



GEOTECHNICAL REPORT

Updated Broadscale Geotechnical Investigation and Landslide Risk
Assessment for Proposed Residential Subdivision

41-53 Courtney Drive, 176-202 Baileys Mountain Road and 288 & Lot
57 Reserve Road

Upper Coomera

Norfolk Estates Pty Ltd

June 2025

PG-12268

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30th June, 2025

Norfolk Estates Pty Ltd
Email: john.warlow@qm.com.au

ATTN: JOHN WARLOW

Dear Sir,

**UPDATED BROADSCALE GEOTECHNICAL INVESTIGATION AND LANDSLIDE RISK
ASSESSMENT FOR PROPOSED RESIDENTIAL SUBDIVISION
41-53 COURTNEY DRIVE, 176-202 BAILEYS MOUNTAIN ROAD AND 288 & LOT 57
RESERVE ROAD, UPPER COOMERA**

Enclosed is a copy of our report for the above project dated June 2025. An electronic copy of the report has been issued.

Should you have any queries regarding this report, please do not hesitate to contact Leigh Bexley or Peter Elkington at this office.

Yours faithfully,



P. ELKINGTON (RPEQ 7226)

For and on behalf of
PACIFIC GEOTECH PTY LTD



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1.0 INTRODUCTION

This broadscale report presents the results of an updated Broadscale Geotechnical Investigation and Landslide Risk Assessment for a proposed new residential subdivision at 41-53 Courtney Drive, 176-202 Baileys Mountain Road and 288 & Lot 57 Reserve Road, Upper Coomera.

It is understood that additional land has been acquired, and the proposed development layout has been amended to involve the subdivision of the above site into 188 individual residential Lots with associated roads, parks and detention basins. Earthworks are expected to consist of significant cuts in the elevated portions of the site and significant fills in the lower portions of the site in association with batters and retaining walls to create level building platforms for the proposed residential development.

From a review of the City Plan Overlay Map provided by City of Gold Coast (Council), parts of the site are located in areas which have been assessed as being a 'Moderate' Landslide Hazard. On this basis, the Client is required to provide a Landslide Risk Assessment of the site as part of a development application to Council.

The report therefore includes a Landslide Risk Assessment which broadly assesses the site in its existing condition, identifying significant geotechnical constraints or issues which would impact on the proposed development within each Lot. A Landslide Susceptibility Rating has also been assigned to each individual Lot and recommendations to maintain or achieve a Landslide Susceptibility Rating of Low or better has been provided. The Landslide Risk Assessment has been carried out in accordance with the City of Gold Coast Council (CoGC) "SC6.10 City Plan Policy - Geotechnical Stability Assessment Guidelines," January 2021.

This report contains the results of the updated Broadscale Geotechnical Investigation and Landslide Risk Assessment and provides general advice and recommendations relating to the following:

- Subsurface conditions in accordance with AS 1726-2017.
- Landslide Risk Assessment which assesses the suitability of the site for residential development. A Landslide Susceptibility Rating has also been assigned to each proposed new Lot and recommendations have been provided to maintain or improve stability.
- Geotechnical issues or constraints for development.
- Drainage recommendations.

Broadscale earthworks recommendations including:

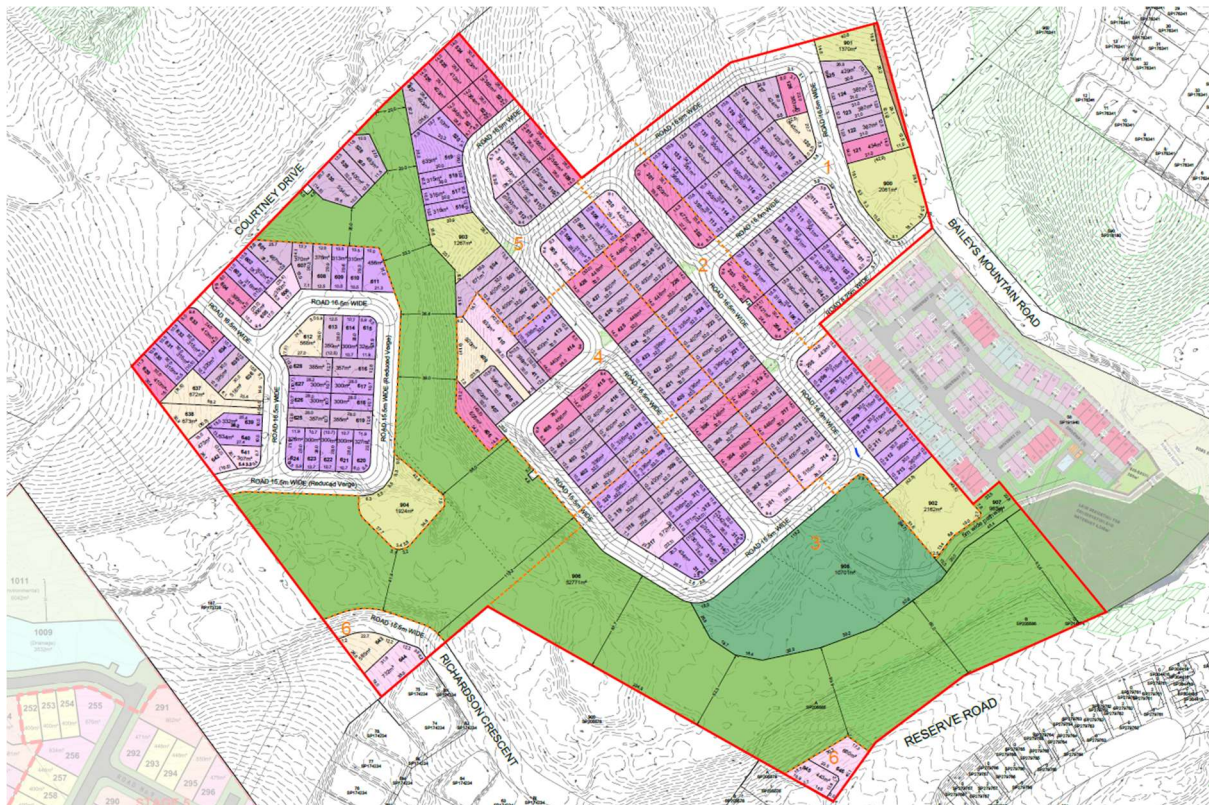
- Suitability of cut for reuse as fill
- Compaction standards

- Stripping depths
- Trafficability
- Excavatability
- Safe temporary batter slopes for cuts
- Fill batter slopes
- Broad scale site classification in accordance with AS.2870-2011, including predicted ground movement and site reactivity at selected borehole locations.
- Preliminary foundation recommendations.
- Preliminary retaining wall design parameters.
- Preliminary pavement design parameters, based on results of soaked CBR testing.
- General recommendations for residential development at the site.

A geotechnical investigation for each individual Lot including site classifications in accordance with AS2870 "Residential Slabs and Footings" and detailed investigation for house design and infrastructure is beyond the scope of this report.

The proposed development is indicated below.

PROPOSED LAYOUT



2.0 METHODOLOGY

A desk study of the Moreton 1:500,000 Geological Map as well as aerial photographs, contour plans, concept plan of subdivision and the 'City Plan Overlay Map' showing Landslide Hazard Ratings provided by CoGC Council were initially carried out to identify the site geology, sloping terrain and areas of potential instability at the site.

Following the desk study, a walkover survey of the site was performed by a Principal Engineering Geologist from Pacific Geotech. This involved mapping and measuring features of significance to slope stability such as slope angles and direction, erosion features, surface and subsurface drainage, wet zones, vegetation density, cut and fill areas and the presence of any irregular surface features such as curved trees, slips, slumps, debris slides or any associated features.

To assess the subsurface conditions at the site, fifteen (15) boreholes (BH01 to BH15) and six (6) test pits (TP01 to TP06) were drilled/excavated at the site. The boreholes were drilled to depths ranging between 1.1m and 5.9m using a utility mounted Digga PDT1 drilling rig with 100mm solid flight augers. The test pits were excavated using a 23 tonne excavator with a 600mm toothed bucket and extended to depths ranging between 0.8m and 3.3m. Dynamic Cone Penetrometer (DCP) tests were carried out adjacent to most borehole locations. The boreholes, test pits and DCP tests were used to assess subsurface profiles to assist with the Landslide Risk Assessment.

The soil classification descriptions and field tests were carried out in general accordance with Australian Standards.

AS 1726 Geotechnical Site Investigations

AS 1289 Methods of Testing Soils for Engineering Purposes

Site photographs are shown in the site description below. The logs of the boreholes and test pits including the DCP test results are presented in Appendix B. The laboratory test certificates are attached in Appendix C whilst the Guidelines for Hillside Construction are presented in Appendix D. The Standard Proforma for Geotechnical Certification and Landslide Susceptibility Analysis Forms are attached in Appendix E. A Site Plan showing the location of the boreholes/test pits and a Concept Plan of Proposed Subdivision are attached to this report in Appendix F.

3.0 SITE DESCRIPTION

The site is located at 41-53 Courtney Drive, 176-202 Baileys Mountain Road and 288 & Lot 57 Reserve Road, Upper Coomera and forms an irregular shaped parcel of land with a total area of 18.266ha. It is made up of six large acreage Lots and is bound by acreage residential properties as well as Courtney Drive to the north, Baileys Mountain Road to the east and Reserve Road to the south. Several environmental, drainage and recreational areas are also proposed throughout the site.

The site topography typically comprises a hill crest in the central and northern portion of the site which also extends into the adjacent neighbouring properties. The hillcrest is flanked to the east, west and south by mild sloping terrain which typically ranges between 5° and 15° in slope gradient with some localised steeper areas ranging up to approximately 20° in slope gradient. The hill crest typically comprises flat or gentle sloping terrain of less than 5° in slope gradient.

The site is drained by several gullies and drainage swales throughout the development areas of the site including a large drainage gully which enters the site from Courtney Drive in the far north west corner. These gullies and drainage swales flow into Yaun Creek in the southern portion of the site with the flow of water towards the east. Yaun Creek meanders around the low lying southern portion of the proposed development area of the site and is surrounded by a flat flood plain area in most areas. Most development appears to avoid these flat flood plain areas as well as the large drainage gully, however several localised areas where development is proposed slightly encroach into these flat flood plain areas adjacent to Yaun Creek.

Numerous dams are also evident throughout the site. These dams are typically confined to the gullies and drainage swales throughout the site.

At the time of the investigation, numerous cut and fill pads associated with existing or recently demolished residential dwellings and sheds were evident throughout the site. These cut and fill pads were located within the elevated areas of the site as well as localised areas of the mild sloping terrain and formed cut and fill batters typically ranging up to approximately 2m in height and depth.

Localised filled areas also appear to be evident extending into the flat floodplain areas associated with Yaun Creek to the south and included filled areas around boreholes BH05, BH08 and BH09 and test pits TP01 to TP05.

Surface levels within the development area at the site range from RL50m in the elevated northern portion of the site down to RL25m in the flat, floodplain area associated with Yaun Creek to the south.

Most of the site has been cleared of vegetation and supports a sparse covering of mature and juvenile native trees with low grass and significant weeds as well as some moderately dense native tree vegetation within the southern portion of the site adjacent to Yaun Creek.

Refer following aerial and site photographs for typical site conditions.

AERIAL IMAGE



SITE PHOTOGRAPHS



Plate 1 – Drainage gully located in low lying far western portion of the site aligning Baileys Mountain Road.



Plate 2 – Drainage swale within mild sloping terrain in northern portion of the site.



Plate 3 – Mild sloping terrain flanking hill crest in northern portion of the site.



Plate 4 – Flat flood plain area adjacent to Yaun Creek in southern portion of the site.



Plate 5 – Possible filled area which extends into flat flood plain area on left adjacent to Yaun Creek in southern portion of the site.



Plate 6 – Dam within drainage swale in southern portion of site next to Yaun Creek.



Plate 7 – Mild sloping terrain in southern portion of development area.



Plate 8 – Filled area extending into flat flood plain area associated with Yaun Creek.



Plate 9 – Flat area at base of mild sloping terrain in western portion of site near BH03.



Plate 10 – Cut and fill pad located on hill crest in central portion of the site.

4.0 GEOTECHNICAL MODEL

Based on the results of borehole drilling and the excavation of test pits, the subsurface conditions encountered within the mild sloping terrain and hill crest typically comprise natural topsoil and minor silty sand at the surface which is underlain by natural stiff or better clay soil. The natural clay is underlain by highly weathered (HW) sandstone and siltstone rock encountered at depths of typically less than 1.5m, extending to the borehole/test pit termination depths.

The subsurface conditions encountered within the gullies, drainage swales or the low lying relatively flat areas of the site typically comprise natural topsoil underlain by sand based soil. The sand is underlain by a deeper profile of clay soils, extending to depths ranging between 2.4m and 4.0m. The clay soils are underlain by highly weathered (HW) sandstone and siltstone rock, extending to the borehole termination depths.

In several boreholes and test pits (BH01, BH04, BH05, BH08, BH09, TP01 to TP05) uncontrolled fill material was encountered which had been placed over the natural clay and typically ranged up to 1.5m to 2.5m in thickness but up to approximately 5.5m in borehole BH09 which may have been drilled within the side of a service trench. The fill material encountered at the site was typically associated with building pads for existing or pre-existing development (ie BH01 and BH04) or placed in low lying areas of the site to raise the surface level in areas prone to flooding (ie BH05, BH09 and TP01

to TP05). In several areas the fill material also appeared to be partly associated with the spoil from the construction of the dams at the site.

Table 1 presents a summary of the encountered subsurface profile. Detailed borehole and test pit record sheets are attached to this report.

TABLE 1 - SUBSURFACE PROFILE SUMMARY

BH/TP No.	FILL	NATURAL						BH/TP TD
		Topsoil	Silty Sand/ Clayey Sand	Clay			HW Rock	
		Loose/ Medium Dense	Loose/ Medium Dense	Soft/Firm	Stiff	Very Stiff/Hard	VLS/LS	
BH01	0.0-2.3	2.3-2.45	NE	NE	NE	2.45-2.8	2.8-TD	3.6*
BH02	NE	0.0-0.15	NE	NE	NE	0.15-0.65	0.65-TD	1.1*
BH03	NE	0.0-0.15	0.15-0.35	NE	NE	0.35-4.0	4.0-TD	4.05*
BH04	0.0-0.5	0.5-0.6	NE	NE	NE	0.6-2.4	2.4-TD	3.0*
BH05	0.0-1.6	NE	NE	NE	NE	1.6-TD	NE	5.0
BH06	NE	0.0-0.1	0.1-0.4	NE	NE	0.4-1.3	1.3-TD	2.9*
BH07	NE	0.0-0.1	0.1-0.25	NE	NE	0.25-1.5	1.5-TD	2.8*
BH08	0.0-1.4	NE	NE	NE	NE	1.4-TD	NE	4.5
BH09	0.0-5.5	NE	NE	NE	NE	5.5-TD	NE	5.9
BH10	NE	0.0-0.1	0.1-0.4	NE	NE	0.4-0.6	0.6-TD	1.2*
BH11	NE	0.0-0.1	NE	NE	NE	0.1-0.7	0.7-TD	1.5*
BH12	NE	0.0-0.1	0.1-0.5	NE	0.5-1.2	1.2-3.0	3.0-TD	3.6*
BH13	NE	0.0-0.1	0.1-0.3	NE	NE	NE	0.3-TD	0.6*
BH14	NE	0.0-0.1	NE	0.1-2.2	2.2-3.3	3.3-TD	NE	4.5
BH15	NE	0.0-0.4	0.4-1.6	NE	NE	1.6-3.1	3.1-TD	3.4*
TP01	0.0-2.1	NE	NE	NE	NE	2.1-TD	NE	2.3
TP02	0.0-1.2	NE	NE	NE	NE	1.2-TD	NE	1.5
TP03	0.0-2.6	NE	2.6-2.9	NE	NE	2.9-TD	NE	3.3
TP04	0.0-1.4	NE	NE	NE	NE	1.4-TD	NE	1.9
TP05	0.0-1.3	NE	NE	NE	NE	1.3-TD	NE	1.8
TP06	NE	0.0-0.15	0.15-0.3	NE	NE	0.3-TD	NE	0.8

Notes:

1. All depths in metres below ground level at time of investigation.
2. NE - Not Encountered; TD - Termination Depth; BH - Borehole; TP - Test Pit.
3. *Maximum TC bit; drill rig refusal.
4. VLS- Very Low Strength, LS – Low Strength

Groundwater was encountered in boreholes BH14, BH15 and test pit TP03 only which were drilled/excavated within or near drainage features at depths of 0.8m, 1.0m and 1.8m respectively at the time of the investigations. No other test pits or boreholes encountered groundwater or subsurface seepage during the investigations.

Seepage could be expected through the surficial granular soils and at the fill/natural soil and natural soil/rock interface following periods of rainfall.

5.0 LABORATORY TESTING

Laboratory testing was carried out on samples retrieved from the site investigation program and was directed towards assessing the reactivity and subgrade characteristics of the subsurface material. The laboratory tests included California Bearing Ratio (CBR) tests and Shrink/Swell Index tests with the results of the laboratory testing contained in Appendix C.

6.0 LANDSLIDE RISK ASSESSMENT

There is no evidence of existing or recent past slope instability involving large scale movements of significant quantities of soil or rock in a short duration event such as a slip or landslide within the proposed development area. There is, however evidence of instability involving erosion and slumping within the drainage features as well as around the dams at the site. There is also evidence of minor instability involving movements of the surficial soil in the form of creep movement within the sloping terrain. Uncontrolled fill material has also been placed in some localised areas of the site.

Several drainage features and dams display evidence of instability within the banks in the form of erosion and slumping. It is also expected that in the base of several drainage features as well as the dams, weak, wet soils are likely to be present at the base. The dams will need to be dewatered and the instability within the banks will need to be removed to expose a competent base. Subgrade replacement requiring the removal of the wet, weak soils in the base of the dams and drainage features where development is proposed may also be required prior to the placement of fill material over the dams and drainage features. This may also require the installation of culverts/pipes at the base of the fills if all surface water and subsurface water cannot be intercepted and directed away from the filled drainage features (ie Lots 121 to 126). Recommendations for treatment of these unsuitable areas and the implementation of drainage provisions is described in Sections 8.0 to 11.0 of this report.

Slow movement or creep of the surficial soil is presently occurring within the mild sloping terrain at the site. The creep movement appears to typically involve up to approximately 0.3m of soil at the surface and is evident by the presence of minor back slants on juvenile trees, typically where the slope exceeds 10° in slope gradient. This minor creep movement of the surficial soil is not expected to impact on the proposed development providing the recommendations outlined in this report are followed.

Uncontrolled fill material appears to have been placed around several of the building pads associated with the existing residential dwellings and recently demolished dwellings and sheds. Uncontrolled fill material also appears to have been placed in localised areas extending into the flat floodplain areas associated with Yaun Creek to the south including at borehole locations BH05, BH08 and BH09 and test pit locations

TP01 to TP05. This uncontrolled fill will need to be removed prior to the placement of controlled fill and prior to residential development at the site.

In all terrain within the proposed development area at the site, the likelihood of slope movement in the form of deep seated failures through the soil or rockmass is considered to be low, due to the relatively flat terrain or mild sloping topography and the estimated friction angle of the soil and rock being significantly higher than the angle of the slope.

With the exception of the instability within the drainage features and dams as well as the presence of creep movement of the surficial soil, the site displays no evidence of instability which would impact on the proposed development. However, due to the sloping terrain, creep movement, uncontrolled fill and several drainage features and dams throughout the site which are proposed to be filled, precautions must be taken during development in relation to earthworks, foundations and drainage to reduce the potential for instability, settlement and erosion. This includes implementing and maintaining properly designed and constructed drainage structures upslope and around the proposed development areas, possible ground improvement works in the dams and drainage features and removing any uncontrolled fill. Recommendations for treatment of these unstable areas and the implementation of drainage provisions is described in subsections below of this report.

