's reticulated water supply, then a dedicated water storage system is to be provided that holds a minimum of 10,000 litres. **PO3.3** If a water tank is provided for fire-fighting purposes, then it is to comply with AO3.3

Performance outcomes	Acceptable outcome	Proposed outcome
Hazardous materials		
PO4 Public safety and the environment are not adversely affected by the detrimental impacts of bushfire on the manufacture or storage of hazardous materials in bulk.	**AO4.1** Development complies with a Bushfire Management Plan for the premises.	**PO4.1** The proposed development is the establishment of a residential dwelling. The manufacture or storage of hazardous materials in bulk is not proposed as a component of this development.
Reconfiguring a Lot and Material Change of Use		
PO5 Lot design and the siting of buildings provide safe sites for habitable and non-habitable buildings.	**AO5.1** All development enables buildings and structures to achieve setbacks from hazardous vegetation that are: a) sited within the area of lowest hazard within the lot; and b) provide for adequate setbacks from hazardous vegetation; and c) 1.5 times the predominant mature canopy tree height or 10m, whichever is the greater; and d) 10m from any retained vegetation strips or small areas of vegetation; and e) sited so that elements of the development least susceptible to fire are sited closest to the bushfire hazard.	**PO5.1** The proposed dwelling is sited to provide adequate setbacks from hazardous vegetation. This is achieved by: a) Building is located in an area of lowest hazard well separated from potentially hazardous downslope vegetation with good access to Alderley Street; b) Setbacks from hazardous vegetation are achieved with separation distances in order of 50 metres; c) Separation distances of at least 1.5 times the predominant mature canopy tree height are achieved from areas of potentially hazardous vegetation. Vegetation in nearby areas has a mature height range of 22 to 28 metres. Setbacks in the order of 50 metres are achieved from areas of potentially hazardous vegetation; d) Separation distances from retained vegetation strips or small areas of hazardous vegetation exceed 10 metres; e) Elements least susceptible to fire such as open grassed and maintained areas are sited closest to the bushfire hazard. Appendix 3 provides additional information on the level of bushfire hazard posed to buildings and the methodology used to calculate it.

Performance outcomes	Acceptable outcome	Proposed outcome
PO6 For development that will result in multiple buildings or lots, roads and access are designed to mitigate against bushfire hazard by ensuring adequate access for: a) fire fighting and other emergency vehicles; and b) the evacuation of people in the event of an emergency	**AO6.1** The road design is capable of providing access for fire-fighting and other emergency vehicles, in accordance with the standards identified in SC4.2 PSP No. 2 – Engineering Standards – Roads and Drainage Infrastructure. **AO6.2** The lot layout ensures that all roads are through roads. **AO6.3** The lot layout does not include long narrow lots, long access ways or rear lots. **AO6.4** The road has a maximum gradient of 1 in 8 (12.5%).	**PO6.1 Not applicable** No new roads or multiple buildings are proposed. **PO6.2 Not applicable** **PO6.3 Not applicable** **PO6.4 Not applicable** No new roads are proposed.
PO7 For development that will result in multiple buildings or lots, fire breaks are provided that: a) adequately and effectively separate the development site from surrounding vegetation to mitigate against bushfire hazard; (b) have sufficient width to enable continuous access for fire fighting and other emergency vehicles, residents and equipment; and (c) are in secure tenure and are maintained.	**AO7.1** The development incorporates a fire break provided by a perimeter road that: a) separates the boundary of the lots and the adjacent bushland; b) has a minimum cleared width of 20m; c) has a formed road width of 6m; and d) is constructed to an all-weather standard. **AO7.2** The development includes fire breaks which are located as close as possible to the boundaries of the lot(s) and the adjoining bushfire hazard and the fire breaks have: a) a minimum cleared width of 6m; b) a minimum formed width of 4m; c) a maximum gradient of 1 in 8 (12.5%); d) are constructed and maintained to prevent erosion, provide adequate drainage and provide continuous access for fire fighting vehicles; e) provide passing bays and turning areas for fire-fighting appliances; and	**PO7.1 Not applicable**. Development is the establishment of a single dwelling on a Lot. As such no fire breaks or boundary roads are proposed. **PO7.2 Not applicable** No fire trails are proposed. A Council maintained fire break and fire trail is present on the eastern boundary of the site.

Performance outcomes	Acceptable outcome	Proposed outcome
	f) are either located on public land, or within an access easement that is granted in favour of the Toowoomba Regional Council and the Queensland Fire and Rescue Service. **AO7.3** Vehicular access is provided along and at each end of the fire break to existing fire maintenance trails or roads. **AO7.4** The development includes sufficient cleared breaks of 6m minimum width in retained bushland within the development (e.g. creek corridors and retained vegetation) to allow burning of sections and access for bushfire response.	**PO7.3 Not applicable** No fire breaks or trails are proposed for the development. **PO7.4 Not applicable** Control burns are not proposed on the site due to the size of the Lot, nature of development, the extent and type of vegetation present and options available for other forms of fuel management (e.g. slashing).

4.0 Determination of Bushfire Attack Level (BAL)

The following steps were carried out using information collected from the relevant site and apply this information to the conditions required and set out in Australian Standard 'Construction of Buildings in Bushfire-prone areas' (AS 3959-2018). Full details of the calculations for determining the BAL for the site are provided in Appendix 3 – Calculation of bushfire hazard.

Table 4: Summary of attributes to determine BAL rating

Step	Procedure	Value
1	Fire Danger Index (FDI) for Queensland as per Table 2.1, Jurisdictional and Regional values for FDI	40
2	Classification of vegetation type	A-03
3	Distance of Classified vegetation from the building site	>50m*
4	Location of vegetation (Upslope/Downslope)	Downslope
5	Effective slope of land under classified vegetation	35 degrees
6	Determination of BAL from Table 2.4.5 AS 3959-2018	BAL-29

***Note:** This fire report has been prepared on the basis that a minimum separation distance of **50 metres** can be achieved and maintained between the building and the edge of hazardous understory vegetation. Failure to maintain this separation distance will result in a higher Bushfire Attack Level (BAL) being applied to the building.

The proposed dwelling is to be located in an open grassed area that is maintained in a low fuel load state. Potentially hazardous vegetation is located downslope of the proposed buildings and comprises open eucalypt woodland with a grassy to open shrubby understorey. Isolated and scattered trees are present in the immediate area of the proposed dwelling but do not contribute to an elevated level of bushfire hazard.

Using AS 3959 – 2018, Table 2.3 Classification of Vegetation, the vegetation is classified as Open Forest A-03 which is shown in Figure 9. It is described as: "*Trees 10–30 m high; 30–70% foliage cover (may include understorey of sclerophyllous low trees and tall scrubs or grass). Typically dominated by eucalypts, melaleuca or callistemon*".

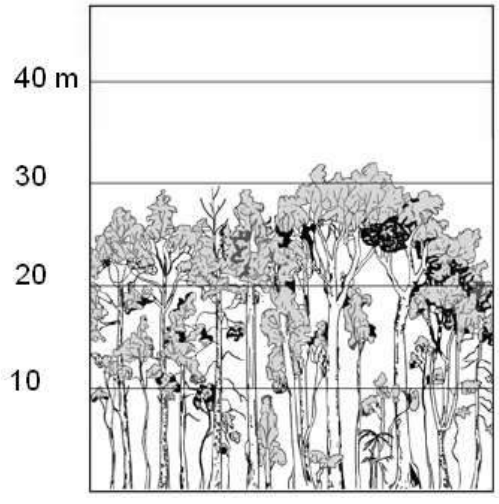

Figure 9: Vegetation Class A-03 Open Forest.

4.1 Minimisation of risk - building

A number of construction measures are required to minimise the risk of bushfire impact on buildings. Key areas include:

- Roof to be fully sarked, **or**
- Gaps under corrugations or roof sheeting sealed at the fascia or wall line and at valleys, hips and ridges,
- Vents and weepholes in walls and eve linings to be screened,
- Cladding to be of bushfire resisting material for walls that are less than 400mm from the ground, decks, awnings, and other horizontal surfaces,
- Openable parts of windows to be screened with corrosion resistant metal mesh, and
- Decking to be of bushfire-resistant or non-combustible material.

A summary of the construction measures required for BAL 29 as specified in AS3959-2018 is provided in Appendix 4.

5.0 Recommendations

Following are a number of recommendations that should be undertaken to mitigate the potential impacts of bushfire on the development. These are as follows:

Construction of buildings

- Buildings are to be designed and constructed to meet the requirements of the relevant building standards prevailing at the time. This includes the Building Code of Australia (BCA), the Australian Standard for "Construction of buildings in bushfire-prone areas (AS3959 – 2018) and relevant Council bylaws and building regulations.

Ingress and egress

- That constructed access be provided and maintained to the dwelling to enable the ready and safe access of emergency services vehicles in an emergency event.

Vegetation management

- That an Asset Protection Zone with a radius of 50 metres be established around facilities comprising an Inner Protection Area of 30 metres width and an Outer Protection Area of 20 metres. Vegetation management within the Asset Protection Zone is to comprise:
  - Inner Protection Area –
    - substantial gaps of at least 2 - 5m are to be achieved between canopies of retained trees,
    - lawns to be kept short (less than 10cm) and accumulations of leaf and bark litter be avoided,
    - avoidance of flammable mulches within 10 metres of buildings, and
    - plants with a higher tolerance to fire be utilised closest to buildings.
  - Outer Protection Area –
    - woody environmental weeds including Lantana and Broadleaf Privet to be effectively controlled,
    - grass to be kept to less than 10cm in height throughout the fire season.

Water supply

- That an adequate water supply for fire-fighting purposes that is safely located and freely accessible be provided for the dwelling. This is to be achieved by:

i. Connection to Council's reticulated water supply system, or
ii. Provision of a dedicated on site water storage system that permanently holds a minimum of 10,000 litres.

Maintenance of bushfire measures

- That bushfire mitigation measures identified in this bushfire management report are implemented and maintained.

6.0 References

Australian Standard; 2018. Construction of buildings in bushfire-prone areas (AS3959–2018). Sydney.

Australian Standard; 2019. Water storage tanks for fire protection systems (AS2304-2019). Sydney

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Ramsay, C & Rudolph, L.; 2003. Landscape and Building Design for Bushfire Areas. CSIRO,

Australia.

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https://www.dnrm.qld.gov.au/

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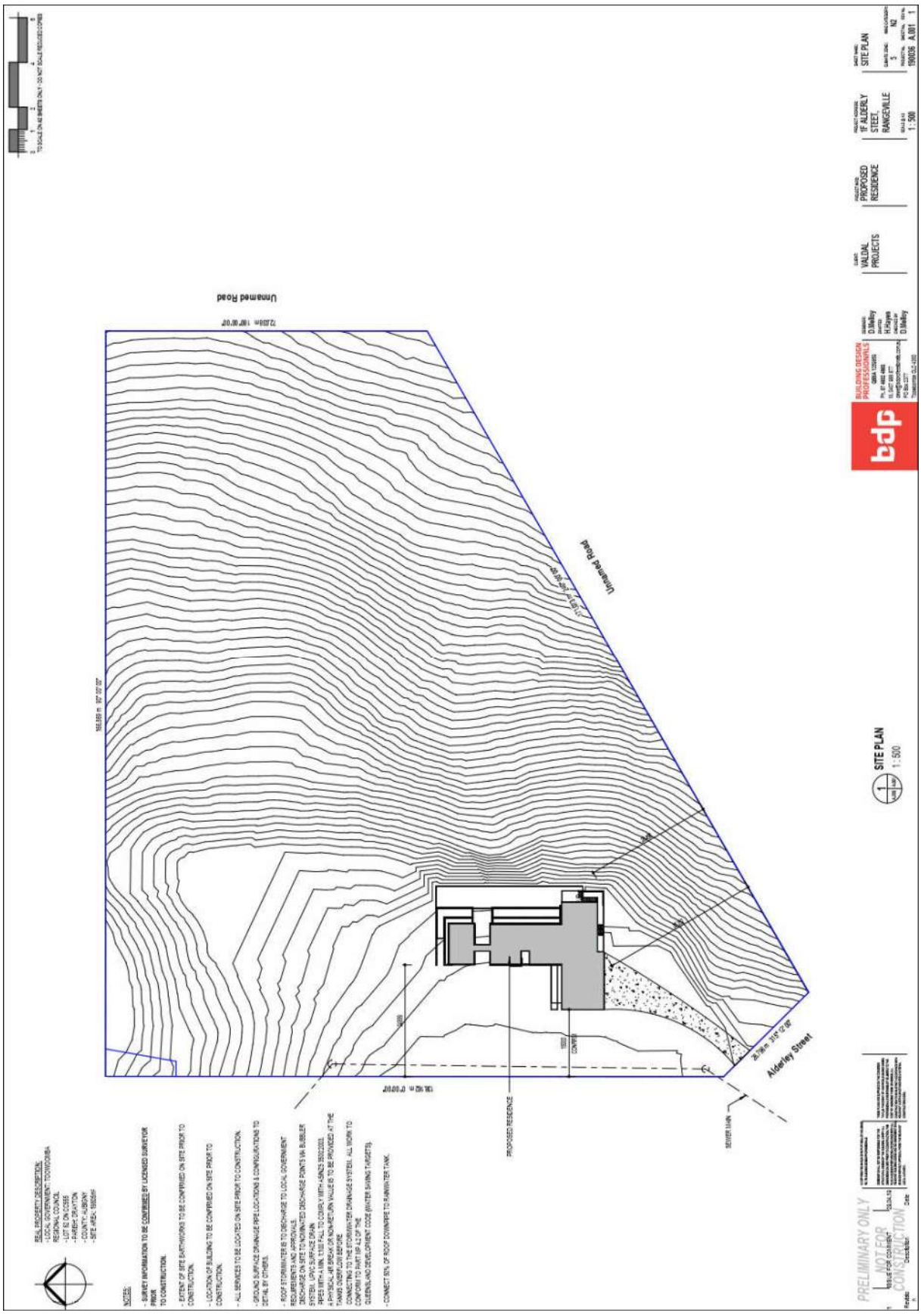
http://www.dilgp.qld.gov.au/planning/state-planning-instruments/spp-interactive-mapping-system.html

The State of Queensland, July 2017. Queensland State Planning Policy (July 2017) Queensland Department of Infrastructure, Local Government and Planning.

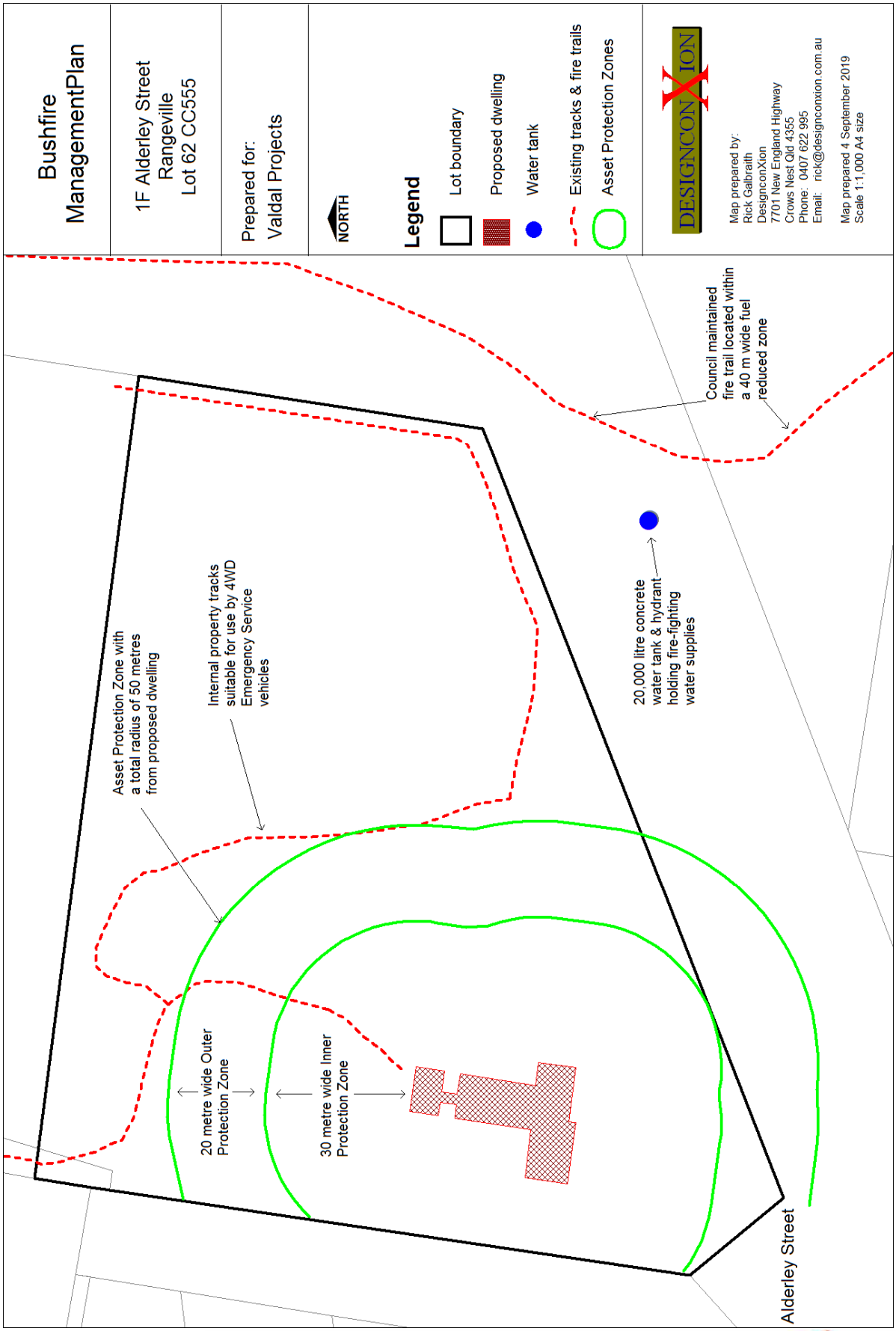
Victoria State Government, July 2010. Overall Fuel Hazard Assessment Guide 4th edition.

Victoria State Government; 2014. Planning Practice Note 65. Melbourne.

Appendix 1 – Overall site plan



Appendix 2 – Bushfire Management Plan



Appendix 3 – Calculation of Bushfire Hazard

The site has been identified by the Toowoomba Regional Council Planning Scheme (2012) as being largely contained within an area of "*Medium*" Fire Risk with smaller areas of "*High*" Fire Risk present. A site assessment was undertaken which confirmed that this site is of Medium bushfire risk.

Overall Fuel Hazard Assessment

An overall fuel hazard assessment was undertaken of the site and an adjacent bushland area in accordance with the 'Overall Fuel hazard Assessment Guide (Victorian State Government 2010) to assess the hazard posed by various fuel components present. Attributes measured were:

- bark fuel;
- elevated fuel;
- near-surface fuel; and
- surface fuel.

Figure 10 identifies the locations where the overall fuel hazard assessments were undertaken with Figure 11 providing a diagrammatic view of the fuel hazard layers. A summary of the data collected is presented in Table 5.

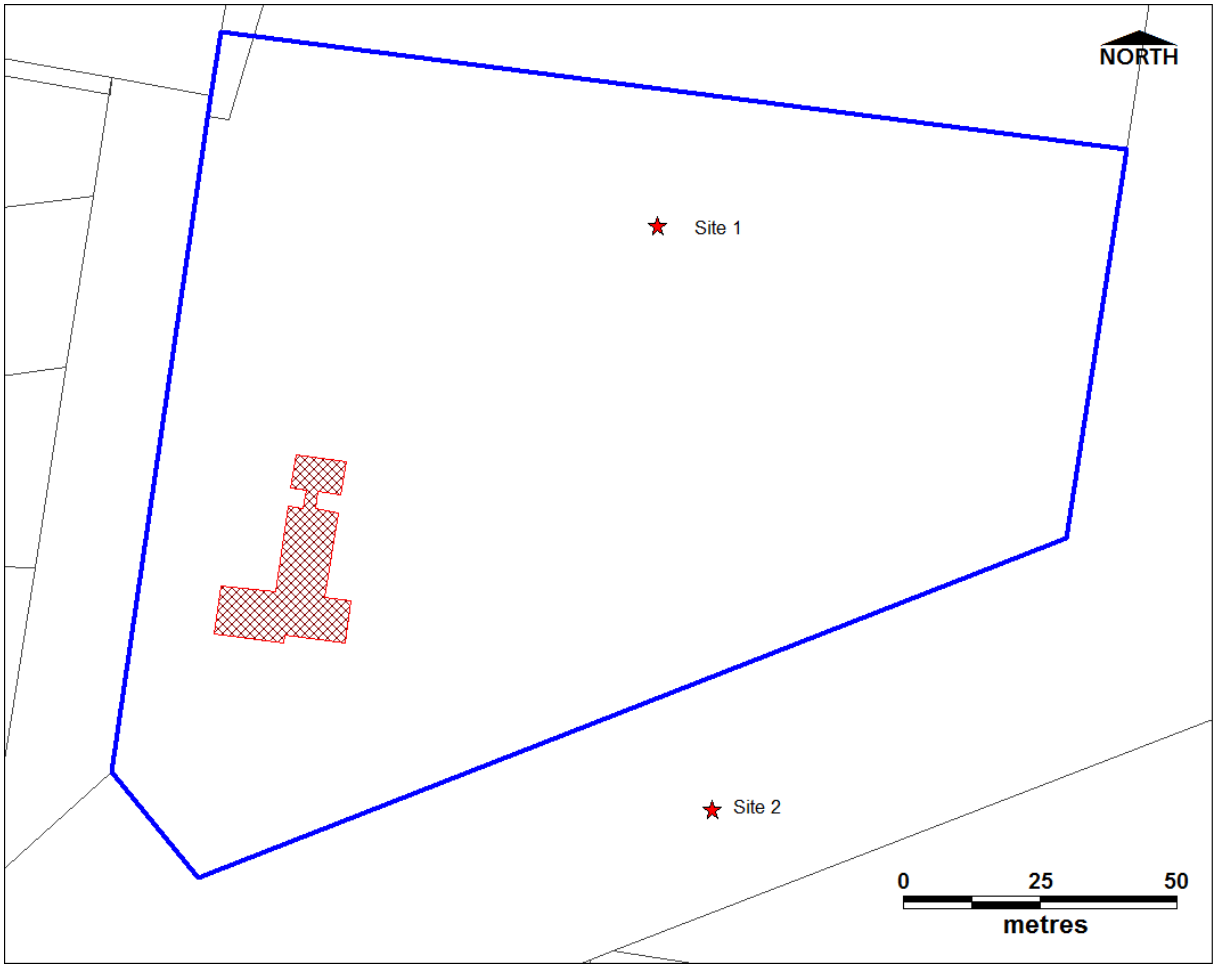


Figure 10: Locations where overall fuel hazard assessments were undertaken.

