PLANNING PROPOSAL

LOT 2 DP 1018217
DIDO STREET, KIAMA

Prepared by

Plannex Environmental Planning

on behalf of Tony Scopelitti

April 2019

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1.0 INTRODUCTION

1.1 Introduction

Plannex Environmental Planning has been engaged by Tony Scopelitti to prepare a Planning Proposal seeking to rezone part of his land at Lot 2 DP 1018217 Dido Street, Kiama from RU1 Primary Production to a mixture of R2 Low Density Residential and R5 Large Lot Residential to enable the site to be subdivided and developed for residential purposes, whilst retaining the existing E2 Environmental Conservation zoning across the western portion of the site.

This Planning Proposal identifies the objectives and intended outcomes of the proposal; offers an explanation of the proposed amendments to Kiama Local Environmental Plan 2011; and, provides detailed justification for the proposed amendment.

Prior to the preparation of the Planning Proposal a meeting was held with Council officers to discuss the development proposal and the intended amendments to Kiama Local Environmental Plan 2011 to facilitate the proposal, and to identify the range of matters to be addressed in the Planning Proposal. A copy of the minutes of that meeting are attached at Appendix A.

This Planning Proposal has been prepared in accordance with Section 3.33 of the Environmental Planning and Assessment Act, 1979 (EP&AA); and, relevant Department of Planning and Environment (DPE) guidelines, including '*A guide to preparing planning proposals'* (2018) and '*A guide to preparing local environmental plans*' (2018).

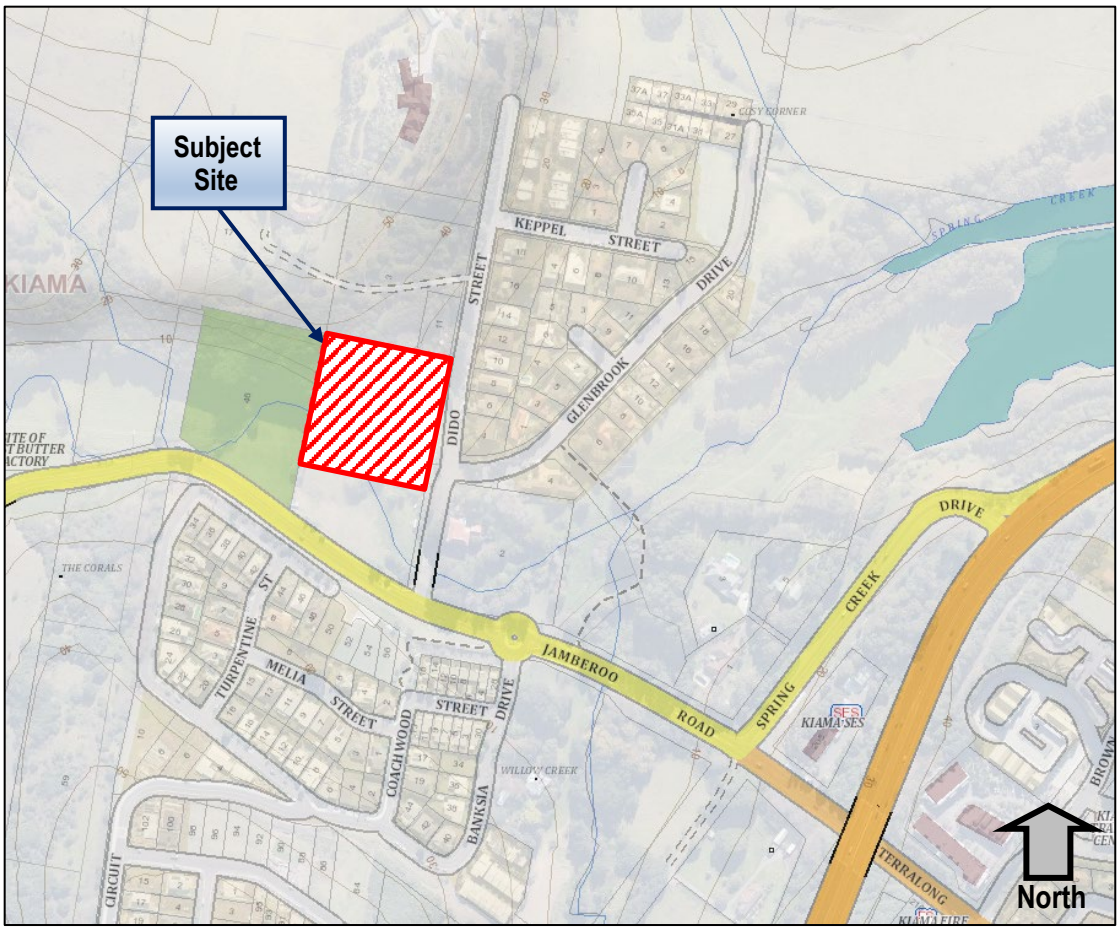
1.2 Subject Site

The subject site is an almost square-shaped allotment of land situated on the western side of Dido Street, north of Jamberoo Road, at Kiama (see Figure 1). The subject site is described as Lot 2 in Deposited Plan No.1018217 Dido Street, and has an area of 1.021 hectares. Photographs of the subject site are contained at Appendix B.

The subject site has a frontage of 100.585m to Dido Street along its eastern boundary. The northern boundary of the subject site measures 101.515m in length and the southern boundary measures 101.56m. The western boundary is 100.585m in length.

The subject site is currently vacant and its southern portion is affected by a 30.48m wide transmission line easement. The remnants of an old dry stone wall are located along part of the northern boundary.

Figure 1 – Location Plan



Source - SIX Maps

The subject site is located to the north-west of Kiama township within the lower hillslopes of the major ridgeline that extends through to Bombo Beach and separates Kiama from Bombo and Kiama Downs to the north. The localised landform of the site slopes in a south-easterly direction towards Dido Street and in a southerly towards Spring Creek, which cuts across the south-western corner of the site before flowing through the significantly flatter neighbouring property to the south and then under Dido Street and eventually into the Spring Creek wetland and lagoon at the southern end of Bombo Beach.

Vegetation across the subject site consists of two (2) vegetation types – 'Weeds and exotics' and 'Exotic grassland'. The dominant plant species present on-site include Large-leaved Privet, Coral Trees, Tobacco Bush and Easter cassia. Grasslands occurring on the cleared portions of the site are dominated by exotic species such as Kikuyu, Paspalum, Panic Veldtgrass and Parramatta Grass.

Figure 2 – Site Context

Source - SIX Maps

The subject site is not currently connected to Sydney Water's reticulated water supply or sewerage systems. Electricity services are similarly not connected to the subject site, but do run along the eastern side of Dido Street as an overhead supply.

1.3 Development Proposal

The rezoning of the land is necessary in order to facilitate a development proposal to subdivide the land into a total of eight (8) allotments to be subsequently developed for residential purposes. The proposed subdivision (illustrated in the concept plan at Appendix C) makes provision for a range of allotment sizes taking into account the site constraints and opportunities. It is proposed to create three (3) 'standard-sized' residential allotments, of between 488.6m^2 and 529.6m^2 in area, fronting Dido Street, with a fourth lot also fronting Dido Street, but with a larger area of 1,350m^2 taking into account the influence of the transmission easement. The layout also proposes four (4) larger battle-axe allotments – three (3) ranging in size from 910.3m^2 to 1,740m^2 and the fourth having an area of 3,396m^2 and encompassing the residue of the land.

Access to the proposed allotments is proposed in two (2) locations from Dido Street – one at the northern end of the site to provide access to Lots 1 to 4, and the other at the southern end of the site providing access to Lots 5 to 8. The access corridors will have a minimum width of 5m and will be covered by Rights of Carriageway so that each allotment has coincidental legal and practical access. It is intended that even the allotments with direct frontage to Dido Street will utilise the designated access corridors in order to minimise the number of access points onto Dido Street.

The subdivision layout has been configured so that each proposed allotment can accommodate a building area that achieves a maximum Bushfire Attack level of BAL-29 without requiring any clearing or vegetation disturbance within the E2 zoned portion of the site.

The subdivision will be serviced with a reticulated water supply, connections to the reticulated sewerage system, underground electricity reticulation, and NBN broadband services.

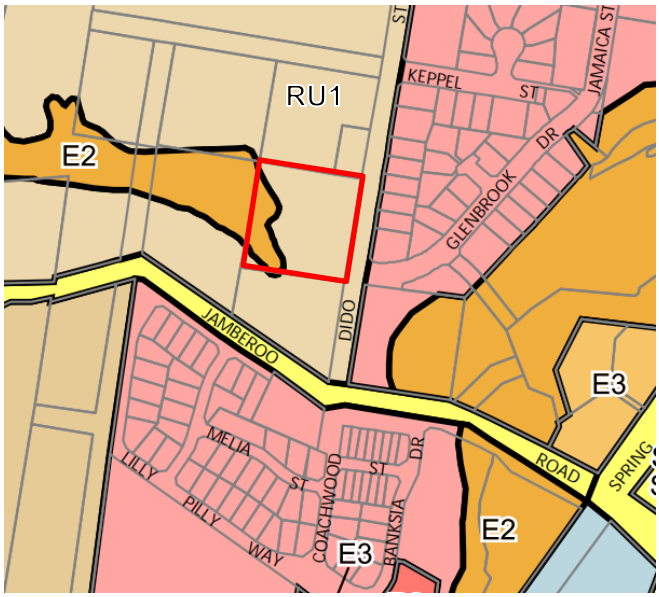
1.4 Existing Planning Controls

1.4.1 Kiama Local Environmental Plan 2011

The subject site is affected by the provisions of Kiama Local Environmental Plan 2011 (KLEP 2011). Under KLEP 2011 the following specific planning controls apply to the subject site (shown edged in red on the map extracts):-

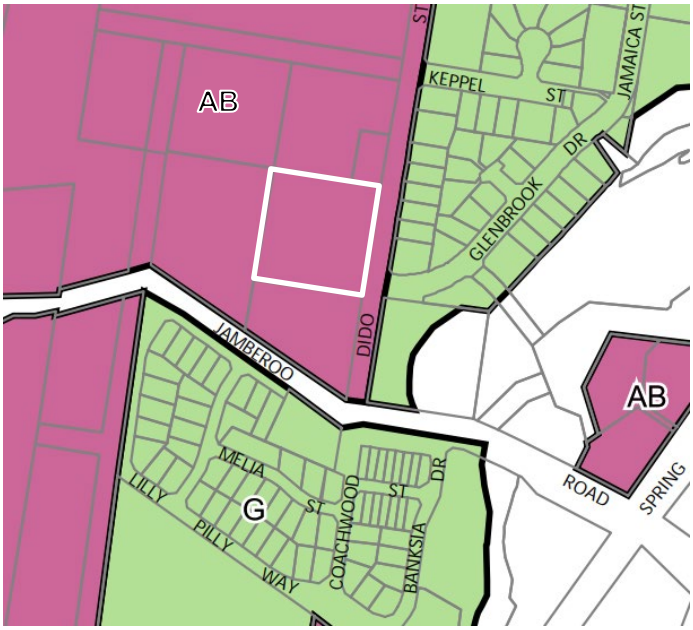
Zoning

RU1 Primary Production
E2 Environmental Conservation



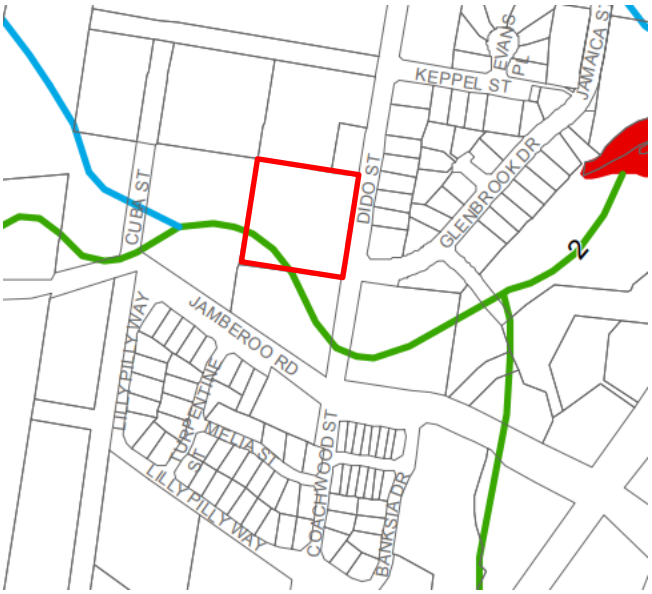
Minimum Allotment Size

40 hectares



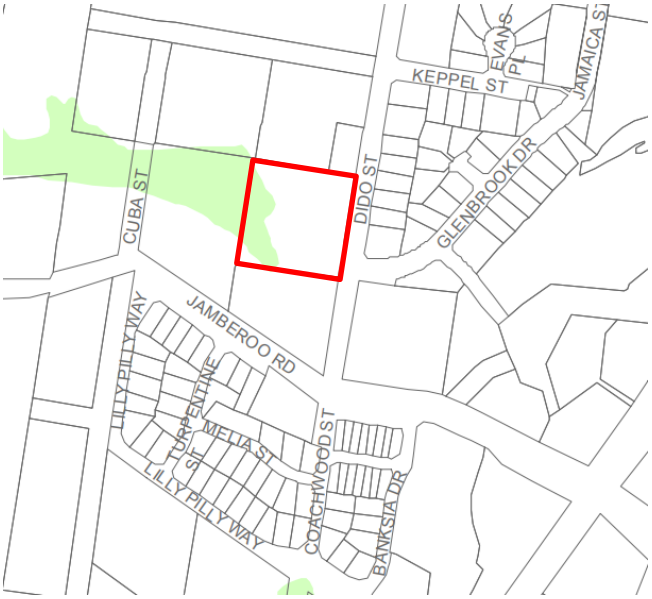
Riparian Lands

Category 2 watercourse



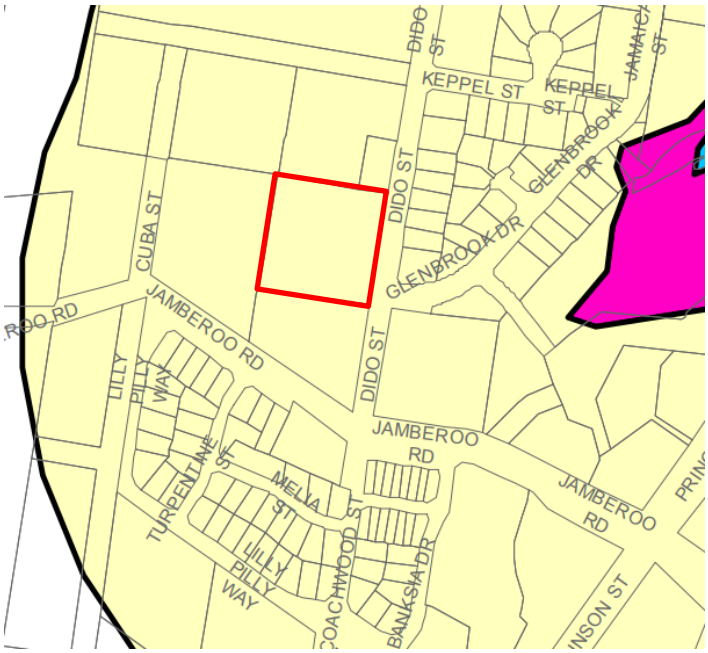
Terrestrial Biodiversity

Biodiversity Land



Acid Sulfate Soils

Class 5



There is currently no specified maximum building height or floor space ratio (FSR) development standards applying to the subject site.

The subject site does not contain any listed items of environmental heritage but is located diagonally opposite listed item no. I99 ("Fernleigh" – at No.2 Dido Street) and there are the remnants of a dry stone wall located along the northern boundary of the site (see Photo 6 in Appendix B). Dry stone walls in Kiama are generally listed as a heritage item in Schedule 5 to KLEP 2011 (item no. I64).

2.0 OBJECTIVES & INTENDED OUTCOMES

The Planning Proposal seeks to make amendments to KLEP 2011 to rezone part of the land from RU1 Primary Production to a mixture of R2 Low Density Residential and R5 Large Lot Residential to enable the land to be subdivided and developed for residential purposes. The existing E2 zoned land will be maintained to enable the protection of the existing mapped Biodiversity Land.

The specific objectives and intended outcomes of the Planning Proposal are:-

(a) to rezone part of the subject site from RU1 Primary Production to R2 Low Density Residential and R5 Large Lot Residential;

(b) to retain the existing E2 Environmental Conservation zone across the western portion of the site and the RU1 Primary Production zone in the site's south-western corner;

(c) to retain the Biodiversity Land designation within the site and to ensure the ongoing protection of this land;

(d) to impose minimum allotment sizes of 450m^2 in respect of the land zoned R2 and 800m^2 in respect of the land zoned R5;

(e) to impose a maximum building height limit of 8.5m in respect of the land zoned R2 and R5;

(f) to impose a maximum FSR of 0.45:1 in respect of the land zoned R2 and R5; and

(g) to enable the Torrens Title subdivision of the subject site to create residential allotments upon which dwelling houses may be constructed and including one (1) allotment that will contain all of the RU1 and E2 zoned land, in addition to at least 800m^2 of R5 zoned land.

3.0 EXPLANATION OF THE PROPOSED PROVISIONS

The objectives and intended outcomes of the Planning Proposal, as identified in Section 2.0, are to be achieved by:-

- Amending the KLEP 2011 Zoning Map in accordance with Appendix D, to rezone part of the subject site from RU1 Primary Production to R2 Low Density Residential and R5 Large Lot Residential;

- Amending the KLEP 2011 Lot Size Map in accordance with Appendix E, to apply a minimum permissible allotment size of 450m^2 in respect of the R2 zoned land and 800m^2 in respect of the R5 zoned land;

- Amending the KLEP 2011 Height of Buildings Map in accordance with Appendix F, to apply a maximum permissible height of 8.5m in respect of the land zoned R2 and R5; and

- Amending the KLEP 2011 FSR Map in accordance with Appendix G, to apply a maximum permissible FSR of 0.45:1 in respect of the land zoned R2 and R5.

4.0 JUSTIFICATION FOR THE PLANNING PROPOSAL

This section of the report examines the justification for the Planning Proposal in terms of the need for the proposal; how it sits within the strategic planning framework; its likely environmental, social and economic impacts; and, its implications for State and Commonwealth government agencies. This section is structured as responses to the questions contained within the DPI's '*A guide to preparing planning proposals*'.

4.1 Need for the Planning Proposal

4.1.1 Is the planning proposal a result of any strategic study or report?

The Planning Proposal has been prepared as a direct result of Council's *Kiama Urban Strategy* (KUS). The KUS was prepared to consider and identify opportunities and options for urban infill and urban expansion development within the Kiama Local Government Area (LGA), including sites adjacent to the western fringe of Kiama township.

Although greenfield land adjoining the site to the north and north-west was examined by the KUS for its potential to be rezoned and developed for residential purposes, the subject site was not. Therefore, whilst the KUS does not specifically identify the site as one which should be considered for progression to Planning Proposal stage, it has similarly not specifically excluded the site either. Accordingly, this Planning Proposal seeks to evaluate the subject site in the same manner as the KUS evaluated other sites adjoining, and in the immediate vicinity of, the subject site.

4.1.2 Is the planning proposal the best means of achieving the objectives or intended outcomes, or is there a better way?

The subject site is currently zoned RU1 Primary Production and E2 Environmental Conservation and is affected by a minimum allotment size of 40 hectares. Under the current provisions of KLEP 2011 it is not possible to subdivide the subject site in the manner proposed. Accordingly, rezoning of the subject site to a mix of R2 Low Density Residential and R5 Large Lot Residential to facilitate the proposal is the best and only means of achieving the desired outcome.

4.2 Relationship to Strategic Planning Framework

4.2.1 Is the planning proposal consistent with the objectives and actions contained within the applicable regional or sub-regional strategy (including the Sydney Metropolitan Strategy and exhibited draft strategies)?

The Illawarra-Shoalhaven Regional Plan (ISRP) was published by the DPE in November 2015 and provides the strategic policy, planning and decision-making framework to guide sustainable growth in the Illawarra-Shoalhaven Region over a 20-year period to 2036. In terms of housing, the ISRP indicates that the region will need to provide at least 35,400 new homes between 2016 and 2036 to meet the demands of population growth and change. The ISRP aims to create sufficient housing supply to enable the region to meet the projected demand for new housing and sets Directions to achieve this outcome.

The Planning Proposal is consistent with Direction 2.1 which seeks to "*provide sufficient housing supply to suit the changing demands of the region*". The ISRP indicates that the projected housing need for the Kiama LGA up to 2036 is 2,850 new homes. Whilst the Planning Proposal will not make a significant impact in terms of meeting the projected housing needs, it will assist. For this reason, the Planning Proposal is consistent with Direction 2.1.

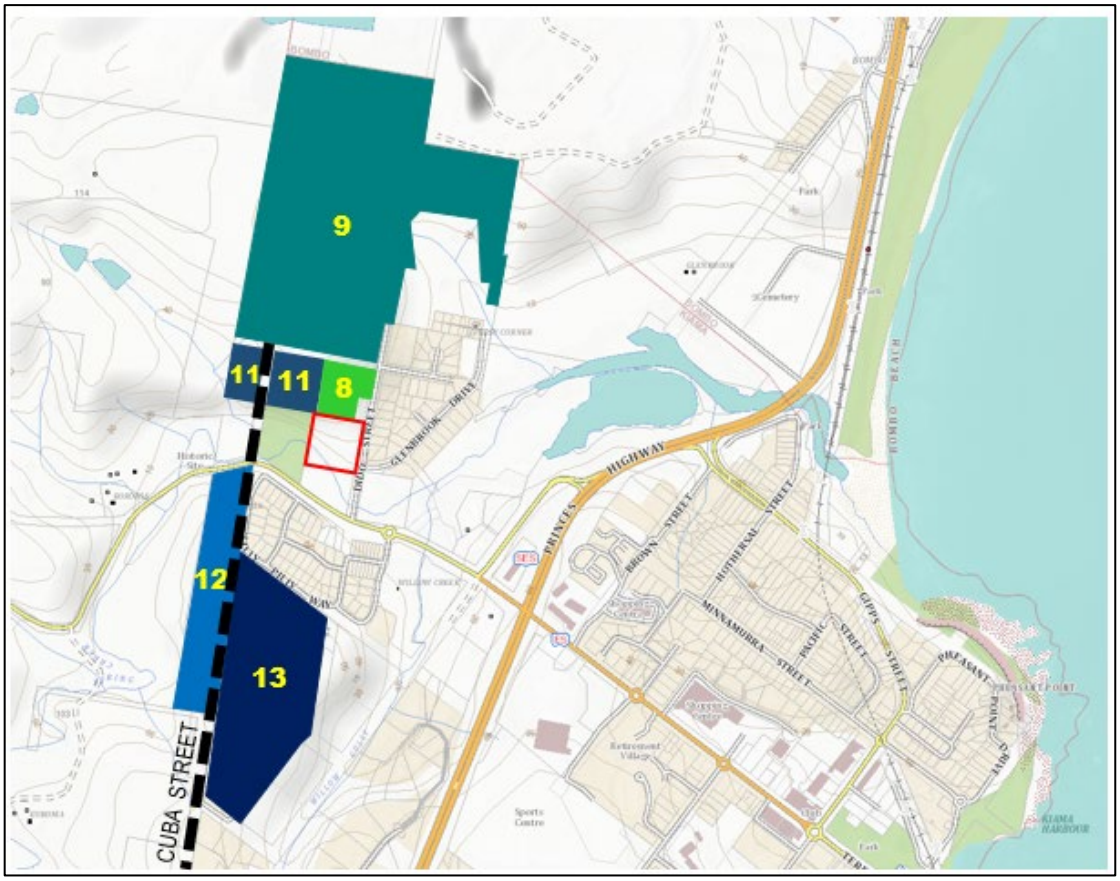
The subject site is located within reasonable proximity to the Kiama Town Centre and is within 200m of a bus stop along Jamberoo Road which services a bus route into the Kiama Town Centre. The Kiama Town Centre provides a range of services including retail, personal, health, community, and financial services. The Planning Proposal is therefore also consistent with Direction 2.2 which seeks to "*support housing opportunities close to existing services, jobs and infrastructure in the region's centres*".

The Planning Proposal will maintain the existing E2 Environmental Conservation zoning and Biodiversity land overlay applying to that band of vegetation along the northern side of Spring Creek. In addition, the concept subdivision plan (which the Planning Proposal will enable) also incorporates measures to ensure the protection of this area by including it within a single allotment and by ensuring that the proposed allotments are sized and configured to accommodate future dwellings without the need to clear or impact on vegetation within this area. The Planning Proposal is therefore considered to be consistent with Direction 2.4 which is to "*identify and conserve biodiversity values when planning new communities*".

4.2.2 Is the planning proposal consistent with a council's local strategy or other local strategic plan?

The KUS was adopted in September 2011 and identifies areas throughout the Kiama LGA that are considered to be potentially suitable for urban infill or greenfield urban expansion. On the north-western periphery of Kiama township (in the immediate vicinity of the subject site), five (5) potential sites were evaluated for suitability for urban expansion and are referenced in the KUS as sites 8, 9, 11, 12 and 13. For some unexplained reason (perhaps an oversight or perhaps because it was not specifically requested by the previous owner at that time), the subject site was not included at all in any evaluation for the purposes of the KUS. The location of the potential sites in relation to the subject site is illustrated in Figure 3 below (with the subject site edged red).

Figure 3 – Kiama Urban Strategy



The KUS evaluation assessment resulted in the following recommendations for each of the five (5) potential sites illustrated in Figure 3:-

Site 8 *Include*

Site 9 *Exclude – due to its highly visual ridge location and not required*

Site 11 *Partial inclusion only as part of the land is west of the town boundary adopted by Council (ie Cuba Street)*

Site 12 *Exclude – as the land is west of the town boundary adopted by Council*

Site 13 *Include – as the land adjoins Cedar Ridge and Cedar Grove and is east of the town boundary adopted by Council*

Of these sites, Site 13 has been rezoned and subdivided and is currently being developed with housing; Site 8 is the subject of a current Planning Proposal seeking rezoning to R2 Low Density Residential to enable subdivision to create a potential ten (10) allotments; and, Site 9 was the subject of a recent planning proposal request which was formally not endorsed to proceed to Gateway determination at the Council meeting held on 19th March 2019. At the time of its initial adoption, the KUS indicated that Site 13 would be available for housing by 2016, and Sites 8 and 11 by 2021.

The subject site has very similar characteristics to Site 8. The subject site is located directly opposite existing residential development in Dido Street; it sits lower on the hillside than the discounted Site 9 (and is lower than the supported Sites 8 and 11); and, importantly, it lies to the east of Cuba Street – with only Crown Land (Lot 701 DP 1026775) located between the site and Cuba Street. Cuba Street was reinforced by Council as the adopted western boundary of Kiama township at its meeting of 17th October 2017, when it was resolved that Council "*not support any new planning proposals that involve new residential land outside the identified town boundaries referred to in the adopted urban strategy areas*".

A more detailed, site-specific analysis of the constraints and capabilities of the subject site has been undertaken to inform the Planning Proposal and concept subdivision layout. This detailed analysis has identified that the subject site does have some capacity for residential subdivision and development without having any adverse environmental impacts. It has also identified that the land immediately to the south is heavily impacted by flooding and biodiversity constraints. These factors, in conjunction with the subject site's location east of Cuba Street, is demonstrative of the suitability of the site for consideration for rezoning.

Even though the subject site has not been recommended by the KUS for consideration for future urban development, this appears to have been the result of the site having never been exposed to evaluation under the KUS rather than as a result of it being evaluated and ruled out as unacceptable. As mentioned above, the land immediately to the north and north-west of the subject site has been identified in the KUS as suitable for consideration for rezoning; the land immediately to the west is Crown Land; and, the land to the south is not suitable for development due to flooding and biodiversity constraints. This leaves the

subject site as an isolated 'island'. It therefore makes sense, from a planning perspective, to consider the site for rezoning.

Council's *Planning Proposal Policy* (adopted 21st February 2012) identifies the circumstances under which Council may be prepared to consider a planning proposal, namely:-

- *Land is identified as a nominated area in the Urban Strategy.*

- *Land can be identified as assisting to meet Council's strategic direction.*

- *A clear zoning anomaly exists on site.*

In this case, the land is not nominated in the KUS. However, for the reasons explained above, it is considered that the subject site is consistent with the intent of the KUS. The development of the site for residential purposes is also consistent with Council's strategic directions for greenfield urban expansion (as outlined in the KUS), particularly:-

4.6.1 That Council provide sufficient land to meet the requirements of the Illawarra Regional Strategy as required by the Department of Planning.