6.1 Landslide Susceptibility Ratings for Individual Lots

A site specific Landslide Risk Assessment of each individual Lot was performed in accordance with the City of Gold Coast Council (CoGC) "SC6.10 City Plan Policy - Geotechnical Stability Assessment Guidelines," January 2021, based on the current site conditions. It must be noted that the Landslide Susceptibility Rating assigned to each Lot applies to the risk associated with the majority of the Lot in its existing condition.

It can be expected that some areas of the Lot may contain Landslide Susceptibility Ratings higher than the overall assigned rating for the site. Depths to bedrock and soil profiles have been obtained from borehole drilling at the site and onsite observations.

The individual Lots have been assigned a Landslide Susceptibility Rating based on:-

- Ground surface slope angle and shape
- Geology
- Typical depth of soil cover
- Presence of uncontrolled fill, erosion features, drainage features, slips or surface irregularities
- Seepage and drainage conditions as assessed during the walkover survey carried out for this study

The results of the Landslide Risk Assessment for each individual Lot are presented in Table 2 below.

TABLE 2 – LANDSLIDE SUSCEPTIBILITY RATINGS FOR INDIVIDUAL LOTS

Identified Lot No.	Landform	Relative Susceptibility	Susceptibility Rating	Required Works to Maintain/Reduce Susceptibility Rating to Low or Better
101-112	Mild Slope	0.2143	Low	Sections 8.0 to 18.0 as reported herein
113-126	Gully/Swale/Dam	0.7655	Moderate	Sections 8.0 to 18.0 as reported herein
127-134	Mild Slope	0.2143	Low	Sections 8.0 to 18.0 as reported herein
201-210	Mild Slope	0.2143	Low	Sections 8.0 to 18.0 as reported herein
211-213	Floodplain	0.2722	Low	Sections 8.0 to 18.0 as reported herein
214-230	Mild Slope	0.2143	Low	Sections 8.0 to 18.0 as reported herein
301	Gully/Swale/Dam	0.7655	Moderate	Sections 8.0 to 18.0 as reported herein
302-312	Mild Slope	0.2143	Low	Sections 8.0 to 18.0 as reported herein
313-316	Floodplain	0.2722	Low	Sections 8.0 to 18.0 as reported herein
317-320	Mild Slope	0.2143	Low	Sections 8.0 to 18.0 as reported herein
401-407	Mild Slope	0.2143	Low	Sections 8.0 to 18.0 as reported herein
408	Hillcrest	0.0110	Very Low	Sections 8.0 to 18.0 as reported herein
409-410	Mild Slope	0.2143	Low	Sections 8.0 to 18.0 as reported herein
411-414	Hillcrest	0.0110	Very Low	Sections 8.0 to 18.0 as reported herein
415-426	Mild Slope	0.2143	Low	Sections 8.0 to 18.0 as reported herein
427-428	Hillcrest	0.0110	Very Low	Sections 8.0 to 18.0 as reported herein
501-506	Mild Slope	0.2143	Low	Sections 8.0 to 18.0 as reported herein
507-508	Hillcrest	0.0110	Very Low	Sections 8.0 to 18.0 as reported herein
509-525	Mild Slope	0.2143	Low	Sections 8.0 to 18.0 as reported herein
526-530	Gully/Swale/Dam	0.7655	Moderate	Sections 8.0 to 18.0 as reported herein
601-608	Floodplain	0.2722	Low	Sections 8.0 to 18.0 as reported herein
609-611	Flat Filled Area	0.7371	Moderate	Sections 8.0 to 18.0 as reported herein
612-625	Floodplain	0.2722	Low	Sections 8.0 to 18.0 as reported herein
626-627	Gully/Swale/Dam	0.7655	Moderate	Sections 8.0 to 18.0 as reported herein
628	Floodplain	0.2722	Low	Sections 8.0 to 18.0 as reported herein
629-638	Mild Slope	0.2143	Low	Sections 8.0 to 18.0 as reported herein
639-641	Floodplain	0.2722	Low	Sections 8.0 to 18.0 as reported herein
642-646	Mild Slope	0.2143	Low	Sections 8.0 to 18.0 as reported herein

The majority of the Lots at the site have been assessed as having a 'Low' or better Landslide Susceptibility Rating due to the relatively flat or mild sloping topography with no evidence of major instability. However, several Lots are located within drainage features, dams or a flat floodplain area which has been filled and have been assigned a Landslide Risk Rating of 'Moderate' in their current state.

It is assessed that all Lots at the site can be maintained or reduced to a 'Low' or better Landslide Susceptibility Rating for the long term providing the recommendations presented in Sections 8.0 to 18.0 of this report are followed.

6.2 Implications of Hazard Classifications

The implications of Hazard Risk Ratings are presented in the City of Gold Coast (CoGC) publication "Guidelines for Control of Slope Instability within the City of the Gold Coast" and reproduced in Table 3.

TABLE 3 – IMPLICATIONS OF HAZARD CLASSIFICATIONS (CoGC PUBLICATION)

Hazard Rating	Implications
VH (Very High Hazard)	Extensive detailed investigation and research, planning and implementation of treatment options essential to reduce risk to acceptable levels.
H (High Hazard)	Detailed investigation, planning and implementation of treatment options required to reduce risk to acceptable levels.
M (Moderate Hazard)	Tolerable provided treatment plan is implemented to maintain or reduce risk. May be accepted. May require investigation and planning of treatment options.
L (Low Hazard)	Usually accepted. Treatment requirements and responsibility to be defined to maintain or reduce risk.
VL (Very Low Hazard)	Accepted. Managed by routine procedures.

7.0 GEOTECHNICAL ISSUES OR CONSTRAINTS FOR DEVELOPMENT

Most of the existing site is considered to be suitable for residential development as most of the proposed development areas avoid the major geotechnical issues or constraints which would impact on the proposed development. The Lots are typically located within relatively flat or mild sloping terrain and there is no evidence of any major existing or recent past instability within the development area of the site. There are however, unstable areas associated with the dams, drainage features and uncontrolled fill which have the potential to impact on the proposed development during the design life of the development if not addressed. Some Lots are also located within flat floodplain areas with weak soils and some uncontrolled fill and development in these areas will need to take this into account including potentially raising the surface level above the Council flood levels in these areas.

These main geotechnical issues which must be addressed prior to development are as follows:-

- The presence of uncontrolled fill at several locations across the site which must be addressed.
- The presence of inground elements such as concrete structures, building foundations etc. which must be removed prior to any potential filling or development.
- Presence of several drainage features and dams which must be dewatered and ground improvement works carried out including the removal of all weak wet soils prior to any potential filling or development.

- Development in floodplain areas. Some floodplain areas adjacent to the drainage features (ie Lots 609 to 611) also contain weak soils and uncontrolled fill material at the surface and ground improvement works including the removal of all uncontrolled fill and weak wet soils prior to any potential filling or development may need to be carried out.
- Sloping terrain.
- Providing adequate drainage or maintaining existing drainage at the site.
- Stripping of the topsoils prior to any potential filling.
- Depressions formed by the removal of trees.
- Potential for differential settlements where fills are significant and fill thickness vary significantly over short distances. (ie filled gullies).
- The presence of shallow rock in the anticipated cut areas which may be difficult to excavate and break down to achieve a product that is suitable for use as structural fill.

8.0 RECOMMENDATIONS TO REDUCE/MAINTAIN LANDSLIDE RATING TO LOW

The Landslide Susceptibility Rating for most of the Lots is assessed to be 'Low' or better for the long term. However, several Lots have been assessed to have a 'Moderate' Landslide Susceptibility Rating as they are located with dams, drainage features or flat floodplain areas with some uncontrolled fill and require treatment prior to filling and residential development. There is also creep movement evident within the mild sloping terrain. The following risk maintenance and reduction strategies are required to maintain or reduce the Landslide Susceptibility Rating to a level of 'Low' or better.

- All uncontrolled fill, topsoils and unsuitable surficial soils should be removed as part of the bulk earthworks to expose a competent base prior to the placement of fill. Alternatively, the fill can be adequately retained where possible.
- In areas where drainage features or dams are to be filled, the recommendations for drainage as well as dewatering and removal of unsuitable soils stated in Section 9.0 below must be followed prior to filling.
- In areas where development is proposed within the flat floodplain areas, these areas may potentially require filling to raise the surface level above the Council regulated flood levels.
- Appropriate scour protection must be implemented along all batters which are located adjacent to or encroach into drainage features.
- All proposed earthworks including all cut and fill batters and retaining structures must achieve a long term factor of safety in excess of 1.5 against geotechnical global instability.

- The recommendations described in Sections 8.0 to 18.0 of this report must be followed which includes recommendations for drainage, site preparation prior to filling, filling, safe cut and fill batters slope angles and general recommendations for residential development.

9.0 DRAINAGE RECOMMENDATIONS

Properly designed, constructed and maintained surface and subsurface drainage is critical to the long term performance of the Lots in terms of slope stability, soil creep and erosion. The ingress of both subsurface and surface water into the cleared sloping terrain or potential structural fill platforms is assessed to be a potential trigger for instability within the Lots at the site. Therefore, minimising the ingress of surface and subsurface water into the sloping terrain or potential structural fill platforms is of significant importance as saturation of these materials can result in creep movements and slips.

The following recommendations with regards to drainage at the site should also be implemented:-

- Upslope surficial water flows should be intercepted and directed away from all Lots, future batters and retaining walls limiting the ingress of water into the potential fill platforms. The pavement drainage system may be sufficient for some Lots, batters and retaining walls.
- Subsurface drains should be installed upslope of the gullies as determined on site by Pacific Geotech at the time, to ensure cut off of the subterrain flow is achieved.
- All Lot runoff should be discharged into stormwater systems via a system of pipe conduits to minimise water infiltration into the slopes and potential fill platforms.
- In areas where drainage features or dams are to be filled, the drainage features and dams must be dewatered and all weak, wet and unsuitable soils must be removed to expose a competent base prior to filling. All surface and subsurface water must then be intercepted and directed away from the drainage features and into dedicated drainage systems. If this cannot be achieved, the installation of drainage such as pipes and culverts will need to be installed at the base of the fills. This is the responsibility of the civil designer. Fill can then be placed in accordance with AS3798.
- Storage tanks must be located to the side or downslope of the dwelling.

10.0 SITE PREPARATION AND STRIPPING DEPTHS

Prior to the placement of fill there are several issues and requirements which must be addressed regarding the surficial soils at the site. These issues include trees, grass, topsoil at the surface, uncontrolled fill and wet weak soils. Most boreholes indicate the

presence of stable, stiff or better clay soils below a depth of approximately 0.3m below the natural ground surface.

The following treatment action is recommended within the development area prior to the placement of structural fill:-

- Remove all trees, grass, topsoil, uncontrolled fill and surface irregularities such as eroded areas from the existing ground surface which is expected to typically extend to depths ranging up to approximately 0.1m to 0.2m (topsoil) but possibly up to approximately 2.5m where wet or weak soils are present within drainage features/dams or more where uncontrolled fill is present (ie TP03) and these soils cannot be adequately compacted prior to filling.
- The stripped ground surface should be proof rolled under Pacific Geotech's supervision using a large vibrating roller of minimum weight of 12 tonnes, to identify areas of weak surficial soils and to compact the upper level material.
- Depressions formed by the removal of vegetation or other features should have all disturbed soil removed to expose competent natural soil and be backfilled with compacted and suitably moisture conditioned select fill material.
- Where the ground surface slopes, the stripped surface should be benched prior to filling.

11.0 RECOMMENDATIONS FOR FILLING

It is anticipated that filling will be carried out as part of the works within Lots and Roads at the site. Broad recommendations for filling are as follows:-

- In areas which are to be filled, all trees, grass, weed zones, uncontrolled fill, organic matter and debris must be removed from the existing ground surface to expose competent natural soil.
- No filling or residential development should take place within any recent past surface irregularities such as washouts, hummocky terrain, seepage zones, uncontrolled fill or erosion features without detailed assessment by Pacific Geotech. If filling or development is to occur in these areas, surface irregularities must be removed prior to development and appropriate drainage provisions must be implemented as described in Section 9.0.
- All filling onsite including fill used in the construction of any proposed batters and behind retaining walls is placed and compacted to at least 95% Standard Maximum Dry Density and is "Controlled Fill" in accordance with A.S. 2870 (Clause 6.4.2 (a)) – "Residential Slabs and Footings" and A.S. 3798.
- Where the ground surface slopes, the foundation is benched prior to filling and the fill supported by engineered retaining walls or battered to the appropriate angles described in Section 13.0 below.

- Fill slopes should be over-constructed and trimmed back to ensure compaction in the outer zones.
- Vertical heights of natural soil and fill batters should incorporate a 1.0m wide bench at every 2.5m height interval when battered to maximum allowable slope angle and a 2.5m wide bench at every 5.0m height interval.
- The majority of the soils on site will be suitable for re-use as structural fill, provided the material is free of organic matter and deleterious material. It is likely that the soils will require conditioning to bring them to optimum moisture content. If the clays are overly moist, difficulty in achieving compaction of the materials will be encountered and moisture conditioning will be required. If the sands have a fines content of greater than approximately 5%, difficulties in working the sands could be experienced, particularly if the sands are overly moist. Preferential disposal of silty sands is recommended to avoid potential handling issues associated with this material. If sands are encountered near the fill/natural interface, some over-excavation and replacement of these sands with a well graded fill material may be required. In the fill areas, treatment and/or bridging of these sands may be required, subject to inspection by Pacific Geotech.
- In the flood plain areas around test pit TP03, unsuitable soils including uncontrolled fill were encountered extending to a depth of approximately 3m. It is recommended that prior to any earthworks in this area that the earthworks contractor excavate a series of test pits throughout this area to further assess the extent, depth and amount of contaminants in this fill material and to assess if it would be economically feasible to dry this material out and remove the contaminants so it would be able to be reused as structural fill material.
- The weathered rock when broken down upon extraction to a maximum particle size of 75mm would generally be suitable for reuse as structural fill providing particles ranging between 50mm and 75mm in size do not make up more than 15% of the total fill volume. Based on our experience on the adjacent site, the weathered rock becomes significantly stronger, less weathered and less fractured with depths resulting in significant issues with achieving a well graded fill product. In our experience, the less weathered rock is unsuitable for reuse without processing using a crushing plant. It is strongly recommended that additional investigations be undertaken to further assess the nature of the weathered rock once bulk earthworks plans are refined.
- In addition to the above, consideration must be given to the material types. It is expected that the soil and more weathered rock will be placed in the lower fill levels with stronger, less fractured and more permeable rock fill material placed above. Careful consideration must be given to ensuring a suitable, relatively impermeable fill product is achieved.

- All filling should be undertaken in layer thicknesses of approximately 250mm (or as appropriate for the compaction equipment being used). Fill should be compacted to at least 95% Standard Maximum Dry Density at a placement moisture content of $\pm 2\%$ of Optimum Moisture Content (OMC) and be "Controlled Fill" in accordance with A.S. 2870 (Clause 6.4.2 (a)) – "Residential Slabs and Footings" and A.S. 3798.
- 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.
- Imported select fill material, if required, should be a good quality select fill material with a soaked CBR of at least 10%, a maximum aggregate size of 50mm and have a maximum Shrink/Swell Index of 1.0%.
- With the use of in-situ or imported reactive clay soils, proper control of moisture content during placement and compaction is required so as to minimise the potential for swelling and shrinkage movement. Moisture content within the range of OMC to OMC +2% is recommended. Foundation design must reflect the use of the potentially reactive clays if they are used as structural fill.

12.0 EXCAVATION CHARACTERISTICS

The information and advice presented in this section of the report is based on the conditions encountered in the boreholes drilled within the development area only. Variations in these conditions will occur across the site and must be expected.

No information with regards to the proposed earthworks have been provided at this stage, however cuts ranging in excess of 5m in the elevated portions of the site may be expected. Bulk excavations extending to depths in excess of 5m are expected to encounter fill material, natural sand and clay as well as extremely weathered (XW), highly weathered (HW), moderately weathered (MW) slightly weathered (SW) and possibly fresh (Fr) siltstone and sandstone rock.

Bulk excavations to the refusal depths in the boreholes (Refer Table 1) should be achievable using conventional earth moving machinery such as scrapers, small to medium dozers (say Cat D6) and medium sized excavators (say ~15t to 20t) using general purpose and toothed buckets. Excavations beyond these depths to depths in excess of 5m in the elevated areas of the site are typically unknown but will likely require the use of medium to large sized dozers (say Cat D7-D9) or large sized excavators (say >24t) using general purpose and toothed buckets. Ripper attachments or possibly hydraulic rock breakers are also likely to be required where possibly less weathered sandstone and siltstone is encountered. Based on our experience on the adjacent site, the rock becomes stronger, less weathered and less fractured requiring larger equipment and possibly soft blasting to achieve

economical excavation rates and to produce a rock product that is suitable for the use as fill.

Additional drilling in the form of core drilling with a truck or track mounted drilling rig would need to be carried out to the required depths to provide a more accurate assessment of the excavation conditions at the site.

No significant groundwater issues are expected to be encountered in excavations for this site under normal weather conditions.

13.0 BATTERS

It is understood that a series of 2.5m high cut and fill batters separated by flat benches at every 2.5m height interval will be required as part of the proposed earthworks development.

Maximum safe cut batter angles for the different materials encountered on site are shown below in Table 4 for unsurcharged batters less than 3.0m high. Where surcharges are located within H(m) (height of the batter) of the top of the batter, then some reduction in the design angle will be required.

TABLE 4 – SAFE BATTER ANGLES FOR CUTS

Material	Short Term	Long Term
Structural fill	45° (1V:1H)	26° (1V:2H)
Medium Dense or Better Sands	45° (1V:1H)	26° (1V:2H)
Stiff or better Natural Clay Soils	45° (1V:1H)	26° (1V:2H)
XW/HW Rock	63° (2V:1H)	45° (1V:1H)

Structural fill batters should be overconstructed and trimmed back at no steeper than 2(H):1(V) or 26°.

It is essential that all exposed permanent batters be suitably protected from erosion and scour. Upslope surficial water flows should also be directed away from the batters limiting the ingress of water into the fill. The pavement drainage system may be sufficient for some batters.

For excavations of a very short term nature, and subject to assessment of factors such as the conditions at the time of excavation, length of time excavations are to remain open, working conditions/requirements and most importantly the rock structure in the cut face, etc., steeper excavations could be possible. Pacific Geotech should be contacted to determine an appropriate profile when construction details have been finalised.

14.0 SITE CLASSIFICATION

The results of Shrink/Swell Index testing indicate that the natural clay soil material encountered at the site is highly reactive to soil moisture changes. On this basis, preliminary potential characteristic ground surface movements of up to 50mm may be expected within this clay material within the upper 1.5m zone of influence on this site corresponding to Class 'H1' site prior to additional filling at the site. These typical ground surface movements are estimated in the context of "normal" soil moisture variations, as defined in AS2870-2011 *Residential Slabs and Footings – Construction*.

Where the natural clay soils are excavated and used as structural fill onsite, a higher soil classification than shown above may result.

Where excavations are carried out to expose weathered rock at the surface the development site would be classified Class 'S' in accordance with AS 2870-2011 'Residential Slabs and Footings' with potential characteristic ground surface movements of up to 20mm expected.

It is recommended that the readers satisfy themselves that the use of AS 2870-2011 is applicable for the proposed design and the above site classification re-confirmed following the completion of the bulk earthworks operation.