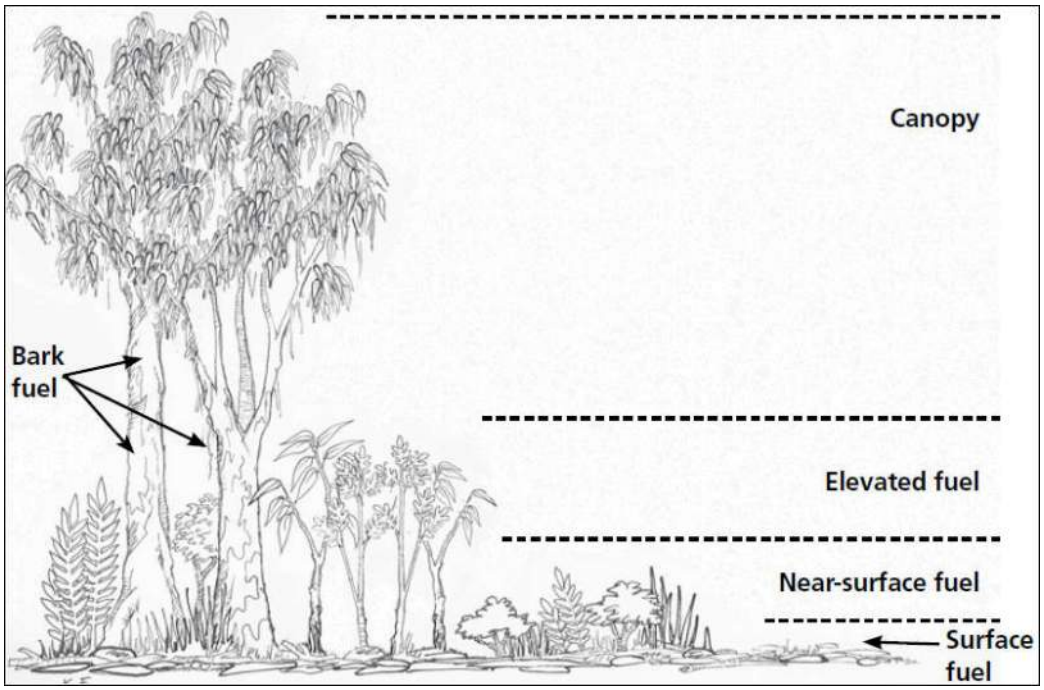


Figure 11: Fuel hazard layers used to determine the overall fuel hazard for a site. (Image from Overall fuel hazard assessment guide 2010).

Table 5: Summary of overall fuel hazard layers assessed

Attribute	Site No. 1	Site No. 2
Emergent Canopy Height	27 metres	33 metres
Main Canopy Height	18 metres	22 metres
Bark Fuel Hazard	Moderate	Moderate
Elevated fuel layer hazard	Low	Very high
Near-surface fuel layer hazard	High	Medium
Surface fuel hazard	Medium	High
Combined surface & near-surface fine fuel hazard	High	High
Overall fuel hazard	**Medium**	**Very high**

Overall fuel hazard assessments were undertaken in areas representative of vegetation on and surrounding the site. Site 1 was located downslope and to the northeast of the site in an area of open woodland / forest with a grassy understorey with isolated shrubs present. This vegetation and associated fuel hazards is representative of areas downslope of the house site on the property. Site 2 was located to the southeast of the property in a gully that runs parallel to the property boundary. Vegetation in this area comprises open eucalypt forest with a dense shrubby understorey largely comprised of the woody environmental weeds Broadleaf Privet and Lantana.

Photos of both sites are presented which illustrate the various fuel layers present.

Photo 8: Overall fuel hazard assessment Site 1 showing surface and near surface fuel layers.

Photo 9: View to the north showing the fuel hazard layers present at Site 1.

Photo 10: View to the west showing the fuel hazard layers present at Site 1.

Photo 11: Overall fuel hazard assessment Site 2 showing surface and near surface fuel layers.

Photo 12: View to the south showing the fuel hazard layers present at Site 2.

Photo 13: View to the west showing the fuel hazard layers present at Site 2.

Bushfire Hazard – Building

The bushfire hazard for the proposed dwelling location was identified using the:

- Australian Standard Construction of buildings in bushfire-prone areas (AS3959-2018) Method 1, and where appropriate
- AS3959-2018 Method 2.

These methods identified that the dwelling could potentially be exposed to a Bushfire Attack Level (BAL) of 29. This Bushfire Attack Level is quite manageable and does not expose residents and structures to an unacceptable level of risk.

Australian Standard Construction of buildings in bushfire-prone areas (AS 3959-2018)

The Australian Standard, "Construction of buildings in bushfire-prone areas" (AS 3959-2018) identifies the level of construction required for the purpose of ensuring that a building is constructed to withstand a potential bushfire attack. This Standard is primarily concerned with improving the ability of buildings in designated bushfire-prone areas to better withstand attack from bushfire, thus giving a measure of protection to the building occupants (until the fire front passes) as well as to the building itself. Table 6 identifies the various site specific parameters used in determining the BAL for the proposed dwelling.

AS3959-2018 requires that vegetation be assessed within 100 metres of a building when determining the Bushfire Attack Level. Figure 2 shows the location of the proposed dwelling with a radius of 100 metres from the edge of it identified. It should be borne in mind that the measures contained in the Standard cannot guarantee that a building will survive a bushfire event on every occasion. This is substantially due to the unpredictable nature and behaviour of fire and extreme weather conditions.

Table 6: Determination of Bushfire Attack Level (BAL) for Lot 13 – parameters assessed

Step	Procedure	North	East	Southeast	South	West
1	Fire Danger Index (FDI) for Queensland as per Table 2.1, Jurisdictional and Regional values for FDI	40	40	40	40	40
2	Classification of vegetation type	A-03	A-03	A-03	A-03	A-03
3	Distance of Classified vegetation from the building site (metres)	40	35	50	40	>100
4	Location of vegetation (Upslope/Downslope)	Down	Down	Down	Down	Up
5	Effective slope of land under classified vegetation	16	35	35	23	15
6	AS3959 Method used to determine Bushfire Attack Level	Method 1	Method 2	Method 2	Method 2	Method 1
7	Determination of BAL from Table 2.7 AS 3959-2018	29	29	29	19	Low

Appendix 4: Summary of AS3959-2018 BAL 29 construction requirements

Note: this is a summary of some portions of the standard - the building designer, builder and subcontractors should refer to AS3959-2018 in full prior to construction.

Subfloor supports

The Standard does not provide construction requirements for sub-floor supports where the sub-floor is enclosed in accordance with wall that conforms to the requirements for walls listed below or is enclosed with corrosion resistant steel, bronze or aluminium mesh with a maximum aperture of 2 mm.

Where the subfloor space is unenclosed, the support posts, columns, stumps, piers and poles are to be of non-combustible material or bushfire resisting timber.

Floors

The Standard does not provide construction requirements for concrete slabs on the ground.

Unenclosed subfloor space

The standard does not provide construction requirements for bearers, joists and floors if the underside element is greater than 400mm above finished ground level

External walls

External walls are to be:

(a) made of non-combustible materials (e.g. full masonry, brick veneer etc.) with a minimum thickness of 90 mm, or

(b) timber logs with a density of 680 kg/m^3 and a minimum nominal thickness of 90mm; or

(c) cladding that is fixed externally to a timber or metal frame and is:

  (i) non-combustible; or

  (ii) fibre cement a minimum of 6mm thick; or

  (iii) bushfire-resisting timber.

Joints

All joints in the external surface material of walls shall be covered, sealed, overlapped, backed or butt-jointed.

Vents and weepholes

Vents and weepholes in external walls are to be screened with corrosion-resistant steel, bronze or aluminium mesh with a maximum aperture of 2 mm.

External glazed elements, assemblies and doors

Screens for windows and doors

Where fitted, screens for windows and doors shall have mesh or perforated sheet made of corrosion-resistant steel, bronze or aluminium with a maximum aperture of 2 mm, with framing made from metal or bushfire resisting timber.

Windows

Frame material for windows are to be made from bushfire-resisting timber, metal or metal-reinforced uPVC.

Glazing is to be toughened glass with a minimum thickness of 5 mm.

The openable portions of windows shall be screened with a mesh with a max aperture of 2 mm made of corrosion resistant steel, bronze or aluminium.

Doors - side hung external doors, panel fold & sliding doors

Doors- shall be completely protected externally by a screen with a mesh with a max aperture of 2mm made of corrosion resistant steel, bronze or aluminium, **OR**

Door panel material shall be:

(a) non-combustible; or

(b) solid timber, laminated timber or reconstituted timber, having a minimum thickness of 35 mm for the first 400 mm above the threshold; or

(c) hollow core, solid timber, laminated timber or reconstituted timber with a non-combustible kickplate on the outside for the first 400 mm above the threshold; or

(d) fully framed glazed door panels with framing made from metal, bushfire resisting timber or uPVC.

Door frames shall be made from metal bushfire resisting timber, metal or metal reinforced uPVC.

Where doors incorporate glazing, the glazing shall be toughened glass with a minimum thickness of 6mm.

Doors shall be tight fitting to the door frame and to an abutting door, if applicable.

Weather strips, draught excluders or draught seals shall be installed.

There is no requirement to screen the openable part of a door at this level.

Garage doors

Vehicle access doors shall be made from:

(i) non-combustible material; or

(ii) bushfire-resisting timber; or

(iii) fibre-cement sheet, a minimum of 6 mm in thickness; or

(iv) a combination of any of items (i), (ii) or (iii) above.

All vehicle access doors to be protected with suitable weather strips, draught excluders, draught seals or brushes.

Roofs

The following apply to all types of roofs and roofing systems:

(a) roof tiles, roof sheets and roof covering accessories shall be non-combustible,

(b) the roof/wall and roof/roof junction shall be sealed, or otherwise protected to prevent openings greater than 2mm,

(c) roof ventilation openings, such as gable and roof vents, shall be fitted with ember guards made of non-combustible material or a mesh or perforated sheet with a max aperture of 2mm made of corrosion resistant steel, bronze or aluminium.

Tiled roofs shall be fully sarked with the sarking covering the entire roof area including ridges and hips and extend into gutters and fascias.

Sheet roofs shall:

(a) be fully sarked with sarking, except that foil backed insulation blankets may be installed over battens; **OR**

(b) have any gaps sealed at the fascia, or wall line, hips and ridges by:

(i) a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium, or

(ii) mineral wool, or

(iii) other non-combustible material, or

(iv) -a combination of any of the above.

Roof penetrations

The following apply to roof penetrations:

(a) roof penetrations, including roof lights, roof ventilators, roof-mounted evaporative cooling units, aerials, vent pipes and supports for solar collectors, shall be adequately sealed at the roof to prevent gaps greater than 3 mm. Sealing material is to be non-combustible.

(b) openings in vented roof lights, roof ventilators or vent pipes shall be fitted with ember guards made from a mesh or perforated sheet with a maximum aperture of 2 mm, made of corrosion-resistant steel, bronze or aluminium.

(c) all overhead glazing shall be Grade A safety glass complying with AS 1288.

(d) Flashing elements shall be non-combustible.

Eaves linings, fascias and gables

The following apply to eaves linings, fascias and gables:

(a) gables shall comply with requirements for walls.

(b) fascias and bargeboards shall be made from bushfire-resisting timber or metal.

(c) eave linings shall be fibre-cement sheet with a minimum thickness of 4.5mm or bushfire resisting timber.

(d) Eave penetrations shall be protected as for roof penetrations.

(e) eaves ventilation openings are to be fitted with ember guards and be made of corrosion resistant steel, bronze or aluminium.

(f) Joints in eave linings, fascias and gables may be sealed with plastic joining strips or timber storm moulds.

Gutters and downpipes

The Standard does not provide material requirements for gutters and downpipes, with the exception of box gutters.

Box gutters are to be non-combustible and flashed at the roof junction with non-combustible material.

If installed, gutter and valley leaf guards are to be non-combustible.

Verandahs, decks, steps, ramps and landings

Decking may be spaced. There is no requirement to enclose the subfloor spaces of verandas, decks, steps, ramps or landings.

Decking, stair treads, trafficable surfaces of ramps and landings, balustrades and handrails are to be made from:

(a) of non-combustible material; or

(b) of bushfire-resisting timber; or

(c) a combination of items (a) and (b) above.

Verandah posts shall be made from non-combustible material or bushfire-resisting timber.

Water and gas supply pipes

Above ground, exposed water and gas supply pipes shall be metal. The metal pipe shall extend a minimum of 400mm within the building and 100mm below the ground.

Appendix 5 – Explanation of bushfire attack levels

				
BAL-12.5	**BAL-19**	**BAL-29**	**BAL-40**	**BAL-FZ**
The risk is considered to be **LOW**	The risk is considered to be **MODERATE**	The risk is considered to be **HIGH.**	The risk is considered to be **VERY HIGH.**	The risk is considered to be **EXTREME.**
There is a risk of ember attack. The construction elements are expected to be exposed to a heat flux not greater than 12.5 kW/m^2.	There is a risk of ember attack and burning debris ignited by wind borne embers and a likelihood of exposure to radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 19 kW/m^2	There is an increased risk of ember attack and burning debris ignited by windborne embers and a likelihood of exposure to an increased level of radiant heat. The construction elements are expected to be exposed to a heat flux not greater than 29 kW/m2.	There is a much increased risk of ember attack and burning debris ignited by windborne embers, a likelihood of exposure to a high level of radiant heat and some likelihood of direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux not greater than 40 kW/m^2.	There is an extremely high risk of ember attack and burning debris ignited by windborne embers, and a likelihood of exposure to an extreme level of radiant heat and direct exposure to flames from the fire front. The construction elements are expected to be exposed to a heat flux greater than 40 kW/m^2.

Images sourced from Planning Practice Note 65 September 2014 Victoria State Government

BAL Descriptions - Australian Standard - Construction of buildings in bushfire-prone areas (AS 3959-2018)

Appendix 6 – Living in a Bushfire Prone Area

A bushfire can ignite fuel and spread in three ways:

- Embers and burning debris carried by wind,
- Heat radiation from fire, and
- Direct flame contact.

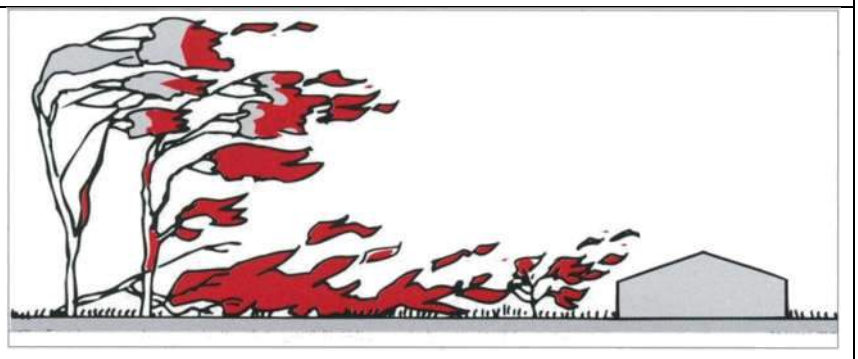
Ignition of buildings by burning embers carried by the wind	
Ignition of buildings by heat radiation from the fire	
Ignition of buildings by direct flame contact	

Figure 12: The three main elements of bushfire which threaten life and property. (Ramsay & Rudolf 2003)

Overall the intention of bush fire protection measures should be to prevent flame contact to a structure, reduce radiant heat to below the ignition thresholds for various elements of a building, to minimise the potential for wind driven embers to cause ignition and reduce the effects of smoke on residents and firefighters.

Asset Protection Zones

The most immediate form of defence for an asset is a well-designed Asset Protection Zone (APZ). This zone serves to protect the asset from flames and radiant heat. It improves the chances of the asset surviving the passing of the fire front, providing a safe refuge for occupants during this period and providing a relatively "defendable space" for firefighting activity.

Whilst research shows that ember attack ultimately claims more vacant houses than radiant heat or flames, if a house is occupied, ember attack can be relatively easily dealt with.

The consequence of leaving a house unattended is that there will probably be nobody there to prevent the small fires which initially start, from gradually taking hold of various parts of the structure. This process can occur over a significant period of time, usually simply with embers which fly about and settle, and start smouldering. The hot windy conditions associated with the fire help fan the smouldering clumps of fuel, and bring many small fires to life. These are usually easy fires to extinguish if there is someone there with the equipment and water to put them out. In their absence, often some time, even hours after the initial fire front, the house succumbs to small fires which have grown to larger ones.

Over 90% of houses burnt down in bushfires are attributable to ember attack, and the vast majority of these are unattended at the time. In the 1984 study of the Ash Wednesday Fires around Mt Macedon, the survival rate amongst the 450 houses was 82% where they were occupied and 90% where the occupants were active, able bodied defenders, while only 30% of houses survived without someone to patrol them (Wilson & Ferguson, 1984).

Outer Protection Area (OPA) is effectively the fuel-reduced outer protection area which serves to deprive attacking fire of fuel and reduce the intensity of the fire front. Removal of mid layer fuels prevents flames from transferring from ground fuels to the canopy where destructive potential is greatest. The OPA will also help shield a building from radiant heat, minimize the rate of spread and also intercept burning embers carried by the wind. Understorey fuel levels in the OPA should be kept below 8t/ha.

Inner Protection Area (IPA) refers to the area between the fuel reduced zone and the asset, and its design may serve to considerably reduce risks posed to the asset. Contrary to common belief, this area does not need to be devoid of vegetation, and in fact some trees in this area can serve a valuable role in trapping embers before they impact on the asset. It is important however that:

- There are substantial gaps (or at least 2 - 5m) between the canopies of any trees in this area.
- There are no continuous fuels linked horizontally or vertically. Smooth barked trees provide a lesser fuel ladder to the canopy than rough barked or ribbon barked species.
- Tree canopies do not overhang the roof.
- Surface and near surface fuels are kept to a minimum. This includes lawns (to be kept short) leaf litter and garden mulches.
- Plants with a higher tolerance to fire should be utilised closest to the house and are maintained in a healthy moisture state throughout the fire season.

Asset Protection Zones act as a buffer zone between a dwelling and the hazard. The primary purpose of an Asset Protection Zone is to ensure that a progressive reduction of bushfire fuels occurs between the bushfire hazard and any habitable structures.

Asset Protection Zones should be in place for dwellings adjoining a bushfire hazard area, whether it is a single building, a group of isolated buildings or an urban subdivision.

Various amenities can contribute to the Asset Protection Zone, provided they are not combustible or otherwise add to radiant heat levels. Such amenities include driveways, tennis courts, swimming pools or firetrails, each adding to the distance from the hazard.

Radiant heat barriers such as non-combustible walls or water tanks can help shield assets from radiant heat, thereby complementing the APZ, and in some cases reducing the requirement for distance from the hazard, to a degree.

The required distances for Asset Protection Zones are dependent on the vegetation type (hazard), the slope of the site and whether the hazard is upslope or downslope from the asset. Figure 13 illustrates how APZ's can be achieved on the site.

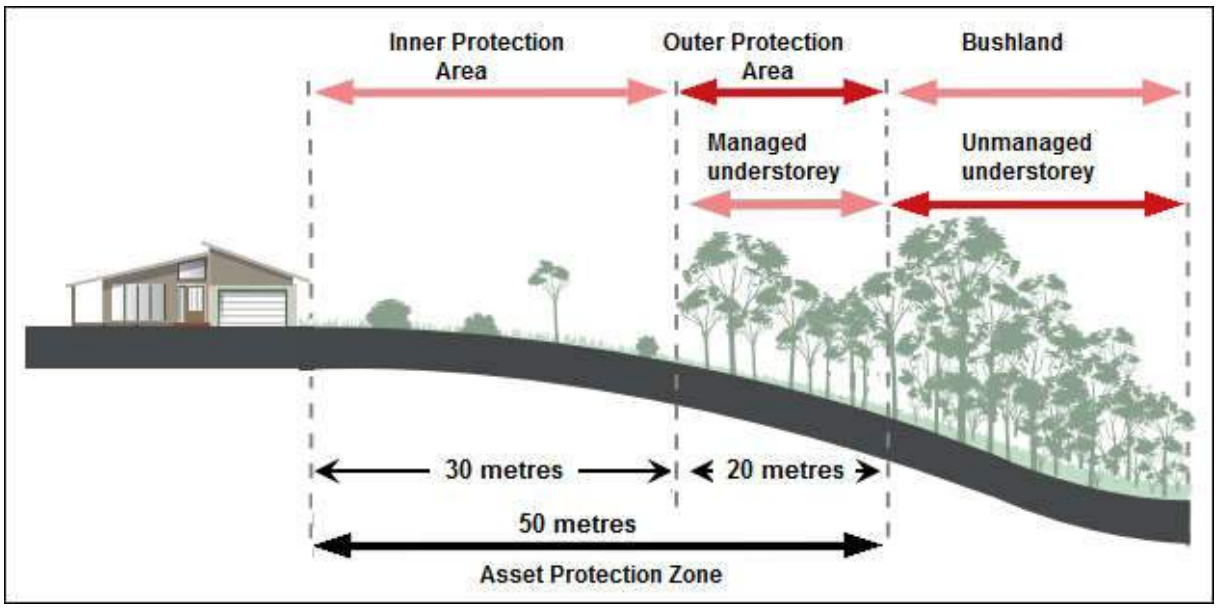


Figure 13: Proposed APZ dimensions. (Adapted from Planning for Bushfire Protection 2017)

SOIL SURVEYS

GEOTECHNICAL INVESTIGATION

PROJECT NO. 1-24866

MARCH, 2022

DASH HOUSE TRUST

PROPOSED RESIDENCE

ALDERLEY STREET, RANGEVILLE

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1.0 INTRODUCTION

1.1 General

This report presents the results of the geotechnical investigation carried out by Soil Surveys Engineering Pty Limited on the 3rd, 14th and 16th March, 2022 for the Proposed Residence at Alderley Street, Rangeville.

The report was carried out following authorisation from the Dash House Trust on 17th February, 2022.

The objectives of this investigation were to assess subsurface conditions at the site in accordance with the Scope of Services detailed in Section 1.3.

1.2 Proposed Development

It is understood that the proposed development is to consist of the construction of a new multi-level residence on the flatter section of the site in the south western corner of the lot.

Details about the structure are preliminary but a provided drawing suggests a structure aligned north south with an access driveway along the boundary and a pool on the eastern side of the site. The provided description indicates a double story house with basement over part of the footprint. Floors will most likely be suspended concrete.

Building loads have not been provided, however based on the provided drawing and description it has been assumed that they would be generally consistent with domestic type structural loads of this type of structure

Earthworks have not been provided and could consist of cuts and fills of up to 3m however this will need to be confirmed.

1.3 Scope of Geotechnical Services

The scope of geotechnical services provided by Soil Surveys Engineering Pty Limited was directed towards evaluating the following items as detailed in our proposal 1-24866, 2022-01-18, PR VER 2, dated 24th January, 2022:-

- Investigation of the subsurface profile at the proposed building location by drilling, sampling and in-situ testing with four boreholes.
- Laboratory testing on selected samples to assess the material parameters of the subsurface material.
- Engineering analysis of site investigation and laboratory test results to evaluate:-
    - Civil works recommendations
        - Trafficability
        - Excavatability
        - Earthworks recommendations
        - Batter recommendations
    - Foundation recommendations
        - Site classification according to AS 2870 (i.e. Reactivity)

  - Footing options and parameters
- Retaining wall design parameters
- Stability Assessment in accordance with:-
  - National Disaster Mitigation Program (NDMP), Landslide Risk Management (LRM) Guidelines, Practice Notes and Geoguidelines as published in the "Australian Geomechanics Journal" Volume 42 No. 1 March, 2007.
  - State Planning Policy July, 2017-SPP.
  - Toowoomba Regional Council (TRC) Planning Scheme.
- Construction recommendations (where applicable)
- Site management recommendations

2.0 GEOTECHNICAL INVESTIGATION

2.1 Field Investigation

Subsurface conditions at the site were investigated by the drilling and sampling of four boreholes to depths of between 0.70m and 4.00m, using a J105 drilling rig.