4.6.3 That Council agree to the IRS target of 43% detached housing as required by the DOP recognising that the implications of this include the requirement to consider broader greenfield sites in the planning proposal process. However Council seek to review the IRS and this percentage following the 2011 Census and an associated review of population and housing needs.

4.6.6 That Council reconfirm its strongly held policy position that residential development in Kiama not progress further west than the current West Kiama/Cedar Ridge/Cedar Grove town boundary.

It is also apparent that the current RU1 Primary Production zoning is not an appropriate zoning for the site. The RU1 zone has objectives aimed at:-

- *To encourage sustainable primary industry production by maintaining and enhancing the natural resource base.*

- *To encourage diversity in primary industry enterprises and systems appropriate for the area.*

- *To minimise the fragmentation and alienation of resource lands.*

- *To minimise conflict between land uses within this zone and land uses within adjoining zones.*

- *To protect agricultural land for long term agricultural production.*

- *To provide opportunities for employment-generating development that adds value to local agricultural production through food and beverage processing.*

The subject site has an area of just 1.021 hectares, of which only approximately 4,700m^2 is currently cleared. Whilst the site is contiguous with the adjoining allotment to the south (Lot 1 DP 1018217 – 7,041m^2 in area), this allotment does not add significantly to the available cleared land and is almost entirely flood-prone. The very small area of cleared land available, together with the shallow soil profile over the site precludes the site from being used for primary production purposes (eg grazing or cropping) consistent with its zoning. In addition, with Council prepared to consider land to the north and north-west for rezoning for residential purposes and the land on the opposite site already being developed for residential purposes, using the subject site for primary production purposes has the potential to cause conflict with existing and future residential neighbours – particularly considering the cleared and less steeply sloping portion of the site is located in its north-eastern corner.

As the site has extremely limited primary production capacity and cannot be used for a purpose that is consistent with the zone objectives, it is considered that there is an anomaly with the existing zoning. This zoning anomaly is further enhanced by the fact that Council is prepared to consider land to the north and north-west for rezoning in accordance with the KUS, and that the subject site should have (as a minimum) at least been evaluated as part of the preparation of the KUS.

4.2.3 Is the planning proposal consistent with applicable State Environmental Planning Policies?

The Planning Proposal has been reviewed having regard to State Environmental Planning Policies (SEPPs). The only applicable SEPP is *State Environmental Planning Policy No.55 – Remediation of Land*. In this regard, a review of the site and understanding of its history does not disclose any known history of being used for potentially contaminating purposes. It is anticipated that a Preliminary Site Investigation contamination assessment may be required at Gateway stage should the Planning Proposal proceed.

4.2.4 Is the planning proposal consistent with applicable Ministerial Directions (s.9.1 directions)?

The Planning Proposal has been reviewed in the light of the Directions issued by the Minister pursuant to Section 9.1(2) of the Environmental Planning and Assessment Act, 1979. The Planning Proposal's consistency with the relevant Section 9.1 Directions is summarised in the Table in Appendix H.

4.3 Environmental, Social and Economic Impact

4.3.1 Is there any likelihood that critical habitat or threatened species, populations or ecological communities, or their habitats, will be adversely affected as a result of the proposal?

The subject site contains various ecological constraints, including land zoned E2 Environmental Conservation and mapped as biodiversity land under KLEP 2011; Spring Creek and its associated riparian area; and, land mapped as having biodiversity values under the NSW Biodiversity Values Map. Accordingly, Ecoplanning was engaged to undertake an ecological constraints assessment of the subject site and the neighbouring Lot 1 DP 1018217 (which is in the same ownership as the subject site). A copy of Ecoplanning's report is attached at Appendix I.

The assessment and investigations undertaken by Ecoplanning included a literature and database review of the study area; determination of the potential for threatened species, populations and migratory species to occur within the study area; and, field surveys. Whilst the literature review revealed 'subtropical dry rainforest' as being mapped across the study area, field surveys determined that the on-site vegetation is dominated by Large-leaved Privet, Coral Trees, Tobacco Bush and Easter cassia. Based on this assessment, the actual vegetation communities present were more properly determined as being 'weeds and exotics' and 'exotic grassland'. None of the threatened flora species recorded within 5km of the study area were present on the site.

Whilst twelve (12) threatened species of fauna have previously been recorded within 5km of the study area, there are no recent records of any threatened fauna occurring within the study area and most threatened species were either determined as being not present or having a low likelihood of occurrence within the study area. No hollow bearing trees were recorded in the study area. Two (2) species of microbats have been recently recorded within the locality – the Eastern Bentwing-Bat and the Southern Myotis. Habitat on the site is limited to foraging habitat only.

The ecological constraints assessment has identified the land within 20m either side of Spring Creek as presenting a 'high' ecological constraint, with the next 20m outside of this presenting a 'medium' constraint. Where development proposes works that will impact on the 'high' ecological constraint area a Biodiversity Development Assessment Report (BDAR) will be required. Where impacts on the Vegetated Riparian Zone to Spring Creek are proposed, a Vegetation Management Plan (VMP) will be required at development application stage.

The proposed subdivision does not seek to undertake any works – including clearing for Asset Protection Zones – within the area of 'high' ecological constraint, and the proposed allotments have been configured accordingly.

4.3.2 Are there any other likely environmental effects as a result of the planning proposal and how are they proposed to be managed?

In addition to the investigations of the site's ecology (outlined above) flooding, bushfire risk and geotechnical constraints together with potential traffic and visual impacts have been investigated as outlined below:-

(a) Flooding

Spring Creek cuts across the south-western corner of the subject site and passes through the adjoining property to the south, before passing under Dido Street and then into the Spring Creek wetland and lagoon. Potential flooding impacts have been investigated by Footprint Sustainable Engineering.

Footprint's analysis of flooding impacting the site has been derived from the *Spring Creek Catchment Flood Study* (May 2014) and has determined that the 1% AEP flood level affecting the site is RL 8.0m AHD, while the PMF level affecting the site is RL 10.0m AHD. Footprint's mapping of the 1% AEP and PMF levels relevant to the site is attached at Appendix J.
The flood analysis clearly demonstrates that only the very south-western corner of the subject site (ie Lot 2 DP 1018217) is affected by the 1% AEP flood event, and impacts only proposed Lots 6 and 7. The flood-affected area coincides with areas of 'high' ecological constraint and therefore will be excluded from any development – including land clearing. Suitable building areas on proposed Lots 6 and 7 are available well above the 1% AEP flood level and the PMF level. Proposed Lots 1 to 5 and 8 are located entirely above the 1% AEP flood level.

(b) Bushfire Hazard

Harris Environmental Consulting has undertaken an assessment of the capability of the subject site to be rezoned and developed for the proposed residential subdivision in accordance with the provisions of *Planning for Bushfire Protection*

(2006). The assessment has considered the capability of the subject site to achieve the required minimum bushfire protection measures for the proposed subdivision and future dwelling houses, having regard to the need to provide Asset Protection Zone (APZ) building setbacks to existing significant vegetation; the need to provide access and egress for future residential development; and, the need to provide other bushfire protection measures such as the provision of utilities.

The bushfire hazard assessment has undertaken an investigation of the vegetation types and land slopes influencing bushfire behaviour. The upslope land to the north is considered to be managed due to the presence of an existing dwelling house (No.11 Dido Street) and the current proposal to rezone the adjoining property to residential. To the west the land is 15-20^{o} downslope and classified as 'rainforest', while to the south and south-west the land is 5-10^{o} downslope and classified as 'riparian corridor', with 'grassland' also present to the south-west and south. The land to the east is 5-10^{o} downslope and classified as a combination of managed land and 'rainforest'.

Using the slope analysis and vegetation classifications, APZ widths for the proposed allotments have been determined in order for each allotment to accommodate a building area capable of achieving a maximum Bushfire Attack Level (BAL) of BAL-29. To avoid impacting on the vegetation embodied within the E2 zone and within the 20m riparian corridor to Spring Creek, the APZs have been measured from the edges of these areas. The nominated APZs required to achieve BAL-29 are 11m to the south-east; 18m to the south and south-west; and 29m to the west.

The geometric design of the Right of Carriageway access driveways will need to comply with *Planning for Bushfire Protection* (2006) in terms of grades, carriageway width, and crossfalls.

As it is intended to provide a reticulated water supply, where any building envelope on an allotment is not within 70m of a fire hydrant, a 10,000 litre dedicated firefighting supply will need to be provided. Bottled gas will need to be installed and maintained in accordance with AS/NZS 1596-2014. Any above ground electricity transmission lines will need to be managed in accordance with the supply authority's specifications.

A copy of the bushfire hazard assessment report is attached at Appendix K.

(c) Site Stability

Southern Geotechnics was engaged to undertake a geotechnical assessment of the stability of the subject site and its suitability for subdivision and subsequent development for residential purposes.

The geotechnical investigations undertaken by Southern Geotechnics involved a review of local geological mapping; site observations on the property and the surrounding area; drilling of three (3) boreholes across the site; and, engineering assessment and reporting.

Based on the geotechnical investigations undertaken, the site was assessed as having a very low to low risk of slope instability and has been classified as a Class P site in accordance with AS2870 – 2011 *Residential slabs and footings*.

It is recommended that development take place on the moderately sloping ground in the north-eastern portion of the site. Coincidentally, this portion of the site corresponds with the area north of the transmission easement and east of the recommended APZ to the E2 zoned land, which is the area where building envelope opportunities exist.

The geotechnical assessment has identified geotechnical constraints and recommendations for future development, including the following:-

- Foundations should be designed in accordance with engineering principles, with reinforced footings or piers founded on rock.

- Excavations over 600mm deep should be supported by engineered retaining walls. Excavations less than 600mm may be battered not steeper than 2.5H:1V, and vegetated or covered to limit erosion. Excavations in rock should be carried out using a process that involves saw cutting, due to the risk of damage to adjoining properties caused by large hydraulic hammer vibrations.

- No fill material apart from that necessary for driveway and slab construction should be imported onto the site. Any fill arising from excavations on site may be placed and compacted in 200mm maximum thickness layers on stripped and benched ground. Fills more than 600mm deep should be supported by an engineered retaining wall. Fill less than 600mm deep may be battered not steeper than 2.5H:1V, and vegetated or covered to limit erosion.

- Retaining walls greater than 600mm high should be engineer designed, include subsoil drainage at the rear, and allow for the lateral loading arising from soil creep on sloping ground. Landscaping walls less than 600mm high should be constructed in accordance with the supplier’s recommendations.

- All roof water run-off not stored for reuse and surface run-off should be piped to the creek. On-site disposal of stormwater by concentrated soakage is not recommended on the basis of the increased risk of slope instability and reactive clay movement. Subsoil drainage is recommended on the upslope side of slab on ground structures to limit the ingress of seepage beneath the slab.

A copy of the geotechnical assessment report is attached at Appendix L.

(d) Traffic Impacts

The subject site is accessed from Jamberoo Road via Dido Street. Jamberoo Road is a main road providing access between Kiama and Jamberoo and also services the M1 motorway, with an on/off ramp located to the east of the site. The proximity of Jamberoo Road provides the site with excellent access to regional the major north-south and east-west road corridors.

In terms of traffic impacts, the site is accessed directly from Dido Street, which has a sealed carriageway and concrete kerb and gutter along its eastern side. The concept subdivision plan makes provision for a total of eight (8) allotments. Based on traffic generation rates of 9 daily vehicle trips per dwelling and 0.85 weekday peak hour vehicle trips per dwelling[1], the eight (8) lot subdivision would generate a total of 72 daily vehicle trips and 6.8 (say 7) vehicle trips in the weekday peak hour.

An additional 7 weekday peak hour trips is not expected to adversely impact upon the current level of service of the intersection of Dido Street and Jamberoo Road.

(e) Visual Impacts

The subject site occupies an elevated hillside position on the lower flanks of a major west-east trending ridgeline. In terms of the general visual exposure of the site, the ridgeline forms the dominant landscape element being clearly visible from the northern parts of Kiama township, the Princes Highway and South Coast Railway, and Bombo Beach. The site sits below the ridgeline, being positioned lower on the hillside just above the Spring Creek flood plain, and is not as extensively exposed to view.

The general visual character of the area is predominantly of a natural and rural character, with elements of residential character also present along Dido Street and in the Cedar Grove Estate. This visual character of the site and its setting is typical of urban fringe development along the western edge of Kiama.

Due to the nature of the prevailing topography of the site and its immediate surrounds, and that of the locality generally, the visual catchment of the subject site is restricted to close range views only. The principal public domain views of the site are from the northbound lanes of the Princes Highway (south of the Spring Creek Drive exit); from Spring Creek Drive; from Terralong Street (west of the Princes Highway overpass); and, from within the 'Cedar Grove' estate (refer to the photograph locations in Figure 4).

[1] *Guide to Traffic Generating Developments* (Roads and Traffic Authority 2002)

Figure 4 – Photograph Locations

In general terms, the ridgeline is the dominant feature of the landscape setting of the site and features in all views of the site from the nominated viewing points. The site does not project above the ridgeline and is viewed against a backdrop of vegetation, flanked by vegetation and with vegetation in the foreground. Most views of the subject site also contain existing residential development, such that the future development of the site will not be a foreign element within the visual catchment. It should also be noted that the land immediately to the north and uphill of the subject site is earmarked for rezoning and residential development (being the subject of a current Planning Proposal). Development of this site will alter the landscaped setting of the subject site and will expand the existing residential elements and will make development on the subject site less apparent.

The following photographs illustrate the visual exposure of the subject site (circled) when viewed from public vantage points to the east and south.

P1 – View from the north-bound lanes of the Princes Highway. The site sits between existing residential development at the top end of Dido Street (to the right) and the 'Cedar Grove Estate' (to the left). The landscape setting is dominated by vegetation and the ridgeline, with elements of residential character also present. Given the comparatively small area affected by potential future development of the site, when considered in the broader visual setting, there will be only a minor change to the landscape setting as the dominant landscape elements will remain the extensive stands of vegetation and the ridgeline.

P2 – View from the western end of Terralong Street (east of the Spring Creek Drive intersection). The site is clearly visible and there are no other visible residential elements present that might otherwise make future development of the site less obvious. Localised topography, intervening vegetation and the alignment of the road all contribute to the screening from view of existing residential development in the Spring Creek area and at Cedar Grove Estate. Future development of the land uphill and to the right of the subject site (as envisaged by the KUS) would also be visible from this viewing point.

P3 – View from the Spring Creek Drive exit off the Princes Highway. The scene has a higher level of residential elements in the immediate vicinity of the site, which will render any future development of the site contiguous with existing development. If development occurs to the right of the subject site (as is envisaged by the KUS) then this will create an expanded residential element within the view, but still maintaining the characteristics of development at the Kiama urban fringe.

P4 – View from the north-bound lanes of Spring Creek Drive. Similar view to that at P3, with more of a predominance of natural elements due to the existence of the Spring Creek floodplain and wetlands in the mid-ground. Even from this vantage point, development on the site will not result in a drastic change to the landscape setting due to the relatively small area of the site and the presence of residential elements within the view.

P5 – View from the intersection of Lilly Pilly Way and Turpentine Street in the Cedar Grove Estate, to the south. The landscape setting is highly urbanised with established residential development in the foreground and to the right of the subject site. Even accounting for the fact that much of the vegetation on the right-hand side of the circled area consists of Coral trees, there is still extensive vegetated areas to the left of the site and above the site to the ridge line. Development of the site will appear as being contiguous with the existing development to the right and will not be inconsistent with the general urban fringe pattern of development in the area generally.

Factors which influence the visual impact of a development include:-

- the distance from the viewer to the development – whether views are distant or close range;

- the extent of the view – whether the development is visible in its entirety or only partially;

- the duration of the view – whether viewed for a short period (as in by a passing motorist) or for an extended period; and

- the visual absorption capacity of the setting – the ability of existing elements within the landscape to hide or screen or disguise a development.

From the locations shown in photographs P1 to P5, views of the site are generally at a distance which would make it difficult for an observer to perceive the detail of future development, with it largely reading as contiguous with the scale and form of the existing residential development.

In terms of the extent of views, even from closer vantage points (P2 and P5), the site is viewed in a broader context and not in its entirety (due to the landform of the site and existing vegetation). Once the site is developed for residential purposes, individual structures would overlap each other in the view and the site would mimic adjacent residential development in that regard.

The exposure of the site to views from public roads will be limited in duration. This is due to a number of factors such as the alignment of the roads; the speed of traffic travelling along the roads; and, intervening topographical, landscape and man-made features. The limited duration of views to the site would not create an increased sensitivity to the development.

The physical setting of the subject site is considered to provide a high visual absorption capacity, on the basis that development of the subject site will not be prominent in the visual catchment. The development will make a comparatively small contribution to the overall view and does not contrast significantly with other residential elements that are apparent in the current views. The major ridgeline backdrop and extensive areas of vegetation will remain the dominant elements within the visual catchment.

Overall, in terms of impacts on the visual quality of the landscape setting, the development of the site will result in a minor modification to the existing visual setting but will not significantly change the overall composition of the wider visual setting. The proposal does not introduce a new visual element into the view, as there is already residential development present in the visual catchment, and therefore achieves compatibility with its surroundings.

4.3.3 Has the planning proposal adequately addressed any social and economic effects?

The Planning Proposal will provide additional residential land to be developed for detached dwellings to assist Kiama Council to meet the housing demands of population growth and change. The subject site is close to the amenities of the Kiama town centre, which include a major supermarket; general shops; cafes; clubs; hotels; community facilities; churches; swimming pools; recreational amenities; medical practitioners; library; child care centres; a public high school; and, public and Catholic primary schools.

The Planning Proposal will lead to increased development and building activity throughout the subdivision and dwelling construction phases. The broader population base will increase the demand for goods and services which will benefit local businesses and service providers. Section 7.11 and 7.12 Contributions levied by Council at both the subdivision and building stages, will provide funding for identified Council projects.

4.4 State and Commonwealth Interests

4.4.1 Is there adequate public infrastructure for the planning proposal?

The subject site is located immediately to the west of the existing, established residential area of Spring Creek. This residential area is currently fully serviced with reticulated water and sewerage, electricity services and NBN broadband connection.

The area is serviced by Sydney Water's reticulated water supply system, with a watermain located along the eastern side of Dido Street. Existing fire hydrants are located in Dido Street to the north-east of the site and at the intersection of Dido Street and Glenbrook Drive. The site is capable of being connected to the reticulated water supply in Dido Street.

The residential properties opposite the site in Dido Street are connected to Sydney Water's reticulated sewerage system. To service the proposed subdivision, it will be necessary to extend the sewerage system across to the western side of Dido Street. It is expected that Council will consult with Sydney Water as part of the Planning Proposal assessment and any specific requirements can be made known at that stage.

Electricity to service the proposed subdivision would be taken from the existing overhead mains on the eastern side of Dido Street and reticulated via underground mains throughout the subdivision.

Access to the proposed allotments will be provided from Dido Street via two (2) separate access driveways – one positioned towards the northern end of the site and servicing proposed Lots 1 to 4, and the other positioned towards the southern end of the site and servicing proposed Lots 5 to 8. A preliminary design for the access driveways, proving access feasibility, has been prepared and is attached at Appendix M. Direct access to Dido Street, other than via the proposed access driveways, will be prohibited for Lots 3, 4, 5 and 8 via an appropriately worded 88B Restriction.

Kiama Coaches operates a bus route along Jamberoo Road between Kiama and Jamberoo (Route 701). There is a bus stop located south of the site on Jamberoo Road, within 200m walking distance of the site.

Having regard to the availability of existing electricity services; the potential to connect to the available reticulated water supply and sewerage systems; and the availability of convenient public transport, it is considered that there is adequate public infrastructure already in place to cater for the proposal.

4.4.2 What are the views of State and Commonwealth public authorities consulted in accordance with the gateway determination?

At this stage, the gateway determination has not been issued by the Minister and the relevant State and Commonwealth public authorities to be consulted have not yet been confirmed. It is expected that the following State and Commonwealth agencies (as a minimum) will be formally consulted:-

- Department of Planning and Environment;
- Sydney Water;
- Endeavour Energy;
- Rural Fire Service;
- NSW Office of Environment and Heritage; and
- NSW Department of Primary Industries – Water.

5.0 COMMUNITY CONSULTATION

The gateway determination will identify the level of public consultation required for the Planning Proposal, and may require:-

- notification of the Planning Proposal in a newspaper circulating in the locality;
- notification on Kiama Council's website; and
- notification in writing to affected and adjoining landowners.

The DPE's '*A guide to preparing local environmental plans*' outlines the consultation required for different types of planning proposals depending on whether or not they can be classified as "*low impact proposals*" or not. It is not expected that the Planning Proposal for the subject site will be classified as "low impact", and therefore a 28 day exhibition period is anticipated.

6.0 CONCLUSION

The Planning Proposal seeks to amend KLEP 2011 to enable the subject site to be subdivided and developed for low density residential purposes, with the existing mapped area of high ecological constraint protected and conserved by the retention of the current E2 Environmental Conservation zoning.

The subject site is considered to be suitable for the proposed subdivision and subsequent residential development having regard to the availability of public utility infrastructure and the proximity of the site to existing facilities and services.

Assessments of the site constraints and development proposal undertaken to date, indicate that the development of the site is possible within the existing constraints, and that there is not likely to be any detrimental environmental impacts arising from the proposed development, and that the likely social and economic impacts of the development will be positive.

This Planning Proposal report has reviewed the proposal in light of the State and local strategic planning framework, and has determined that the proposal is consistent with the *Illawarra-Shoalhaven Regional Plan*, relevant SEPPs and s9.1 Directions, and is not inconsistent with Council's adopted *Kiama Urban Strategy* (2011).

The Planning Proposal is recommended to Council for referral to the Department of Planning and Environment for Gateway Determination.

Glenn Debnam BTP (UNSW) RPIA
Town Planner
Director

8th April 2019

APPENDIX A

Pre-Lodgement Meeting Notes

Preliminary Planning Proposal Meeting
Minutes – 11 February 2019

Present: Mark Lyndon, Edward Paterson

Attendees: Glenn Debnam (Plannex Environmental Planning) and Tony Scopelliti (Owner)

Property: Lot 2 DP 1018217 –Dido Street Kiama.

Proposal: Rezone part of the site from RU2 Rural Landscape to Residential (either R2 or a combination of R2 and R5/E4) to enable the residential development of part of the site.

The applicant provided the following information:

- Explained that currently the site was zoned Rural Landscape but due to its size, zoning and constraints the site is not conducive to any form of residential development.
- Aware that the site is not identified for future residential expansion by the Kiama Urban Strategy (KUS).
- Suggested that while not identified by the KUS the proposed rezoning was not inconsistent with the objectives/intent of the KUS.
- The site is within the western boundary identified by the KUS.
- The site adjoins residential land on the eastern side of Dido Street.
- Aware that the site if effected by the following constraints:
    - Bush fire prone land;
    - Slope;
    - Riparian land/flooding issues;
    - Electrical transmission easement;
    - Heritage listed dry stone wall; and
    - Terrestrial biodiversity land.
- For these reasons it is proposed to only rezoning the north-eastern portion of Lot 2 (approximately 6000m2).
- Access to the site will require a lot of work along existing Dido Street frontage of site.
- The intent of the Planning Proposal would be to rezone the eastern part of the site, not constrained by slope, bushfire, transmission easement etc. to R2 Low Density Residential to create approximately eight (8) residential allotments.
- Some of the larger lots could be zoned either R5 Large Lot Residential or E4 Environmental Living.

- The following information was provided:
    - Bushfire Hazard Assessment Report
    - Flood and Slope Constraints assessment
    - Flora & Fauna Constraints Assessment
    - Geotechnical Report
    - Proposed Zoning, Lot Size, Height of Building and FSR Maps
    - Draft subdivision layout

Council provides the following information in response:

- Any request to rezone the site to residential would need to argue why the proposed Residential zoning is more appropriate than the existing RU2 Rural Landscape zone.
- It was stressed that any request to rezone this site would need to strongly argue why it was appropriate to rezone the site even though it had been omitted from inclusion in the KUS.
- Council's Planning Proposal Policy outlines that Council staff may agree in principle to the preparation of a Planning Proposal if the proposal meets any of the following criteria:
    - Land identified as a nominated area in the Urban Strategy;
    - Land can be identified as assisting to meet Council's strategic direction; or
    - A clear zoning anomaly exists on site.
- As the site is not identified as a nominated area in the KUS any request will need to argue why the proposal assists Council meet its strategic direction (i.e. intent of KUS, Illawarra-Shoalhaven Regional Plan etc.)
- It was suggested that any request to rezone this site should stress the 'minimal' extent of land to be rezoned and that the intent of the proposal would be to create large allotments.
- Council agreed with the suggestion to rezone the proposed western allotments to R5 Large Lot Residential or E4 Environmental Living (subject to an adjoining Planning Proposal) rather than R2 Low Density Residential.
- The submitted Proposed Lot Size Map shows that the proposed minimum lot size is 450m^2. It is suggested that, due to the site constraints, the proposed western allotments be given a minimum lot size of 800m^2 or 1,000m^2.
- The current Floor Space Ratio Map shows that no maximum floor space ratio (FSR) is prescribed for the site. Any Planning Proposal, to rezone the site to residential, should establish a maximum FSR of 0.45:1.
- The current Height of Building Map shows that no maximum building height (HOB) is prescribed for the site. Any Planning Proposal, to rezone the site to residential, should establish a maximum HOB of 8.5m.
- Recent Planning Proposals have come under scrutiny by both Council and the community in regards to their visual impact and the site's relationship with the KUS.

- Any Planning Proposal will need to be prepared in accordance with the Department of Planning & Environment's (DoPE) Guide to Preparing Local Environmental Plans and Guide to Preparing Planning Proposals as well as Council's Planning Proposal Policy.
- A request to prepare a Planning Proposal will require payment in accordance with Council's adopted fees and charges.
- The elected Council has recently suggested that a review of the KUS may be appropriate. This will require a resolution of Council and may be some time away, however it may be appropriate to wait until this occurs before proceeding with preparing a request to rezone the site.
- The following accompanying reports/comments would be required with a request to rezone this site:
    - Updated Bushfire Report to reflect submitted:
        - Flood and Slope Constraints assessment
        - Flora & Fauna Constraints Assessment
        - Geotechnical Report
    - Engineering advice regarding proposed access points off Dido Street, this advice will influence the final subdivision layout;
    - Commentary regarding impact on Heritage Dry Stone Walls;
    - Commentary/Photomontage about visual impact.
- It was agreed that a Service Feasibility assessment is not required due to the limited size of the proposal.

Note: The information provided by the Preliminary Planning Proposal Meeting is based on the level of information presented for discussion and represents the professional opinions of the members and their interpretation of the Illawarra-Shoalhaven Regional Plan, Kiama Urban Strategy, as well as other relevant Planning Instruments, Codes and Policies. The level of advice provided may not be exhaustive. The proposal is subject to a full assessment with a formal Application for Planning Proposal lodged to Council for its consideration.

Edward Paterson

Strategic Planner/Development Assessment Officer

APPENDIX B

Site Photographs

PHOTO 1 – Looking south along the Dido Street frontage of the subject site.

PHOTO 2 – View to the south from near the north-eastern corner of the subject site.

PHOTO 3 – View from adjacent to the eastern boundary, looking towards the north-western corner of the site.