15.0 BUILDING FOUNDATIONS

15.1 High Level Foundations

The most appropriate footing systems for the support of the residential buildings in areas of the site which are less than 10° in slope angle are considered to be high level strip or pad footings or stiffened raft system.

The design of high-level footings including pads, strips and the ground beams of stiffened rafts founding in new controlled fill, medium dense natural sand, stiff/very stiff/hard natural clay or weathered rock at a minimum depth of 0.5m below the finished ground surface can be based on the allowable bearing pressures presented in Table 5 below.

TABLE 5 – ALLOWABLE DESIGN PARAMETERS FOR HIGH LEVEL FOOTINGS

Material ⁽¹⁾		Allowable Bearing Pressure (kPa) ⁽³⁾
Uncontrolled Fill		Not Recommended
Controlled Fill ⁽²⁾		100
Natural Clay	Stiff	100
	Very Stiff	200
	Hard	400
XW/HW Bedrock ⁽⁴⁾	Very Low/Low Strength	600
Notes: 1. All founding material should be verified by a suitably qualified geotechnical engineer or engineering geologist during construction. 2. In accordance with AS3798-2007 and certified as such. 3. Based on a factor of safety of 3.0. 4. Greater capacities may be available in stronger, less weathered rock subject to inspection at the times of excavation.		

Where the foundations for the building found in different materials, consideration should be given to articulating the foundation system to minimise differential settlements.

It is expected that settlements associated with creep of the structural fill may range up to 0.5% of the fill thickness. On this basis, consideration must be given to the potential for significant differential settlements in areas where fill thicknesses vary significantly over short distances. Fill supervision in these areas is critical and should only be carried out by experience geotechnical technicians to reduce fill settlements to a minimum.

It is recommended that detailed site specific investigations be undertaken by Pacific Geotech, following bulk earthworks, to confirm the site classification and foundation recommendations for each structure.

Where footings are located adjacent to excavations such as underground service trenches, it is recommended that the footings be deepened to found at least 200mm below a line drawn up at 45 degrees from the base of the trench.

15.2 Deep Foundations

Where uncontrolled fill is evident or the sloping terrain is greater than approximately 10° in slope gradient, a deep footing system is the preferred foundation system. Piers founding through any existing uncontrolled fill and into the very stiff or hard natural clay soils or extremely weathered (XW) or highly weathered (HW) rock are considered a suitable system for deep footings at this site.

The deep foundation system should be designed in accordance with the recommendations of AS 2159-2009 'Piling - Design and Installation'.

Indicative ultimate geotechnical strength ($R_{d,ug}$) of piles can be calculated using the unfactored, ultimate shaft adhesion and end bearing values given in Table 6. The $R_{d,ug}$ values given in Table 6 will need to be multiplied by a suitable geotechnical strength reduction factor (ϕ_g) to obtain the design geotechnical strength ($R_{d,g}$) of piles. In accordance with AS2159-2009, the ϕ_g value must be determined by the designer, but based on the anticipated site, design and installation risk factors, a ϕ_g value of 0.40 is recommended. Higher values may be applicable with suitable supervision and additional investigation.

If working stress methods are used in the pile design, the $R_{d,ug}$ values given in Table 6 will need to be divided by a factor of safety of 2.5 to calculate the maximum single pile working load.

Bored piles can be designed using the indicative ultimate geotechnical pressures presented in Table 6 below.

TABLE 6 – INDICATIVE ULTIMATE DESIGN PARAMETERS FOR BORED PILES

Material		Ultimate Geotechnical Shaft Adhesion (kPa)	Ultimate Geotechnical End Bearing Pressure (kPa) ⁽³⁾	
			$L \leq 4D$ ⁽²⁾	$L \geq 4D$ ⁽²⁾
Controlled Fill		NC ⁽¹⁾	NR ⁽¹⁾	NR ⁽¹⁾
Natural Clay Soils	Stiff	25	NR ⁽¹⁾	NR ⁽¹⁾
	Very Stiff	35	600 ⁽⁴⁾	900 ⁽⁴⁾
	Hard	50	1200 ⁽⁴⁾	1800 ⁽⁴⁾
XW/HW Rock	Very Low/Low Strength	100	1800	2700
Notes: (1) NC – Not considered; NR – Not recommended. (2) L – Total pier socket length; D – Pile diameter. (3) Values given above are based on founding material extending to at least four pile diameters below the pile base. (4) Upward ultimate geotechnical shaft adhesion resistance and ultimate end bearing pressure should only be considered below a depth of 2 pile diameters due to possible moisture variations where clay soils are present.				

Construction Considerations

If bored piers are adopted, the bases of the bored pile holes must be thoroughly cleaned of all loose soil and rock debris using a proper cleaning tool. The practice of adding water and spinning the auger is generally not acceptable. If there is any doubt as to the effectiveness of the base cleaning, the base resistance must be ignored.

Groundwater or seepage was only encountered in boreholes BH14 and BH15 and test pit TP03 which were drilled excavated within drainage features or floodplain areas adjacent to drainage features. Groundwater is therefore generally not expected during bored pile installation. If seepage is encountered, inflow rates are expected to

be slow and the pile holes will need to be poured immediately following the excavation of the holes. If significant seepage is encountered, the holes will need to be lined with steel liners which must be socketed into low permeability material to achieve an impermeable seal against any water charged soils above.

Alternatively, groundwater seepages may be controllable by pumping, otherwise requiring the piles to be constructed under water or bentonite using tremie methods. Shaft adhesion must be ignored for the portion of the pile that is permanently lined. As an alternative to bored piles, grout injected CFA piles could be adopted.

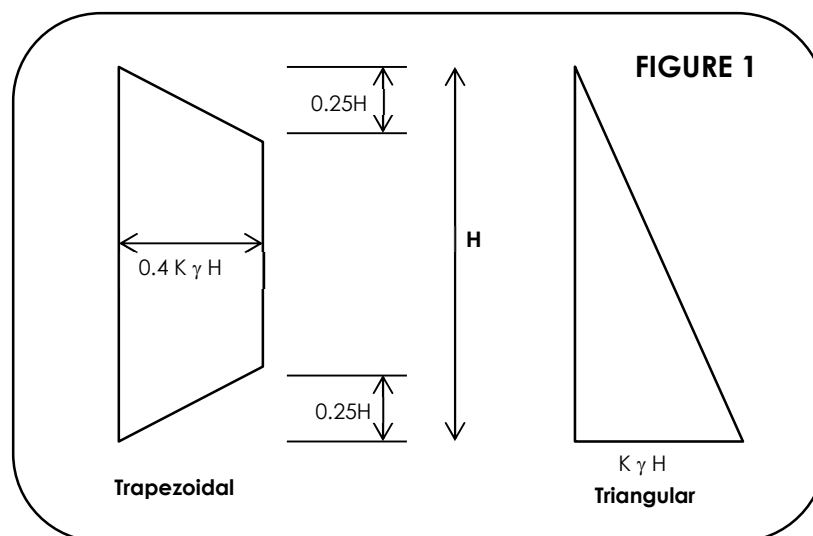
Drilling piles is not only dependent on the subsurface profile characteristics, but also the type (power and size) of the bored pile drilling rig, drilling teeth, size of pile, etc. It is recommended that a specialist drilling contractor be consulted to be able to manage the above conditions and materials encountered.

During construction, it is recommended that footing inspections be undertaken by Pacific Geotech, following excavation, to confirm the specified founding strata has been reached.

16.0 RETAINING WALLS

Retaining walls should be specifically engineer designed in accordance with AS 4678-2002 (Ref 9).

The design of flexible and rigid retaining walls could be undertaken using a triangular pressure distribution and the earth pressure parameters given in Table 7. Flexible walls are those which are free to rotate or tilt (such as cantilevered walls) and should be designed using active (K_a) earth pressure coefficient. Rigid walls are those which are restrained against rotation or tilt (i.e. single anchored/propped walls) and should be designed using the at-rest earth pressure (K_o) and a trapezoidal pressure distribution as per Figure 1.



Passive resistance (K_p) at the toe of the wall should be ignored in the zone where future disturbance (e.g. services trenches) could occur.

The effects of surcharge in the retained zone should be included by multiplying the vertical pressure developed by the surcharge by the appropriate lateral earth pressure coefficient. Allowance should also be made for the surcharge due to sloping crests if applicable.

TABLE 7 - EARTH PRESSURE COEFFICIENTS (NON-SLOPING CREST BACKFILL)

Material	Unit Weight (kN/m ³)	Friction Angle (degrees)	Active K_a	At Rest K_o	Passive K_p
Controlled Clay Fill*	19	26	0.39	0.56	2.57
Natural Sand - Loose	19	30	0.33	0.50	3.00
Natural Sand – Medium Dense	20	32	0.31	0.47	3.25
Clays - Stiff	19	26	0.39	0.56	2.57
Clays - Very Stiff/Hard	20	28	0.35	0.53	2.77
XW/HW Rock	23	34	0.28	0.44	3.55

Notes: * Depends on fill material type and level of compaction. Assumes material compacted under 'Level 1' supervision.

The generalized lateral earth pressure distribution is given as:

$$p = K\gamma H + Kq + \sigma_L \text{ (kPa)}$$

- K is either K_a , K_o , or K_p for "active", "at rest" or "passive" earth pressure conditions, respectively
- γ (kN/m³) is the relevant density of the soil or rock
- H (m) is the distance down from the top of the wall
- q (kPa) is any uniform surface surcharge load behind the wall
- σ_L (kPa) is the lateral pressure on the wall resulting from adjacent surcharges.

It is assumed that no groundwater is present and adequate drainage will be provided behind the wall.

It is recommended that the design parameters for retaining walls presented in this section be confirmed by on-site inspection when the subsurface conditions are exposed during construction.

Preference should be given to adopting thin soil layers and using small hand-controlled compaction equipment during backfilling against retaining walls. This is in order to limit the stress applied to the walls during construction. Should heavy compaction be required, then wall stresses will be well in excess of K_o and temporary propping should be used.

Clay backfill should not be placed dry of optimum moisture content, as this can lead to increased future swelling with changes to moisture content or inundation from water creating additional load on the back of the wall.

It is recommended that all retaining walls be drained for full height in order to minimise hydrostatic pressure build-up behind the wall. Additional guidelines on wall drainage are provided in Appendix G of AS 4678-2002.

17.0 PAVEMENT DESIGN CONSIDERATIONS

Soaked CBR laboratory testing was conducted on samples of the natural clay soils from boreholes BH06 and BH12 with the clay from borehole BH12 comprising a high sand content with some gravel. The Soaked CBR tests produced values of 3.0% (BH06) and 12.0% (BH06).

Considering the nature of the natural clays, a design CBR value of 2% to 3% and a modulus of subgrade reaction of 20kPa/mm to 25kPa/mm are recommended for the pavement design where the natural clay or clay fill is to form the subgrade for pavements. This value should be confirmed with additional on-site sampling and testing following the bulk earthworks operation on site.

Following excavations, in areas where XW/HW siltstone or sandstone are to form the subgrade for pavements, a design CBR value of 4% to 6% and a modulus of subgrade reaction of 30kPa/mm to 40kPa/mm could be considered for the pavement design. This value should be confirmed with additional on-site sampling and testing following the bulk earthworks operation on site.

Specific additional construction considerations are offered in regard to the construction of the pavements on the site:-

- Suitable subsurface drainage should be installed around the perimeter of the pavements.
- It should be ensured that the subgrade of the pavement is suitably graded to allow any seepage to flow from under the pavement to the perimeter drains.
- Pavement materials should comply with MRS 11.05 specifications and the corresponding minimum dry density ratios are recommended:
 - i) Lower Sub-base (Type 2.5) 95% (Modified)
 - ii) Sub-base (Type 2.3) 95% (Modified)
 - iii) Base (Type 2.1) 98% (Modified)
- Inspections and testing should be carried out by Pacific Geotech following the completion of the bulk earthworks to confirm subgrade conditions across the pavement areas.

18.0 GENERAL RECOMMENDATIONS FOR DEVELOPMENT

To maintain the long term performance of the proposed development, good management of the soil conditions and the development is vital throughout the life of the development.

The following are some specific comments with respect to site management and general development at the site:

- The ground surface around the perimeter of the buildings should slope away from the structure and fall to the stormwater system. Water should not be allowed to pond adjacent to the buildings.
- Founding soils should not be allowed to become saturated.
- Service trenches under the buildings should be kept to a minimum. Saturation of the on-site material will result in an increase in potential ground surface movements.
- Footings should be poured immediately after excavation. If footings cannot be poured on the same day as excavation, a blinding layer of 50mm thickness is recommended.
- Trees, garden beds and other vegetation should be planted at a distance at least equivalent to three quarters of their mature height away from the structures. This will assist in minimising shrinkage movements in the expansive onsite soils.
- Trafficability across the site at the time of the investigation was assessed to be fair to good. If significant rainfall events occur during the earthworks operation, some difficulties could be experienced in trafficking the exposed surface, particularly following stripping of the ground surface to expose the high plasticity clay soils or silty/clayey sands. Site trafficability may be improved by constructing haulage roads into and on the site or placing rock along high traffic areas.
- All permanent excavations exceeding 1.0m must be supported by adequately engineered retaining walls incorporating drainage or battered at appropriate angles.
- All retaining walls must be individually designed to have a factor of safety of at least 1.5 with respect to internal stability, including sliding and overturning. This is the responsibility of the retaining wall designer.
- The residential development within all Lots must be designed, constructed and maintained in accordance with the attached Guidelines for Hillside Construction and the development examples of good and poor hillside practice.

- Revegetation must commence immediately after the completion of any potential earthworks to minimise future erosion.
- Excavations into the slope must not undermine the stability of any existing structures. I.e. all footings from adjacent buildings or structures must be founded at least 200mm below a line drawn up at 45 degrees from the base of any excavation.
- The feasibility and suitability of the site for the proposed residential development based on existing geotechnical conditions of the site is considered satisfactory providing the recommendations stated in this report are followed and implemented.

19.0 PROPOSED RESIDENTIAL BUILDING RECOMMENDATIONS

The recommendations for any proposed development within the proposed new Lots in the future must be followed as part of the operational building works:-

- All house footings must found into structural fill platforms, medium dense or better natural sands or stiff or better natural soil or weathered rock, below any uncontrolled fill, topsoils, weak soils or soils which may be susceptible to settlement or creep movement.
- A detailed geotechnical investigation of any proposed new development must also be carried out prior to development to confirm the foundation requirements stated above. All structures must also be adequately designed to restrain any upper level soil creep and withstand lateral forces from the movement of soil.
- All roof water from any possible future development should be discharged into stormwater systems via a system of pipe conduits clear of the site to minimise water infiltration into the slopes and fill platforms. Alternatively, roof water can be discharged into roof water tanks for storage.
- Storage tanks must be located to the side or downslope of any potential dwellings that may be constructed in the future.

20.0 ACID SULFATE SOILS

It is understood that no excavations below R.L 20m are proposed as part of the earthworks for this site.

On this basis, no assessment of the site for Acid Sulfate Soils is required in accordance with the City of Gold Coast Council Planning Scheme Policy 14 – Management of Activities located within Acid Sulfate Soils – Version 1.0.

21.0 LIMITATIONS

We have prepared this report for the Updated Broadscale Geotechnical Investigation and Landslide Risk Assessment for Proposed Residential Subdivision at 41-53 Courtney Drive, 176-202 Baileys Mountain Road and 288 & Lot 57 Reserve Road, Upper Coomera. The report is provided for the exclusive use of Norfolk Estates Pty Ltd, for this project only and for the purposes outlined in the report. It should not be used by, or relied upon, for other projects on the same or different sites or by a third party. In preparing this report, we have relied upon information provided by the client or their agents.

The results are indicative of the subsurface conditions on site only at the specific testing locations. Subsurface conditions can change between test locations and the design and construction should take the spacing of the testing and testing methods adopted and the potential for variation between the test locations.

It is recommended that Pacific Geotech be engaged to provide advice and ensure the development is undertaken in accordance with the assumptions made in writing this report.

This is not to reduce the level of responsibility accepted by Pacific Geotech, but rather to ensure that the parties who may rely on the information contained in this report are aware of the responsibilities they assume in doing so.



L. BEXLEY

For and on behalf of

PACIFIC GEOTECH PTY LTD



P. ELKINGTON (RPEQ 7226)

APPENDICES

APPENDIX A

NOTES RELATING TO THIS REPORT

Reports

The report has been prepared by qualified personnel, is based on the information obtained from field and laboratory testing, and has been undertaken to current engineering standards of interpretation and analysis.

Every care has been taken with the report as it relates to interpretation of subsurface conditions, discussion of geotechnical conditions and contains recommendations or suggestions for design and construction. However, unexpected variations in ground conditions will occur. The potential for this will depend partly on testing, spacing and sampling frequency.

If variations are identified, Pacific Geotech would be pleased to assist with additional investigations or advice to resolve the matter.

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Borehole and Test Pit Logs

The borehole and test pit logs presented in this report are an engineering and/or geological interpretation of the subsurface conditions, and their reliability will depend to some extent on frequency of sampling and the method of drilling or excavation.

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

Description and Classification Methods

The description and classification of soils and rocks used in this report are based on AS 1726.

Soil types are described according to the predominating particle size and behaviour as set out in the attached Unified Soil Classification Table qualified by the percent of

other particles present (e.g. sandy clay) as set out below:

Soil Classification	Particle Size
Clay	less than 0.002mm
Silty	0.002 to 0.06mm
Sand	0.06 to 2mm
Gravel	2 to 60mm

Non-cohesive soils are classified on the basis of relative density which can be correlated from the results of Standard Penetration Test (SPT) as below:

Relative Density	SPT 'N' Value (blows/300mm)
Very Loose	less than 4
Loose	4 – 10
Medium Dense	10 – 30
Dense	30 – 50
Very Dense	greater than 50

Cohesive soils are classified on the basis of strength (consistency) and can be quantified by the Pocket Penetrometer test, Vane Shear test, laboratory testing or engineering examination. The strength terms are defined as follows:

Classification	Unconfined Compressive Strength kPa
Very Soft	less than 25
Soft	25 - 50
Firm	50 – 100
Stiff	100 – 200
Very Stiff	200 - 400
Hard	greater than 400
Friable	strength not attainable – soil crumbles

Rock types are classified by their geological names, together with descriptive terms regarding weathering, strength, defects, etc.

Planarity	
CU	Curved
DIS	Discontinuous
IR	Irregular
PR	Planar
ST	Stepped
UN	Undulose

Roughness	
POL	Polished
RJ	Rough
S	Smooth
SL	Slickened
VR	Very Rough

Defects	Type
BP	Bedding Parting
CL	Cleavage
CO	Contact
CS	Crushed Seam
CZ	Crushed Zone
DB	Drilling Break
DK	Dyke
DL	Drill Lift
DZ	Decomposed Zone
FC	Fracture
FL	Foliation
FZ	Fracture Zone
HB	Handling Break
IS	Infilled Seam
JT	Joint
H	Schistosity
SI	Sill
SM	Seam
SS	Shear Seam
SZ	Shear Zone
VN	Vein
VO	Void

Sampling

Sampling is undertaken during the fieldwork to allow examination of the soil or rock and to allow laboratory testing to be undertaken.

Disturbed samples taken during drilling provide information on plasticity, grain size, colour, moisture content and minor constituents. Bulk samples are similar but of greater volume required for some test procedures such as CBR testing.

Undisturbed samples are taken by pushing a thin-walled sample tube, usually 50mm diameter (known as a U50), into the soil and collecting 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 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.

Investigation Methods

Test Pits: These are typically undertaken with a backhoe or a tracked excavator, allowing examination of the insitu soils. Limitations of test pits are the problems associated with collapse of the pits, 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 typical diameter of between 50mm to 75mm advance manually operated equipment. Premature refusal of the hand augers can occur on a variety of materials such as fill, gravel, hard clays and collapse of the borehole (typically in non-cohesive soil).