All boreholes terminated at 'TC' bit refusal. In addition, dynamic cone penetrometer tests were carried out adjacent to the boreholes. In the case of BH01, several attempts were made to penetrate through the fill layer however refusal was reached on large rock fragments at each location.

The description of the materials encountered in the field investigation is subjective, based on the experience and judgement of the rig/site supervisor and some variations in the description, from the actual material type may occur.

The soil classification descriptions, field and laboratory testing were carried out in general accordance with the following Australian Standards:-

- AS 1726 Geotechnical Site Investigations
- AS 1289 Methods of Testing Soils for Engineering Purposes

Notes relating to this report, borehole records and site plans (Dwg's 1-24866-01 and 1-24866-02) showing the location of the boreholes are included in the Appendices.

The site was also mapped by a geotechnical engineer with experience in slope stability assessments.

2.2 Site Description

The site is situated at Alderley Street, Rangeville (refer Figure 1). Access onto the site was off the end of Alderley Street. At the time of the investigation, the site was clear of any structures.

The site generally slopes to the east with a fall of some 4.0m across the site (based on TRC contours). The area is moderately to well grassed with numerous small to medium sized trees. The majority of the trees on the platform suggest that the existing surface has been in place for

a considerable period of time, however several trees around the edge of the structure indicate newer filling.

Refer to site photographs in Appendix D for typical site conditions.

FIGURE 1 – SITE LOCATION

2.3 Geotechnical Model

2.3.1 Regional Geology of Toowoomba

According to the Toowoomba 1:100,000 Geology Map published by the Department of Mines and Energy, 1999, the site is underlain by rocks of the mid-Tertiary (27-18 Mya) Toowoomba Volcanics which is part of the extensive Main Range Volcanics.

This unit consists primarily of basalt, inferred to be from several small local eruptive centres; mostly basalt flows, some ponded in craters and various interbeds of tuff. Rare interflow sediments and brown coals have been noted.

The unit was deposited onto an irregular terrestrial surface over immature soils covering the underlying Mesozoic sediments of the Walloon Coal Measures.

Willey (2003) describes two main periods of basalt flows between which a paleosol developed. Following the final period of flows, an upper paleosol (UP) developed on the land surface. The UP has been extensively laterised and contains no primary minerals of the parent material. It is described as very cohesive, even rocky when dry and highly permeable.

2.3.2 Site History & Observations

Published Slope Stability Assessments

A review of the site history based on published documentation and historical aerial photos indicates the following.

Two slope stability assessments were undertaken of the Toowoomba escarpment. Holmes (1981) carried out an assessment of the upper/western section of the escarpment mainly within the Toowoomba City Council area. Willmott (1984) undertook a similar assessment on the lower/eastern section of the escarpment mainly within the Gatton Shire area.

Whilst the site is presently within the Toowoomba Regional Council area the extent of the Holmes report just extended to the site with the Willmott report starting directly to the east of the existing platform.

The classification zones and their explanation used by Holmes is outlined in Table 1 below.

TABLE 1 HOLMES (1981) CLASSIFICATION ZONES

Category	Topography	Geology	Stability Constraints & Suitability
A	Plateau surface gently undulating	Lateritic soils of variable depth	No natural stability problems identified. Suitable for building for close settlement
B	Gentle to steep slopes on the top of the escarpment	Lateritic soils of variable depth	Few landslides have been recorded. Generally suitable for small acreage and close settlement but foundation investigation advisable. On-site disposal of water would be critical to land downslope.
C	Moderate to steep slopes of the escarpment	Moderately deep to deep colluvial clays and lateritic soils	Generally stable slopes, however, numerous stability problems associated with seepage zones have been identified. Land in this zone is considered suitable for small acreage settlement, but only where shown safe by geotechnical investigation. Areas of uncertain stability should be avoided. On-site disposal of stormwater and wastewater not allowable.
D	Heads of gullies and adjacent gully sides	Moderately deep to deep colluvial clays	Natural vegetated slopes mostly stable. When cleared slopes are subject to landslides both by rotational and flow sliding associated with seepage. Most unstable zone on escarpment. Not suitable for building.
E	Very steep slopes on edge of escarpment	Shallow, stoney dark brown soils	Natural vegetated slopes mostly stable. Cleared slopes are subject to shallow debris slides. Generally unsuitable for settlement. Only rare building sites available on sharp ridge crests to which access is difficult.

Holmes identified the site as being covered by two stability zones:-

- C – for the majority of the site
- D – for the southern section of the site (approximately south of BH01)

The work done by Holmes was based on air photo interpretation with site checking. In the case of this site and given the pre-fill surface the site is most likely correctly identified as D at the end of Alderley St (southern end of site) and the nearby gully to the south with the remainder more fitting to a B classification.

Air Photography

Google Earth (GE) and TRC historical photos indicate the following:-

- 2005 (Jan) - site appears to be well grassed with a track along the western boundary of the site, possible bench approximately 20m wide from western boundary. No obvious earthworks on the site (GE).
- 2009 (Jun) – the northern end of the site appears to be disturbed possible filling (GE).
- 2016 (Feb) – filling on outside edge (10m in width) of platform near BH 2 location, Fill extending from the top to the base of the batter (GE).The house to the west was constructed with what appears to be a fill embankment between that house and the subject site.
- 2017 (July) – Filling along a 25m length of the edge to the east on BH4 (TRC).
- 2017 (Dec) – further filling along the edge of the platform (25m in length) adjacent to and north of BH2. Fill is 50m horizontally from top to base (along a north south track below the site) (GE).

- 2018 (Apr) – no recent filling but what appears to be face scour adjacent to BH4 (TRC)
- 2018 (Nov) – no recent filling (TRC)
- 2019 (Jan) – fill noted in 2017 refreshed and what appears like filling (or at least clearing off the platform southeast of BH1 (GE).
- 2019 (May) – extensive fill dumped over the edge to the east of BH4 along a 30m section of crest (TRC).

2.3.3 Subsurface Profile

The subsurface profile intersected during the drilling program consisted of:-

- Fill - Identified in all the boreholes with the thickest layers in BH02 (3.5m) and was described as:-
    - Silty & Sandy CLAY (CL, CI, CH), stiff to very stiff
    - Sandy Gravelly CLAY (CL), stiff, very stiff to hard
    - Clayey & Clayey Gravelly SAND (SC), loose to medium dense
    - Silty Gravelly SAND (SM), loose
    - Clayey Sandy GRAVEL (GC), medium dense
    - GRAVEL (GP), very dense

  In the absence of documentation to confirm that the filling was placed and compacted in accordance with AS 3798-2007, then the filling must be considered as being 'uncontrolled'.
- Clay - Encountered in boreholes BH3 and BH4 only and was described as Silty and Silty Sandy CLAY (CL & CI), stiff and very stiff.
- Sand - Identified in borehole BH4 and was described as Clayey Silty SAND (SC), dense.
- Weathered Rock - Encountered in BH2 to BH4 and was described as Basalt, extremely weathered (XW) to distinctly weathered (DW), very low to low strength.

Note AS 1726-2017 'Geotechnical Site Investigations' requires that XW rock be described using soil terms.

A summary of the subsurface profile is presented in Table 2 with detailed borelogs included in the appendices.

TABLE 2 SUBSURFACE PROFILE SUMMARY

BH No.	Fill (m)	Sand (m)	Clay (m)	Weathered Rock (m)		Total Depth (m)	DCP Refusal Depth[3] (m)
				XW[6]	DW		
BH1[4]	0.00-TD[5]	NE	NE	NE	NE	0.90	0.83
BH1A[4]	0.00-TD[5]	NE	NE	NE	NE	0.70	0.59
BH2	0.00-3.50	NE	NE	3.50-3.80	3.80-TD[5]	4.00	0.76
BH3	0.00-0.20	NE	0.20-1.60	1.60-2.00	2.00-TD[5]	2.20	1.67
BH4	0.00-1.40	1.80-2.80	1.40-1.80	2.80-3.00	3.00-TD[5]	3.30	2.70

Notes:-
1. NE = Not Encountered; NC = Not confirmed; TD = Total Depth.
2. All depths below existing ground level (3rd, 14th and 16th March, 2022).
3. Blows >20 per 100mm.
4. Several attempts were made at the location of BH1 to penetrate the fill.
5. TC bit (rig) refusal.
6. Note AS 1726-2017 'Geotechnical Site Investigations' requires that XW rock be described using soil terms.

2.3.4 Discussion

Fill

Significant amounts of fill have been identified on the site. The fill as identified in the boreholes and exposed unvegetated batters around the platform indicate an extremely variable material source. Assessment of the air photos (Section 2.3.2) indicates that the filling has been occurring over a significant period of time and that the majority appears to have been end dumped over the edge of the platform and allowed to flow down the slope. Any fill on the main platform level to the west of the centreline of the platform may have been in place for some time based on the size of some of the trees on the platform.

Residual Soils

The field description of the natural soil consists of sands and clays grading into low strength weathered rock. Whilst the descriptions are accurate from a textural aspect, the material could as a whole be described as a silty Clay or Silt. On close inspection, the material described as sand generally consists of fine, hard agglomerates of clay/silt particles that texturally appear to be sand. The surface layer also tends to have had the more mobile clay particles leached out. These leached clays collect in lower lying areas and tend to have extremely high reactivity values.

In some areas, this "sandy" layer also behaves as a silt, this can result in some problems with compaction. The layer tends to dry out quickly and is very difficult to rewet to optimum.

The soil layers also have a gravel component. This is a secondary feature which sometimes has a benefit of lowering the soils reactivity, however it is generally difficult to test and also is not necessarily consistent in extent.

2.3.5 Groundwater

The boreholes were drilled using open hole auger techniques to their total depths and groundwater was not encountered in the boreholes at the time of the investigation.

It should be noted that groundwater may be present, however due to the relatively short time that observations were made during the drilling of the boreholes and the possible effect of smear on the sides of the boreholes it was not able to be identified.

It should also be noted that the level of groundwater may fluctuate due to seasonal variations and that localised seepage may occur during and following rainfall particularly along the fill/soil and soil/rock interfaces.

2.4 Laboratory Testing

Laboratory testing was carried out on selected samples retrieved from the site investigation program and included:-

- Shrink/Swell Index - to assess the reactivity of the subsurface material
- Swell Pressure - to assess the potential uplift effects resulting from moisture variation within the upper-level clays

The results of the laboratory testing are summarised in Table 3 with full laboratory certificates given in Appendix C.

TABLE 3 SUMMARY OF LABORATORY TESTING

BH No.	Depth (m)	Material Type	FMC (%)	Shrink Swell Index (%)	Swell Pressure (kPa)
BH2	0.6	Silty CLAY (CH)	24.6	2.7	NT
BH3	0.6	Silty CLAY (CH)	20.9	3.2	220

Notes:
1. NT = Not Tested.
2. FMC = Field Moisture Content (Swell sample)

3.0 SLOPE STABILITY

3.1 Assessment Methodology

The assessment of the stability of slopes at the site has utilised a Hazard and Risk Assessment approach. In this method, the potential stability hazards on the site are assessed using certain features/properties of the site (i.e. slope angle, ground water conditions, etc.). This method provides a ranking for each of the identified hazards.

Using this hazard ranking and based on assumed consequences, an assessment of risk can then be made using a risk matrix (refer Attachment E).

The general processes in assessment and management of risks associated with landslides are given in detail in the National Disaster Mitigation Program (NDMP), “Landslide Risk Management (LRM) Guidelines”, Practice Notes and Geoguidelines as published in the Australian Geomechanics Journal Volume 42 No. 1, March 2007.

The effects of earthquake on slope stability have not been included in this study.

This study has identified hazard ratings using a classification system consistent with the procedures detailed in the paper entitled “A Method of Zoning Landslide Hazards”, prepared by McGregor and Taylor. This method has been adopted on a wide range of projects and has proven to be robust.

3.2 Site Factors

A recent aerial photograph of the site (refer Drawing 1-24866-01) provides an overview of the existing site conditions (along with TRC contours in Drawing 1-24866-02). Selected site photographs are included in Appendices C and D. The principal site features are:-

- The study site is located at the south western corner of 1F Alderley St, Rangeville (Lot on Plan CC555/62).
- The lot is approximately 2ha in total area with the subject section of the site is approximately 6,000m^2.
- The subject section of the covers a near level platform that runs along the western boundary (southern section).
- The platform is some 85m in length (north/south) and 40 meters wide (east/west).
- A low retaining wall runs at or near the western boundary below the adjoining lot (8 Manooka Court), this may be on adjoining site.
- The platform is well grassed with several large trees on the platform and surrounding the site.

- The edge of the platform appears to be predominately fill with slope angles of between 25^{o} and 40^{o} measured during the site inspection.
- Outside the platform batters the natural slopes range from 25^{o} to 35^{o} to the east, 15^{o} to 20^{o} to the north and 25^{o} to 30^{o} to the south east.
- The ground surface rises to the west with a section what appears to be fill directly to the west.
- Significant sections of the outer batters are obviously made up of dumped fill with large rock fragments noted within and on the surface of the batter.
- An inspection below the batters noted numerous large cobble sized fragments that have rolled down the slope.
- A detailed mapping exercise was undertaken over the platform and batters and is included in Appendix C.

3.3 Evidence of Existing and Possible Instability

Existing Land Slips

Areas of slumping were noted on the outside edge of the platform. It should be noted that there is some evidence that this has also occurred in the past.

Significant cracking was noted around the edge of most of the platform. These cracks were large and extended for several metres from the crest. Some slumping of the surface was noted. This indicates active instability and slumping of the outer material.

Refer to Appendix C for mapping of zones and instability noted.

A large slip has occurred in the bank (fill) to the west of the site which appears to have significantly affected the existing sewer line.

Surface Scour

Some evidence of surface scour was noted onsite during the site walkover particularly on the outside batter of the platform.

Soil Creep

Slight leaning and/or bowed trunks of trees are generally considered to be indicative of soil creep, with the affected trees being progressively tilted by the slow movement of soil down the slope. The degree of tilting or bowing of these trees is considered to be a sign of relatively minor movements, and is typical for trees growing on such a steep slope. Rapid or gross movements of soil downslope would be likely to uproot or kill the trees.

There was no evidence of soil creep noted onsite during the time of the site walkover.

3.4 Risk Assessment – Stability

3.4.1 General

For the purposes of this study, the assessment of Risk for the site has been based on risk to property, where Risk is the product of Likelihood and Consequence.

This method is based on the method outlined in the "Practice Note Guidelines for Landslide Risk Management 2007" (PNGLRM), produced by the Australian Geomechanics Society, 2007.

The following assessment is also based on the premise that all works are undertaken in accordance with our recommendations.

3.4.2 Identification of Potential Stability Hazards on the Site

Based on the site walkover, a review of the site information and experience on similar sites, the following potential land stability hazards have been identified for the subject site:-

I. Slumping failure of the platform and existing batters
II. Slumping failure of the embankment to the west of the subject site
III. Rocks/boulders rolling down slope
IV. Shallow Landslide within the natural slopes

3.4.3 Likelihood Estimation

Methods of Assessment

The site was assessed and zoned using the method as outlined in MacGregor and Taylor (2001). The method has been adopted as a slope stability assessment tool and used in the Brisbane, Gold Coast and Redlands Shire regional stability assessments.

Evaluation of Likelihood Rating for Existing Overall Site

Once the relative frequency of slope instability for the site is calculated, MacGregor and Taylor (2001) suggest a likelihood rating as outlined in Table 4 below.

This rating has then been compared to the Likelihood Descriptor from Appendix C of "Practice Note Guidelines for Landslides Risk Management (PNGLRM) (2007c)".

TABLE 4 LIKELIHOOD RATING

MacGregor and Taylor (2001)		Landslide Risk Management (2007c) Appendix C	
Relative Frequency	**Likelihood Rating**	**Likelihood Descriptor**	**Adopted Indicative Value of Annual Probability**
< 0.2	Very Low	Barely Credible	10^{-6}
0.2 to 0.6	Low	Rare to Unlikely	10^{-5} to 10^{-4}
0.6 to 2.0	Moderate	Unlikely to Possible	10^{-4} to 10^{-3}
2.0 to 6.0	High	Possible to Likely	10^{-3} to 10^{-2}
> 6.0	Very High	Almost Certain	10^{-1}
Notes:- 1. McGregor & Taylor (2001). 2. Likelihood adopted based on Landslide Risk Management (2007c), Appendix C.			

Assessment zones

The site has been divided into five zones with the likelihood of hazards occurring within each zone discussed below (refer Dwg 1-24866-03, Appendix H).

Zone A – Main platform area away from the crest

The existing platform is relatively level and based on existing vegetation appears to have been in place for some time. The main potential hazards are:-

- Slumping of the outside batter not being addressed and the slump being allowed to migrate back into the platform. The platform zone does not extend to the crest of the platform. To allow for this, Zone B is extended back from the edge of the platform.
- Slumping of the embankment above (this has occurred). The platform zone does not extend to the rear boundary with that area being part of Zone B.

Based on the designated zone and provided any failure with Zone B is addressed and not allowed to migrate then this zone has been given a likelihood hazard rating of **Very Low,** which translates to a Likelihood Descriptor of **Barely Credible.** If the slumping in Zone B is not controlled the likelihood hazard rating will increase for this zone.

Zones B & C - Platform edge and fill batter

These zones cover the edge of the platform and the existing fill batters. This seems to cover the more recent filling which has occurred in the last five (or so) years. Following the recent rainfall event (and most likely well before that) instability has occurred in this zone.

Visual evidence is discussed in sections 2.3.2 and Appendix C and consisted of significant tension cracking parallel with the crest, slumping of the surface in these areas, slumps on the steep batters, scour of the faces and trees within the fill leaning downslope.

Therefore, this zone has been given a likelihood hazard rating of **Very High**, which translates to a Likelihood Descriptor of **Almost Certain.**

Zone D – Natural Slopes Unaffected by fill

The extent of this zone is based on air photo interpretation of the slope over time as well as the remnant vegetation and site observations. The most likely stability hazards in this area were assessed for their likelihood hazard rating based on site observations and the expected slope properties:-

- Rocks/boulders rolling down slope – likelihood hazard rating of **Moderate to High**, which translates to a Likelihood Descriptor of **Unlikely to Likely**
- Shallow Landslide within the natural slopes - likelihood hazard rating of **Moderate**, which translates to a Likelihood Descriptor of **Unlikely to Possible**

Zone E – Embankment to the west of the platform

This embankment appears to have been constructed as part of the house to the west of the site in 2016 (refer Section 2.3.2). A significant section of that embankment has slumped onto the subject site following the recent significant rainfall event.

Therefore, this zone has been given a likelihood hazard rating of **Very High**, which translates to a Likelihood Descriptor of **Almost Certain.**

3.4.4 Consequence Analysis

General

As part of the assessment of the risk of slope instability, the analysis of the consequence of any failure must also be considered.

The future development will comprise the construction of a residential dwelling as outlined in Section 1.2 of this report.

Consequence to Property

For the purposes of this study, a semi-qualitative measure of consequence to property will be adopted, as outlined in Appendix C of PNGLRM 2007c. If slope instability were to occur, the aspect of property most at risk would be the proposed dwelling.

Based on Appendix A of PNGLRM 2007c the residential structures at risk would be classified as Importance Level 2.

Considering the above information, the consequence to property for each of the hazards is as follows:-

- Zone A - **Major**
- Zone B & C - **Major**
- Zone D - **Insignificant**
- Zone E - **Medium**

3.4.5 Risk Determination and Evaluation - Property

Appendix C of "PNGLRM (2007)" outlines a method of assessing Risk to Property. The calculation of likelihood is based on the estimate outlined in Section 3.4.3 of this report. The consequence is based on the proposed development and the effects on the property of the specific hazards from Section 3.4.4.

The risk is then assessed based on the Risk Matrix shown in Attachment E. This is summarised in Table 5.

TABLE 5 SUMMARY OF RISK TO PROPERTY

Zone	Hazard Rating	Assessed Likelihood	Assessed Consequence	Assessed Risk to Property
A	Very Low	Barely Credible	Major	**Very Low**
B&C	Very High	Almost Certain	Major	**Very High**
D - Boulders	Moderate to High	Unlikely to Likely	Insignificant	**Very Low**
D - Landslides	Moderate	Unlikely to Possible	Insignificant	**Very Low to Low**
E	Very High	Almost Certain	Medium	**Very High**

Notes: Refer Appendix B of "Practice Note Guidelines for Landslides Risk Management (2007)".

3.5 Conclusions and Recommendations

3.5.1 Discussion and Conclusions

The assessed risk in different zones of the site is outlined in Table 5. The areas of major concern from a instability risk perspective are areas B&C and E. The following comments can be made with respect to the platform area:-

- The site appears to have been extensively filled over time.
- Filling of the site appears to have occurred in stages over a considerable period. Fill was identified in all the boreholes (although BH3 only encountered a thin surficial layer).

- There may be a central section of the site near BH3 and the two mature trees near BH3 where only limited filling (if any has occurred)
- The remainder of the platform has undergone significant filling.
- The most recent filling (say last five years) has been of variable quality/type and the method of filling appears to have consisted of end dumping of material either directly over the edge of the platform or subsequently pushed over the edge.
- There has been significant slumping of this material around the platform edge resulting in cracking and subsidence in areas.

The major issue with filling in the above way is the fill is generally poorly compacted and sorted. Planes of weakness develop in the fill mass which parallel the outside batter. This leads to movement of the fill mass. The peak strength is exceeded and the mass develops a lower residual strength and this results in failure of the mass. This failure unless remediated will progress into the slope resulting in a larger failure than initially observed.

The use of end dumping results in an over steepened batter particularly in the upper section of the slope with the slope having a factor of safety near unity which will eventually fail when ground water conditions result in increased pore water pressure and eventual failure.

3.5.2 Recommendations

It is strongly recommended that all uncontrolled fill be removed and where suitable re compacted in accordance with recommendations outlined in Section 4.1. At this stage given the very high risk of instability around the platform, the use of an alternative to the above (e.g., use of deep foundations and a fully suspended slab with the existing fill mass) will not be recommended.

A failure to the west of the platform was also noted. This appears to have occurred on an adjoining property in a newly constructed fill embankment. This has led to disruption of an existing sewer line and resulted in failed material slumping onto the subject property. At this stage this is likely to only effect the proposed access driveway to the west of the residence however if not repaired (including the non-failed section of the embankment), further failures may occur.

4.0 ENGINEERING ASSESSMENT

4.1 Civil Works

4.1.1 Trafficability and Site Preparation

At the time of the field investigation, trafficability was considered to be fair. Access over the site could be described as good although the presence of soft areas following rainfall and surface cracking adjacent to the edge of the platform didn't allow machinery access.

The fieldwork for this investigation was carried out following (and during) wet weather conditions with a small 4WD truck mounted drilling rig. However, as is the case on most construction sites, some problems may be anticipated during wet weather for even light weight 4WD vehicles.

The contractor should fully inform himself of the ground conditions on site prior to commencement of earthworks. This requirement should be explicit in any earthworks specifications or contract.

The soils on site are sensitive to repetitive vehicle loading and water (i.e., they will lose strength through repetitive vehicle loading or if they become overly moist or wet). Further, seepage may also result in a subsequent loss of strength. This may limit trafficability and create difficulties for earthworks operations. This situation would be more pronounced if rainfall followed initial clearing, stripping and grubbing.

Problems may also arise from disturbance of the upper-level soil fabric with removal of vegetation and existing structures. Depressions could be formed resulting in water traps and potential softening of adjacent and underlying soils.