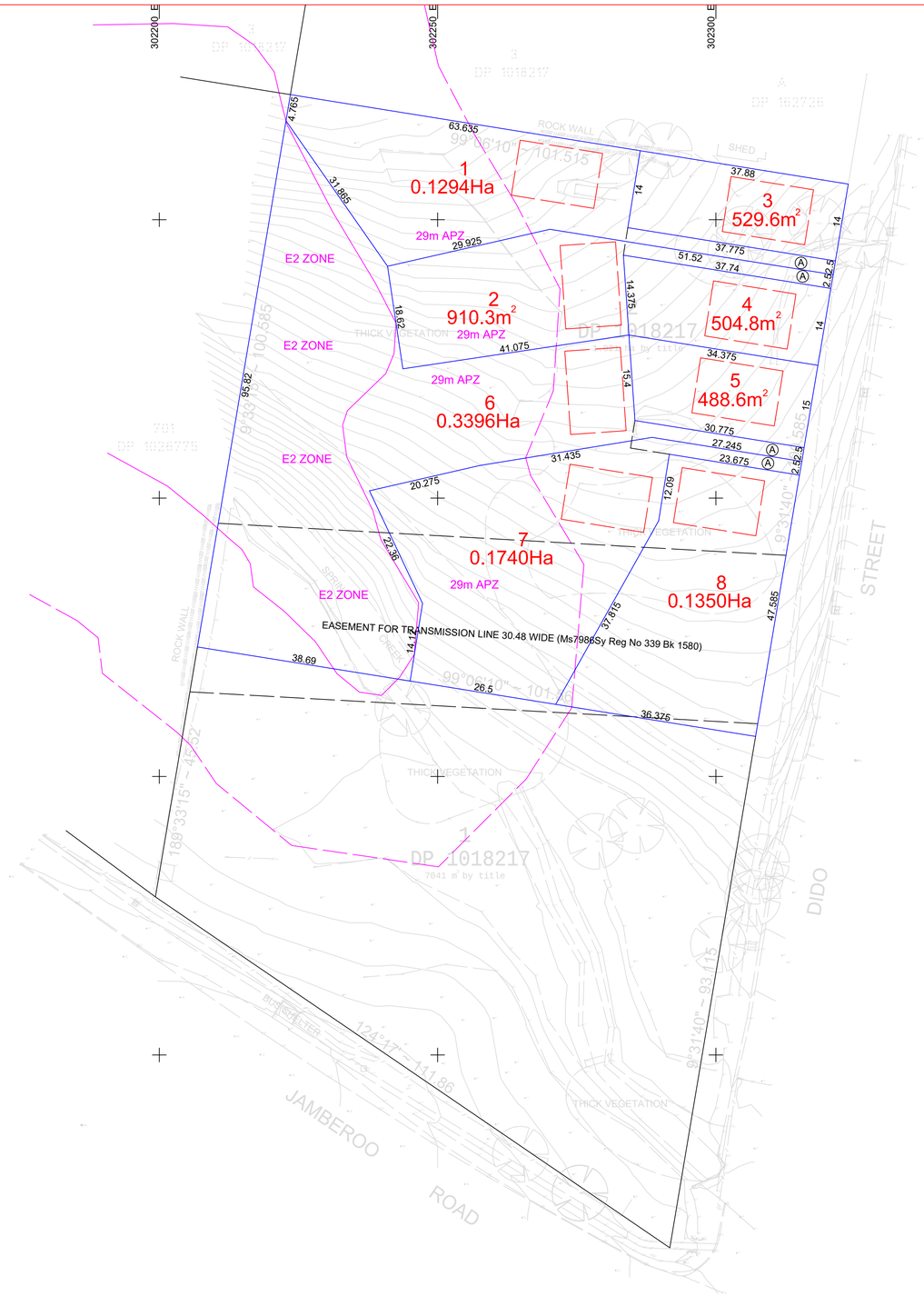
PHOTO 4 – Overview of the subject site taken from the north-western corner and looking towards the south-east.

PHOTO 5 – Looking towards the east from a central position within the north-eastern cleared portion of the subject site.

PHOTO 6 – A section of dry stone wall along the site's northern boundary.

APPENDIX C

Proposed Concept
Subdivision Plan



THIS PLAN IS PREPARED FROM A COMBINATION OF FIELD SURVEY AND EXISTING RECORDS FOR THE PURPOSE OF DESIGNING NEW CONSTRUCTIONS ON THE LAND AND SHOULD NOT BE USED FOR ANY OTHER PURPOSE.

PRIOR TO ANY CONSTRUCTION ON OR NEAR A PROPERTY BOUNDARY, THE LOCATION OF THE PROPERTY BOUNDARIES SHOULD BE DETERMINED BY A REGISTERED SURVEYOR.

VISIBLE SERVICES ONLY HAVE LOCATED AS PART OF THIS SURVEY.
THE LOCATION OF UNDERGROUND SERVICES HAVE BEEN PLOTTED FROM INFORMATION PROVIDED BY 'DIAL BEFORE YOU DIG.'
THE LOCATIONS OF THESE SERVICES ARE APPROXIMATE ONLY.

PRIOR TO EXCAVATION THE CONTRACTOR MUST:
CONTACT "DIAL BEFORE YOU DIG"
PH: 1100
WEB: www.1100.com.au

PRIOR TO ANY DEMOLITION, EXCAVATION OR CONSTRUCTION ON THE SITE, THE RELEVANT AUTHORITY SHOULD BE CONTACTED FOR POSSIBLE LOCATION OF FURTHER UNDERGROUND SERVICES AND DETAILED LOCATIONS OF ALL SERVICES.

CAUTION: CONTOURS SHOWN HEREON ARE INDICATIVE ONLY PREFERENCE SHOULD BE GIVEN TO SPOT HEIGHTS AS SHOWN.

TREES SHOWN
T+1.2X12
AND ARE NOT TO SCALE
TREE SIZES SHOWN ARE APPROXIMATE ONLY
T+1.2X12 DENOTES: 1.2m DIAMETER 12 SPREAD
ONLY TREES OVER DIAMETER 0.3 HAVE BEEN SURVEYED

MGA

DENOTES BUILDING ENVELOPE 10m X 15m

Ⓐ PROPOSED RIGHT OF ACCESS & EASEMENT FOR SERVICES

Keatley Surveyors
S & L Keatley P/L (ABN) 73 097 227 266
PO Box 3101 Minnamurra 2533
16 Bass Street, Kiama Downs NSW 2533
Phone 4237 6211 Fax 4237 5222 Mob 0413 388 428
Email surveyors@keatley.com.au

PLAN OF PROPOSED SUBDIVISION
DIDO STREET KIAMA
LOTS 1 & 2 DP 1018217

KEY (VISIBLE SERVICES)

F+T - TIMBER FENCE
F+M - METAL FENCE
F+PW - POST WIRE FENCE
CL - CL BITUMEN ROAD
EB - EDGE OF BITMEN SURFACE
EC - EDGE OF PATHWAY
ET - EDGE GRAVEL DRIVEWAY
FL - FLOOR LEVEL
GAS - GAS METER
BK - BRICK WALL
CH - CLOTHES HOIST
SMH - SEWER MAN HOLE
HYD - HYDRANT
SV - STOP VALVE
PP - POWER POLE
NS - NATURAL SURFACE
SIG - SIGN POST
SIL - SEWER INSPECTION LID
TB - TOP OF BANK
BB - BOTTOM OF BANK
TK - BACK OF CONCRETE KERB
TEL - TELSTRA
WM - WATER METER
TRW - TOP RETAINING WALL
INV+1.1 - INVERT PIPE 1.1 DIA
HW - HEAD WALL
RK - ROCK WALL

DATE OF SURVEY: 14th February 2019

SCALE(HOR) : 1:500 (A1)

ORIGIN OF COORDINATES & LEVELS
SSM144392 E 302 186.042, N 6 162 187.393 MGA
SSM144392 RL 13.302 AHD

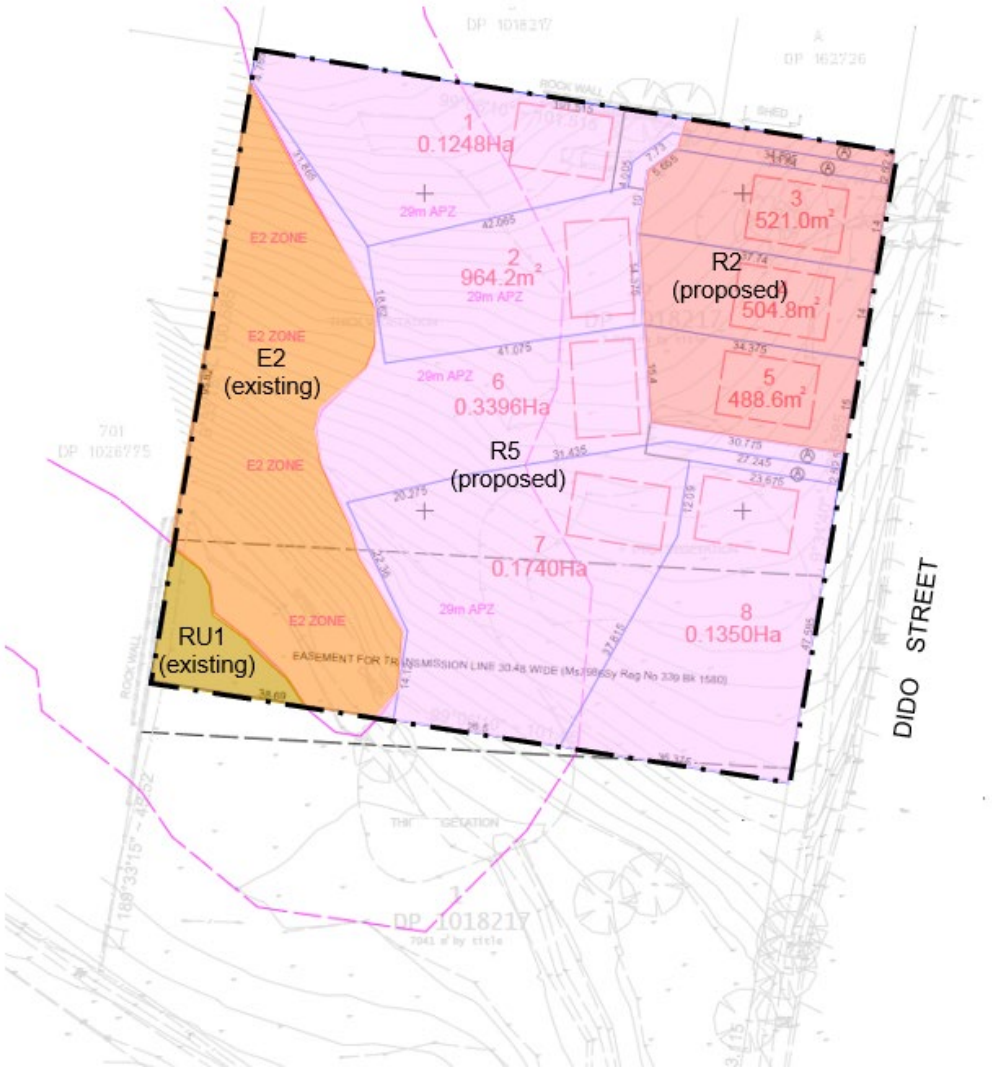
CONTOUR INTERVAL 0.5m

L.G.A. KIAMA

REF: 2923sub03 Sheet 1 of 1 Sheets

APPENDIX D

Amendment to
Land Zoning Map



R2 Low Density Residential

R5 Large Lot Residential

Subject Site

Not to Scale

PLANNING PROPOSAL

Amendment to Land Zoning Map
Kiama Local Environmental Plan 2011

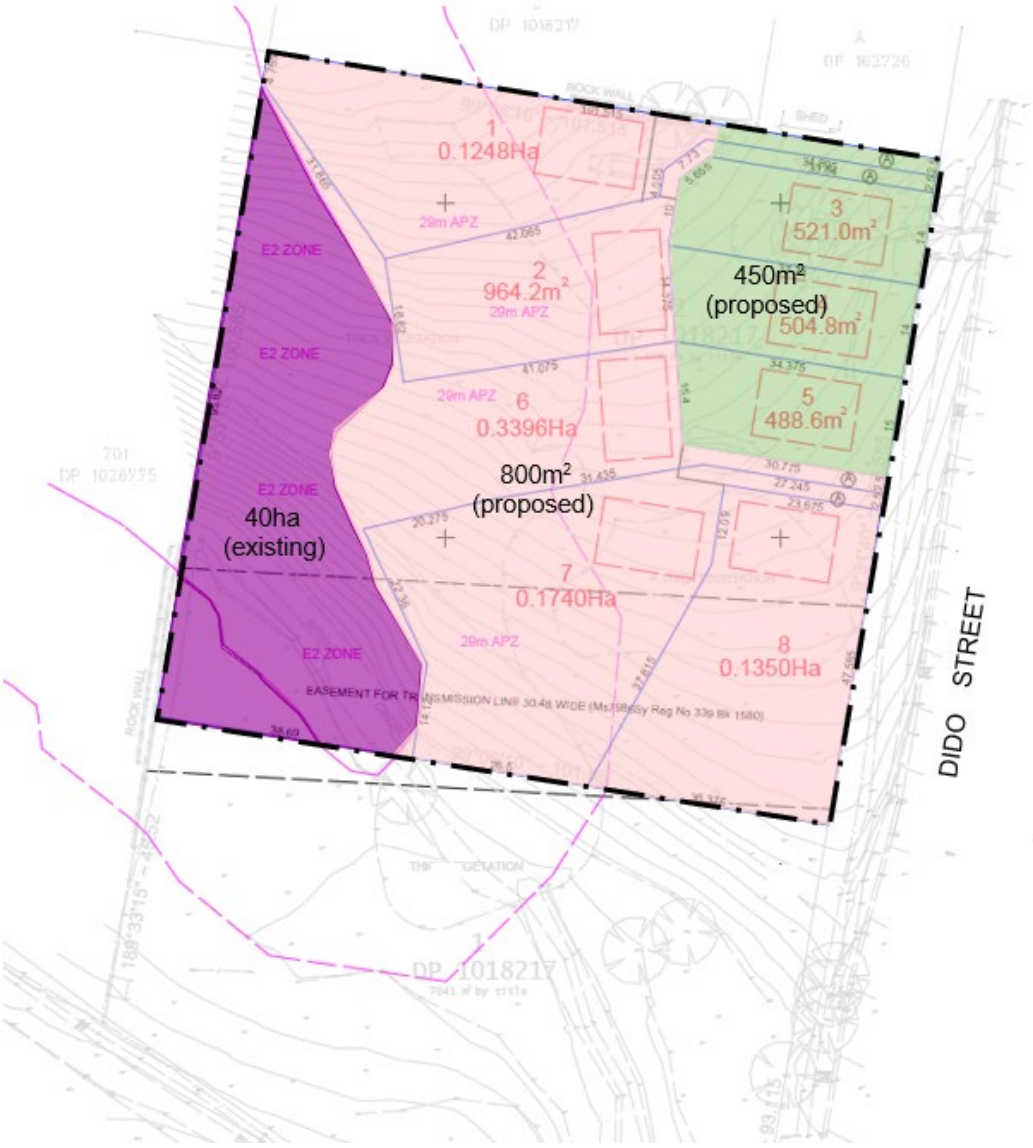
Lot 2 DP 1018217 Dido Street, Kiama

Plannex Environmental Planning

April 2019

APPENDIX E

Amendment to
Lot Size Map



450m²

800m²

Subject Site

Not to Scale

PLANNING PROPOSAL

Amendment to Lot Size Map
Kiama Local Environmental Plan 2011

Lot 2 DP 1018217 Dido Street, Kiama

Plannex Environmental Planning

April 2019

APPENDIX F

Amendment to
Height of Buildings Map

8.5m

Subject Site

Not to Scale

PLANNING PROPOSAL

Amendment to Height of Buildings Map
Kiama Local Environmental Plan 2011

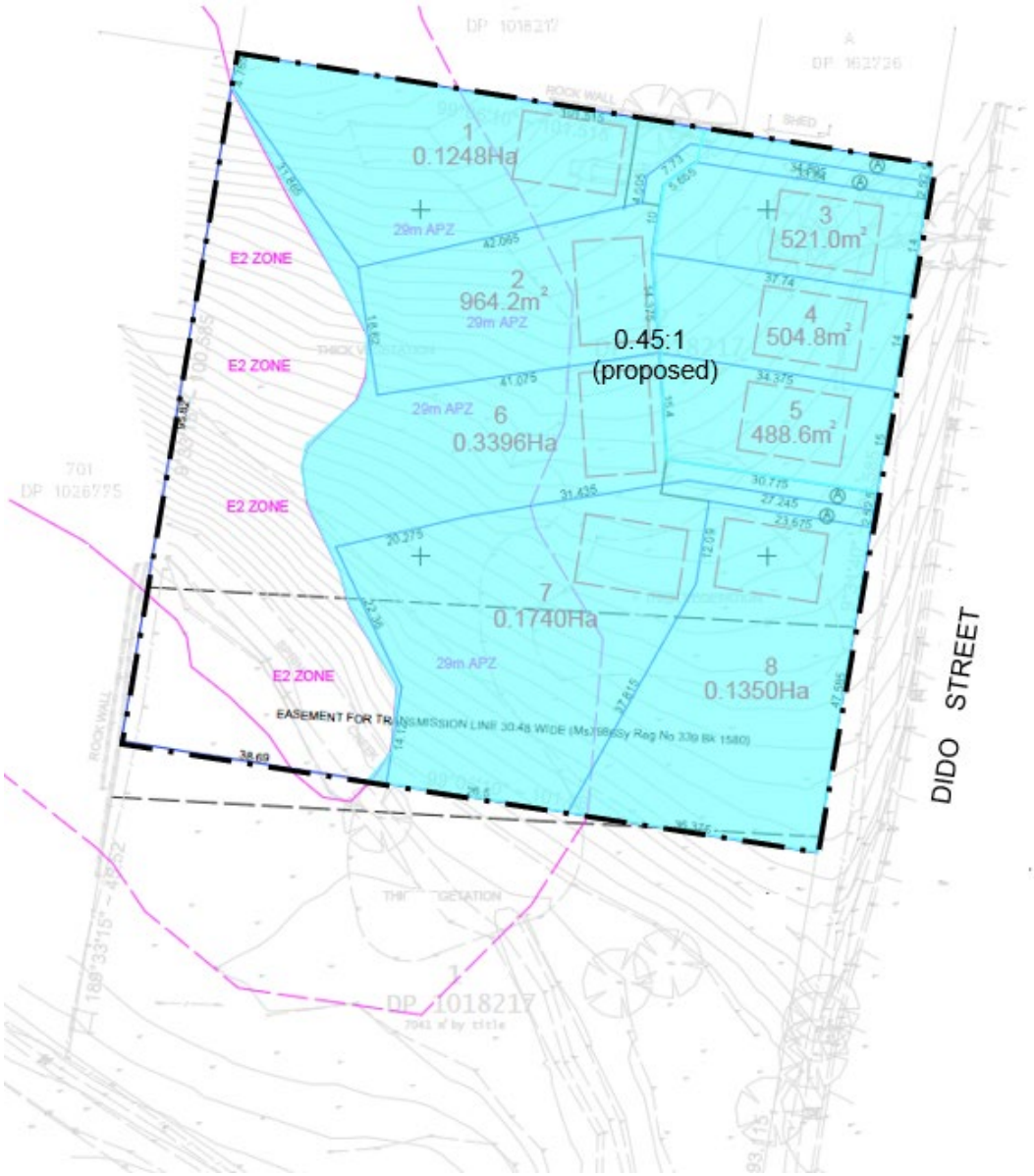
Lot 2 DP 1018217 Dido Street, Kiama

Plannex Environmental Planning

April 2019

APPENDIX G

Amendment to
FSR Map



0.45:1

Subject Site

Not to Scale

PLANNING PROPOSAL

Amendment to FSR Map
Kiama Local Environmental Plan 2011

Lot 2 DP 1018217 Dido Street, Kiama

Plannex Environmental Planning

April 2019

APPENDIX H

Section 9.1 Directions

Section 9.1 Ministerial Directions

Section 9.1 Direction Title	Consistency of Planning Proposal
1 Employment and Resources	
1.1 Business and Industrial Zones	*N/A*
1.2 Rural Zones	***Inconsistent*** *– The Planning Proposal seeks to rezone land currently zoned RU1 to a combination of R2 and R5, which is inconsistent with the Direction. However, the Planning Proposal is considered to be justified by the 'Kiama Urban Strategy'. In this regard, although the site has not been specifically included for consideration for future urban development, it has not been specifically excluded either – as the site was never evaluated at all. Whilst not being specifically included, the site does bear a number of consistencies with land to the north and north-west which is identified as being suitable for consideration for future residential development. The site also lies to the east of Cuba Street – the adopted western boundary of Kiama township.* *A Planning Proposal can be inconsistent with this Direction where it is:-* *• Justified by a strategy which:* *o Gives consideration to the objectives of the direction;* *o Identifies the land which is the subject of the PP; and* *o Is approved by the Department of Planning.* *• Justified by a study prepared in support of the planning proposal which gives consideration to the objectives of the direction;* *• In accordance with the relevant Regional Strategy, Regional Plan or SubRegional Strategy prepared by the Department of Planning which gives consideration to the objective of this direction; or* *• Is of minor significance*

Section 9.1 Direction Title	Consistency of Planning Proposal
	In this instance, justification for the Planning Proposal's inconsistency is being sought on the basis that the proposal is of minor significance. The Planning Proposal will not result in the loss of productive agricultural land as the land in question is only small in total area (at 1.021 hectares) and only supports a total of approximately 4,700m^2 of cleared land, with the balance of the site being overgrown with weeds and exotics. The proposal itself is only a small-scale project involving the rezoning of just approximately 7,900m^2 of the subject site.
1.3 Mining, Petroleum Production and Extractive Industries	*N/A*
1.4 Oyster Aquaculture	*N/A*
1.5 Rural Lands	***Consistent** – The Planning Proposal affects land within an existing RU1 zone and the Direction requires the Planning Proposal to:-* *(a) be consistent with any applicable strategic plan, including regional and district plans endorsed by the Secretary of the Department of Planning and Environment, and any applicable local strategic planning statement* *(b) consider the significance of agriculture and primary production to the State and rural communities* *(c) identify and protect environmental values, including but not limited to, maintaining biodiversity, the protection of native vegetation, cultural heritage, and the importance of water resources* *(d) consider the natural and physical constraints of the land, including but not limited to, topography, size, location, water availability and ground and soil conditions* *(e) promote opportunities for investment in productive, diversified, innovative and sustainable rural economic activities* *(f) support farmers in exercising their right to farm* *(g) prioritise efforts and consider measures to minimise the fragmentation of rural land and reduce the risk of land use conflict, particularly between residential land uses and other rural land uses* *(h) consider State significant agricultural land identified in State Environmental Planning Policy (Primary Production and Rural Development) 2019 for the purpose of ensuring the ongoing viability of this land* *(i) consider the social, economic and environmental interests of the community*

Section 9.1 Direction Title	Consistency of Planning Proposal
	With regard to the listed matters, the following responses are offered:- • *The Planning Proposal is consistent with the ISRP (2015), but is not strictly consistent with the KUS (2012) – although the Planning Proposal is considered to be consistent with the intent of the KUS and Council's adopted western town boundary.* • *The site is not conducive to viable agricultural uses due to the limited amount of cleared land available, the shallow soil profile, the overall topography, and the proximity of existing (and potential) residential development.* • *The Planning Proposal seeks to maintain the existing E2 Environmental Conservation zone affecting the site and does not propose to alter the Biodiversity Land overlay applying to the site under the provisions of Kiama LEP 2011, thereby protecting environmental values.* • *The natural and physical constraints of the site have been examined and considered in detail in formulating the Planning Proposal. The result of those assessments is that the site has some limited potential for residential development, with the remainder to be remain protected because of its environmental attributes.* • *The subject site has no value as agricultural land and therefore maintaining the RU1 zone does nothing to promote opportunities for investment in productive, diversified, innovative and sustainable rural economic activities.* • *The subject site and immediately surrounding properties are not currently used for agricultural activities and therefore there will be no impact on the 'right to farm' of farmers.* • *The subject site is already fragmented from nearby rural lands – being bounded to the east by Dido Street and residential development; to the west by Crown Land; and to the north and north-west by effectively rural-residential development.* • *The land is not mapped as State significant agricultural land under State Environmental Planning Policy (Primary Production and Rural Development) 2019.* • *The Planning Proposal will not result in any adverse social, economic or environmental impacts for the community.* *It is noted that a Planning Proposal may be inconsistent with the Direction in circumstances where it is justified by a strategy or where it is of minor significance. Whilst it is considered that the proposal is consistent with the Direction, it is also considered that the proposal is of minor significance (see comments above in response to Direction 1.2).*

Section 9.1 Direction Title	Consistency of Planning Proposal
2 Environmental and Heritage	
2.1 Environmental Protection Zones	***Consistent*** *– The Planning Proposal does not propose to alter the current E2 Environmental Conservation zone affecting the site and does not propose to alter the Biodiversity Land overlay applying to the site under the provisions of Kiama LEP 2011.*
2.2 Coastal Management	***Consistent*** *– The Planning Proposal does not apply to land that is within a coastal vulnerability area, as identified by State Environmental Planning Policy (Coastal Management) 2018, and the site has not been identified as land affected by a current or future coastal hazard.*
2.3 Heritage Conservation	***Consistent*** *– The Planning Proposal does not apply to any items or areas of European or Aboriginal heritage significance. In addition, Kiama LEP 2011 currently contains adequate provisions to facilitate the conservation of items of European and Aboriginal heritage significance.*
2.4 Recreation Vehicle Areas	***Consistent***
2.5 Application of E2 and E3 Zones and Environmental Overlays in Far North Coast LEPs	*N/A – Does not apply to Kiama LGA*
3 Housing, Infrastructure and Urban Development	
3.1 Residential Zones	***Consistent*** *– Allowing residential development on the subject site will increase housing choice in the market; and, make more efficient use of existing infrastructure.*
3.2 Caravan Parks and Manufactured Home Estates	***Consistent*** *– The Planning Proposal does not propose to undertake development for the purposes of a caravan park or manufactured home estate on the site, and does not alter existing provisions within Kiama LEP 2011 relating to caravan parks or manufactured home estates.*

Section 9.1 Direction Title	Consistency of Planning Proposal
3.3 Home Occupations	***Consistent*** *– "Home occupations" are permitted without consent in the R2 Low Density Residential and R5 Large Lot Residential zones proposed for the subject site.*
3.4 Integrating Land Use & Transport	***Consistent***
3.5 Development Near Licensed Aerodromes	*N/A*
3.6 Shooting Ranges	*N/A*
3.7 Reduction in non-hosted short term rental accommodation period	*N/A*
4 Hazard and Risk	
4.1 Acid Sulfate Soils	***Consistent*** *– The site is mapped as potentially containing Class 5 acid sulfate soils. Given the elevation of the site and the distance from Class 1 and 2 acid sulfate soils in the Spring Creek wetland area, it is unlikely that development of the site will disturb acid sulfate soils.*
4.2 Mine Subsidence and Unstable Land	*N/A – The site is not within a mine subsidence area or located on potentially unstable land.*
4.3 Flood Prone Land	***Consistent*** *– A flood impact analysis of the site has determined that the area proposed for residential rezoning and future residential development will not be detrimentally impacted by flooding from Spring Creek.*
4.4 Planning for Bushfire Protection	***Consistent*** *– The site is mapped as containing bushfire prone land and the Planning Proposal has been accompanied by a bushfire hazard assessment which demonstrates that the proposal can comply with the requirements of Planning for Bushfire Protection 2006 and that adequate Asset Protection Zones can be accommodated.*

Section 9.1 Direction Title	Consistency of Planning Proposal
5 Regional Planning	
5.1 Implementation of Regional Strategies	*N/A – The site is not within an area affected by the South Coast Regional Strategy or the Sydney-Canberra Corridor Regional Strategy.*
5.2 Sydney Drinking Water Catchments	*N/A – The subject site is not within the Sydney drinking water catchment.*
5.3 Farmland of State and Regional Significance on the NSW Far North Coast	*N/A – Does not apply to Kiama LGA*
5.4 Commercial and Retail Development along the Pacific Highway, North Coast	*N/A – Does not apply to Kiama LGA*
Directions 5.5 to 5.8 revoked	
5.9 North West Rail Link Corridor Strategy	*N/A – Does not apply to Kiama LGA*
5.10 Implementation of Regional Plans	***Consistent** – The Planning Proposal is consistent with the Illawarra-Shoalhaven Regional Plan (2015).*
5.11 Development of Aboriginal Land Council land	*N/A – Does not apply to land to which State Environmental Planning Policy (Aboriginal Land) 2019 apples.*

Section 9.1 Direction Title	Consistency of Planning Proposal
6 Local Plan Making	
6.1 Approval and Referral Requirements	***Consistent*** *– No concurrence, consultation or referral provisions are proposed by the Planning Proposal and no development is identified by the Planning Proposal as designated development.*
6.2 Reserving Land for Public Purposes	***Consistent*** *– The Planning Proposal does not affect or require land to be reserved for public purposes.*
6.3 Site Specific Provisions	*N/A – the Planning Proposal is not being made specifically to allow a particular type of development to be undertaken on the subject site.*
7 Metropolitan Planning	
7.1 Implementation of A Plan for Growing Sydney	*N/A – Does not apply to Kiama LGA*
7.2 Implementation of Greater Macarthur Land Release Investigation	*N/A – Does not apply to Kiama LGA*
7.3 Parramatta Road Corridor Urban Transformation Strategy	*N/A – Does not apply to Kiama LGA*
7.4 Implementation of North West Priority Growth Area Land Use and Infrastructure Implementation Plan	*N/A – Does not apply to Kiama LGA*

Section 9.1 Direction Title	Consistency of Planning Proposal
7.5 Implementation of Greater Parramatta Priority Growth Area Interim Land Use and Infrastructure Implementation Plan	*N/A – Does not apply to Kiama LGA*
7.6 Implementation of Wilton Priority Growth Area Interim Land Use and Infrastructure Implementation Plan	*N/A – Does not apply to Kiama LGA*
7.7 Implementation of Glenfield to Macarthur Urban Renewal Corridor	*N/A – Does not apply to Kiama LGA*
7.8 Implementation of Western Sydney Aerotropolis Interim Land Use and Infrastructure Implementation Plan	*N/A – Does not apply to Kiama LGA*
7.9 Implementation of Bayside West Precincts 2036 Plan	*N/A – Does not apply to Kiama LGA*
7.10 Implementation of Planning Principles for the Cooks Cove Precinct	*N/A – Does not apply to Kiama LGA*

APPENDIX I

Ecological Constraints Assessment

Glenn Debnam
Director
Plannex Environmental Planning
E: plannex@bigpond.com

ecoplanning
ecology | planning | offsets

7 August 2018

RE: Dido St and Jamberoo Rd, Kiama – Ecological Constraints Assessment

Dear Glenn,

This letter outlines the methods and results of an Ecological Constraints Assessment (ECA) prepared for Lot 1 and 2 // DP 1018217, Dido Street and Jamberoo Road, Kiama (the 'study area'; **Figure 1**). The study area is located adjacent to residential properties, approximately 1 km west of South Bombo Beach.