Continuous Spiral flight Augers: The borehole is advanced using 65mm to 100mm diameter continuous spiral flight augers, which are withdrawn at intervals to allow sampling and insitu testing. Augers of up to 300mm in diameter are used to recover larger volumes of sample. Samples are returned to the surface by the flights or may be collected after withdrawal of the auger flights. Samples can be disturbed and layers may become mixed. Augering below the groundwater table can be less reliable than augering above the water table.

A Tungsten Carbide (TC) bit for auger drilling into rock can be used to indicate rock strength and continuity by variation in drilling resistance and from examination of recovered rock fragments but provides only an indication of the likely rock strength. Where rock strengths may have a significant impact on construction feasibility or costs, then further investigation by means of cored boreholes may be warranted.

Wash Boring: The borehole is advanced by a bit attached to the end of a hollow rod string, with water being pumped down the drill rods and returned up the annulus of the borehole, carrying the drill cuttings. Changes in stratification can be determined from the return, together with information from "feel" and rate of penetration.

The borehole can be stabilised through the use of drilling mud as a circulating fluid. The term 'mud' encompasses a range of products ranging from bentonite to polymers such as Revert or Biogel.

Continuous Core Drilling: A continuous core sample is obtained using a diamond tipped core barrel. This technique provides a reliable (but relatively expensive) method of investigation. In rocks, an NMLC triple tube core barrel is used, which gives a core of about 50mm diameter. The length of core recovered is compared to the length drilled and any length not recovered is shown as CORE LOSS.

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 and also of obtaining a disturbed sample. The test procedure is described in Australian Standard 1289, "Methods of Testing Soils for Engineering Purposed", 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 63kg hammer, with a free fall of 760mm. The sample is driven in three successive 150mm increments and the 'N' value is taken as the number of blows for the last 300mm. In dense soils, hard clays or weak rock, the full 450mm penetration may not be practicable and the test is discontinued.

The test results are reported in the following form:

- In the case where full penetration is obtained with successive blow counts for each 150mm of , say, 4, 6 and 7 blows, as
N = 13
4, 6, 7
- In a case where the test is discontinued short of full penetration, say after 15 blows for the first 150mm and 30 blows for the next 40mm, as
N > 30
15, 30/40mm

Cone Penetrometer Testing (CPT): Cone Penetrometer Testing with or without pore pressure measurement (CPTu) is carried out

using a Cone Penetrometer in general accordance with AS 1289 6.5.1, 1999.

In the tests, a 36mm diameter rod with a conical tip is pushed continuously into the soil, the reaction being provided by a hydraulic ram system. Measurements are made of the end bearing resistance on the cone and the fractional resistance on a separate 135mm long sleeve, immediately behind the cone. Pore Pressure is recovered through a pore ring located either within, or more usually immediately behind the cone/tip.

As penetration occurs (at a rate of approximately 20mm per second) and data is recorded every 20mm of penetration, the results are presented graphically.

The information provided on the plot comprises:

- Cone resistance – expressed in mPa
- Sleeve friction – expressed in kPa
- Friction ratio – the ratio of sleeve friction to cone resistance expressed as a percentage.
- Pore pressure in kPa
- Tilt of probe (in degrees).

The ratios of the sleeve resistance to cone resistance will vary with the type of soil encountered, with higher relative friction in clays than in sands. Friction ratios of 1% to 2% are commonly encountered in sands and rising to 2% to as high as 8%, and higher in organic soils. Soil descriptions based on cone resistance and friction ratios are only inferred and must not be considered as exact.

Stratification can be inferred from the cone and friction traces and from experience and information from nearby boreholes, etc. Where shown, this information is presented for general guidance, but must be regarded as interpretive.

Dynamic Cone Penetrometers:

Dynamic Cone Penetrometer (DCP) tests are carried out by driving a 16mm diameter rod into the ground with a 9kg sliding hammer dropping 510mm and counting the blows for successive 100mm increments of penetration.



Logs

The borehole or test pit logs are an 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.

Interpretation of the information shown on the logs, and its application to design and construction, should therefore take into account the spacing of the 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 low permeability soils it may enter the hole slowly or perhaps not at all during the time it is left open.
- A localised perched water table may lead to an erroneous indication of the true water table.
- Water table levels will vary from time to time with seasons or recent weather changes 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 flushed from the hole and drilling mud must be washed out of the hole or 'reverted' chemically if water observations are to be made.

More reliable measurements can be made by installing standpipes from which ongoing monitoring can be undertaken.

Fill

The present 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 to reliably determine the extent of the fill.

Laboratory Testing

Laboratory testing is carried out in general accordance with Australian Standard 1289 'Methods of Testing Soil for Engineering Purposes'.

Site Anomalies

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

Review of Design

Where major civil or structural developments are proposed or where only a limited investigation has been completed or where the geotechnical conditions/constraints are quite complex, it is prudent to have a design review.

Site Inspection

Pacific Geotech would be pleased to provide engineering inspection services for geotechnical aspects of work to which this report is related:

Requirements could range from:

- i. a site visit to confirm that conditions exposed are no worse than those interpreted, to
- ii. a visit to assist the contractor or other site personnel in identifying various soil/rock types such as appropriate footing or pier founding depths, or
- iii. full time engineering present on site.

APPENDIX B

BOREHOLE AND TEST PIT RECORD SHEETS

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd

Commenced: 12/09/2024

Project Name: Proposed Residential Subdivision

Logged By: LB

Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera

Checked By:

Hole Position:

Drill Model and Mounting: 23t Excavator

RL Surface: No survey

Hole Diameter:

Datum: AHD Operator:

Drilling Information							Soil Description		
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional
600mm toothed bucket						0.20		SM	FILL Silty Gravelly SAND (SM) Medium dense, fine to medium grained, grey, fine to medium sized gravel, trace low plasticity clay, moist (root matter).
						0.5		CI	FILL Sandy CLAY (CI) Stiff, medium plasticity, orange brown mottled brown, fine to medium grained sand, with fine to medium sized gravel, moist (some pvc pipe & some organics).
						1.0			
						1.10		GM	FILL Silty Sandy GRAVEL (GM) Medium dense, fine to medium sized, orange brown mottled brown and grey, fine to coarse grained sand, with low plasticity clay, moist (some cobbles).
						1.50		GC	FILL Clayey Sandy GRAVEL (GC) Medium dense, fine to coarse sized, brown mottled and grey, low plasticity clay, fine to medium grained sand, moist.
						2.10		CI-CH	NATURAL Silty CLAY (CI-CH) Very stiff, medium to high plasticity, grey mottled orange brown, trace fine grained sand, moist.
						2.30			Hole Terminated at 2.30 m
						2.5			
						3.0			
						3.5			
Method AS - Auger RR - Rock Roller WB - Washbore							Water ☒ Level (Date) ☐ Inflow		Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample
Support C - Casing							Classification Symbols and Soil Descriptions Based on Unified Soil Classification System		Remarks 1. Groundwater not encountered.

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd

Commenced: 12/09/2024

Project Name: Proposed Residential Subdivision

Logged By: LB

Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera

Checked By:

Hole Position:

Drill Model and Mounting: 23t Excavator

RL Surface: No survey

Hole Diameter:

Datum: AHD Operator:

Drilling Information							Soil Description		
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional
600mm toothed bucket						0.20		SM	FILL Silty Gravelly SAND (SM) Medium dense, fine to medium grained, dark grey brown, fine to medium sized gravel, trace low plasticity clay, moist (organics & pvc pipe).
						0.5		CI	FILL Sandy Gravelly CLAY (CI) Very stiff, medium plasticity, orange brown mottled brown, fine to medium sized gravel, fine to medium grained sand, moist (trace organics).
						1.0			
						1.20		CI-CH	NATURAL Silty CLAY (CI-CH) Very stiff, medium to high plasticity, grey mottled orange brown, trace fine grained sand, moist.
						1.5			Hole Terminated at 1.50 m
						2.0			
						2.5			
						3.0			
						3.5			
Method AS - Auger RR - Rock Roller WB - Washbore							Water ☒ Level (Date) ☐ Inflow		Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample
Support C - Casing							Classification Symbols and Soil Descriptions Based on Unified Soil Classification System		Remarks 1. Groundwater not encountered.

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd

Commenced: 12/09/2024

Project Name: Proposed Residential Subdivision

Logged By: LB

Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera

Checked By:

Hole Position:

Drill Model and Mounting: 23t Excavator

RL Surface: No survey

Hole Diameter:

Datum: AHD Operator:

Drilling Information							Soil Description		
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional
600mm toothed bucket		▽				0.20		SM	FILL Silty SAND (SM) Loose, fine to medium grained, brown, trace low plasticity clay, moist (organics).
						0.5		CI	FILL Sandy Gravelly CLAY (CI) Firm to stiff, medium plasticity, brown mottled orange brown and grey, fine to coarse sized gravel, fine to medium grained sand, moist (trace organics).
						0.60		CI	FILL Sandy Gravelly CLAY (CI) Firm, medium plasticity, brown mottled orange brown and grey, fine to coarse sized gravel, fine to medium grained sand, wet to moist (trace organics).
						0.80		CI	FILL Sandy Gravelly CLAY (CI) Soft to firm, medium plasticity, brown mottled orange brown and grey, fine to coarse sized gravel, fine to medium grained sand, wet (trace organics& timber).
						1.0			
						1.5			
						2.0			
						2.10		CI	FILL Sandy CLAY (CI) Soft to firm, medium plasticity, dark grey, fine to medium grained sand, trace fine to medium sized gravel, wet (organics).
						2.40		GM	FILL Silty Sandy GRAVEL (GM) Loose, fine to coarse sized, grey, fine to medium grained sand, with low plasticity clay, wet.
						2.60		SM	NATURAL Silty SAND (SM) Loose, fine to medium grained, grey, with low plasticity clay, wet.
						2.90		CI-CH	Silty CLAY (CI-CH) Very stiff, medium to high plasticity, grey mottled orange brown, with fine grained sand, moist.
						3.0			
						3.30			Hole Terminated at 3.30 m
						3.5			
Method AS - Auger RR - Rock Roller WB - Washbore							Water ▨ Level (Date) ▽ Inflow		Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample
Support C - Casing							Classification Symbols and Soil Descriptions Based on Unified Soil Classification System		Remarks 1. Groundwater encountered at 1.80m.

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd

Commenced: 12/09/2024

Project Name: Proposed Residential Subdivision

Logged By: LB

Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera

Checked By:

Hole Position:

Drill Model and Mounting: 23t Excavator

RL Surface: No survey

Hole Diameter:

Datum: AHD Operator:

Drilling Information							Soil Description		
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional
600mm toothed bucket						0.10		SM	FILL Silty SAND (SM) Medium dense, fine to medium grained, grey, with fine to medium sized gravel, moist (organics).
						0.40		CI	FILL Sandy Gravelly CLAY (CI) Stiff, medium plasticity, brown mottled orange brown, fine to medium sized gravel, fine to medium grained sand, moist.
						0.50		CI	FILL Sandy Gravelly CLAY (CI) Firm, medium plasticity, brown mottled orange brown, fine to medium sized gravel, fine to medium grained sand, wet to moist.
						0.70		CI	FILL Sandy Gravelly CLAY (CI) Stiff, medium plasticity, grey mottled orange brown and brown, fine to medium sized gravel, fine to medium grained sand, moist.
						1.40		CI-CH	NATURAL Silty CLAY (CI-CH) Very stiff, medium to high plasticity, grey mottled orange brown, trace fine grained sand, moist.
						1.90			Hole Terminated at 1.90 m
						2.0			
						2.5			
						3.0			
						3.5			
Method AS - Auger RR - Rock Roller WB - Washbore							Water ☒ Level (Date) ☐ Inflow		
Support C - Casing							Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample Classification Symbols and Soil Descriptions Based on Unified Soil Classification System		
							Remarks 1. Groundwater not encountered.		

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd

Commenced: 12/09/2024

Project Name: Proposed Residential Subdivision

Logged By: LB

Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera

Checked By:

Hole Position:

Drill Model and Mounting: 23t Excavator

RL Surface: No survey

Hole Diameter:

Datum: AHD Operator:

Drilling Information							Soil Description		
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional
600mm toothed bucket						0.23		SM	FILL Silty Gravelly SAND (SM) Medium dense, fine to medium grained, grey brown, fine to medium sized gravel, trace low plasticity clay, (organics).
						0.50		GC	FILL Clayey Sandy GRAVEL (GC) Medium dense, fine to medium sized, brown mottled orange brown, low plasticity clay, fine to medium grained sand, moist (some organics).
						1.10		CI	FILL Sandy Gravelly CLAY (CI) Very stiff, medium plasticity, brown mottled orange brown, fine to medium sized gravel, fine to medium grained sand, moist.
						1.30		CI	FILL Sandy Gravelly CLAY (CI) Very stiff, medium plasticity, grey mottled orange brown and brown, fine to medium sized gravel, fine to medium grained sand, moist.
						1.80		CI-CH	NATURAL Silty CLAY (CI-CH) Very stiff, medium to high plasticity, grey mottled orange brown, trace fine grained sand, moist.
						2.0			Hole Terminated at 1.80 m
						2.5			
						3.0			
						3.5			
Method AS - Auger RR - Rock Roller WB - Washbore							Water Level (Date) Inflow		
Support C - Casing							Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample Classification Symbols and Soil Descriptions Based on Unified Soil Classification System		
							Remarks 1. Groundwater not encountered.		

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd

Commenced: 12/09/2024

Project Name: Proposed Residential Subdivision

Logged By: LB

Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera

Checked By:

Hole Position:

Drill Model and Mounting: 23t Excavator

RL Surface: No survey

Hole Diameter:

Datum: AHD Operator:

Drilling Information							Soil Description		
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional
600mm toothed bucket						0.15		SM	NATURAL Silty SAND (SM) Medium dense, fine to medium grained, brown, trace low plasticity clay, moist (organics).
						0.30		SM	Silty SAND (SM) Medium dense, fine to medium grained, brown, with low plasticity clay, moist.
						0.5		CI-CH	Silty CLAY (CI-CH) Very stiff, medium to high plasticity, orange brown mottled grey, trace fine grained sand, moist.
						0.80			
						1.0			Hole Terminated at 0.80 m
						1.5			
						2.0			
						2.5			
						3.0			
						3.5			
Method AS - Auger RR - Rock Roller WB - Washbore							Water  Level (Date)  Inflow		Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample
Support C - Casing							Classification Symbols and Soil Descriptions Based on Unified Soil Classification System		Remarks 1. Groundwater not encountered.

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd
Project Name: Proposed Residential Subdivision
Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera
Hole Position:
Commenced: 05/08/2024
Logged By: EA
Checked By:

Drill Model and Mounting: Digga PDT 1
Hole Diameter:
RL Surface: No survey
Datum: AHD
Operator: EA

Drilling Information							Soil Description			DCP						
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm						
AD/T						0.10		GM	FILL Silty Sandy GRAVEL (GM) Medium dense, fine to coarse sized, pale orange brown, fine to medium grained sand, with low plasticity clay, moist (organics). FILL Silty Sandy GRAVEL (GM) Medium dense, fine to coarse sized, pale orange brown, fine to medium grained sand, with low plasticity clay, moist (organics & cobbles throughout).							
								GM								
						1			NATURAL Silty SAND (SM) Medium dense, fine to medium grained, brown, moist. Silty CLAY (CI) Hard, medium plasticity, orange brown mottled grey, with fine grained sand, moist. Silty CLAY (CI) Hard, medium plasticity, pale orange brown mottled pale grey, with fine grained sand, moist. SILTSTONE (HW) Highly weathered, very low strength, pale orange brown mottled pale grey.							
						2										
						2.30										
						2.45		SM								
						2.60			CI	Silty CLAY (CI) Hard, medium plasticity, orange brown mottled grey, with fine grained sand, moist. Silty CLAY (CI) Hard, medium plasticity, pale orange brown mottled pale grey, with fine grained sand, moist.						
						2.80	CI									
						3			SILTSTONE (HW) Highly weathered, very low strength, pale orange brown mottled pale grey.							
					3.60				Hole Terminated at 3.60 m							
						4										
						5										
<u>Method</u> AS - Auger RR - Rock Roller WB - Washbore							<u>Water</u> Level (Date) Inflow			<u>Samples and Tests</u> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample			<u>Remarks</u> 1. Groundwater not encountered. 2. Maximum TC refusal at 3.60m.			
<u>Support</u> C - Casing							<u>Classification Symbols and Soil Descriptions</u> Based on Unified Soil Classification System									

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd

Commenced: 05/08/2024

Project Name: Proposed Residential Subdivision

Logged By: EA

Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera

Checked By:

Hole Position:

Drill Model and Mounting: Digga PDT 1

RL Surface: No survey

Hole Diameter:

Datum: AHD

Operator: EA

Drilling Information							Soil Description			DCP					
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm					
AD/T						0.15		SM	NATURAL Silty SAND (SM) Medium dense, fine to medium grained, dark grey, moist (organics).	0	5	10	15	20	25
						0.50		CI-CH	Silty CLAY (CI-CH) Very stiff, medium to high plasticity, orange brown mottled grey, with fine to medium grained sand, moist.						
						0.65		CL-CI	Silty CLAY (CL-CI) Hard, low to medium plasticity, pale orange brown mottled pale grey, with fine to medium grained sand, moist.						
						1.00			SILTSTONE (HW) Highly weathered, very low strength, pale orange brown mottled pale grey.						
						1.10			SILTSTONE (HW) Highly weathered, low strength, pale grey mottled pale orange brown.						
									Hole Terminated at 1.10 m						
						2									
						3									
						4									
						5									

Method

AS - Auger
RR - Rock Roller
WB - Washbore

Water

Level (Date)
 Inflow

Samples and Tests

U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
B - Bulk Sample

Remarks

1. Groundwater not encountered.
2. DCP refusal at 0.67m.
3. Maximum TC refusal at 1.10m.

Support

C - Casing

Classification Symbols and Soil Descriptions

Based on Unified Soil Classification System

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd

Commenced: 05/08/2024

Project Name: Proposed Residential Subdivision

Logged By: EA

Hole Location: Courtney Dr, Baileys Mountian Rd & Reserve Rd, Upper Coomera

Checked By:

Hole Position:

Drill Model and Mounting: Digga PDT 1

RL Surface: No survey

Hole Diameter:

Datum: AHD Operator: EA

Drilling Information							Soil Description				DCP					
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm						
AD/T			ASS 0.00-1.00 m			0.15		SM	NATURAL Silty SAND (SM) Medium dense, fine to medium grained, dark brown, moist (organics).							
						0.35		SM	Silty SAND (SM) Medium dense, fine to medium grained, dark brown mottled orange brown, with low plasticity clay, moist (organics).							
						0.60		CL-CI	Sandy CLAY (CL-CI) Very stiff, low to medium plasticity, orange brown, fine to medium grained sand, trace fine to medium sized gravel, moist.							
						1.00		CL-CI	Sandy Gravelly CLAY (CL-CI) Very stiff, low to medium plasticity, orange brown, fine to medium sized gravel, fine to medium grained sand, moist.							
			ASS 1.00-2.00 m			1.60		CI-CH	Sandy CLAY (CI-CH) Very stiff, medium to high plasticity, orange brown mottled grey, fine to medium grained sand, moist.							
						1.90		CI	Sandy Gravelly CLAY (CI) Very stiff, medium plasticity, orange brown, fine to medium sized gravel, fine to medium grained sand, moist.							
			ASS 2.00-3.00 m			2.30		CI-CH	Silty CLAY (CI-CH) Very stiff, medium to high plasticity, grey mottled orange brown, with fine to medium sized gravel, with fine to medium grained sand, moist.							
						3.10		CI	Sandy Gravelly CLAY (CI) Very stiff, medium plasticity, grey mottled orange brown, fine to medium sized gravel, fine to medium grained sand, moist.							
						4.00										
						4.05										
									SILTSTONE (HW) Highly weathered, low strength, pale orange brown (possible boulder). Hole Terminated at 4.05 m							
						5										

Method
AS - Auger
RR - Rock Roller
WB - Washbore

Support
C - Casing

Water
 Level (Date)
 Inflow

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
B - Bulk Sample

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Remarks
1. Groundwater not encountered.
2. Maximum TC refusal at 4.05m.