It is recommended that after stripping, clearing and grubbing, the exposed surface in the construction area be proof rolled (where appropriate) to assist in identifying weak areas and to improve trafficability. In areas of cut, proof rolling may be deferred until after the cut operation.

An important aspect of maintaining trafficability is seepage/drainage control.

Maintaining adequate drainage conditions is also essential. It should be ensured that runoff is diverted away from the construction area to prevent ponding of water. In addition, the construction area should be "sealed" at the completion of each day and in the event of rain.

Potential trafficability problems with this site should not be underestimated. The site will very quickly become untrafficable if appropriate seepage and drainage control measures, along with construction practices appropriate for site conditions, are not maintained.

Further, Soil Surveys Engineering offers a pre-construction meeting service. The primary objective of this service is to allow the Contractor to demonstrate to the Principal and Project Manager that they have a complete understanding of the earthwork challenges/risks associated with this site (i.e., trafficability conditions, treatment of silty/clayey sands, use of in-situ soils as structural fill, etc.) and that they have made appropriate cost and time allowances. Excavation of trial pits by the preferred contractor (just prior to commission) should form part of this exercise. Our standard rates will apply for this pre-construction meeting service. **Please note that this pre-construction meeting service is considered essential for this project.**

Working Platforms for Tracked Plant and Heavy Construction Vehicles

The scope of Soil Surveys Engineering's study **DOES NOT** include the design of a working platform for heavy construction vehicles or heavy tracked plant. If such platforms are required to be constructed on the site, general comments with respect to earthworks are included in Section 4.1.2 to allow for the preparation of costings for the project.

Detailed design of a working platform should be carried out considering the operation of actual machinery proposed to be used and the areas of work. This is particularly important when considering the use of **heavy** piling rigs and **heavy** cranes - the piling/crane contractor should be consulted regarding their requirements.

Demolition and Clearing Activities

Extreme care should be exercised during the demolition/clearing phase to ensure that excessive subgrade disturbance is not caused during removal of existing pavements, services, etc.

4.1.2 Earthworks

General

It is understood that the original proposed earthworks may have consisted of cuts of up to 3.0m in depth however based on the recommendations outlined in Section 3.5, a more extensive earthworks program will be required.

Earthwork procedures should be carried out in a responsible manner in accordance with AS 3798-2007 'Guidelines on Earthworks for Commercial and Residential Developments'. It is recommended that the earthworks contractor make themselves familiar with site conditions.

Subgrade Preparation Procedures

Subgrade preparation procedures should include the following:-

- Clearing, stripping and grubbing should be carried out in areas subject to earthworks. Also, all soils containing organic matter should be stripped from the construction area. This material is not considered suitable for use as structural fill.
- In construction areas where fill is to be placed, the existing ground surface should be proof rolled (where appropriate) under the supervision of Soil Surveys Engineering in accordance with methods and equipment as per Clause 5.5 of AS 3798-2007. In areas of cut, proof rolling may be deferred until after the cut operation. Areas demonstrating excessive movement should be treated (dried and recompacted) or removed and replaced with compacted fill, particularly loose surface clayey sands, should be compacted to the appropriate requirements. Soft, wet clays, should they be encountered, should preferably be removed. In areas of cut, proof rolling may be deferred until after the cut operation.
- Depressions formed by the removal of vegetation, existing structures, underground elements etc. should have all disturbed weakened soil cleaned out and be backfilled with compacted select material.
- Any fill material encountered should be considered uncontrolled and requiring treatment (i.e., excavate/condition/replace/compact as required). Please note that treatment standards may vary subject to slab on ground floor support requirements.
- Where fill is to be placed on sloping ground, particular care should be taken with respect to benching of the subgrade such that filling is carried out on a level, refer Section 2(i) and 2(j) of AS 3798-2007.
- Sloping ground, etc. should be benched to "key in" fill material and optimise compaction. The benches should slope back at 1V:10H and be at least 0.5m wide. Wider benches to accommodate the width of the roller may need to be adopted in some situations. Figure 2 refers.

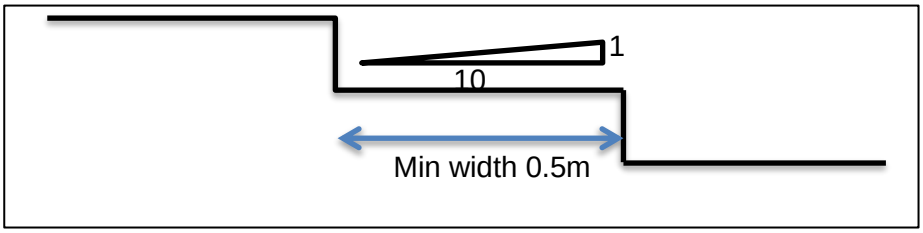


FIGURE 2

- Please note that the onsite soils are very sensitive to water and will lose strength if they become wet. Should these soils be wet at time of construction, significant works to treat these soils would be required.

Material Usage and Fill

Natural Soils

- The in-situ soils were described as highly reactive and whilst it may be able to be used for structural fill (provided they are free of organic and deleterious material) this material potentially could have a significant effect on the site reactivity. It should be noted that where reactive soils are recompacted there is the potential for over compaction of the soil to alter their reactivity. There is the potential for the reuse of this material in the lower levels of any filled area, where it affects a site-on-site reactivity would be significantly reduced.
- Use of the highly reactive clay soils may be considered with very close control on moisture content during placement and compaction. To minimise the potential for swelling and shrinkage movement a moisture content within the range of OMC -1% to OMC +2% is recommended. Foundation design must reflect the use of the potentially reactive clays if they are used as structural fill.
- Some soils may require conditioning to dry out/wet up, otherwise difficulties could be experienced in handling and achieving adequate compaction. This may require spreading, conditioning (i.e., drying/wetting up) and mixing to achieve a uniform improvement in the materials.

Existing Fill

- The existing fill has been described as uncontrolled and it is therefore suggested that this be completely excavated.
- Fill material, excluding silty/clayey sands, may be reused in the construction where Fill Specifications (see below) are met.

Imported Fill

- Imported select fill, if required for filling in structural areas/if needed to make up earthworks deficiencies, should conform to the minimum specification as set out below:-
  - Soaked CBR — Minimum of 10%
  - Liquid Limit — <45%
  - Plasticity Index — <15%
  - Maximum Aggregate Size — <75mm
  - Passing 19mm Sieve — 80%, minimum
  - Passing 0.075mm Sieve — 20%, minimum
  - Shrink/Swell Index — Maximum of 1.0%
- Typical material that would conform to the above quality limits would be a good to fair quality overburden type material; such material would have a soaked CBR value of approximately 7% to 10%.
- The requirement to specify a minimum soaked CBR value is dependent on pavement design issues; this matter should be referred to the Civil Engineer.

- Pavement gravels should comply with the Local Council quality specifications for base, sub-base and blanket materials.

Compaction Procedures and Specifications

General filling

- Fill placed should be compacted in layers (approximately 250mm loose thickness) to a density not less than 98% of maximum dry density in accordance with AS 1298 Test Series 5 (Standard Compaction).
- Field density testing should be carried out to check the standard of compaction achieved and the placement moisture content. The frequency and extent of testing should be as per guidelines in AS 3798-2007, Section 8.0.
- The select fill material should be compacted in layers not exceeding 250 mm, loose thickness. However, layer thicknesses will be dependent on the compaction plant type and size, use of vibration, material type and condition. Final maximum placement layer thicknesses will need to be determined when compaction plant as well as material type and conditions are known.
- Provided the placement moisture content of the imported fill or select in-situ material approximates the optimum moisture content for compaction, suitable compaction should be achievable using typical compaction machinery, i.e., say a 5t-10t vibrating sheepsfoot roller or 25t-30t sheepsfoot compactor.
- Other comparable compaction specifications may be adopted for earthwork procedures; however, Soil Surveys Engineering Pty. Limited should be consulted prior to site works to confirm.

Service Trenches

- Backfilling for service trenches etc. should use good quality material free of organic and deleterious matter, either select fill won from site or imported fill. The backfill should be placed in uniform layers over the full width of the excavations with the layers not exceeding 200mm loose thickness using wheeled plant and 100 mm loose thickness using vibrating plates. The backfill material should be compacted to the specifications outlined above for in-situ or imported cohesive material.

Behind retaining walls

- Care should be exercised when backfilling retaining walls. Compaction against the wall could increase the long-term lateral pressure on the wall in excess of design lateral pressures.

Fill batters

- **Fill batters should be overfilled and cut-back to design batter angles (refer to AS3798-2007 Section 6.2.4).**

Trenching

Shoring of deep trench excavations is recommended. Suitable precautions to satisfy Health & Safety requirements must be adopted. Construction procedures (i.e., operation of plant, storage of materials, etc.) should also consider the nature of the site soils.

4.1.3 Earthworks Supervision and Certification

Engineering supervision of the earthworks operations by Soil Surveys Engineering Pty Limited is recommended.

Following production of AS 3798-2007, the terms "Level 1 and 2 Supervision" have been adopted in earthworks specifications to describe what could also be termed Engineering Supervision. Whilst there is no particular problem with using these terms, there does not seem to be wide agreement as to what Level 1 or 2 Supervision actually means or entails.

It should be noted that Level 1 fill may not be suitable as a founding layer and it is recommended that any filling when the intention is for the fill to be used as a founding layer be supervised and certified for a particular minimum bearing capacity by a RPEQ.

Regardless of terminology, it should be made clear in any earthworks specification as to what is actually required in terms of certification. It is recommended that the following objectives (as a minimum) be incorporated into the earthworks specification:-

- Engineering certification that all general earthworks operations (i.e., stripping, proof rolling of subgrade, subgrade treatment, etc.) have been carried out in accordance with the earthworks specification.
- Engineering certification that fills has been placed and compacted to the required minimum density in accordance with the earthworks specification.
- Engineering certification that embankment filling has been undertaken in accordance with AS3798-2007 Section 6.2.4 i.e., overfilled and cut back to the final profile.
- If required, engineering certification that the controlled fill is suitable for support of conventional high-level footings and has a recommended minimum bearing capacity (Note the removal of all uncontrolled fill would be a requirement of placement of footings in any engineered fill). Refer to Section 4.1.4.
- If required, engineering certification that the controlled fill material is suitable to support a conventional slab on ground floor.
- Engineering certification that the quality of any imported fill complies with the earthworks specification requirements.
- Engineering certification that the stability of cut/fill batters and trenches is adequate.

Engineering certification should be provided by a Registered Professional Engineer of Queensland.

Please note that Soil Surveys Engineering in our role as Earthworks Supervisor (under normal circumstances) cannot authorise variations to the contract or the use of provisional items. If the Contractor considers that any recommendation/instruction issued by Soil Surveys Engineering is a variation to the contract, the Contractor should advise the Superintendent and obtain written approval before proceeding with Soil Surveys Engineering's recommendation/instruction.

4.1.4 Definitions

The following terms have been used in this section:-

- Engineered (certified) Fill – Fill placed in a controlled manner and certified by a RPEQ to the following:-
    - Confirmation that high level footings can found in the fill.
    - Provide a design allowable bearing capacity for the footings
    - Confirm that all the works have been undertaken in accordance with AS3798 including the requirements outlined in 4.1.3 of this report especially removal of existing fill and recommendations with respect to filling on slopes.
- Controlled fill – fill placed in a controlled manner.

Note: A "Level 1 report" may not comply with the definition of Engineered Fill.

4.1.5 Excavation Characteristics

General

It is anticipated that excavations will consist of the following:-

- Bulk Cuts - for site stripping and excavation to create building platforms and carpark/driveway areas.
- Trenching - for high level footings and underground services.
- Drilling - for bored pier foundations.

Excavatability Comments

Based on geotechnical knowledge of excavations/earthworks on projects in the local area and the findings of the investigation, the following comments can be made on excavation characteristics:-

- Bulk Works
    - Excavations in the soils and upper 0.5m to 1.0m, or so, of the very low to low strength weathered rock to 'TC' bit refusal depth (refer Table 2) should be within the capacity of a medium size backhoe (Case 580 or similar) or small excavator (e.g., 12t - 15t).
    - Below these levels (i.e., 'TC' bit refusal depths noted in Table 2), a larger excavator would be required for excavation further into the weathered rock (where required).
- Trenching
    - Trench excavations in the soils and upper 0.5m to 1.0m, or so, of the very low to low strength weathered rock to 'TC' bit refusal depth (refer Table 2) should be within the capacity of a medium size backhoe (Case 580 or similar) or small excavator (e.g., 12t - 15t).
    - Below these levels (i.e., 'TC' bit refusal depths noted in Table 2), a larger excavator would be required for excavation further into the medium to high strength weathered rock (where required).

- Bored Piers
    - It should be noted that the ability to drill piers in the weathered rock material is not only dependent on material characteristics but also the type (power and size) of the bored pier drilling rig, drilling teeth, size of pier, etc. It is recommended that the drilling contractors be consulted on this matter.
    - It is important that the drilling contractor have a 'clean-out' bucket to ensure adequate cleaning of the pier bases if hand cleaning of the bases is not possible.
    - The existing contains large fragments of rock which may make installation of bored piers difficult or not possible.

4.1.6 Batters

General

Whilst the initial development suggested that cut batters of up to 3.0m may be required, the subsequent recommendations as outlined in Section 3.5 may result in higher fill batters.

Batter Angles

Maximum batter angles for different material types are outlined in Table 6 for **un-surcharged** cut and fill batters less than 3m high on the site.

TABLE 6 DESIGN MAXIMUM BATTER ANGLES (Slopes up to 3m high)

Material	Short Term	Long Term
Existing Fill	26° (1V:2H)	15° (1V:4H)
Future Controlled Fill[1]	35° (1V:1.5H)	18° (1V:3H)
Clay Soils	45° (1V:1H)	26° (1V:2H)
Weathered Rock XW [3]	45° (1V:1H)	26° (1V:2H)

Notes:-
1. Assumes earthworks are undertaken as per section 3.1 and the following section (Fill Batters) is undertaken.
2. These values assume no seepage. If seepage is present the recommended angles would need to be significantly reduced or the use of dewatering considered.
3. Subject to inspection by an experienced geotechnical engineer/engineering geologist.

Where surcharges (e.g., footings, live loads, etc.) are located within H (height of batter) of the top of the batter, then some reduction in design angle will occur.

Steeper batters are possible with suitable surface protection such as stone pitching, etc. or by use of retaining structures (temporary and permanent).

Note values above are maximum values in the case of fill and soils. Flatter angles may be considered for ease of maintenance.

Regardless of the design, it is important that all cuts be inspected (progressively as construction proceeds) by an experienced Geotechnical Engineer/Engineering Geologist.

Fill Batters

Fill batter slopes are dependent on suitable compaction being achieved. It is recommended that all fill batters are formed by overfilling past the line of the final face and then the batter cut back (Figure 3) refer to AS3798-2007 Section 6.2.4. This allows compaction equipment to adequately

compact the entire fill batter. All fill batters should consider the possible effects of scour and water runoff.

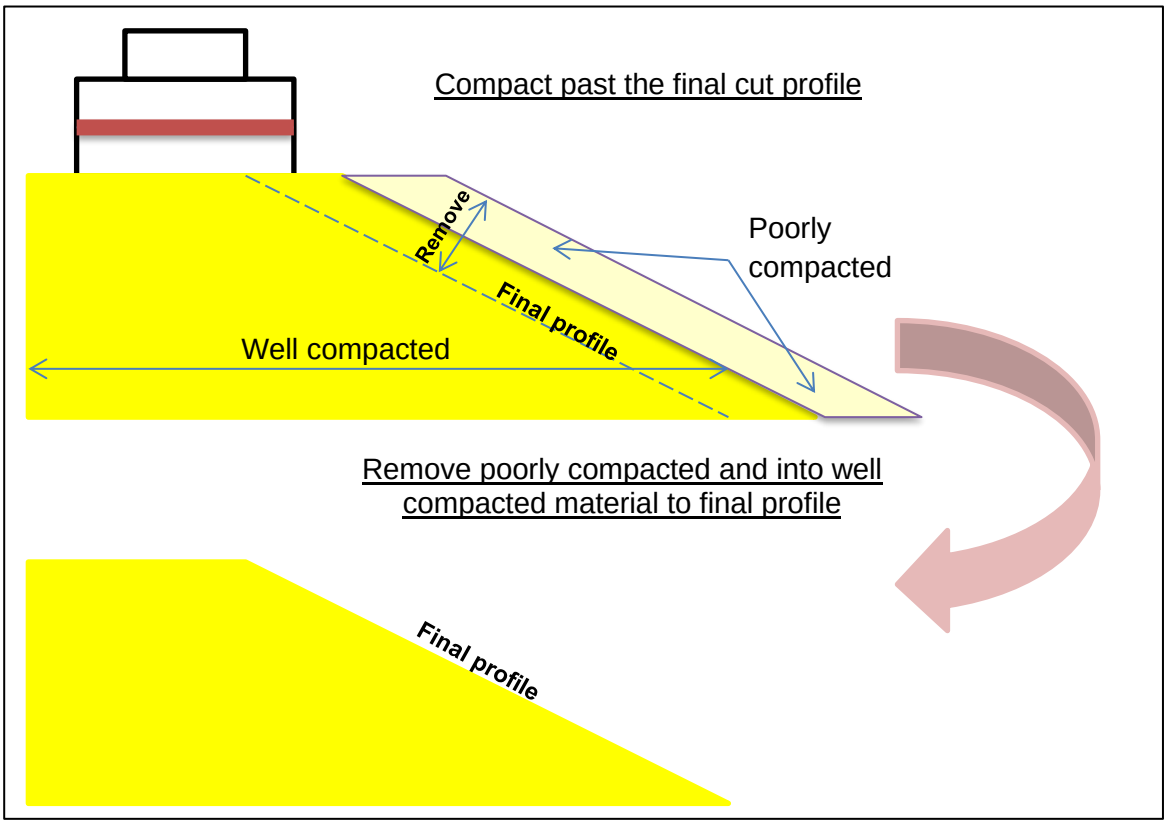


FIGURE 3

Scour Protection and Erosion Control

It is essential that permanent batters be suitably protected from erosion and scour by appropriate drainage and the establishment of ground cover and shrubs, etc. Pavement runoff should not be allowed to discharge directly across the batters without suitable scour protection.

If runoff velocities are sufficiently high, following cutting and construction of batters, erosion of the exposed soil and fractured rock could occur.

Top soiling and seeding or hydromulching on cut areas steeper than 1:5 (11 degrees) is suggested so that protection could be provided until such time as the grass cover is established.

Drain outlets would also need to consider the effects of scouring runoff water. These will need to be concrete lined near each entry and exit, with grassing further out.

It is suggested that top soiling and seeding or hydromulching also be used on all fill batters, regardless of slope, to provide protection to the slopes until permanent grass cover is established. The seed selection for the hydromulch will depend on the season when placed, but in any case, should include a rapid growing seasonal variety that could rapidly establish itself until such time as the regular grass variety is established.

It is recommended that where possible all batters have surface and subsurface drains installed above and below the slope so that water is collected and directed away from structures. This is particularly important when lots are located below the road level.

4.2 Wastewater Disposal

Appropriate drainage provisions are essential in any development. Adequate subsoil and surface drainage should also be incorporated in the batters and access driveway construction, as well as any retaining wall construction.

Wastewater from the proposed future structures should be piped to storage tanks or an approved Council discharge location. **Wastewater should not be disposed of on site without consideration of slope stability taken into account.**

Other usual treatment options associated with Good Hillside Practice, as outlined in Attachment I of this report should also be adopted. Some of these are implicit or assumed by the analysis. For example, provision of surface water drainage measures (**such as a lined drain across the top of retaining walls and batters**) and properly engineered retaining walls (where adopted). Such treatment options should be clearly stated as part of the risk management requirements.

4.3 Continued Maintenance

As with all developments, continued maintenance of the proposed site works is essential to maintain the assessed risks outlined in this report. Maintenance should include but not be limited to the following:-

- Maintaining clear drainage paths for surface water flows.
- Maintaining and promoting revegetation of exposed batter areas.
- Regular maintenance checks to ensure any damage is repaired in a timely manner.

4.4 Building Foundations

4.4.1 Site Classification as per AS 2870-2011

General

A site classification, in accordance with AS 2870 'Residential Slabs and Footings' (it is recommended that the reader satisfy themselves that the use of AS 2870 is applicable for the proposed design) has been carried out with the following information:-

- Subsurface profile
    - Up to 3.5m of fill in BH02
    - Residual soils over weathered rock
- Proposed earthworks
    - Cuts of up to 3.0m
    - Fill depths to be confirmed
- Soil Moisture Model
    - A zone of moisture variation of 2.3m
    - A crack zone of 1.15m
    - ΔpF = 1.2
- Laboratory test results
    - Refer to Section 2.4 of this report and attached certificates

Site Classification

Based on the site investigation the site has been assessed as being a reactive site according to AS 2870-2011 Section 1.8.44.

According to AS 2870-2011 Clause 2.1.3 the site has been designated Class 'P' due to:-

- The site being potentially subject to moisture changes due to site conditions more severe than normal site conditions or other factors resulting in foundation movement beyond the reactive soil movements resulting from moisture changes due to the normal site conditions refer AS 2870-2011 Clause 1.3.2 (i.e., Clause 1.3.3 abnormal moisture conditions). Abnormal moisture conditions can occur on reactive site when there is:-
    - removal of trees prior to construction,
    - presence of trees on the building site or adjacent site,
    - unusual moisture conditions caused by drains, channels, ponds, dams, swimming pools, effluent disposal areas of tanks, which are to be maintained or removed from the site.
- The bearing capacity is less than that specified in AS 2870-2011 Clause 2.4.5;
- Excessive foundation settlement may occur due to the design loading on the foundations;
- The presence of uncontrolled or controlled fill as defined in AS 2870-2011 Clause 2.5.3 i.e., in excess of 0.4m in depth;
- The site may be subject to mine subsidence, landslip, collapse activity or coastal erosion

The above site classification has been assessed based on the provided/assumed earthworks. Should the extent of earthworks change, the site classification may need to be reassessed by Soil Surveys Engineering to confirm it has not changed.

It should also be noted that the site classification provided above applies to the design of the structural foundation system. Further comments are provided in Section 4.4.2.

Should a site classification with respect to plumbing and sanitary drainage be required please refer to the Section 4.4.3.

4.4.2 Further Comments Regarding Foundations

Foundation Design

As noted above this site has been classified as ‘P’, however, if the site was classified by the soils reactivity alone, based on the site investigation results, laboratory testing and adopting the **EXISTING SURFACE**, a ground surface movement (ys) of 55mm (maximum) has been calculated, i.e., 'H1' Class site.

The recommendation above may change if any:-

- Filling in excess of 0.40m occurs on the site
- Cuts in excess of 0.50m occurs on the site

The above is based on the existing site. Given the potential for additional earthworks to be undertaken on the site, it is strongly recommended that the above be reassessed once these earthworks have been completed.

The above calculation has also been based on the recommendations outlined in Sections 4.1 'Civil Works' and 4.4.12 'Site Management' being complied with. Where these recommendations cannot be met then the ys value and classification will need to be reviewed.

It should also be noted that the methodology adopted for determination of the site classification assumes the structure has performance requirements similar to domestic type construction.

Effect of Reactivity on Services

It should be noted that a site classification of 'H1' was assessed for this site as such the detailing of services at the edge of the buildings should be carefully considered to take into effect the potential for movement differentials at the edges of the structure and the potential effect on service lines. Reference to Section 5.5.4 of AS 2870-2011 is recommended.