This ECA identifies the ecological values present within the study area and potential constraints for a proposed subdivision of the study area. Specifically, this ECA considers threatened species, populations and ecological communities listed under the Commonwealth's *Environment Protection and Biodiversity Conservation Act 1999* (EPBC Act) and the NSW *Biodiversity Conservation Act 2016* (BC Act).

Methods

A literature review and database review were undertaken for the study area, which included the following sources:

- Vegetation mapping (Tozer et al 2010)
- SIX Maps (LPI 2018)
- NSW Planning Portal (DPE 2018)
- NSW Biodiversity Values Map (OEH 2018a)
- BioNet Atlas of NSW Wildlife (OEH 2018b)
- Protected Matters Search Tool (DoE 2018)

Threatened species, populations and migratory species recorded during the literature and database review were consolidated into one list and likelihood of occurrence of each species was determined by:

- review of available habitat within the study area and surrounding area
- review of the scientific literature pertaining to each species and population
- discussion with council environment staff
- applying expert knowledge of each species

The potential for each threatened species, population and/or migratory species to occur was then considered. Following field surveys and a review of available habitat within the study area, the potential for species to use the study area and be affected directly or indirectly by the proposed action was determined as either:

- "Recent record" = species has been recorded in the study area within the past 5 years
- "High" = species has previously been recorded in the study area (>5 years) or in proximity (for mobile species), and/or habitat is present that is likely to be used by a local population
- "Moderate" = suitable habitat for a species is present onsite but no evidence of a species detected and relatively high number of recent records (5-20 years) in the locality or species is highly mobile
- "Low" = suitable habitat for a species is present onsite but limited or highly degraded, no evidence of a species detected and relatively low number of recent records in the locality
- "Not present" – suitable habitat for the species is not present onsite or adequate survey has determined species does not occur in the study area.

A site inspection of the study area was undertaken by Lucas McKinnon (Principal Ecologist, Ecoplanning) on 3 July 2018, over approximately 2 person hours (see **Figure 2**). The purpose of this site inspection was to validate vegetation community mapping, assess the structure and condition of vegetation in the study area and determine if vegetation would be impacted by the proposed works. Additionally, fauna habitat features (i.e. tree hollows, stags, decorticating bark, mature / old growth trees, winter-flowering eucalypts) and indirect signs of fauna use (i.e. scats, owl pellets, fur, bones, tracks, bark scratches, foliage chew marks and chewed capsules) were recorded.

Results

Vegetation communities and zoning

Based on the literature review one vegetation type was mapped across the study area by Tozer et al. (2010); 'Subtropical Dry Rainforest' which is equivalent to the Plant Community Type (PCT) (OEH 2018c) 'Whalebone Tree – Native Quince dry subtropical rainforest on dry fertile slopes, southern Sydney Basin (PCT 1300)' (see **Figure 3**). Most of the study area was zoned 'RU1 – Primary Production' and a small portion in the west of the study area was zoned 'E2 – Environmental Conservation' (**Figure 4**). This westerly portion was also mapped on the Kiama Local Environmental Plan (KLEP) Terrestrial Biodiversity Lands Map (KLEP 2011) (**Figure 5**).

Vegetation mapping undertaken onsite was revised after field assessment, during which 10 native, 30 exotic and one naturalised species were recorded (**Table 2**). No remnant PCTs were recorded during the field assessment and only 'Weeds and exotics' and 'Exotic grassland' vegetation was recorded in the study area (**Figure 4**).

Areas zoned 'E2 – Environmental conservation' and identified on the KLEP (2011) Terrestrial Biodiversity Lands Map, are the areas previously mapped as 'Subtropical Dry Rainforest' (Tozer et al 2010), which is a component of Illawarra Subtropical Rainforest (ISR)

in the Sydney Basin Bioregion, an EEC under the BC Act (NSW SC 2002). However, field assessment did not record this vegetation type in the study area. *Streblus brunonianus* (Whalebone), whilst present, was not a dominant species, with only sparse cover and abundance recorded. Rather, the subject site was dominated by woody weeds such as *Ligustrum lucidum** (Large-leaved Privet), *Erythrina sykesii** (Coral Tree), *Solanum mauritianum** (Tobacco Bush) and *Senna pendula** dominated (**Photo 1, 2** and **3**). Consequently, these and other corresponding areas have been reassigned to 'Weeds and exotics'.

'Exotic grassland' was mapped in previously cleared areas which are now dominated by exotic grasses such as *Pennisetum clandestinum** (Kikuyu), *Paspalum dilatatum** (Paspalum), *Ehrharta erecta** (Panic Veldtgrass) and *Sporobolus africanus** (Parramatta Grass) (**Photo 4**).

Flora species

Five records of threatened flora species have been previously recorded within 5 km of the study area; *Cynanchum elegans* (a climber), *Daphnandra johnsonii* (a small tree), *Gossia acmenoides* (a shrub), *Pimelea spicata* (a shrub) and *Zieria granulata* (a shrub) (**Table 3** and **Figure 7**). All species were determined to be 'not present' in the likelihood of occurrence assessment, as suitable habitat does not occur in the study area.

Fauna species and habitat

Twelve threatened fauna species have been recorded within 5 km of the study area (**Table 3** and **Figure**). The fauna habitat features present in the study area included a dense monoculture of Ligustrum spp., representative of an exotic dominated rainforest, as well as exotic grassland. No hollow bearing trees (HBTs) were recorded within the study area.

There are no 'recent records' of any threatened fauna species occurring within the study area and most species were determined as being 'not present' or having a 'low' likelihood of occurrence within the study area. Only two microbats, *Miniopterus schreibersii oceanensis* (Eastern Bentwing-bat) and *Myotis macropus* (Southern Myotis), have been recently recorded in the locality. However, this may be due to limited survey effort in the locality as more species would be expected. Regardless, habitat on site is limited to foraging only.

Creeklines

One 4th order creekline (Strahler stream order) runs through the study area in a south-easterly direction (**Figure**). This same creekline is identified as a 'Category 2 watercourse' on the Kiama LEP Riparian Land and Watercourses Map. The northern portion of the creekline within the study area is dominated by 'weeds and exotics', and 'exotic grassland' along the northern and southern banks. The area identified as an approximate 20 m 'Category 2 watercouse' in the KLEP is also mapped on the Biodiversity Value Map (OEH 2018a) (**Figure 9**).

Ecological constraints and recommendations

The results of the ecological constraints assessment identified areas of 'high' and 'medium' ecological constraint (see **Table 1** and **Figure 10**).

Table 1: Ecological constraints criteria

Ecological Constraint	Criteria
High	• Areas identified as 'Riparian land' (KLEP 2011) • Areas identified on the Biodiversity Value Map (OEH 2018a)
Medium	• Additional areas identified by DPI guidelines as requiring 40m VRZ

The remainder of the site is 'Weeds and exotics' or 'Exotic grassland' (~0.66 ha) and has no ecological constraint.

According to the Kiama LEP the creekline within the study area is identified as a 'Category 2 watercourse', for which it is specified that land within 20 m of the ToB be designated as 'Riparian land'. Furthermore, this 'Riparian land' is also identified on the Biodiversity Value Map (OEH 2018a) and is therefore considered to have 'high' ecological constraint (**Figure 10**). If at the DA stage the proposed works include impacts to this land identified as 'high' ecological constraint, a Biodiversity Development Assessment Report (BDAR) prepared by a suitably qualified ecologist will be required to accompany the DA. A key step in all assessments is demonstrating avoidance of impacts in the first instance. Therefore, opportunities to reduce impacts to areas of high ecological value should be explored.

Additional targeted surveys may be required during the preparation of the BDAR for some threatened species, including microbats. The timing of such surveys must comply with the survey periods identified in the BAM Credit Calculator, with microbat survey not possible until spring.

During the preparation of the BDAR, plots will be undertaken to determine the condition score for each mapped vegetation type. Under the BC Act if the condition score exceeds 20/100, offsetting will be required. Offsetting may be required for all vegetation types (including 'Weeds and exotics' due to the presence of multiple native species) but seems unlikely in this case.

Under the NSW *Water Management Act 2000* (WM Act) DPI guidelines (NOW 2012) impacts within 40 m of the creekline in the study area would trigger the need to apply for a Controlled Activity Approval. The creek corridor is mapped by DPI using the Strahler stream order classification and as a 4th order stream requires a 40 m Vegetated Riparian Zone (VRZ) on both sides of the watercourse (80 m Riparian Corridor) (NOW 2012). In this case, due to the degraded condition of the creekline, associated degraded riparian vegetation and surrounding land use, it is considered that a 20 m VRZ is appropriate to maintain the ecological value of the watercourse. The fact that DPI guidelines (NOW 2012) require a larger VRZ is a 'medium' ecological constraint, as an application to DPI will need to be made to adopt the KLEP (2011) required buffer zone of 20 m (i.e. a 40 m Riparian Corridor) rather than the 40 m buffer (80 m VRZ).

The VRZ has been buffered from the centre of the creekline but would need to be buffered from the Top of Bank (ToB) at the Development Application (DA) stage. As such, the ToB will need to be mapped and a Vegetation Management Plan (VMP) prepared by a suitably qualified ecologist to accompany the DA should impacts to this buffer zone be proposed.

Once the riparian area has been restored in accordance with the VMP, it is recommended that the area be rezoned to 'E3 – Environmental management'.

Whilst the study area is not identified for future residential expansion by the Kiama Urban Strategy (KUS), due to the current site condition and ecological constraints, it is recommended that areas not contained within the VRZ and currently zoned 'RU1 – Rural landscape' or 'E2 – Environmental conservation' be rezoned to 'R2 – Low density residential', allowing for a mix of lot sizes between 850m^2 and 1000m^2.

If you have any queries please do not hesitate to contact me.

Yours sincerely,

Lucas McKinnon
Director | Principal Ecologist | Accredited Biobanking (#76) and BAM Assessor (#17012)
BScEnv (Hons), GradCert Ornithology
M: 0421 603 549
E**:** lucas.mckinnon@ecoplanning.com.au

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Figure 1. Location of the study area.

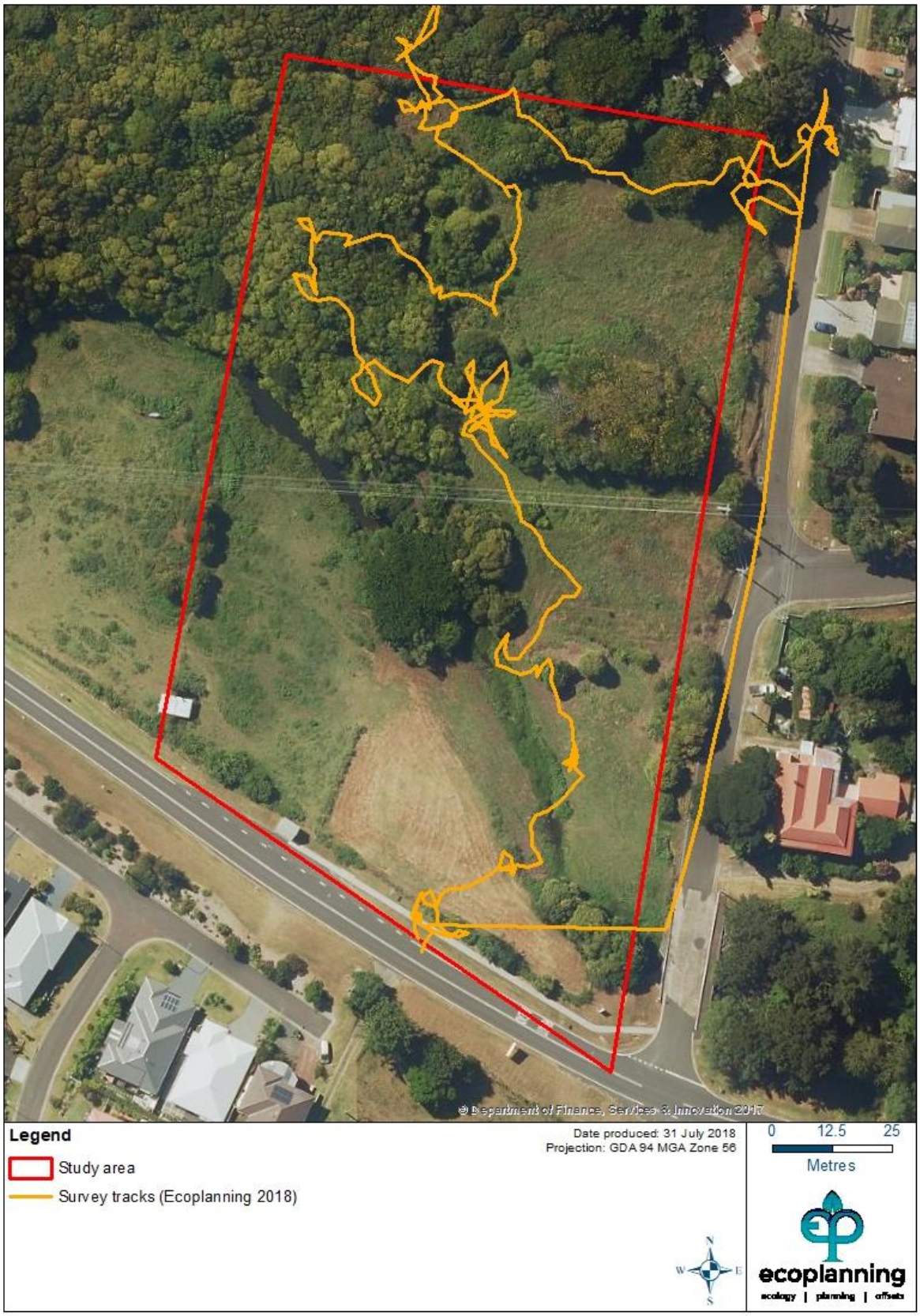


Figure 2: Survey effort within the study area (3 July 2018).

Figure 3: Regional vegetation mapping (Tozer et al. 2010).

Figure 4: Land zoning in the study area.

Figure 5: Terrestrial biodiversity land (Kiama LEP 2011).

Table 2: Flora species list (July 2018)

Scientific Name	Common Name	Native / Exotic/ Naturalised
Acacia maidenii	Maiden's Wattle	native
Ageratina adenophora	Crofton Weed	exotic
Ageratina riparia	Mistflower	exotic
Andropogon virginicus	Whisky Grass	exotic
Bidens pilosa	Cobbler's Pegs	exotic
Carex longebrachiata		native
Cirsium vulgare	Spear Thistle	exotic
Conyza spp		exotic
Delairea odorata	Cape Ivy	exotic
Dichondra repens	Kidney Weed	native
Ehrharta erecta	Panic Veldtgrass	exotic
Erythrina x *sykesii*	Coral tree	exotic
Foeniculum vulgare	Fennel	exotic
Geranium solanderi	Native Geranium	native
Grevillea robusta	Silky Oak	naturalised
Lantana camara	Lantana	exotic
Ligustrum lucidum	Large-leaved Privet	exotic
Lonicera japonica	Japanese Honeysuckle	exotic
Modiola caroliniana	Red-flowered Mallow	exotic
Olea europaea subsp. cuspidata	African Olive	exotic
Paspalum dilatatum	Paspalum	exotic
Paspalum urvillei	Vasey Grass	exotic
Pellaea falcata	Sickle Fern	native
Pennisetum clandestinum	Kikuyu Grass	exotic
Persicaria spp		native
Phytolacca octandra	Inkweed	exotic
Pittosporum undulatum	Sweet Pittosporum	native
Plantago lanceolata	Lamb's Tongues	exotic
Pteridium esculentum	Bracken	native
Rumex crispus	Curled Dock	native

Senecio madagascariensis	Fireweed	exotic
Senna pendula		exotic
Sida rhombifolia	Paddy's Lucerne	exotic
Solanum mauritianum	Wild Tobacco Bush	exotic
Sonchus oleraceus	Common Sowthistle	exotic
Sporobolus africanus	Parramatta Grass	exotic
Streblus brunonianus	Whalebone Tree	native
Tradescantia fluminensis	Wandering Jew	exotic
Tradescantia fluminensis	Wandering Jew	exotic
Trifolium repens	White Clover	exotic
Verbena bonariensis	Purpletop	exotic

Figure 6: Validated vegetation communities within the study area.

Photo 1: *Ligustrum lucidum* (Large-leaved privet) dominated vegetation, mapped as 'Weeds and exotics' in the north-east of the study area.

Photo 2: *Erythrina x sykesii* (Coral Tree) and *Solanum mauritianum* (Tobacco Bush) mapped as 'Weeds and exotics' in the north-west of the study area

Photo 3: *Ligustrum lucidum* (Large-leaved Privet) and *Senna pendula* mapped as 'Weeds and exotics' in the centre of the study area.

Photo 4: 'Exotic grassland' in the south of the study area.

Table 3: Threatened flora and fauna records from within 5km of the study area (OEH 2018).

Common name	Scientific name	Number of records >1995	Most recent record	Nearest record (m)	Likelihood of occurrence – post survey
Flora					
White-flowered Wax Plant	*Cynanchum elegans*	23	27/10/2017	522.7	Not present
Illawarra Socketwood	*Daphnandra johnsonii*	466	19/02/2018	879.2	Not present
Gossia acmenoides (population)	*Gossia acmenoides*	2	6/05/2015	2094.2	Not present
Spiked Rice-flower	*Pimelea spicata*	11	2/09/2013	3787.5	Not present
Illawarra Zieria	*Zieria granulata*	462	27/10/2017	402.3	Not present
Fauna					
Class: Amphibia					
Green and Golden Bell Frog	*Litoria aurea*	6	19/05/2000	83.3	Not present
Class: Aves					
Australasian Bittern	*Botaurus poiciloptilus*	1	3/07/1995	695.8	Not present
Bush Sone-curlew	*Burhinus grallarius*	1	5/12/2003	3643.7	Not present
Spotted Harrier	*Circus assimilis*	1	29/10/2014	4222.1	Low
White-bellied Sea-Eagle	*Haliaeetus leucogaster*	4	13/01/2016	1987.0	Low
Little Eagle	*Hieraaetus morphnoides*	2	12/02/2012	187.9	Low
Powerful Owl	*Ninox strenua*	1	1/08/2017	3571.1	Low
Eastern Osprey	*Pandion cristatus*	2	7/08/2014	4895.9	Low
Class: Mammalia					
Spotted-tailed Quoll	*Dasyurus maculatus*	3	1/07/2012	1304.3	Low

Common name	Scientific name	Number of records >1995	Most recent record	Nearest record (m)	Likelihood of occurrence – post survey
Eastern Bentwing-bat	*Miniopterus schreibersii oceanensis*	6	28/04/2009	2133.4	Low
Southern Myotis	*Myotis macropus*	4	8/10/2014	4882.0	Low
Grey-headed Flying-fox	*Pteropus poliocephalus*	2	20/07/2014	4269.7	Low

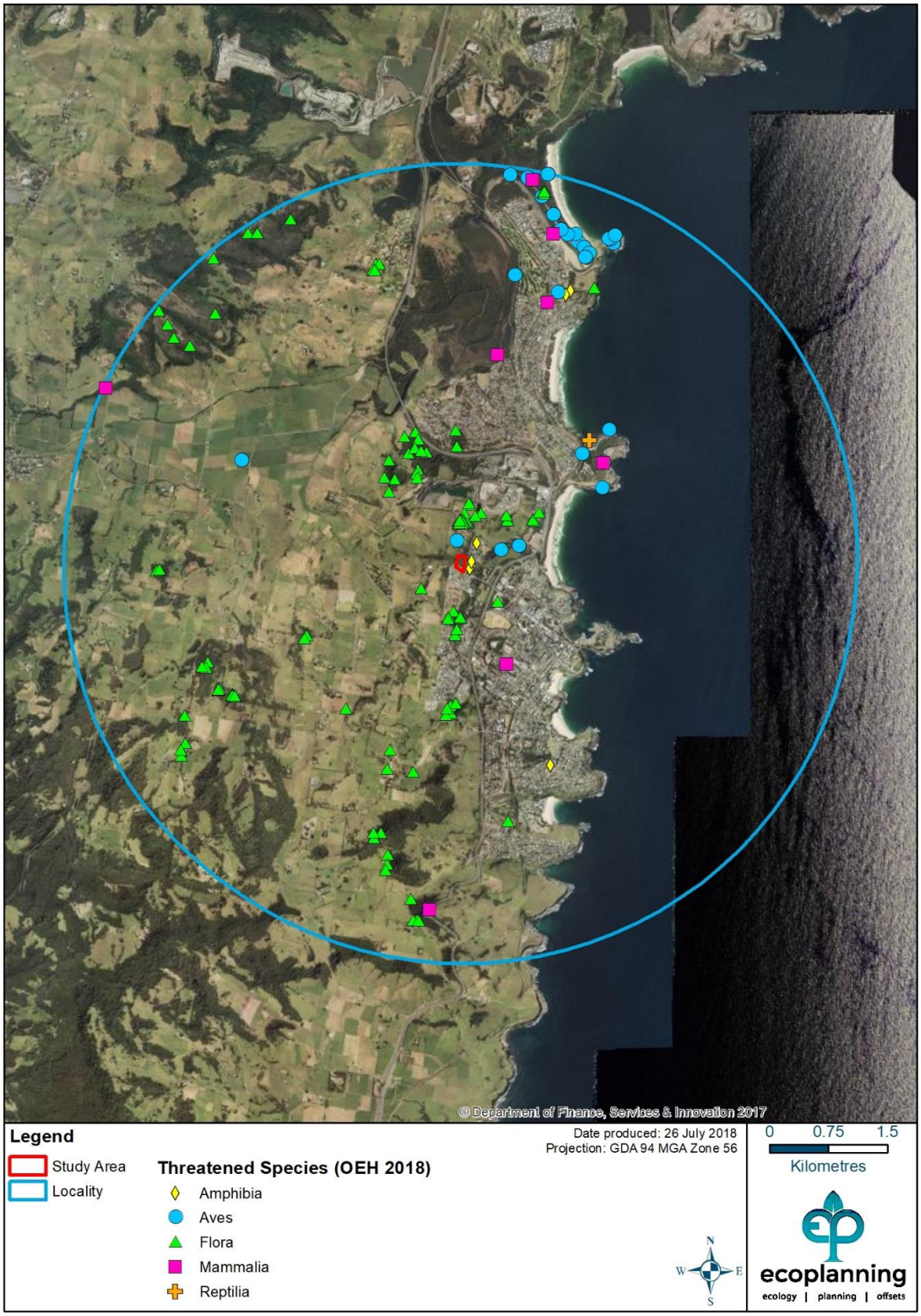


Figure 7: Threatened species records within a 5 km radius of the study area.

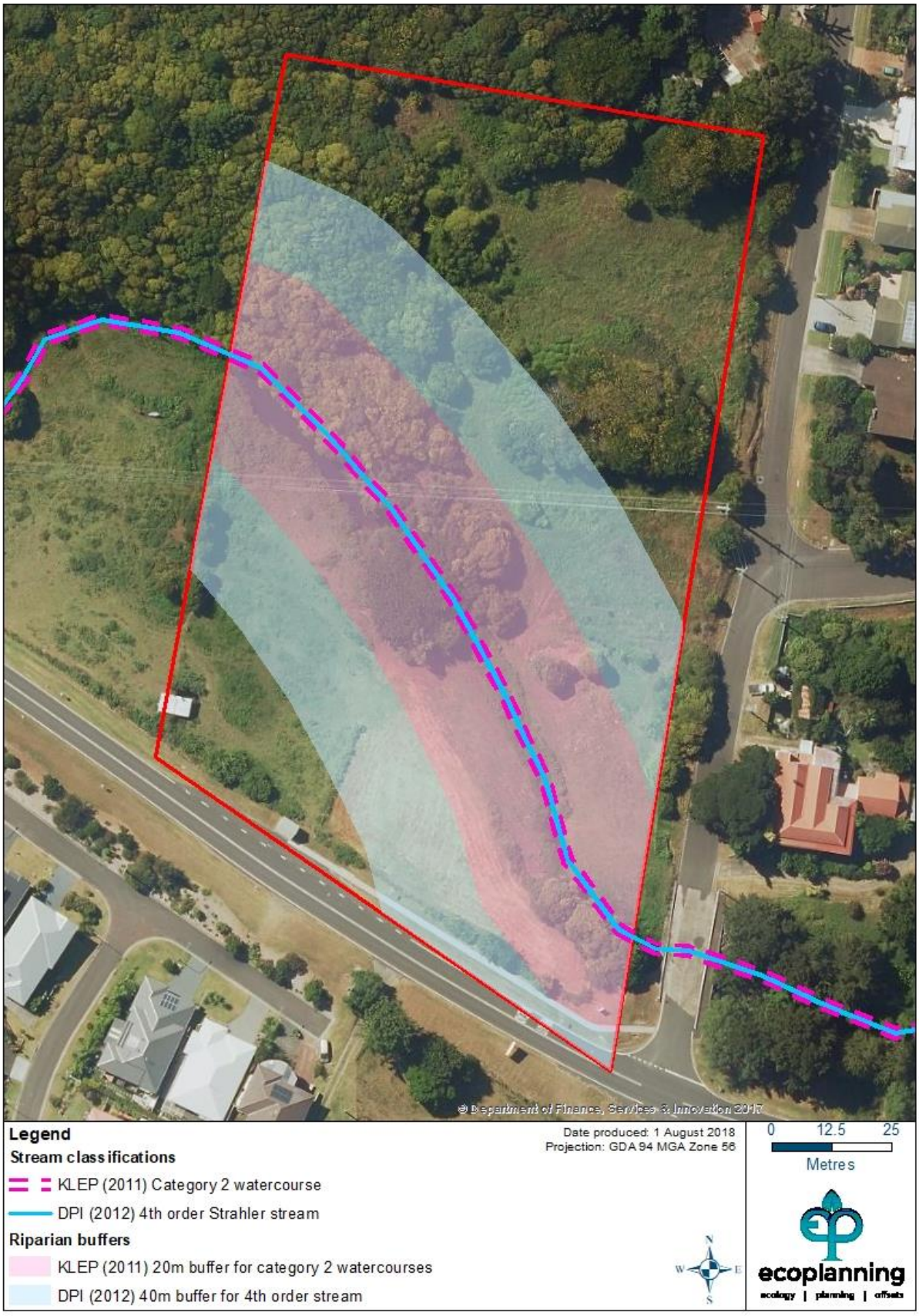


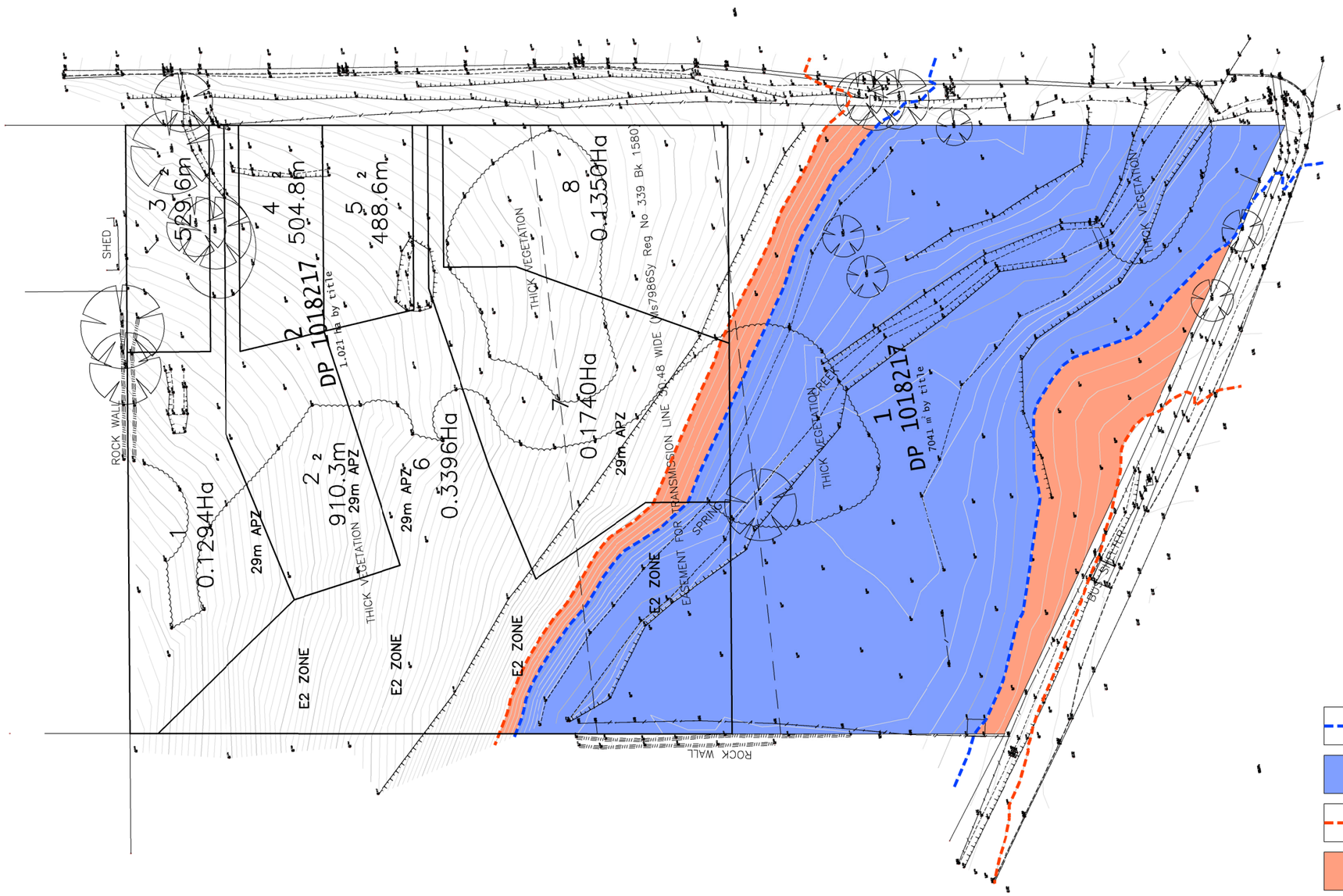
Figure 8: Stream classifications within the study area.