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd
Project Name: Proposed Residential Subdivision
Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera
Hole Position:

Commenced: 05/08/2024
Logged By: EA
Checked By:

Drill Model and Mounting: Digga PDT 1
Hole Diameter:

RL Surface: No survey
Datum: AHD Operator: EA

Drilling Information							Soil Description			DCP						
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm						
AD/T			U50 1.00-1.15 m			0.50		CI	FILL Sandy CLAY (CI) Very stiff, medium plasticity, brown mottled orange brown, fine to medium grained sand, moist.	0	5	10	15	20	25	
				0.60		SM	NATURAL Silty SAND (SM) Loose, fine to medium grained, dark brown, moist.									
						CI-CH	Silty CLAY (CI-CH) Very stiff, medium to high plasticity, orange brown mottled grey, trace fine grained sand, moist.									
				1.20		CI-CH	Silty CLAY (CI-CH) Very stiff, medium to high plasticity, grey mottled orange brown, trace fine grained sand, moist.									
				1.80		CI	Silty CLAY (CI) Hard, medium plasticity, pale grey mottled orange brown, moist.									
				2.20		CL-CI	Silty CLAY (CL-CI) Hard, low to medium plasticity, pale grey mottled orange brown, moist.									
				2.40			SILTSTONE (HW) Highly weathered, very low strength, pale grey mottled pale orange brown.									
				3.00			Hole Terminated at 3.00 m									
															</	

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd

Commenced: 05/08/2024

Project Name: Proposed Residential Subdivision

Logged By: EA

Hole Location: Courtney Dr, Baileys Mountian Rd & Reserve Rd, Upper Coomera

Checked By:

Hole Position:

Drill Model and Mounting: Digga PDT 1

RL Surface: No survey

Hole Diameter:

Datum:

Operator: EA

Drilling Information						Soil Description				DCP					
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm					
										0	5	10	15	20	25
AD/T			ASS 0.00-1.00 m			0.10		SM	FILL Silty SAND (SM) Loose to medium dense, fine to medium grained, dark brown, trace low plasticity clay, moist (organics).						
						0.50		SM	FILL Silty SAND (SM) Loose to medium dense, fine to medium grained, dark brown mottled orange brown, with low plasticity clay, trace low plasticity clay, moist.						
						1.10		SM	FILL Silty Gravelly SAND (SM) Medium dense, fine to medium grained, brown mottled orange brown, fine to medium sized gravel, with low plasticity clay, moist.						
			ASS 1.00-2.00 m			1.60		CI	FILL Silty CLAY (CI) Stiff to very stiff, medium plasticity, brown mottled dark grey and orange brown, trace fine to medium sized gravel, with fine grained sand, moist.						
						2.00		CI-CH	NATURAL Silty CLAY (CI-CH) Very stiff, medium to high plasticity, dark grey mottled orange brown, trace fine grained sand, moist.						
			ASS 2.00-3.00 m			2.50		CI-CH							
						3.00		CI-CH							
			ASS 3.00-4.00 m			4.10		CI	Silty CLAY (CI) Very stiff, medium plasticity, pale orange brown mottled pale grey, trace fine grained sand, moist.						
						5.00		CI							
										Hole Terminated at 5.00 m					

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd

Commenced: 05/08/2024

Project Name: Proposed Residential Subdivision

Logged By: EA

Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera

Checked By:

Hole Position:

Drill Model and Mounting: Digga PDT 1

RL Surface: No survey

Hole Diameter:

Datum: AHD

Operator: EA

Drilling Information						Soil Description				DCP					
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm					
AD/T			B 0.40-1.00 m			0.10		SM	NATURAL Silty SAND (SM) Loose, fine to medium grained, dark grey, moist (organics).	0	5	10	15	20	25
						0.40		SM	Silty SAND (SM) Loose, fine to medium grained, dark grey, with low plasticity clay, moist.						
						0.60		CI-CH	Silty CLAY (CI-CH) Very stiff, medium to high plasticity, orange brown mottled grey, moist.						
						0.60		CI-CH	Silty CLAY (CI-CH) Very stiff, medium to high plasticity, pale grey mottled pale orange brown, moist.						
						1.00		CL-CI	Silty CLAY (CL-CI) Hard, low to medium plasticity, pale grey mottled pale orange brown, moist.						
						1.30		CL-CI	Silty CLAY (CL-CI) Hard, low to medium plasticity, pale grey mottled pale orange brown, moist.						
						2.10			SILTSTONE (HW) Highly weathered, very low strength, pale grey mottled pale orange brown.						
						2.10			SILTSTONE (HW) Highly weathered, low strength, mottled orange grey brown.						
						2.90									
								3			Hole Terminated at 2.90 m				
					4										
					5										
Method AS - Auger RR - Rock Roller WB - Washbore						Water  Level (Date)  Inflow			Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample			Remarks 1. Groundwater not encountered. 2. DCP refusal at 1.15m. 3. Maximum TC refusal at 2.90m.			
Support C - Casing						Classification Symbols and Soil Descriptions Based on Unified Soil Classification System									

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd

Commenced: 05/08/2024

Project Name: Proposed Residential Subdivision

Logged By: EA

Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera

Checked By:

Hole Position:

Drill Model and Mounting: Digga PDT 1

RL Surface: No survey

Hole Diameter:

Datum: AHD

Operator: EA

Drilling Information						Soil Description				DCP					
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm					
AD/T			U50 0.50-0.70 m			0.10		SM	NATURAL Silty SAND (SM) Loose, fine to medium grained, dark brown, trace low plasticity clay, moist (organics).	0	5	10	15	20	25
		0.25				SM									
						CI-CH	Silty SAND (SM) Loose, fine to medium grained, dark brown, with low plasticity clay, trace low plasticity clay, moist.								
		0.70				CI-CH	Silty CLAY (CI-CH) Very stiff, medium to high plasticity, orange brown mottled grey, trace fine grained sand, moist.								
		1.00				CI-CH	Silty CLAY (CI-CH) Very stiff, medium to high plasticity, grey mottled orange brown, moist.								
		1.30				CI	Silty CLAY (CI) Very stiff to hard, medium plasticity, pale grey mottled pale orange brown, moist.								
		1.50				CL-CI	Silty CLAY (CL-CI) Hard, low to medium plasticity, pale grey mottled pale orange brown, moist.								
		2.10					SILTSTONE (HW) Highly weathered, very low strength, pale grey mottled pale grey blue.								
		2.80					SILTSTONE (HW) Highly weathered, low strength, mottled grey.								
								3			Hole Terminated at 2.80 m				
					4										
					5										
Method AS - Auger RR - Rock Roller WB- Washbore						Water Level (Date) Inflow			Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample			Remarks 1. Groundwater not encountered. 3. Maximum TC refusal at 2.80m.			
Support C - Casing						Classification Symbols and Soil Descriptions Based on Unified Soil Classification System									

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd

Commenced: 05/08/2024

Project Name: Proposed Residential Subdivision

Logged By: EA

Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera

Checked By:

Hole Position:

Drill Model and Mounting: Digga PDT 1

RL Surface: No survey

Hole Diameter:

Datum: AHD

Operator: EA

Drilling Information							Soil Description			DCP					
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm					
AD/T			ASS 0.00-1.00 m			0.10		SM GM	FILL Silty Gravelly SAND (SM) Loose to medium dense, fine to medium grained, orange brown mottled brown, fine to medium sized gravel, trace low plasticity clay, moist (organics). FILL Silty Sandy GRAVEL (GM) Medium dense, fine to medium sized, orange brown, fine to medium grained sand, with low plasticity clay, moist.						
			ASS 1.00-2.00 m			0.80		CL-CI	FILL Sandy Gravelly CLAY (CL-CI) Stiff, low to medium plasticity, orange brown, fine to medium sized gravel, fine to medium grained sand, moist.						
			ASS 2.00-3.00 m			1.40		CI-CH	NATURAL Silty CLAY (CI-CH) Very stiff, medium to high plasticity, orange brown mottled grey, moist.						
			ASS 2.00-3.00 m			2.20		CI-CH	Silty CLAY (CI-CH) Very stiff, medium to high plasticity, grey mottled orange brown, moist.						
			ASS 3.00-4.00 m			2.70		CI-CH	Silty CLAY (CI-CH) Very stiff, medium to high plasticity, grey mottled orange brown, with fine grained sand, moist.						
			ASS 3.00-4.00 m			3.90		CI	Sandy CLAY (CI) Very stiff, medium plasticity, pale grey mottled grey, fine to medium grained sand, trace fine to medium sized gravel, moist.						
						4.50			Hole Terminated at 4.50 m						

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd

Commenced: 05/08/2024

Project Name: Proposed Residential Subdivision

Logged By: EA

Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera

Checked By:

Hole Position:

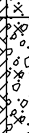
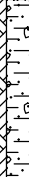
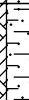
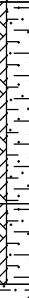
Drill Model and Mounting: Digga PDT 1

RL Surface: No survey

Hole Diameter:

Datum: AHD

Operator: EA

Drilling Information							Soil Description			DCP							
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm							
AD/T						0.10		SM	FILL Silty SAND (SM) Loose, fine to medium grained, brown, trace low plasticity clay, moist (organics).	0	5	10	15	20	25		
								GM	FILL Silty Sandy GRAVEL (GM) Medium dense, fine to medium sized, orange brown, fine to medium grained sand, with low plasticity clay, moist.								
						0.70		CL-CI	FILL Sandy Gravelly CLAY (CL-CI) Very stiff, low to medium plasticity, orange brown, fine to medium sized gravel, fine to medium grained sand, moist.								
					1												
					1.60			CL-CI	FILL Sandy CLAY (CL-CI) Stiff, low to medium plasticity, brown, fine to medium grained sand, with fine to medium sized gravel, moist.								
					2												
					2.40			CL-CI	FILL Sandy CLAY (CL-CI) Very stiff, low to medium plasticity, brown, fine to medium grained sand, trace fine to medium sized gravel, moist.								
					3												
					4	4.10		CI	FILL Sandy CLAY (CI) Stiff, medium plasticity, brown, fine to medium grained sand, trace fine to medium sized gravel, moist.								
					5												
				5.10		CI		FILL Sandy CLAY (CI) Stiff, medium plasticity, brown, fine to medium grained sand, trace fine to medium sized gravel, moist (some cobbles).									
				5.50			CI	NATURAL Sandy CLAY (CI) Very stiff, medium plasticity, grey mottled orange brown, fine to medium grained sand, with fine to medium sized gravel, moist.									
				5.90				Hole Terminated at 5.90 m									
Method AS - Auger RR - Rock Roller WB - Washbore Support C - Casing							Water  Level (Date)  Inflow		Samples and Tests U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample Classification Symbols and Soil Descriptions Based on Unified Soil Classification System			Remarks 1. Groundwater not encountered. 2. DCP refusal at 0.28m.					

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd

Commenced: 05/08/2024

Project Name: Proposed Residential Subdivision

Logged By: EA

Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera

Checked By:

Hole Position:

Drill Model and Mounting: Digga PDT 1

RL Surface: No survey

Hole Diameter:

Datum: AHD

Operator: EA

Drilling Information							Soil Description				DCP					
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm						
										0	5	10	15	20	25	
AD/T						0.10		SM	NATURAL Silty SAND (SM) Medium dense, fine to medium grained, dark brown, trace low plasticity clay, moist (organics).							
						0.40		SM	Silty SAND (SM) Medium dense, fine to medium grained, orange brown mottled grey, with low plasticity clay, trace low plasticity clay, moist.							
						0.60		CL-CI	Silty CLAY (CL-CI) Hard, low to medium plasticity, pale orange brown mottled pale grey, with fine grained sand, moist.							
						1.00			SILTSTONE (HW) Highly weathered, very low strength, pale orange brown mottled pale grey.							
						1.20			SILTSTONE (HW) Highly weathered, low strength, mottled orange grey brown.							
									Hole Terminated at 1.20 m							
						2										
						3										
						4										
						5										
<u>Method</u> AS - Auger RR - Rock Roller WB- Washbore							<u>Water</u> Level (Date) Inflow		<u>Samples and Tests</u> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample		<u>Remarks</u> 1. Groundwater not encountered. 2. DCP refusal at 0.65m. 3. Maximum TC refusal at 1.20m.					
<u>Support</u> C - Casing							<u>Classification Symbols and Soil Descriptions</u> Based on Unified Soil Classification System									

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd

Commenced: 05/08/2024

Project Name: Proposed Residential Subdivision

Logged By: EA

Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera

Checked By:

Hole Position:

Drill Model and Mounting: Digga PDT 1

RL Surface: No survey

Hole Diameter:

Datum: AHD

Operator: EA

Drilling Information							Soil Description			DCP					
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm					
AD/T						0.10		SM	NATURAL Silty SAND (SM) Medium dense, fine to medium grained, dark brown, trace low plasticity clay, moist (organics).	0	5	10	15	20	25
						0.30		CI-CH	Silty CLAY (CI-CH) Very stiff, medium to high plasticity, orange brown mottled grey, trace fine sized gravel, with fine grained sand, moist.						
						0.50		CI-CH	Silty CLAY (CI-CH) Very stiff, medium to high plasticity, orange brown mottled grey, trace fine sized gravel, with fine grained sand, moist.						
						0.70		CL-CI	Silty CLAY (CI-CH) Very stiff, medium to high plasticity, orange brown mottled grey, with fine grained sand, moist.						
						1.00			Sandy CLAY (CL-CI) Hard, low to medium plasticity, pale orange brown mottled pale grey, fine to medium grained sand, moist.						
						1.20			SANDSTONE (HW) Highly weathered, very low strength, fine to medium grained, pale orange brown mottled pale grey.						
						1.50			SANDSTONE (HW) Highly weathered, low strength, fine to medium grained, pale grey mottled pale orange brown.						
									Hole Terminated at 1.50 m						
						2									
						3									
						4									
						5									
<u>Method</u> AS - Auger RR - Rock Roller WB- Washbore							<u>Water</u> Level (Date) Inflow			<u>Samples and Tests</u> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample			<u>Remarks</u> 1. Groundwater not encountered. 2. DCP refusal at 0.78m. 3. Maximum TC refusal at 1.50m.		
<u>Support</u> C - Casing							<u>Classification Symbols and Soil Descriptions</u> Based on Unified Soil Classification System								

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd

Commenced: 05/08/2024

Project Name: Proposed Residential Subdivision

Logged By: EA

Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera

Checked By:

Hole Position:

Drill Model and Mounting: Digga PDT 1

RL Surface: No survey

Hole Diameter:

Datum: AHD

Operator: EA

Drilling Information							Soil Description		DCP						
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm					
AD/T			ASS 0.00-1.00 m			0.10		SM	NATURAL Silty SAND (SM) Loose, fine to medium grained, dark grey, trace low plasticity clay, with fine sized gravel, moist (organics).	0	5	10	15	20	25
						0.25		SM	Silty SAND (SM) Loose, fine to medium grained, dark grey, trace low plasticity clay, with fine sized gravel, moist.						
			B 0.50-1.20 m			0.50		SM	Silty SAND (SM) Loose, fine to medium grained, grey mottled orange brown, wet to moist.						
						1.00		SM	Silty SAND (SM) Loose, fine to medium grained, grey mottled orange brown, wet to moist.						
			ASS 1.00-2.00 m			1.20		SM	Silty SAND (SM) Loose, fine to medium grained, grey mottled orange brown, wet to moist.						
						1.60		SM	Silty SAND (SM) Loose, fine to medium grained, grey mottled orange brown, wet to moist.						
						2.00		SM	Silty SAND (SM) Loose, fine to medium grained, grey mottled orange brown, wet to moist.						
						2.40		SM	Silty SAND (SM) Loose, fine to medium grained, grey mottled orange brown, wet to moist.						
						2.80		SM	Silty SAND (SM) Loose, fine to medium grained, grey mottled orange brown, wet to moist.						
						3.00		SM	Silty SAND (SM) Loose, fine to medium grained, grey mottled orange brown, wet to moist.						
						3.60		SM	Silty SAND (SM) Loose, fine to medium grained, grey mottled orange brown, wet to moist.						
									Hole Terminated at 3.60 m						

Method

AS - Auger
RR - Rock Roller
WB - Washbore

Water

Level (Date)
 Inflow

Samples and Tests

U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
B - Bulk Sample

Remarks

1. Groundwater not encountered.
2. DCP refusal at 1.63m.
3. Maximum TC refusal at 3.60m.

Support

C - Casing

Classification Symbols and Soil Descriptions

Based on Unified Soil Classification System

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd
Project Name: Proposed Residential Subdivision
Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera
Hole Position:
Commenced: 17/06/2025
Logged By: MW
Checked By:

Drill Model and Mounting: BT50
Hole Diameter:
RL Surface: No survey
Datum: AHD
Operator: MW

Drilling Information							Soil Description			DCP					
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm					
AD/T						0.10	X	SM	NATURAL Silty SAND (SM) Medium dense, fine to medium grained, dark brown, with low plasticity clay, moist (organics).	0	5	10	15	20	25
						0.30	X	SM	Silty Gravelly SAND (SM) Medium dense, fine to medium grained, orange brown, fine to medium sized gravel, with low plasticity clay, moist.						
						0.60	X		SILTSTONE (HW) Highly weathered, very low strength, orange brown mottled pale grey.						
							X		Hole Terminated at 0.60 m						
						1									
						2									
						3									
						4									
						5									

Method
AS - Auger
RR - Rock Roller
WB - Washbore

Water
Level (Date)
Inflow

Samples and Tests
U - Undisturbed Sample
D - Disturbed Sample
SPT - Standard Penetration Test
B - Bulk Sample

Remarks
1. Groundwater not encountered.
2. DCP refusal at 0.32m.
3. Maximum TC refusal at 0.60m.

Support
C - Casing

Classification Symbols and Soil Descriptions
Based on Unified Soil Classification System

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd
Project Name: Proposed Residential Subdivision
Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera
Hole Position:

Commenced: 17/06/2025
Logged By: MW
Checked By:

Drill Model and Mounting: BT50
Hole Diameter:

RL Surface: No survey
Datum: AHD Operator: MW

Drilling Information							Soil Description			DCP						
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm						
AD/T		▽				0.10		SM	NATURAL Silty SAND (SM) Very loose, fine to medium grained, dark grey, with low plasticity clay, wet (organics). Sandy CLAY (CI) Soft to firm, medium plasticity, dark grey, fine to medium grained sand, wet.	0	5	10	15	20	25	
						CI										
						0.80		CI	Sandy CLAY (CI) Soft to firm, medium plasticity, dark grey mottled orange brown, fine to medium grained sand, wet.							
						1.70			CI	Sandy CLAY (CI) Firm, medium plasticity, grey mottled orange brown, fine to medium grained sand, wet.						
						2.20			CI	Sandy CLAY (CI) Stiff, medium plasticity, grey mottled orange brown, fine to medium grained sand, moist.						
					3.30		CI	Sandy CLAY (CI) Very stiff, medium plasticity, orange brown mottled pale grey, fine to medium grained sand, moist.								
					4.50											
						5			Hole Terminated at 4.50 m							
<u>Method</u> AS - Auger RR - Rock Roller WB- Washbore <u>Support</u> C - Casing							<u>Water</u>  Level (Date)  Inflow		<u>Samples and Tests</u> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample <u>Classification Symbols and Soil Descriptions</u> Based on Unified Soil Classification System		<u>Remarks</u> 1. Seepage noted at 0.80m.					