The effect of this possible movement should also be considered in points of egress and ingress to the structure to ensure that differential movement does not result in a safety hazard.

Trees

As noted in AS 2870-2011 Section 1.3.3, if existing trees are left in place (or subsequently planted) 'close' to future building locations, significantly greater movements than those nominated above may occur due to an increased soil suction magnitude and depth. Also, if trees proposed to be removed are not removed well in advance of construction, significantly greater shrink-swell movements could also occur on 'wetting up' following tree removal.

Further, AS 2870-2011 Appendix H, includes an informative section on the design of footings for trees and in particular the calculations of the maximum potential surface movement due to the tree-induced suction change (that is in addition to the normal design suction profile). The Designer should refer to AS 2870-2011 for detailed discussion on this matter.

Development of Abnormal Soil Conditions

It is recommended that design works for the proposed development take into account the long term effect of any design elements on the subsurface moisture conditions under and around the structure.

These design works should consider aspects of the design that may contribute to the development of abnormal moisture conditions i.e.:-

- Site drainage
- Gardens and landscaping
- Future planting of trees and shrubs
- Services and repair of leaks

The designer is directed to AS 2870-2011 Appendix B and Section 4.4.12 'Site Management' of this report which outlines measures that should be considered.

Settlement of Bulk Filling

Where bulk filling is placed under 'controlled' conditions, there is potential for 'creep' settlement of the filling material as the filling settles over a period of years due to the self-weight of the fill. Estimates of bulk filling creep settlement under self-weight will vary in accordance with the depth and quality of the filling. Given the variation of fill encountered on site, this may result in differential settlements.

Potential movements of 'controlled' bulk filling are estimated to be in the order of 0.1% to 0.5% of the total fill thickness i.e. for maximum encountered fill depths = 5mm to 25mm with an additional settlement of another 25% due to slab loads. This range should be considered for sensitivity assessment and is in addition to any movement due to reactivity of the fill (or in the case of the south western corner the existing subsurface profile).

The creep settlement estimates of both filling under self-weight must be added to the settlement estimates of any footings founded in the controlled filling.

4.4.3 Site Classification for the Purpose of Sanitary Drainage

It should be noted that the soil classification to AS 2870 for the purpose of design of plumbing and sanitary drainage systems (Form 1 Section 5) is 'H1'. Reference to Section 5.6.4 of AS 2870-2011 is recommended.

As the site has been classified as 'H1' an articulation report will be required. We would recommend that a suitably qualified person be engaged to complete this for submission.

4.4.4 Hazard factor and Site Sub-soil Class as per AS 1170.4-2007

It is recommended that the following coefficients be adopted for the design of the structure on this site according to AS 1170.4-2007 Structural design actions Part 4: Earthquake actions in Australia :-

- Hazard Design Factor (Z) = 0.08 - Figure 3.2 (F)
- Site sub-soil class, depending on founding level for the main structure shall be (Refer Section 4 of code): Class C_e – Shallow Soils Site

4.4.5 Settlement

A preliminary assessment of likely settlements of footings is required. The assessment of settlement depends upon the following factors:-

- The properties of the subsurface profile at and below the footings
- The type of footings adopted on the site
- The size of the footing
- The applied loads

Given the supplied information with respect to the proposed structure (proposed earthworks and design loads) and the results of the geotechnical investigation; provided the recommendations contained in this report are followed it is expected that the total settlement of the footings to be <10mm. It should be noted that the effects of closely spaced footings have not been taken into

account and this may need to be reviewed once the footing layout and applied loads have been finalised.

4.4.6 Foundation Options

The results of the drilling and site observations to date suggest that high level foundations may only be possible in a small portion of the development. The remainder is underlain by a significant thickness of uncontrolled fill which has the potential to undergo slope failure. As such the recommendations made in this report is to completely remove and replace with more suitable fill placed in the correct manner.

The existing fill also appears to contain (in part at least) significant amounts of over sized material. This would make the installation of deep foundations very difficult if not impossible. The additional benefit of replacing the fill would be to remove these oversize fragments.

On the basis of these recommendations the use of a combination high-level/deep foundation system dimensioned for the loads and the bearing capacity of the founding material would generally be acceptable for the proposed development once the existing fill had been suitably replaced.

It should be noted that the use of the same type of footing system founding in similar material is recommended to minimise the potential for differential settlement over the structure.

4.4.7 High Level Footings

It should be noted that the use of high-level footings in highly reactive clay soils may result in shrink or swell movements of the footings adopted for the structure.

The amount of movement will depend upon:-

- the depth and size of footings,
- the material parameters of the founding layer,
- the potential for change in the moisture regime around and under the footings (i.e. in general the shallower the footing the greater the potential).

Where high level footings are adopted, our recommendation is that all footings:-

- Should be founded at least 200mm into natural stiff or better CLAYS or WEATHERED ROCK.
- Found at least (assuming masonry veneer construction):-
    - 500mm below platform level for strip footings
    - 1,000mm below platform level for pad footings
- Not be founded in Topsoil, FILL, soft or firm CLAYS.
- All footings be founded in similar stratum material.

Footings may be dimensioned for an allowable bearing pressure as outlined in Table 7.

TABLE 7 ALLOWABLE BEARING CAPACITIES FOR HIGH LEVEL FOOTINGS

Material		Allowable Bearing Capacity (kPa)[2]	
		Strip Footing	Pad Footing
Fill	- Uncontrolled	NR	NR
	- Controlled[3]	100	125
	- Existing	NR	NR
Clay	- Stiff	100	125
	- Very Stiff	200	250
	- Hard	350	425
Weathered Rock	- Above 'TC' Bit Refusal	500	550
	- Below 'TC' Bit Refusal	650	750

Notes:
1. NR = Not Recommended.
2. To be confirmed by inspection.
3. To be confirmed by the earthworks certifying engineer (refer Section 4.1.3)

Where necessary, footings deeper than the values indicated above may be made up with mass concrete poured to the underside of the footings, or alternatively, footings may be constructed over mass concrete filled, backhoe excavated pedestals.

4.4.8 Deep Foundations

General

A deep foundation system utilizing bored piers/screw piles founding:-

- into the top of the weathered rock or
- to a suitable founding depth based on loads and soil capacity or
- below the base of services

could be considered are recommended.

Ultimate Strength Design

The design of a deep foundation system should consider the following:-

- Compressional capacity i.e. base bearing and skin friction design values
- Tensional capacity and effects i.e. potential uplift due to expansive clays
- Lateral capacity of the piles
- Design considerations
- Construction considerations

Compressional Capacity

It is recommended that the deep foundation system on this project be designed in accordance with AS 2159-2009 'Piling - Design and Installation'. This code uses the limit state design method.

In the limit state design method the following must be taken into account:-

- Considering limit state analysis (AS 2159-2009), the design geotechnical strength $R_{d,g}$ is calculated by multiplying the ultimate geotechnical strength $R_{d,ug}$ by the geotechnical strength reduction factor ϕ_g, i.e.

$$R_{dg} = R_{d,ug}\ \phi_g \qquad \textbf{AS 2159-2009 1.3.7}$$

- Ultimate strength - the design of a single pile or a pile group must be such that both the design geotechnical strength ($R_{d,g}$) and the structural strength ($R_{d,s}$) are greater than or equal to the Design action effect (E_d) i.e.

$$R_{d,g} \geq E_d \text{ and } R_{d,s} \geq E_d \quad \textbf{AS 2159-2009 3.2.2 (d)}$$

- Serviceability - Single piles and pile groups shall be designed for serviceability by controlling or limiting pile movements.
- Durability - This is outlined in Section 6 of AS 2159-2009 and will not be discussed any further here.
- Any other factors that need to be considered i.e. stability, scour, fatigue, cyclic loading or seismic actions - As we are not aware that any of these factors will affect the pile design they will not be considered any further.

The design geotechnical strength ($R_{d,g}$) can be calculated as the design ultimate geotechnical strength ($R_{d,ug}$) multiplied by the geotechnical strength reduction factor (ϕ_g). The ultimate geotechnical strength parameters for the materials encountered on the site are outlined in Table 8.

TABLE 8 ULTIMATE GEOTECHNICAL STRENGTH PARAMETERS ($R_{d,ug}$)

Material		Base Bearing (kPa)		Skin Friction (kPa)
		L<4D	L>4D	
Fill		NR	NR	NC
Clay	- Stiff	300	450	15
	- Very Stiff	600	900	30
	- Hard	900	1350	45
Rock	- Above 'TC' Bit Refusal	1500	2200	60
	- Below 'TC' Bit Refusal	3000		100

Notes:
1. NR - Not Recommended; NC - Not considered in skin friction calculations.
2. Recommended geotechnical strength reduction factor (ϕ_g) - Refer AS 2159-2009 - for a moderate risk category and a low redundancy system a value of 0.48 is recommended. This should be confirmed by designer.
3. Considering limit state analysis (AS 2159-2009), the design geotechnical strength $R_{d,g}$ is calculated by multiplying the ultimate geotechnical strength $R_{d,ug}$ by the geotechnical strength reduction factor ϕ_g, i.e. $R_{d,g} = R_{d,ug} \times \phi_g$.
4. Should a "working stress" approach be adopted, a minimum factor of safety of 3.0 on base and 2.0 on skin friction is recommended.
5. Ignore top 2.3m of clay profile in skin friction calculations; shrinkage of the upper-level clays may occur.
6. The above parameters are for single piers. If piers are spaced at closer than three diameters, a reduction factor (Group Efficiency Ratio) may apply.
7. All values to be confirmed by inspection.

Tensional Effects - Potential Uplift Due to Swelling Soils

General

It is recommended that individual piers be assessed for uplift capacity as well as the overall pier capacity. The following sections of the Piling Code AS 2159-2009 should be considered:-

Section 3 Design Requirements and Procedures

A review of Section 3 of the piling code indicates that in Section 3.3 ACTIONS AND COMBINATIONS FOR STRENGTH AND SERVICEABILITY DESIGN that:-

"Where a pile is situated in swelling soils, such as reactive clays or those subjected to frost action, allowance shall be made for the compressive and tensile actions (F_{ex}) that may be developed in the pile." AS 2159-2009 3.3.1.2(b).

Section 3.3.2 Load combinations for strength design and where the actions are induced by ground movement, they shall be computed as below:-

- Structural Design – AS 2159-2009 3.3.2(b)(i)(B) - compressive and tensile actions – refer Section 5.
- Geotechnical Design – AS 2159-2009 3.3.2(b)(ii) - "Loads induced by soil movement shall not be taken into account"

Section 4 Geotechnical Design

In the case of geotechnical design, the effects of swelling soils are mentioned in several sections of AS 2159-2009 Section 4 Geotechnical Design. The designer is directed to review the following sections with respect to their design:-

- 4.4.6 Soil Swelling
- 4.6.4 Pile heave due to soil swelling

Section 5 Structural Design

In the case of structural design, the effect of swelling soils should be considered as part of the structural design of the foundation and as noted above:-

$$S_u = 1.5F_{es}$$ **AS 2159-2009 3.3.2 (b)(i)(B)**

Where Su is the "Ultimate value of various actions appropriate for particular combinations" AS 2159-2009 Table 1.1 (refer also AS 1170) and Fes is the tensile (in this case) actions in the pile induced by vertical ground movements.

F_{es} can be calculated using the "Rational Pier Formula" as

$$F_{es} = 0.15 * SP * A_{mv}$$

- SP = Assessed Swell Pressure of soil (kPa)
- A_{mv} = Surface area of pile in intimate contact with soil in the zone affected by swelling (i.e. above 2.3m)

Based on testing carried out on samples from the site, for design purposes SP = 220kPa.

Uplift may be reduced by constructing a separation e.g. sleeving between the pile shaft and the soil in the unstable zone.

4.4.9 Slab on Ground

General

The expected subgrade following the required earthworks is controlled or engineered fill.

Field and laboratory test results indicate that the existing natural soils, along with any controlled fill, are suitable for slab on ground construction provided that earthworks are carried out in accordance with recommendations in Section 4.1.

However, the existing fill is not considered to be suitable in its current state (certification status) to support slab on ground floors. Should earthworks operations not result in a subgrade suitable for slab support, the slab on ground floor should be supported on pedestals/piers founding in competent natural soils.

Options

Slab on ground floor options include:-

- Stiffened raft - A stiffened raft comprises perimeter and internal beams and is designed to accommodate potential ground surface movements.
- Fully suspended slab - A fully suspended slab system involves the support of the slab on piers with provision of a void beneath the slab to accommodate potential reactive clay movement, span over service trenches or areas above retaining walls to limit additional surcharges on the walls. The design of piers should be in accordance with Section 4.4.8.

4.4.10 Design Considerations

Articulation

Given the potentially reactive nature of the subsurface material, the importance of architectural and structural detailing cannot be over-emphasised. It is essential that the building be suitably articulated/detailed to allow for ground surface movement. In addition, the overall design of the building and surrounds should consider the likely ground surface movement and site classification, with the objective being to maintain a stable moisture environment.

It is recommended that any masonry walls be articulated. This articulation may be achieved by the use of full height (footings to eaves) openings or vertical construction joints at regular intervals. Guidelines on articulation are contained in the Cement and Concrete Association's Technical Note 61, 'Articulated Walling'.

Underground Services/Retaining Walls

Where footings are located adjacent to underground services or retaining walls, the footings should extend to base a minimum of 200mm below the trench/wall base level for a distance of 1.0m out from the trench/wall. Beyond 1.0m the footings should be taken a minimum of 200mm below an imaginary line drawn up at 45° from the trench/wall base level. Figure 4 refers.

These requirements do not override minimum footing levels.

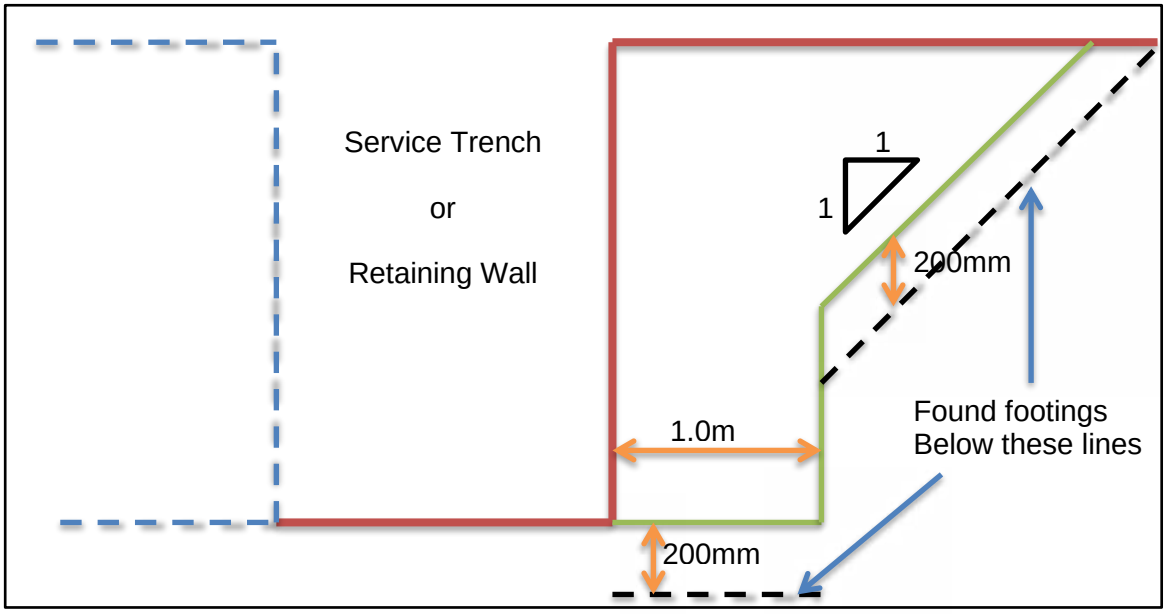


FIGURE 4

4.4.11 Construction Considerations

Inspections

It is recommended that inspections be undertaken by an experienced and qualified geotechnical engineer or engineering geologist following footing excavations and during pier excavations to confirm the adequacy of the founding material. **Inspections should be carried out prior to placement of reinforcing steel and ordering of concrete.**

High Level Footings

Given the properties of the founding materials it is recommended that the footings be poured as soon as possible following excavation, to minimise the potential for desiccation/wetting up of the founding material. Where the footings cannot be poured the same day as excavation, it is recommended that a blinding layer of concrete, at least 50mm thick, be placed immediately following excavation, cleaning and inspection of the footing bases.

Bored Piers

Some difficulty with fall-in may occur with bored piers, particularly when drilling through fill material and clayey sand. It should be ensured that all loose material is removed from the base of piers prior to pouring of concrete. The use of a 'clean-out' bucket should be explicit in instructions to the drilling contractor. The practice of 'using water and spinning the augers' to remove loose material from the pier base is generally unacceptable.

Although groundwater was not encountered in the boreholes (refer Section 2.3.4) at the time of the investigation:-

- It is recommended that, should a bored pier foundation system be adopted, some allowance for dewatering and the use of liners should be made. In addition, it may be prudent to drill a "trial pier" to fully assess construction difficulties.
- The potential for seepage still exists particularly if the piers are not poured straight after drilling. If the piers exhibit seepage or if left for a significant period (e.g. over night), at the

very least it is recommended that the pier holes should be covered and/or soil placed around the piers to minimise the possibility of water entering the pier from the surface. It is also likely that the piers will need to be cleaned and deepened to remove any softened material.

Considering the depth of fill encountered in some of the boreholes, liners may need to be considered in those holes to minimise the issue of wall collapse during the installation of the piers.

Given the nature and strength of the subsurface material encountered, it is recommended that inspections are undertaken by a qualified geotechnical engineer/engineering geologist from Soil Surveys Engineering Pty Limited during pier excavations to confirm the adequacy of the founding material. Inspections should be carried out prior to placement of reinforcing steel and following cleaning of pier bases.

Given the properties of the founding materials, it is recommended that the pier holes be poured as soon as possible following boring, to minimise the potential for desiccation/wetting up of the founding material.

4.4.12 Site Management

It is important that proper site management methods be observed for the existing soil conditions by both the builder at the time of the construction and the owner throughout the life of the proposed development.

Particular reference to this is set out in AS 2870-2011. It should be noted that where proper site management particularly with respect to change in moisture conditions is not followed the foundation recommendations contained in this report could be considered void.

The following are some specific comments with respect to site management and the reader is also directed to CSIRO pamphlet, 10-91, 'to Home Owners on Foundation Maintenance and Footing Performance' for further information.

- It is important that the site be well drained. The ground around the structures should slope away at 1 in 20 for 2 metres and then fall to the stormwater system to prevent ponding of water adjacent to the building.
- Founding soils should not be allowed to become saturated.
- It is recommended that service trenches under the structures be minimised as disruption or breakage of these service lines could lead to saturation of the under-slab/footing material resulting in an increase to the site classification. If this were to occur all footing recommendations contained within this report would be void. Where service trenches are adopted the possible effects of leakage should be considered in the design
- Where service lines are placed under a structure it is recommended that the base of these trenches fall towards the outside of the structure and that these trenches are backfilled in an appropriate manner to minimise the potential for seepage into the trench and therefore under the structure.
- Footings should be placed with minimal delay after excavation to avoid desiccation or wetting of the founding soils. If footings cannot be poured on the same day as excavation, a blinding layer of 50mm thickness is recommended. Piers should be poured immediately following excavation.

- Do not let the slab subgrade "dry out" prior to casting.
- Future shrubs and trees should be planted at a distance at least equivalent to one times their mature height away from the building to avoid shrinkage movement in the potentially expansive founding soils. Existing trees that may encroach within this restriction should be removed. It is recommended that trees to be removed as early as possible prior to building construction to enable soil moisture to reach equilibrium. Should this not be done the effect of these trees must be taken into account in the design of the structure.

4.5 Retaining Walls

4.5.1 General

It is understood that retaining walls may be required for sections of the proposed development.

The lateral earth pressure distribution that affects the retaining walls on the site will depend upon the following parameters:-

- In-situ and backfill material properties
- Design water regime at the rear of the wall
- Wall and cut geometry
- Surcharges affecting the wall
- Wall type
- The structural bracing of the wall and the timing of backfilling behind the wall

4.5.2 Design Requirements

It is recommended that any retaining structure is designed in accordance with AS 4678-2002 ‘Earth Retaining Structures’. Section 3 of this code outlines the design requirements for these retaining structures which specifically includes both Ultimate and Serviceability Limit Modes, it is recommended that the retaining structures be assessed for each of these modes.

Note the following sections provide general recommendations with respect to some of these limit modes however it doesn't provide a detailed assessment in full accordance with the above-mentioned modes for AS 4678 as this will require additional information. A detailed assessment can be undertaken of the geotechnical aspects of the Limit Modes for the proposed retaining structures once details of the wall have been provided. **Of particular importance is the assessment for Limit Mode U5 Global Failure for the proposed walls.**

4.5.3 Pressure Distribution

The following situations should be considered:-

- For cantilever walls, which allow some movement at the top, (i.e., at least 0.005H in clays) the active case (K_a) applies with a triangular distribution in both the short- and long-term situations.
- For cantilever walls which cannot tolerate this movement, the at rest case (K_o) applies with a triangular distribution in both the short- and long-term situations.

- For structurally braced walls the wall design should be checked for both a trapezoidal (clay soils - short term conditions) and triangular distribution with K_o values (long term conditions).

The pressure distributions as referred to above are shown in Figures 5 and 6. The parameters selected for use in the figures are dependent on the preconstruction geometry of the face being retained. Where the material has been cut using the recommendations as outlined in Section 4.1.6, the backfill parameters will control. Where a steeper angle is used the earth parameters will control.

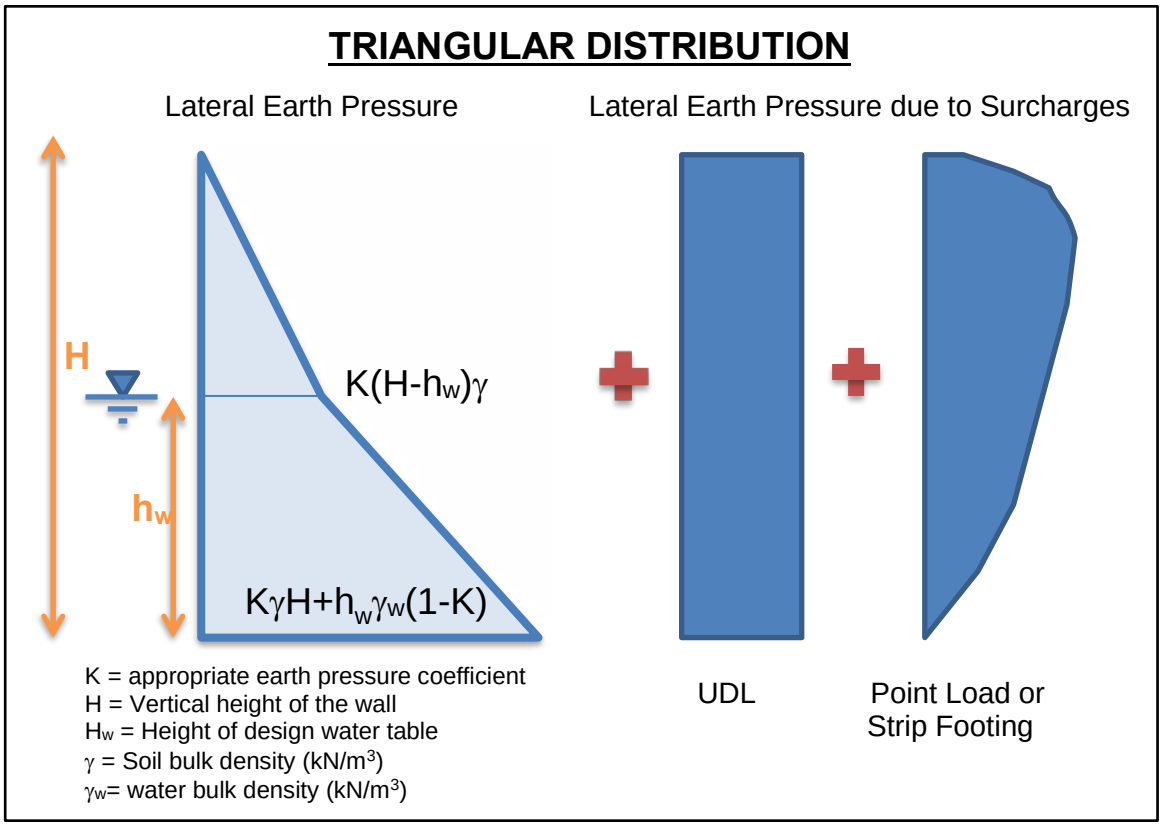


FIGURE 5

The lateral pressure distributions shown in Figures 5 and 6 include hydrostatic pressure and show typical pressure distributions due to surcharge loadings. It is recommended that where the retaining walls are expected to be surcharged (e.g., by footings, traffic loads, sloping ground surface, etc.) Soil Surveys Engineering should be contacted to provide a recommended lateral earth pressure distribution.