Figure 9: Land within the study area mapped on the Biodiversity Value Map (OEH 2018a).

Figure 10: Ecological constraints.

APPENDIX J

Flooding Constraints
Mapping



ISSUE	DESCRIPTION	DATE
2	FOR PLANNING PROPOSAL	20/02/19
1	FOR INFORMATION	30/08/18

FOR PLANNING PROPOSAL

NOT FOR CONSTRUCTION

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SURVEYOR:	KEATLEY
DATUM:	AHD
AZIMUTH:	MGA
DRAWN:	AB
DESIGNED:	AB
DESIGNED DATE:	AUG '18
CHECKED:	AB

footprint
sustainable engineering
a. 15 meehan drive
kiama downs nsw 2533
p. 02 4237 6770
f. 02 4237 8962

PLANNING PROPOSAL FOR SUBDIVISION

LOTS 1 & 2, DP1018217

DIDO STREET, KIAMA

CONSTRAINTS MAPPING - FLOODING

DRAWING NO. 1783-SK01

ISSUE. 2

APPENDIX K

Bushfire Hazard Assessment

REF: 2919BF

MARCH 19, 2019

Harrisenvironmental CONSULTING

BUSHFIRE HAZARD ASSESSMENT

PLANNING PROPOSAL TO REZONE LOT 2 DP 1018217 DIDO STREET, KIAMA, NSW TO ENABLE RESIDENTIAL LOTS

LGA: Kiama

Lot 2 DP 1018217

Applicant: Tony Scopelliti

HARRIS ENVIRONMENTAL CONSULTING
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BPAD Bushfire Planning & Design Accredited Practitioner Level 3

BUSHFIRE HAZARD ASSESSMENT

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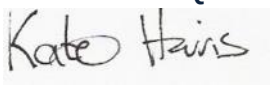

BPAD-L3-26927
GRAD DIP BUSH FIRE PROTECTION, UWS
GRAD DIP ENVIRO MANG HERTS, UK,
GRAD DIP NAT RES UNE,
BSC APP SC, AGRICULTURE HAC

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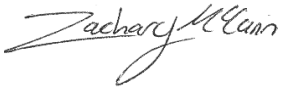

BSC,.ENV, UOW

DISCLAIMER

The recommendations provided in the summary of this report are a result of the analysis of the proposal in relation to the requirements of Planning for Bushfire Protection 2006 and the PBP Addendum Appendix 3 (2010). Utmost care has been taken in the preparation of this report however there is no guarantee of human error. There is no implied assurance or guarantee the summary conditions will be accepted in the final consent and there is no way Harris Environmental Consulting is liable for any financial losses incurred should the recommendations in this report not be accepted in the final conditions of consent.

This bushfire assessment provides a risk assessment of the bushfire hazard as outlined in the PBP 2006 and AS3959 2009. It does not provide protection against any damages or losses resulting from a bushfire event.

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FIGURES

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EXECUTIVE SUMMARY

This Bushfire Hazard Assessment is for a planning proposal to rezone Lot 2 DP 1018217 Dido Street, Kiama, NSW to residential to enable it to be subdivided.

The Gateway process allows a planning proposal to be reviewed at an early stage and identify bushfire management principles to be considered.

This report demonstrates how this proposal conforms with the aims and objectives of *Planning for Bush Fire Protection 2006* (PBP) with the following:

1 The land is currently weed infested and unmanaged. It is assumed that the land will be managed once developed and pose less of a bushfire risk;

2 The proposed lots can provide APZ setbacks and building envelopes that meet BAL 29 or less as specified by AS3959 -2009 Construction for Buildings in Bushfire Prone Areas. Special Fire Protection Purpose developments have not been considered in this investigation.

3 Internal Access is designed to provide safe operational access to structures and water supply. No public roads are proposed and 2 Right Of Ways (ROWS) are proposed to service 4 lots each. It is noted that the 4.1.3 PBP 2006 allows for access to a development compromising more than 3 dwellings to have formalized access by dedication of a road not by a Right of Way.

4 The firefighting water supply can be provided by either
- at least 10,000- itre water supply available for each proposed building or;
- access points for reticulated water that incorporates a ring main system for all internal roads. Any proposed dwelling should be within 60 m of the hydrant points.

Dido Street is currently a no-through road and should be upgraded to be able to provide turning for a medium rigid vehicle. This would include providing a minimum 12 m outer radius turning circle which is clearly sign posted as a dead end to direct traffic away from the bushfire hazard.

For the purposes of this assesment the adjacent land on Lot 3 DP1018217 which is vegetated, is considered to be developed and managed concurrently to this proposal.

1 INTRODUCTION

1.1 Proposal

The applicant proposes to amend Lot 2 DP 1018217 Dido Street, Kiama, NSW, in the Kiama Local Environment Plan (LEP) 2011 to permit an eight-lot subdivision.

Harris Environmental Consulting was commissioned to provide this bushfire assessment.

Figure 1 shows the subdivision proposal. Figure 2 shows a recent NEARMAP image of the site with the proposed subdivision layout.

FIGURE 1 SUBDIVISION PROPOSAL

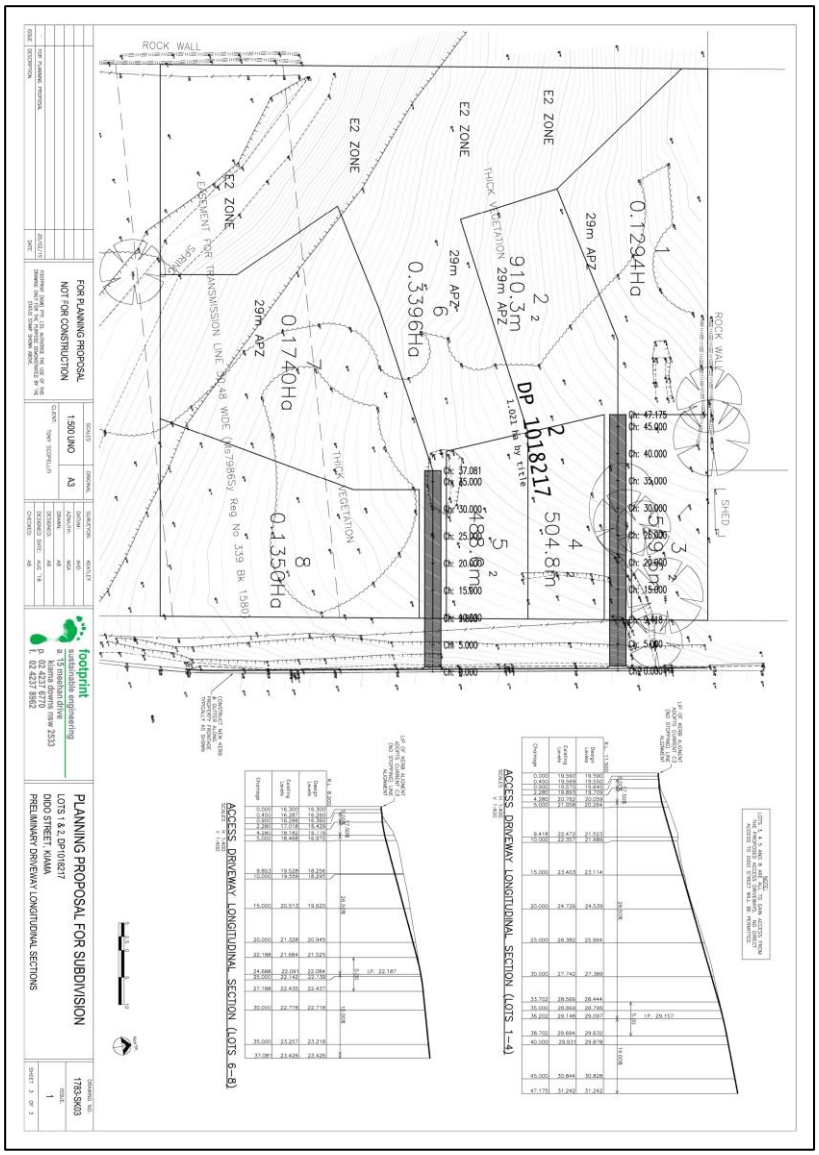


FIGURE 2 SUBDIVISION PROPOSAL AND AERIAL

1.2 Bushfire Protection Requirements

Section 91 (2) of the *Environment Planning and Assessment Act 1979* requires that Kiama Council in preparation of a planning proposal to consult with the Commissioner of the NSW RFS under section 3.34 of the Act, and prior to undertaking community consultation in satisfaction of section 3.34 of the Act. This assessment addresses the bushfire protection requirements of Section 91 Direction 4.4 of the *Environmental Planning and Assessment Act 1979*. It applies the Planning Principles for Rezoning to Residential Land in Bushfire Prone Areas from the PBP. Practice note 2/12 Planning Instruments and Polices (RFS) is provided in the Appendix. It can be expected that the RFS, in its assessment of this planning proposal and written instruments through the Gateway process will consider this practice note.

2 SITE DESCRIPTION

2.1 Lot Characteristics

The proposal is located opposite the Dido Street and Glenbrook Drive intersection as shown in Figure 3. The land under consideration comprises a square shape that is 1.08 ha in size. The eastern boundary is104 m in length and the southern boundary is 104 m in length..

Figure 4 provides a broadscale aerial view of the subject site. As can be seen from Figure 5 the subject lot is mapped as Bushfire Prone. The subject lot is mapped “Vegetation Buffer” and “Category 2”. Figure 6 shows the Kiama LEP Zone Map and shows the subject site is mapped “RU1 Primary Production” and “E2 Environmental Conservation”.

FIGURE 3 LOCATION OF PROPERTY

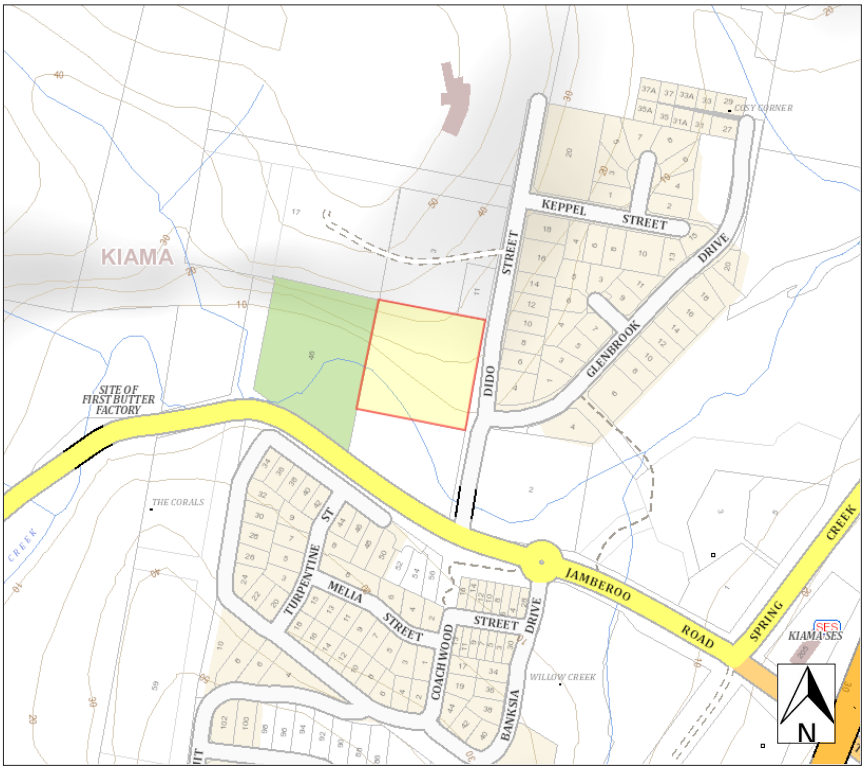
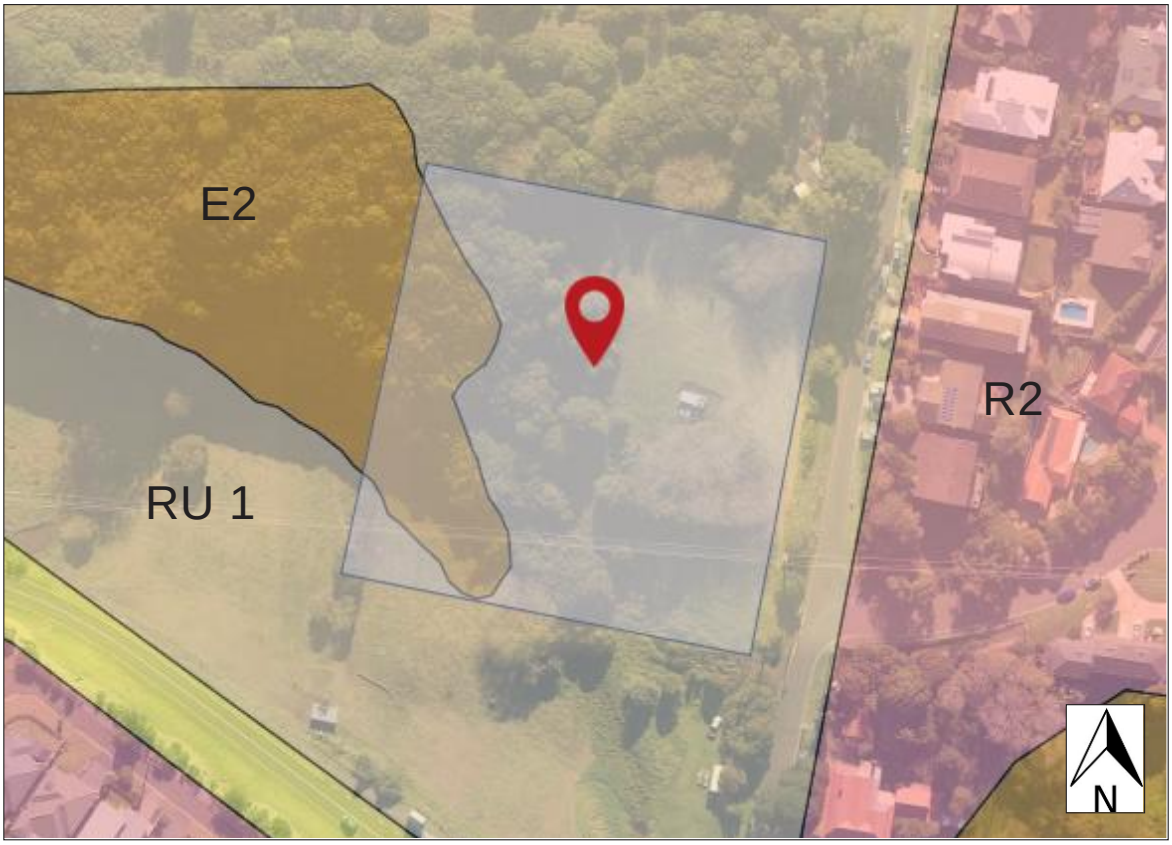


FIGURE 4 EXTENDED AERIAL VIEW OF THE SUBJECT LOT

FIGURE 5 BUSHFIRE PRONE MAP

FIGURE 6 LEP ZONE MAP



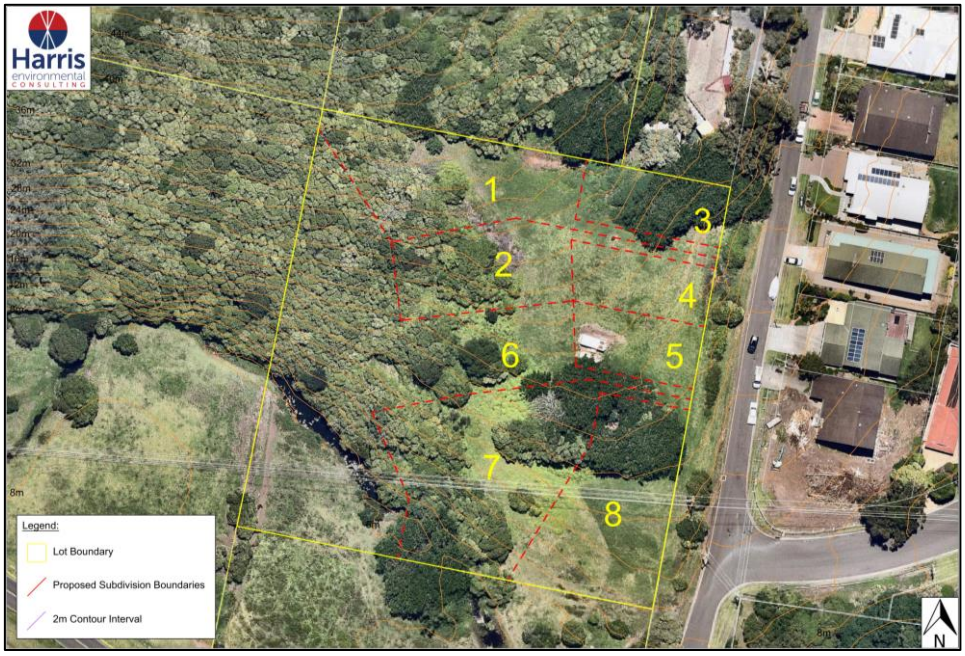
2.2 Slope and Aspect

The slope that would most significantly influence fire behaviour was determined over a distance of 100m out from the subject lot. This assessment was made with ELVIS DEM data derived at 2 m intervals.

The Australian Standard AS3959-2009 identifies that the slope of the land under the classified vegetation is much more important than the slope between the site and the edge of the classified vegetation.

The subject site is located on land that exhibits a steep south sloping gradient that runs towards the Spring Creek. The topography further exhibits a gently cross fall towards the east. To the south of Spring Creek the land exhibits an upslope topography. This is shown in Figure 7.

FIGURE 7 SLOPE



2.3 Identification of Significant Environmental Features

An ecological constraints assessment has been prepared by Lukas McKinnon (Ecoplanning) on the 7th August 2018.

The investigation concluded that within the subject lot 10 native, 30 exotic and one naturalised species were recorded.

Within the land zoned E2 and the identified on the Terrestrial Biodiversity Lands Map the report concluded that the existing vegetation does not reflect the recorded vegetation type of 'Illawarra Subtropical Rainforest'. The formation has been classified as 'Weeds and Exotics' and therefore no constraints are in place.

Ecoplanning maintains that the land mapped 'Riparian Corridor' identified on the Biodiversity Values Map to have 'high' ecological significance. They recommend a BDAR report be conducted in the case of clearing within this area. This bushfire assessment setbacks the APZ so that there would be not clearing of the Riparian corridor required.

3 BUSHFIRE THREAT ASSESSMENT

3.1 Bushfire Vegetation Formation

Figure 8 shows the managed and unmanaged land within 140 m of the subject lot.
This assessment was undertaken by field inspection and confirmed by *Tozer et al.* (2010) vegetation mapping (Appendix II).

The vegetation formations are described below:

Northern Elevation

The land on the northern elevation is considered managed for 110 m from the subject boundary. The land with 110 m consists of 1 managed residential lot (A/162726) and Lot 3 DP1018217 which is currently vegetated but for the purposes of this assessment considered developed, as it is assumed that it will be concurrently rezoned. This is shown in Photo 1.

Western Elevation

The land on the western elevation is considered downslope 15-20˚ and classified as 'Rainforest'. This formation covers the western portion of the subject lot and continues westerly for the entire survey area. This is shown in Photo 2.

South Western Elevation

The land located on the south western elevation within the subject lot is considered downslope 5-10˚ and classified as 'Riparian Corridor'. The land outside of the subject lot is considered upslope and classified as Grassland. This is shown in Photo 3. The land located 108 m away is considered upslope and classified as 'Rainforest'.

Southern Elevation

The land on the southern elevation is considered downslope 5-10˚ and is characterised by 'Riparian Corridor' and 'Grassland along the southern lot boundary. This is shown in Photo 4.

Eastern Elevation

The land on the eastern elevation is managed for 24 m from the western lot boundary. The land 24 m away if considered downslope 0-5˚ and classified "Rainforest". This is shown in Photo 5.

FIGURE 8 BUSHFIRE PRONE VEGETATION

Photo 1 View of Northern elevation

Photo 2 View of vegetation on the Western elevation

Photo 3 View of Grassland on the South Western elevation

Photo 4 View of Riparian Corridor and Grassland on the Southern elevation

Photo 5 View of Rainforest on the Eastern elevation

3.2. Asset Protection Zones (APZ)

Table 2.4.2 of the AS 3959 2009 has been used to determine the width of the required APZ for the proposed development using the vegetation and slope data identified. An FDI of 100 was used for this location.

Table 1 below shows the APZ and BAL Determination for the proposed subdivision.

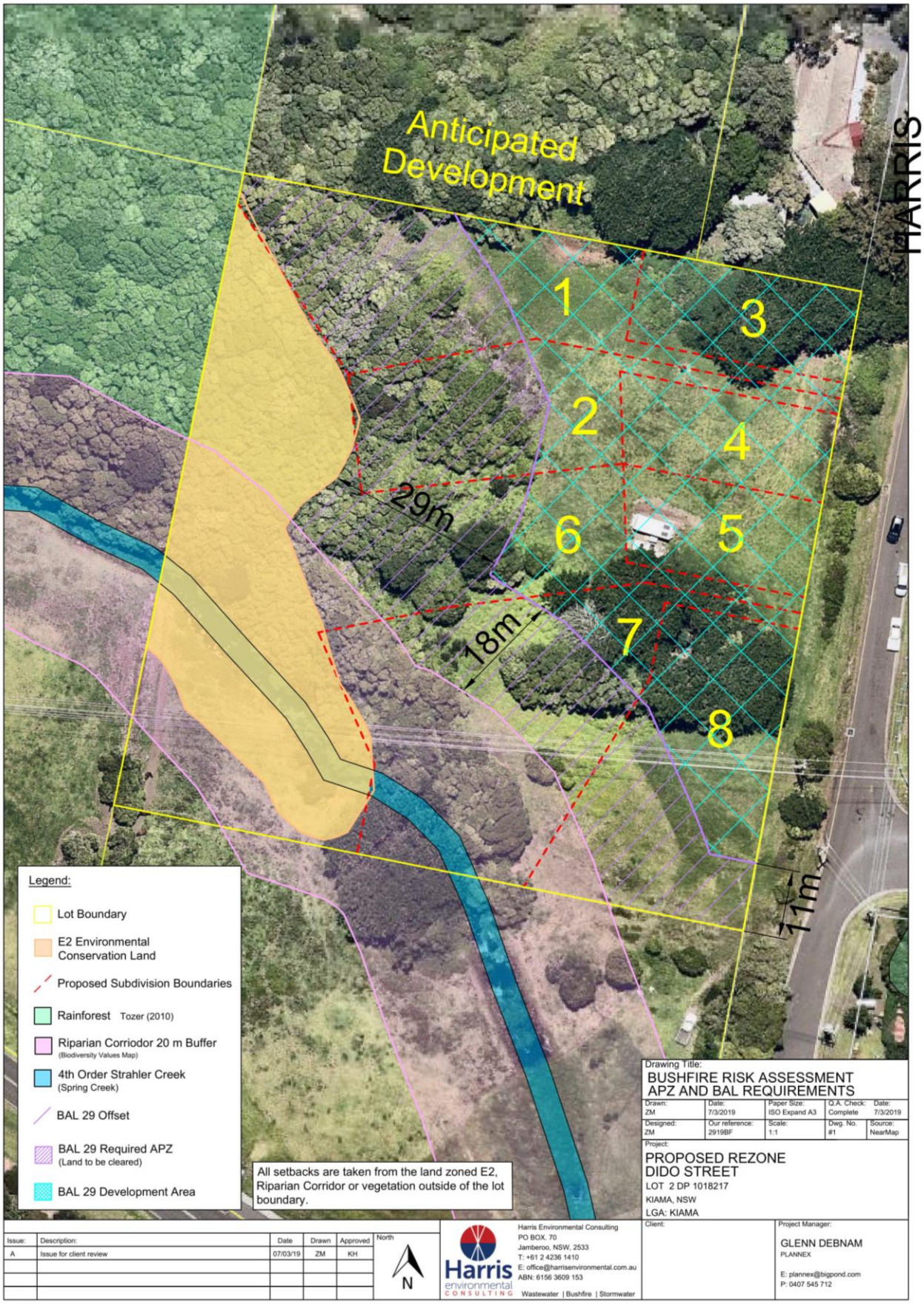
An APZ should be established on from the commencement of building works and maintained for perpetuity for the following distances;

- 29 m on the western elevation from the land mapped E2;
- 18 m on the southern and south western elevation from the land mapped Riparian Corridor;
- 11 m on the south eastern elevation.