Project No.: PG-12268

Client: Norfolk Estates Pty Ltd
Project Name: Proposed Residential Subdivision
Hole Location: Courtney Dr, Baileys Mountain Rd & Reserve Rd, Upper Coomera
Hole Position:
Commenced: 17/06/2025
Logged By: MW
Checked By:

Drill Model and Mounting: BT50
Hole Diameter:
RL Surface: No survey
Datum: AHD
Operator: MW

Drilling Information							Soil Description			DCP					
Method	Casing	Water	Samples Tests Remarks	Recovery	RL (m)	Depth (m)	Graphic Log	Classification Symbol	Material Description Fraction, Colour, Structure, Bedding, Plasticity, Sensitivity, Additional	DCP TEST (AS 1289.6.3.2-1997) Blows per 100 mm					
AD/T		▽				0.40		SM	NATURAL Silty SAND (SM) Loose, fine to medium grained, dark grey, with low plasticity clay, wet (organics).	0	5	10	15	20	25
						0.90		SM	Silty SAND (SM) Loose, fine to medium grained, dark grey, with low plasticity clay, wet.						
						1.60		SC	Clayey SAND (SC) Medium dense, fine to medium grained, orange brown mottled grey, low plasticity clay, wet.						
						2.10		CI-CH	Sandy CLAY (CI-CH) Very stiff, medium to high plasticity, orange brown mottled grey, fine to medium grained sand, moist.						
						2.50		CI-CH	Sandy CLAY (CI-CH) Hard, medium to high plasticity, grey mottled orange brown, fine to medium grained sand, moist.						
						3.10		CL-CI	Sandy CLAY (CL-CI) Hard, low to medium plasticity, pale grey mottled, fine to medium grained sand, moist.						
						3.40			SANDSTONE (HW) Highly weathered, very low strength, fine to medium grained, pale orange brown mottled pale grey.						
		Hole Terminated at 3.40 m													
						4									
						5									
<u>Method</u> AS - Auger RR - Rock Roller WB - Washbore							<u>Water</u> Level (Date) Inflow		<u>Samples and Tests</u> U - Undisturbed Sample D - Disturbed Sample SPT - Standard Penetration Test B - Bulk Sample		<u>Remarks</u> 1. Seepage noted at 0.30m. 2. Maximum TC refusal at 3.40m.				
<u>Support</u> C - Casing							<u>Classification Symbols and Soil Descriptions</u> Based on Unified Soil Classification System								

APPENDIX C

LABORATORY TEST CERTIFICATES

SHRINK SWELL INDEX REPORT

CLIENT:	Norfolk Estates Pty Ltd	PROJECT NUMBER:	PG-12268
CLIENT ADDRESS:	c/o 3 Jowett Street, Coomera, Qld 4209	REPORT NUMBER:	PG-12268-BH04-1.0-SS
PROJECT NAME:	Proposed Subdivision	REPORT DATE:	08.08.2024
PROJECT LOCATION:	Courtney Dr & Baileys Mt Rd, Upper Coomera	TEST METHOD:	AS 1289.7.1.1, 2.1.1 & 2.1.4

SAMPLE LOCATION:	BH04, 1.0-1.2
SAMPLE NUMBER:	24-1668
SAMPLING METHOD:	SAMPLE AS SUPPLIED
SAMPLED BY:	PACIFIC GEOTECH
DATE SAMPLED:	05.08.2024
DATE TESTED:	07.08.2024
MATERIAL TYPE:	Silty CLAY

SHRINKAGE MOISTURE CONTENT (%):	28.5
SHRINKAGE (%):	7.5
SWELL MOISTURE CONTENT INITIAL (%):	29.2
SWELL MOISTURE CONTENT FINAL (%):	33.8
SWELL (%):	0.3
UNIT WEIGHT (t/m ³):	1.85
SHRINK SWELL INDEX I_{ss} (%):	4.3
CRACKING:	None
CRUMBLING:	None
ESTIMATED PERCENTAGE OF INERT INCLUSIONS (%):	0

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Report Remarks:			

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Sampling test method is not covered by our scope of accreditation.



SHRINK SWELL INDEX REPORT

CLIENT:	Norfolk Estates Pty Ltd	PROJECT NUMBER:	PG-12268
CLIENT ADDRESS:	c/o 3 Jowett Street, Coomera, Qld 4209	REPORT NUMBER:	PG-12268-BH07-0.5-SS
PROJECT NAME:	Proposed Subdivision	REPORT DATE:	08.08.2024
PROJECT LOCATION:	Courtney Dr & Baileys Mt Rd, Upper Coomera	TEST METHOD:	AS 1289.7.1.1, 2.1.1 & 2.1.4

SAMPLE LOCATION:	BH07, 0.5-0.7
SAMPLE NUMBER:	24-1670
SAMPLING METHOD:	SAMPLE AS SUPPLIED
SAMPLED BY:	PACIFIC GEOTECH
DATE SAMPLED:	05.08.2024
DATE TESTED:	07.08.2024
MATERIAL TYPE:	Silty CLAY

SHRINKAGE MOISTURE CONTENT (%):	22.8
SHRINKAGE (%):	6.9
SWELL MOISTURE CONTENT INITIAL (%):	24.8
SWELL MOISTURE CONTENT FINAL (%):	30.8
SWELL (%):	0.6
UNIT WEIGHT (t/m ³):	1.91
SHRINK SWELL INDEX I_{ss} (%):	4.0
CRACKING:	None
CRUMBLING:	None
ESTIMATED PERCENTAGE OF INERT INCLUSIONS (%):	0

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Report Remarks:	Variation to test method, Shrinkage specimen is outside of 1.5 to 2.0 Length/Diameter Ratio.		

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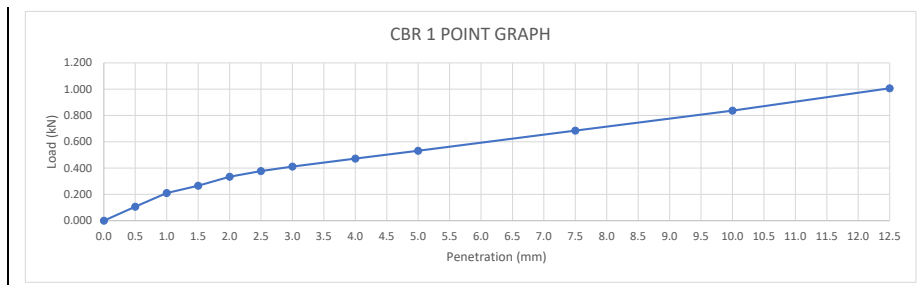
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 3 Jowett Street, Coomera, Qld, 4209 | PO Box 499, Paradise Point, Qld, 4216
www.pacgeo.com.au
 ABN: 62 615 248 952

CALIFORNIA BEARING RATIO REPORT (1 POINT)			
CLIENT:	Norfolk Estates Pty Ltd	PROJECT NUMBER:	PG - 12268
CLIENT ADDRESS:	c/o 3 Jowett Street, Coomera QLD 4209	REPORT NUMBER:	PG-12268-CBR-BH06
PROJECT NAME:	Proposed Subdivision	REPORT DATE:	14/08/2024
PROJECT ADDRESS:	Courtney Drive & Baileys Mt Road, Upper Coomera	TEST METHOD:	AS 1289.6.1.1

SAMPLE LOCATION:	BH 06 (0.4m-1.0m)
SAMPLE NUMBER:	24-1669
SAMPLING METHOD:	AS SUPPLIED
SAMPLED BY:	PACIFIC GEOTECH
DATE SAMPLED:	5/08/2024
DATE TESTED:	9/08/2024
PREPARATION METHOD:	AS 1289.1.1
MOISTURE CONTENT METHOD:	AS1289.2.1.1
MATERIAL TYPE:	Sandy Clay, Brown

MAXIMUM DRY DENSITY (t/m ³):	1.65
OPTIMUM MOISTURE CONTENT (%):	21.2
COMPACTIVE EFFORT:	Standard
COMPACTION METHOD:	AS1289.5.1.1
LABORATORY DENSITY RATIO:	100.0
LABORATORY MOISTURE RATIO:	98.0
DRY DENSITY BEFORE SOAK (t/m ³):	1.65
DRY DENSITY AFTER SOAK (t/m ³):	1.65
FIELD MOISTURE CONTENT:	21.3
MOISTURE CONTENT AT COMPACTION BEFORE SOAK (%):	20.8
MOISTURE CONTENT OF TOP 30mm AFTER PENETRATION (%):	28.8
MOISTURE CONTENT REST OF SAMPLE AFTER PENETRATION (%):	22.6
SWELL (%):	3.0
CBR SURCHARGE (Kg):	4.5
SOAKING PERIOD (Days):	4
CURING TIME (Hours):	51
PERCENTAGE OVERSIZE MATERIAL RETAINED ON 19mm SIEVE (%):	0
METHOD OF ESTABLISHING PLASTICITY:	Visual/Tactile Assessment

CBR 2.5mm (%):	3.0
CBR 5mm (%):	2.5
CBR VALUE (%):	3.0



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Report Remarks:	-		

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ABN: 62 615 248 952

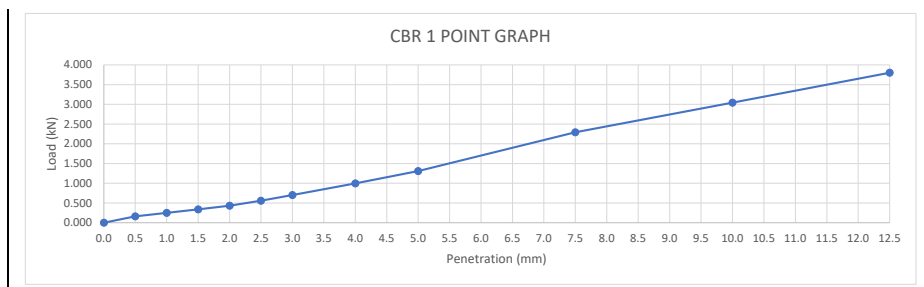
CALIFORNIA BEARING RATIO REPORT (1 POINT)

CLIENT:	Norfolk Estates Pty Ltd	PROJECT NUMBER:	PG - 12268
CLIENT ADDRESS:	c/o 3 Jowett Street, Coomera QLD 4209	REPORT NUMBER:	PG-12268-CBR-BH12
PROJECT NAME:	Proposed Subdivision	REPORT DATE:	14/08/2024
PROJECT ADDRESS:	Courtney Drive & Baileys Mt Road, Upper Coomera	TEST METHOD:	AS 1289.6.1.1

SAMPLE LOCATION:	BH 12 (0.5m-1.2m)
SAMPLE NUMBER:	24-1671
SAMPLING METHOD:	AS SUPPLIED
SAMPLED BY:	PACIFIC GEOTECH
DATE SAMPLED:	5/08/2024
DATE TESTED:	9/08/2024
PREPARATION METHOD:	AS 1289.1.1
MOISTURE CONTENT METHOD:	AS1289.2.1.1
MATERIAL TYPE:	Clayey Sand, Brown

MAXIMUM DRY DENSITY (t/m ³):	1.99
OPTIMUM MOISTURE CONTENT (%):	10.2
COMPACTIVE EFFORT:	Standard
COMPACTION METHOD:	AS1289.5.1.1
LABORATORY DENSITY RATIO:	99.5
LABORATORY MOISTURE RATIO:	104.0
DRY DENSITY BEFORE SOAK (t/m ³):	1.98
DRY DENSITY AFTER SOAK (t/m ³):	1.98
FIELD MOISTURE CONTENT:	10.0
MOISTURE CONTENT AT COMPACTION BEFORE SOAK (%):	10.6
MOISTURE CONTENT OF TOP 30mm AFTER PENETRATION (%):	12.3
MOISTURE CONTENT REST OF SAMPLE AFTER PENETRATION (%):	11.6
SWELL (%):	0.0
CBR SURCHARGE (Kg):	4.5
SOAKING PERIOD (Days):	4
CURING TIME (Hours):	48
PERCENTAGE OVERSIZE MATERIAL RETAINED ON 19mm SIEVE (%):	0
METHOD OF ESTABLISHING PLASTICITY:	Visual/Tactile Assessment

CBR 2.5mm (%):	8.0
CBR 5mm (%):	10.0
CBR VALUE (%):	10.0



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Report Remarks:	-		

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APPENDIX D

GUIDELINES FOR HILLSIDE CONSTRUCTION

PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT 2007

APPENDIX G - SOME GUIDELINES FOR HILLSIDE CONSTRUCTION

GOOD ENGINEERING PRACTICE

POOR ENGINEERING PRACTICE

ADVICE

GEOTECHNICAL ASSESSMENT	Obtain advice from a qualified, experienced geotechnical practitioner at early stage of planning and before site works.	Prepare detailed plan and start site works before geotechnical advice.
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PLANNING

SITE PLANNING	Having obtained geotechnical advice, plan the development with the risk arising from the identified hazards and consequences in mind.	Plan development without regard for the Risk.
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DESIGN AND CONSTRUCTION

HOUSE DESIGN	Use flexible structures which incorporate properly designed brickwork, timber or steel frames, timber or panel cladding. Consider use of split levels. Use decks for recreational areas where appropriate.	Floor plans which require extensive cutting and filling. Movement intolerant structures.
SITE CLEARING	Retain natural vegetation wherever practicable.	Indiscriminately clear the site.
ACCESS & DRIVEWAYS	Satisfy requirements below for cuts, fills, retaining walls and drainage. Council specifications for grades may need to be modified. Driveways and parking areas may need to be fully supported on piers.	Excavate and fill for site access before geotechnical advice.
EARTHWORKS	Retain natural contours wherever possible.	Indiscriminatory bulk earthworks.
CUTS	Minimise depth. Support with engineered retaining walls or batter to appropriate slope. Provide drainage measures and erosion control.	Large scale cuts and benching. Unsupported cuts. Ignore drainage requirements
FILLS	Minimise height. Strip vegetation and topsoil and key into natural slopes prior to filling. Use clean fill materials and compact to engineering standards. Batter to appropriate slope or support with engineered retaining wall. Provide surface drainage and appropriate subsurface drainage.	Loose or poorly compacted fill, which if it fails, may flow a considerable distance including onto property below. Block natural drainage lines. Fill over existing vegetation and topsoil. Include stumps, trees, vegetation, topsoil, boulders, building rubble etc in fill.
ROCK OUTCROPS & BOULDERS	Remove or stabilise boulders which may have unacceptable risk. Support rock faces where necessary.	Disturb or undercut detached blocks or boulders.
RETAINING WALLS	Engineer design to resist applied soil and water forces. Found on rock where practicable. Provide subsurface drainage within wall backfill and surface drainage on slope above. Construct wall as soon as possible after cut/fill operation.	Construct a structurally inadequate wall such as sandstone flagging, brick or unreinforced blockwork. Lack of subsurface drains and weepholes.
FOOTINGS	Found within rock where practicable. Use rows of piers or strip footings oriented up and down slope. Design for lateral creep pressures if necessary. Backfill footing excavations to exclude ingress of surface water.	Found on topsoil, loose fill, detached boulders or undercut cliffs.
SWIMMING POOLS	Engineer designed. Support on piers to rock where practicable. Provide with under-drainage and gravity drain outlet where practicable. Design for high soil pressures which may develop on uphill side whilst there may be little or no lateral support on downhill side.	
DRAINAGE		
SURFACE	Provide at tops of cut and fill slopes. Discharge to street drainage or natural water courses. Provide general falls to prevent blockage by siltation and incorporate silt traps. Line to minimise infiltration and make flexible where possible. Special structures to dissipate energy at changes of slope and/or direction.	Discharge at top of fills and cuts. Allow water to pond on bench areas.
SUBSURFACE	Provide filter around subsurface drain. Provide drain behind retaining walls. Use flexible pipelines with access for maintenance. Prevent inflow of surface water.	Discharge roof runoff into absorption trenches.
SEPTIC & SULLAGE	Usually requires pump-out or mains sewer systems; absorption trenches may be possible in some areas if risk is acceptable. Storage tanks should be water-tight and adequately founded.	Discharge sullage directly onto and into slopes. Use absorption trenches without consideration of landslide risk.
EROSION CONTROL & LANDSCAPING	Control erosion as this may lead to instability. Revegetate cleared area.	Failure to observe earthworks and drainage recommendations when landscaping.

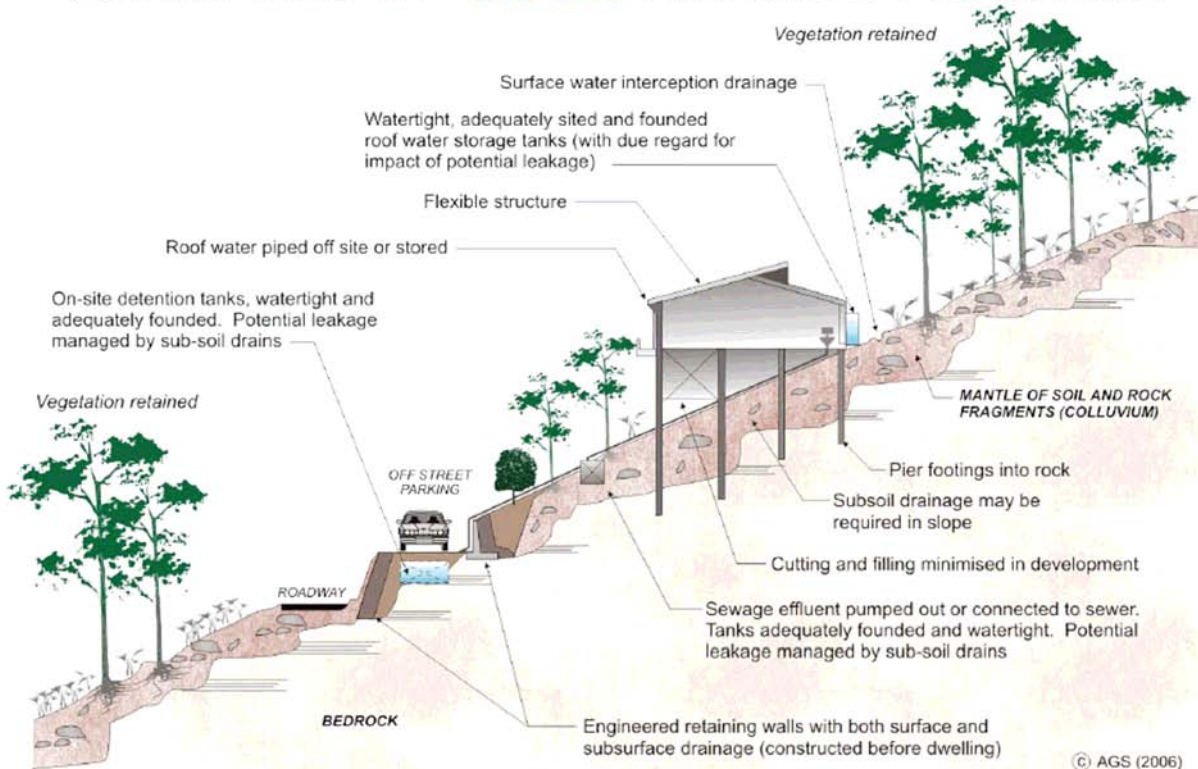
DRAWINGS AND SITE VISITS DURING CONSTRUCTION

DRAWINGS	Building Application drawings should be viewed by geotechnical consultant	
SITE VISITS	Site Visits by consultant may be appropriate during construction/	