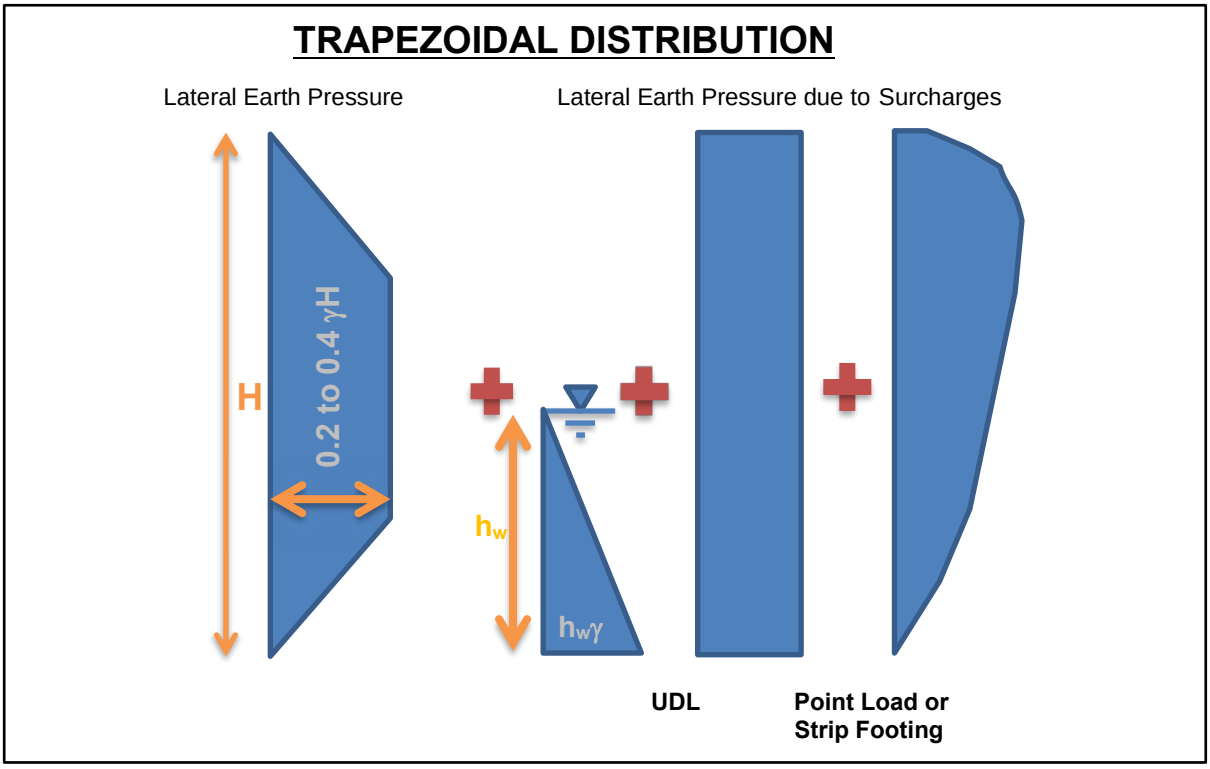


FIGURE 6

Parameters (unfactored) for assessment of lateral earth pressures are outlined in Table 9.

TABLE 9 RETAINING WALL DESIGN PARAMETERS (UNFACTORED)

Material	Density (kN/m^3)	Earth Pressure Coefficient Vertical Wall			Long Term Drained ϕ (°)
		K_a	K_o	K_p	
Existing Fill	18	0.41	0.58	NR	25
Compacted Fill	19	0.36	0.53	2.8	28
Gravel Back Fill[2]	20	0.27	0.43	NR	35
Residual Clay	19	0.36	0.53	2.8	28
Weathered Rock	21	0.27	0.43	3.7	35

Notes:-
1. NC = Not Considered, NR = Not recommended.
2. Drainage gravel.

The above recommend values are based on a drained model but has assumed a cohesion value of 0kPa for all materials. Whilst testing will indicate a value in excess of 0kPa there is some concern that in the long term a very low cohesion would be more appropriate for design. Should an undrained model be more appropriate values can be provided.

4.5.4 Resistance To Lateral Forces

Retaining walls can be designed to resist lateral pressure distribution in several ways i.e.:-

- Passive resistance at the toe of the wall
- Passive resistance at the key of the wall
- Frictional resistance due to the weight of the wall
- Dowelling into rock

- Positive resistance at the base for Bored pier walls (Figure 7)

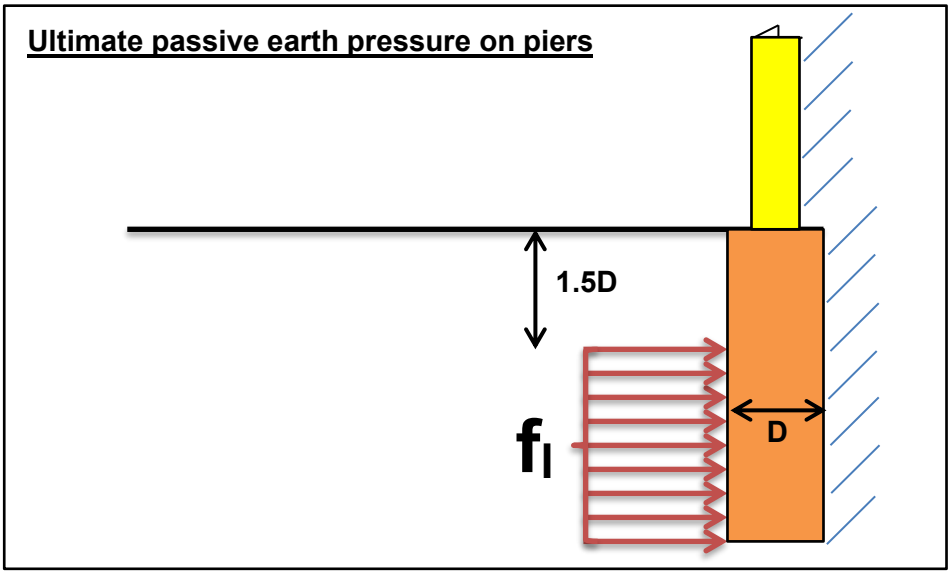


FIGURE 7

Because the resistance can be affected by various parameters, Soil Surveys Engineering should be contacted once the general wall geometry has been identified to provide further comment. For design purposes adopt f_l (design ultimate lateral capacity) values equal to the Ultimate base bearing pressure for the various material types as outlined in Table 8 in Section 4.4.8.

4.5.5 Surcharge Loads

AS 4678 requires that all structures are designed to resist live loads resulting from the intended use of the structure but not less than the values outlined in Table 4.1 of the code.

AS 4678 (Appendix J) also provides some guidance on the effect of earth pressures resulting from:-

- The geometric shape of the retaining structure.
- The effect of compaction adjacent to the retaining structure.
- Various types of surcharges.

As a general guide (using an elastic model) line loads located 2.5H away from the wall (where H is the wall height) results in lateral forces of less than 10% of the line load.

4.5.6 Backfill and Drainage

Any backfill placed behind the wall should be loose granular material. The backfill should not be heavily compacted since research has shown that compaction can raise the earth pressure to above the 'at rest' pressure (refer AS 4678 Appendix J).

Adequate surface and subsoil drainage should be provided for all retaining walls on the site. Cut-off/interceptor drains should also be provided around the high side of the wall to ensure stormwater runoff from the area above the wall is suitably diverted.

The placement of a filter fabric between the retained soil and the drainage material (e.g., granular backfill) for protection against silting of the drainage material is recommended. The outlets to

subsoil pipe drains must be located beyond the ends of the walls and connected to a proper drainage system. It is suggested the pipes be wrapped in filter fabric to minimise silting.

In weather exposed locations, to reduce infiltration by surface runoff, the surface of the backfill should be sealed. This can be achieved by either compacting a material of low permeability i.e., on site clay or concrete, etc. with a slope towards an open drain.

Due to possible long-term problems with blocking of gravel filters and drains and short-term storm conditions that could flood the fill behind retaining walls, it is recommended that all retaining walls be designed for some water pressure distribution. For ultimate limit state the suggested water pressure distribution for retaining walls on this site would be half height water pressure.

During installation of any retaining walls, the in-situ soils should be battered back to minimise fall-in and subsequent disruption of works. Temporary batter angles are given in Section 4.1.6. Suitable precautions to satisfy Health & Safety requirements must also be adhered to.

5.0 CONSTRUCTION INSPECTIONS

It is recommended that placement of all structural fill, footing excavations, and cut batter slopes in soil should be inspected by Soil Surveys Engineering Pty. Limited or a duly qualified Geotechnical Engineer. Should subsurface conditions other than those described in this report be encountered, Soil Surveys Engineering Pty. Limited should be consulted immediately and appropriate modifications developed and implemented if necessary.

6.0 FURTHER WORK

It is recommended that following the preparation of design drawings that they be reviewed by Soil Surveys to confirm that they comply with the recommendations outlined in this report. Particularly with respect to the required earthworks control and certification.

7.0 LIMITATIONS

We have prepared this report for the use of **Dash House Trust**, for design purposes in accordance with generally accepted geotechnical engineering practices. No other warranty, expressed or implied, is made as to the professional advice included in this report. This report has not been prepared for use by parties other than **Dash House Trust**; it may not contain sufficient information for purposes of other parties or for other uses. Please note that any third party relying on the information contained in this report for any purpose whatsoever does so entirely at its own risk, and any duty of care to that third party is excluded.

Any interpretation or recommendation given by Soil Surveys Engineering shall be understood to be based on judgement and experience and not on greater knowledge of the facts than the reported investigations would imply. The interpretation and recommendations are therefore opinions provided for our Client's sole use in accordance with the specific brief. As such they do not necessarily address all aspects of ground behaviour on the subject site. Information provided by others has been taken in good faith, but no liability can be accepted for information provided by others.

Your attention is drawn to 'Appendix A', 'Notes Relating to this Report'. Interpretation of factual data given in this report is based on judgement, not a greater knowledge of facts other than those reported.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing and depth of boreholes, the method of drilling, the frequency of sampling and testing and the possibility of other than "straight line" variations between the boreholes. Subsurface conditions between and below boreholes may vary significantly from conditions encountered at the borehole locations.

Please note that should, following detailed design, footings or piers/piles be required to extend within 3B (B = footing width/pier diameter) above the termination level of the boreholes or any excavations extend below borehole termination levels, Soil Surveys Engineering should be contacted immediately. In this case, geotechnical data in this report should be considered preliminary only; additional investigation is likely to be required.

In the event that conditions encountered on site during construction appear to vary from those expected from the information contained in the report, the Company strongly recommends that it immediately be notified. Most problems are more readily resolved when conditions are exposed than at some later stage, after the event. Should Soil Surveys Engineering not be notified or if this notification is delayed, then Soil Surveys cannot be held responsible for the affect that any variation has on any aspect of the development.

Soil Surveys Engineering consider that a documentation review service (during the design phase and prior to construction) to verify that the intent of geotechnical recommendations is properly reflected in the design, along with construction inspections, forms a very important component of the geotechnical engineering design service/process.

The geotechnical review ensures geotechnical risks to our Client and their project are minimised at the design and tender stage of the project. Further, with Soil Surveys Engineering being commissioned to carry out geotechnical construction inspections, an opportunity at the time of construction to confirm any assumptions made in the preparation of the report and allow the effect of any normally occurring variation in ground conditions to be assessed with respect to construction becomes available.

The above statements are not intended to reduce the level of responsibility accepted by Soil Surveys Engineering in accordance with our commission, but rather to ensure that all parties who may rely on this report are aware of the responsibilities each assumes in doing so and the risks they accept should they decline to have Soil Surveys Engineering carry out a geotechnical documentation review and geotechnical construction inspections.

It is highly recommended that the Client avail themselves of these review and inspection services; our standard rates will apply.

N.T. PERKINS (RPEQ 7527)
PRINCIPAL GEOTECHNICAL ENGINEER

For and on behalf of
SOIL SURVEYS ENGINEERING PTY LIMITED

APPENDICES

APPENDIX A

NOTES RELATING TO THIS REPORT

INTRODUCTION

These notes are provided by Soil Surveys Engineering Pty Limited (the Company) to complement the geotechnical report in regard to classification methods and field procedures. Not all notes are necessarily relevant to all reports.

The ground is a product of continuing natural and man-made processes and therefore exhibits a variety of characteristics and properties which vary from place to place and can change with time. Geotechnical engineering involves gathering and assimilating limited information about these characteristics and properties in order to understand or predict the behaviour of the ground on a particular site under certain conditions. This report may contain such information obtained by inspection, excavation, probing, sampling, testing or other means of investigation. If so, they are directly relevant only to the ground at the place where and at the time when the investigation was carried out.

DESCRIPTION AND CLASSIFICATION METHODS

Soils - The methods of description and classification of soils and rocks used in this report are based on Australian Standard 1726-2017 (Geotechnical Site Investigations), where appropriate. In general, descriptions cover the following properties - soil or rock type, colour, structure, strength or density, and inclusions. Identification and classification of soil and rock involves judgement and the Company infers accuracy only to the extent that is common in current geotechnical practice.

Soil types are described according to the dominant particle size and behaviour as set out in AS 1726-2017.

Cohesive soils are classified on the basis of strength (consistency) either by use of hand penetrometer, shear vane, laboratory testing or engineering examination. The strength terms are defined in AS 1726-2017 Table 11.

Non-cohesive soils are classified on the basis of relative density usually based on insitu testing or engineering examination (see AS 1726-2017 Table 12).

Rocks - Rock types are classified by their geological names (AS 1726-2017 Tables 15 to 18), together with descriptive terms regarding weathering (AS 1726-2017 Table 20), strength (AS 1726-2017 Table 19), defects (AS 1726-2017 Table 22), etc.

SAMPLING

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

Disturbed samples taken during drilling provide information on plasticity, grain size, colour, moisture content, minor constituents and, depending upon sample disturbance, (information on strength and structure).

Undisturbed samples are taken by pushing a thin walled sample tube, usually 50mm diameter (U50), into the soil and withdrawing it with a sample of the soil contained in a relatively undisturbed state. Such samples yield information on structure and strength, and are necessary for laboratory determination of shear strength, volume change potential and compressibility. Undisturbed sampling is generally effective only in cohesive soils.

Details of the type and method of sampling used are given on the attached logs.

SAMPLE STORAGE – SOIL, ROCK AND WATER SAMPLES

Soil samples (not subject to testing) are not stored beyond a period of 90 days of taking or receiving said soil sample. Rock core (not subject to testing) is not stored beyond a period of six months of taking or receiving said rock core.

Should any party require that soil samples (not subject to testing) be stored beyond 90 days, or rock core (not subject to testing) be stored beyond six months, please contact Soil Surveys Engineering.

Water samples (not subject to testing) are not stored beyond a period of seven days of taking or receiving water samples.

TEST LOCATIONS

Test locations (e.g. boreholes, CPT's, test pits etc.) were based on available access at the time of testing. Test locations may have been shifted if access was not suitable.

Unless noted otherwise, accuracy of test locations are to the accuracy of hand held GPS equipment.

INVESTIGATION METHODS

The following is a brief summary of investigation methods currently adopted by the Company and some comments on their use and application.

Test Pits - These are normally excavated with a backhoe or a tracked excavator, allowing close examination of the insitu soils if it is safe to descend into the pit. The depth of penetration is limited to approximately 3.0m for a backhoe and up to 6.0m for an excavator. Limitations of test pits are the problems associated with disturbance and difficulty of reinstatement and the consequent effects on close-by structures. Care must be taken if construction is to be carried out near test pit locations to either properly recompact the backfill during construction or to design and construct the structure so as not to be adversely affected by poorly compacted backfill at the test pit location.

Hand Auger Drilling - A borehole of 50mm to 100mm diameter is advanced by manually operated equipment. Refusal of the augers can occur on a variety of materials such as hard clay, gravel or rock fragments and does not necessarily indicate rock level.

Continuous Spiral Flight Augers - The borehole is advanced using 75mm to 300 mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling or insitu testing. This is a relatively economical means of drilling in clays and in sands above the water table. Samples are returned to the surface by the flights or may be collected after withdrawal of the augers. Information from the drilling (as distinct from specific sampling) is of relatively lower reliability due to remoulding, inclusion of cuttings from above or softening of samples by groundwater, or

uncertainties as to the original depth of the samples. Augering below the groundwater table has a lower reliability than augering above the water table. Various drill bits are attached to the base of the augers during the drilling. The depth of refusal of the different bit types can provide information as to the strength of the material encountered. Generally the 'TC' bit (a tungsten carbide tipped screw type bit) is used.

Wash Boring - The borehole is usually advanced by a rotary bit with water or fluid pumped down the hollow drill rods and returned up in the space between the rods and the soil or casing, carrying the drill cuttings. Only major changes in stratification can be determined from the cuttings, together with some information from "feel" and rate of penetration. More accurate information on soil strata is gained by regular testing and sampling using the Standard Penetration Test (SPT) and undisturbed thin walled tube samples (U50).

Mud Stabilized Drilling - Either Wash Boring or Continuous Core Drilling can use drilling mud as a circulating fluid to stabilize the borehole. The term "mud" encompasses a range of products ranging from bentonite to polymers such as Revert or Biogel. The mud tends to mask the cuttings and reliable identification is only possible from regular intact sampling (e.g. from SPT and U50 samples) or from rock coring, etc.

Continuous Core Drilling - A continuous core sample is obtained using a diamond or tungsten carbide tipped core barrel. Provided full core recovery is achieved (which is not always possible in very weak rocks and granular soils), this technique provides a very reliable method of investigation. In rocks, NMLC coring (nominal 52 mm diameter) is usually used with water flush. The length of core recovered is compared to the length drilled and any length not recovered is shown as CORE LOSS. The location of losses is determined on site by the supervisor. If the location of the loss is uncertain, it is placed at the top end of the run, when the core is placed in a storage tray and recorded on the log.

Standard Penetration Tests - Standard Penetration Tests (SPT) are used mainly in non-cohesive soils, but can also be used in cohesive soils, as a means of indicating density or strength. 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 50mm diameter split sample tube with a tapered shoe, 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, the upper 150 mm being neglected due to possible disturbance from the drilling method. In dense sands, very hard clays or weak rock, the full 450 mm penetration may not be practicable and the test is discontinued at a reduced penetration.

In the case where full penetration is obtained with successive blow counts for each 150 mm of, say 4, 6 and 7 blows, the record shows,

4, 6, 7 N = 13

In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150 mm and 30 blows for the next 40 mm, the record shows:

15, 30/40mm

The results of the test can be related empirically to the engineering properties of the soil.

Occasionally, the drop hammer is used to drive 50mm diameter thin walled sample tubes (U50) in clays. In such circumstances, it is noted on the borehole logs.

A modification to the SPT test is where the same driving system is used with a solid 600 tipped steel cone of the same diameter as the SPT hollow sampler. The solid cone can be continuously driven for some distance in soft clays or loose sands, or may be used where damage would otherwise occur to the SPT. The results of this Solid SPT are shown as "N_c" on the borehole logs, together with the number of blows per 150 mm penetration.

Cone Penetration Tests - Test Method - Cone Penetration Tests (CPT) are carried out in accordance with AS 1289 Test 6.5.1-1999, using an electrical friction-cone penetrometer.

The test essentially comprises the measurement of resistance to penetration of a cone of 35.7 mm diameter pushed into the soil at a rate of 10-20 mm per second by hydraulic force. The resistance to penetration is recorded in terms of pressure on the end area of the cone (cone resistance, q_c, in MPa) and friction on the side of the 135 mm long sleeve immediately above the top of the cone (friction resistance, f_s, in kPa). These forces are measured by electrical transducers (strain gauges) within the cone device. The ratio between friction resistance and cone resistance is also calculated as a percentage, i.e.-

$$\text{Friction Ratio (FR)} = \frac{\textit{Friction Resistance, } f_s\ (kPa)\ x\ 100}{\textit{cone resistance, } q_c\ (kPa)}$$

The friction ratio, FR, is generally low in sands (less than 1% or 2%) and generally higher in clays (say 3% or more). The interpretation of sandy clays, clayey sands and material with a high silt content is more difficult, but intermediate values (between 1% and 3%) would be expected. Highly organic clays and peats generally have a friction ratio in excess of 5%.

Static cone data is recorded in the field on disc for later presentation using computer aided drafting.

The equipment can be operated from any conventional drill rig. A total applied load in the range of 4 to 10 tonnes is required for practical purposes, although lighter loads may be used. The cone penetrometers are available with various capacities of cone resistance ranging up to 100 MPa for general purpose investigations, while a range of 0 to 10 MPa can be used where more sensitive investigations of soft clay are required.

The cone resistance value provides a continuous measure of soil strength or density, and together with the friction ratio, provide very useful indications of the presence of narrow bands of geotechnically significant layers such as thin, soft clay layers or lenses of sand which might otherwise be missed using conventional drilling methods.

The lithology of the encountered soils is interpreted from static cone data and is generally presented on the static cone log sheets.

It is important to note that the lithology is interpreted information and is based on research by Schmertmann (1970), Sanglerat (1972), Robinson and Campinalli (1986), modified to suit local conditions as indicated by borehole information and laboratory testing.

As soils generally change gradually it is sometimes difficult to accurately describe depths of strata changes, although greater accuracy is obtained with the static cone compared with conventional drilling. In addition, friction ratios decrease in accuracy with low cone resistance values, and in desiccated soils. As a result, some overlap and minor discrepancies may exist between static cone and nearby borehole information.

Portable Dynamic Cone Penetrometers - Portable Dynamic Cone Penetrometer (DCP) tests are carried out by driving a rod into the ground with a falling weight hammer and measuring the blows for successive 100mm increments of penetration.

The DCP comprises a Cone of 20 mm diameter with 30 degree taper attached to steel rods of smaller section.