TABLE 1 APZ AND BAL DETERMINATION

	NORTH	***WEST***	***SOUTH WEST***	***SOUTH***	***SOUTH EAST***
GRADIENT	Upslope	Downslope 15-20˚	Downslope 5-10˚	Downslope 5-10˚	Downslope 5-10˚
VEG	Rainforest	Rainforest	Riparian Corridor	Riparian Corridor	Grassland
Distance between façade and hazard	110 m	29 m	18 m	18 m	11 m
AS 3959 BAL 29 required APZ	11-<16 m	29-<42 m	18-<26 m	18-<26 m	11-<17 m
BAL Required	**BAL 29 or less**	**BAL 29 or less**	**BAL 29 or less**	**BAL 29 or less**	**BAL 29 or less**

FIGURE 9 APZ AND BAL REQUIREMENTS



4 RELEVANT CONSTRUCTION STANDARD

The Australian Standard AS3939 – 2009 is the enabling standard that addresses the performance requirements of both parts 2.3.4 and Part GF5.1 of the Building Code of Australia for the construction of Class 1, 2 and Class 3 buildings within a designated Bushfire Prone Area.

The following was determined for this site:
Relevant fire danger index…… FD1 100
Flame temperature ……1090 K

Special Fire Protection Purpose developments have not been considered in this investigation.

The land available for the required asset protection zones will allow construction of future dwellings to be undertaken in accordance with a maximum of BAL 29 AS 3959-2009. The future use of the rezoned land for residential purposes will require approval of an integrated development application for subdivision under s 91 of the *EP&A Act* and require consultation with the RFS for the issue of a 100B Rural Fires Act Bushfire Safety Authority.

The proposed subject sites can meet **BAL 29** or less as shown in Table 2 below.

TABLE 2 CONSTRUCTION STANDARDS

Proposed Lot	Construction Standard	Approximate Available Envelope
Lot 1	BAL 29 or less	400 m^2
Lot 2	BAL 12.5 or less	260 m^2
Lot 3	BAL 29 or less	525 m^2
Lot 4	BAL 29 or less	490 m^2
Lot 5	BAL 29 or less	475 m^2
Lot 6	BAL 29 or less	350 m^2
Lot 7	BAL 29 or less	190 m^2
Lot 8	BAL 29 or less	675 m^2

5 SAFE OPERATIONAL ACCESS

The PBP (2006) requires the provision of safe operational access to structures and water supply for emergency services, while residents are seeking to evacuate from an area.

Access will be from Dido Street. This road is a no through dead end road with no capacity for turning at the end. This road should be upgraded to be able to provide turning for a medium rigid vehicle. This would include providing a minimum 12 m outer radius turning circle which is clearly sign-posted as a dead end to direct traffic away from the bushfire hazard.

Two Right of Way internal access roads are proposed, are shown in Figure 10 and are as follows.

- The northern ROW is 46 m in length and provides access for Lots 1 to 4;
- The southern ROW is 36 m in length and provides access for Lots 5 to 8.

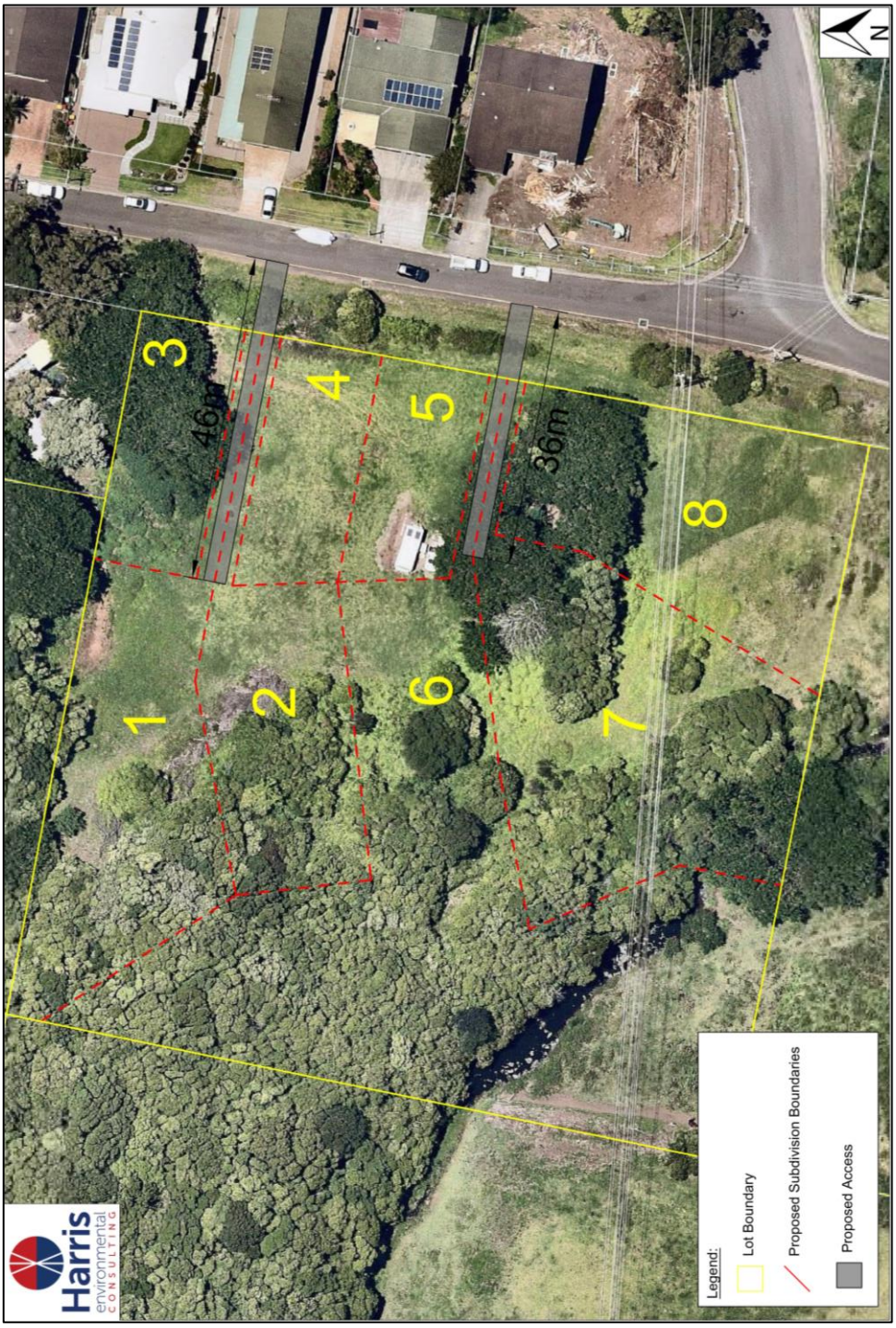
.

It is noted that the 4.1.3 PBP 2006 allows for access to a development compromising more than 3 dwellings to have formalized access by dedication of a road not by a Right of Way.
If the building envelopes are more than 70 m from a hydrant, a truck turning area would be required to provide enough turning room for a fire tanker that requires an inner minimum turning radius of 6 m and outer minimum radius of 12 m

The proposed ROW's are required to comply with the PBP- Property Access. This includes:

- A minimum carriageway width of four metres;
- Curves a minimum inner radius of six metres;
- The minimum distance between inner and outer curves is six metres;
- The crossfall is not more than 10 degrees;
- Maximum grades for sealed roads do not exceed 15 degrees (28 per cent) and not more than 10 degrees (18 percent) for unsealed roads;
- The internal road surfaces and bridges have a capacity to carry fully loaded firefighting vehicles (28 tonnes).

FIGURE 10 PROPOSED ACCESS



6 ADEQUATE WATER AND UTILITY SERVICES

Reticulated water is proposed. If the extent of any building envelope on each lot is not within 70 m of a hydrant, a 10,000 L water supply for firefighting purposes is required.

Any bottled gas will be installed and maintained in accordance with AS1596 and the requirements of the relevant authority. If gas cylinders need to be kept close to the buildings, the release valves must be directed away from the building and away from any combustible material. Polymer sheathed flexible gas supply lines to gas meters adjacent to buildings are not to be used.

Electrical transmission lines, if above ground, will be managed in accordance with specifications issued by Energy Australia.

7 MEETING THE BUSHFIRE PLANNING PROVISIONS

The following table shows how the proposed development meets Direction 4.4 Planning for Bushfire Protection and the Performance Based Controls of the PBP (2006)

Table 3 Demonstration of Compliance

Performance criteria	Acceptable Solution	Demonstration of compliance
Protection of life, property and the environment from bushfire hazards by discouraging the establishment of imcompatible land uses in bushfire prone areas and to encourage sound management of bushfire prone areas	The proposed intensity of a site to be commensurate with the level of risk • Specifiy minimum residential lots to accommodate APZ • Provision for two way access roads which link to perimeter roads • Adequate water supply for fire fighting	8 lots are proposed which can all meet BAL 29 or less and will be located less than 70 m from Dido Street. The proposal does not involve the provision of any new public roads. . It is noted that the 2 ROWs will serve 4 lots each. 4.1.3 PBP 2006 allows for access to a development compromising more than 3 dwellings to have formalized access by dedication of a road not by a Right of Way. The land is currently weed infested and unmanaged. It is assumed that the land will be managed once developed and pose less of a bushfire risk.
Provisions that give effect to and are consistent with PBP 2006, in particular:	Radiant heat levels at any point on a proposed building will not exceed 29kw/m^2 APZ is determined in accordance with PBP, 2006 Appendix 2, and as 3959 2009.	The proposed lots meet the APZ for BAL 29 and less.
APZ's are managed and maintained to prevent the spread of a fire towards the building	In accordance with the requirements of standards for asset protection zones (RFS, 2005)	APZ is wholly within the boundaries of the development site for BAL 29.
APZ maintenance is practical	APZ not located on steep land	The APZ is located on land less than 18 degrees downslope
Whether development will result in increase demand for emergency services	Firefighters are provided with safe all weather access to structures	Access is from Dido Street. This road is a no through road and will require upgrading to comply. two-wheel drive, all weather road. The capacity of road

	Public road widths and design allow safe access for firefighters while residents are evacuating an area Access to properties is provided in recognition of the risk to fire fighters and/or evacuating occupants Capacity of road surfaces and bridges is sufficient to carry fully loaded firefighting vehicles. All weather access is provided Road widths and design enable safe access for vehicles	surfaces and bridges is sufficient to carry fully loaded firefighting vehicles. The rezone proposes two Right of Way internal access roads. The northern ROW is 46 m in length and provides access for Lots 1 and 2. The southern ROW is 36 m in length and provides access for Lots 6 and 7. Lots 3, 4, 5 and 8 will have direct access from Dido Street. The proposed internal access is required to comply with the PBP- Property Access. This includes: A minimum carriageway width of four metres; Curves a minimum inner radius of six metres; The minimum distance between inner and outer curves is six metres; The crossfall is not more than 10 degrees; Maximum grades for sealed roads do not exceed 15 degrees (28 per cent) and not more than 10 degrees (18 percent) for unsealed roads; The internal road surfaces and bridges have a capacity to carry fully loaded firefighting vehicles (28 tonnes).
A water supply reserve is dedicated to firefighting purposes and is installed and maintained.	The minimum dedicated water supply required for firefighting purposes for each occupied building is provided in accordance with PBP 2006 table 4.2. A suitable connection for firefighting purposes is made available. The gate or ball valve and pies are adequate for water flow and are metal rather than plastic. Pumps are shielded.	Reticulated water is proposed. If the extent of the building envelope on each lot is not within 70 m of a hydrant, a 10,000 L water supply for firefighting purposes is required on each lot.
Location of electricity services limits the possibility of ignition of surrounding bushland or the fabric of the buildings. Regular inspection of lines are undertaken to ensure they are not fouled by branches.	Where practicable, electrical transmission lines are underground	Underground electricity transmission lines will be installed if practical.
Location of gas services will not lead to ignition of surrounding bushland or the fabric of the buildings.	Reticulated or bottled gas is installed and maintained in accordance with as 1596 and the requirements of relevant acceptable solutions as identified in PBP 4.1.3	Gas will be installed according to AS 1596 and relevant acceptable solutions as identified in PBP 4.1.3

8 SUMMARY

This Bushfire Hazard Assessment proposes:

- The proposed lots can meet the following construction standards:

Proposed Lot	Construction Standard	Approximate Available Envelope
Lot 1	BAL 29 or less	400 m^2
Lot 2	BAL 12.5 or less	260 m^2
Lot 3	BAL 29 or less	525 m^2
Lot 4	BAL 29 or less	490 m^2
Lot 5	BAL 29 or less	475 m^2
Lot 6	BAL 29 or less	350 m^2
Lot 7	BAL 29 or less	190 m^2
Lot 8	BAL 29 or less	675 m^2

- An APZ should be established on from the commencement of building works and maintained for perpetuity for the following distances;
  - 29 m on the western elevation from the land mapped E2;
  - 18 m on the southern and south western elevation from the land mapped Riparian Corridor;
  - 11 m on the south eastern elevation.

- Reticulated water is proposed. If the extent of the building envelope on each lot is not within 70 m of a hydrant, a 10,000 L water supply for firefighting purposes is required on each lot;

- The rezone proposes two Right of Way internal access roads as follows.
  - The northern ROW is 46 m in length and provides access for Lots 1 2;3 and 4;
  - The southern ROW is 36 m in length and provides access for Lots 5,6 7 and 8.

- It is noted that the 2 ROWs will serve 4 lots each. 4.1.3 PBP 2006 allows for access to a development compromising more than 3 dwellings to have formalized access by dedication of a road not by a Right of Way.

- Dido Street is currently a no-through road and should be upgraded to be able to provide turning for a medium rigid vehicle. This would include providing a minimum 12 m outer radius turning circle which is clearly sign posted as a dead end to direct traffic away from the bushfire hazard.

- The proposed ROW is required to comply with the PBP- Property Access. This includes:
  - A minimum carriageway width of four metres;
  - Curves a minimum inner radius of six metres;
  - The minimum distance between inner and outer curves is six metres;
  - The crossfall is not more than 10 degrees;
  - Maximum grades for sealed roads do not exceed 15 degrees (28 per cent) and not more than 10 degrees (18 percent) for unsealed roads;
  - The internal road surfaces and bridges have a capacity to carry fully loaded firefighting vehicles (28 tonnes);

- Any above ground electrical transmission lines should be regularly inspected to insure no branches are within proximity of it;

- If gas cylinders need to be kept close to the buildings, the release valves must be directed away from the building and away from any combustible material. Polymer sheather flexible gas supply lines to gas meters adjacent to buildings are not to be used.

9 REFERENCES

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APPENDIX I NSW RFS COMMUNITY RESILIENCE PRACTICE NOTE 2/12 PLANNING INSTRUMENTS AND POLICIES

NSW RURAL FIRE SERVICE

COMMUNITY RESILIENCE PRACTICE NOTES **2/12**

Planning Instruments and Policies

This Practice Note provides direction for local government and agencies responsible for the creation and implementation of local area policy and provisions for development in bush fire prone areas. It will assist in interpreting and addressing the requirements for a planning proposal and in structuring written instruments relating to development on bush fire prone land.

It can be expected that the RFS, in its assessment of planning proposals and written instruments through the Gateway process, will consider this Practice Note.

The planning process

Planning for Bush Fire Protection 2006 (PBP) provides guidelines for use once an area has been identified and zoned for development. Its primary purpose is to assist with the development of bush fire prone land. Instruments and policies that guide planning and land use control allow for a more strategic approach to planning and developing in bush fire prone areas.

Within NSW Environmental Planning Instruments (EPIs) regulate land use and development and are legislated through the *Environmental Planning and Assessment Act 1979* (EP&A Act). They include State Environmental Planning Policies (SEPPs) and Local Environmental Plans (LEPs).

Local Environmental Plans (LEPs) guide planning decisions at the local government area and are a useful mechanism for managing bush fire risk. Through land use zoning and development standards, LEPs allow local government and other consent authorities to manage the ways in which land is used.

On 31 March 2006, the NSW Government gazetted a standard instrument for preparing principal LEPs (the LEP template). Although the standard instrument does not specifically refer to bush fire, Councils are able to include localised planning objectives and provisions specific to their area, which can include bush fire provisions.

The Minister for Planning, under section 117(2) of the *Environmental Planning and Assessment Act 1979* (EP&A Act) issues directions that relevant planning authorities (such as local councils) must follow when preparing planning proposals for new LEPs. Direction 4.4 Planning for Bushfire Protection identifies matters for consideration for planning proposals that will affect, or are in proximity to land mapped as bush fire prone. This Practice Note outlines the RFS expectations in meeting this Direction.

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The LEP process

The 'Gateway' process was introduced by the NSW Department of Planning in 2009 to streamline the process of making LEPs so they can be prepared, considered and approved in a much shorter timeframe. It allows a planning proposal to be reviewed at an early stage and a decision made on whether to proceed further.

Bush fire planning in LEPs

LEPs can ensure bush fire management principles are considered at all stages of the planning and development process. This applies to both principal LEPs and amending LEPs (e.g. site specific, rezoning). Early on in the strategic planning process (e.g. when considering land use zoning for an area) consideration is to be given to limiting or excluding incompatible development in bush fire affected areas commensurate with the level of risk. A key principle should be to ensure that future development is capable of complying with (PBP).

It may be appropriate to apply zones that limit or exclude incompatible development in bush fire affected areas where:

- development is likely to be difficult to evacuate during a bush fire,
- development is likely to create control difficulties during a bush fire,
- development will adversely affect other bush fire protection strategies or place existing development at increased risk,
- development is likely to result in a substantially increased requirement for government spending on bush fire mitigation measures, infrastructure or services,
- environmental constraints to the site cannot be overcome,
- required bush fire protection measures would incur significant environmental costs.

To achieve this it will be necessary to undertake a risk assessment of the area in respect to bush fire to identify potential bush fire risks to individual sites, localities and proposed forms of development. A constraint assessment will identify elements which may restrict development or that will be impacted upon by development such as water supply, access and evacuation.

Planning Proposals

A planning proposal explains the intended effect of a proposed LEP. It is the first step in preparing a LEP and is comprised of four parts:

- Part 1 - A statement of the **Objectives or Intended Outcomes** of the proposed LEP;

- Part 2 - An **Explanation of the Provisions** that are to be included in the proposed LEP;
- Part 3 - The **Justification** for those objectives, outcomes and provisions and the process for their implementation;
- Part 4 - Details of the **Community Consultation** that is to be undertaken on the planning proposal.

Detailed below is information to support a planning proposal on bush fire prone land or adjoining land and addresses the first three requirements indentified above:

Part 1 – Objectives or Intended Outcomes

When preparing a planning proposal relating to bush fire prone land, the primary objectives should be to:

a) protect life, property and the environment from bush fire hazards, by discouraging the establishment of incompatible land uses in bush fire prone areas, and
b) encourage sound management of bush fire prone areas.

Part 2 – Explanation of the Provisions

The objectives identified in Part 1 can be achieved by ensuring that new controls imposed on development must:

a) not increase the risk to life from bush fire
b) not introduce controls that place inappropriate developments in areas exposed to unacceptable bush fire hazard
c) ensure that appropriate bush fire protection measures can be afforded to property at risk of bush fire
d) minimise negative impacts on the surrounding environment,
e) ensure that provision is made for adequate evacuation/shelter options for the community, and
f) ensure that development is capable of complying with *Planning for Bush Fire Protection 2006.*

An example local provision for bush fire prone land is included in Appendix 2 of this Practice Note and may be utilised. The acceptance of such a provision would be determined through the Gateway process.

Part 3 – Justification

The level of justification should be proportionate to the impact that the planning proposal will have. Information provided in Appendix 1 may assist in explaining land use and zoning decisions or the inclusion of a local provision.

Bush fire planning in Development Control Plans

Development Control Plans (DCP) are prepared by Council under the EP&A Act and associated Regulation. They provide guidelines for development standards contained within an LEP and are generally site or land use zone specific. They provide a flexible means of identifying additional development controls and standards.

The following are matters that may be addressed through a DCP:

a) the proposed intensity of a site commensurate with the level of risk,
b) provisions that give effect to and are consistent with Planning for Bush Fire Protection 2006, and in particular
    i. specify minimum residential lot depths to accommodate asset protection zones
    ii. contain provisions for two-way access roads which link to perimeter roads and/or to fire trail networks,
    iii. contain provisions for adequate water supply for fire fighting purposes,
c) whether development will result in an increase demand for emergency services,
d) whether bush fire protection measures will adversely affect the environment,
e) minimising the perimeter of the area of land interfacing the hazard which may be developed,
f) whether proposed revegetation of a site will result in the introduction or increase of a bush fire hazard.

Bush fire prone land mapping

It is recommended that the bush fire prone land map (required under Section 146 of the EP&A Act) for an area affected by a LEP, DCP or local provision be reviewed, and amended where necessary. Maps are to reflect any changes to the designation of bush fire prone areas that may result from changes in vegetation (e.g. where development has resulted in the clearing of vegetation or where revegetation has introduced a new bush fire hazard to an area).

Appendix 1: Information relating to various forms of development in bush fire prone areas

Detailed below is information that can be included to justify objectives, outcomes and provisions that may be included in a planning proposal. These examples address some common issues that are raised in bush fire prone areas.

1. **High- Rise Construction in Bush Fire Prone Areas**

Construction of high-rise buildings in bush fire prone areas poses unique issues over and above those associated with other types of buildings. High-rise buildings, for the purposes of PBP are defined as buildings exceeding three (3) stories in height. Such structures have increased external façade surface areas that can be expected to be exposed to greater amounts of radiant heat and also ember attack. Their height can also result in exposure to convective heat which otherwise would not be significant for lower height buildings. Additionally, high-rise buildings are associated with higher populations that make egress from the building(s) more of an issue and also place a higher load on road infrastructure during evacuations due to the potential for higher density populations. External balconies can easily trap embers which can ignite combustible materials.

Because of the challenges that high-rise buildings pose when located in bush fire prone areas, they require special consideration.

This includes consideration of the following:

- Location – high-rise buildings should not be located along ridges or along slopes with significant fire runs;
- Existing infrastructure – when high-rise developments are proposed their impact during potential bush fire emergencies needs to be considered, particularly in terms of evacuating occupants along the road network and the availability of water supplies available for high-rise fire fighting;
- External facades – external facades may result in increased exposure to radiant heat and also convection columns. Specialised modelling may be needed and APZs may need to be increased over and above those specified to account for this;
- Potential for entrapment - the risk associated with occupant egress is higher in high-rise buildings than for lower-rise structures and therefore the potential for entrapment during a bush fire emergency should be addressed.

Such developments should only be considered on bush fire prone land if an engineering analysis can demonstrate that the above issues do not pose an unacceptable risk.

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2. High Density Development in Bush Fire Prone Areas

High density development in bush fire prone areas may present unique challenges in relation to proposed developments and the existing infrastructure. High density development would include dual occupancies, multi dwelling housing and residential flat buildings. It may also include higher than normal density of Special Fire Protection Purpose [1] development in a precinct.

High density developments often result in an increased demand on existing services and may result in an increased risk to occupants and the existing community. They may also expose increased numbers of occupants to bush fire risk and therefore require special consideration. This includes consideration of the following:

- Location – high density developments should not be located along ridges or along slopes with significant fire runs;
- Existing infrastructure – when high density developments are proposed their impact during potential bush fire emergencies needs to be considered, particularly in terms of evacuating occupants along the road network and the availability of water supplies available for fire fighting;
- Potential for entrapment -the risk associated with occupant egress is higher in high density developments than for lower density developments and therefore the potential for entrapment during a bush fire emergency should be addressed.

Such developments should only be considered on bush fire prone land if an engineering analysis can demonstrate that the above issues do not pose an unacceptable risk. It should be noted that in some situations new development may not be feasible due to existing or proposed high densities and the increased risk associated with the proposal.

Appendix 2: Example Principal LEP Bush Fire Provision

Explanation of Provisions

The LEP will include the following additional local provision and applies to land identified as being within a bush fire prone area.

Development within bush fire prone areas

(1) The objectives of this clause are as follows:

b) to minimise the bush fire risk to life, property, heritage values and the natural environment associated with the use of land consistent with the principles of ecologically sustainable development, and

c) to allow development on land that is compatible with the land's bush fire risk, and

d) to ensure ongoing maintenance of bush fire protection measures will be feasible, and

e) to avoid significant environmental and visual impacts of the clearing of vegetation for hazard reduction activities related to the development, and

f) to avoid significant adverse impacts on the ability of emergency services to effectively control major bush fires, and

a) to prohibit development that is likely to cause a significant increased risk to the lives of residents, visitors or emergency services personnel as a result of the development.

(2) This clause applies to land identified as bush fire prone land (*see note).

(3) Development consent must not be granted to development on land, to which this clause applies unless, in the opinion of the consent authority the development:

a) does not result in the location of increased development or infrastructure in areas exposed to unreasonable bush fire risk, or require an increase in measures to manage bush fire risk by other land owners/managers, and

b) will achieve an appropriate balance between the conservation of the natural environment and the provision of appropriate bush fire protection measures, taking into account the significance of the vegetation and biodiversity corridors, and

c) will include adequate measures to enable the safe evacuation of people from the locality during a bush fire, and

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d) will enable adequate access to that locality by emergency services, during a bush fire including the provision of fire trails where necessary, and

e) is unlikely to result in unsustainable social and economic costs to the community as a consequence of managing bush fire risk, and

f) will ensure ongoing provision and maintenance of the full suite of bush fire protection measures without unreasonable cost to the community, and neighbouring properties, and

g) will ensure the ongoing maintenance of the suite of bush fire protection measures to be carried out, and

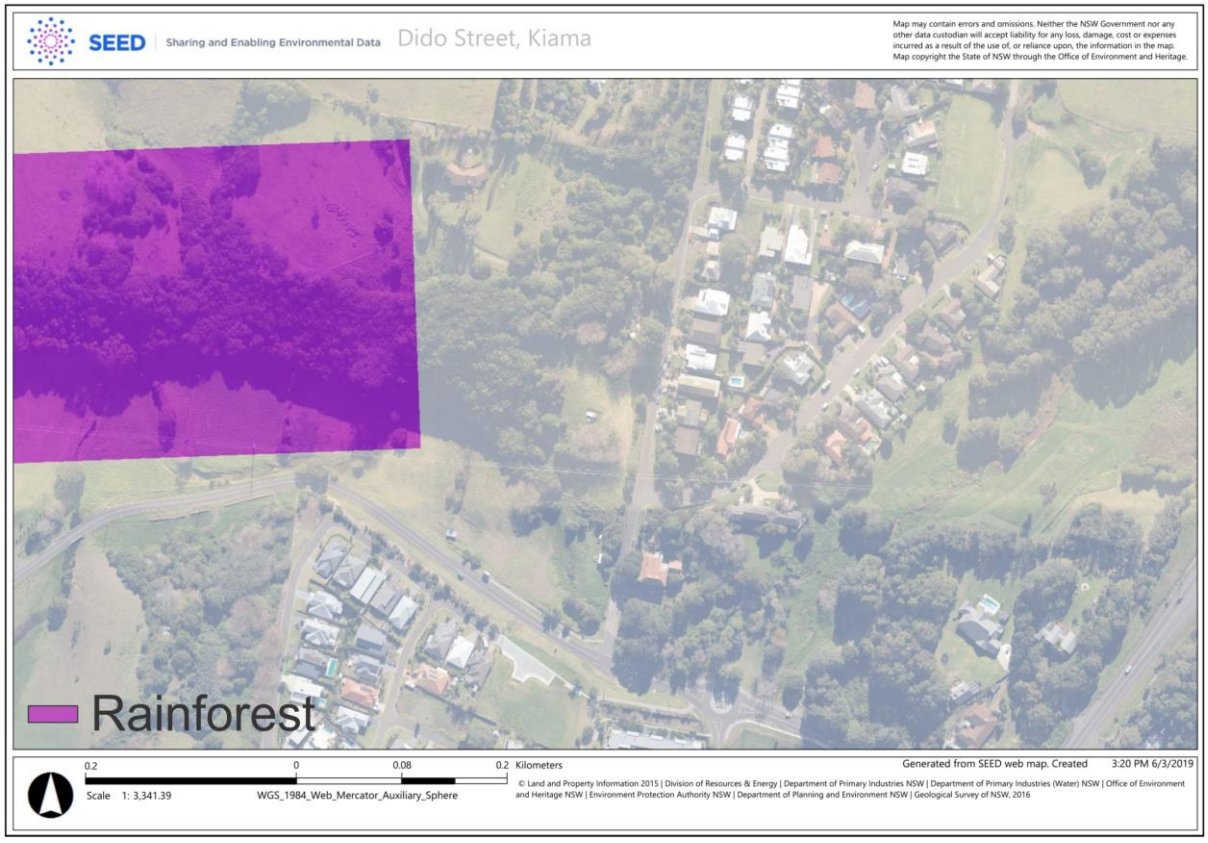
h) conforms with the aims and objectives set out in the document entitled Planning for Bush Fire Protection, ISBN 0 9751033 2 6, prepared by the NSW Rural Fire Service in cooperation with the Department of Planning, dated December 2006, or any document/s that supersedes this.