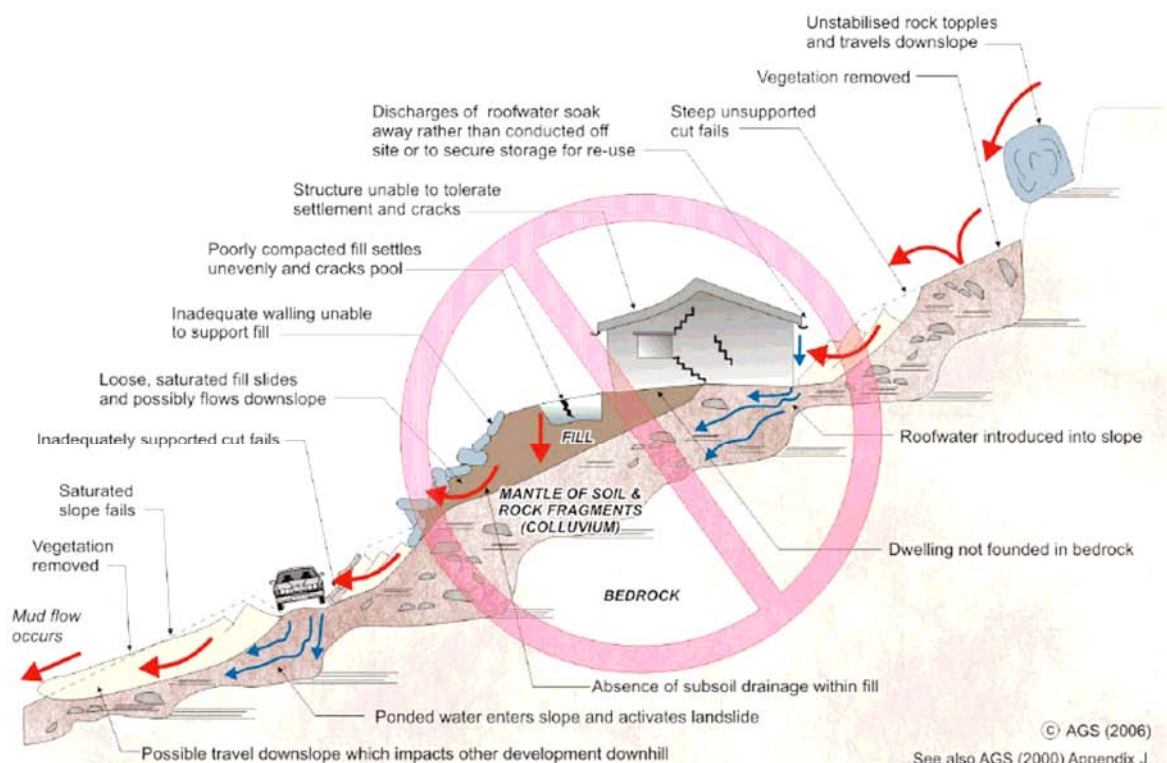
INSPECTION AND MAINTENANCE BY OWNER

OWNER'S RESPONSIBILITY	Clean drainage systems; repair broken joints in drains and leaks in supply pipes. Where structural distress is evident see advice. If seepage observed, determine causes or seek advice on consequences.	
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EXAMPLES OF **GOOD** HILLSIDE PRACTICE



EXAMPLES OF **POOR** HILLSIDE PRACTICE



APPENDIX E

**STANDARD PROFORMA FOR GEOTECHNICAL CERTIFICATION
AND LANDSLIDE SUSCEPTIBILITY ANALYSIS FORM**

LANDSLIDE SUSCEPTIBILITY ANALYSIS FORM - Drainage Features

1 Natural Slope Surface			
Site		Level	Factor
☐	Less than 5 degrees	L	0.1
☒	Between 5 and 15 degrees	M	0.5
☐	Between 15 and 30 degrees	M	0.8
☐	Between 30 and 45 degrees	H	1.2
☐	More than 45 degrees	M	1.5
☐	Custom		0.6

2 Slope Shape			
Site		Level	Factor
☐	Crest or ridge	L	0.7
☐	Planar / Convex	M	0.9
☐	Rough / Irregular	H	1.2
☒	Concave	H	1.5
☐	Custom		1

3 Site Geology			
Site		Level	Factor
☐	Volcanic Extrusive Rock	H	1.1
☒	Sedimentary Rock	M	1
☐	Low Grade Metamorphic Rock	M	1
☐	High Grade Metamorphic Rock	L	0.9
☐	Volcanic Intrusive Rock	M	1
☐	Custom		1

4 Soils			
Site		Level	Factor
☐	Rock at Surface	VL	0.1
☐	Residual Soil < 1m deep	L	0.5
☐	Residual Soil 1-3m deep	M	0.9
☐	Residual Soil >3m deep	H	1.5
☒	Colluvial Soil < 1m deep	H	1.5
☐	Colluvial Soil 1-3m deep	VH	2
☐	Colluvial Soil >3m deep	VH	4
☐	Custom		0.7

5 Fill Height			
Site		Level	Factor
☒	None	L	1
☐	Less than 1m	M	1.1
☐	Between 1 and 3m	M	1.3
☐	Between 3 and 6m	H	1.7
☐	More than 6m	VH	2.5
☐	Custom		1.2

6 Evidence of Groundwater			
Site		Level	Factor
☐	None apparent	L	0.7
☒	Minor moistness	M	0.9
☐	Generally wet	H	1.5
☐	Surface springs	VH	3
☐	Custom		0.7

7 Cut Height			
Site		Level	Factor
☒	None (Go to Section 11)	L	1
☐	Less than 1m	M	1.1
☐	Between 1 and 3m	M	1.3
☐	Between 3 and 6m	H	1.7
☐	More than 6m	VH	2.5
☐	Custom		2.5

8 Slope of Cut Face			
Site		Level	Factor
☒	NA	NA	1
☐	Less than 30 degrees	L	0.5
☐	Between 30 and 45 degrees	M	1
☐	Between 45 and 60 degrees	H	1.5
☐	More than 60 degrees	VH	3
☐	Custom		1.5

9 Material in Cutting			
Site		Level	Factor
☒	NA	NA	1
☐	High Strength Rock	L	0.5
☐	Medium Strength Rock	L	1
☐	Low Strength Rock	M	1.2
☐	Very Low Strength Rock and Soil	V	1.5
☐	Soil	VH	2
☐	Custom		0.7

10 Cut Slope Support			
Site		Level	Factor
☒	NA	NA	1
☐	Concrete Wall	L	0.5
☐	Crib Wall	M	0.9
☐	Gabion Wall	M	1
☐	Rock Wall	H	1.5
☐	Unsupported	H	2
☐	Custom		1

11 Concentration of Surface Water			
Site		Level	Factor
☐	Ridge	L	0.7
☐	Crest	M	0.8
☒	Upper Slope	M	0.9
☐	Mid Slope	H	1.2
☐	Lower Slope	H	1.5
☐	Custom		1

12 Wastewater Disposal			
Site		Level	Factor
☒	Fully Sewered	M	1
☐	Onsite disposal - Surface	M	1.2
☐	Onsite disposal - Soak Pits / Trenches	H	1.5
☐	Custom		1

13 Stormwater Disposal			
Site		Level	Factor
☒	All stormwater piped into road drainage	L	0.7
☐	Rain water tanks with overflows	M	1
☐	Stormwater Discharge on site	H	1.5
☐	Custom		1

14 Evidence of Instability			
Site		Level	Factor
☐	No sign of instability	L	0.8
☒	Soil Creep	H	1.2
☐	Minor irregularity	VH	2
☐	Major irregularity	VH	5
☐	Active instability	VH	10
☐	Custom		1.8

Summary

		Factor
1	Natural Slope Surface	2 0.5
2	Slope Shape	4 1.5
3	Site Geology	2 1
4	Soils	5 1.5
5	Fill Height	1 1
6	Evidence of Groundwater	2 0.9
7	Cut Height	1 1
8	Slope of Cut Face	1 1
9	Material in Cutting	1 1
10	Cut Slope Support	1 1
11	Concentration of Surface Water	3 0.9
12	Wastewater Disposal	1 1
13	Stormwater Disposal	1 0.7
14	Evidence of Instability	2 1.2
		0.7655

LANDSLIDE SUSCEPTIBILITY ANALYSIS FORM - Flat Filled Areas

1 Natural Slope Surface			
Site		Level	Factor
☒	Less than 5 degrees	L	0.1
☐	Between 5 and 15 degrees	M	0.5
☐	Between 15 and 30 degrees	M	0.8
☐	Between 30 and 45 degrees	H	1.2
☐	More than 45 degrees	M	1.5
☐	Custom		0.6

2 Slope Shape			
Site		Level	Factor
☐	Crest or ridge	L	0.7
☒	Planar / Convex	M	0.9
☐	Rough / Irregular	H	1.2
☐	Concave	H	1.5
☐	Custom		1

3 Site Geology			
Site		Level	Factor
☐	Volcanic Extrusive Rock	H	1.1
☒	Sedimentary Rock	M	1
☐	Low Grade Metamorphic Rock	M	1
☐	High Grade Metamorphic Rock	L	0.9
☐	Volcanic Intrusive Rock	M	1
☐	Custom		1

4 Soils			
Site		Level	Factor
☐	Rock at Surface	VL	0.1
☐	Residual Soil < 1m deep	L	0.5
☐	Residual Soil 1-3m deep	M	0.9
☐	Residual Soil >3m deep	H	1.5
☐	Colluvial Soil < 1m deep	H	1.5
☒	Colluvial Soil 1-3m deep	VH	2
☐	Colluvial Soil >3m deep	VH	4
☐	Custom		0.7

5 Fill Height			
Site		Level	Factor
☐	None	L	1
☐	Less than 1m	M	1.1
☒	Between 1 and 3m	M	1.3
☐	Between 3 and 6m	H	1.7
☐	More than 6m	VH	2.5
☐	Custom		1.2

6 Evidence of Groundwater			
Site		Level	Factor
☐	None apparent	L	0.7
☐	Minor moistness	M	0.9
☒	Generally wet	H	1.5
☐	Surface springs	VH	3
☐	Custom		0.7

7 Cut Height			
Site		Level	Factor
☒	None (Go to Section 11)	L	1
☐	Less than 1m	M	1.1
☐	Between 1 and 3m	M	1.3
☐	Between 3 and 6m	H	1.7
☐	More than 6m	VH	2.5
☐	Custom		2.5

8 Slope of Cut Face			
Site		Level	Factor
☒	NA	NA	1
☐	Less than 30 degrees	L	0.5
☐	Between 30 and 45 degrees	M	1
☐	Between 45 and 60 degrees	H	1.5
☐	More than 60 degrees	VH	3
☐	Custom		1.5

9 Material in Cutting			
Site		Level	Factor
☒	NA	NA	1
☐	High Strength Rock	L	0.5
☐	Medium Strength Rock	L	1
☐	Low Strength Rock	M	1.2
☐	Very Low Strength Rock and Soil	V	1.5
☐	Soil	VH	2
☐	Custom		0.7

10 Cut Slope Support			
Site		Level	Factor
☒	NA	NA	1
☐	Concrete Wall	L	0.5
☐	Crib Wall	M	0.9
☐	Gabion Wall	M	1
☐	Rock Wall	H	1.5
☐	Unsupported	H	2
☐	Custom		1

11 Concentration of Surface Water			
Site		Level	Factor
☐	Ridge	L	0.7
☐	Crest	M	0.8
☐	Upper Slope	M	0.9
☐	Mid Slope	H	1.2
☒	Lower Slope	H	1.5
☐	Custom		1

12 Wastewater Disposal			
Site		Level	Factor
☒	Fully Sewered	M	1
☐	Onsite disposal - Surface	M	1.2
☐	Onsite disposal - Soak Pits / Trenches	H	1.5
☐	Custom		1

13 Stormwater Disposal			
Site		Level	Factor
☒	All stormwater piped into road drainage	L	0.7
☐	Rain water tanks with overflows	M	1
☐	Stormwater Discharge on site	H	1.5
☐	Custom		1

14 Evidence of Instability			
Site		Level	Factor
☐	No sign of instability	L	0.8
☐	Soil Creep	H	1.2
☒	Minor irregularity	VH	2
☐	Major irregularity	VH	5
☐	Active instability	VH	10
☐	Custom		1.8

Summary

		Factor
1	Natural Slope Surface	1 0.1
2	Slope Shape	2 0.9
3	Site Geology	2 1
4	Soils	6 2
5	Fill Height	3 1.3
6	Evidence of Groundwater	3 1.5
7	Cut Height	1 1
8	Slope of Cut Face	1 1
9	Material in Cutting	1 1
10	Cut Slope Support	1 1
11	Concentration of Surface Water	5 1.5
12	Wastewater Disposal	1 1
13	Stormwater Disposal	1 0.7
14	Evidence of Instability	3 2
		0.7371

LANDSLIDE SUSCEPTIBILITY ANALYSIS FORM - Flat Floodplain

1 Natural Slope Surface			
Site		Level	Factor
☒	Less than 5 degrees	L	0.1
☐	Between 5 and 15 degrees	M	0.5
☐	Between 15 and 30 degrees	M	0.8
☐	Between 30 and 45 degrees	H	1.2
☐	More than 45 degrees	M	1.5
☐	Custom		0.6

2 Slope Shape			
Site		Level	Factor
☐	Crest or ridge	L	0.7
☐	Planar / Convex	M	0.9
☒	Rough / Irregular	H	1.2
☐	Concave	H	1.5
☐	Custom		1

3 Site Geology			
Site		Level	Factor
☐	Volcanic Extrusive Rock	H	1.1
☒	Sedimentary Rock	M	1
☐	Low Grade Metamorphic Rock	M	1
☐	High Grade Metamorphic Rock	L	0.9
☐	Volcanic Intrusive Rock	M	1
☐	Custom		1

4 Soils			
Site		Level	Factor
☐	Rock at Surface	VL	0.1
☐	Residual Soil < 1m deep	L	0.5
☐	Residual Soil 1-3m deep	M	0.9
☐	Residual Soil >3m deep	H	1.5
☐	Colluvial Soil < 1m deep	H	1.5
☒	Colluvial Soil 1-3m deep	VH	2
☐	Colluvial Soil >3m deep	VH	4
☐	Custom		0.7

5 Fill Height			
Site		Level	Factor
☒	None	L	1
☐	Less than 1m	M	1.1
☐	Between 1 and 3m	M	1.3
☐	Between 3 and 6m	H	1.7
☐	More than 6m	VH	2.5
☐	Custom		1.2

6 Evidence of Groundwater			
Site		Level	Factor
☐	None apparent	L	0.7
☒	Minor moistness	M	0.9
☐	Generally wet	H	1.5
☐	Surface springs	VH	3
☐	Custom		0.7

7 Cut Height			
Site		Level	Factor
☒	None (Go to Section 11)	L	1
☐	Less than 1m	M	1.1
☐	Between 1 and 3m	M	1.3
☐	Between 3 and 6m	H	1.7
☐	More than 6m	VH	2.5
☐	Custom		2.5

8 Slope of Cut Face			
Site		Level	Factor
☒	NA	NA	1
☐	Less than 30 degrees	L	0.5
☐	Between 30 and 45 degrees	M	1
☐	Between 45 and 60 degrees	H	1.5
☐	More than 60 degrees	VH	3
☐	Custom		1.5

9 Material in Cutting			
Site		Level	Factor
☒	NA	NA	1
☐	High Strength Rock	L	0.5
☐	Medium Strength Rock	L	1
☐	Low Strength Rock	M	1.2
☐	Very Low Strength Rock and Soil	V	1.5
☐	Soil	VH	2
☐	Custom		0.7

10 Cut Slope Support			
Site		Level	Factor
☒	NA	NA	1
☐	Concrete Wall	L	0.5
☐	Crib Wall	M	0.9
☐	Gabion Wall	M	1
☐	Rock Wall	H	1.5
☐	Unsupported	H	2
☐	Custom		1

11 Concentration of Surface Water			
Site		Level	Factor
☐	Ridge	L	0.7
☐	Crest	M	0.8
☐	Upper Slope	M	0.9
☐	Mid Slope	H	1.2
☒	Lower Slope	H	1.5
☐	Custom		1

12 Wastewater Disposal			
Site		Level	Factor
☒	Fully Sewered	M	1
☐	Onsite disposal - Surface	M	1.2
☐	Onsite disposal - Soak Pits / Trenches	H	1.5
☐	Custom		1

13 Stormwater Disposal			
Site		Level	Factor
☒	All stormwater piped into road drainage	L	0.7
☐	Rain water tanks with overflows	M	1
☐	Stormwater Discharge on site	H	1.5
☐	Custom		1

14 Evidence of Instability			
Site		Level	Factor
☐	No sign of instability	L	0.8
☒	Soil Creep	H	1.2
☐	Minor irregularity	VH	2
☐	Major irregularity	VH	5
☐	Active instability	VH	10
☐	Custom		1.8

Summary

		Factor
1	Natural Slope Surface	1 0.1
2	Slope Shape	3 1.2
3	Site Geology	2 1
4	Soils	6 2
5	Fill Height	1 1
6	Evidence of Groundwater	2 0.9
7	Cut Height	1 1
8	Slope of Cut Face	1 1
9	Material in Cutting	1 1
10	Cut Slope Support	1 1
11	Concentration of Surface Water	5 1.5
12	Wastewater Disposal	1 1
13	Stormwater Disposal	1 0.7
14	Evidence of Instability	2 1.2
		0.2722

LANDSLIDE SUSCEPTIBILITY ANALYSIS FORM - Hillcrest

1 Natural Slope Surface			
Site		Level	Factor
☒	Less than 5 degrees	L	0.1
☐	Between 5 and 15 degrees	M	0.5
☐	Between 15 and 30 degrees	M	0.8
☐	Between 30 and 45 degrees	H	1.2
☐	More than 45 degrees	M	1.5
☐	Custom		0.6

2 Slope Shape			
Site		Level	Factor
☒	Crest or ridge	L	0.7
☐	Planar / Convex	M	0.9
☐	Rough / Irregular	H	1.2
☐	Concave	H	1.5
☐	Custom		1

3 Site Geology			
Site		Level	Factor
☐	Volcanic Extrusive Rock	H	1.1
☒	Sedimentary Rock	M	1
☐	Low Grade Metamorphic Rock	M	1
☐	High Grade Metamorphic Rock	L	0.9
☐	Volcanic Intrusive Rock	M	1
☐	Custom		1

4 Soils			
Site		Level	Factor
☐	Rock at Surface	VL	0.1
☒	Residual Soil < 1m deep	L	0.5
☐	Residual Soil 1-3m deep	M	0.9
☐	Residual Soil >3m deep	H	1.5
☐	Colluvial Soil < 1m deep	H	1.5
☐	Colluvial Soil 1-3m deep	VH	2
☐	Colluvial Soil >3m deep	VH	4
☐	Custom		0.7

5 Fill Height			
Site		Level	Factor
☒	None	L	1
☐	Less than 1m	M	1.1
☐	Between 1 and 3m	M	1.3
☐	Between 3 and 6m	H	1.7
☐	More than 6m	VH	2.5
☐	Custom		1.2

6 Evidence of Groundwater			
Site		Level	Factor
☒	None apparent	L	0.7
☐	Minor moistness	M	0.9
☐	Generally wet	H	1.5
☐	Surface springs	VH	3
☐	Custom		0.7

7 Cut Height			
Site		Level	Factor
☒	None (Go to Section 11)	L	1
☐	Less than 1m	M	1.1
☐	Between 1 and 3m	M	1.3
☐	Between 3 and 6m	H	1.7
☐	More than 6m	VH	2.5
☐	Custom		2.5