The cone end is driven with a 9 kg hammer falling 510 mm (AS 1289 Test 6.3.2). The test was developed initially for pavement subgrade investigations, and empirical correlations of the test results with California Bearing Ratio have been published by various Road Authorities. The Company has developed their own correlations with Standard Penetration tests and Density Index tests in sands.

LOGS

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

The attached explanatory notes define the terms and symbols used in preparation of the logs.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of boreholes or test pits, the method of drilling or excavation, the frequency of sampling and testing and the possibility of other than "straight line" variations between the boreholes or test pits. Subsurface conditions between boreholes or test pits may vary significantly from conditions encountered at the borehole or test pit locations.

GROUNDWATER

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

- Although groundwater may be present in lower permeability soils, it may enter the hole slowly or perhaps not at all during the time the hole is open.
- A localized 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 and may not be the same at the time of construction.
- The use of water or mud as a drilling fluid will mask any groundwater inflow. Water has to be bailed out of the bore and mud must be washed out of the hole or "reverted" if water observations are to be made.

More reliable measurements can be made by use of standpipes which are read after stabilizing at periods ranging from several days to 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 perched water tables or surface water.

FILL

The presence of fill materials can often be determined only by the inclusion of foreign objects (e.g. bricks, steel, etc.) or by distinctly unusual colour, texture or fabric. Identification of the extent of fill materials will also depend on investigation methods and frequency. Where natural soils similar to those at the site are used for fill, it may be difficult with limited testing and sampling to reliably determine the extent of the fill.

The presence of fill materials is usually regarded with caution as the possible variation in density, strength and material type is much greater than with natural soil deposits. Consequently, there is an increased risk of adverse engineering characteristics or behaviour. If the volume and quality of fill is important to a project, then frequent test pit excavations are preferable to boreholes.

LABORATORY TESTING

Laboratory testing is normally carried out in accordance with Australian Standard 1289 "Methods of Testing Soil for Engineering Purposes". Details of the test procedure used are given on the individual report forms and the attached explanatory notes summarize important aspects of the Laboratory Test Procedures adopted.

ENGINEERING REPORTS

Engineering reports are prepared by qualified personnel and are based on the information obtained and on current engineering standards of interpretation and analysis. The information provided in Soil Surveys Engineering reports is opinion and interpretation and not factual. The client/contractor increases their risk by not retaining the person who authored the geotechnical report, to carry out site inspection and review (overseeing role) during construction, to confirm opinion and interpretation expressed in the report is accurate. 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, the Company 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 aspects and recommendations or suggestions for design and construction. Since the test sites in any exploration represent a very small proportion of the total site and since the exploration only identifies actual ground conditions at the test sites, even under the best circumstances actual conditions may vary from those inferred to exist. No responsibility is taken for:-

- Unexpected variations in ground and/or groundwater conditions.
- Changes in policy or interpretation of policy by statutory authorities.
- The actions of other persons.
- Any work where the company is not given the opportunity to supervise the construction using the Companies designs/recommendations.

If differences occur, the Company will be pleased to assist with investigation or advice to resolve any problems occurring.

SITE ANOMALIES

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

Extreme events including but not limited to the results of climate change, e.g. flood levels above previously identified levels, beach scour or erosion beyond normal expectations (as identified by local authorities) extreme rainfall events, war, espionage, sabotage may result in different conditions between time of investigation and time of construction.

REPRODUCTION OF INFORMATION FOR CONTRACTUAL PURPOSES

Attention is drawn to the document “Guidelines for the Provision of Geotechnical Information in Construction Contracts (1987)”, published by the Institution of Engineers, Australia. Where information obtained from this investigation 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. The Company would be pleased to assist in this regard and/or to make additional report copies available for contract purposes at a nominal charge.

REVIEW OF DESIGN

Where major civil or structural developments are propose or where only a limited investigation has been completed or where the geotechnical conditions/ constraints are quite complex, it is prudent to have a joint design review which involves a senior geotechnical engineer. We would be happy to assist in this regard as an extension of our investigation commission. Construction drawings should be reviewed by Soil Surveys Engineering, with sufficient time to allow changes if required, prior to inspections. Otherwise Soil Surveys Engineering reserves the right to refuse to carry out inspections.

SITE INSPECTION

The Company will always be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related.

i. Site visits during construction to confirm reported ground conditions
ii. Site visits to assist the contractor or other site personnel in identifying various soil/rock types such as appropriate footing or pier founding depths, the stability of a filled or excavated slope; or
iii. Full-time engineering presence on site.

In the vast majority of cases it is advantageous to the principal for the geotechnical engineer who wrote the investigation report to be involved in the construction stage of the project.

The geotechnical engineer cannot take responsibility for variations in encountered conditions, where he is not given the opportunity to review plans for the proposed development with sufficient time to allow review and make changes to the proposed development if required, and where he is not given the opportunity to inspect the site and oversee construction methods with regard to site conditions with sufficient time to observe all relevant site conditions and operations.

RESPONSIBLE USE OF GEOTECHNICAL INFORMATION

Recommendations in our report are for design purposes only and provided on the basis that inspections are carried out to allow finalisation of opinions and recommendations contained in our report.

The geotechnical investigation consisting of field and laboratory testing has been carried out to indicate typical conditions by indicating conditions and parameters at the specific locations of boreholes/test pits. Subsurface conditions are indicated at these locations only and the inference of conditions between or away from these locations (interpolation and extrapolation) involves a certain degree of risk. Persons inferring such conditions or carrying out such inferences should do so with a degree of caution and conservatism which is commensurate with the consequences of the risk of error.

Estimates of volumes based on our findings require interpolation and extrapolation between test locations and as such may be significantly different from actual volumes.

APPENDIX B

ASSESSMENT GUIDELINES

B.1 STATE PLANNING POLICY (JULY, 2017)

B.1.1 General

In 2003 the Queensland State Government adopted under the Integrated Planning Act 1997 (IPA) the State Planning Policy 1/03 "Mitigating the Adverse Impacts of Flood, Bushfire and Landslide" and an associated guideline.
In 2014, the Queensland State Government reissued all the State Planning Policies under a single document (State Planning Policy July 2014 - SPP).
In July 2017, the Queensland State Government reviewed the State Planning Policies, releasing the updated State Planning Policy July 2017 – SPP.
Landslide is addressed under two sections of the document, these being:-

Part E - State interest policies and assessment benchmarks

The SPP contains state interest policies and where relevant, the assessment benchmarks for each state interest. These are relevant for landslide hazards in the following sections:-

- Planning for the environment and heritage
- Planning for safety and resilience to hazards
- Natural hazards, risk and resilience

As noted in the policy, the risks associated with natural hazards, including the projected impacts of climate change, are avoided or mitigated to protect people and property and enhance the community's resilience to natural hazards.

All of the following state interest policies must be appropriately integrated in planning and development outcomes, where relevant:

1. Natural Hazard areas are identified, including:-
    a. Bushfire prone areas
    b. Flood hazard areas
    c. Landslide hazard areas
    d. Storm tide inundation areas
    e. Erosion prone areas
2. A fit-for-purpose risk assessment is undertaken to identify and achieve an acceptable or tolerable level of risk for personal safety and property in natural hazard areas.

Bushfire, flood, landslide, storm tide inundation, and erosion prone areas:

1. Land in an erosion prone area is not to be used for urban purposes, unless the land is located in:
    a. an urban area in a planning scheme; or
    b. an urban footprint identified in a regional plan.
2. Development in bushfire, flood, landslide, storm tide inundation or erosion prone natural hazard areas:
    a. avoids the natural hazard area; or
    b. where it is not possible to avoid the natural hazard area, development mitigates the risks to people and property to an acceptable or tolerable level.
3. Development in natural hazard areas:
    a. supports, and does not hinder disaster management capacity and capabilities
    b. directly, indirectly and cumulatively avoids an increase in the exposure or severity of the natural hazard and the potential for damage on the site or to other properties

c. avoids risks to public safety and the environment from the location of the storage of hazardous materials and the release of these materials as a result of a natural hazard
d. maintains or enhances the protective function of landforms and vegetation that can mitigate risks associated with the natural hazard.

4. Community infrastructure is located and designed to maintain the required level of functionality during and immediately after a natural hazard event.
5. Coastal protection work in an erosion prone area is undertaken only as a last resort where coastal erosion or inundation presents an imminent threat to public safety or existing buildings and structures[5], and all of the following apply:
    a. The building or structure cannot reasonably be relocated or abandoned.
    b. Any erosion control structure is located as far landward as practicable and on the lot containing the property to the maximum extent reasonable.
    c. Any increase in coastal hazard risk for adjacent areas from the coastal protection work is mitigated.

Assessment benchmarks – natural hazards, risk and resilience

These performance outcomes apply to the following development applications, to the extent the SPP has not been identified in a local planning instrument as being appropriately integrated.

A development application for a material change of use, reconfiguration of a lot or operational works on premises in any of the following:

1. bushfire prone areas
2. flood hazard areas
3. landslide hazard areas
4. storm tide inundation areas
5. erosion prone area

All of the following requirements are assessment benchmarks for the development in relation to all natural hazard areas:

1. Development supports and does not hinder disaster management response or recovery capacity and capabilities.
2. Development directly, indirectly and cumulatively avoids an increase in the severity of the natural hazard and the potential for damage on the site or to other properties.
3. Risks to public safety and the environment from the location of hazardous materials and the release of these materials as a result of a natural hazard are avoided.
4. The natural processes and the protective function of landforms and the vegetation that can mitigate risks associated with the natural hazard are maintained or enhanced.

In accordance with the SPP, risks to the community for proposed developments in identified Natural Hazard Management Areas should be adequately considered during design and assessment of a proposed development. Where risks are unacceptable they should be suitably minimised and/or controlled.

Part F – Glossary

The SPP defines the following:-

- **Landslide hazard area** means an area that is:

a) identified by a local government in a local planning instrument as a landslide hazard area, based on a localised landslide study prepared by a suitably qualified person; or
b) if the local government has not identified landslide hazard areas in a local planning instrument in accordance with (a) above; land with a slope greater than or equal to 15 per cent.

- **Natural hazard** means a naturally occurring situation or condition, such as a flood, bushfire, landslide, coastal erosion or storm tide inundation, with the potential for loss or harm to the community, property or environment.
- **Natural hazard area** means a flood hazard area, a bushfire hazard area, a landslide hazard area, an erosion prone area or a storm tide inundation area.

B.2 TOOWOOMBA *REGIONAL PLANNING SCHEME, VERSION 21, AUGUST, 2019*

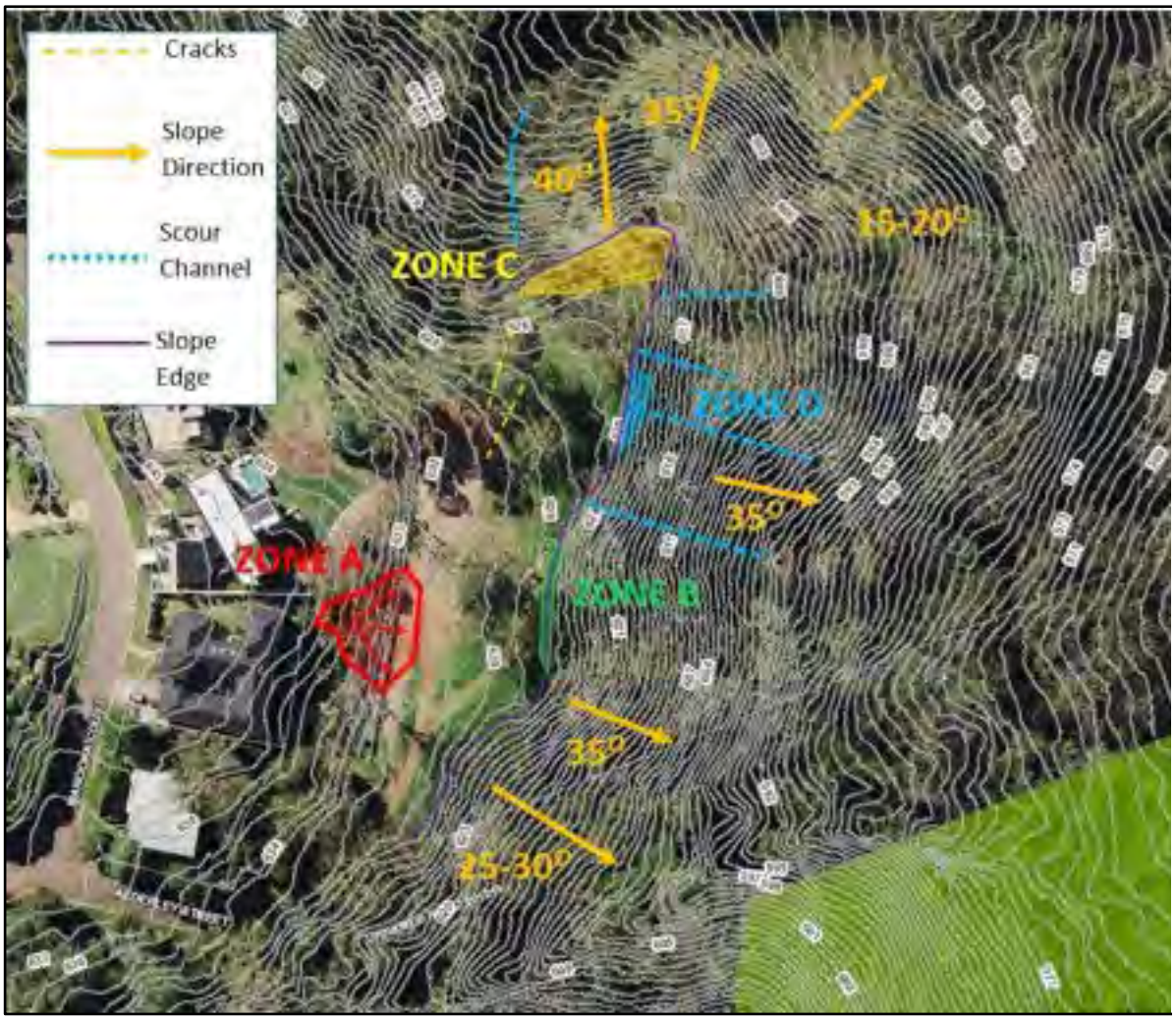
The Toowoomba Regional Council Planning Scheme Version 21, 2019 includes two items in relation to Landslide hazards:-

- Part 8.2.4 Landslide Hazard Overlay Code – Contains application information, purpose and overall outcomes and criteria for assessment.
- Schedule 6.1.6 Additional Information required by Development and Overlay Code - Contains additional information requirements triggered by the Landslide Hazard Overlay Code.

Figure 1 shows the relevant section of the Landslide Hazard Overlay and based on this, essentially the entire site is situated within the Landslide Hazard High Risk Zone**.** Therefore, the TRC Planning Scheme Version 21 2019 will apply to the development.

APPENDIX C

SITE REPORT



ZONE A – Slip on neighbouring land to the west.

- Predominantly Silty Clay with sand, gravels and organics.
- 1m high blockwork retaining wall destroyed, slump spilling into subject site. Overturned sewer manhole, vegetation and retaining wall debris noted in slump material. Soil at toe of slump downslope from manhole is wet.




ZONE B – Sunken section along edge of slope.

- Dished section running along slope edge in this area, approximately 0.3m deep in the centre, grass covered.
- Expected fill has consolidated in this area, no visible scouring on slope.



ZONE C – Cracked and slumped ground at top of slope.

- Cracks running the entire length of the slumped area from west to east. Crack widths ranging from 15-40mm.
- Ground has slumped approximately 0.95m from edge of slump to lowest point of slump.
- Some 10-20mm cracks also noted to the south west of slumped area.





ZONE D – Eroded section at top of hill leading to scour channel.

- Fill has slumped and scoured away in this area, revealing boulders and large cobbles in the fill.
- Many rills branching off the main scour channel and throughout this area of the slope face. Little to no vegetation in this area.




APPENDIX D

PHOTOGRAPHS

PLATE 1 – SITE LOOKING NORTH FROM NEAR BH1

PLATE 2 – SITE LOOKING WEST. NOTE: SLUMP ON ADJACENT SITE

PLATE 3 – RECENT SLUMP ON OUTER EDGE

PLATE 4 – NORTHERN END OF PLATFORM

PLATE 5 – CLOSE UP OF FILL BATTER

PLATE 6 – CRACKING OF FILL BATTER

APPENDIX E

LRM2007 PRACTICE NOTE GUIDELINES – RISK MATRIX

APPENDIX C: – QUALITATIVE TERMINOLOGY FOR USE IN ASSESSING RISK TO PROPERTY (CONTINUED)

QUALITATIVE RISK ANALYSIS MATRIX – LEVEL OF RISK TO PROPERTY

LIKELIHOOD		CONSEQUENCES TO PROPERTY (With Indicative Approximate Cost of Damage)				
	Indicative Value of Approximate Annual Probability	**1: CATASTROPHIC 200%**	**2: MAJOR 60%**	**3: MEDIUM 20%**	**4: MINOR 5%**	**5: INSIGNIFICANT 0.5%**
A – ALMOST CERTAIN	10^{-1}	VH	VH	VH	H	M or **L** (5)
B - LIKELY	10^{-2}	VH	VH	H	M	**L**
C - POSSIBLE	10^{-3}	VH	H	M	M	**VL**
D - UNLIKELY	10^{-4}	H	M	**L**	**L**	**VL**
E - RARE	10^{-5}	M	**L**	**L**	**VL**	**VL**
F - BARELY CREDIBLE	10^{-6}	**L**	**VL**	**VL**	**VL**	**VL**

Notes: (5) For Cell A5, may be subdivided such that a consequence of less than 0.1% is Low Risk.
(6) When considering a risk assessment it must be clearly stated whether it is for existing conditions or with risk control measures which may not be implemented at the current time.

RISK LEVEL IMPLICATIONS

Risk Level		**Example Implications** (7)
VH	VERY HIGH RISK	Unacceptable without treatment. Extensive detailed investigation and research, planning and implementation of treatment options essential to reduce risk to Low; may be too expensive and not practical. Work likely to cost more than value of the property.
H	HIGH RISK	Unacceptable without treatment. Detailed investigation, planning and implementation of treatment options required to reduce risk to Low. Work would cost a substantial sum in relation to the value of the property.
M	MODERATE RISK	May be tolerated in certain circumstances (subject to regulator's approval) but requires investigation, planning and implementation of treatment options to reduce the risk to Low. Treatment options to reduce to Low risk should be implemented as soon as practicable.
L	LOW RISK	Usually acceptable to regulators. Where treatment has been required to reduce the risk to this level, ongoing maintenance is required.
VL	VERY LOW RISK	Acceptable. Manage by normal slope maintenance procedures.

Note: (7) The implications for a particular situation are to be determined by all parties to the risk assessment and may depend on the nature of the property at risk; these are only given as a general guide.

APPENDIX F

BOREHOLE RECORD SHEETS

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BOREHOLE RECORD SHEET

Location Number: BH 01

Project Number: 1-24866
Project Name: Proposed Residence
Location: Alderley Street, Rangeville
Client: Dash House Trust
Date: 03/03/2022

Easting: 400247 Northing: 6947797 RL:
Logger: JCG Operator: JCG Machine: J 105

Drilling Method (TC / WB / RR / NMLC / Casing)	Depth	Graphic	Description	DCP Test (blows/100mm) 0 6 12 18 24 30	Samples and Remarks
TC	0.20		FILL Sandy Gravelly CLAY (CL): Stiff, low plasticity, orange red brown dark grey, fine sized gravel, fine to coarse grained sand, w=pl		D
TC	0.5		FILL Sandy CLAY (CL): Stiff to very stiff, low plasticity, red brown mottled dark grey, fine to coarse grained sand, trace fine sized gravel, w=pl		U50 PP=>600 Rec = 100%
TC	0.80				
TC	0.90		FILL GRAVEL (GP): Very dense, coarse sized, light brown mottled light grey, with fine grained sand, with boulders, moist		
TC	1.0		BOREHOLE BH 01 TERMINATED AT 0.90 m		
TC	1.5				
TC	2.0				
TC	2.5				
TC	3.0				
TC	3.5				
TC	4.0				
TC	4.5				
TC	5.0				

Comments:
1. Groundwater not encountered during augering.
2. DCP refusal at 0.83m.
3. TC bit refusal at 0.90m.

Water First Noted Water Steady Level Water Loss

Weathering Grades
RS - Residual Soil
XW - Extremely weathered
HW - Highly weathered
DW - Distinctly weathered
MW - Moderately weathered
SW - Slightly weathered
FR - Fresh

Rock Strength
RS - Residual Soil
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

Samples
U50
SPT
Disturbed Sample
Bulk Sample

Approved: NTP
Date: 9/05/2023

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BOREHOLE RECORD SHEET

Location Number: BH 01 A

Project Number: 1-24866
Project Name: Proposed Residence
Location: Alderley Street, Rangeville
Client: Dash House Trust
Date: 03/03/2022

Easting: 400248 Northing: 6947798 RL:
Logger: JCG Operator: JCG Machine: J 105

Drilling Method (TC / WB / RR / NMLC / Casing)	Depth	Graphic	Description	DCP Test (blows/100mm) 0 6 12 18 24 30	Samples and Remarks
TC	0.30		FILL Sandy Gravelly CLAY (CL): Firm, low plasticity, red brown mottled dark grey, fine to medium sized gravel, fine to coarse grained sand, w>pl		
TC	0.5		FILL Sandy Gravelly CLAY (CL): Stiff, low plasticity, red brown mottled dark grey, fine to medium sized gravel, fine to coarse grained sand, w=pl		
TC	0.60 0.70		FILL GRAVEL (GP): Dense, coarse sized, light grey mottled light brown, with fine to medium grained sand, moist (cobble/boulder)		
	1.0		BOREHOLE BH 01 A TERMINATED AT 0.70 m		
	1.5				
	2.0				
	2.5				
	3.0				
	3.5				
	4.0				
	4.5				
	5.0				

Comments:
1. Groundwater not encountered during augering.
2. DCP refusal at 0.59m.
3. TC bit refusal at 0.70m.

Water First Noted Water Steady Level Water Loss

Weathering Grades
RS - Residual Soil
XW - Extremely weathered
HW - Highly weathered
DW - Distinctly weathered
MW - Moderately weathered
SW - Slightly weathered
FR - Fresh

Rock Strength
RS - Residual Soil
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

Samples
U50
SPT
Disturbed Sample
Bulk Sample

Approved: NTP
Date: 9/05/2023

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BOREHOLE RECORD SHEET

Location Number: BH 02

Project Number: 1-24866
Project Name: Proposed Residence
Location: Alderley Street, Rangeville
Client: Dash House Trust
Date: 03/03/2022

Easting: 400266 Northing: 6947813 RL:
Logger: JCG Operator: JCG Machine: J 105

Drilling Method (TC / WB / RR / NMLC / Casing)	Depth	Graphic	Description	DCP Test (blows/100mm) 0 6 12 18 24 30	Samples and Remarks
	0.10		FILL Clayey Gravelly SAND (SC): Loose, fine to coarse grained, dark grey light brown, low plasticity clay, fine to medium sized gravel, moist		D
	0.5		FILL Sandy CLAY (CL): Very stiff, low plasticity, orange red brown mottled dark grey, fine to medium grained sand, trace fine to medium sized gravel, w<pl		D
	0.70		FILL Clayey Sandy GRAVEL (GC): Medium dense, coarse sized, red brown dark grey, low plasticity clay, fine to medium grained sand, with cobble, moist		U50 PP=>600 Rec = 100%
	1.0				
	1.5				
	1.50		FILL Silty CLAY (CH): Very stiff, high plasticity, light brown, with fine to coarse grained sand, w>pl		D
	2.0				
	2.00		FILL Sandy CLAY (CI): Stiff to very stiff, medium plasticity, dark brown mottled red brown dark grey, fine to medium grained sand, w>pl		U50 PP=260 Rec = 60%
	2.40				
	2.5		FILL Sandy CLAY (CH): Stiff to very stiff, high plasticity, dark brown mottled red brown dark grey, fine to coarse grained sand, with fine sized gravel, w>pl		
	3.0				
	3.10		FILL Clayey Gravelly SAND (SC): Medium dense, fine to medium grained, dark grey yellow, low plasticity clay, fine to medium sized gravel, moist (possibly colluvium)		U50 PP=>600 Rec = 89%
	3.5				
	3.50		NATURAL Extremely weathered Basalt (XW) recovered as Sandy SILT (ML): Hard, low plasticity, yellow brown, fine grained sand, inorganic, moist		D
	3.80		BASALT (DW): Distinctly weathered, low strength, fine grained, brown yellow, moist		
	4.0				
	4.00		BOREHOLE BH 02 TERMINATED AT 4.00 m		
	4.5				
	5.0				

Comments:
1. Groundwater not encountered during augering.
2. DCP refusal at 0.76m.
3. TC bit refusal at 4.00m.