* Note: The land to which this clause applies can be extended to include land that is not mapped as bush fire prone on a bush fire prone land but has the potential to be affected by the impacts of bush fire (e.g. over 100m from vegetation but evacuation is problematic).

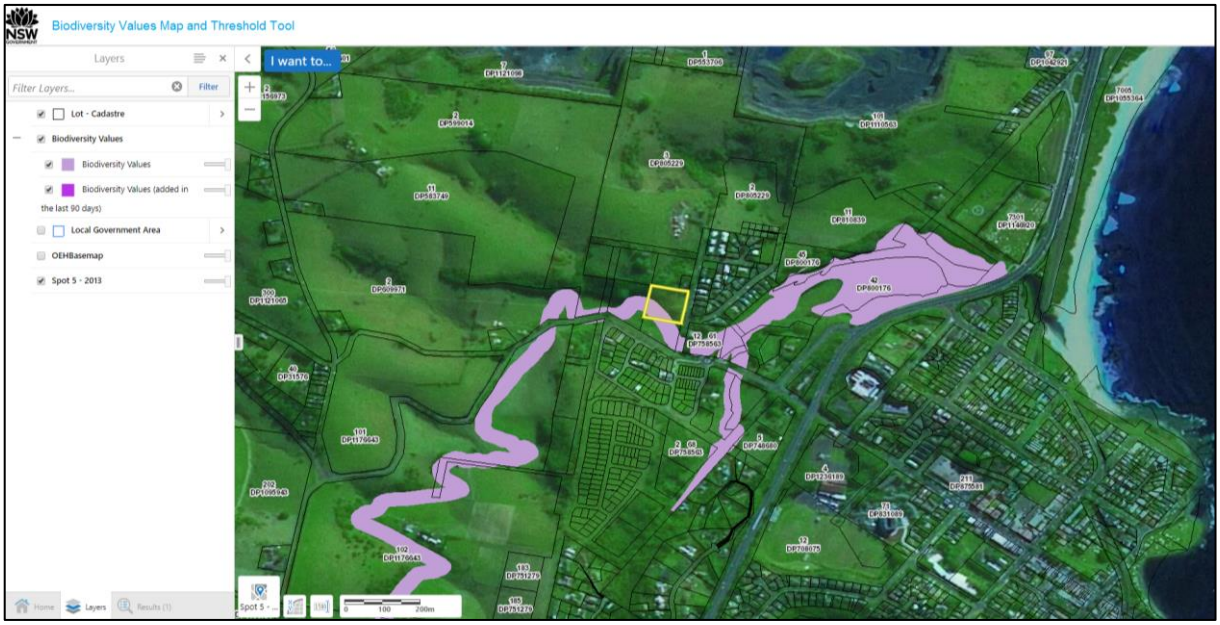
The RFS acknowledges Sutherland Shire Council and Wyong Shire Council for their assistance in preparing this Practice Note.

Disclaimer: Any representation, statement opinion, or advice expressed or implied in this publication is made in good faith on the basis that the State of New South Wales, the NSW Rural Fire Service, its agents and employees are not liable (whether by reason of negligence, lack of care or otherwise) to any person for any damage or loss whatsoever which has occurred or may occur in relation to that person taking or not taking (as the case may be) action in respect of any representation, statement or advice referred to above

APPENDIX III SOUTHEAST NSW NATIVE VEGETATION CLASSIFICATION AND MAPPING SCIVI. VIS_ID 2230



APPENDIX IIIII BIODIVERSITY VALUES MAP



APPENDIX L

Geotechnical Assessment

Southern Geotechnics NSW
Consulting Geotechnical Engineers

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201866: njb:
19 August, 2018

Mr Tony Scopelliti
c/o Plannex Environmental Planning
PO Box 239
Figtree, NSW 2525

Dear Sir,

RE: PROPOSED REZONING OF LOT 2, D.P.1018217, DIDO STREET, KIAMA GEOTECHNICAL ASSESSMENT

1.0 INTRODUCTION

As requested through Glenn Debnam of Plannex Environmental Planning, Southern Geotechnics has carried out a geotechnical assessment of the above property. Field work was undertaken on 2 August 2018, and comprised a walkover geotechnical assessment supplemented by the machine drilling of boreholes, in which logging was carried out by our Senior Geotechnical Engineer.

It is understood that you propose to rezone the north-eastern portion of the lot, to enable residential development of part of the site.

The risk of slope instability on the property and immediate surrounding area, has been assessed from the observed site conditions in accordance with the classification system formulated by the Australian Geomechanics Society Landslide Taskforce, "Practice Note Guidelines for Landslide Risk Management" and published in Australian Geomechanics, Volume 42, Number 1, March 2007 (refer to the attached appendices from this document, for an explanation of risk categories and the implications for development).

The report provides some geotechnical recommendations for the site development in light of the assessed constraints, the risk of slope instability, and the observed sub-surface profile.
The onus is on the owner, potential owner or interested party to take into account the possible economic consequences of the assessed risk and geotechnical constraints.

2.0 SCOPE OF WORK

The geotechnical assessment has involved the following activities:-

- A review of existing regional maps and reports held within our files
- Observations of surface features on the property and the surrounding area by an experienced Geotechnical Engineer
- Drilling of three 150mm diameter boreholes to refusal at a maximum depth of 1.5m using a 2 tonne rubber tracked mini-excavator supplied and operated by John Boers, to assess the nature and consistency of the soils and weathered rock
- Engineering assessment and reporting

3.0 SITE OBSERVATIONS

The following site observations, some of which are shown on Drawing No.201866 -2, were made during the site visit.

3.1 Surface Site Description

The site is located on the western side of Dido Street, in the general area circled on Drawing No.201866 – 1.
Topographically, the site is located on the south-eastern flanks of a broad crested spur feature, within the Primrose Hill region.
The north eastern portion of the lot is clear of vegetation, and the grassed ground surface slopes down towards the south-east at about 12 degrees. The area to the south is densely vegetated, and the ground surface in this area slopes down towards the south and south-west at a maximum grade of about 25 degrees to Spring Creek. The road excavation has been cut between the eastern boundary and the street, and has a grade of about 35 degrees. Vehicle access to the lot has been provided by an excavation at the northern end of the eastern boundary.

3.2 Subsurface Conditions

The regional geological map of Kiama, produced by the NSW Geological Survey, shows the site to be underlain by the Budgong Sandstone Formation, which is a member of the Shoalhaven Group of rocks, and which comprises litho- feldspathic, quartz-lithic, lithic and minor quartzose sandstone.
The map also shows that the area immediately upslope of the site is underlain by the Bumbo Latite Member of the Shoalhaven Group of rocks, which comprises mid-grey aphanitic and vesicular to porphyritic latite.

Recently deposited alluvium is shown to underlie the terrace along the creek and adjacent to Jamberoo Road.

The augered boreholes exposed the following subsurface profile:

BH1 & BH2	**Description**
0.0m - 0.2m	Topsoil, gravelly, dark grey brown, moist, stiff
0.2m – 1.5m	Extremely weathered latite, grey, moist, very stiff to hard
1.5m	Auger refusal on densely packed latite gravel and cobbles

BH3	**Description**
0.0m - 0.15m	Topsoil, dark grey brown, moist, friable
0.15m – 0.6m	Clay loam, dark brown, moist, friable
0.6m – 1.0m	Silty clay, medium plasticity, brown, moist, very stiff
1.0m – 1.3m	Extremely weathered sandstone, red grey brown, dry, hard
1.3m	Auger refusal on sandstone rock

Rock Exposure: Red grey brown sandstone is exposed within the road excavation along the eastern boundary of the lot

No groundwater was encountered in the boreholes, which were backfilled upon completion of logging.
Explanation sheets are attached which describe the terms used above, and the location of each borehole is sketched on the attached site plan.

3.3 Evidence of Slope Instability (at the time of visit)

Neville's 1977 Land Stability Assessment of the Kiama Area, shows the site to be within a zone described as "Potentially unstable Land".
There was no sign of recent slope instability observed on the ground surface around the site, or within the subsurface profile.

4.0 DISCUSSION & RECOMMENDATIONS

4.1 Risk of Slope Instability

The following assessment of the risk of slope instability at this site has been undertaken using the Australian Geomechanics Society Practice Note published in 2007 (ref (1)). The risk assessment has considered the risk of damage to houses or property, and also to life.

The assessment of the risk of slope instability for Lot 2, D.P1018217, Dido Street, has been based on the site observations recorded in Section 3. The principal features used in the assessment are:

- the surface contours and ground features in the area.
- the presence of residual clay soils overlying weathered rock
- the lack of surface signs of recent slope instability in the immediate vicinity of the site
- the topographic position of the site

The assessed potential slope failure types which may affect this site are:

1. slope instability on the slopes uphill of the site
2. slope instability within the proposed building area
3. slope instability downslope of the proposed building area

The potential hazards, the assessed likelihood, the expected consequences, and the assessed level of risk for the proposed development are shown in the table below. (refer to Appendix C attached, for explanation of terms)

Possible Hazard	Assessed Likelihood	Expected Consequences	Assessed Level of Risk
(1) Instability Upslope	Rare	Medium	Low
(2) Instability within the site	Rare	Medium	Low
(3) Instability below site	Possible	Insignificant	Very Low

On the basis of these scenarios, the site is assessed in accordance with the classification system described above, to have an overall **very low to low** risk of slope instability.

During the construction period, there will be a brief period when temporary excavations, removal of vegetation and the like, will result in a higher risk of localised slope instability, and the construction program should seek to minimise this period of higher exposure.

It would be normal practice in the Kiama area for residential development to proceed on a block with these risk level classifications. Development should be carried out in accordance with good hillside practice (as set out in Appendix G, attached) and the specific geotechnical recommendations described in Section 4.3.

The **risk to life** has been assessed considering the estimated frequency of instability, the spatial probability of the instability impacting on the residence, the probability of the residence being occupied, and the vulnerability of a person in a residence affected by instability.
The risk for the person most at risk (full time occupier) has been assessed as 1.2×10^{-6}, and the risk for the average person at risk has been assessed as 6.0×10^{-7}.
Both of these values are lower than those listed in the AGS Guidelines as tolerable risks for existing slopes, and also lower than the acceptable level of risk.

Management of the risk of slope instability in the slopes above the site is not able to be influenced by the owners of this site, and is dependent on the landowners and developers upslope following good hillside development and maintenance practices.

The risk of slope instability within and below the site may best be managed by the effective control of surface and subsurface water, and the engineered support of excavations and fill throughout the site.

4.2 Lot Classification to AS 2870

Given the slope on the ground surface in the proposed building area, and the need to carry out foundation design and development in accordance with the hillside guidelines, the site is assessed as a **Class P** site. Footing design should be carried out in accordance with engineering principles, having regard to the site constraints, and the recommendations in Section 4.3.

While the site has been classified as one for which the standard footing details and consequent level of performance are not covered by AS2870, specific engineering design and the continued maintenance of the site in accordance with the guidelines in the attached copy of CSIRO Builders Technology File 18, 2011- Foundation Maintenance and Footing Performance: A Homeowners Guide, should result in a level of performance similar to that expected for a "normal" site covered by the standard.

4.3 Assessed Geotechnical Constraints and Recommendations for Development

Site:	North-eastern portion of Lot 2, D.P.1018217, Dido Street, Kiama
Type of Structure:	No restriction for geotechnical reasons.
Area for Development:	Development recommended to be on the moderately sloping ground in the north-eastern portion of the lot.
Foundation Type:	Foundations should be designed in accordance with engineering principles, with reinforced footings or piers founded on rock. An allowable bearing pressure of 400kPa may be assumed for footings taken into extremely or less weathered rock.
Excavations:	Excavations over 0.6m deep should be supported by engineered retaining walls. Excavations less than 0.6m may be battered not steeper than 2.5H:1V, and vegetated or covered to limit erosion. Excavations in rock should be carried out using a process that involves saw cutting, due to the risk of damage to adjoining properties caused by large hydraulic hammer vibrations.

Filling:	No fill material apart from that necessary for driveway and slab construction should be imported onto the site. Any fill arising from excavations on site may be placed and compacted in 200mm maximum thickness layers on stripped and benched ground. Fills more than 0.6m deep should be supported by an engineered retaining wall. Fill less than 0.6m deep may be battered not steeper than 2.5H:1V, and vegetated or covered to limit erosion.
Retaining Walls:	Retaining walls greater than 0.6m high should be engineer designed, include subsoil drainage at the rear, and allow for the lateral loading arising from soil creep on sloping ground. An effective lateral load coefficient (K) of not less than 0.6 should be adopted for soil in retaining wall design. A nominal K of 0.15 should be adopted for weathered rock. Landscaping walls less than 0.6m high should be constructed in accordance with the supplier's recommendations
Drainage:	All roofwater not stored for reuse, and surface run-off should be piped to the creek. On-site disposal of stormwater by concentrated soakage is not recommended on the basis of the increased risk of slope instability and reactive clay movement. Subsoil drainage is recommended on the upslope side of slab on ground structures to limit the ingress of seepage beneath the slab.
Geotechnical Input:	No further geotechnical input should be required for a proposed development within the north-east portion of the lot.

5.0 SUMMARY

The site is assessed to have an overall **very low to low** risk of slope instability and residential development is considered to be appropriate, pending compliance with geotechnical recommendations.

The design of foundations should be carried out in accordance with engineering principles, having regard to the site constraints, and the recommendations in Section 4 above.

Yours faithfully,
Southern Geotechnics NSW Pty Ltd

Per: Nick Boers
MIEAust, CPEng, NER

Encl.: Landslide Risk Management 2007 – Appendices C & G
CSIRO Builders Technology File 18, 2011- Foundation Maintenance and Footing Performance: A Homeowners Guide
Explanation Sheets 1 & 2

Drawing No. 201866 -1 - Site Location Plan
Drawing No. 201866 -2 - Sketched Site Plan

References:

1. Practice Note Guidelines For Landslide Risk Management 2007, Australian Geomechanics, Vol. 42, No.1, 2007.

APPENDIX C: – QUALITATIVE TERMINOLOGY FOR USE IN ASSESSING RISK TO PROPERTY (CONTINUED)

QUALITATIVE RISK ANALYSIS MATRIX – LEVEL OF RISK TO PROPERTY

LIKELIHOOD		CONSEQUENCES TO PROPERTY (With Indicative Approximate Cost of Damage)				
	Indicative Value of Approximate Annual Probability	**1: CATASTROPHIC 200%**	**2: MAJOR 60%**	**3: MEDIUM 20%**	**4: MINOR 5%**	**5: INSIGNIFICANT 0.5%**
A – ALMOST CERTAIN	10^{-1}	VH	VH	VH	H	M or **L** (5)
B - LIKELY	10^{-2}	VH	VH	H	M	**L**
C - POSSIBLE	10^{-3}	VH	H	M	M	**VL**
D - UNLIKELY	10^{-4}	H	M	**L**	**L**	**VL**
E - RARE	10^{-5}	M	**L**	**L**	**VL**	**VL**
F - BARELY CREDIBLE	10^{-6}	**L**	**VL**	**VL**	**VL**	**VL**

Notes: (5) For Cell A5, may be subdivided such that a consequence of less than 0.1% is Low Risk.
(6) When considering a risk assessment it must be clearly stated whether it is for existing conditions or with risk control measures which may not be implemented at the current time.

RISK LEVEL IMPLICATIONS

Risk Level		**Example Implications** (7)
VH	VERY HIGH RISK	Unacceptable without treatment. Extensive detailed investigation and research, planning and implementation of treatment options essential to reduce risk to Low; may be too expensive and not practical. Work likely to cost more than value of the property.
H	HIGH RISK	Unacceptable without treatment. Detailed investigation, planning and implementation of treatment options required to reduce risk to Low. Work would cost a substantial sum in relation to the value of the property.
M	MODERATE RISK	May be tolerated in certain circumstances (subject to regulator's approval) but requires investigation, planning and implementation of treatment options to reduce the risk to Low. Treatment options to reduce to Low risk should be implemented as soon as practicable.
L	LOW RISK	Usually acceptable to regulators. Where treatment has been required to reduce the risk to this level, ongoing maintenance is required.
VL	VERY LOW RISK	Acceptable. Manage by normal slope maintenance procedures.

Note: (7) The implications for a particular situation are to be determined by all parties to the risk assessment and may depend on the nature of the property at risk; these are only given as a general guide.

PRACTICE NOTE GUIDELINES FOR LANDSLIDE RISK MANAGEMENT 2007

APPENDIX C: LANDSLIDE RISK ASSESSMENT

QUALITATIVE TERMINOLOGY FOR USE IN ASSESSING RISK TO PROPERTY

QUALITATIVE MEASURES OF LIKELIHOOD

Approximate Annual Probability		Implied Indicative Landslide Recurrence Interval		Description	Descriptor	Level
Indicative Value	Notional Boundary					
10^{-1}	$5x10^{-2}$	10 years	20 years	The event is expected to occur over the design life.	ALMOST CERTAIN	A
10^{-2}	$5x10^{-3}$	100 years	200 years	The event will probably occur under adverse conditions over the design life.	LIKELY	B
10^{-3}	$5x10^{-4}$	1000 years	2000 years	The event could occur under adverse conditions over the design life.	POSSIBLE	C
10^{-4}	$5x10^{-5}$	10,000 years	20,000 years	The event might occur under very adverse circumstances over the design life.	UNLIKELY	D
10^{-5}	$5x10^{-6}$	100,000 years	200,000 years	The event is conceivable but only under exceptional circumstances over the design life.	RARE	E
10^{-6}		1,000,000 years		The event is inconceivable or fanciful over the design life.	BARELY CREDIBLE	F

Note: (1) The table should be used from left to right; use Approximate Annual Probability or Description to assign Descriptor, not *vice versa*.

QUALITATIVE MEASURES OF CONSEQUENCES TO PROPERTY

Approximate Cost of Damage		Description	Descriptor	Level
Indicative Value	Notional Boundary			
200%	100%	Structure(s) completely destroyed and/or large scale damage requiring major engineering works for stabilisation. Could cause at least one adjacent property major consequence damage.	CATASTROPHIC	1
60%	40%	Extensive damage to most of structure, and/or extending beyond site boundaries requiring significant stabilisation works. Could cause at least one adjacent property medium consequence damage.	MAJOR	2
20%	10%	Moderate damage to some of structure, and/or significant part of site requiring large stabilisation works. Could cause at least one adjacent property minor consequence damage.	MEDIUM	3
5%	1%	Limited damage to part of structure, and/or part of site requiring some reinstatement stabilisation works.	MINOR	4
0.5%		Little damage. (Note for high probability event (Almost Certain), this category may be subdivided at a notional boundary of 0.1%. See Risk Matrix.)	INSIGNIFICANT	5

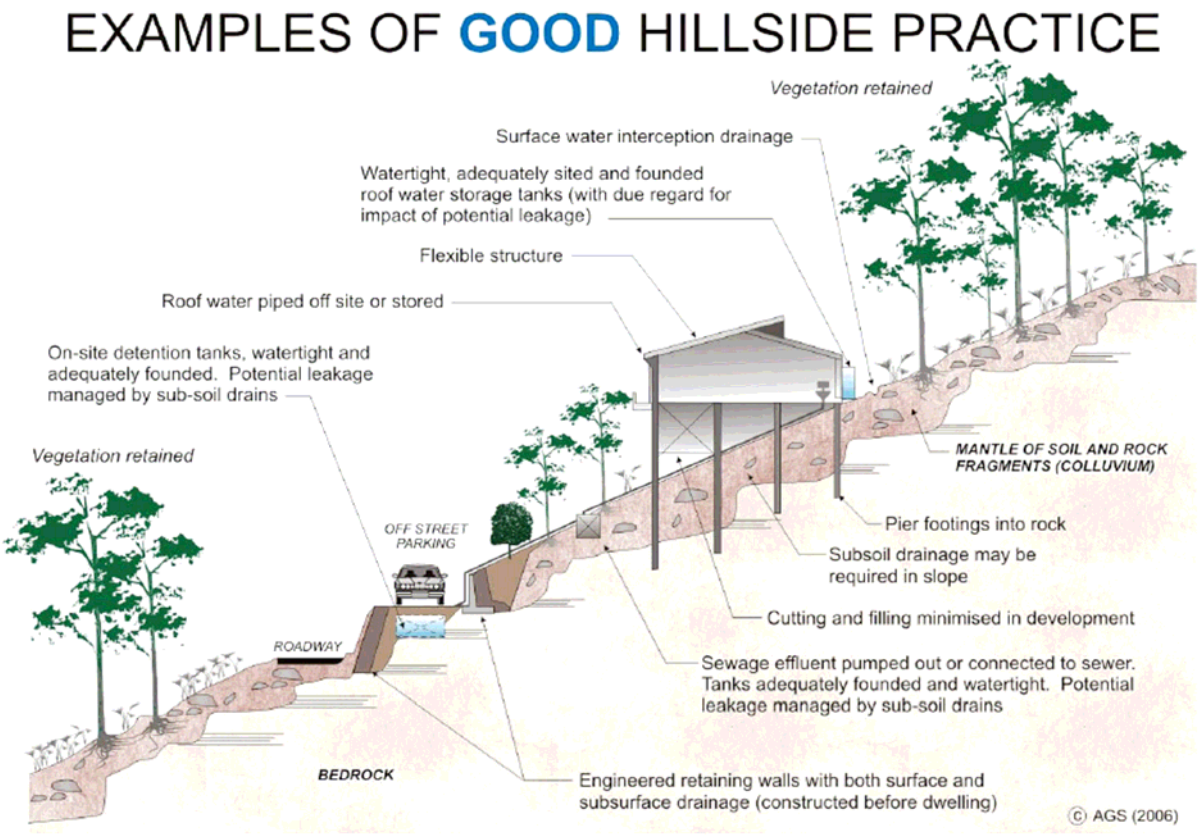
Notes: (2) The Approximate Cost of Damage is expressed as a percentage of market value, being the cost of the improved value of the unaffected property which includes the land plus the unaffected structures.

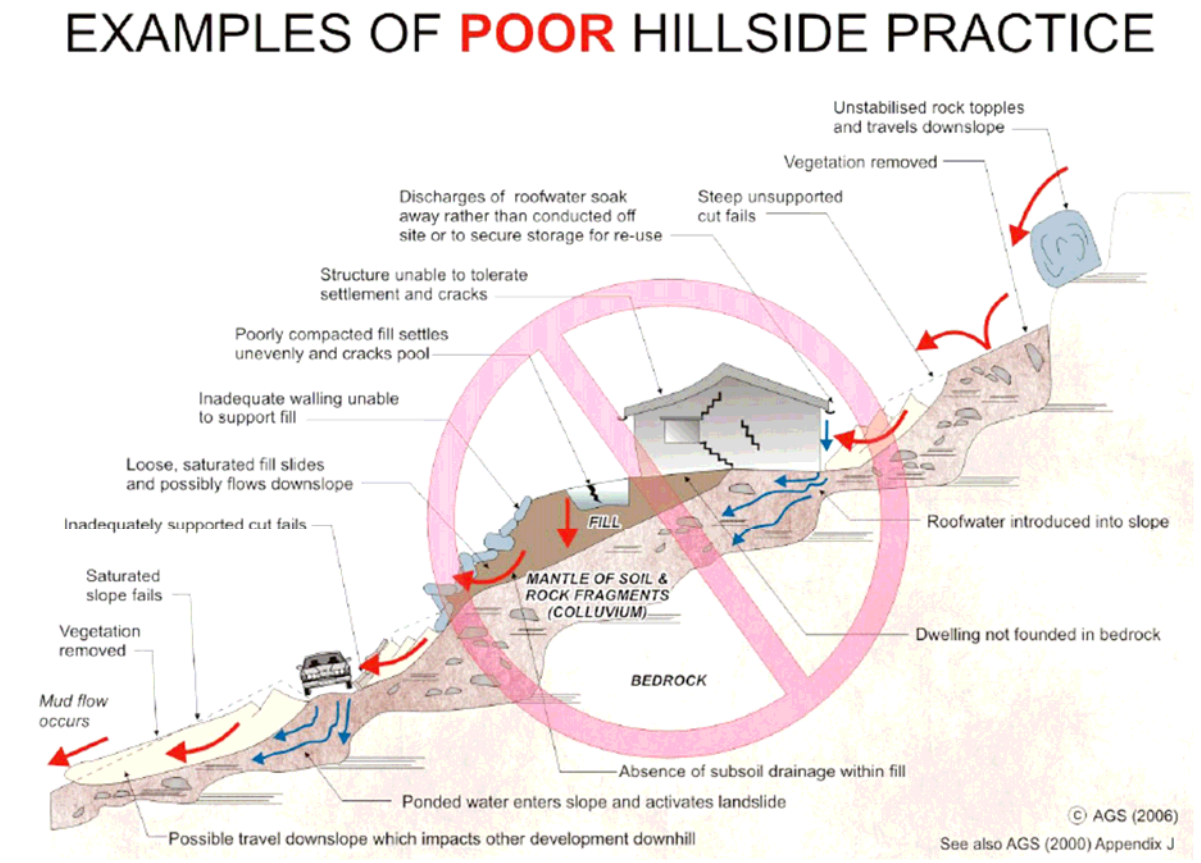
(3) The Approximate Cost is to be an estimate of the direct cost of the damage, such as the cost of reinstatement of the damaged portion of the property (land plus structures), stabilisation works required to render the site to tolerable risk level for the landslide which has occurred and professional design fees, and consequential costs such as legal fees, temporary accommodation. It does not include additional stabilisation works to address other landslides which may affect the property.

(4) The table should be used from left to right; use Approximate Cost of Damage or Description to assign Descriptor, not vice versa

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.
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.
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.	


EXAMPLES OF GOOD HILLSIDE PRACTICE
Vegetation retained
Surface water interception drainage
Watertight, adequately sited and founded roof water storage tanks (with due regard for impact of potential leakage)
Flexible structure
Roof water piped off site or stored
On-site detention tanks, watertight and adequately founded. Potential leakage managed by sub-soil drains
Vegetation retained
MANTLE OF SOIL AND ROCK FRAGMENTS (COLLUVIUM)
OFF STREET PARKING
Pier footings into rock
Subsoil drainage may be required in slope
Cutting and filling minimised in development
ROADWAY
Sewage effluent pumped out or connected to sewer. Tanks adequately founded and watertight. Potential leakage managed by sub-soil drains
BEDROCK
Engineered retaining walls with both surface and subsurface drainage (constructed before dwelling)
© AGS (2006)


EXAMPLES OF POOR HILLSIDE PRACTICE
Unstabilised rock topples and travels downslope
Vegetation removed
Discharges of roofwater soak away rather than conducted off site or to secure storage for re-use
Steep unsupported cut fails
Structure unable to tolerate settlement and cracks
Poorly compacted fill settles unevenly and cracks pool
Inadequate walling unable to support fill
Loose, saturated fill slides and possibly flows downslope
Inadequately supported cut fails
FILL
Roofwater introduced into slope
Saturated slope fails
MANTLE OF SOIL & ROCK FRAGMENTS (COLLUVIUM)
Vegetation removed
Dwelling not founded in bedrock
BEDROCK
Mud flow occurs
Absence of subsoil drainage within fill
Ponded water enters slope and activates landslide
Possible travel downslope which impacts other development downhill
© AGS (2006)
See also AGS (2000) Appendix J

Foundation Maintenance and Footing Performance: A Homeowner's Guide

CSIRO PUBLISHING

BTF 18-2011
replaces
Information
Sheet 10/91

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

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

Soil Types

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

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

Causes of Movement

Settlement due to construction

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

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

These problems are the province of the builder and should be taken into consideration as part of the preparation of the site for construction. Building Technology File 19 (BTF 19) deals with these problems.