8 Slope of Cut Face			
Site		Level	Factor
☒	NA	NA	1
☐	Less than 30 degrees	L	0.5
☐	Between 30 and 45 degrees	M	1
☐	Between 45 and 60 degrees	H	1.5
☐	More than 60 degrees	VH	3
☐	Custom		1.5

9 Material in Cutting			
Site		Level	Factor
☒	NA	NA	1
☐	High Strength Rock	L	0.5
☐	Medium Strength Rock	L	1
☐	Low Strength Rock	M	1.2
☐	Very Low Strength Rock and Soil	V	1.5
☐	Soil	VH	2
☐	Custom		0.7

10 Cut Slope Support			
Site		Level	Factor
☒	NA	NA	1
☐	Concrete Wall	L	0.5
☐	Crib Wall	M	0.9
☐	Gabion Wall	M	1
☐	Rock Wall	H	1.5
☐	Unsupported	H	2
☐	Custom		1

11 Concentration of Surface Water			
Site		Level	Factor
☐	Ridge	L	0.7
☒	Crest	M	0.8
☐	Upper Slope	M	0.9
☐	Mid Slope	H	1.2
☐	Lower Slope	H	1.5
☐	Custom		1

12 Wastewater Disposal			
Site		Level	Factor
☒	Fully Sewered	M	1
☐	Onsite disposal - Surface	M	1.2
☐	Onsite disposal - Soak Pits / Trenches	H	1.5
☐	Custom		1

13 Stormwater Disposal			
Site		Level	Factor
☒	All stormwater piped into road drainage	L	0.7
☐	Rain water tanks with overflows	M	1
☐	Stormwater Discharge on site	H	1.5
☐	Custom		1

14 Evidence of Instability			
Site		Level	Factor
☒	No sign of instability	L	0.8
☐	Soil Creep	H	1.2
☐	Minor irregularity	VH	2
☐	Major irregularity	VH	5
☐	Active instability	VH	10
☐	Custom		1.8

Summary

	Factor
1 Natural Slope Surface	1 0.1
2 Slope Shape	1 0.7
3 Site Geology	2 1
4 Soils	2 0.5
5 Fill Height	1 1
6 Evidence of Groundwater	1 0.7
7 Cut Height	1 1
8 Slope of Cut Face	1 1
9 Material in Cutting	1 1
10 Cut Slope Support	1 1
11 Concentration of Surface Water	2 0.8
12 Wastewater Disposal	1 1
13 Stormwater Disposal	1 0.7
14 Evidence of Instability	1 0.8
	0.0110

LANDSLIDE SUSCEPTIBILITY ANALYSIS FORM - Mild Sloping Terrain

1 Natural Slope Surface			
Site		Level	Factor
☐	Less than 5 degrees	L	0.1
☒	Between 5 and 15 degrees	M	0.5
☐	Between 15 and 30 degrees	M	0.8
☐	Between 30 and 45 degrees	H	1.2
☐	More than 45 degrees	M	1.5
☐	Custom		0.6

2 Slope Shape			
Site		Level	Factor
☐	Crest or ridge	L	0.7
☒	Planar / Convex	M	0.9
☐	Rough / Irregular	H	1.2
☐	Concave	H	1.5
☐	Custom		1

3 Site Geology			
Site		Level	Factor
☐	Volcanic Extrusive Rock	H	1.1
☒	Sedimentary Rock	M	1
☐	Low Grade Metamorphic Rock	M	1
☐	High Grade Metamorphic Rock	L	0.9
☐	Volcanic Intrusive Rock	M	1
☐	Custom		1

4 Soils			
Site		Level	Factor
☐	Rock at Surface	VL	0.1
☐	Residual Soil < 1m deep	L	0.5
☒	Residual Soil 1-3m deep	M	0.9
☐	Residual Soil >3m deep	H	1.5
☐	Colluvial Soil < 1m deep	H	1.5
☐	Colluvial Soil 1-3m deep	VH	2
☐	Colluvial Soil >3m deep	VH	4
☐	Custom		0.7

5 Fill Height			
Site		Level	Factor
☒	None	L	1
☐	Less than 1m	M	1.1
☐	Between 1 and 3m	M	1.3
☐	Between 3 and 6m	H	1.7
☐	More than 6m	VH	2.5
☐	Custom		1.2

6 Evidence of Groundwater			
Site		Level	Factor
☒	None apparent	L	0.7
☐	Minor moistness	M	0.9
☐	Generally wet	H	1.5
☐	Surface springs	VH	3
☐	Custom		0.7

7 Cut Height			
Site		Level	Factor
☒	None (Go to Section 11)	L	1
☐	Less than 1m	M	1.1
☐	Between 1 and 3m	M	1.3
☐	Between 3 and 6m	H	1.7
☐	More than 6m	VH	2.5
☐	Custom		2.5

8 Slope of Cut Face			
Site		Level	Factor
☒	NA	NA	1
☐	Less than 30 degrees	L	0.5
☐	Between 30 and 45 degrees	M	1
☐	Between 45 and 60 degrees	H	1.5
☐	More than 60 degrees	VH	3
☐	Custom		1.5

9 Material in Cutting			
Site		Level	Factor
☒	NA	NA	1
☐	High Strength Rock	L	0.5
☐	Medium Strength Rock	L	1
☐	Low Strength Rock	M	1.2
☐	Very Low Strength Rock and Soil	V	1.5
☐	Soil	VH	2
☐	Custom		0.7

10 Cut Slope Support			
Site		Level	Factor
☒	NA	NA	1
☐	Concrete Wall	L	0.5
☐	Crib Wall	M	0.9
☐	Gabion Wall	M	1
☐	Rock Wall	H	1.5
☐	Unsupported	H	2
☐	Custom		1

11 Concentration of Surface Water			
Site		Level	Factor
☐	Ridge	L	0.7
☐	Crest	M	0.8
☒	Upper Slope	M	0.9
☐	Mid Slope	H	1.2
☐	Lower Slope	H	1.5
☐	Custom		1

12 Wastewater Disposal			
Site		Level	Factor
☒	Fully Sewered	M	1
☐	Onsite disposal - Surface	M	1.2
☐	Onsite disposal - Soak Pits / Trenches	H	1.5
☐	Custom		1

13 Stormwater Disposal			
Site		Level	Factor
☒	All stormwater piped into road drainage	L	0.7
☐	Rain water tanks with overflows	M	1
☐	Stormwater Discharge on site	H	1.5
☐	Custom		1

14 Evidence of Instability			
Site		Level	Factor
☐	No sign of instability	L	0.8
☒	Soil Creep	H	1.2
☐	Minor irregularity	VH	2
☐	Major irregularity	VH	5
☐	Active instability	VH	10
☐	Custom		1.8

Summary

		Factor
1	Natural Slope Surface	2 0.5
2	Slope Shape	2 0.9
3	Site Geology	2 1
4	Soils	3 0.9
5	Fill Height	1 1
6	Evidence of Groundwater	1 0.7
7	Cut Height	1 1
8	Slope of Cut Face	1 1
9	Material in Cutting	1 1
10	Cut Slope Support	1 1
11	Concentration of Surface Water	3 0.9
12	Wastewater Disposal	1 1
13	Stormwater Disposal	1 0.7
14	Evidence of Instability	2 1.2
		0.2143

**Standard Pro-forma for
Geotechnical Certification**

City of Gold Coast Council file reference:

PROPOSED WORKS AT (LOCATION): **41-53 Courtney Drive, 176-202 Baileys Mountain Road and 288 & Lot 57 Reserve Road, Upper Coomera**

for (proposed development): **Proposed Residential Subdivision**

I, Peter ELKINGTON, RPEQ No. 7226, of Pacific Geotech Pty Limited (Consulting Engineers), being duly authorised on this behalf, do certify that:-

The Lots for the proposed new residential subdivision at 41-53 Courtney Drive, 176-202 Baileys Mountain Road and 288 & Lot 57 Reserve Road, Upper Coomera can achieve a Landslide Susceptibility Rating of ‘Low’ or better for the long term (70 years minimum) and will therefore be sustainable and not cause any adverse effects on the stability and integrity of the neighbouring buildings, properties, utility services and infrastructures providing the advice and construction recommendations made in the Pacific Geotech report “Updated Broadscale Geotechnical Investigation and Landslide Risk Assessment For Proposed Residential Subdivision – 41-53 Courtney Drive, 176-202 Baileys Mountain Road and 288 & Lot 57 Reserve Road, Upper Coomera” dated 30th June 2025 Job No. PG-12268 have been followed and implemented and that no other development adversely affects the subject development.

I am aware that the City of Gold Coast Council will rely upon this certificate and any associated geotechnical reports, maps, graphs, tables, attachments etc. produced as a consequence of commissioning this development proposal.

Signed:



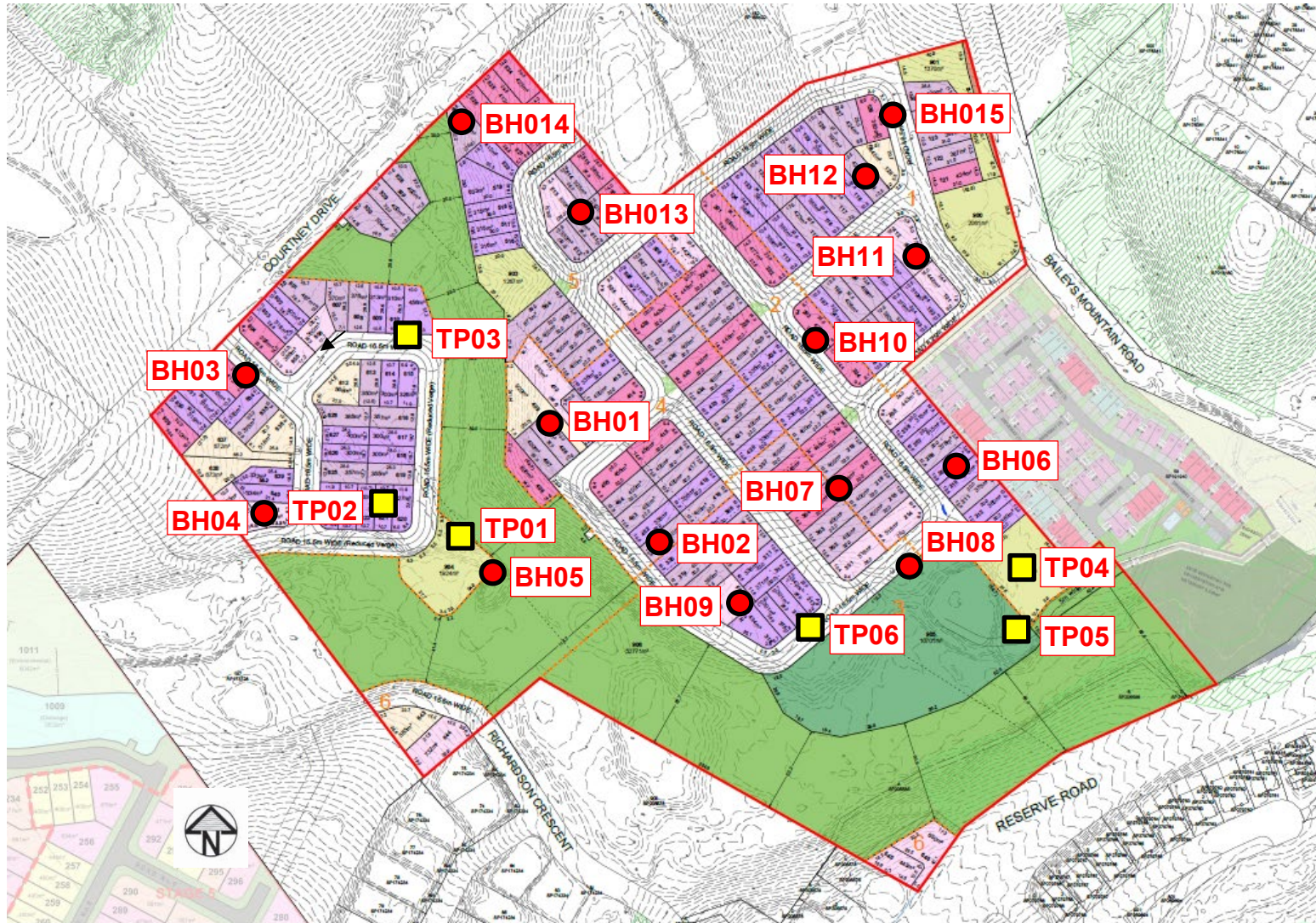
PETER ELKINGTON (RPEQ No. 7226)

Designation: **GEOTECHNICAL ENGINEER**

Certified this: **Thirtieth Day of June, 2025.**

APPENDIX F

SITE PLAN AND CONCEPT PLAN OF PROPOSED SUBDIVISION



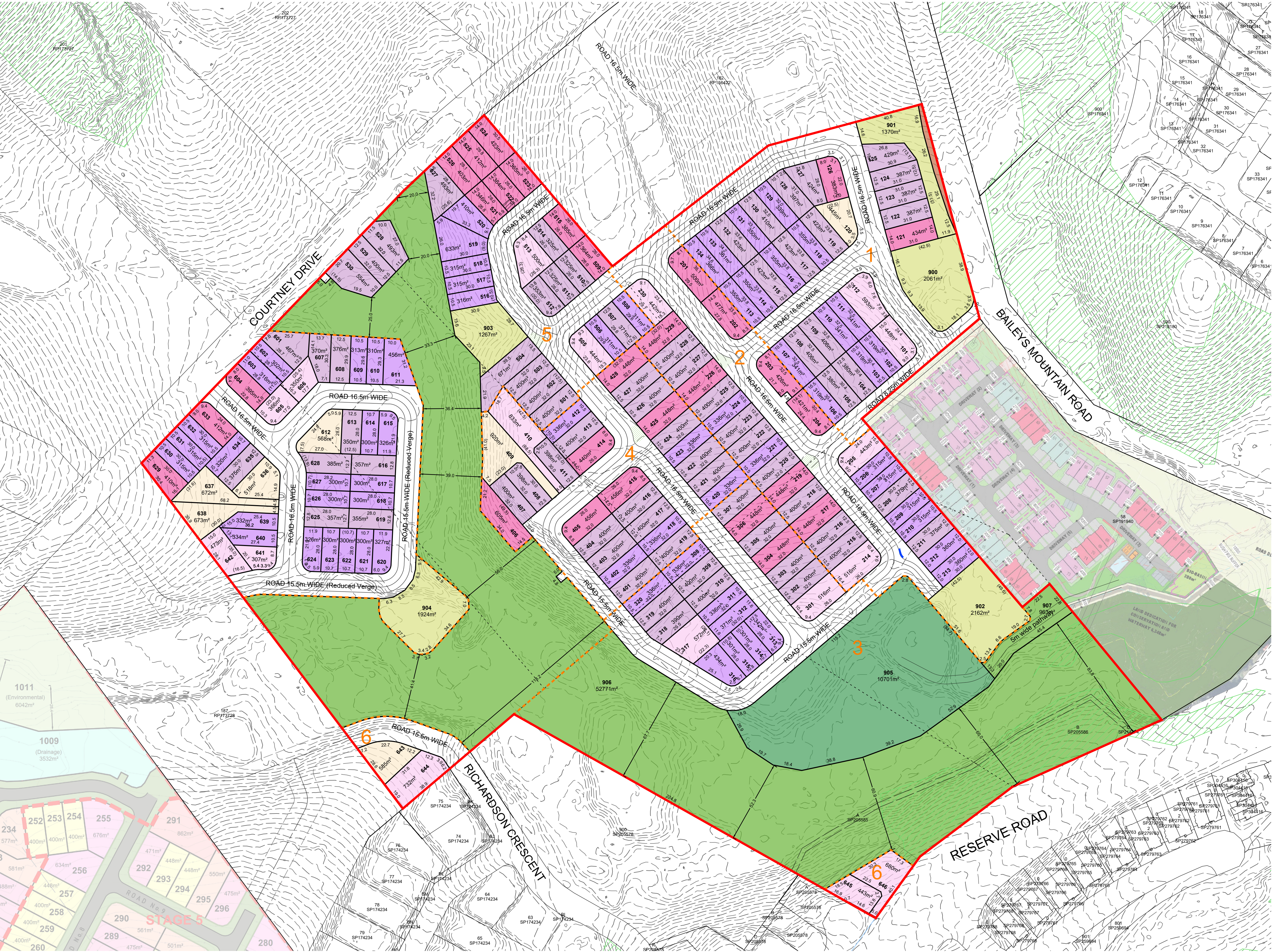
 Test Pit

 Borehole



Drawn LB	Project:	Proposed Residential Subdivision – Site Plan	Drawing No. PG-12268-03	A4
Date JUN-25	Location:	Courtney Drive, Baileys Mountain Road, and Reserve Road, Upper Coomera		
Checked	Client:	Norfolk Estates Pty Ltd		

CONCEPT PLAN



NOT TO BE USED FOR ENGINEERING DESIGN
OR CONSTRUCTION

NOTES

This plan was prepared as a conceptual layout only. The information on this plan is not suitable for any other purpose.

Property dimensions, areas, numbers of lots and contours and other physical features shown have been compiled from existing information and may not have been verified by field survey. These may need verification if the development application is approved and development proceeds, and may change when a full survey is undertaken or in order to comply with development approval conditions.

No reliance should be placed on the information on this plan for detailed subdivision design or for any financial dealings involving the land.

Pavements and centrelines shown are indicative only and are subject to Engineering Design.

Saunders Havill Group therefore disclaims any liability for any loss or damage whatsoever or howsoever incurred, arising from any party using or relying upon this plan for any purpose other than as a document prepared for the sole purpose of accompanying a development application and which may be subject to alteration beyond the control of the Saunders Havill Group. Unless a development approval states otherwise, this is not an approved plan.

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PROJECTION: GDA2020 MGA56
SUBJECT BOUNDARIES: LOT CALCULATIONS BY LANDPARTNERS
DATED 25/11/2024

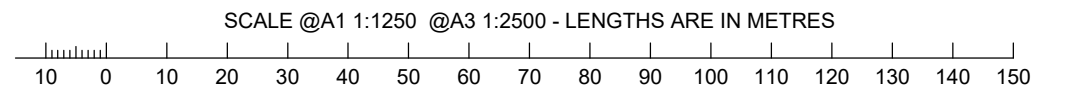
LEGEND

- Site Boundary
- Major Contour (1.0m interval)
- Minor Contour (0.5m interval)
- Vegetation Management
- Traffic Calming & Landscape Treatment
- Proposed Temporary Turnaround Easement
- Indicative Binpad Location
- Stage Boundary
- Stage No.

DEVELOPMENT STATISTICS			
RESIDENTIAL ALLOTMENTS	No. Lots	%	Net Area
10.5m - 12.49m Frontage	64	34.0%	2.152 ha
12.5m - 13.99m Frontage	71	37.8%	2.851 ha
14m - 14.99m Frontage	29	15.4%	1.244 ha
> 15m Frontage	17	9.0%	0.866 ha
Irregular Frontage	7	3.7%	0.439 ha
Total Residential Allotments	188	100.0%	7.552 ha

Land Budget	Area (Ha)	%	
Area of Subject Site / Stage	18.266 ha		
Net Residential Area (no roads)	7.552 ha	41.3%	
Detention / Drainage	0.881 ha	4.8%	
Local Park	1.070 ha	5.9%	
Environmental Open Space	5.280 ha	28.9%	
Road Widening	0.025 ha	0.1%	
Road Areas	3.458 ha	18.9%	
Total	18.266 ha	100.0%	

RP DESCRIPTION: Lot 185 on RP173727, Lot 186 on RP173728, Lot 57 on SP214370 & Lot 56 on RP162858, Lot 58 on SP191940



NORFOLK ESTATES PTY LTD ATF SOLANDER INVESTMENT UNIT TRUST