Water First Noted Water Steady Level Water Loss

Weathering Grades
RS - Residual Soil
XW - Extremely weathered
HW - Highly weathered
DW - Distinctly weathered
MW - Moderately weathered
SW - Slightly weathered
FR - Fresh

Rock Strength
RS - Residual Soil
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

Samples
U50
SPT
Disturbed Sample
Bulk Sample

Approved: NTP
Date: 9/05/2023

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BOREHOLE RECORD SHEET

Location Number: BH 03

Project Number: 1-24866
Project Name: Proposed Residence
Location: Alderley Street, Rangeville
Client: Dash House Trust
Date: 16/03/2022

Easting: 400252 Northing: 6947840 RL:
Logger: JCG Operator: JCG Machine: J 105

Drilling Method (TC / WB / RR / NMLC / Casing)	Depth	Graphic	Description	DCP Test (blows/100mm) 0 6 12 18 24 30	Samples and Remarks
	0.20		FILL Silty Gravelly SAND (SM): Loose, fine to coarse grained, light brown dark grey, fine to coarse sized gravel, moist		
	0.5		NATURAL Silty CLAY (CI): Stiff to very stiff, medium plasticity, red brown, w=pl		D
	0.80		Silty CLAY (CL): Very stiff, low plasticity, red brown mottled dark grey, with fine grained sand, w<pl		U50 PP=>600 Rec = 96%
	1.0				
	1.40		Hard		
	1.5				
	1.60		Extremely weathered Basalt (XW) recovered as Clayey SAND (SC): Dense, fine to medium grained, yellow grey brown, low plasticity clay, moist		D
	2.0				
	2.00		BASALT (DW): Distinctly weathered, low strength, fine to medium grained, light grey brown, moist		
	2.20		BOREHOLE BH 03 TERMINATED AT 2.20 m		
	2.5				
	3.0				
	3.5				
	4.0				
	4.5				
	5.0				

Comments:
1. Groundwater not encountered during augering.
2. DCP refusal at 1.67m.
3. TC bit refusal at 2.20m.

Water First Noted Water Steady Level Water Loss

Weathering Grades
RS - Residual Soil
XW - Extremely weathered
HW - Highly weathered
DW - Distinctly weathered
MW - Moderately weathered
SW - Slightly weathered
FR - Fresh

Rock Strength
RS - Residual Soil
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

Samples
U50
SPT
Disturbed Sample
Bulk Sample

Approved: NTP
Date: 9/05/2023

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BOREHOLE RECORD SHEET

Location Number: BH 04

Project Number: 1-24866
Project Name: Proposed Residence
Location: Alderley Street, Rangeville
Client: Dash House Trust
Date: 16/03/2022

Easting: 400269 Northing: 6947834 RL:
Logger: JCG Operator: JCG Machine: J 105

Drilling Method (TC / WB / RR / NMLC / Casing)	Depth	Graphic	Description	DCP Test (blows/100mm) 0 6 12 18 24 30	Samples and Remarks
	0.5		FILL Clayey SAND (SC): Loose, fine to medium grained, red brown dark brown, low plasticity clay, moist		D
	0.50		FILL Clayey Sandy GRAVEL (GC): Medium dense, fine to coarse sized, red brown dark grey, low plasticity clay, fine to medium grained sand, with cobbles, moist		
	0.80		FILL Sandy Gravelly CLAY (CL): Very stiff to hard, low plasticity, dark brown dark grey red brown, fine to coarse sized gravel, fine to medium grained sand, w<pl		D
	1.0				
	1.40		NATURAL Silty Sandy CLAY (CI): Stiff, medium plasticity, dark brown mottled red brown, fine to medium grained sand, w=pl		D
	1.5				
	1.80		Clayey Silty SAND (SC): Dense, fine to medium grained, yellow grey brown, low plasticity clay, moist		D
	2.0				
	2.5				
	2.80		Extremely weathered Basalt (XW) recovered as Clayey SAND (SC): Dense, fine to medium grained, yellow grey brown, low plasticity clay, moist		
	3.0				
	3.00		BASALT (DW): Distinctly weathered, low strength, fine to medium grained, yellow grey brown, moist		
	3.30				
	3.5		BOREHOLE BH 04 TERMINATED AT 3.30 m		
	4.0				
	4.5				
	5.0				

Comments:
1. Groundwater not encountered during augering.
2. DCP refusal at 0.55m and 2.78m.
3. TC bit refusal at 3.30m.

Water First Noted Water Steady Level Water Loss

Weathering Grades
RS - Residual Soil
XW - Extremely weathered
HW - Highly weathered
DW - Distinctly weathered
MW - Moderately weathered
SW - Slightly weathered
FR - Fresh

Rock Strength
RS - Residual Soil
VL - Very low
L - Low
M - Medium
H - High
VH - Very high
EH - Extremely high

Samples
U50
SPT
Disturbed Sample
Bulk Sample

Approved: NTP
Date: 9/05/2023

APPENDIX G

LABORATORY TEST CERTIFICATES

SOIL SURVEYS ENGINEERING PTY LIMITED
Specialists in Applied Geotechnics
A.B.N. 70 054 043 631

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GOLD COAST
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HELENSVALE QLD 4212
PH:07 55026795

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info@soilsurveys.com.au

SHRINK SWELL INDEX REPORT

Client :	**Dash House Trust**	Report No:	WHL22-0202-S1-S2
Client Address :	**C/O 2/19 Finchley Street, Milton, QLD, 4064**	Report Date:	24/03/2022
Project Number :	**1-24866**	Issue Number:	1
Project :	**Proposed Residence**	Page 1 of 1	
Location :	**Rangeville**		

SAMPLE DETAILS:					
Sample ID:	WHL22-0202-S1	WHL22-0202-S2			
Date Sampled:	3/03/2022	3/03/2022			
Date Tested:	21/03/2022	21/03/2022			
Soil Description:	Silty Clay (CH) Trace of Sand & Gravel, Brown, Black & Orange Mottled	Silty Clay (CH) Trace of Sand & Gravel, Brown/ Red Brown			
Sampling Method:	As Supplied	As Supplied			
Sampled by:	SSE	SSE			
Sample Location:	**BH02**	**BH03**			
Depth (m):	**0.6**	**0.6**			
Source:	Borehole	Borehole			
Material:	Unknown	Unknown			
TEST RESULTS:					
Swell Test (AS1289.7.1.1)					
Swell on Saturation(%)	**1.4**	**5.8**			
Moisture Content Before(%)	24.6	20.9			
Moisture Content After(%)	27.5	27.0			
Shrink Test (AS1289.7.1.1)					
Shrink on Drying(%)	**4.1**	**2.8**			
Shrinkage Moisture Content(%)	25.0	22.1			
Est. Inert Material(%)	5	2			
Crumbling	None	None			
Cracking	Slight	Slight			
Results:					
Shrink Swell Index - Iss (%):	**2.7**	**3.2**			
Swell Pressure (kPa)		220			
Unit Weight (t/m^3):	1.98	2.15			

Remarks :

APPROVED SIGNATORY
C.Ferguson-Hannah

Nata Accreditation number: 15301

END OF DOCUMENT

APPENDIX H

SITE PLANS

LEGEND

Borehole Locations

Approx. Lot Boundary

Image from Nearmap.com (15/11/2021)

SCALE: 1:750 @ A4			DRAWING TITLE: **Bore Hole Locations**
REFERENCE: V:\Milton\Milton 1-24001 - 1-25000\1-24801 - 1-25000\1-24866 Rangeview\Graphics			
A4	DRW NO: 1-24866-01	DATE: 18/02/2022	CHECKED: NTP
CLIENT: Dash House Trust			
LOCATION: 1F Alderley Street Rangeview			

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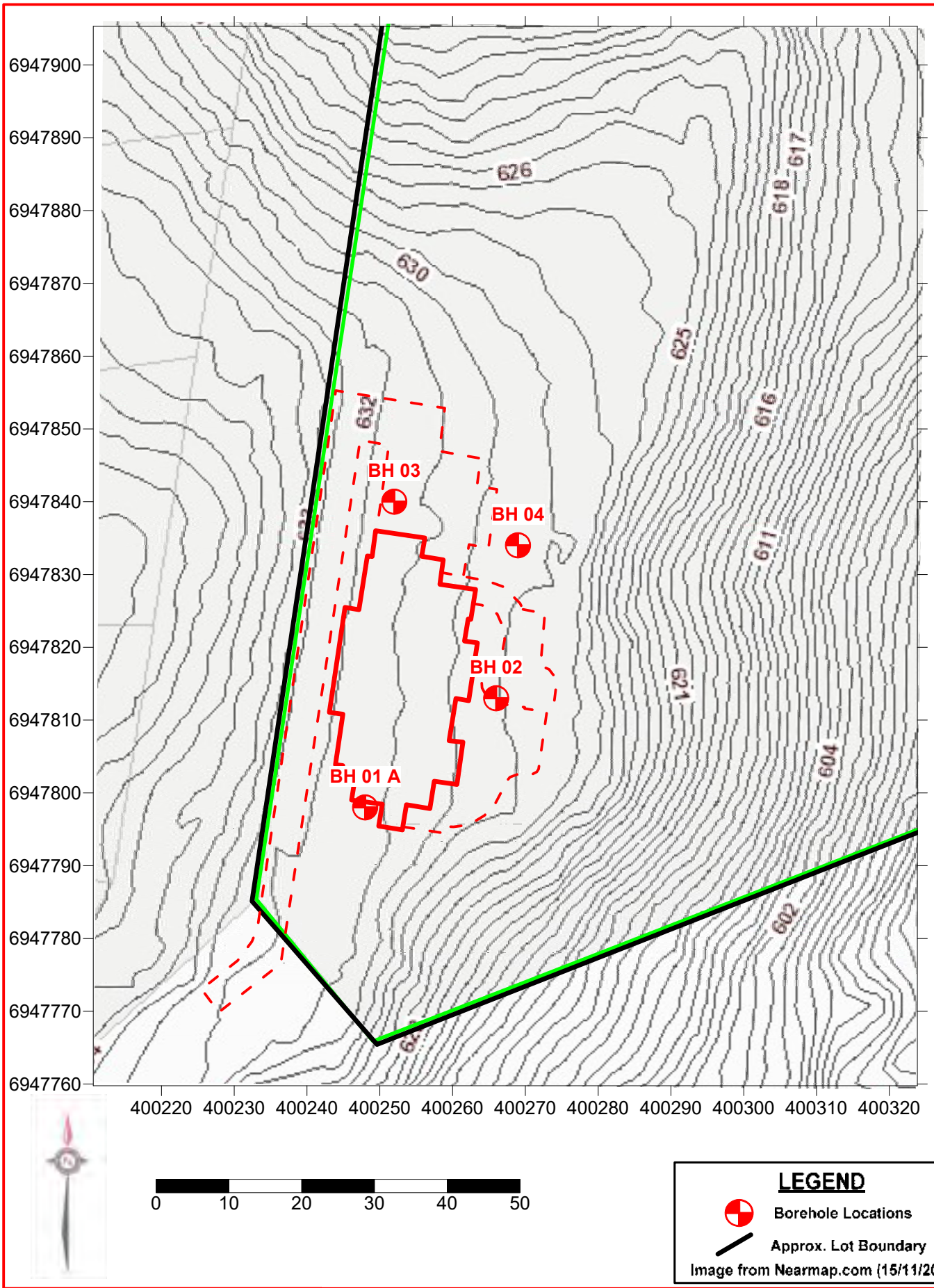

LEGEND

Borehole Locations

Approx. Lot Boundary

Image from Nearmap.com (15/11/2021)

SCALE: 1:750 @ A4			DRAWING TITLE: **TRC Contours**
REFERENCE: V:\Milton\Milton 1-24001 - 1-25000\1-24801 - 1-25000\1-24866 Rangeview\Graphics			
A4	DRW NO: 1-24866-02	DATE: 18/02/2022	CHECKED: NTP
CLIENT: Dash House Trust			
LOCATION: 1F Alderley Street Rangeview			

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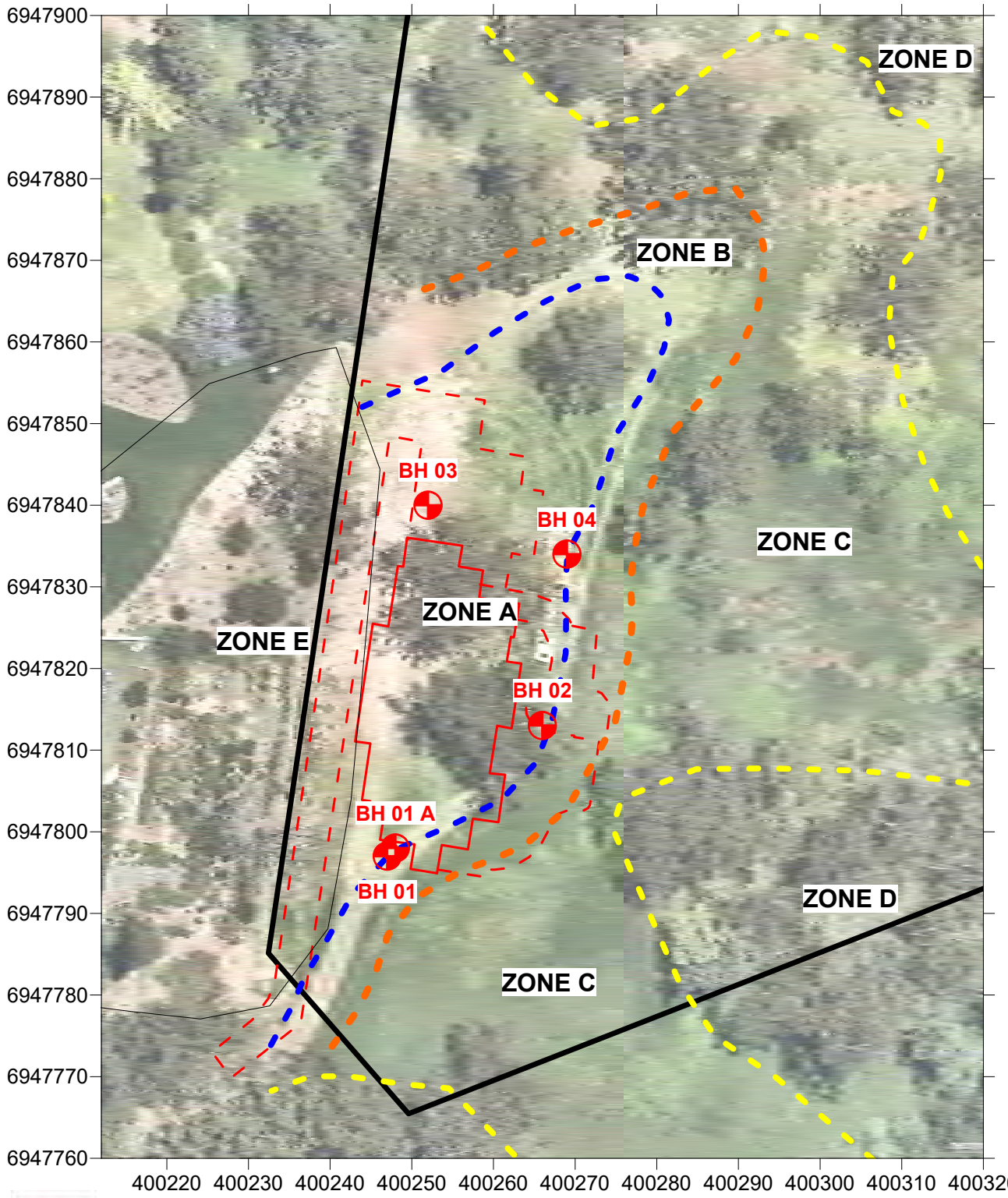

LEGEND

Borehole Locations

Approx. Lot Boundary

Image from Nearmap.com (15/11/2021)

SCALE: 1:750 @ A4			DRAWING TITLE: **Stability Zones**
REFERENCE: V:\Milton\Milton 1-24001 - 1-25000\1-24801 - 1-25000\1-24866 Rangeview\Graphics			
A4	DRW NO: 1-24866-03	DATE: 18/02/2022	CHECKED: NTP
CLIENT: Dash House Trust			
LOCATION: 1F Alderley Street Rangeview			

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APPENDIX I

HILLSIDE CONSTRUCTION GUIDELINES

AUSTRALIAN GEOGUIDE LR8 (CONSTRUCTION PRACTICE)

HILLSIDE CONSTRUCTION PRACTICE

Sensible development practices are required when building on hillsides, particularly if the hillside has more than a low risk of instability (GeoGuide LR7). Only building techniques intended to maintain, or reduce, the overall level of landslide risk should be considered. Examples of good hillside construction practice are illustrated below.

WHY ARE THESE PRACTICES GOOD?

Roadways and parking areas - are paved and incorporate kerbs which prevent water discharging straight into the hillside (GeoGuide LR5).

Cuttings - are supported by retaining walls (GeoGuide LR6).

Retaining walls - are engineer designed to withstand the lateral earth pressures and surcharges expected, and include drains to prevent water pressures developing in the backfill. Where the ground slopes steeply down towards the high side of a retaining wall, the disturbing force (see GeoGuide LR6) can be two or more times that in level ground. Retaining walls must be designed taking these forces into account.

Sewage - whether treated or not is either taken away in pipes or contained in properly founded tanks so it cannot soak into the ground.

Surface water - from roofs and other hard surfaces is piped away to a suitable discharge point rather than being allowed to infiltrate into the ground. Preferably, the discharge point will be in a natural creek where ground water exits, rather than enters, the ground. Shallow, lined, drains on the surface can fulfil the same purpose (GeoGuide LR5).

Surface loads - are minimised. No fill embankments have been built. The house is a lightweight structure. Foundation loads have been taken down below the level at which a landslide is likely to occur and, preferably, to rock. This sort of construction is probably not applicable to soil slopes (GeoGuide LR3). If you are uncertain whether your site has rock near the surface, or is essentially a soil slope, you should engage a geotechnical practitioner to find out.

Flexible structures - have been used because they can tolerate a certain amount of movement with minimal signs of distress and maintain their functionality.

Vegetation clearance - on soil slopes has been kept to a reasonable minimum. Trees, and to a lesser extent smaller vegetation, take large quantities of water out of the ground every day. This lowers the ground water table, which in turn helps to maintain the stability of the slope. Large scale clearing can result in a rise in water table with a consequent increase in the likelihood of a landslide (GeoGuide LR5). An exception may have to be made to this rule on steep rock slopes where trees have little effect on the water table, but their roots pose a landslide hazard by dislodging boulders.

Possible effects of ignoring good construction practices are illustrated on page 2. Unfortunately, these poor construction practices are not as unusual as you might think and are often chosen because, on the face of it, they will save the developer, or owner, money. You should not lose sight of the fact that the cost and anguish associated with any one of the disasters illustrated, is likely to more than wipe out any apparent savings at the outset.

ADOPT GOOD PRACTICE ON HILLSIDE SITES

AUSTRALIAN GEOGUIDE LR8 (CONSTRUCTION PRACTICE)

WHY ARE THESE PRACTICES POOR?

Roadways and parking areas - are unsurfaced and lack proper table drains (gutters) causing surface water to pond and soak into the ground.

Cut and fill - has been used to balance earthworks quantities and level the site leaving unstable cut faces and added large surface loads to the ground. Failure to compact the fill properly has led to settlement, which will probably continue for several years after completion. The house and pool have been built on the fill and have settled with it and cracked. Leakage from the cracked pool and the applied surface loads from the fill have combined to cause landslides.

Retaining walls - have been avoided, to minimise cost, and hand placed rock walls used instead. Without applying engineering design principles, the walls have failed to provide the required support to the ground and have failed, creating a very dangerous situation.

A heavy, rigid, house - has been built on shallow, conventional, footings. Not only has the brickwork cracked because of the resulting ground movements, but it has also become involved in a man-made landslide.

Soak-away drainage - has been used for sewage and surface water run-off from roofs and pavements. This water soaks into the ground and raises the water table (GeoGuide LR5). Subsoil drains that run along the contours should be avoided for the same reason. If felt necessary, subsoil drains should run steeply downhill in a chevron, or herring bone, pattern. This may conflict with the requirements for effluent and surface water disposal (GeoGuide LR9) and if so, you will need to seek professional advice.

Rock debris - from landslides higher up on the slope seems likely to pass through the site. Such locations are often referred to by geotechnical practitioners as "debris flow paths". Rock is normally even denser than ordinary fill, so even quite modest boulders are likely to weigh many tonnes and do a lot of damage once they start to roll. Boulders have been known to travel hundreds of metres downhill leaving behind a trail of destruction.

Vegetation - has been completely cleared, leading to a possible rise in the water table and increased landslide risk (GeoGuide LR5).

DON'T CUT CORNERS ON HILLSIDE SITES - OBTAIN ADVICE FROM A GEOTECHNICAL PRACTITIONER

More information relevant to your particular situation may be found in other Australian GeoGuides:

- GeoGuide LR1 - Introduction
- GeoGuide LR2 - Landslides
- GeoGuide LR3 - Landslides in Soil
- GeoGuide LR4 - Landslides in Rock
- GeoGuide LR5 - Water & Drainage
- GeoGuide LR6 - Retaining Walls
- GeoGuide LR7 - Landslide Risk
- GeoGuide LR9 - Effluent & Surface Water Disposal
- GeoGuide LR10 - Coastal Landslides
- GeoGuide LR11 - Record Keeping

The Australian GeoGuides (LR series) are a set of publications intended for property owners; local councils; planning authorities; developers; insurers; lawyers and, in fact, anyone who lives with, or has an interest in, a natural or engineered slope, a cutting, or an excavation. They are intended to help you understand why slopes and retaining structures can be a hazard and what can be done with appropriate professional advice and local council approval (if required) to remove, reduce, or minimise the risk they represent. The GeoGuides have been prepared by the Australian Geomechanics Society, a specialist technical society within Engineers Australia, the national peak body for all engineering disciplines in Australia, whose members are professional geotechnical engineers and engineering geologists with a particular interest in ground engineering. The GeoGuides have been funded under the Australian governments' National Disaster Mitigation Program.

ATTACHMENT 3

Development Approval

Issued by:

Toowoomba Regional Council