Erosion

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

Saturation

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

Seasonal swelling and shrinkage of soil

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

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

Shear failure

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

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

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

GENERAL DEFINITIONS OF SITE CLASSES

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

Notes

1. Where controlled fill has been used, the site may be classified A to E according to the type of fill used.
2. Filled sites. Class P is used for sites which include soft fills, such as clay or silt or loose sands; landslip; mine subsidence; collapsing soils; soil subject to erosion; reactive sites subject to abnormal moisture conditions or sites which cannot be classified otherwise.
3. Where deep-seated moisture changes exist on sites at depths of 3 m or greater, further classification is needed for Classes M to E (M-D, H1-D, H2-D and E-D).

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

- Roots that grow under footings may increase in cross-sectional size, exerting upward pressure on footings.
- Roots in the vicinity of footings will absorb much of the moisture in the foundation soil, causing shrinkage or subsidence.

Unevenness of Movement

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

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

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

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

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

Effects of Uneven Soil Movement on Structures

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

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

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

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

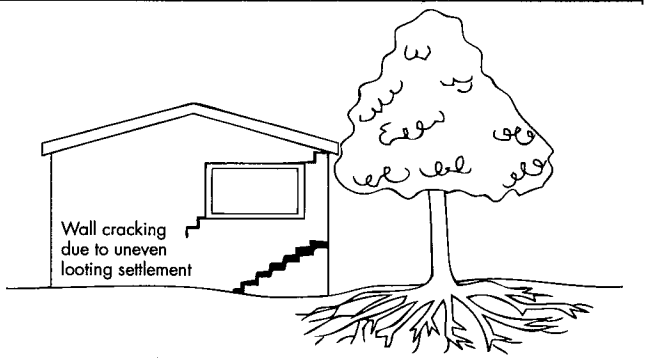
The first noticeable symptom may be that the floor appears slightly dished. This is often accompanied by some doors binding on the floor or the door head, together with some cracking of cornice mitres. In buildings with timber flooring supported by bearers and joists, the floor can be bouncy. Externally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

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

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

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

Trees can cause shrinkage and damage



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

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

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

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

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

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

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

Upheaval caused by growth of tree roots under footings is not a simple vertical shear stress. There is a tendency for the root to also exert lateral forces that attempt to separate sections of brickwork after initial cracking has occurred.

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

Effects on framed structures

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

Effects on brick veneer structures

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

Water Service and Drainage

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

Pipe leakage and trench water flows also encourage tree and shrub roots to the source of water, complicating and exacerbating the problem. Poor roof plumbing can result in large volumes of rainwater being concentrated in a small area of soil:

- Incorrect falls in roof guttering may result in overflows, as may gutters blocked with leaves etc.
- Corroded guttering or downpipes can spill water to ground.
- Downpipes not positively connected to a proper stormwater collection system will direct a concentration of water to soil that is directly adjacent to footings, sometimes causing large-scale problems such as erosion, saturation and migration of water under the building.

Seriousness of Cracking

In general, most cracking found in masonry walls is a cosmetic nuisance only and can be kept in repair or even ignored. The table below is a reproduction of Table C1 of AS 2870-2011.

AS 2870-2011 also publishes figures relating to cracking in concrete floors, however because wall cracking will usually reach the critical point significantly earlier than cracking in slabs, this table is not reproduced here.

Prevention/Cure

Plumbing

Where building movement is caused by water service, roof plumbing, sewer or stormwater failure, the remedy is to repair the problem. It is prudent, however, to consider also rerouting pipes away from the building where possible, and relocating taps to positions where any leakage will not direct water to the building vicinity. Even where gully traps are present, there is sometimes sufficient spill to create erosion or saturation, particularly in modern installations using smaller diameter PVC fixtures. Indeed, some gully traps are not situated directly under the taps that are installed to charge them, with the result that water from the tap may enter the backfilled trench that houses the sewer piping. If the trench has been poorly backfilled, the water will either pond or flow along the bottom of the trench. As these trenches usually run alongside the footings and can be at a similar depth, it is not hard to see how any water that is thus directed into a trench can easily affect the foundation's ability to support footings or even gain entry to the subfloor area.

Ground drainage

In all soils there is the capacity for water to travel on the surface and below it. Surface water flows can be established by inspection during and after heavy or prolonged rain. If necessary, a grated drain system connected to the stormwater collection system is usually an easy solution.

It is, however, sometimes necessary when attempting to prevent water migration that testing be carried out to establish watertable height and subsoil water flows. This subject is referred to in BTF 19 and may properly be regarded as an area for an expert consultant.

Protection of the building perimeter

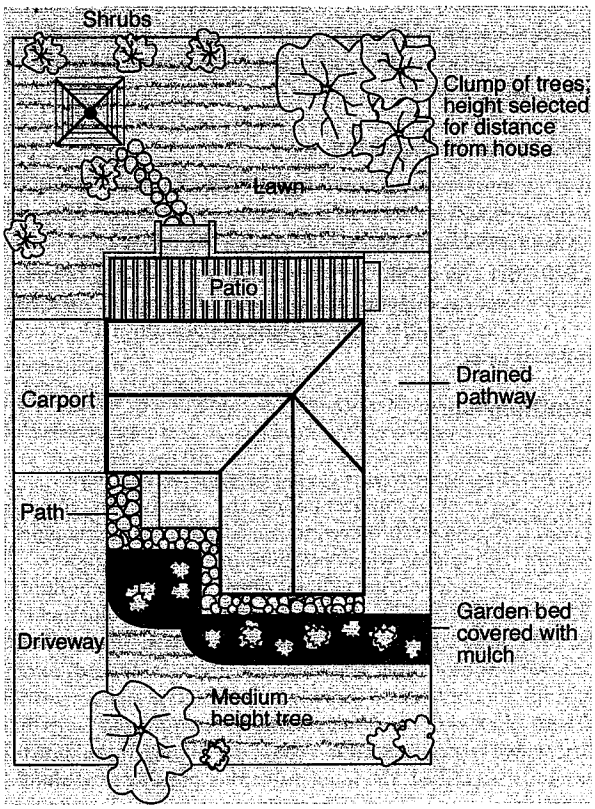
It is essential to remember that the soil that affects footings extends well beyond the actual building line. Watering of garden plants, shrubs and trees causes some of the most serious water problems.

For this reason, particularly where problems exist or are likely to occur, it is recommended that an apron of paving be installed around as much of the building perimeter as necessary. This paving should

CLASSIFICATION OF DAMAGE WITH REFERENCE TO WALLS

Description of typical damage and required repair	Approximate crack width limit (see Note 3)	Damage category
Hairline cracks	<0.1 mm	0
Fine cracks which do not need repair	<1 mm	1
Cracks noticeable but easily filled. Doors and windows stick slightly.	<5 mm	2
Cracks can be repaired and possibly a small amount of wall will need to be replaced. Doors and windows stick. Service pipes can fracture. Weathertightness often impaired.	5–15 mm (or a number of cracks 3 mm or more in one group)	3
Extensive repair work involving breaking-out and replacing sections of walls, especially over doors and windows. Window and door frames distort. Walls lean or bulge noticeably, some loss of bearing in beams. Service pipes disrupted.	15–25 mm but also depends on number of cracks	4

Gardens for a reactive site



extend outwards a minimum of 900 mm (more in highly reactive soil) and should have a minimum fall away from the building of 1:60. The finished paving should be no less than 100 mm below brick vent bases.

It is prudent to relocate drainage pipes away from this paving, if possible, to avoid complications from future leakage. If this is not practical, earthenware pipes should be replaced by PVC and backfilling should be of the same soil type as the surrounding soil and compacted to the same density.

Except in areas where freezing of water is an issue, it is wise to remove taps in the building area and relocate them well away from the building – preferably not uphill from it (see BTF 19).

It may be desirable to install a grated drain at the outside edge of the paving on the uphill side of the building. If subsoil drainage is needed this can be installed under the surface drain.

Condensation

In buildings with a subfloor void such as where bearers and joists support flooring, insufficient ventilation creates ideal conditions for condensation, particularly where there is little clearance between the floor and the ground. Condensation adds to the moisture already present in the subfloor and significantly slows the process of drying out. Installation of an adequate subfloor ventilation system, either natural or mechanical, is desirable.

Warning: Although this Building Technology File deals with cracking in buildings, it should be said that subfloor moisture can result in the development of other problems, notably:

- Water that is transmitted into masonry, metal or timber building elements causes damage and/or decay to those elements.
- High subfloor humidity and moisture content create an ideal environment for various pests, including termites and spiders.
- Where high moisture levels are transmitted to the flooring and walls, an increase in the dust mite count can ensue within the living areas. Dust mites, as well as dampness in general, can be a health hazard to inhabitants, particularly those who are abnormally susceptible to respiratory ailments.

The garden

The ideal vegetation layout is to have lawn or plants that require only light watering immediately adjacent to the drainage or paving edge, then more demanding plants, shrubs and trees spread out in that order.

Overwatering due to misuse of automatic watering systems is a common cause of saturation and water migration under footings. If it is necessary to use these systems, it is important to remove garden beds to a completely safe distance from buildings.

Existing trees

Where a tree is causing a problem of soil drying or there is the existence or threat of upheaval of footings, if the offending roots are subsidiary and their removal will not significantly damage the tree, they should be severed and a concrete or metal barrier placed vertically in the soil to prevent future root growth in the direction of the building. If it is not possible to remove the relevant roots without damage to the tree, an application to remove the tree should be made to the local authority. A prudent plan is to transplant likely offenders before they become a problem.

Information on trees, plants and shrubs

State departments overseeing agriculture can give information regarding root patterns, volume of water needed and safe distance from buildings of most species. Botanic gardens are also sources of information. For information on plant roots and drains, see Building Technology File 17.

Excavation

Excavation around footings must be properly engineered. Soil supporting footings can only be safely excavated at an angle that allows the soil under the footing to remain stable. This angle is called the angle of repose (or friction) and varies significantly between soil types and conditions. Removal of soil within the angle of repose will cause subsidence.

Remediation

Where erosion has occurred that has washed away soil adjacent to footings, soil of the same classification should be introduced and compacted to the same density. Where footings have been undermined, augmentation or other specialist work may be required. Remediation of footings and foundations is generally the realm of a specialist consultant.

Where isolated footings rise and fall because of swell/shrink effect, the homeowner may be tempted to alleviate floor bounce by filling the gap that has appeared between the bearer and the pier with blocking. The danger here is that when the next swell segment of the cycle occurs, the extra blocking will push the floor up into an accentuated dome and may also cause local shear failure in the soil. If it is necessary to use blocking, it should be by a pair of fine wedges and monitoring should be carried out fortnightly.

This BTF was prepared by John Lewer FAIB, MIAMA, Partner, Construction Diagnosis.

The information in this and other issues in the series was derived from various sources and was believed to be correct when published.

The information is advisory. It is provided in good faith and not claimed to be an exhaustive treatment of the relevant subject.

Further professional advice needs to be obtained before taking any action based on the information provided.

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DESCRIPTION AND CLASSIFICATION METHODS

Soil and rock descriptions are generally in accordance with the recommendations of Australian Standard AS 1726-1993, and cover the following properties:

SOIL	Colour	ROCK	Colour
	Plasticity		Grain Size
	Grain Size		Structure
	Minor Components		Minor Components
	Moisture		Weathering
	Consistency		Strength
	Origin and Structure		Discontinuities
	Other Relevant Information		

Field tests have been used extensively to assess soil consistency, rock strength, and grain size. Unless specifically stated otherwise, these assessments have been transferred directly to the record sheets and not modified to coincide with laboratory test results. Field descriptions may therefore be used as an independent estimate of material properties which can be correlated with other data.

Individual assessment of colour has been made at field moisture condition, or as received. No reference has been made to standard colour charts, unless specifically stated.

SOIL CLASSIFICATION SYMBOLS

The appropriate group symbol may be given as shown on Sheet 2. This is based on the Unified Soil Classification procedure. (refer to AS1726-1993)

COMPOSITE SOIL TYPE

As most natural soils are a mixture of basic soil types, the primary soil is described and modified by secondary constituents as follows:

- components are approximately equal in proportions - by dual classification eg. CLAY - SAND
- secondary component(s) greater than about 12% - by an adjective eg. clayey SAND
- secondary components between about 5 to 12% - the term "with some" is used. The presence of the secondary component is easily detected by feel or eye, but soil properties would be little different to the general properties of the primary component.
- secondary component just detectable - the term "trace" is used. Soil properties little or no different to the general properties of the primary component.

SOIL MOISTURE CONDITION

DRY (D)	Looks and feels dry, absence of moisture, dusty
MOIST(M)	No free water collects on hands when remoulding
WET (W)	Free water collects on hands when remoulding

Moisture content (w) may be compared to the Plastic Limit (Wp), or Liquid Limit (Wl); eg $w > Wp$ means moisture content has been assessed as being greater than the plastic limit. The presence of any free water is noted on the engineering logs.

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GRAPHIC SYMBOLS FOR SOILS

EXPLANATION SHEET 2
Rev1-03/03

	Asphaltic Concrete or Hotmix		Gravelly Clay (CL, CI, CH)
	Concrete		Sandy Silt (ML)
	Topsoil		Clayey Sand (SC)
	Fill		Silty Sand (SM)
	Peat, Organic Clays and Silts (Pt, OL,OH)		Sand (SP, SW)
	Clay (CL, CI, CH)		Clayey Gravel (GC)
	Silt (ML, MH)		Silty Gravel (GM)
	Sandy Clay (CL, CI, CH)		Gravel (GP, GW)
	Silty Clay (CL, CI, CH)		Talus

CONSISTENCY, NON-COHESIVE SOILS

FIELD TEST	Easily excavated with a spade	Some resistance to a spade or penetration with a hand bar	Considerable resistance to spade or penetration with a hand bar	No penetration with a hand bar; requires pick for excavation	High resistance to a pick

SPT "N" VALUE * (blows/300mm)	* N corrected for overburden pressure 0	4	10	30	50
DESIGNATION	Very Loose (VL)	Loose (L)	Medium Dense (MD)	Dense (D)	Very Dense (VD)
DENSITY INDEX	0	15	35	65	85 100

CONSISTENCY, COHESIVE SOILS - based on unconfined compressive strength (Qu), estimated or measured by hand penetrometer. If a soil crumbles on testing, it is described as friable

FIELD TEST	Penetrated by, or exudes between fingers when squeezed	Easily penetrated by thumb or moulded with fingers	Penetrated by thumb without effort, moulded by strong pressure of fingers	Indented by thumb cannot be moulded by fingers	Penetrated by thumb nail and to about 15mm with knife

DESIGNATION	Very Soft (VS)	Soft (S)	Firm (F)	Stiff (St)	Very Stiff (VSt)	Hard (H)
Qu (kPa)	25	50	100	200	400	

GRAIN SIZE

DESIGNATION	CLAY	SILT	SAND			GRAVEL			COBBLES	BOULDERS
			Fine (f)	Medium (m)	Coarse (c)	Fine (f)	Medium (m)	Coarse (c)		

GRAIN SIZE	2	60	200	600	2	6	20	60	200
	Microns				Millimetres				

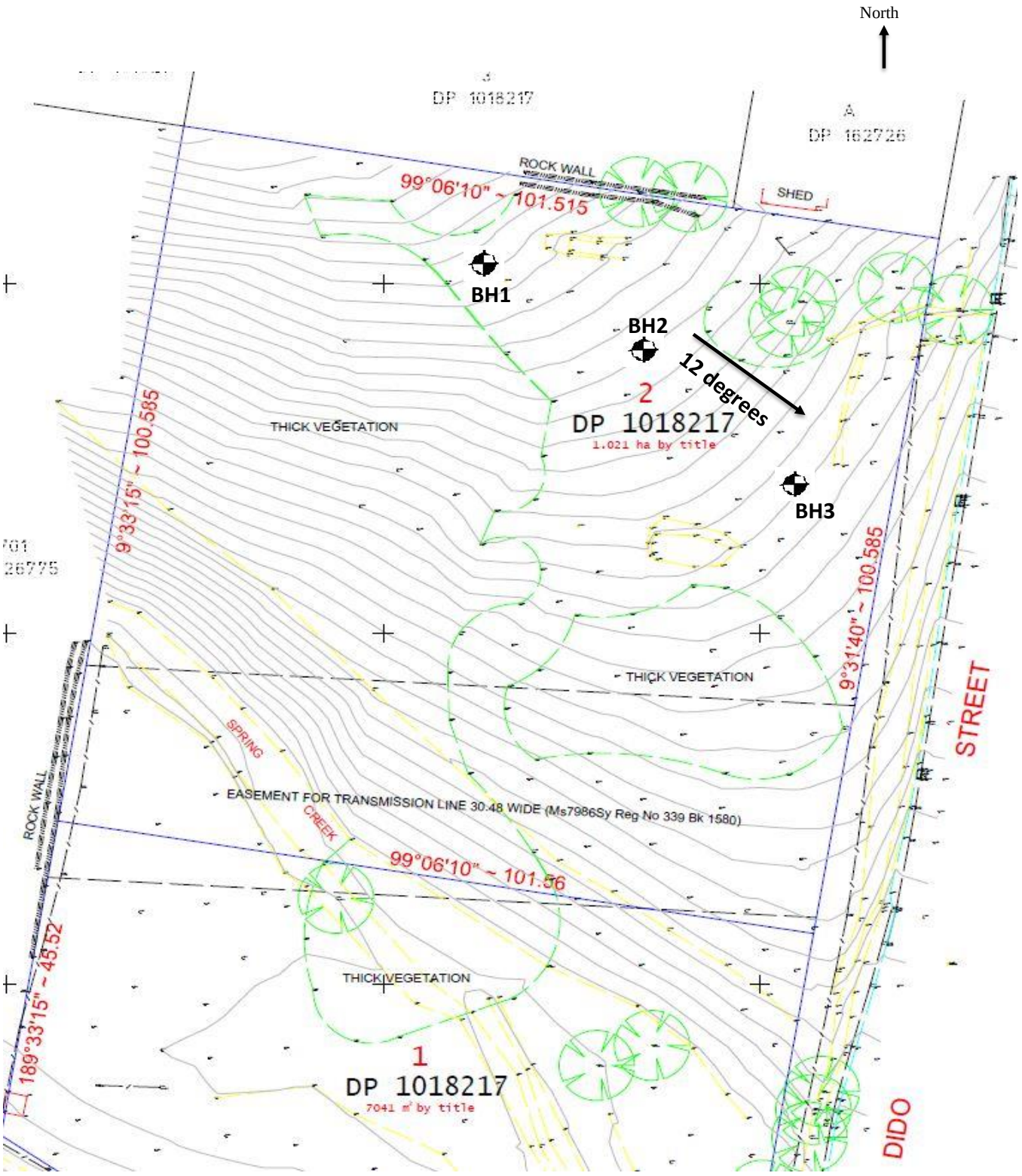
Water Level	Water Inflow	Water Outflow

SURFACES ——— Known Boundary	----- Probable Boundary	— ? — ? — Possible Boundary

The Site

North

drawn	NJB	MR TONY SCOPELLITI	Southern Geotechnics NSW	drawing no:
approved	NJB	LOT 2, D.P.1018217, DIDO STREET, KIAMA		201866 - 1
date	15/08/18	GEOTECHNICAL ASSESSMENT		
scale	NTS	SITE LOCALITY PLAN	Consulting Geotechnical Engineers	job no: 201866

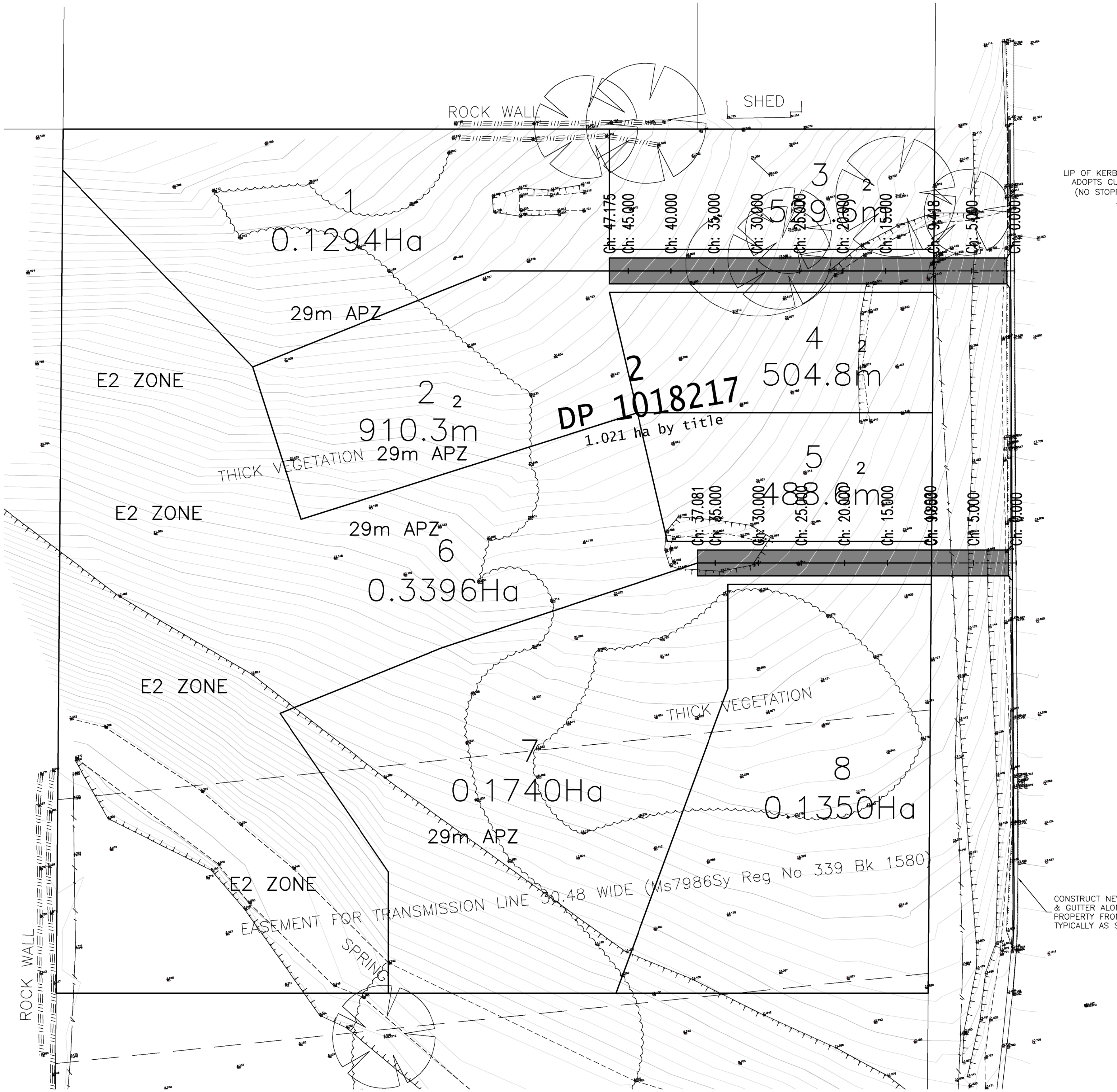


drawn	NJB	MR TONY SCOPELLITI	Southern Geotechnics NSW	drawing no:
approved	NJB	LOT 2, D.P.1018217, DIDO STREET, KIAMA		201866 - 2
date	15/08/18	GEOTECHNICAL ASSESSMENT		
scale	NTS	SKETCHED SITE PLAN	Consulting Geotechnical Engineers	job no: 201866

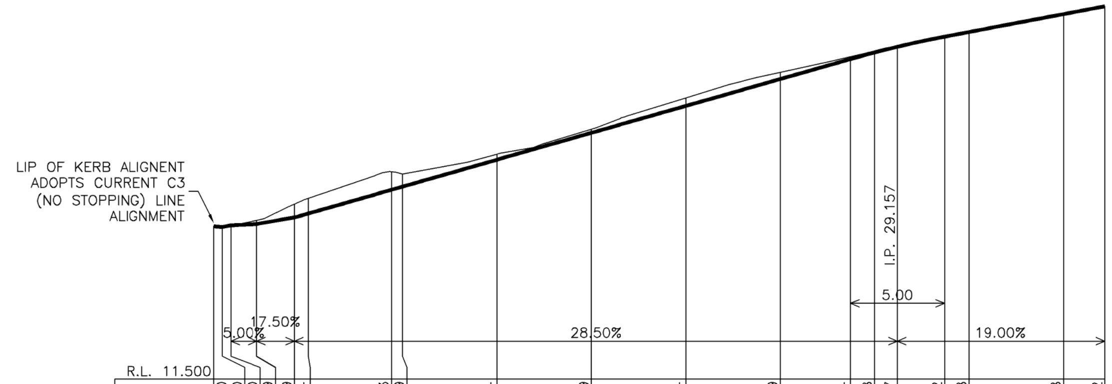
APPENDIX M

Preliminary Access Design

NOTE:
LOTS 3, 4 5 AND 8 ARE ALL TO GAIN ACCESS FROM THE PROPOSED ACCESS DRIVEWAYS. NO DIRECT ACCESS TO DIDO STREET WILL BE PERMITTED.



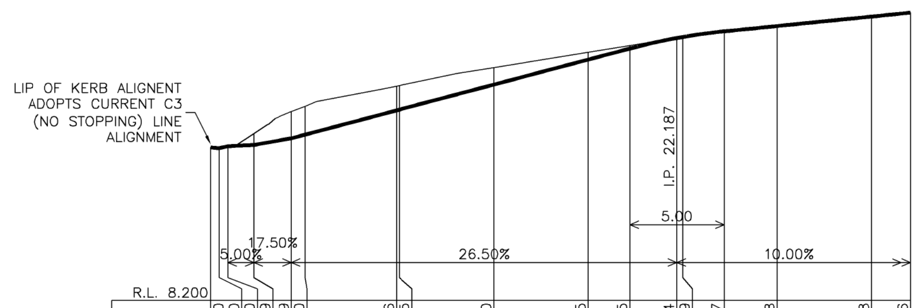
CONSTRUCT NEW KERB & GUTTER ALONG PROPERTY FRONTAGE TYPICALLY AS SHOWN



Design Levels	19.590	19.550	19.640	19.709	20.059	20.264	21.523	21.689	23.114	24.539	25.964	27.389	28.444	28.798	29.097	29.632	29.878	30.828	31.242
Existing Levels	19.590	19.569	19.570	19.893	20.762	21.058	22.472	22.357	23.403	24.726	26.382	27.742	28.566	28.869	29.148	29.694	29.931	30.844	31.242
Chainage	0.000	0.450	0.900	2.280	4.280	5.000	9.418	10.000	15.000	20.000	25.000	30.000	33.702	35.000	36.202	38.702	40.000	45.000	47.175

ACCESS DRIVEWAY LONGITUDINAL SECTION (LOTS 1–4)

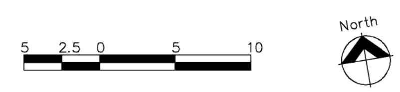
SCALES H 1:400
V 1:400



Design Levels	16.300	16.260	16.360	16.429	16.779	16.970	18.256	18.295	19.620	20.945	21.525	22.084	22.139	22.437	22.718	23.218	23.426
Existing Levels	16.300	16.287	16.286	17.018	18.182	18.468	19.528	19.559	20.513	21.328	21.684	22.091	22.142	22.435	22.778	23.257	23.426
Chainage	0.000	0.450	0.900	2.280	4.280	5.000	9.853	10.000	15.000	20.000	22.188	24.688	25.000	27.188	30.000	35.000	37.081

ACCESS DRIVEWAY LONGITUDINAL SECTION (LOTS 6–8)

SCALES H 1:400
V 1:400



ISSUE	DESCRIPTION	DATE
1	FOR PLANNING PROPOSAL	20/02/19

FOR PLANNING PROPOSAL
NOT FOR CONSTRUCTION

FOOTPRINT (NSW) PTY. LTD. AUTHORISE THE USE OF THIS DRAWING ONLY FOR THE PURPOSE DEMONSTRATED BY THE STATUS STAMP SHOWN ABOVE.

SCALES	ORIGINAL
1:500 UNO	A3

CLIENT: TONY SCOPELLITI

SURVEYOR:	KEATLEY
DATUM:	AHD
AZIMUTH:	MGA
DRAWN:	AB
DESIGNED:	AB
DESIGNED DATE:	AUG '18
CHECKED:	AB

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PLANNING PROPOSAL FOR SUBDIVISION

LOTS 1 & 2, DP1018217
DIDO STREET, KIAMA
PRELIMINARY DRIVEWAY LONGITUDINAL SECTIONS

DRAWING NO. 1783-SK03
ISSUE. 1
SHEET 3 OF 3